

# Operation & Maintenance Manual

YEAM200201

## **GALEO**

PC200, 200LC-7,  
PC210, 210LC-7,  
PC220, 220LC-7  
**HYDRAULIC EXCAVATOR**

SERIAL NUMBERS PC200-7, DBB0001  
PC200LC-7, DBE0001  
PC210-7, DBF0001 and up  
PC210LC-7, DBG0001  
PC220-7, DBH0001  
PC220LC-7, DBJ0001

### **WARNING**

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

### **NOTICE**

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

# **KOMATSU**

# FOREWORD

## **CALIFORNIA**

### **Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

## **CALIFORNIA**

### **Proposition 65 Warning**

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

**Wash hands after handling.**

# FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. The precautions in this manual must be followed at all times when performing operation and maintenance. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. Accidents can be prevented by knowing beforehand conditions that may cause hazard when performing operation and maintenance.

## WARNING

**Operators and maintenance personnel must always do as follows before beginning operation or maintenance.**

- **Always be sure to read and understand this manual thoroughly before performing operation and maintenance.**
- **Read the safety messages given in this manual and the safety labels affixed to the machine thoroughly and be sure that you understand them fully.**

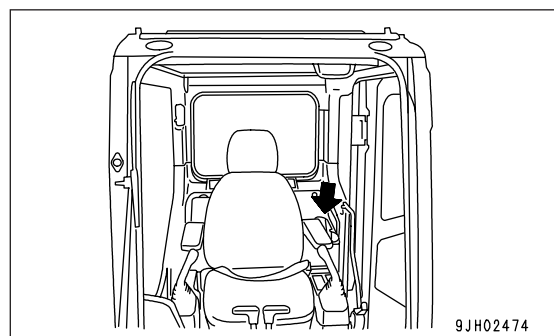
**Keep this manual at the storage location for the Operation and Maintenance Manual given below, and have all personnel read it periodically.**

**If this manual has been lost or has become dirty and cannot be read, request a replacement manual immediately from Komatsu or your Komatsu distributor.**

**If you sell the machine, be sure to give this manual to the new owners together with the machine.**

**Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.**

Storage location for the Operation and Maintenance Manual:  
magazine box on the left side of the operator's seat.



9JH02474

# SAFETY INFORMATION

To enable you to use this machine safely, safety precautions and labels are given in this manual and affixed to the machine to give explanations of situations involving potential hazards and of the methods of avoiding such situations.

## Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.

In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

**⚠ DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to most extreme situations.

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

**⚠ CAUTION** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

## Example of safety message using signal word

**⚠ WARNING**  
To avoid hitting unlocked operation levers, lower equipment to ground and move SAFETY LOCK LEVER (located near seat) to LOCK position before starting up from operator's seat.  
Sudden and unwanted machine movement can cause serious injury or death.

## Other signal words

In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

**NOTICE** This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.

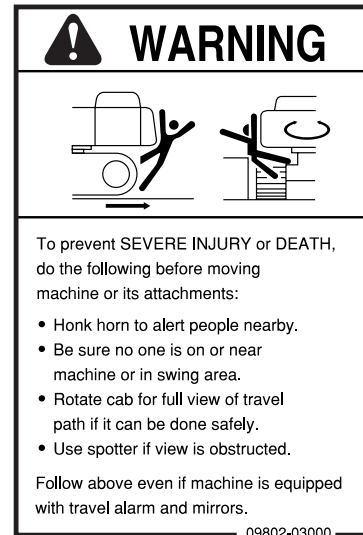
**REMARK** This gives information that is useful to know.

**Safety labels**

Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.

This machine uses "Safety labels using words" and "Safety labels using pictograms" to indicate safety procedures.

**Example of safety label using words**



Part No.

**Safety labels using pictogram**

Safety pictograms use a picture to express a level of hazardous condition equivalent to the signal word. These safety pictograms use pictures in order to let the operator or maintenance worker understand the level and type of hazardous condition at all times. Safety pictograms show the type of hazardous condition at the top or left side, and the method of avoiding the hazardous condition at the bottom or right side. In addition, the type of hazardous condition is displayed inside a triangle and the method of avoiding the hazardous condition is shown inside a circle.



Part No.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to take the necessary steps to ensure safety.

In no event should you engage in prohibited uses or actions described in this manual.

The explanations, values, and illustrations in this manual were prepared based on the latest information available at that time. Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

The numbers in circles in the illustrations correspond to the numbers in ( ) in the text. (For example: ① → (1))

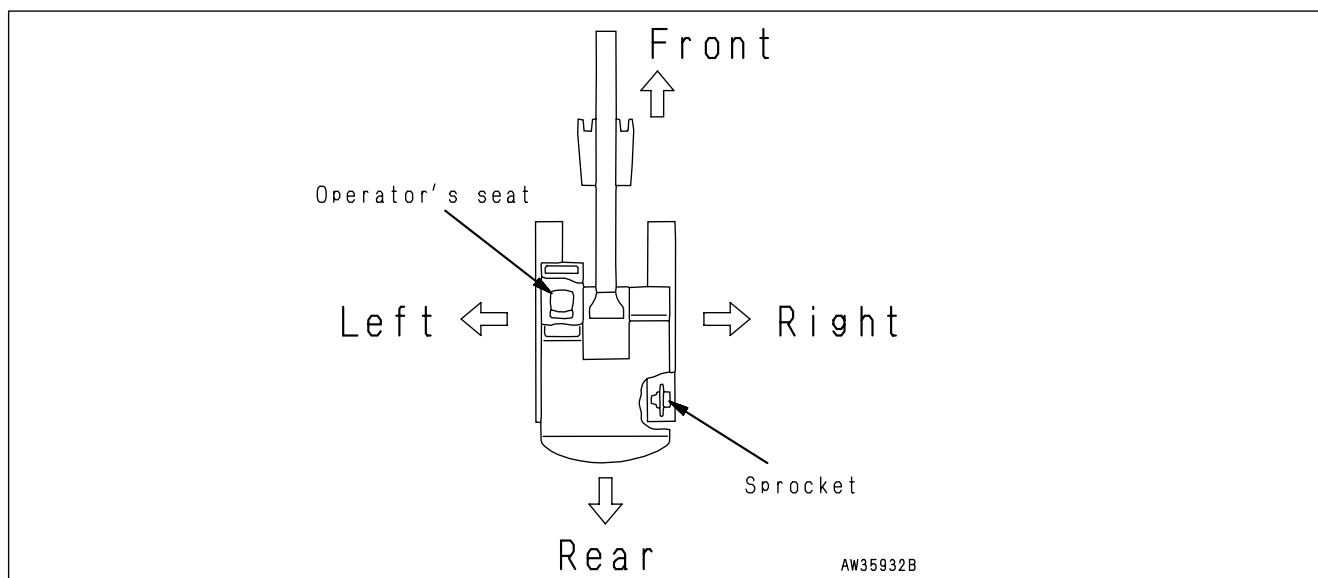
# INTRODUCTION

This Komatsu HYDRAULIC EXCAVATOR is designed to be used mainly for the following works:

- Digging work
- Leveling work
- Ditching work
- Loading work
- Demolition work

See the section "RECOMMENDED APPLICATIONS (PAGE 3-97)" for further details.

## DIRECTIONS OF MACHINE



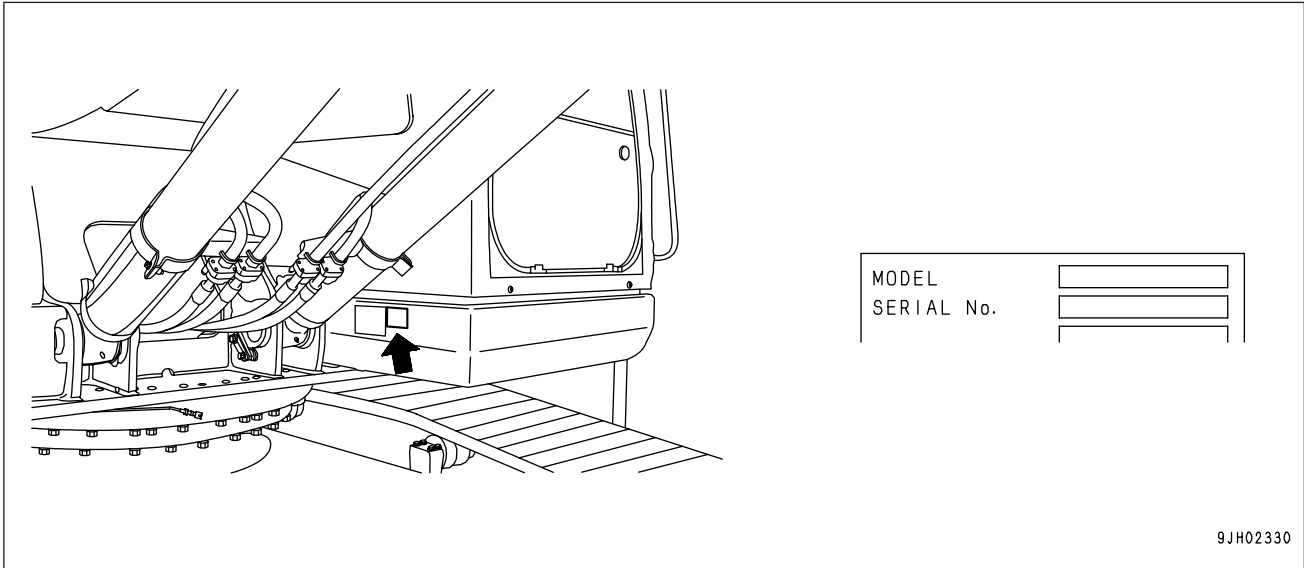
In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's cab when the operator's cab is facing the front and the sprocket is at the rear of the machine.

# PRODUCT INFORMATION

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items.

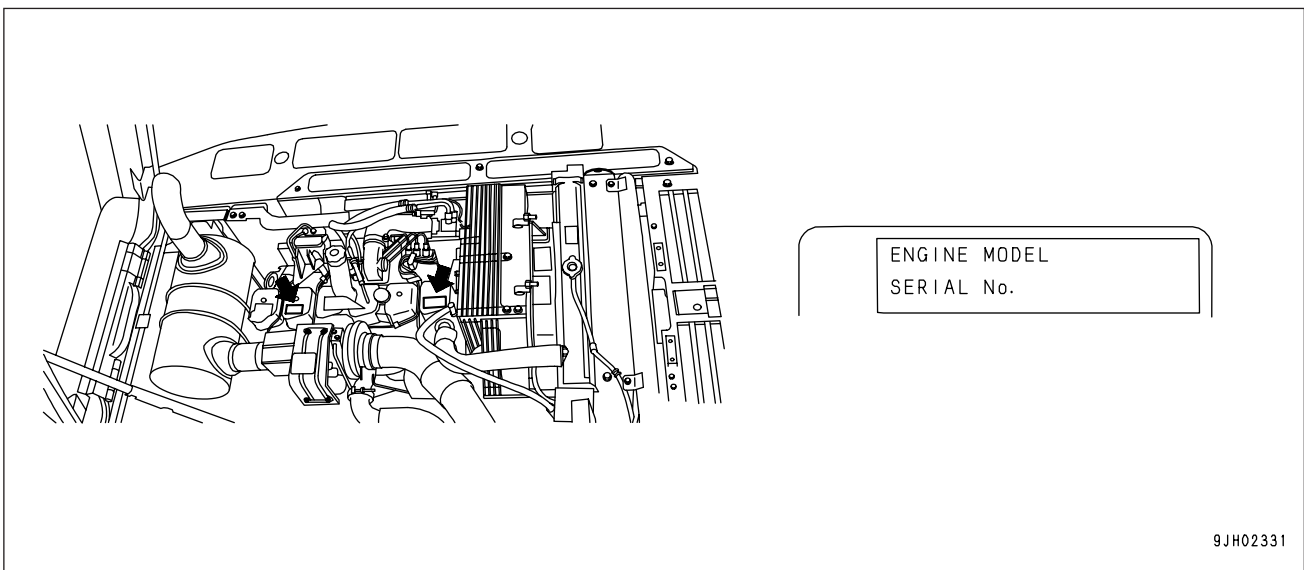
## MACHINE SERIAL NUMBER PLATE AND ITS LOCATION

On the bottom right of the operator's cab



## ENGINE SERIAL NUMBER PLATE AND ITS LOCATION

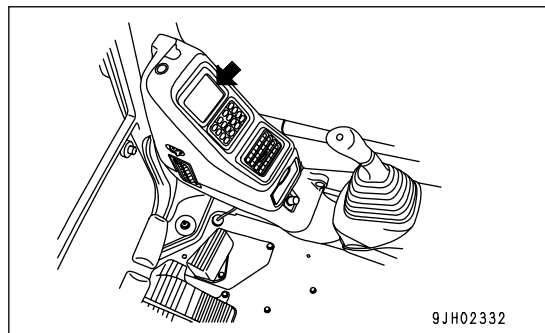
On the top of the No.1 cylinder head cover (The EPA auxiliary nameplate is on the top of the No. 5 cylinder head cover.)



EPA: Environmental Protection Agency, U.S.A.

## SERVICE METER LOCATION

On top of the machine monitor



## YOUR MACHINE SERIAL NUMBERS AND DISTRIBUTOR

Machine serial No.	
Engine serial No.	
Distributor name	
Address	-----
	-----
	-----
Service Personal	-----
Phone/Fax	-----



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# SAFETY

## WARNING

Please read and make sure that you fully understand precautions described in this manual and the safety labels on the machine. When operating or servicing the machine, always follow these precautions strictly.

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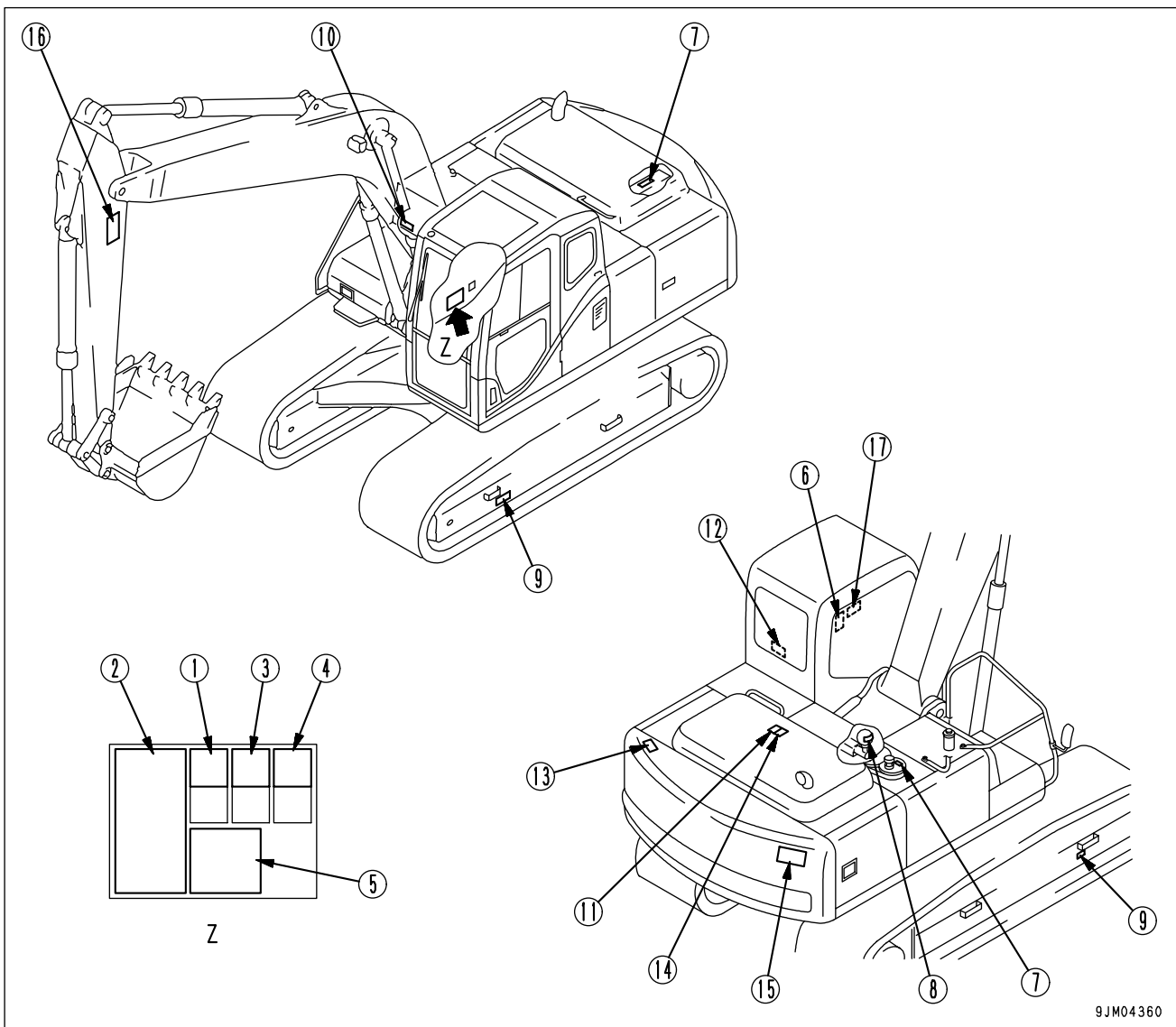
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# POSITION FOR ATTACHING SAFETY LABELS

The following warning signs and safety labels are used on this machine.

- Be sure that you fully understand the correct position and content of labels.
- To ensure that the content of labels can be read properly. Be sure that they are in the correct place and always keep them clean. When cleaning them, do not use organic solvents or gasoline, there may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

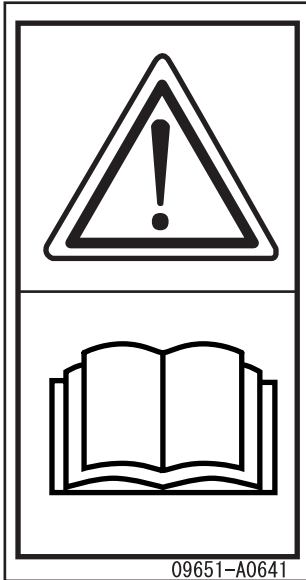
## POSITION FOR ATTACHING SAFETY LABELS





**SAFETY LABELS**

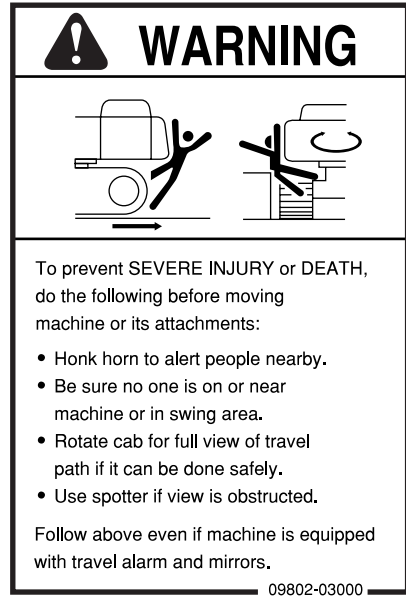
- (1) Precautions for operation, inspection and maintenance (09651-A0641)



Warning !

Read manual before operation, maintenance, disassembly, assembly and transportation.

- (2) Precautions for before operation (09802-03000)



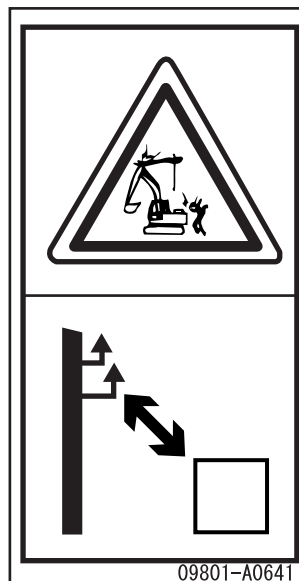
- (3) Warning for leaving operator's seat (09654-A0641)



Sign indicates a hazard of being caused or run over by unexpected moving of stopped machine.

Lower working device to ground, move safety lever to lock position and take engine key with you before leaving machine.

- (4) Warnings for high voltage (09801-A0641)



Sign indicates an electrocution hazard if machine is brought too near electric power lines.

Keep a safe distance from electric power lines.

- (5) Warnings when opening front window (09839-03000)



- (6) Warnings when stowing front window (09308-A0481)



Sign indicates a hazard from falling window.

After raising window, be sure to lock it in place with lock pins.

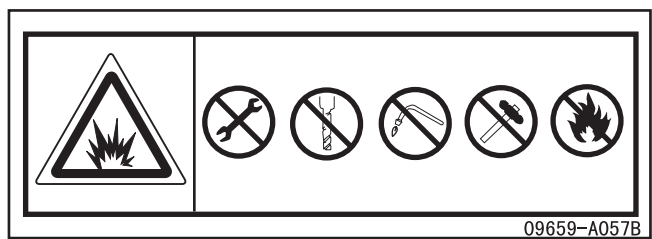
- 7) Precautions for high-temperature cooling water and hydraulic oil (09653-A0481)



Sign indicates a burn hazard from spurting hot water or oil if radiator or hydraulic tank is uncapped while hot.

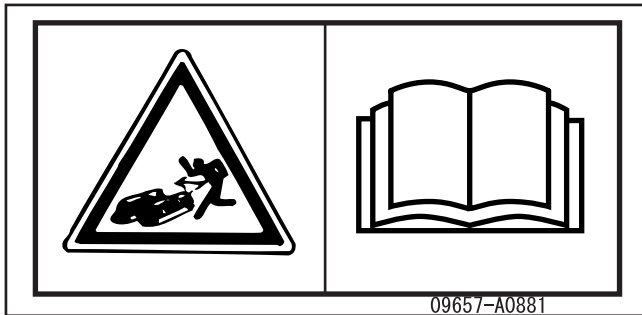
Allow radiator or hydraulic tank to cool before removing cap.

- (8) Precautions when handling accumulator (09659-A057B)



Sign indicates Never drill, cut with gas, hit or disassemble. Also keep open flame away. hazard.

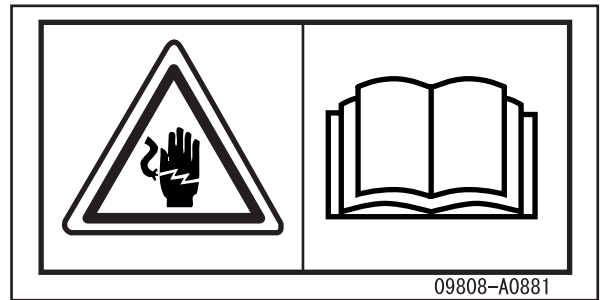
(9) Precautions when adjusting track tension (09657-A0881)



Sign indicates a hazard of flying plug from track adjuster that could cause injury.

Read manual and adjust track for safe and proper handling.

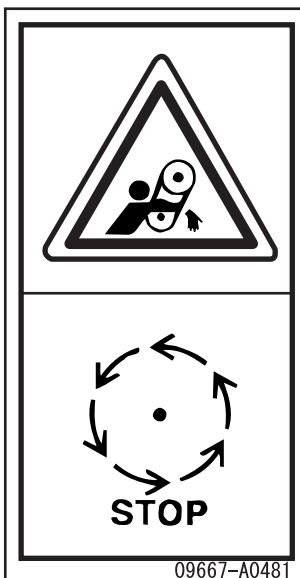
(10) Precautions when handling cable (09808-A0881)



Sign indicates an electric hazard from handling the cable.

Read manual for safe and proper handling.

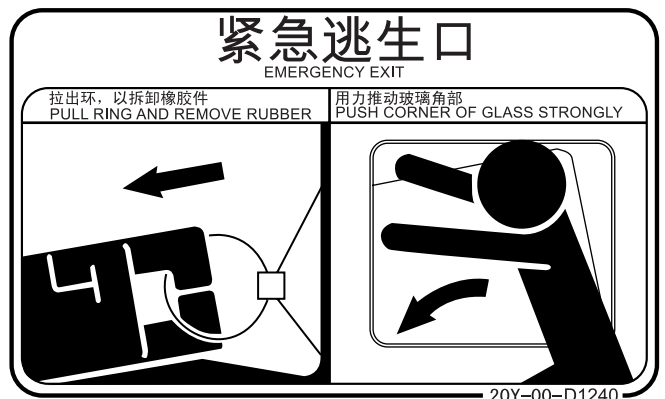
(11) Stop rotation when performing testing and adjusting (09667-A0481)



Sign indicates a hazard of rotating parts, such as belt.

Turn off before inspection and maintenance.

(12) Explanation of methods for emergency escape (20Y-00-D1240)



(13) Roll-over precautions (09805-A0881)



Sign indicates a hazard of falling off the fender or hood.

Never stand close to the edge.

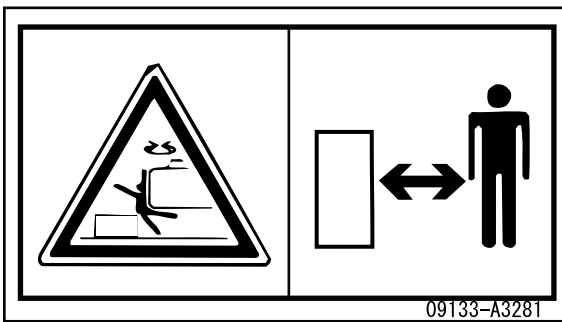
(14) Roll-over precautions (09805-C0881)



Sign indicates a hazard of falling.

Do not stand on this place here.

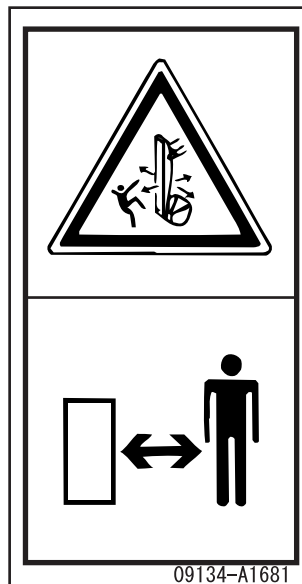
(15) Prohibited to enter within swing range (09133-A3281)



Sign indicates a crush hazard by rotation of upper structure of the machine.

Keep away from swinging area of the machine.

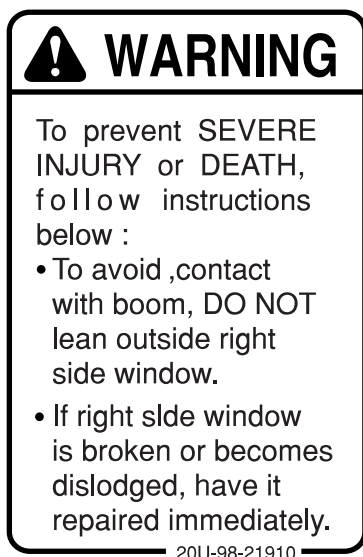
(16) Beware of equipment (09134-A1681)



Sign indicates a hazard of being hit by the working device of the machine.

Keep away from machine during operation.

- (17) Precautions for broken or becomes dislodged to the window (20U-98-21910)



# SAFETY INFORMATION

## SAFETY RULES

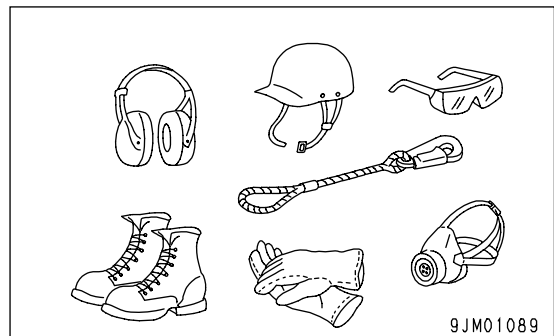
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired putting yourself and everyone else on your jobsite in danger.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.

## IF ABNORMALITIES ARE FOUND

If you find any abnormality in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the machine until the abnormality has been corrected.

## WORKING WEAR AND PERSONAL PROTECTIVE ITEMS

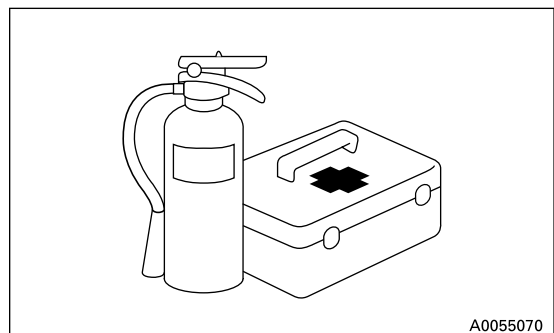
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get caught.
- Always wear a hard hat and safety shoes. If the nature of the work requires it, wear safety glasses, mask, gloves, ear plugs, and safety belt when operating or maintaining the machine.
- Check that all protective equipment functions properly before using it.



## FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
- Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.

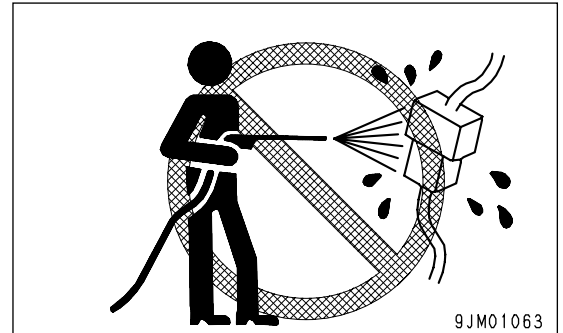


## SAFETY EQUIPMENT

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

## KEEP MACHINE CLEAN

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

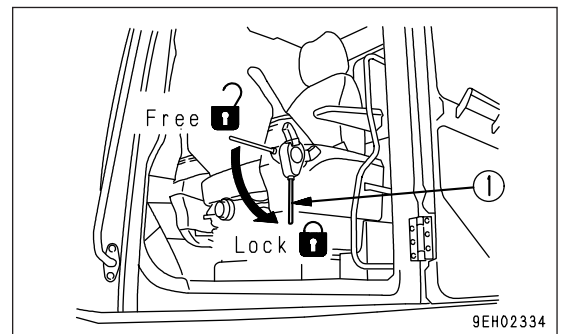


## KEEP OPERATOR'S COMPARTMENT CLEAN

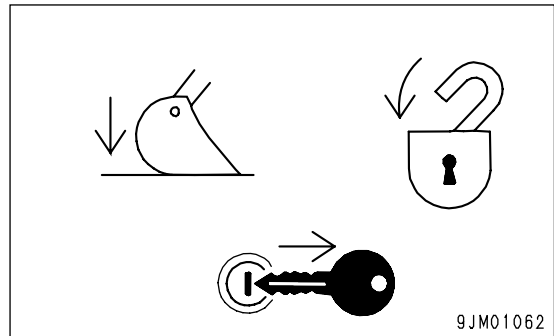
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do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

## LEAVING OPERATOR'S SEAT WITH LOCK

- Before standing up from the operator's seat (such as when opening or closing the front window or roof window, or when removing or installing the bottom window, or when adjusting the operator's seat), lower the work equipment completely to the ground, set safety lock lever (1) securely to the LOCK position, then stop the engine. If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.



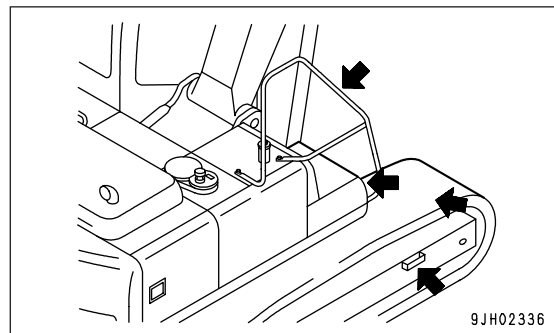
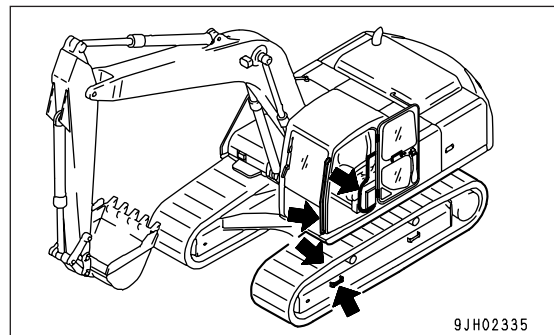
- When leaving the machine, always lower the work equipment completely to the ground, set safety lock lever (1) securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.



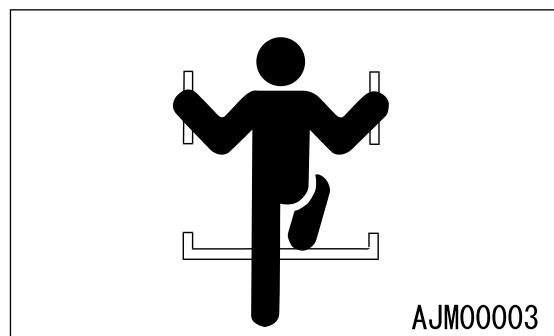
## HANDRAILS AND STEPS

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

- Use the handrails and steps marked by arrows in the diagram on the right when getting on or off the machine.



- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Do not grip the control levers when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.



- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.



## MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

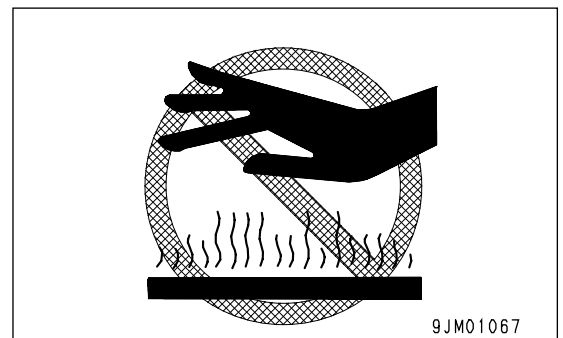
## NO PERSONS ON ATTACHMENTS

Never let anyone ride on the bucket, grapple, clamshell, or other attachments. There is a hazard of falling and suffering serious injury.

## BURN PREVENTION

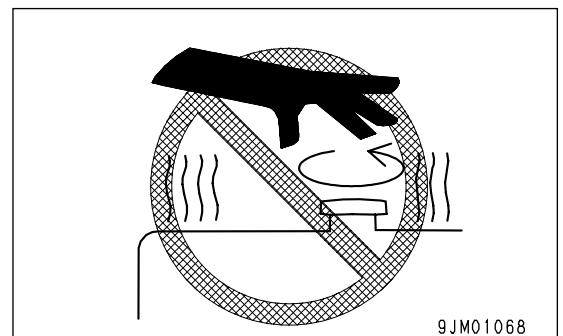
### Hot coolant

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



### Hot oil

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

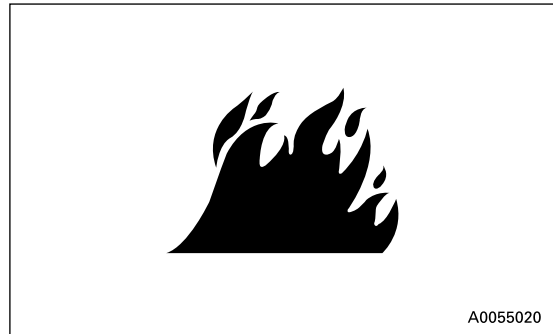


## FIRE PREVENTION AND EXPLOSION PREVENTION

- **Fire caused by fuel or oil**

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

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



- **Fire caused by accumulation of flammable material.**

- Remove any dry leaves, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.

- **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire.

- Always keep electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.

- **Fire coming from hydraulic line**

Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.

If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.

- **Explosion caused by lighting equipment**

- When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion that may cause serious injury.
- When taking the electrical power for the lighting from the machine, follow the instructions in this manual.

## ACTION IF FIRE OCCURS

If a fire occurs, escape from the machine as follows.

- Turn the starting switch OFF and stop the engine.
- Use the handrails and steps to get off the machine.

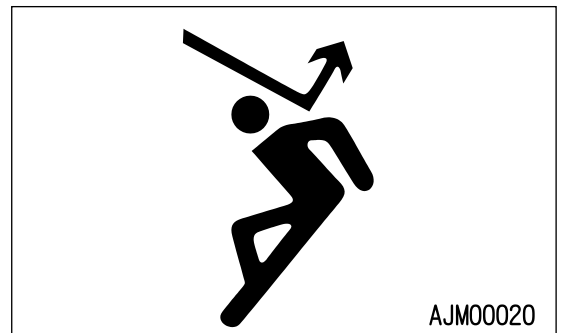
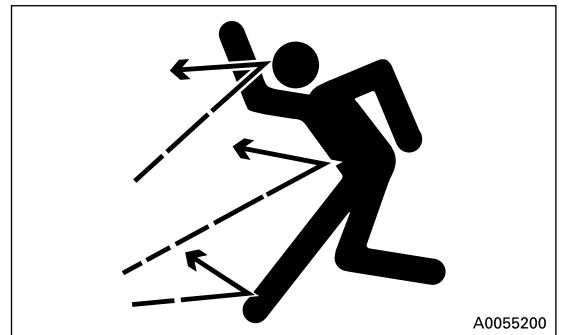
## WINDSHIELD WASHER FLUID

Use an ethyl alcohol base washer liquid. Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

## FALLING OBJECTS, FLYING OBJECTS AND INTRUDING OBJECTS PREVENTION

On jobsites where there is a hazard that falling objects, flying objects, or intruding objects may hit or enter the operator's cab, consider the operating conditions and install the necessary guards to protect the operator.

- When carrying out demolition or breaker operations, install a front guard and use a laminated coating sheet on the front glass.
- When working in mines or quarries where there is a hazard of falling rock, install FOPS (Falling Objects Protective Structure) and a front guard, and use a laminated coating sheet on the front glass.
- When carrying out the above operations, always close the front window. In addition, always ensure that bystanders are a safe distance away and are not in hazard from falling or flying objects.
- The above recommendations assume that the conditions are for standard operations, but it may be necessary to add additional guards according to the operating conditions on the jobsite.  
Always contact your Komatsu distributor for advice.



## ATTACHMENT INSTALLATION

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

## ATTACHMENT COMBINATIONS

Depending on the type or combination of work equipment, there is a hazard that the work equipment may hit the cab or other parts of the machine. Before using unfamiliar work equipment, check if there is any hazard of interference, and operate with caution.

## CAB WIDOW GLASSES

- If the cab glass on the work equipment side is broken, there is a hazard that the work equipment may contact the operator's body directly. Stop operation immediately and replace the glass.
- If roof windows made of organic glass (polycarbonate) are damaged, they may crack and lose their protective function. If the roof window has been damaged or cracked by falling stones or rocks, replace it with a new part.

## UNAUTHORIZED MODIFICATIONS

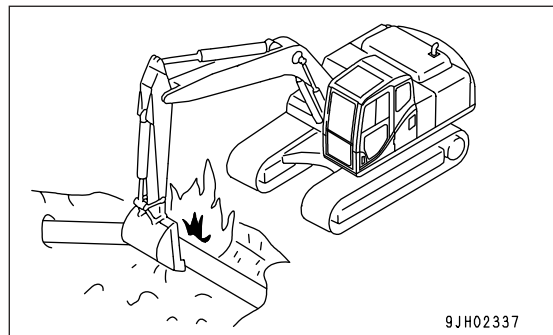
Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, or product failures resulting from modifications made without authorization from Komatsu.

## SAFETY AT JOBSITE

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

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take necessary measures to prevent any unauthorized person from entering the operating area.
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.



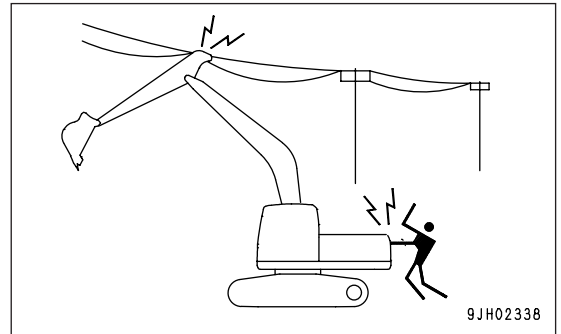
## WORKING ON LOOSE GROUND

- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

## DISTANCE TO HIGH VOLTAGE CABLES

Do not travel or operate the machine near electric cables. There is a hazard of electric shock, which may cause serious injury or property damage. On jobsites where the machine may go close to electric cables, always do as follows.

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.
- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- If the machine should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off. Also, do not let anyone come close to the machine.



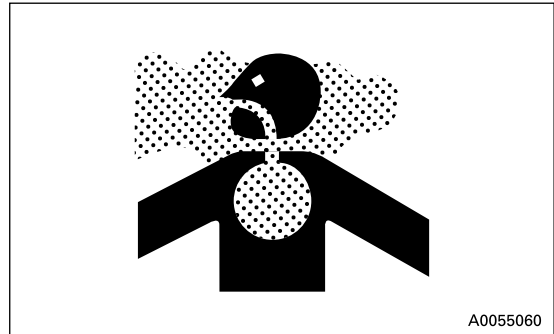
	Voltage	Min. safety distance
Low voltage	100V 200V	2m
	6,600V	2m
Very high voltage	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

## ENSURE GOOD VISIBILITY

- Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.
  - When working in dark places, turn on the working lamp and front lamps installed to the machine, and set up additional lighting in the work area if necessary.
  - Stop operations if the visibility is poor, such as in mist, snow, rain, or dust.

## VENTILATION FOR ENCLOSED AREA

If it is necessary to start the engine within an enclosed area, or when handling fuel, flushing oil, or paint, open the doors and windows to ensure that adequate ventilation is provided to prevent gas poisoning.



## SIGNALMAN'S SIGNAL AND SIGNS

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

## EMERGENCY EXIT FROM OPERATOR'S CAB

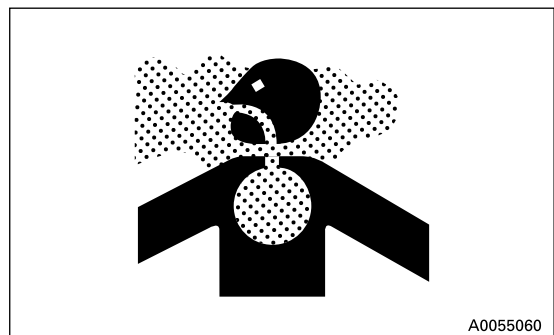
- If it should become impossible to open the cab door for any reason, open the rear window and use it as an emergency escape. For details, see "EMERGENCY EXIT FROM OPERATOR'S CAB (PAGE 3-31)" in this manual.

## ASBESTOS DUST HAZARD PREVENTION

Asbestos dust in the air can cause lung cancer if it is inhaled. There is danger of inhaling asbestos when working on jobsites handling demolition work or work handling industrial waste. Always observe the following.

- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position. All workers should use an approved respirator.
- Do not allow other persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

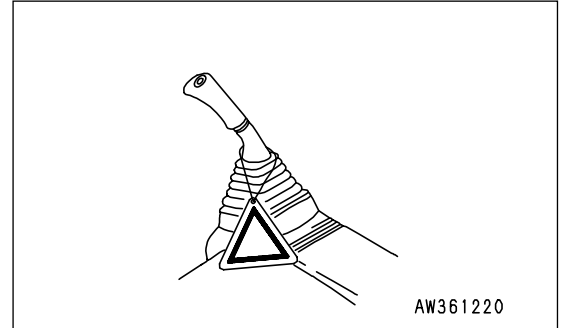
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



# SAFETY MACHINE OPERATION

## STARTING ENGINE

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



## CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.

- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the front lamps and working lamps, and check that they light up correctly.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Before starting the engine, check that the safety lock lever is at the LOCK position.
- Adjust the mirrors so that the rear of the machine can be seen clearly from the operator's seat. When adjusting, see "ADJUSTMENT OF MIRRORS (PAGE 3-66)".
- Check that there are no persons or obstacles above, below, or in the area around the machine.

## SAFETY RULES FOR STARTING ENGINE

- When starting the engine, sound the horn as a warning.
- Start and operate the machine only while seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.

## STARTING ENGINE IN COLD WEATHER

- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery. Before charging or starting the engine with a different power source, melt the battery electrolyte and check for frost and leakage of battery electrolyte before starting.



## OPERATION

### CHECKS AFTER STARTING ENGINE

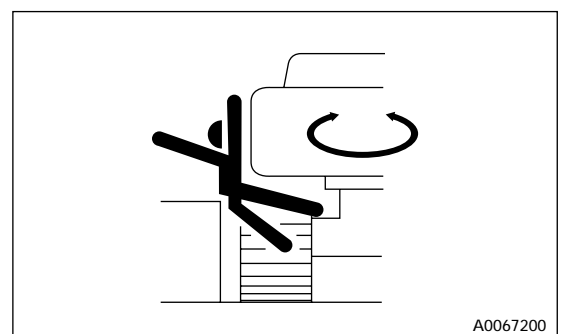
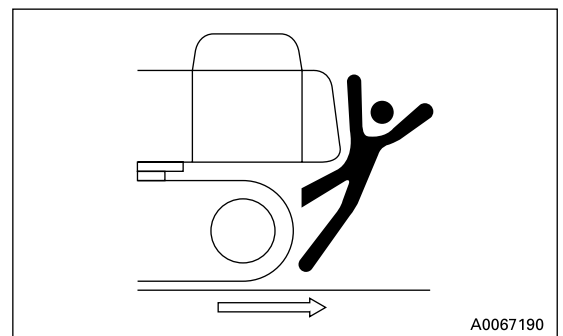
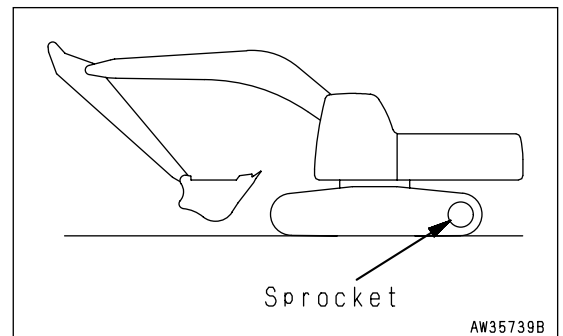
When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

- Always fasten your seat belt.
- Check that the movement of the machine matches the display on the control pattern card. If it does not match, replace it immediately with the correct control pattern card.
- Check the operation of the gauges and equipment, and check the operation of the bucket, arm, boom, travel system, swing system, and steering system.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any abnormality is found, carry out repairs immediately.

### SAFETY RULES FOR CHANGING MACHINE DIRECTIONS

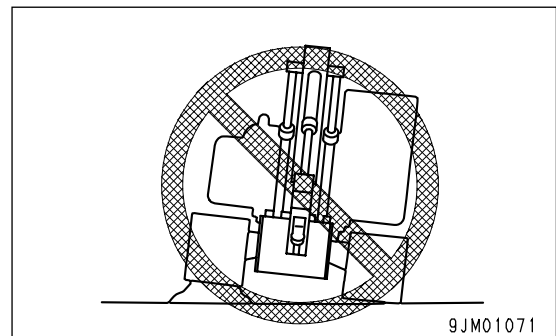
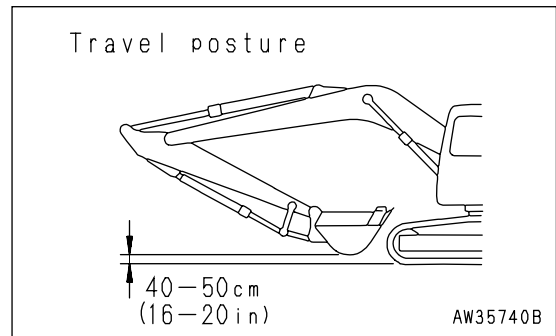
- Position the upper structure so that the sprocket is at the rear of the operator's cab before traveling. If the sprocket is at the front of the operator's cab, the direction of operations is reversed (for example, forward becomes reverse, and left becomes right).
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check that the travel alarm (if equipped) works properly.
- Always lock the door and windows of the operator's compartment in position (open or closed). On jobsites where there is a hazard of flying objects or of objects entering the operator's compartment, check that the door and windows are securely closed.
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.

Always be sure to carry out the above precautions even when the machine is equipped with mirrors.



## SAFETY RULES FOR TRAVELING

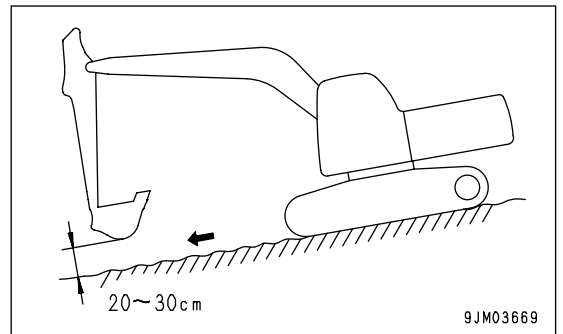
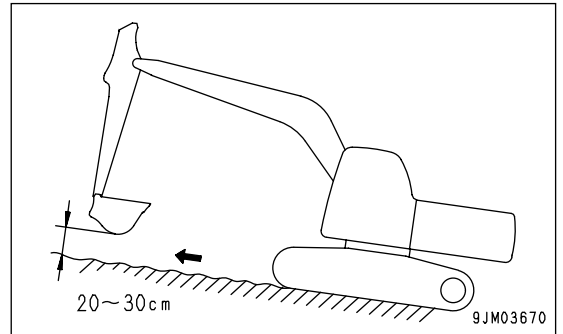
- When using the machine, to prevent the machine from overturning due to overloading and to avoid damage to the work equipment, do not exceed the maximum permitted load or performance of the machine.
- When traveling on level ground, pull in the work equipment and keep it at a height of 40 to 50cm (16 to 20 in) from the ground.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
- When traveling on rough ground or steep slopes, if the machine is equipped with auto-deceleration, always turn the auto-deceleration switch OFF (cancel). If the auto-deceleration is ON, the engine speed may rise and the travel speed may suddenly increase.
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine.  
When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.



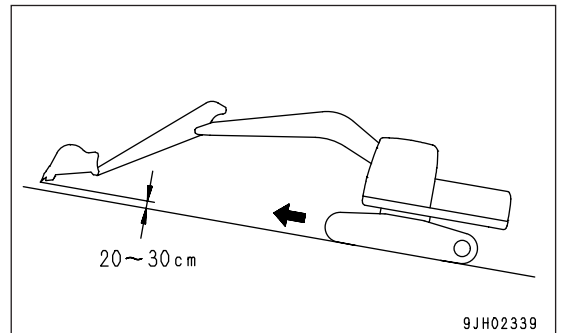
## TRAVELING ON SLOPES

To prevent the machine from tipping over or slipping to the side, always do as follows.

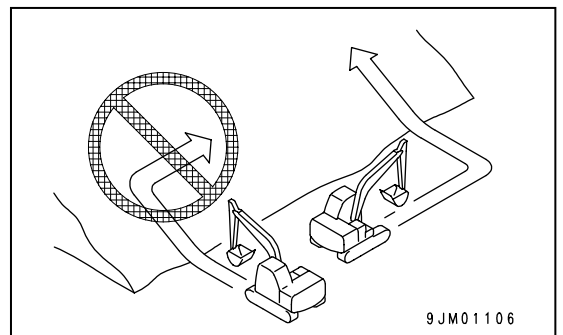
- When traveling on slopes, keep the work equipment approximately 20 to 30cm (8 to 12 in) above the ground. In case of emergency, quickly lower the work equipment to the ground immediately to help stop the machine.
- When travel up slopes, set the operator's cab facing uphill, when travel down slopes, set the operator's cab facing downhill.  
Always check the firmness of the ground under the front of the machine when traveling.



- When traveling up a steep slope, extend the work equipment to the front to improve the balance, keep the work equipment approximately 20 to 30cm (8 to 12 in) above the ground, and travel at low speed.
- When traveling downhill, lower the engine speed, keep the travel lever close to the neutral position, and travel at low speed.

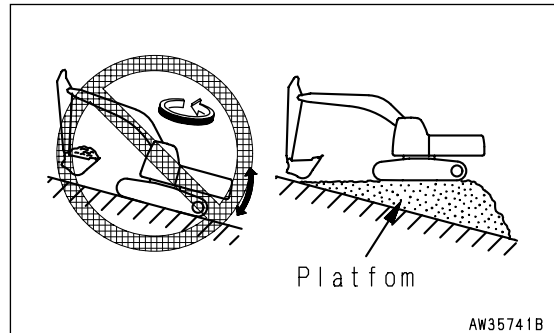


- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- If the engine stops when the machine is traveling on a slope, move the control levers immediately to the neutral position and start the engine again.



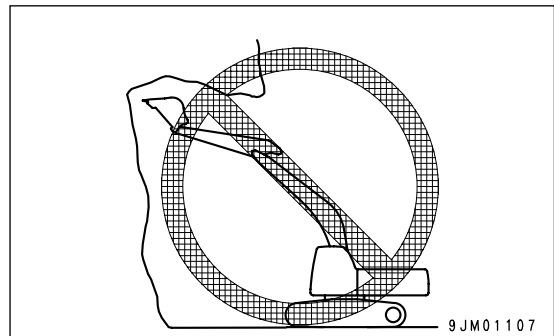
## OPERATIONS ON SLOPES

- When working on slopes, there is a hazard that the machine may lose its balance and turn over when the swing or work equipment are operated. This may lead to serious injury or property damage, so always provide a stable place when carrying out these operations, and operate carefully.
- Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous, and may cause the machine to tip over.
- If the machine has to be used on a slope, pile the soil to make a platform that will keep the machine as horizontal as possible.

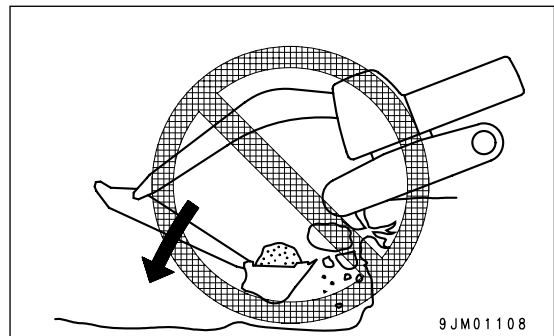


## PROHIBITED OPERATIONS

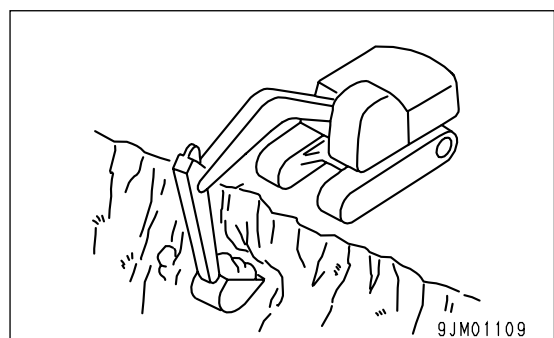
- Never dig the work face under an overhang. There is a hazard that rocks may fall or that the overhang may collapse and fall on top of the machine.



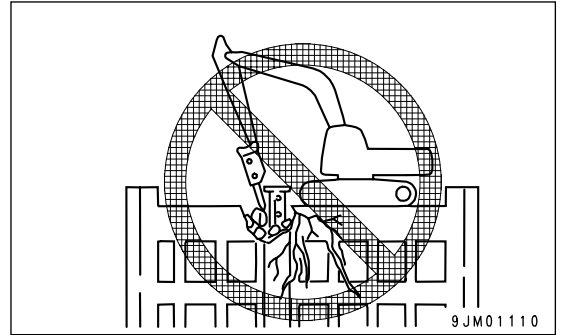
- Do not excavate too deeply under the front of the machine. The ground under the machine may collapse and cause the machine to fall.



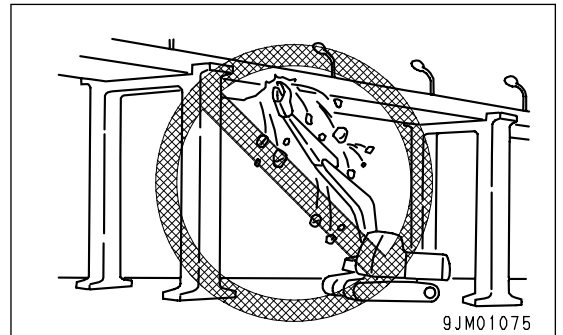
- To make it easier to escape if there is any problem, set the tracks at right angles to the road shoulder or cliff with the sprocket at the rear when carrying out digging operations.



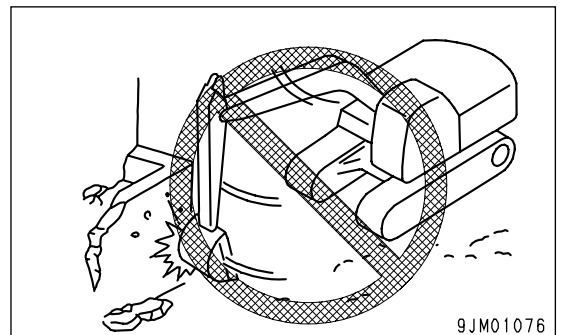
- Do not carry out demolition work under the machine. There is a hazard that the machine may become unstable and tip over.
- When working on or from the top of buildings or other structures, check the strength and the structure before starting operations. There is a hazard of the building collapsing and causing serious injury or damage.



- When carrying out demolition work, do not carry out demolition above your head. There is a hazard of broken parts falling or of the building collapsing and causing serious injury or property damage.



- Do not use the impact force of the work equipment for breaking work. There is a hazard of personal injury or property damage being caused by flying pieces of broken material or damage to the work equipment.
- Generally speaking, the machine is more liable to overturn when the work equipment is at the side than when it is at the front or rear.



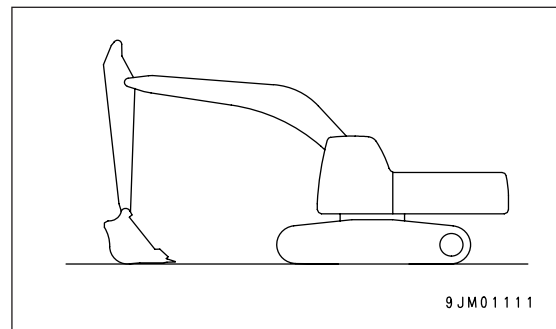
- When using a breaker or other heavy work equipment, there is a hazard of the machine losing its balance and tipping over. When operating on flat ground as well as on slopes.
  - Do not suddenly lower, swing, or stop the work equipment.
  - Do not suddenly extend or retract the boom cylinder. There is a hazard that impact will cause the machine to tip over.
- Do not pass the bucket over the head of other workers or over the operator's seat of dump trucks or other hauling equipment. The load may spill or the bucket may hit the dump truck and cause serious injury or property damage.

## OPERATIONS ON SNOW

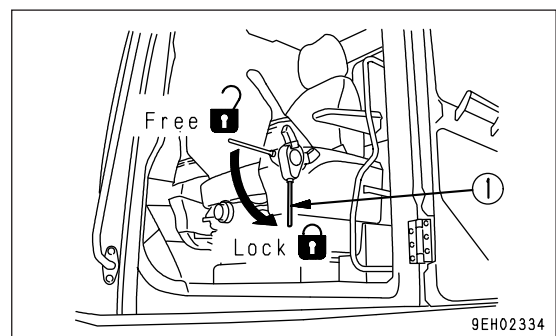
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.

## PARKING MACHINE

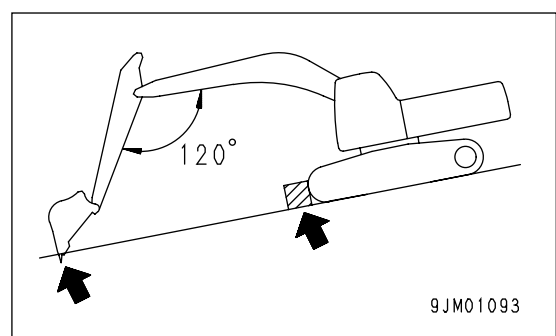
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set safety lock lever (1) to the LOCK position, then stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



- If it is necessary to park the machine on a slope, always do as follows.
  - Set the bucket on the downhill side, then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.



## TRANSPORTATION

The machine can be divided into parts for transportation, so when transporting the machine, please contact your Komatsu distributor to have the work carried out.

### SHIPPING THE MACHINE

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

- Investigate all state and local laws governing the weight, width, and length of a load. If necessary, disassemble the work equipment. The width, height and weight of the load differ according to the work equipment, so take this into account when determining the shipping route.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-105)" in the OPERATION section.

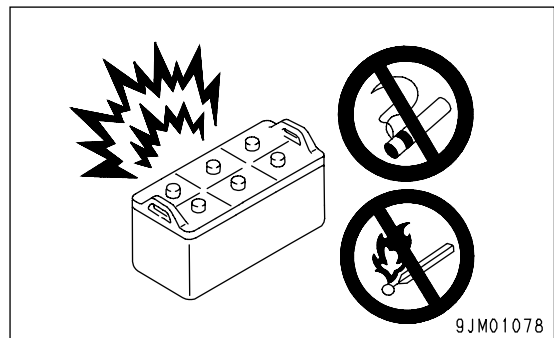
## BATTERY

### BATTERY HAZARD PREVENTION

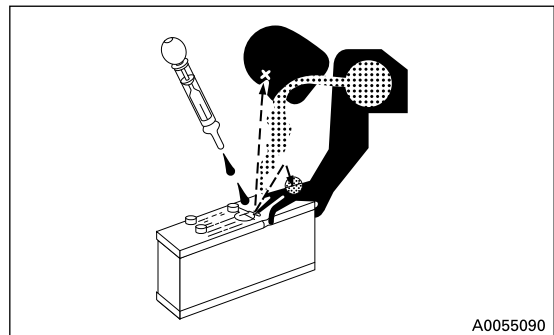
Battery electrolyte contains sulphuric acid, and batteries generate flammable hydrogen gas, which may explode.

Mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- When working with batteries, always wear safety glasses and rubber gloves.
- Never smoke or use any flame near the battery.



- If you spill acid on your clothes or skin, immediately flush the area with large amounts of water.
- If acid gets into your eyes, flush them immediately with large quantities of water and seek medical attention.



- Before working with batteries, turn the starting switch to the OFF position.

As there is a hazard that sparks will be generated, always do as follows.

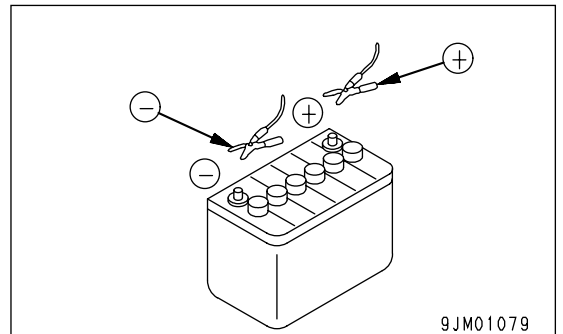
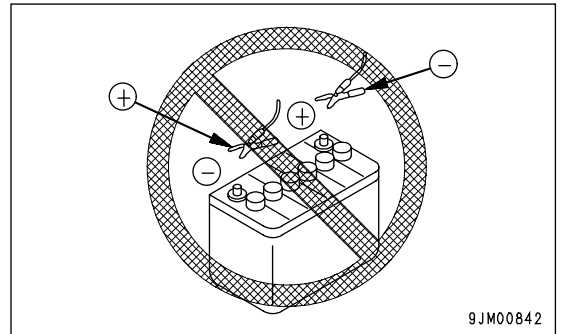
- Do not let tools or other metal objects make any contact between the battery terminals. Do not leave tools or other metal objects lying around near the battery.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery; when installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Tighten the battery caps securely.
- Install the battery securely to the determined place.



## STARTING ENGINE WITH BOOSTER CABLES

If any mistake is made in the method of connecting the booster cables, it may cause the battery to explode, so always do as follows.

- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see "STARTING ENGINE WITH BOOSTER CABLES (PAGE 3-126)" in the OPERATION section.



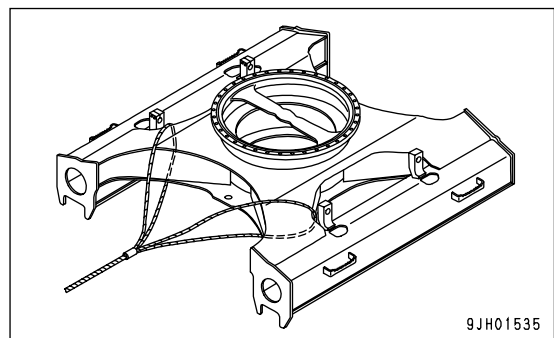
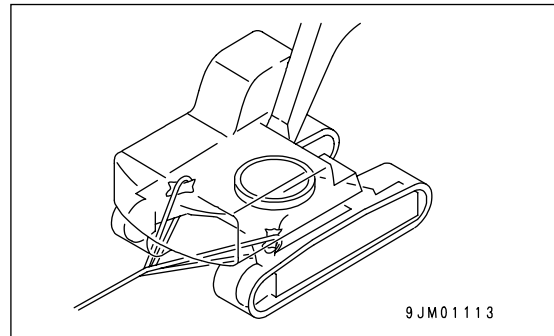
## TOWING

### SAFETY RULES FOR TOWING

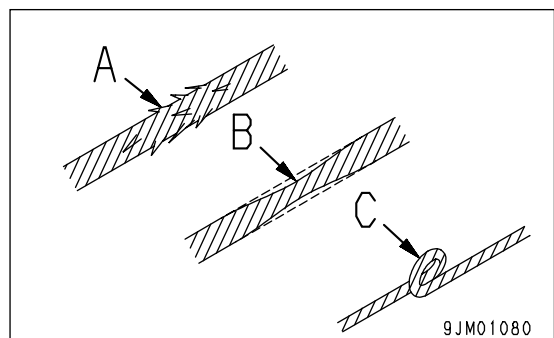
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing, see "TOWING THE MACHINE (PAGE 3-122)".

- Always wear leather gloves when handling wire rope.
- Fix the wire rope to the truck frame.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.



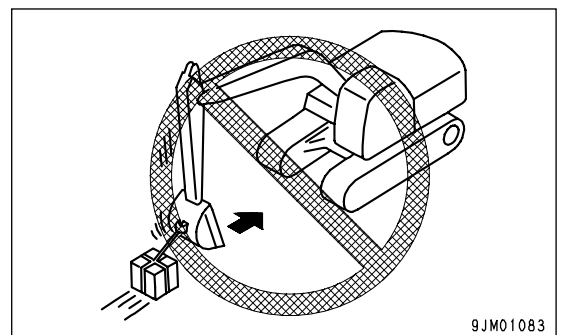
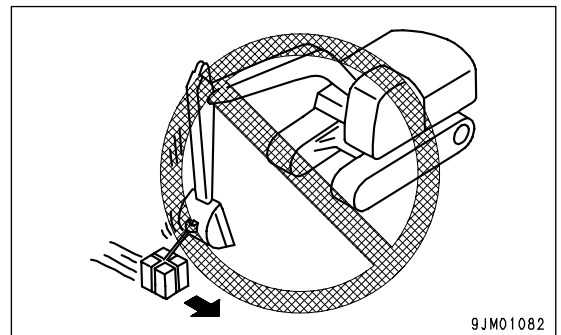
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.



## LIFTING OBJECTS WITH BUCKET

### SAFETY RULES FOR LIFTING OBJECTS

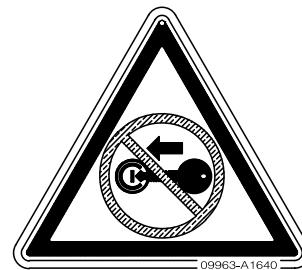
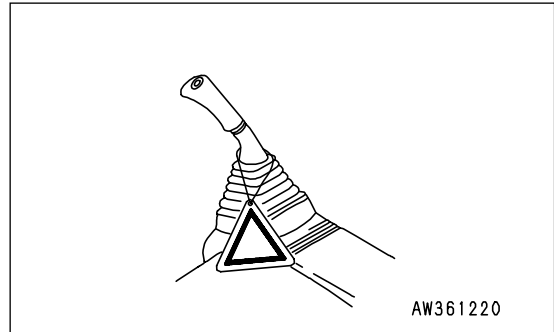
- Do not carry out lifting work on slopes, soft ground, or other places where the machine is not stable.
- Use wire rope that conforms to the specified standard.
- Do not exceed the specified lifting load.  
For details of the maximum lifting load permitted for this machine, see "HANDLING BUCKET WITH HOOK (PAGE 6-5)"
- It is dangerous if the load hits any worker or structure. Always check carefully that the surrounding area is safe before swinging or turning the machine.
- Do not start, swing, or stop the machine suddenly. There is a hazard that the lifted load will swing.
- Do not pull the load to the side or in towards the machine.
- Do not leave the operator's seat when there is a raised load.



# SAFETY MAINTENANCE INFORMATION

## WARNING TAG

- Always attach the "DO NOT OPERATE" warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine.  
Attach additional warning tags around the machine if necessary.  
Warning tag Part No. 09963-A1640  
Keep this warning tag in the tool box while it is not used. If there is not the tool box, keep the tag in the operation manual pocket.
- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.



## KEEP WORK PLACE CLEAN AND TIDY

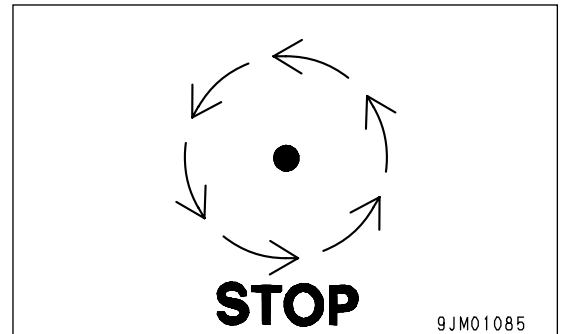
- Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean and tidy to enable you to carry out operations safely.  
If the work place is not kept clean and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.
- Use water to clean roof windows made of organic glass (polycarbonate); do not use any organic solvent. If benzene, toluene, methanol, or other organic solvents are used, there will be chemical reactions such as the glass dissolving or decomposing, and the polycarbonate will deteriorate.

## APPOINT LEADER WHEN WORKING WITH OTHERS

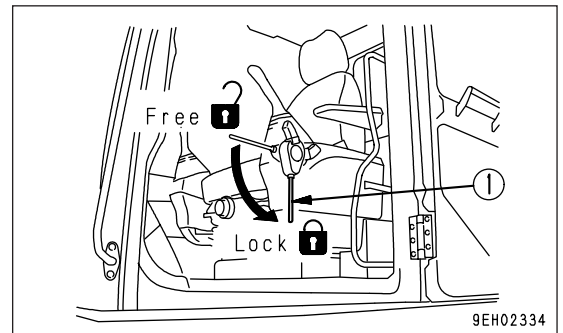
- When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.  
When working with others, misunderstandings between workers can lead to serious accidents.

## STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

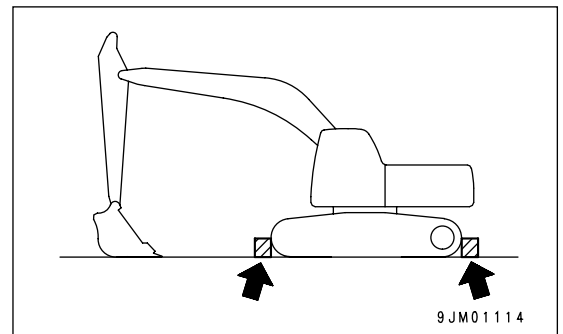
- Stop the machine on firm, level ground.
- Select a place where there is no danger of falling rocks, landslides, or flooding.
- Lower the work equipment completely to the ground and stop the engine.



- Turn the starting switch to the ON position. Operate the work equipment control lever back and forth, left and right at the full stroke 2 to 3 times to eliminate the remaining internal pressure in the hydraulic circuit, and then push up safety lock lever (1) to the LOCK position.



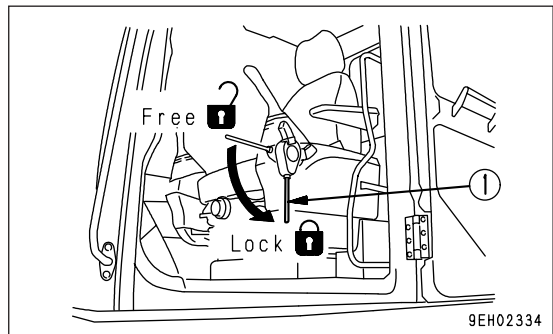
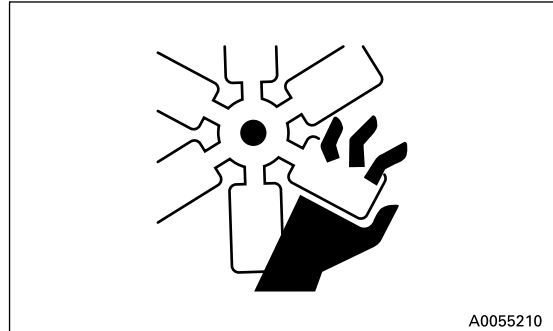
- Put blocks under the track to prevent the machine from moving.



## TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

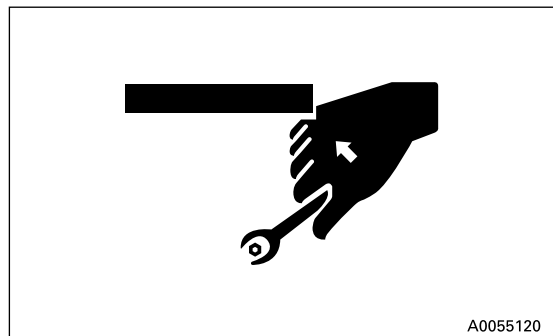
To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- Set safety lock lever (1) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be extremely careful.
- Do not touch any control levers. If any control lever must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Never drop or insert tools or other objects into the fan or fan belt.  
Parts may break or be sent flying.



## PROPER TOOLS

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



## ACCUMULATOR

The accumulator is charged with high-pressure nitrogen gas.

When handling the accumulator, careless procedure may cause an explosion which could lead to serious injury or property damage. For this reason, always observe the following precautions.

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



## PERSONNEL

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area.

If necessary, employ an observer.

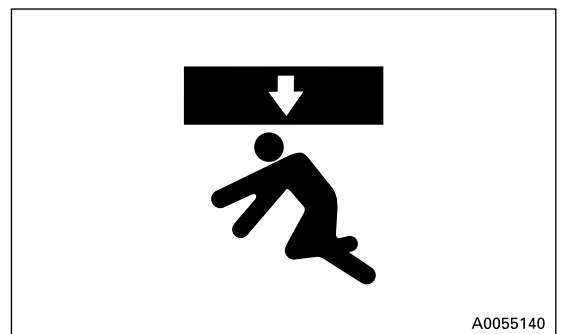
## ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.



## WORK UNDER THE MACHINE

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are off the ground and the machine is supported only by the work equipment. If the control levers are touched by mistake, or there is a hazard to the hydraulic line, the work equipment or the machine may suddenly descend. This is extremely dangerous. Never work under the machine if the machine is not properly supported by blocks or stands.



## NOISE

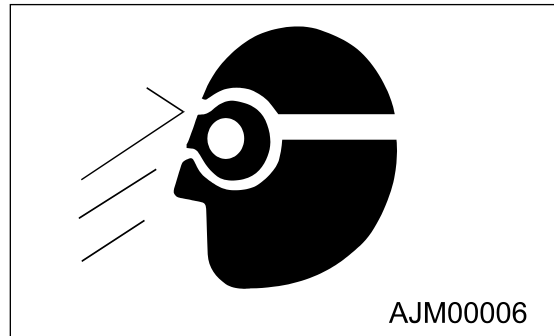
If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

## WHEN USING HAMMER

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause injury. Always wear safety goggles and gloves.
- When hitting pins or bucket teeth, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.
- If pins are hit with strong force, there is a hazard that the pin may fly out and injure people in the surrounding area.



## WELDING WORKS

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

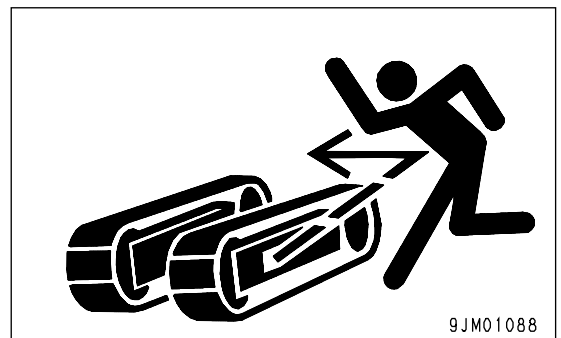
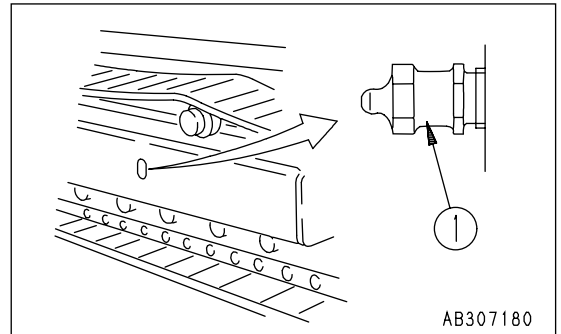
## REMOVING BATTERY TERMINALS

When repairing the electrical system or when carrying out electrical welding, remove the negative (-) terminal of the battery to prevent the flow of current.



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

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



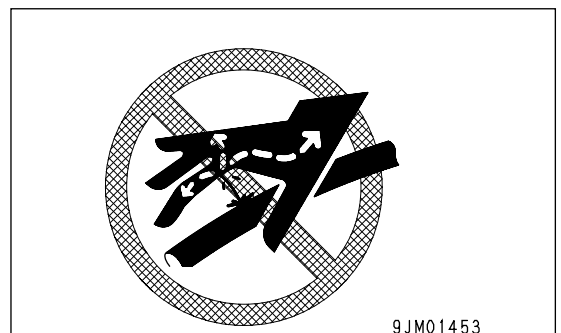
## DO NOT DISASSEMBLE RECOIL SPRINGS

The recoil spring assembly is used to reduce the impact on the idler. It contains a spring under high pressure, so if it is disassembled by mistake, the spring will fly out and cause serious injury or even death. Never disassemble the recoil spring.

## SAFETY RULES FOR HIGH-PRESSURE OIL

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

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



## SAFETY HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury or property damage. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.

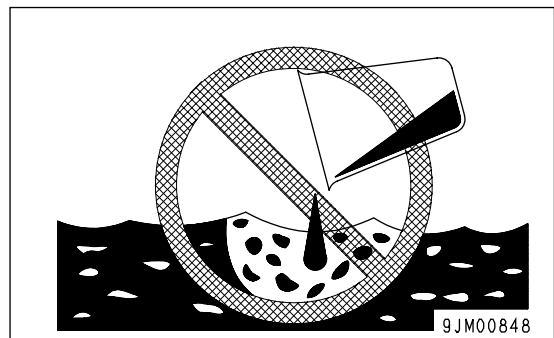
Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement layer of wire.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.

## WASTE MATERIALS

To prevent pollution, pay careful attention to the method of disposing of waste materials.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground or dump into the sewage system, rivers, the sea, or lakes.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.



## AIR CONDITIONER MAINTENANCE

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frost-bite.

Never touch refrigerant.

## COMPRESSED AIR

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

## PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- In order for the machine to be operated safely for a long time, it is necessary to add oil and to carry out service and maintenance at periodic intervals. In order to further increase safety, components with a strong relationship to safety, such as hoses and seat belts, must be replaced at periodic intervals.  
Replacement of safety critical parts: See "SAFETY CRITICAL PARTS (PAGE 4-16)".
- The material of these components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or property damage. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety critical parts if any defect is found, even when they have not reached the time specified interval.

**MEMO**

# OPERATION

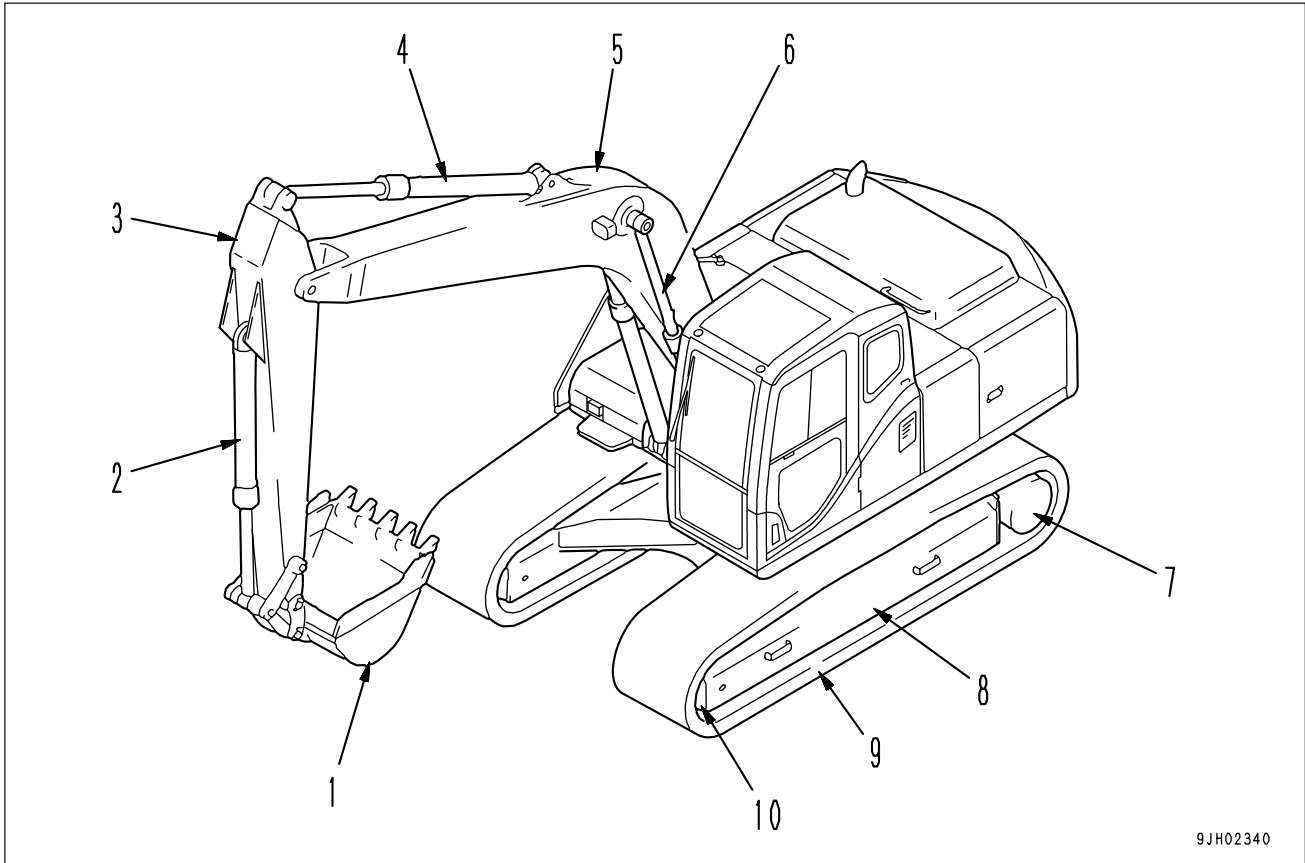
 **WARNING**

Please read and make sure that you understand the **SAFETY** section before reading this section.

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# GENERAL VIEW

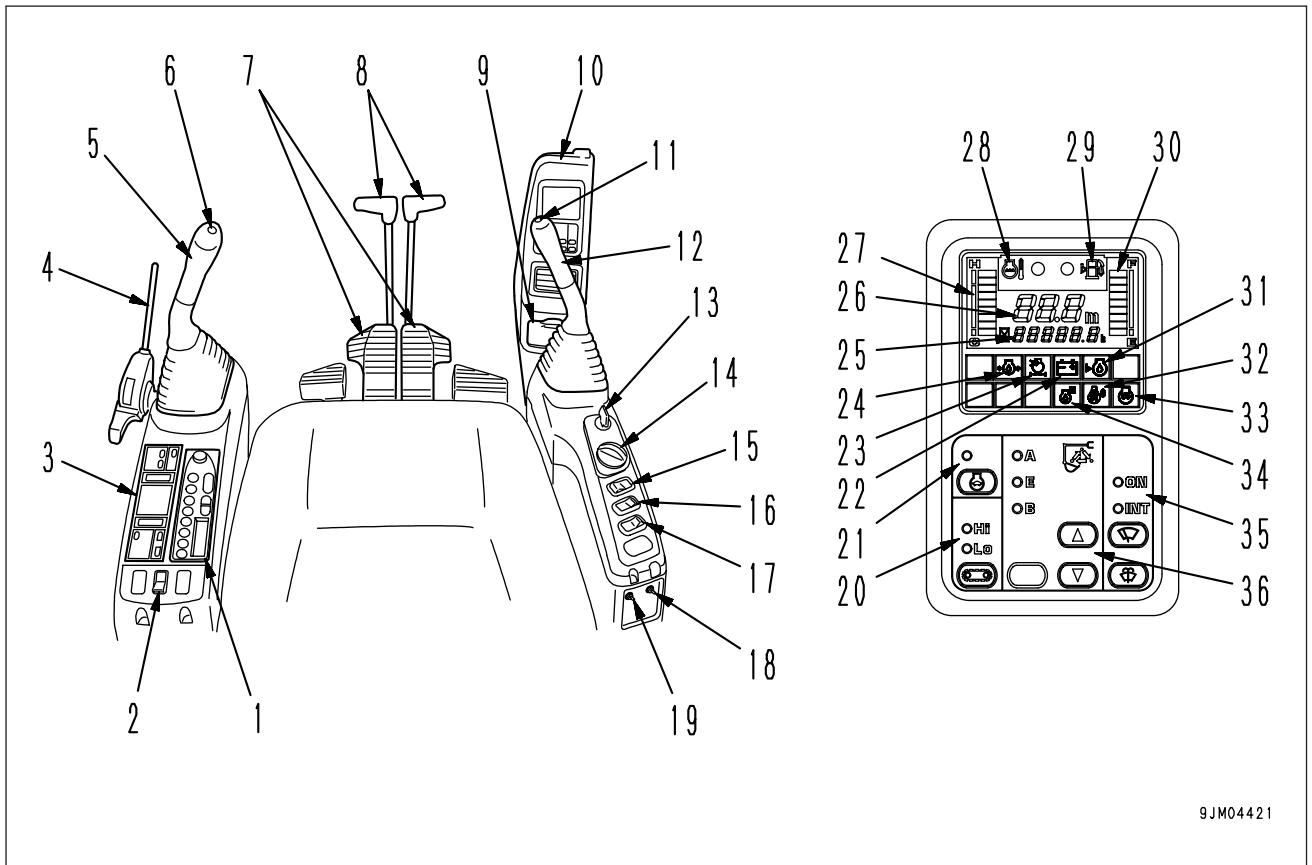
## GENERAL VIEW OF MACHINE



9JH02340

- |                     |                   |
|---------------------|-------------------|
| (1) Bucket          | (6) Boom cylinder |
| (2) Bucket cylinder | (7) Sprocket      |
| (3) Arm             | (8) Track frame   |
| (4) Arm cylinder    | (9) Track shoe    |
| (5) Boom            | (10) Idler        |

# GENERAL VIEW CONTROLS AND GAUGES



- (1) Car radio
- (2) Rotating lamp switch (if equipped)
- (3) Airconditioner control panel
- (4) Safety lock levers
- (5) Left work equipment control lever
- (6) Knob switch
- (7) Travel pedal
- (8) Travel levers
- (9) Cigarette lighter / Ashtray
- (10) Machine monitor
- (11) Horn switch
- (12) Right work equipment control lever
- (13) Starting switch
- (14) Fuel control dial
- (15) Lamp switch
- (16) Alarm buzzer stop switch
- (17) Swing lock switch
- (18) Swing brake cancel switch

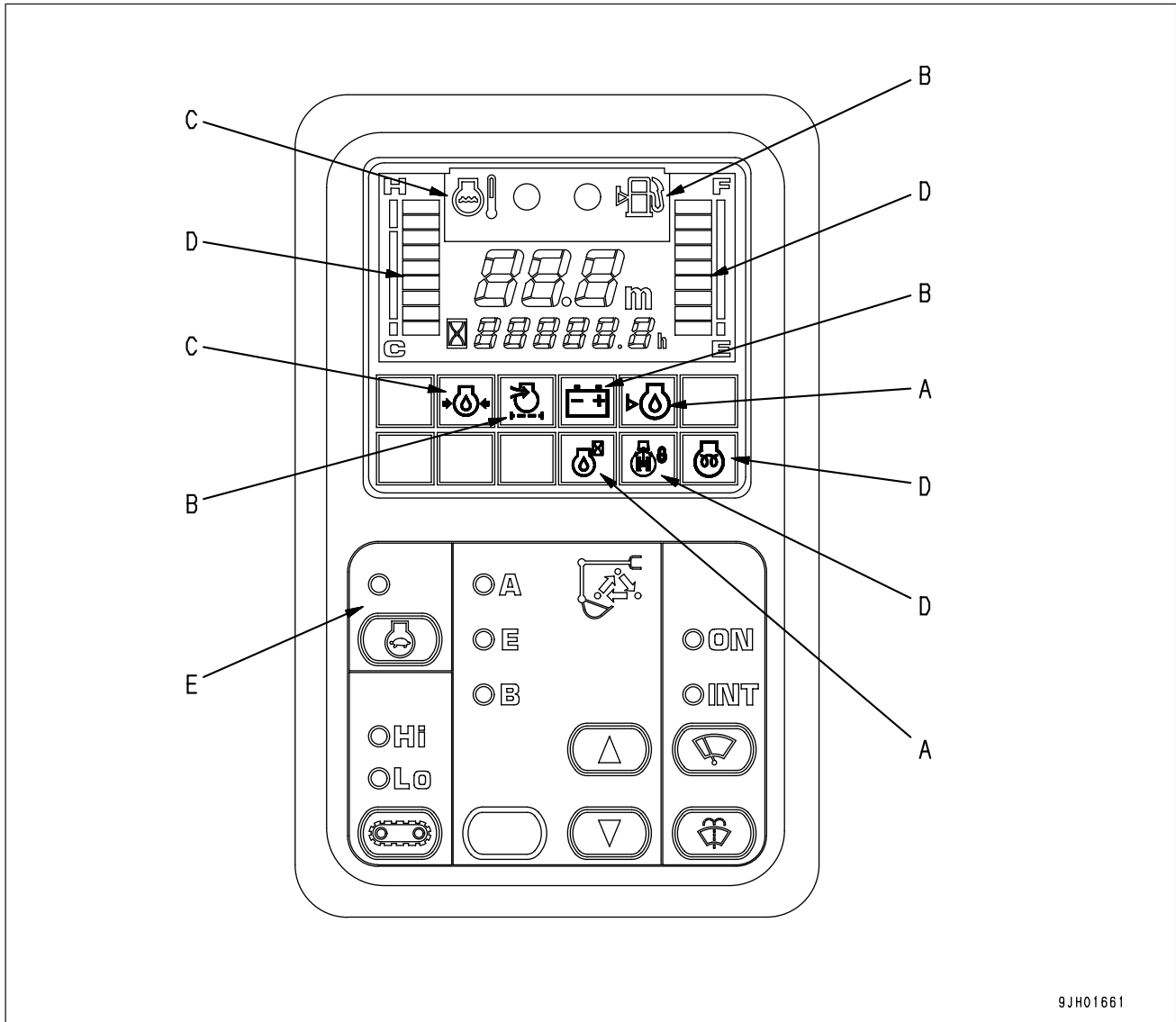
- (19) Emergency pump drive switch
- (20) Travel speed selector switch
- (21) Auto-deceleration switch
- (22) Charge monitor
- (23) Air cleaner clogging monitor
- (24) Engine oil pressure monitor
- (25) Service meter
- (26) Display
- (27) Engine water temperature gauge
- (28) Engine water temperature monitor
- (29) Fuel level monitor
- (30) Fuel gauge
- (31) Engine oil level monitor
- (32) Swing lock monitor
- (33) Engine pre-heating monitor
- (34) Engine oil replacement monitor
- (35) Wiper switch
- (36) Working mode selector switch

# EXPLANATION OF COMPONENTS

The following is an explanation of the 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.

## MACHINE MONITOR



A:Basic check Items

D:Meter Display Portion

B:Caution Items

E:Monitor Switches

C:Emergency Stop Items

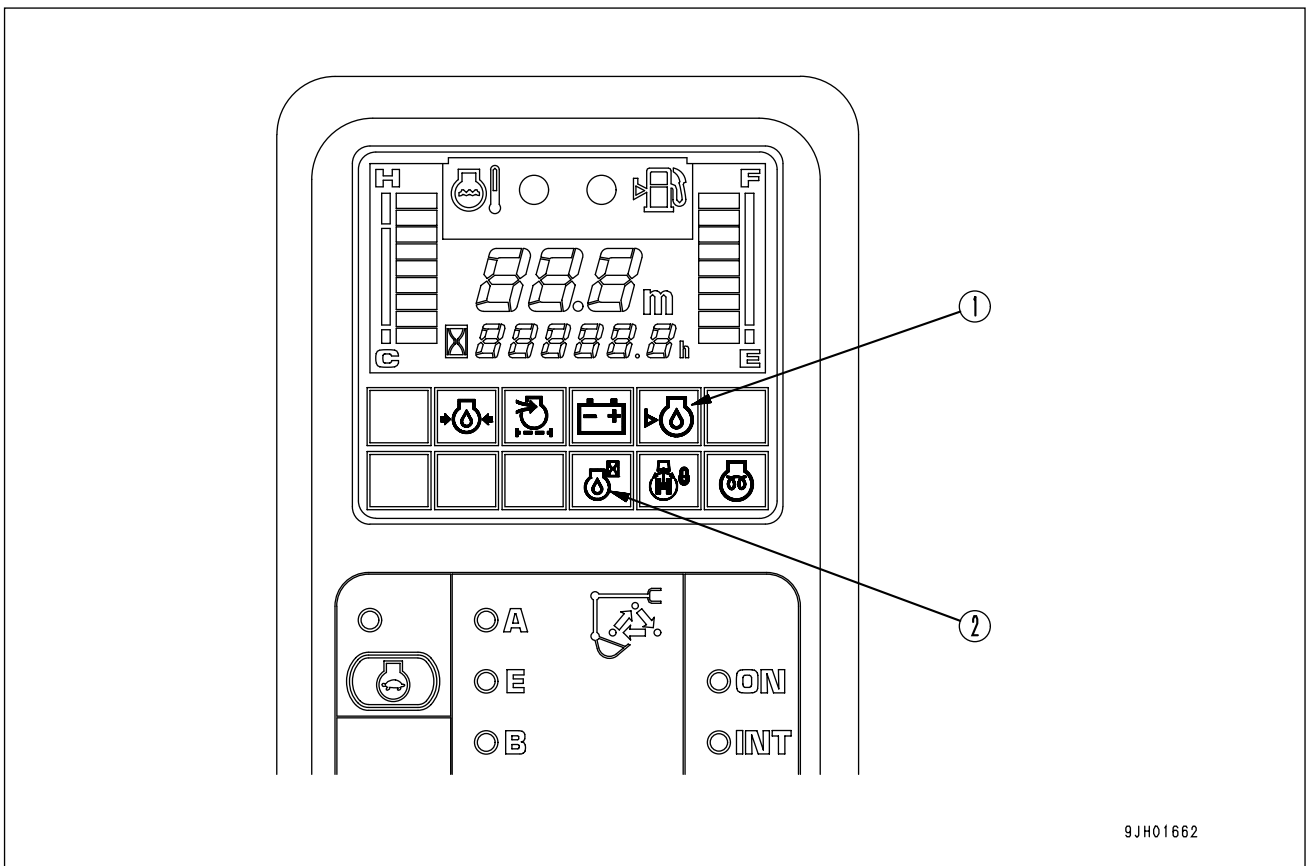


# BASIC CHECK ITEMS

**⚠ WARNING**

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

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



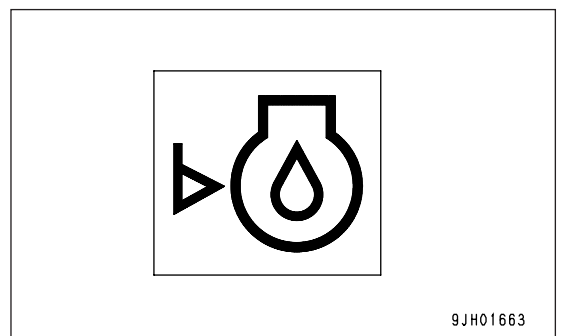
(1) Engine oil level monitor

(2) Engine oil replacement monitor (only for set machines)

## ENGINE OIL LEVEL MONITOR

This monitor (1) warns the operator if the oil level in the engine oil pan has dropped.

If the oil level in the engine oil pan is low, the monitor will flash, so check the oil level in the engine oil pan and add oil.



9JH01663

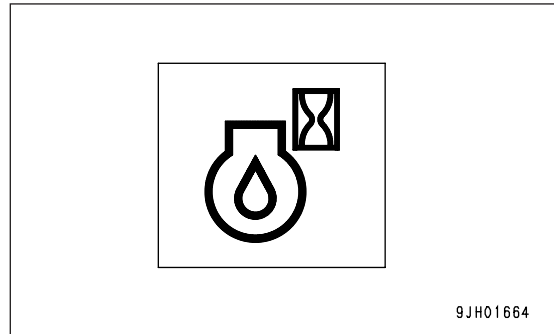
## ENGINE OIL REPLACEMENT MONITOR

(only for set machines)

This monitor (2) warns the operator if the set time passes after the engine oil was changed.

If the set time (125, 250, 500H) passes after the engine oil is replaced, this lamp lights up. If the lamp lights up, replace the engine oil.

If you want to change the set time for replacement of oil, please consult your Komatsu distributor.



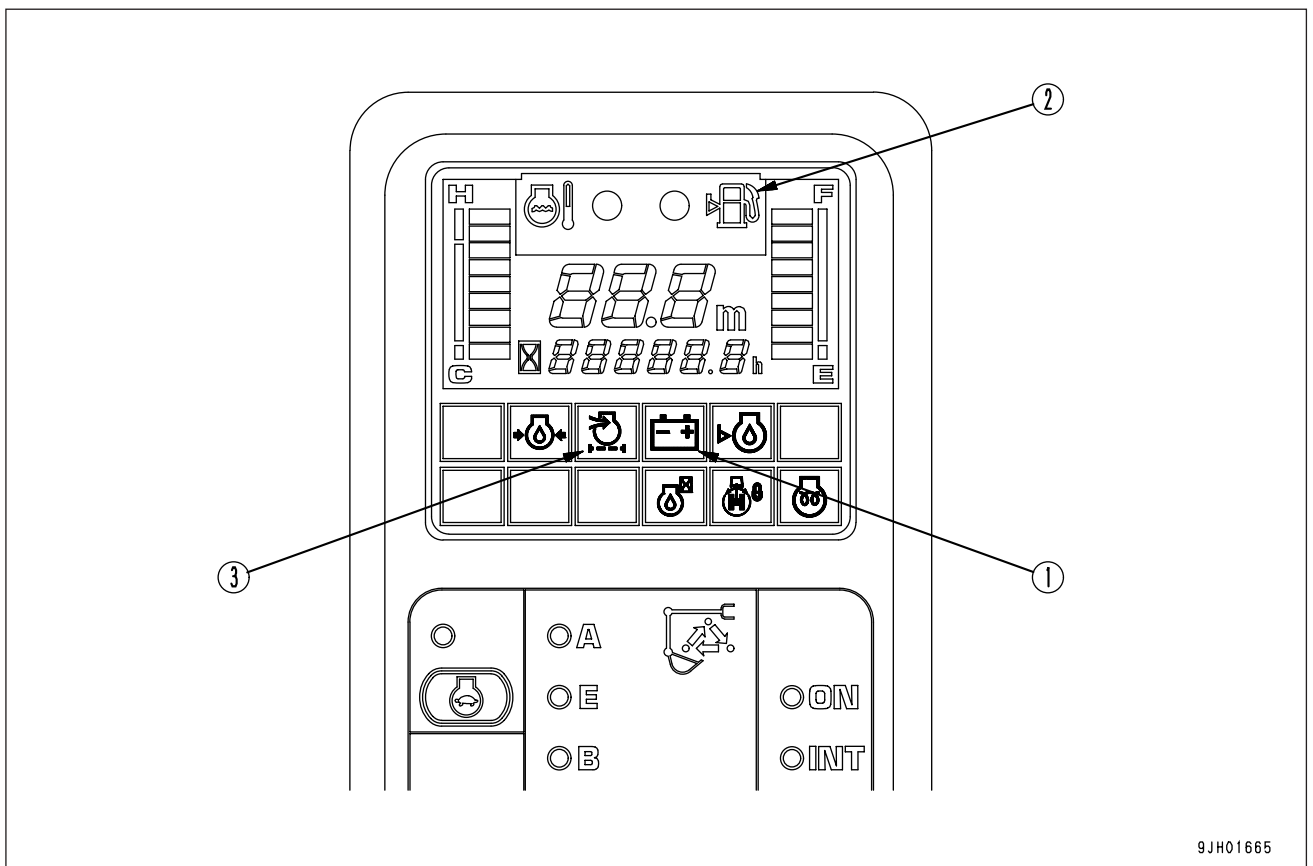
## CAUTION ITEMS

### ⚠ CAUTION

If the warning monitor flashes or lights up, carry out inspection and maintenance of the appropriate point as soon as possible.

If the problem is not corrected, it may lead to failure of the machine.

These are items which need to be observed when the engine is running. If any abnormality occurs, the item needing immediate repair is displayed. If there is any abnormality, the abnormal location on the monitor will flash or light up.



- (1) Charge level monitor
- (2) Fuel level monitor

- (3) Air cleaner clogging monitor

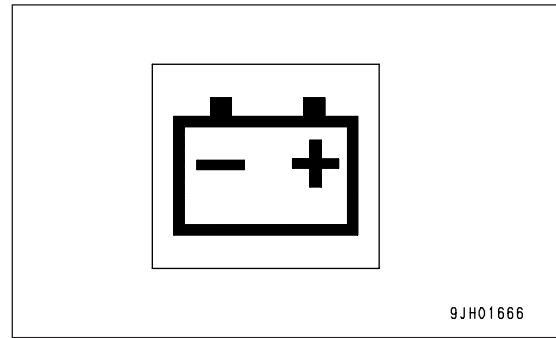
## CHARGE LEVEL MONITOR

This monitor(1) indicates an abnormality in the charging system while the engine is running.

If the monitor lamp flashes, check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-128)".

### REMARK

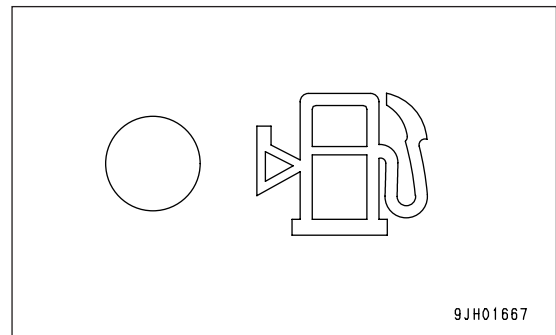
- While the starting switch is ON, the lamp will remain lit and will go off once the engine is started.
- When the engine is started or stopped with the starting switch at the ON position, the lamp may light up and the buzzer may sound momentarily, but this does not indicate any abnormality.



## FUEL LEVEL MONITOR

This monitor(2) warns the operator if the level of the fuel remaining in the fuel tank goes down too low.

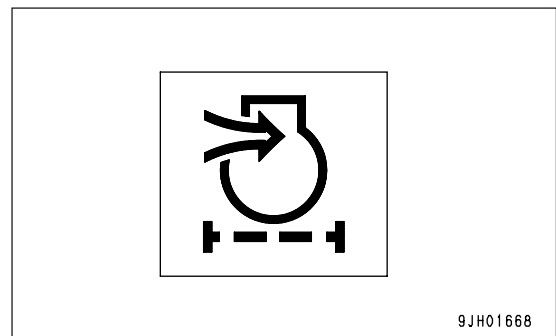
When the remaining fuel goes down to approx. 41 liters (10.83 US gal) , the monitor flashes, so add fuel as soon as possible.



## AIR CLEANER CLOGGING MONITOR

This monitor (3) warns the operator that the air cleaner is clogged.

If it flashes, stop the engine and carry out inspection and cleaning of the air cleaner.

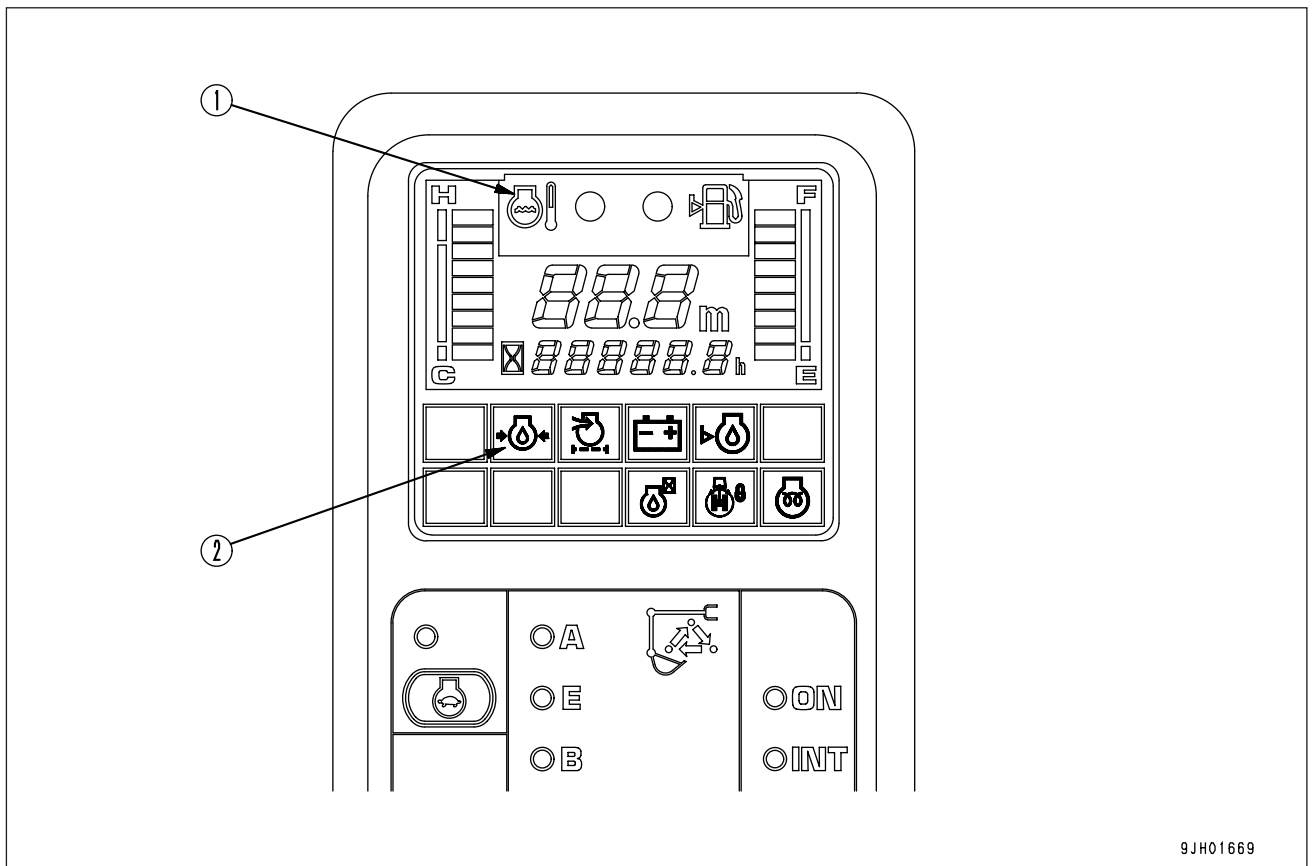


## EMERGENCY STOP ITEMS

### CAUTION

If the monitor flashes, stop the engine immediately or run at low idling, then inspect the problem point immediately and repair the problem.

These are items which need to be observed when the engine is running. If there is any abnormality, the abnormal location on the monitor will flash and the buzzer will sound. Carry out the necessary repairs immediately.



(1) Engine water temperature monitor

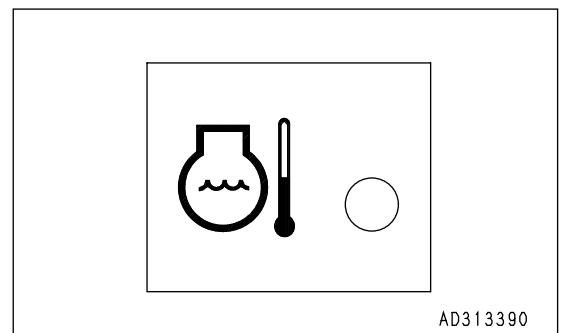
(2) Engine oil pressure monitor

### ENGINE WATER TEMPERATURE MONITOR

This monitor (1) warns the operator that the temperature of the engine coolant has risen.

If the temperature of the engine coolant becomes abnormally high, the monitor flashes, and the overheat prevention system is automatically actuated to reduce the engine speed.

Stop operations, and run the engine at low idling until the engine water temperature gauge returns to the green range.



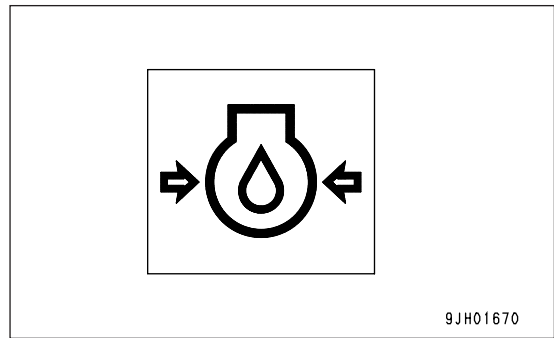
AD313390

## ENGINE OIL PRESSURE MONITOR

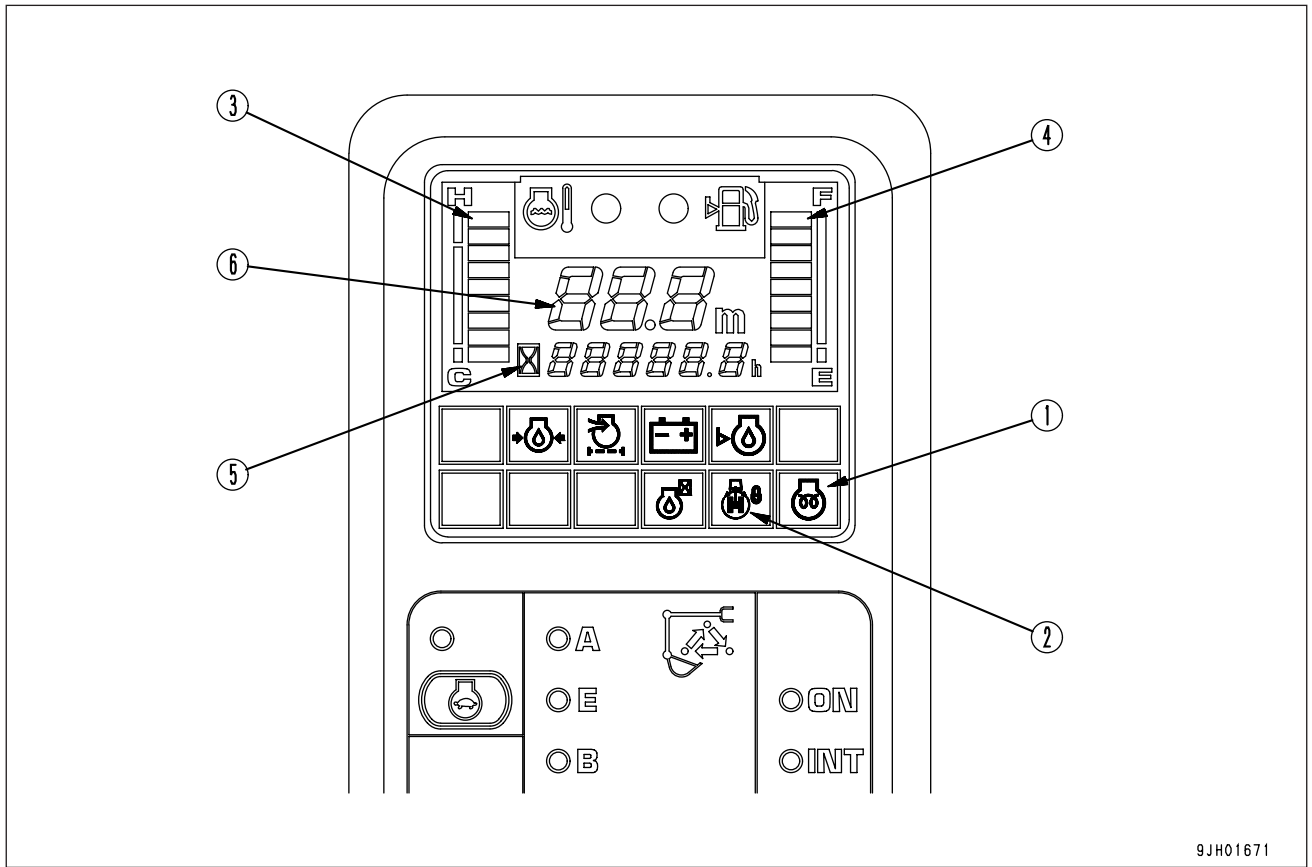
If the engine lubricating pressure is below the normal value, this monitor (1) lights up and the buzzer sounds. If it lights up, stop the engine, and check the oil level in the oil pan and lubricating system.

### REMARK

- While the starting switch is ON, the lamp will remain lit and will go off once the engine is started.
- When the engine is started or stopped with the starting switch at the ON position, the lamp may light up and the buzzer may sound momentarily, but this does not indicate any abnormality.



METER DISPLAY PORTION



9JH01671

Pilot Display

Gauges And Meter

- (1) Engine Pre-heating Monitor
- (2) Swing Lock Monitor

- (3) Engine water temperature gauge
- (4) Fuel Gauge
- (5) Service Meter
- (6) Display

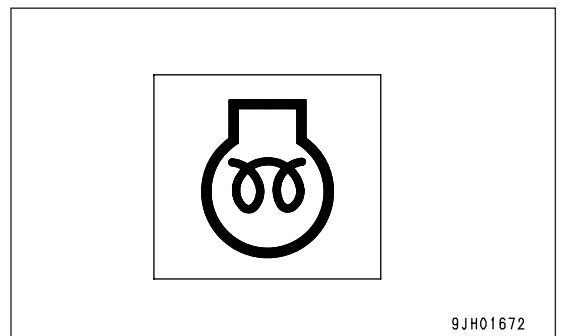
PILOT DISPLAY

When the starting switch is ON, the pilot display lights up when the display items are functioning.

ENGINE PRE-HEATING MONITOR

This monitor lamp(1) indicates the pre-heating time required when starting the engine at an ambient temperature below 0°C (32°F).

The monitor lamp lights when the starting switch is turned to HEAT position and flashes after about 30 seconds to show that the pre-heating is completed. (The monitor lamp will go off after about 10 seconds.)



9JH01672

**SWING LOCK MONITOR**

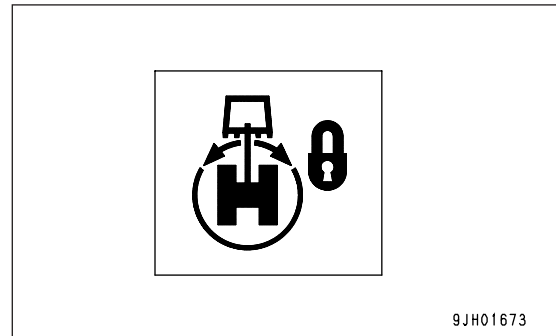
This monitor (2) informs the operator that the swing lock is being actuated.

Actuated: Lights up

When the swing lock switch is turned ON (ACTUATED), the monitor lamp lights up.  
 This monitor flashes when the swing holding brake cancel switch is turned on.

**REMARK**

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



**GAUGES AND METER**

**ENGINE WATER TEMPERATURE GAUGE**

This monitor (3) displays the engine coolant temperature.

During operations, the green range should be lighted up. If the red range lights up during operations, the overheat prevention system is actuated.

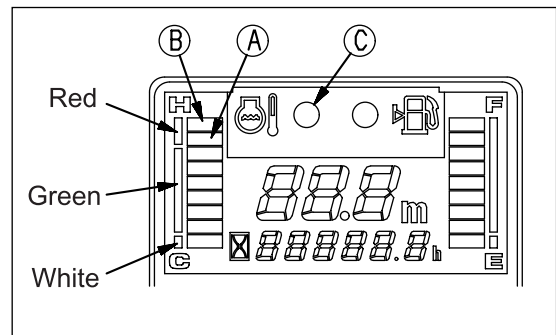
The overheat prevention system is actuated as follows.

Red range (A) lights up: Engine water temperature monitor lamp (C) flashes.

Red range (B) lights up: Engine speed is reduced to low idling, engine water temperature monitor lamp (C) flashes, and alarm buzzer sounds at the same time.

The overheat prevention system is actuated until the gauge returns to the green range.

When red range (A) has lighted up, wait for the engine water temperature to go down, then set the fuel control dial to low idling to cancel the display.



**FUEL GAUGE**

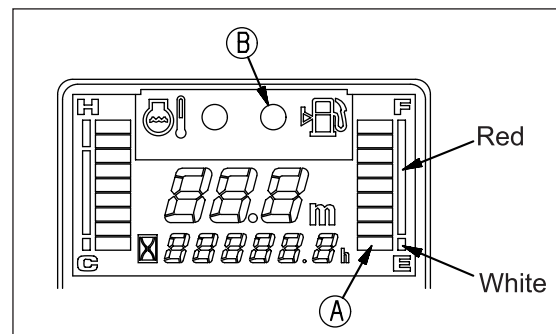
This meter (4) shows the fuel level in the fuel tank. During normal operation, the lamp should light up in the green range.

If the lamp in the red range flashes during operation, there is less than 60 liters (15.85 US gal) of fuel remaining, so check and add fuel.

Red range (A) lights up: Fuel gauge monitor lamp (B) flashes.

The correct level may not be displayed for a short time after the starting switch is turned to the ON position, but this is not an abnormality.

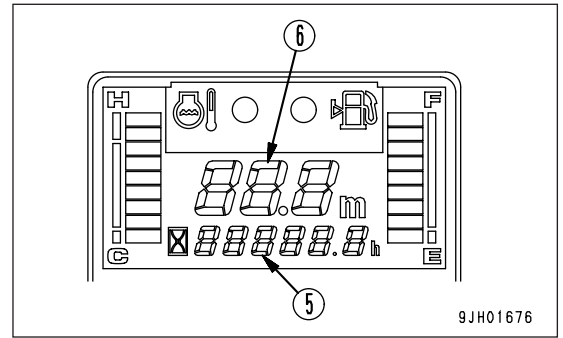
With the engine stopped, turn the starting switch ON to check that each item and meter lights up.





**DISPLAY**

This monitor (6) displays the service meter, and monitor (6) displays the content of the failure if any abnormality occurs.



**REMARK**

If the machine breaks down, the content of the failure is displayed when the starting switch is ON. The display shows all the failures flashing in turn.

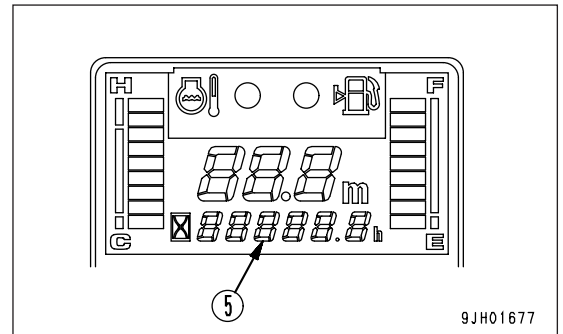
Monitor display	Failure mode
E02	Pump control system error
E03	Swing brake system error
E05	Governor system error
E06	Electric system error

If the above displays flash, go to the item in see "ELECTRONIC CONTROL SYSTEM (PAGE 3-132)"

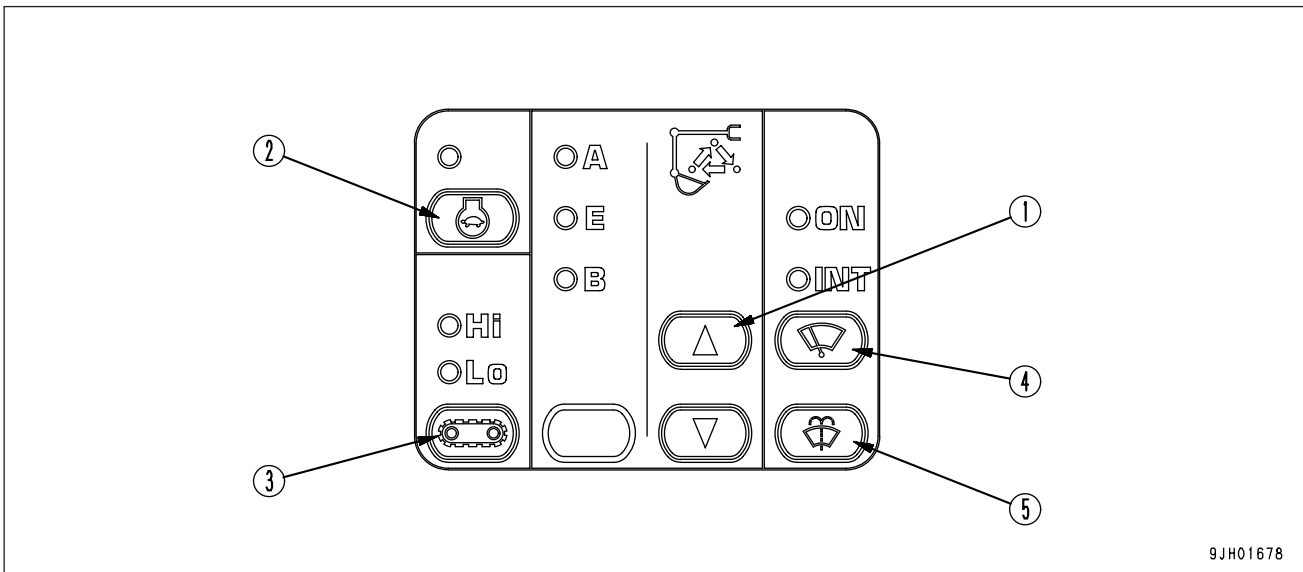
**SERVICE METER**

This meter(5) shows the total operation hours of the machine. Set the periodic maintenance intervals using this display. The service meter advances while the engine is running - even if the machine is not traveling.

The meter will advance by 1 for each hour of operation regardless of the engine speed.



### MONITOR SWITCHES



9JH01678

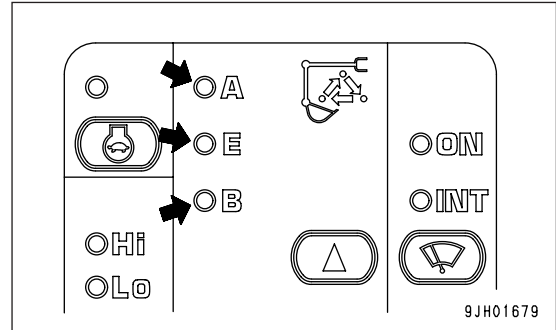
- (1) Working mode selector switch (basic switch)
- (2) Auto-deceleration switch (selection switch)
- (3) Travel speed switch
- (4) Wiper switch
- (5) Window washer switch

### WORKING MODE SELECTOR SWITCH (BASIC SWITCH)

This switch (1) is used to set the power and movement of the work equipment.

Operations can be carried out more easily by selecting the mode to match the type of operation.

- A lights up: For heavy-load operations
- E lights up: For operations with emphasis on fuel economy
- B lights up: For breaker operations



- When starting the engine, the A mode is automatically set. Each time the switch is pressed, the next mode can be selected.
- When starting the engine, if it is desired to set the E or B mode automatically (default option setting), please contact your Komatsu distributor for adjustment.

**NOTICE**

**When using the breaker, do not use A mode. There is danger that the breaker may be damaged.**

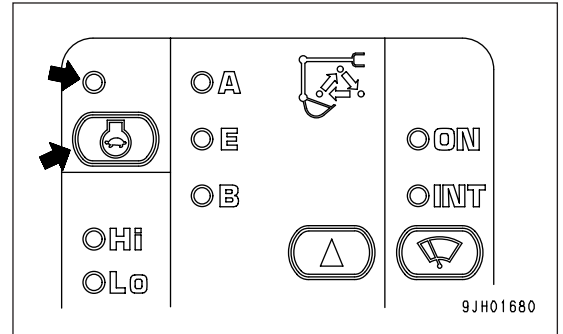
### AUTO-DECELERATION SWITCH

When this auto-deceleration switch button (2) is depressed, the auto-deceleration is actuated, if the control levers are in the neutral position, and the engine speed is automatically lowered to reduce fuel consumption.

The auto-deceleration lamp "ON": The auto-deceleration is actuated.

The auto-deceleration lamp "OFF": The auto-deceleration is released.

Every time the switch button is depressed, actuation and release alternate.



### TRAVEL SPEED SELECTOR SWITCH

**⚠ WARNING**

- When loading or unloading from a trailer, always travel at low speed. Never operate the travel speed selector switch during the loading or unloading operation.
- If the travel speed is switched between high and low when the machine is traveling, the machine may deviate to one side, even when traveling in a straight line. Stop the machine before switching the travel speed.

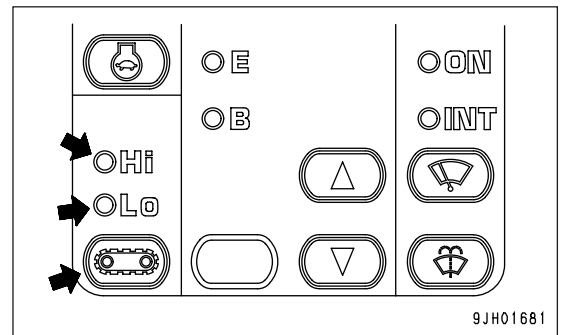
This switch(3) is used to select high or low travel speed.

Lo lights up: Low-speed travel

Hi lights up: High-speed travel

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

When traveling at high speed (Hi), if travel power is needed when traveling on soft ground or slopes, the travel speed is automatically set to low speed travel (Lo), so there is no need to operate this switch. On the monitor display, the Hi (high speed) lamp stays lighted up.



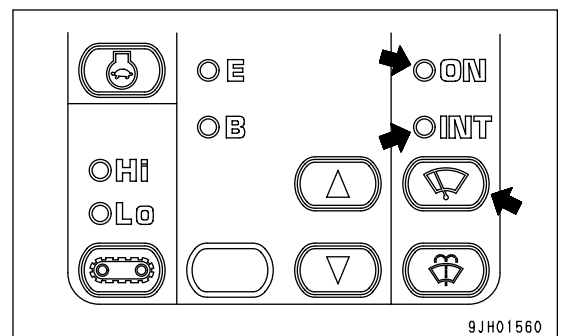
### WIPER SWITCH

This switch (4) actuates the front window wiper.

ON lights up: The wiper works continuously.

INT lights up: The wiper works intermittently.

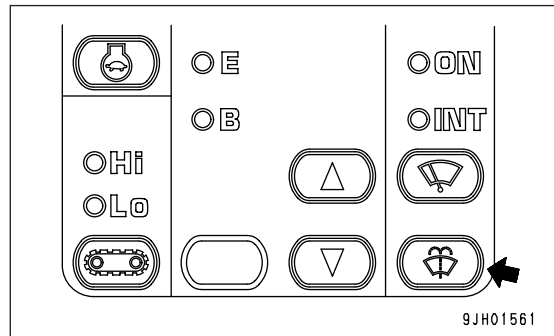
OFF: The wiper stops.



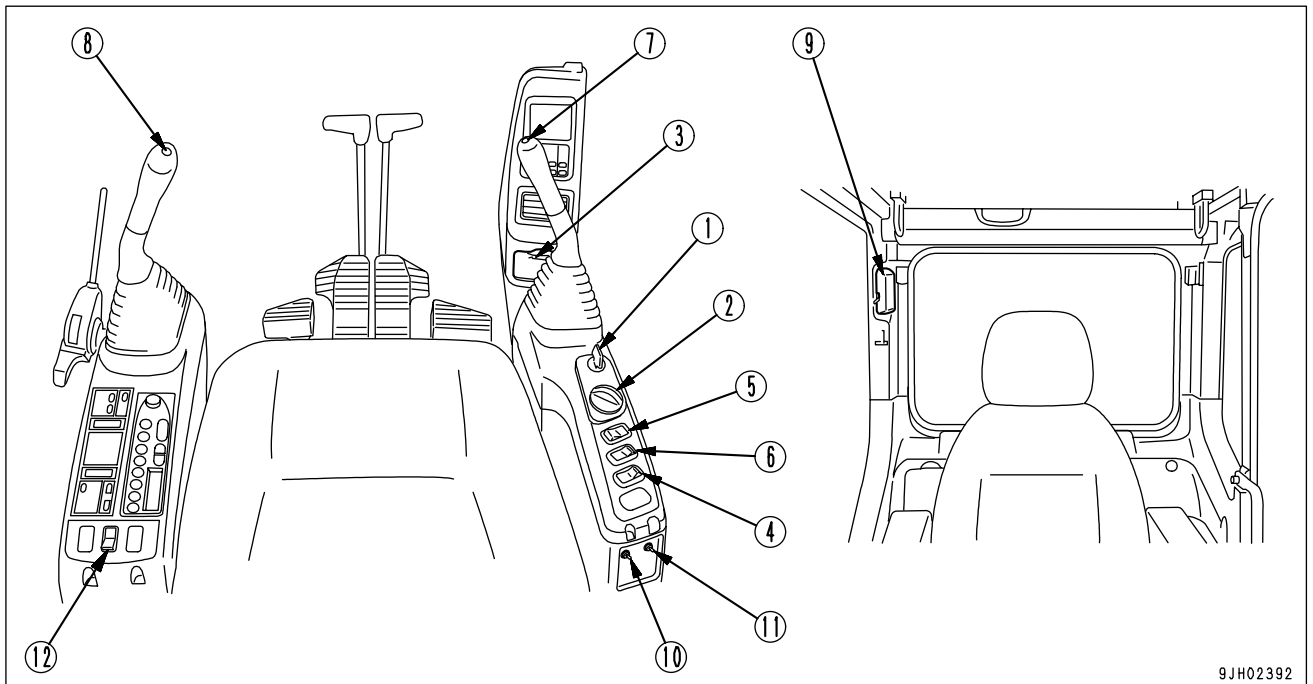
### WINDOW WASHER SWITCH

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

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



# SWITCHES



9JH02392

- (1) Starting switch
- (2) Fuel control dial
- (3) Cigarette lighter
- (4) Swing lock switch
- (5) Lamp switch
- (6) Alarm buzzer stop switch
- (7) Horn switch
- (8) Knob switch
- (9) Room lamp switch
- (10) Emergency pump drive switch
- (11) Swing brake cancel switch
- (12) Rotating lamp switch

## STARTING SWITCH

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

### OFF position

The key can be inserted or withdrawn. The switches for the electric system except the room lamp, are all turned off and the engine is stopped.

### ON position

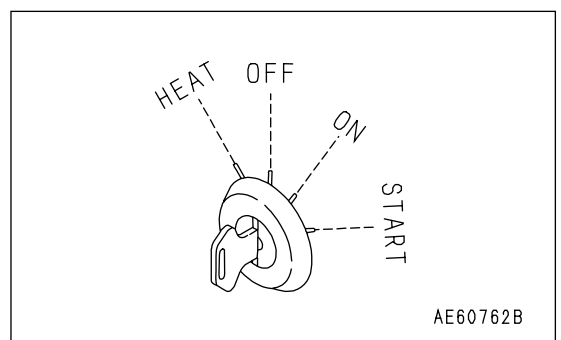
Electric current flows in the charging and lamp circuits. Keep the starting switch key at the ON position while the engine is running.

### START position

This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key. It will automatically return to the ON position.

### HEAT (preheat) position

When starting the engine in winter, set the key to this position. When the key is set to the HEAT position, the pre-heating monitor lights up. Keep the key at this position until the monitor lamp flashes. Immediately after the pre-heating monitor flashes, release the key. The key automatically returns to the OFF position. Then, start the engine by turning the key to the START position.

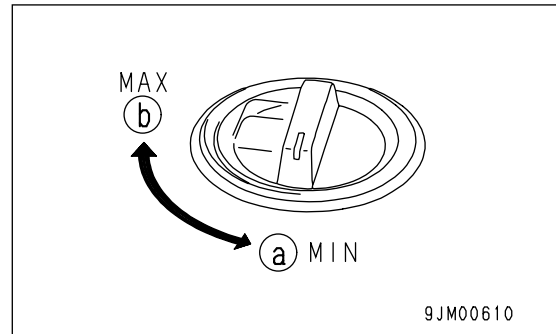


AE60762B

## FUEL CONTROL DIAL

This dial(2) is used to control the engine speed and output.

- (a) Low idling position: The dial is turned to the left (counter-clockwise)
- (b) High idling position: The dial is turned to the right (clockwise)

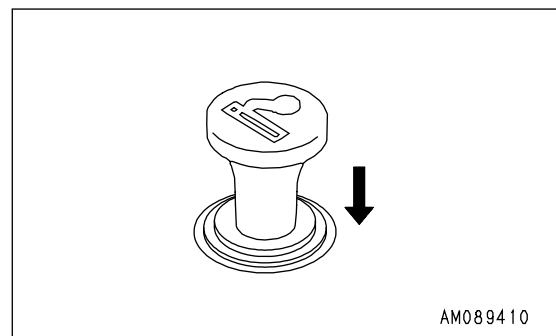


## CIGARETTE LIGHTER

This switch (3) is used when lighting cigarettes.

When the cigarette lighter is pushed in, it will return to its original position after several seconds, so pull it out to use it.

If the cigarette lighter is removed, it can be used as the power source for the yellow hazard lamp. The capacity of the cigarette lighter is 85W (24V x 3.5A).



## SWING LOCK SWITCH

### WARNING

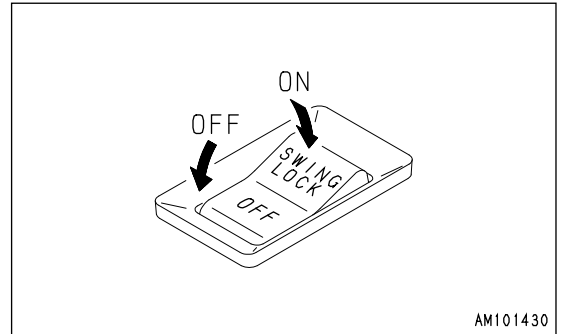
- When traveling or when not using the swing operation, apply the swing lock.
- On slopes, even when the swing lock switch is at the ON position, the weight of the work equipment may cause the upper structure to swing if the swing control lever is operated in the downhill direction.

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

**ON position (actuated):** The swing lock is always applied, and the upper structure will not swing even if the swing is operated. In this condition, the swing lock lamp lights up.

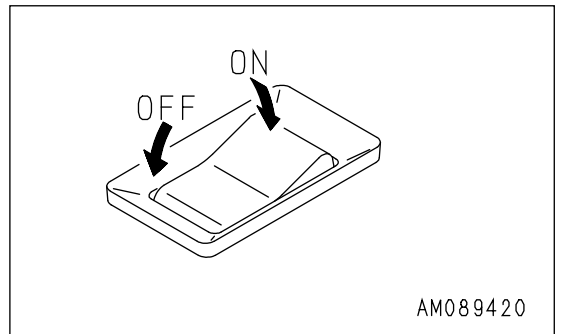
**OFF position (canceled):** The swing lock is applied only when all the control levers of the work equipment are at neutral; when any of the control levers is operated, it is cancelled.

The swing lock is actuated approx. 5 seconds after all the control levers are placed in the neutral position.



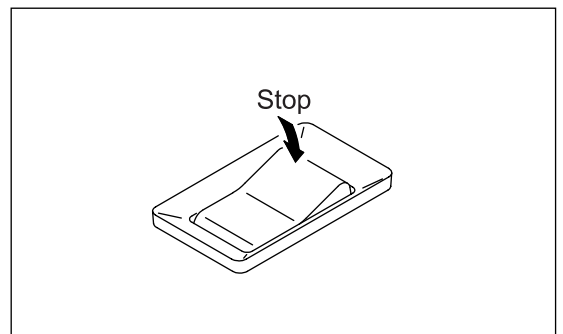
## LAMP SWITCH

This switch (5) is used to light up the front lamps, working lamp, additional lamp at the top front of the cab, rear lamp, and monitor lighting.



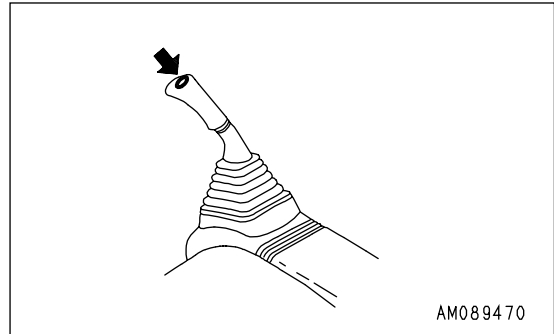
## ALARM BUZZER STOP SWITCH

This switch (6) is used (when the engine is running) to stop the alarm buzzer when it has sounded to warn of an abnormality in a warning item.



## HORN SWITCH

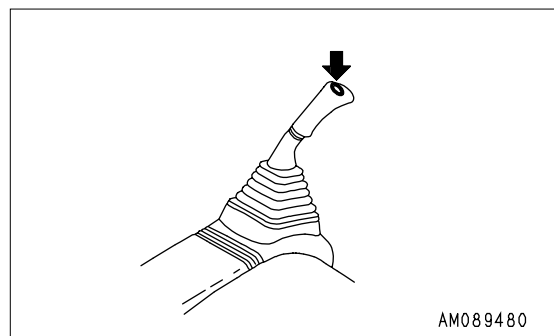
When the button(7) at the tip of the right work equipment control lever is pressed, the horn will sound.



## KNOB SWITCH

Knob switch (8) on the left work equipment control lever is used to actuate the power max and slow-down functions.

Press once (single click) and keep the switch pressed. The one-touch power max. function is actuated for a maximum of 8.5 seconds at A and E mode.



## ROOM LAMP SWITCH

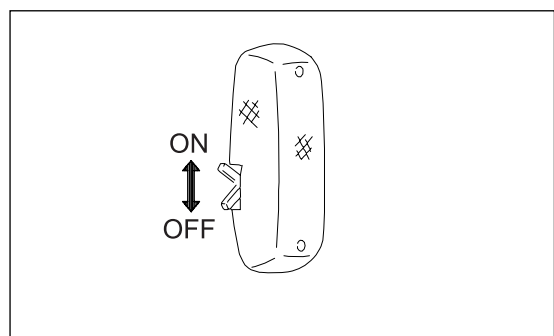
### NOTICE

**Be sure to switch the lamp to the OFF position after use.  
If the switch is left at the ON position, the battery will run down.**

This switch (9) is used to light up the room lamp.

ON position: Lights up  
OFF position: Goes out

It will also light up even when the engine is not running.





## EMERGENCY PUMP DRIVE SWITCH

### NOTICE

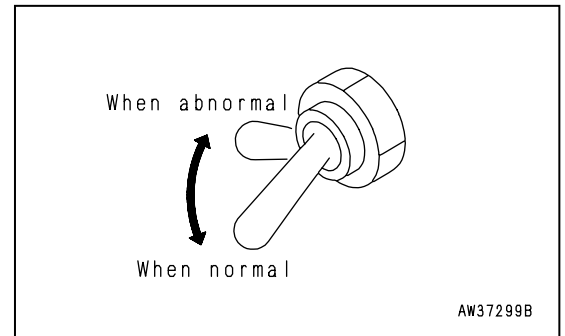
This switch is installed to make it possible to carry out operation temporarily if any abnormality should occur in the pump control system. It is not intended for permanent use. Repair the cause of the abnormality immediately.

This switch (10) is used to make it possible to carry out operations temporarily if any abnormality should occur in the pump control system (when the display shows E02).

When normal: Move switch down

When abnormal: Move switch up

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



## SWING BRAKE CANCEL SWITCH

### NOTICE

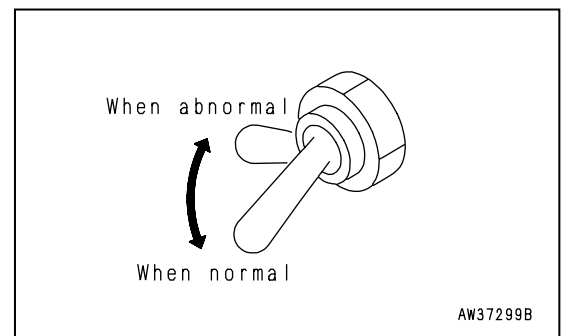
This switch is installed to make it possible to carry out operation temporarily if any abnormality should occur in the swing brake system. It is not intended for permanent use. Repair the cause of the abnormality immediately.

This switch (11) is used to make it possible to carry out operations temporarily if any abnormality should occur in the swing brake system (when the display shows E03).

When normal: Move switch down

When abnormal: Move switch up

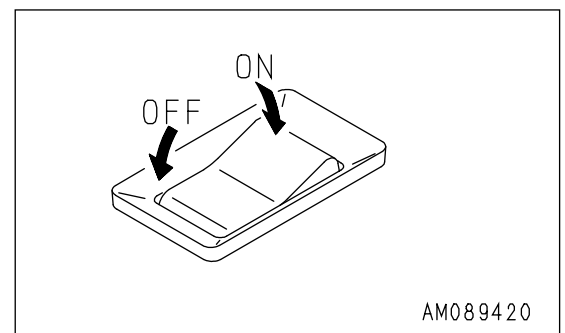
If the display shows E03, move the switch up to make it possible to carry out work.



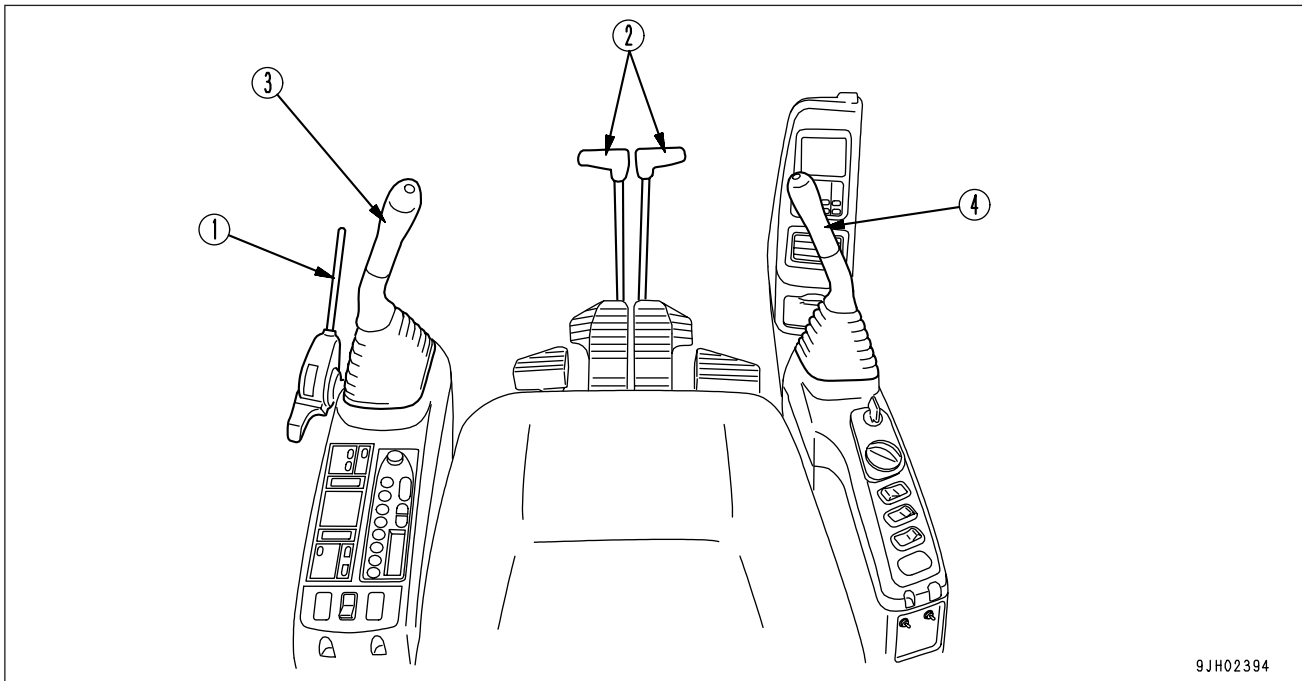
## ROTATING LAMP SWITCH

(if equipped)

This switch (12) is used to light up the yellow rotating lamp on top of the cab.



## CONTROL LEVERS, PEDALS



9JH02394

- |  |  |
|--|--|
| (1) Safety Lock Lever                          | (3) Left Work Equipment Control Lever  |
| (2) Travel Levers (Machines with travel pedal) | (4) Right Work Equipment Control Lever |

## SAFETY LOCK LEVER

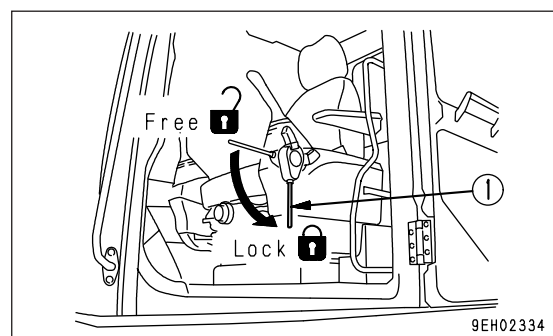
### ⚠ WARNING

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

Lever (1) is a device to lock the work equipment, swing, travel, and attachment (if equipped) control levers.

Pull the lever up to apply the lock.

This lock lever is a hydraulic lock, so even if it is in the lock position, the work equipment control lever and travel lever will move, but the work equipment, travel motor, and swing motor will not work.



9EH02334

## TRAVEL LEVERS

### WARNING

- Do not put your foot on the pedal unless the machine is traveling. If you leave your foot on the pedal and press it by mistake, the machine will move suddenly, and this may lead to a serious accident.
- With the track frame facing to the rear, the machine will move in the reverse direction by forward traveling and in the forward direction by reverse traveling. When the travel lever is used, check to see if the track frame is facing forward or backward. (If the sprocket is located to the rear, the track frame is facing forward.)
- Be extremely careful when using the pedal for operations and travel.

This lever (2) is used to switch the direction of travel of the machine. ( ) shows the operation of the pedal.

(a) FORWARD:

The lever is pushed forward  
(The pedal is angled forward)

(b) REVERSE:

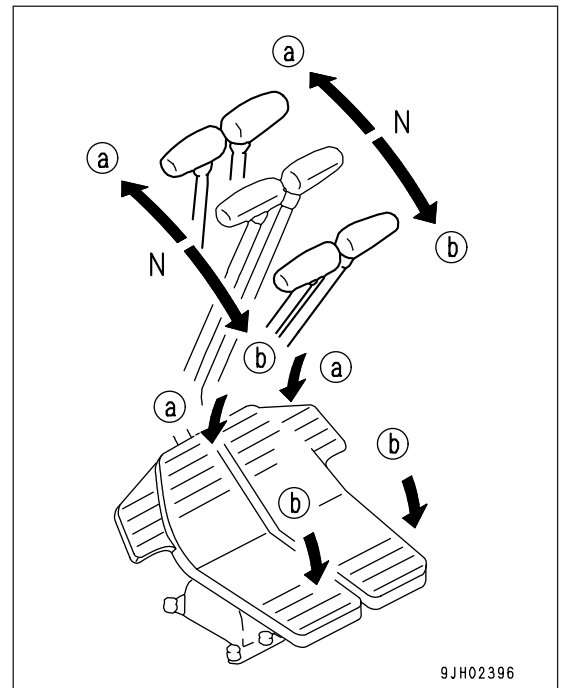
The lever is pulled back  
(The pedal is angled back)

N (Neutral): The machine stops

( ) : This indicates operation of the pedal.

### REMARK

- Machines equipped with travel alarm (If equipped)  
If the lever is shifted to the advance or reverse position from the neutral position, the alarm sounds to warn that the machine is starting to advance.
- The travel lever can use the auto-deceleration mechanism to change the engine speed as follows.
- When the travel lever and work equipment control levers are at the neutral position, even if the fuel control dial is above midrange speed, the engine speed will go down to a midrange speed. If one of these levers is operated, the engine speed will rise to the speed set by the fuel control dial.
- If all the control levers are at the neutral position, the engine speed goes down approx. 100 rpm, then after approx. 4 seconds, the engine speed goes down to the deceleration speed (approx. 1400 rpm).



## WORK EQUIPMENT CONTROL LEVER

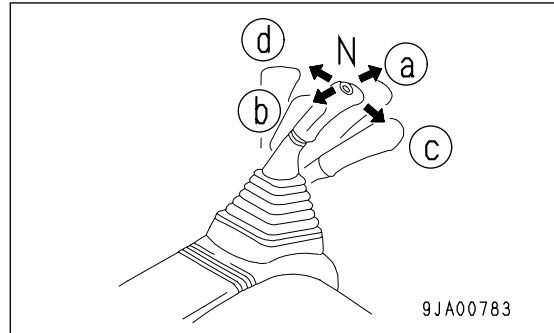
(with auto-deceleration device)

This Left work equipment control lever (3) is used to operate the arm and upper structure.

Arm operation / Swing operation

- (a) Arm OUT
- (b) Arm IN
- (c) Swing to right
- (d) Swing to left

N (Neutral): The upper structure and arm are held in position and do not move.

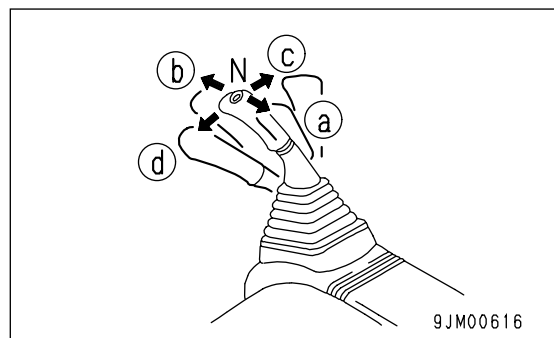


This Right work equipment control lever(4) is used to operate the boom and bucket.

Boom operation / Bucket operation

- (a) RAISE
- (b) LOWER
- (c) DUMP
- (d) CURL

N (Neutral): The boom and bucket are held in position and do not move.



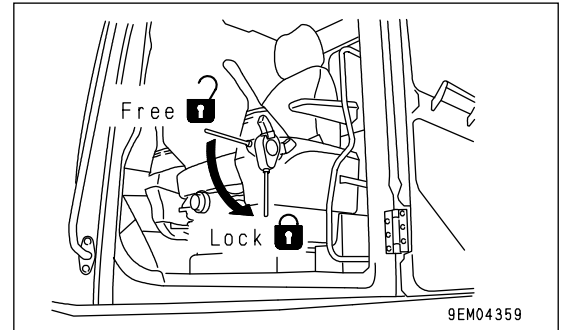
### REMARK

- The engine speed for all control levers (travel, work equipment, attachment) is changed as follows by the auto-deceleration mechanism.
- When the travel lever and work equipment control levers are at the neutral position, even if the fuel control dial is above midrange speed, the engine speed will go down to a midrange speed. If one of these levers is operated, the engine speed will rise to the speed set by the fuel control dial.
- If all the control levers are at the neutral position, the engine speed goes down approx. 100 rpm, then after approx. 4 seconds, the engine speed goes down to the deceleration speed (approx. 1400 rpm).

## CEILING WINDOW

### WARNING

- When leaving the operator's compartment, set the safety lock lever securely to the LOCK position.
- If the control levers are not locked, and they are touched by mistake, this may lead to a serious accident.

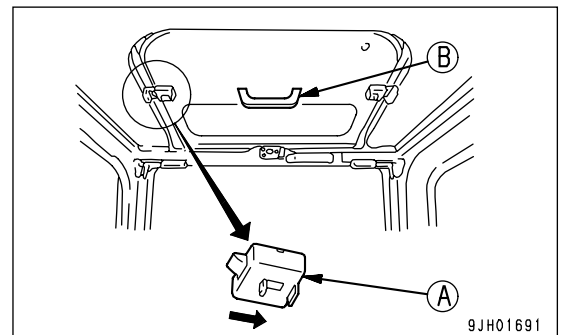


#### When opening

1. Lock the safety lock lever securely.
2. Check for any ceiling window movement by pulling lock knob (A) located on front side, then push up and open the ceiling window grasping grip (B).

#### When closing

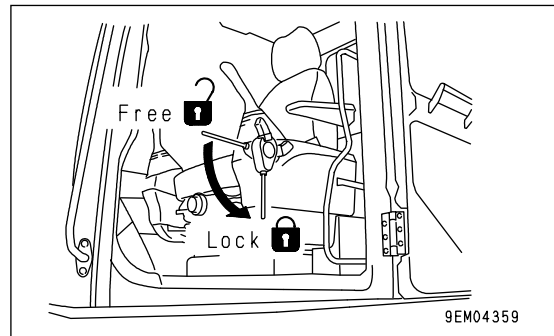
Close the ceiling window grasping grip (B) and lock it with lock knob (A). If the lock cannot be applied, open and close the ceiling window again.



## FRONT WINDOW

### WARNING

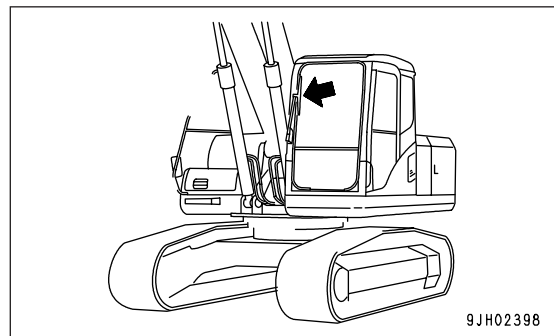
- When opening or closing the ceiling window, front window, bottom window, or door, always set the safety lock lever to the LOCK position. If the control levers are not locked and they are touched by accident, this may lead to a serious accident.
- When opening or closing the window at the front of the cab, stop the machine on horizontal ground, lower the work equipment completely to the ground, stop the engine, then carry out the operation.
- When opening the front window, hold the grip securely with both hands, pull up, and do not let go until the automatic lock catch is locked.
- When closing the front window, the window will move quicker under its own weight. Hold the grips securely with both hands when closing it.



It is possible to store (pull up) the front window (top) in the roof of the operator's compartment.

### When opening

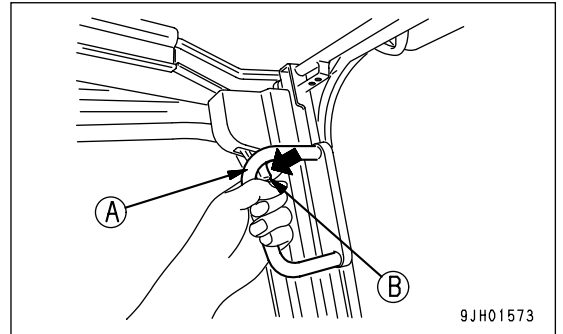
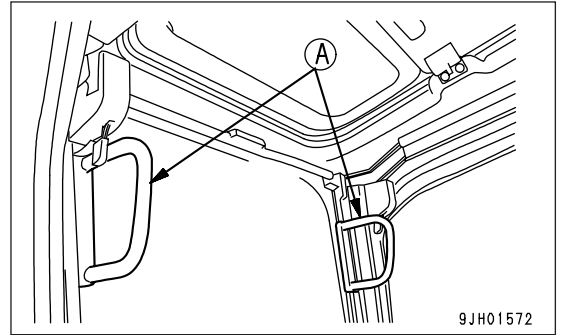
1. Place the work equipment on flat ground and stop the engine.
2. Securely lock the safety lock lever.
3. Check that the wiper blade is stored in the right stay.



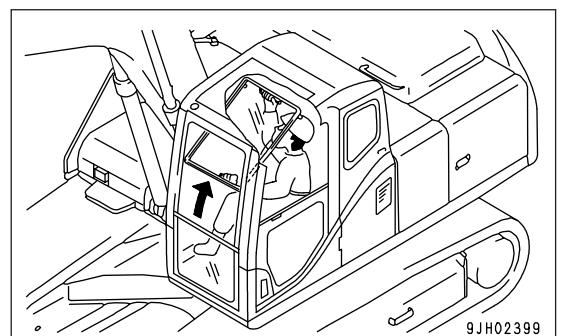
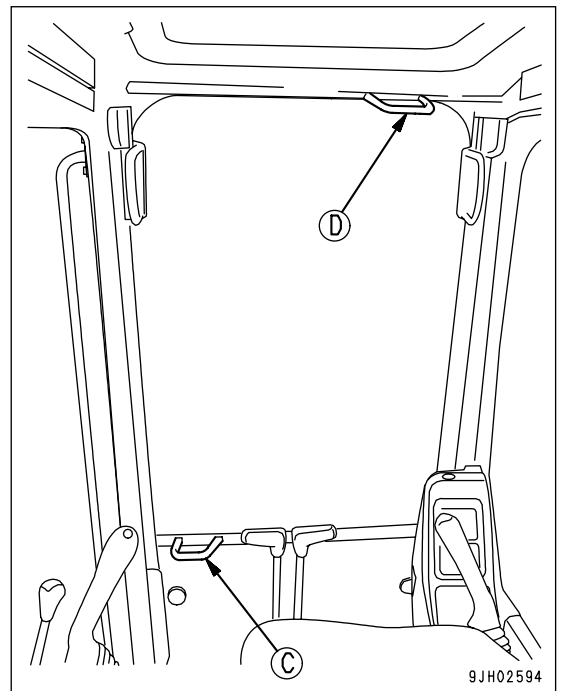
## OPERATION

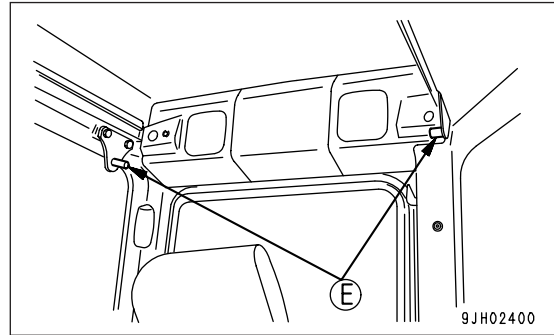
## EXPLANATION OF COMPONENTS

4. Grip knobs (A) at the top, bottom, left, and right of the front window, and pull lock lever (B) to release the lock at the top of the front window. The top of the front window will come out.



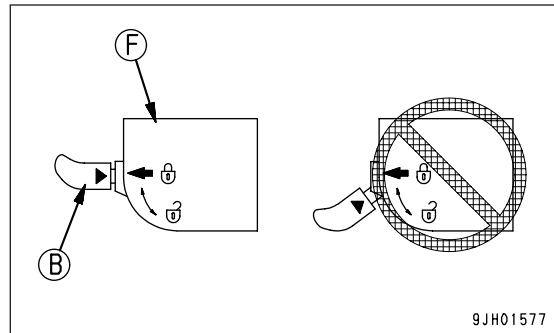
5. Hold lower knob (C) with your left hand from inside the operator's cab, and with your right hand, grip top knob (D), pull it up, and push it against lock catch (E) at the rear of the cab securely to lock the window.





6. Check that lock lever (B) is securely at the LOCK position.

- The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lock lever (B). Check visually.
- If the arrow on lock case (F) does not match the position of the arrow on lock lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock.



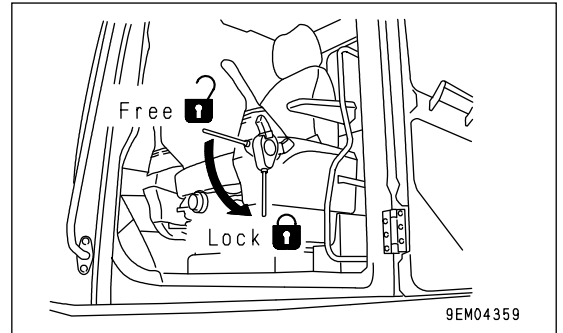


When closing

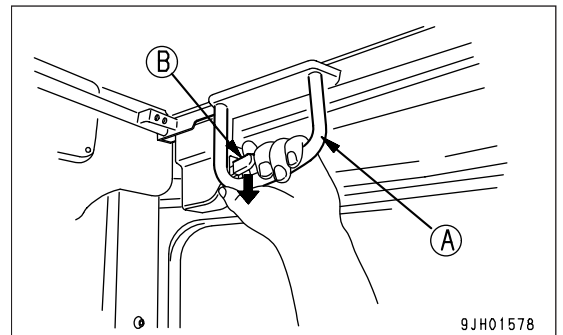
**⚠ WARNING**

When closing the window, lower it slowly and be careful not to get your hand caught.

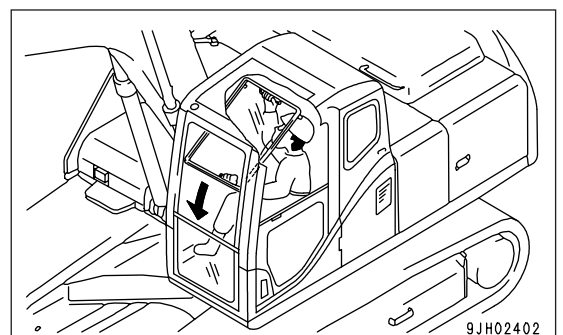
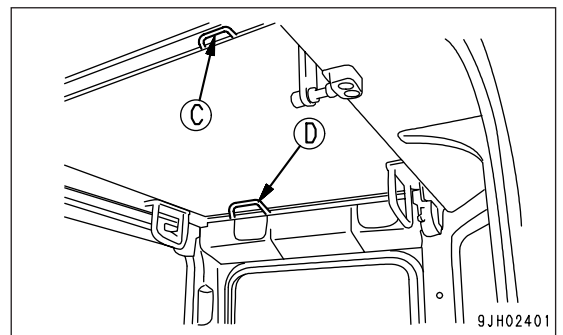
1. Place the work equipment on flat ground and stop the engine.
2. Securely lock the safety lock lever.



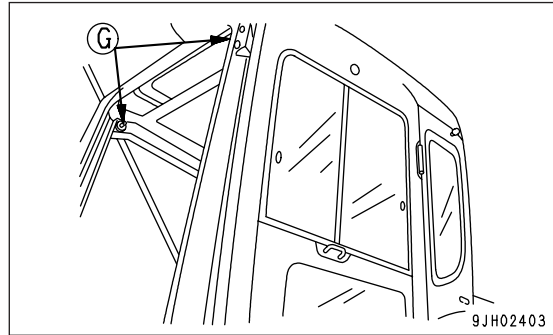
3. Grip left and right knobs (A), and pull down lock lever (B) to release the lock.



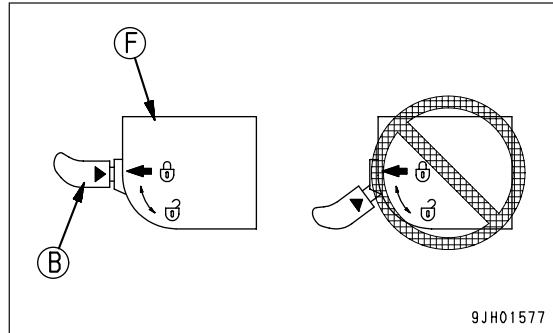
4. Grip knob (C) at the bottom of the front window with your left hand and knob (B) at the top with your right hand, push to the front, then lower slowly.



5. When the bottom of the window reaches the top of the bottom window, push the top of the window to the front to push it against left and right lock catches (G) and engage the lock.

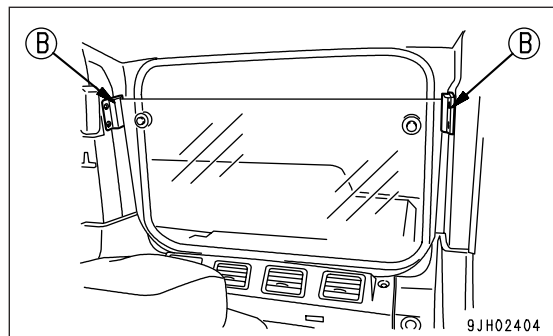
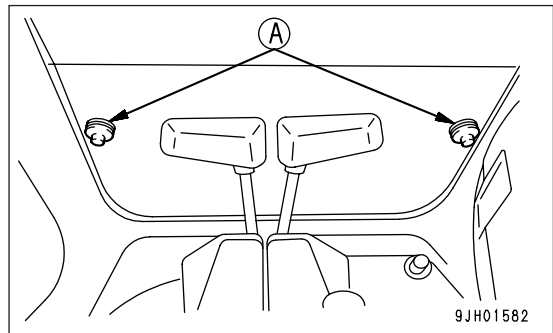


6. Check that lock lever (B) is securely at the LOCK position.
  - The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lock lever (B). Check visually.
  - If the arrow on lock case (F) does not match the position of the arrow on lock lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock.



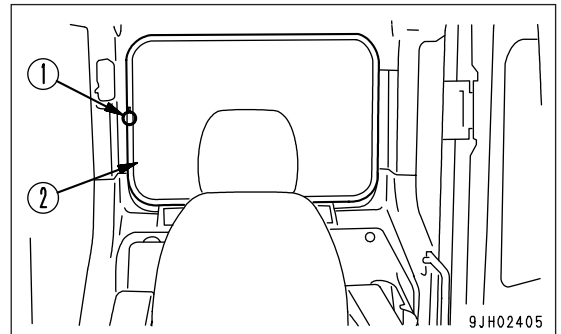
**Removing front window (bottom)**

1. Open the front window, then hold grip (A), pull up, and remove the bottom window.
2. After removing the bottom window, store it at the rear of the operator's cab and lock it securely with left and right locks (B).
  - When removing, always hold the glass with one hand and release the lock with the other hand.



## EMERGENCY EXIT FROM OPERATOR'S CAB

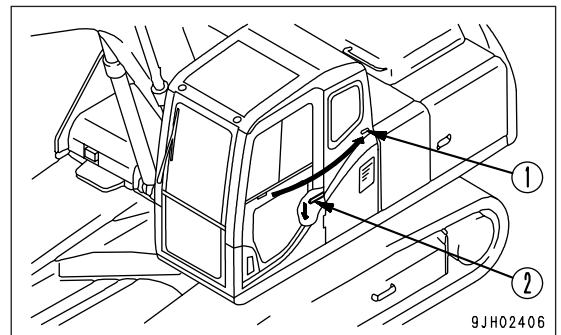
- If for some reason, the cab door does not open, open the rear window and use it as an emergency escape exit.
- Remove the rear window as follows.
  1. Pull ring (1) and completely remove seal (2) from the rubber core.
  2. When the corner of the front window glass is pushed strongly, it can be removed to the outside.
    - Do not remove the rear window except when using it as an emergency exit.



## DOOR LOCK

Use the door lock to fix the door in position after opening it.

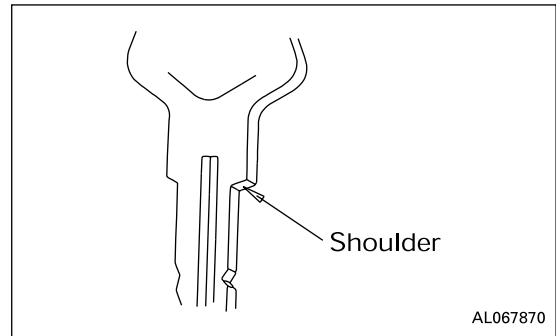
1. Push the door against catch (1) to fix it in position.
2. To release the lock, press knob (2) down at the left side of the operator's seat to release the catch.
3. When fixing the door, fix it firmly to the catch.



## CAP, COVER WITH LOCK

Locks are fitted to the fuel tank filler, hydraulic tank filler, operator's cab, engine hood, battery box cover, right side door of the machine, and left side door of the machine. Use the starting key to open and close the caps, doors and covers.

Insert the key as far as it will go, then turn it. If the key is turned before it is inserted fully, it may break.



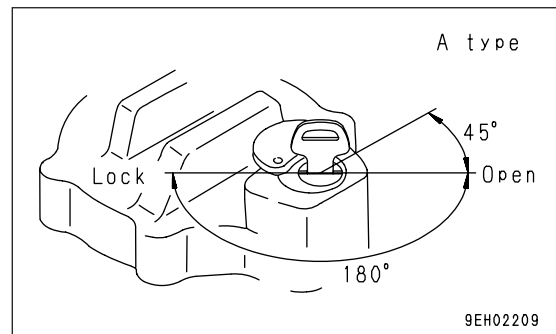
## METHOD OF OPENING AND CLOSING CAP WITH LOCK

### When opening

1. Insert the key into the key slot.
2. Turn the starting switch key counterclockwise, align the key slot and counter mark on the cap, then open the cap.

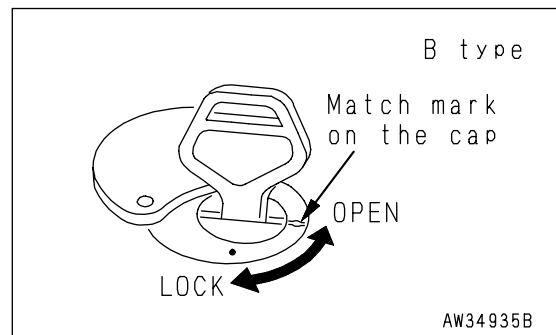
### REMARK

- Type A is used for the fuel tank cap. Type B is used for the hydraulic tank cap.
- With type A, the cap is locked if it rotates freely. When it rotates, the cap does not come off from the tank. Turn the starting switch key counterclockwise, align the groove in the rotor with the counter mark on the cap, then turn the cap slowly, and when a click is heard, the lock is released and the cap can be opened.



### When locking

1. Screw in the cap, then insert the key in the key slot.
2. Turn the starting switch key clockwise, then remove the key.



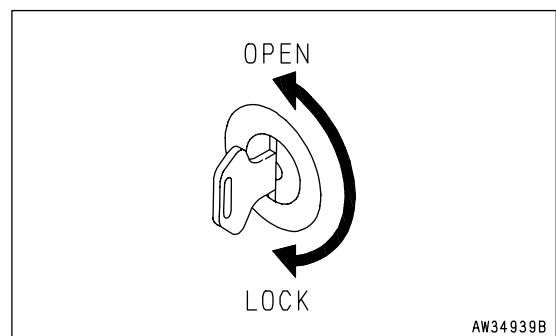
## METHOD OF OPENING AND CLOSING COVER WITH LOCK

### To open the cover (locked cover)

1. Insert the key into the key slot.
2. Turn the key counterclockwise and open the cover by pulling the cover grip.

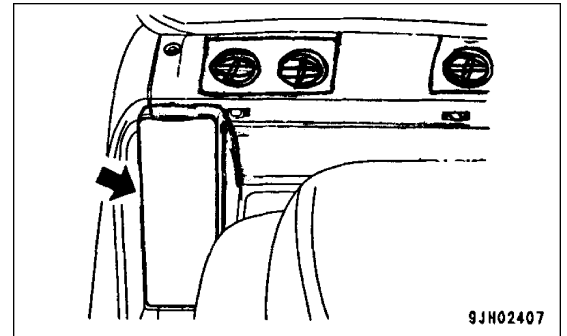
### To lock the cover

1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and take the key out.



## HOT AND COOL BOX

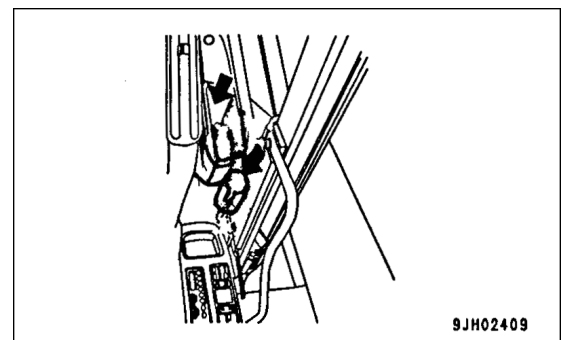
This is at the rear right of the operator's seat. It is interconnected with the air conditioner: it warms when the heater is being used and cools when the air conditioner is being used.



## MAGAZINE BOX AND CUP HOLDER

This is on the left side of the operator's seat.

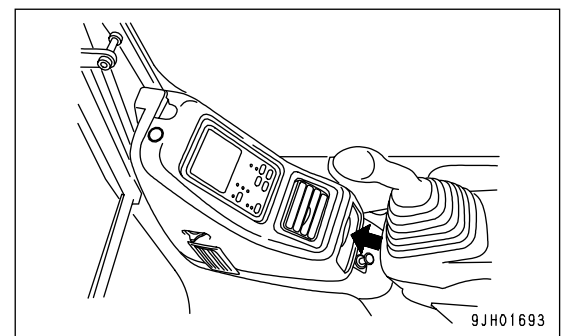
Keep the Operation and Maintenance Manual in this box so that it can be taken out and read whenever necessary.



## ASHTRAY

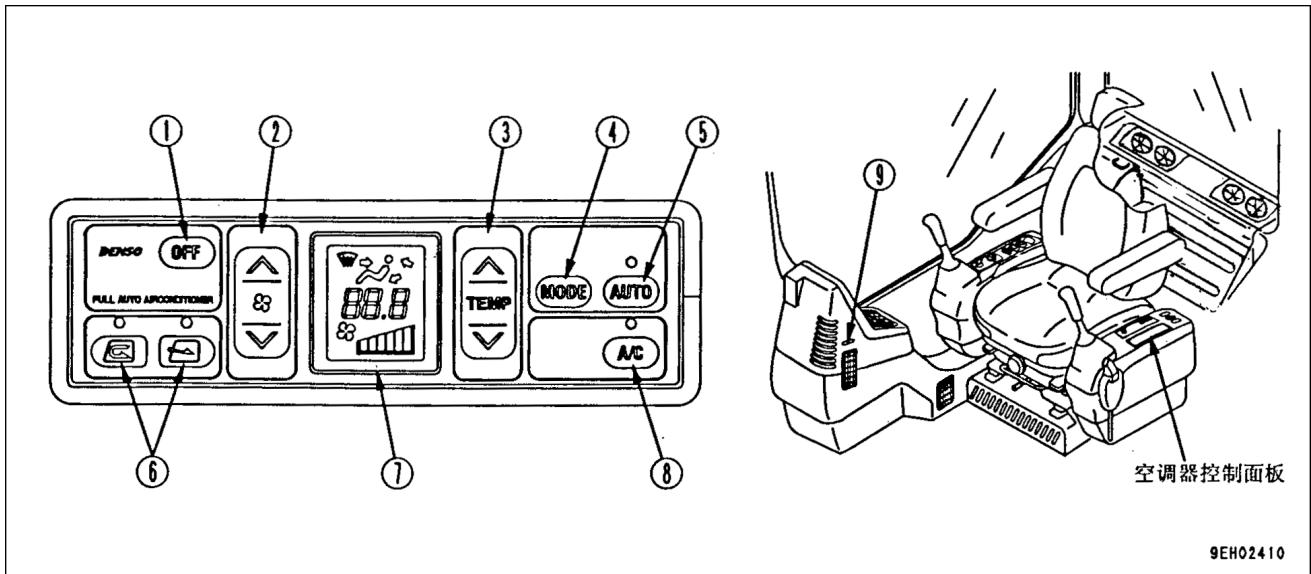
This is under the machine monitor at the front right of the operator's compartment.

Always make sure that you extinguish your cigarette, then put it in the ashtray and close the lid.



# HANDLING AIR CONDITIONER

## GENERAL LOCATIONS OF CONTROL PANEL

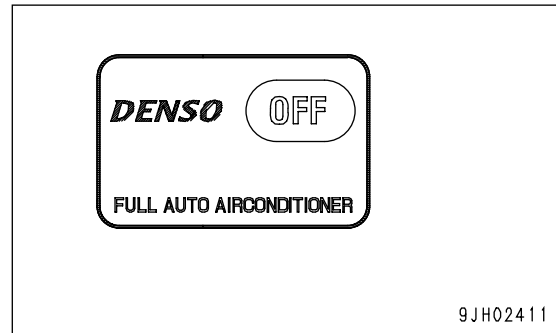


- |                                |                                  |
|--------------------------------|----------------------------------|
| (1) OFF switch                 | (6) FRESH/RECIRC selector switch |
| (2) Fan switch                 | (7) Display monitor              |
| (3) Temperature control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

### OFF SWITCH

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

- When OFF switch (1) is pressed, the set temperature and air flow display on display monitor (7) and the lamps above auto switch (5) and air conditioner switch (8) go out, and operation stops.

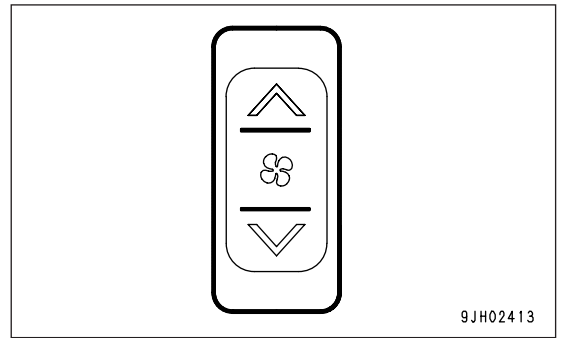


**FAN SWITCH**

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

The air flow can be adjusted to six levels.

- Press the ^ switch to increase the air flow; press the v switch to reduce the air flow.
- During auto operation, the air flow is automatically adjusted.



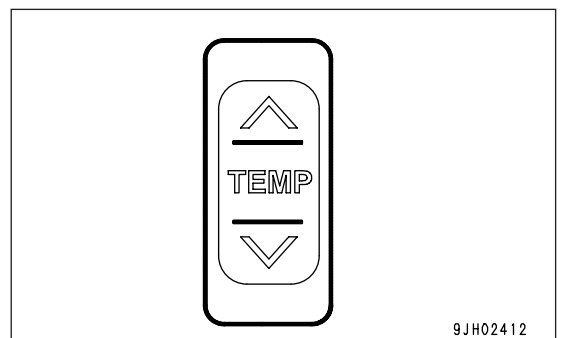
**<Monitor display and air flow>**

Liquid crystal display	Air flow
	Air flow "low"
	Air flow "medium 1"
	Air flow "medium 2"
	Air flow "medium 3"
	Air flow "medium 4"
	Air flow "high"

**TEMPERATURE CONTROL SWITCH**

This switch (3) is used to control the temperature inside the cab. The temperature can be set between 18°C (64.4°F) and 32°C (89.6°F).

- Press the ^ switch to raise the set temperature; press the v switch to lower the set temperature.
- The temperature is generally set at 25°C (77°F).
- The temperature can be set in stages of 0.5°C (0.9°F).



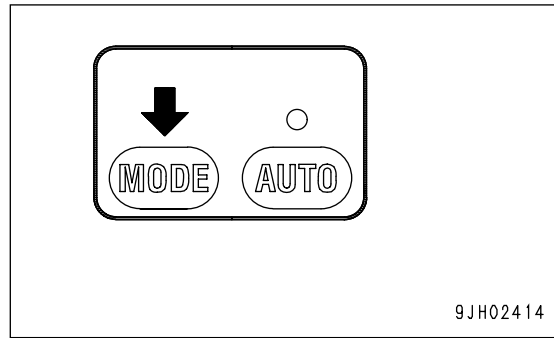
**<Monitor display and the function>**

Monitor display (°C)	Set temperature
18.0 (64.4°F)	Max. cooling
18.5 to 31.5 (65.3°F to 88.7°F)	Adjusts temperature inside cab to set temperature
32.0 (89.6°F)	Max. heating

### VENT SELECTOR SWITCH

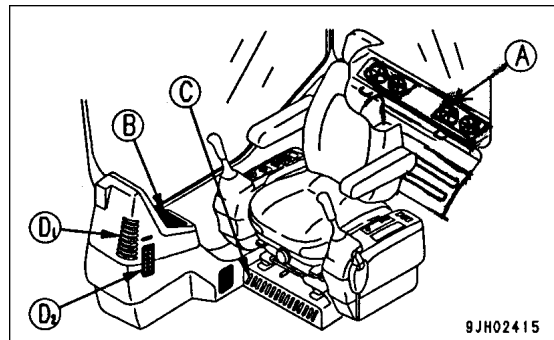
This switch (4) is used to select the vents.

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



- (A): Rear vents (4 places)
- (B): Face vent (1 place)
- (C): Foot vent (1 place)
- (D1): Front window vent (1 place)
- (D2): Front window vent (1 place)

- Front window vent (D2) can be opened or closed by hand.



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

Note 1: Air blows out from vents marked ○

Note 2: The defroster vents can be opened or closed manually with the vent lever.

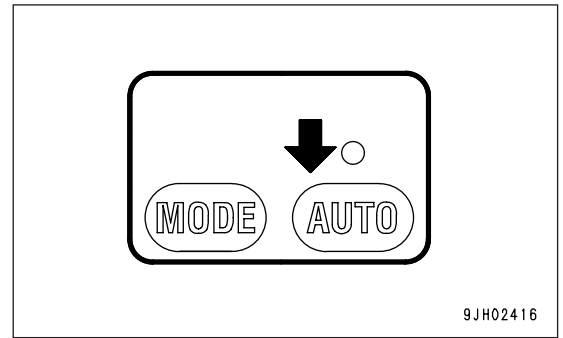


**AUTO SWITCH**

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

This switch also acts as the air conditioner main switch.

- When auto switch (5) is pressed, the lamp at the top of the auto switch lights up.
- Normally, press this switch, then use temperature control switch (3) to set the temperature, and run the air conditioner under automatic control.
- When the control is switched from automatic operation to manual operation, it is possible to operate the switch to change the air flow, vents, and air source (RECIRC/FRESH). When the manual control is used, the lamp at the top of the auto switch goes out.

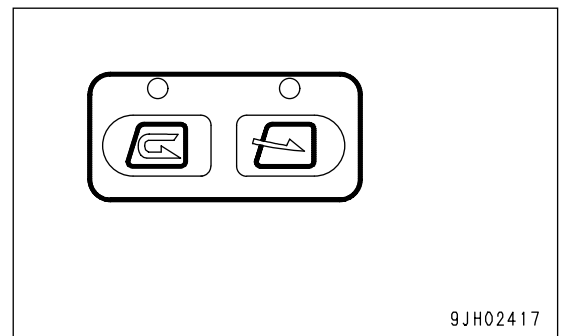


RECIRC	The outside air is shut off and only the air inside the cab is circulated. Use this position to carry out rapid cooling of the cab or when the outside air is dirty.
FRESH	Outside air is taken into the cab. Use this position to take in fresh air or when carrying out demisting.

**FRESH/RECIRC SELECTOR SWITCH**

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

- When switch (6) is pressed, the lamp at the top of the selector switch lights up to show that air is being blown out.
- During automatic operation, the selection of inside air (RECIRC) and outside air (FRESH) is carried out automatically.

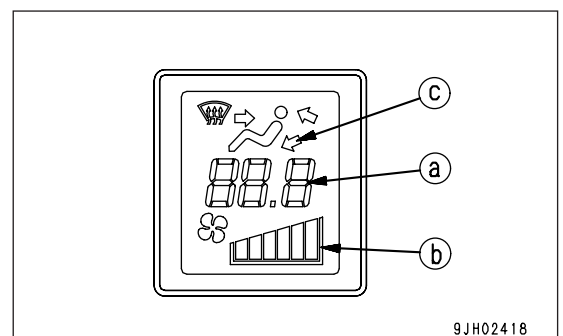


RECIRC	The outside air is shut off and only the air inside the cab is circulated. Use this position to carry out rapid cooling of the cab or when the outside air is dirty.
FRESH	Outside air is taken into the cab. Use this position to take in fresh air or when carrying out demisting.

**DISPLAY MONITOR**

This display monitor displays the status of temperature setting (a), air flow (b), and vents (c).

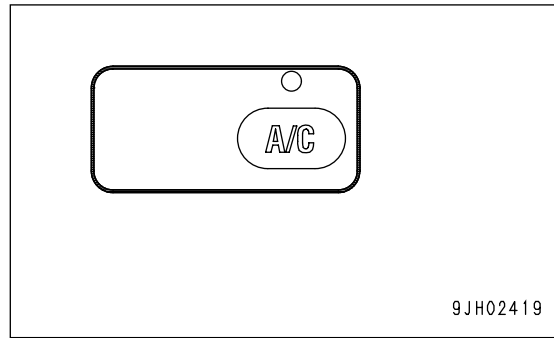
- When OFF switch (1) is pressed, the display of temperature setting (a) and air flow (b) goes out, and operation stops.



### AIR CONDITIONER SWITCH

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

- When the fan is acutated (the display monitor shows (b)) and air conditioner switch (8) is pressed, the air conditioner is switched ON, the lamp at the top of the air conditioner switch lights up, and the air conditioner starts. When it is pressed again to the OFF position, the lamp at the top of the air conditioner switch goes out.
- The air conditioner cannot be operated while the fan is stopped.



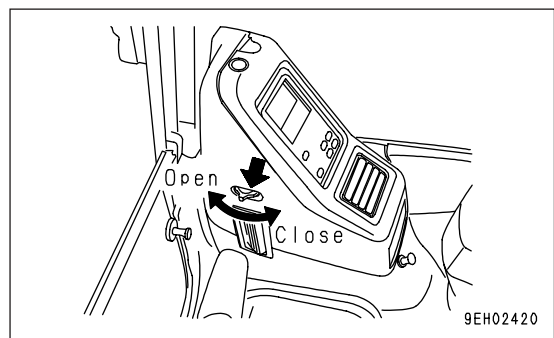
### DEFROSTER SELECTOR LEVER

This switch (9) is used in cold or rainy weather to remove the mist that forms on the front glass.

Selector lever forward: To defroster (open)

Selector lever back: Closed

The defroster can be used when the vent selector switch is set to face or face and foot.

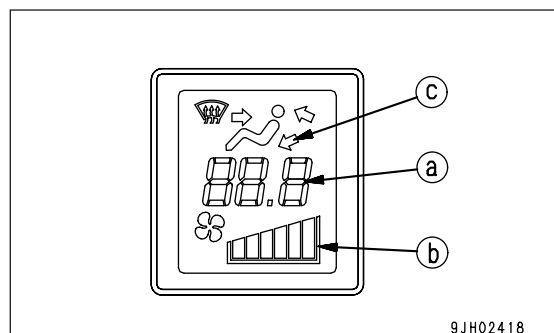
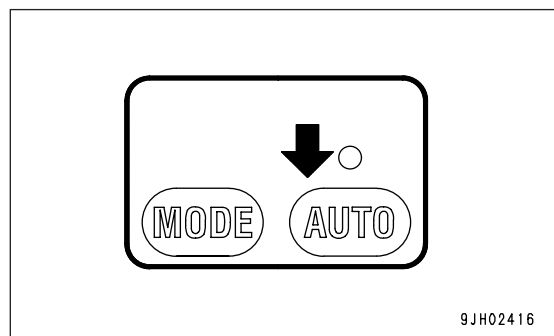


### METHOD OF OPERATION

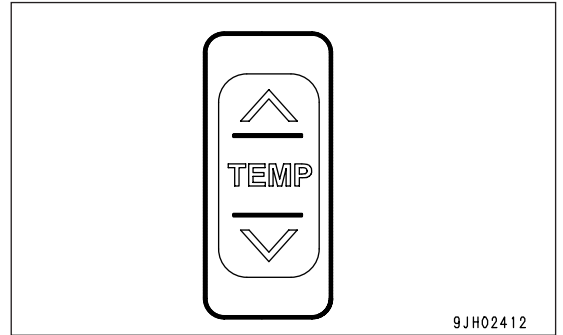
The air conditioner can be operated automatically or manually. Select the method of operation as desired.

#### AUTOMATIC OPERATION

1. Turn auto switch (5) ON.
  - The lamp at the top of switch (5) lights up.
  - The set temperature (a) and air flow (b) are displayed on the monitor.

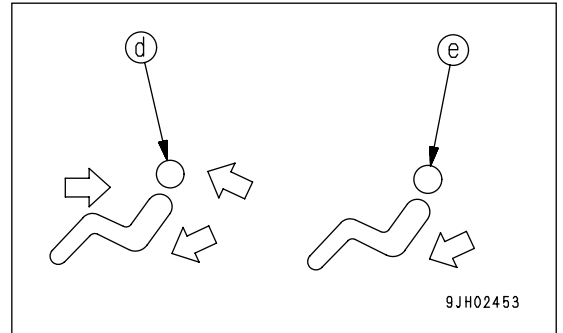


- 2. Use temperature set switch (3) to set to the desired temperature. The air flow, combination of vents, and selection of fresh or recirculated air is automatically selected according to the set temperature, and the air conditioner is operated automatically to provide the set temperature.



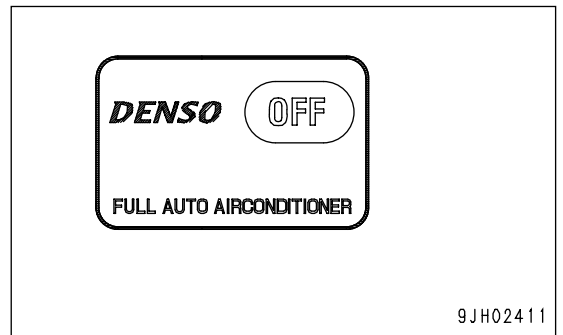
**REMARK**

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



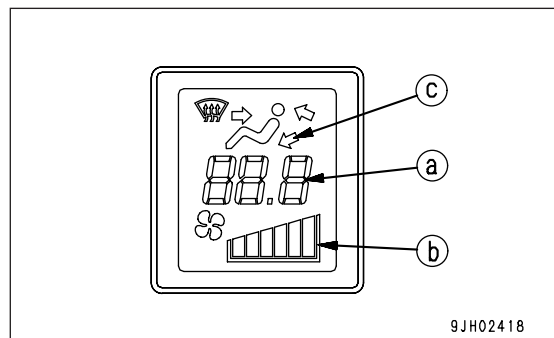
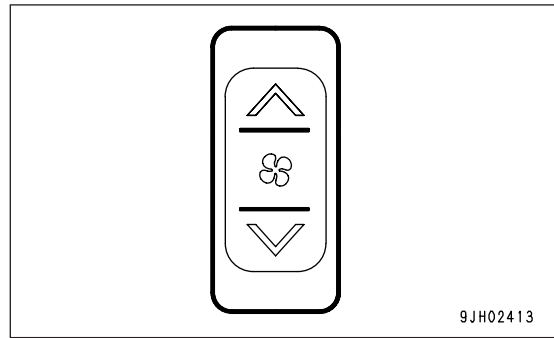
**STOPPING AUTOMATIC OPERATION**

Press OFF switch (1). The displays for temperature setting (a) and air flow (b) on the display monitor, and the lamps above auto switch (5) and air conditioner switch (8) go out, and the operation stops.

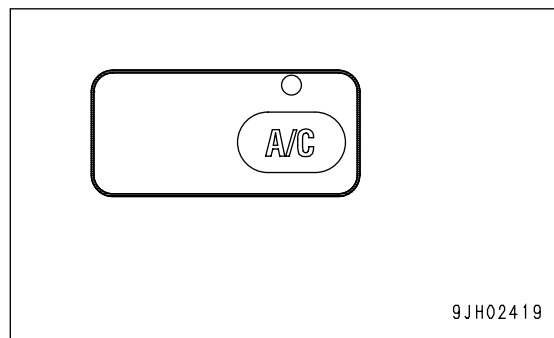


**MANUAL OPERATION**

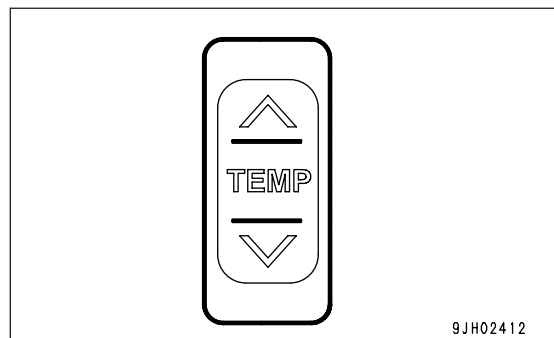
- 1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on the display monitor.



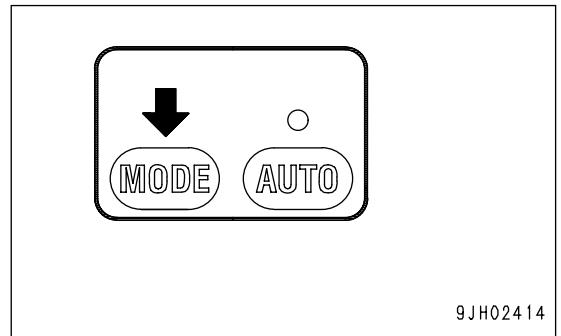
- 2. Turn air conditioner switch (8) ON. Check that the lamp at the top of the air conditioner switch lights up.



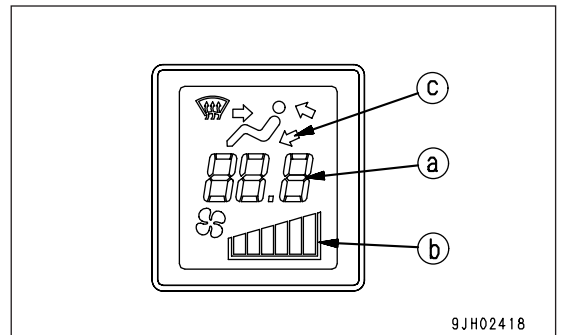
- 3. Press the temperature setting switch and adjust the temperature inside the cab.



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

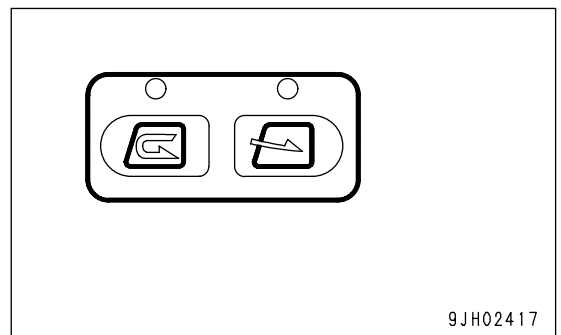


9JH02414



9JH02418

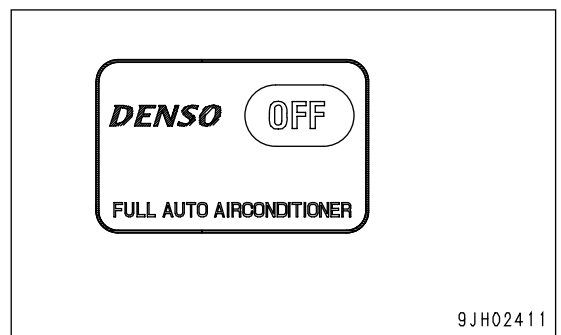
5. Press RECIRC/FRESH selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).



9JH02417

**STOPPING MANUAL OPERATION**

Press OFF switch (1). The displays for temperature setting (a) and air flow (b) on the display monitor, and the lamps above auto switch (5) and air conditioner switch (8) go out, and the operation stops.

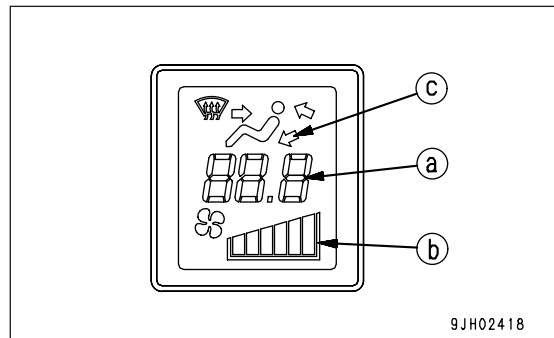
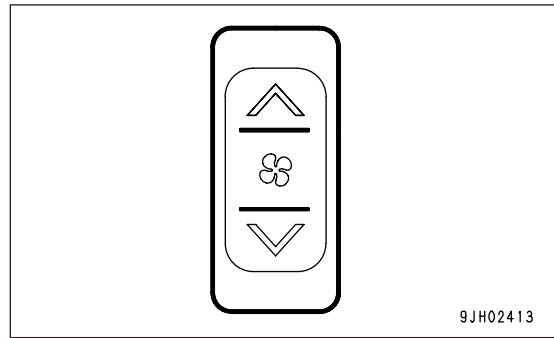


9JH02411

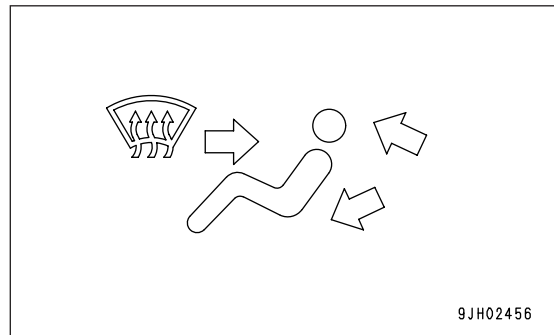
**OPERATION WITH COLD AIR TO FACE AND WARM AIR TO FEET**

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

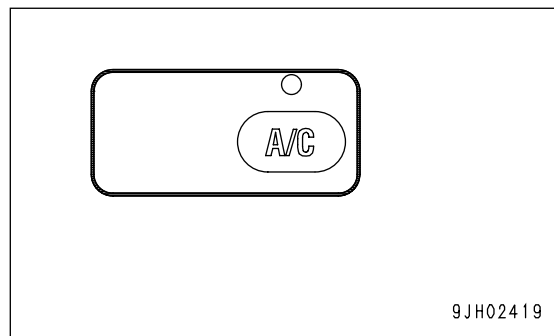
1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on the display monitor.



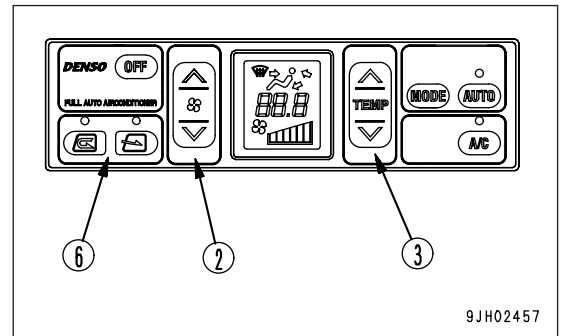
2. Press vent selector switch (4) and set the vent display on the display monitor to the display shown in the diagram on the right.



3. Turn air conditioner switch (8) ON. When this is done, the lamp above the air conditioner switch lights up.

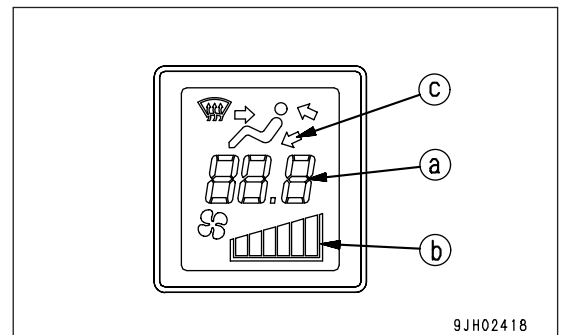
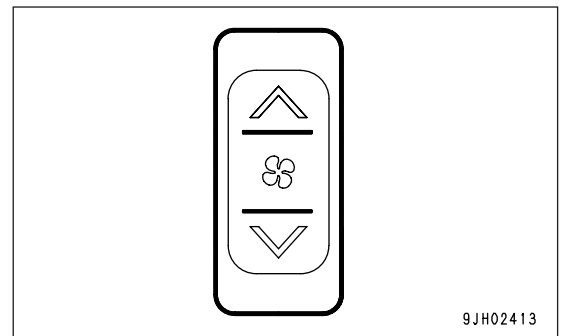


- Adjust fan switch (2), temperature setting switch (3) and FRESH/RECIRC selector switch (6) to the desired positions.

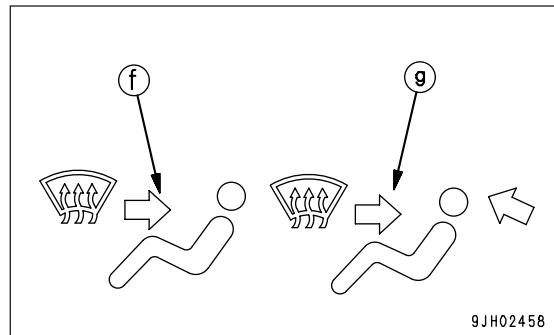
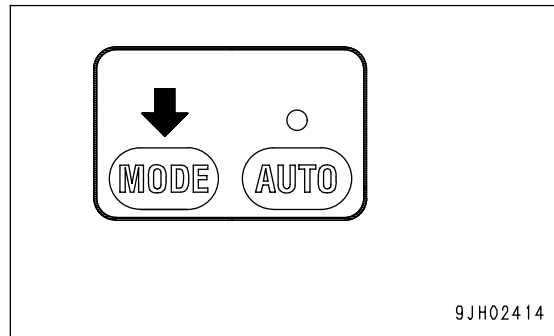


**DEFROSTER OPERATION**

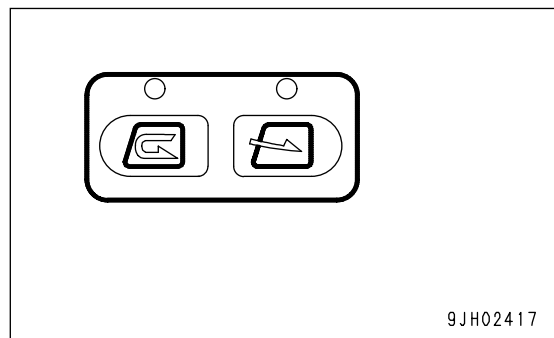
- Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on the display monitor.



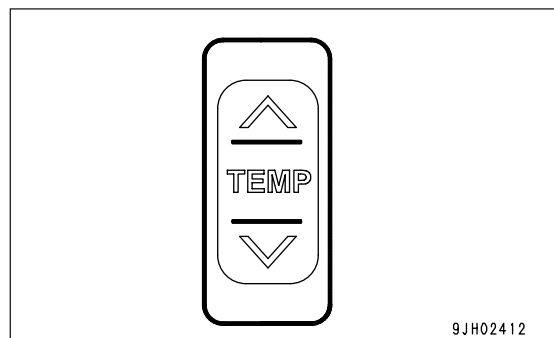
- Press vent selector switch (4) and set the vent display on the display monitor to the display shown in (f) or (g) in the diagram on the right.



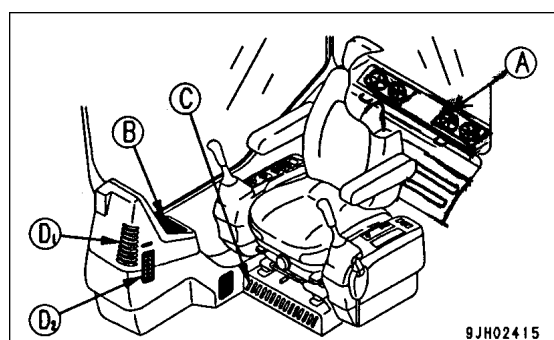
- Press FRESH/RECIRC selector switch (6) and set it to take in fresh air.



- Press temperature setting switch (3) and set the set temperature display on the display monitor to the maximum heating temperature of 32.0.

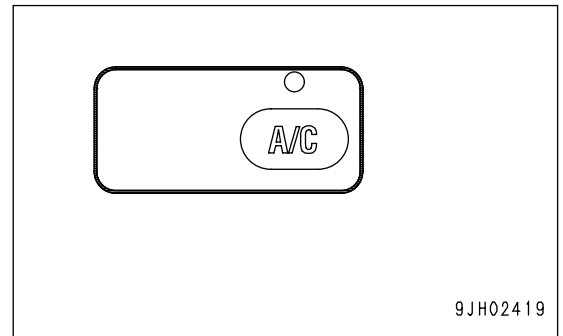


- Adjust vents (A), (B), and (D2) so that the air blows onto the window glass. (Vents (C) and (D1) are fixed and cannot be adjusted.)





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



## PRECAUTIONS WHEN USING AIR CONDITIONER

### NOTICE

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

## PRECAUTIONS WHEN USING AIR CONDITIONER

### Ventilate the cab from time to time when using the cooler.

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so open the window and carry out ventilation and cooling for a short time to remove the smoke.

When running the air conditioner for a long time, carry out ventilation and cooling together once an hour.

### Be careful not to make the temperature in the cab too low.

When the cooler is on, set the temperature so that it feels slightly cool when entering the cab (5 - 6°C lower than the outside temperature). This temperature difference is considered to be the most suitable for your health, so always be careful to adjust the temperature properly.

## CHECK, MAINTAIN MACHINE EQUIPPED WITH AIR CONDITIONER

When carrying out inspection of a machine equipped with an air conditioner, see the "MAINTENANCE SCHEDULE CHART (PAGE 4-17)" and carry out inspection according to the table.

## OTHER FUNCTIONS

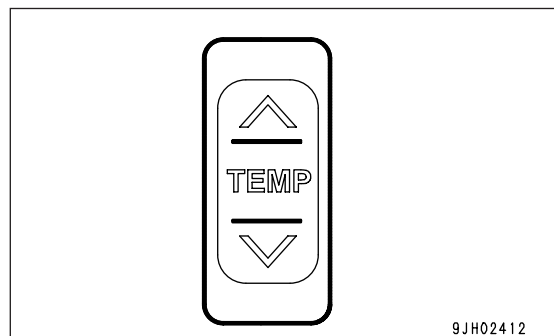
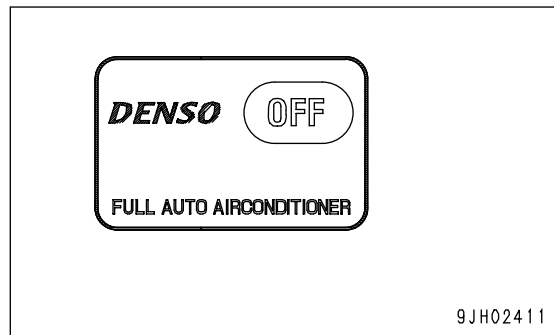
### SELF-DIAGNOSTIC FUNCTION

It is possible to carry out troubleshooting of the various sensors and equipment used on the air conditioner.

1. Press OFF switch (1). The temperature setting and air flow display on the liquid crystal display portion go out and operation stops.
2. If the "▲" and "▼" parts of temperature setting switch (3) are kept pressed at the same time for at least 3 seconds, the troubleshooting mode is displayed on the liquid crystal display portion.

<Monitor display and failure mode>

Display	Failure mode
E--	No failure
E11	Disconnection in recirculated air sensor
E12	Short circuit in recirculated air sensor
E13	Disconnection in fresh air sensor
E14	Short circuit in fresh air sensor
E15	Disconnection in water temperature sensor
E16	Short circuit in water temperature sensor
E18	Short circuit in sunlight sensor
E21	Disconnection in vent sensor
E22	Short circuit in vent sensor
E43	Abnormality in vent damper
E44	Abnormality in air mix damper
E45	Abnormality in FRESH/RECIRC air damper
E51	Abnormality in refrigerant pressure



- When more than one failure is detected, press the "▲" or "▼" portion of temperature setting switch (3) to display the failures in turn.
- After completing the troubleshooting, press OFF switch (1) again to return to the normal display.

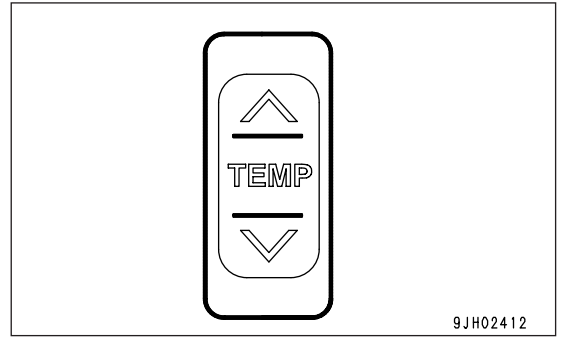
If any abnormality is detected by the self-diagnostic function, ask your Komatsu distributor to carry out inspection and repair.

**FUNCTION TO SWITCH SET TEMPERATURE DISPLAY BETWEEN °F AND °C**

It is possible to switch the set temperature display between °F and °C.

If the "∧" and "∨" portions of temperature setting switch (3) are pressed at the same time for more than 5 seconds while the fan is running, the temperature display will switch between °F and °C.

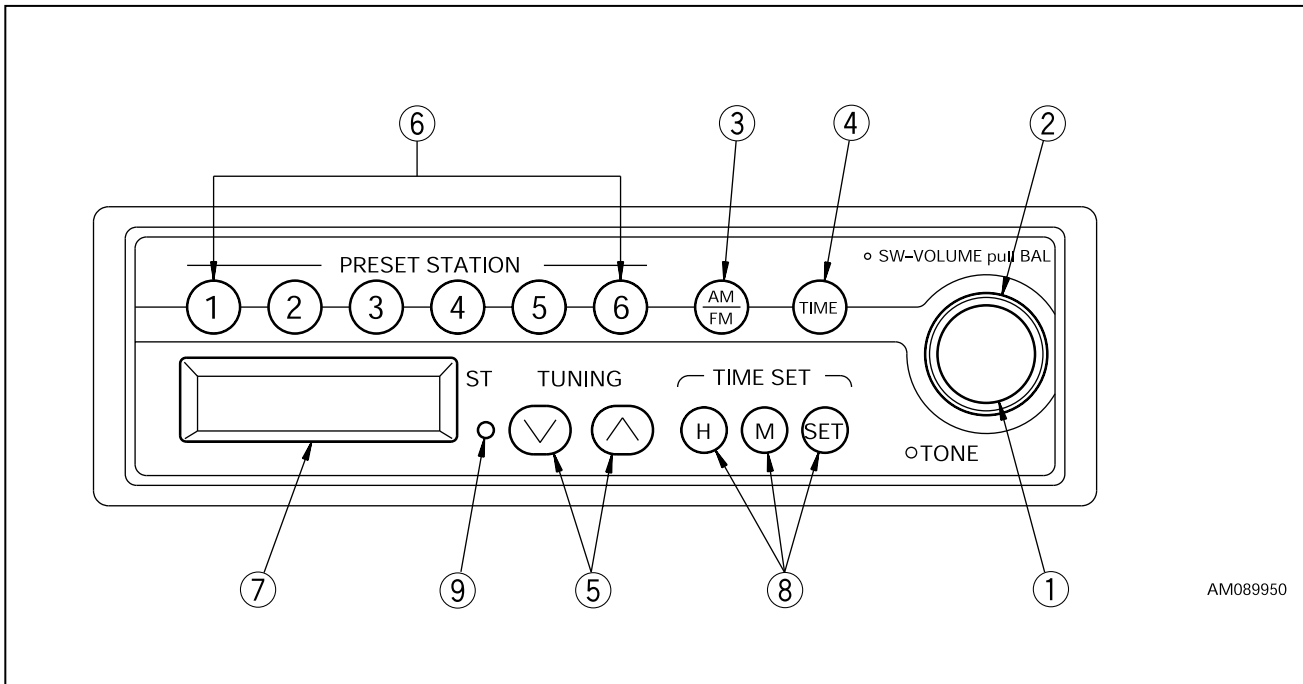
(Note that the unit is not displayed.)



	Liquid crystal display range
°C	18.0 to 32.0
°F	63 to 91

# CAR RADIO

## EXPLANATION OF COMPONENTS



- |   |                            |
|---|----------------------------|
| (1) Power switch/Volume control knob/Balance knob | (6) Preset buttons         |
| (2) Tone control knob                             | (7) Display                |
| (3) FM/AM selector button                         | (8) Time correction button |
| (4) Display selector button                       | (9) Stereo indicator       |
| (5) Manual tuning                                 |                            |

### POWER SWITCH/VOLUME CONTROL KNOB (SW-VOLUME)/BALANCE (Pull BAL)

Press this knob (1) to turn the power for the radio on. The frequency is displayed on display (7). Press again to turn the power off.

Turn the knob to adjust the volume as follows.

Turn CLOCKWISE to INCREASE volume

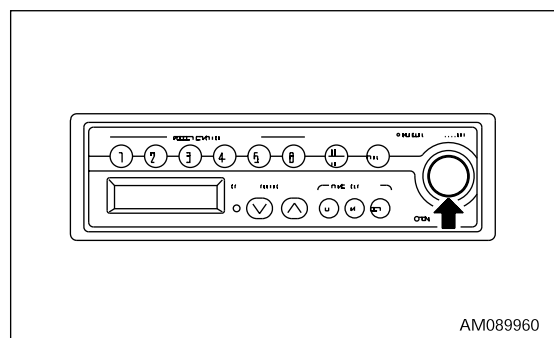
Turn COUNTERCLOCKWISE to REDUCE volume

If the knob is pulled until it locks, it can be turned to the left or right to adjust the balance of the left and right speakers.

Turn CLOCKWISE to increase volume from RIGHT speaker

Turn COUNTERCLOCKWISE to increase volume from LEFT speaker

After adjusting the left and right balance, press lightly to return the knob to its original position. (If it is left pulled out, the overall volume cannot be adjusted.)

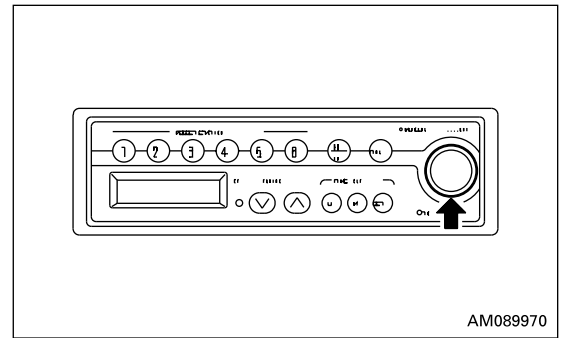


**TONE CONTROL KNOB (TONE)**

Turn the knob (2) to adjust the tone as follows.

Turn CLOCKWISE to emphasize the high sounds

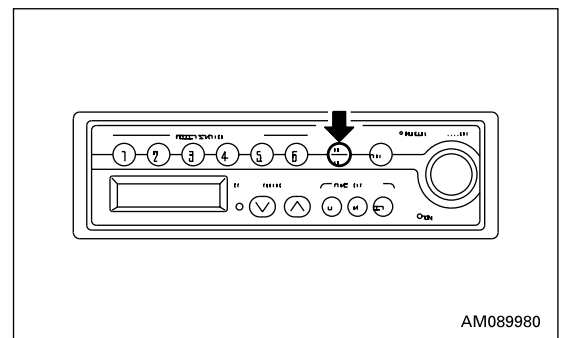
Turn COUNTERCLOCKWISE to suppress the high sounds



**FM/AM SELECTOR BUTTON (AM/FM)**

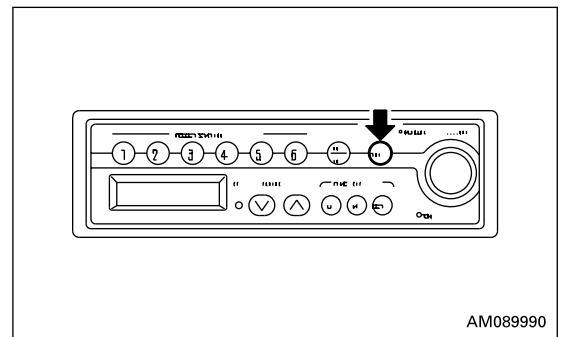
Press this button (3) and select the desired band.

Each time the button is pressed, it switches AM → FM → AM ...



**DISPLAY SELECTOR BUTTON (TIME)**

This equipment gives priority to the frequency display. If the button (4) is pressed when the frequency is displayed, display will give the present time for 5 seconds. After 5 seconds pass, the display will automatically return to the frequency display. If any button other than TIME SET (H, M, SET) is pressed within the 5 seconds, the display will return to the frequency display.



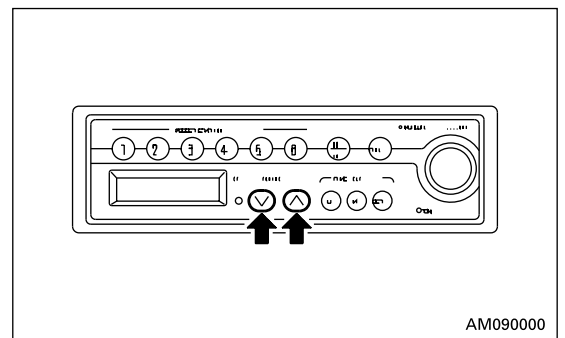
**MANUAL TUNING (MANUAL)**

Use the buttons to (5) change the frequency.

Up button (^): Each time the button is pressed, the frequency will go up in steps (FM: 0.1 MHz, AM: 9 kHz).

Down button (v): Each time the button is pressed, the frequency will go down in steps (FM: 0.1 MHz, AM: 9 kHz).

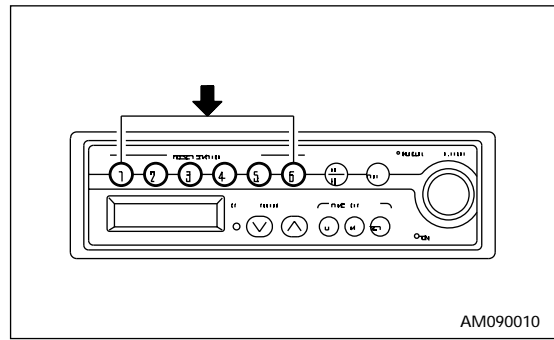
For further details, see "METHOD OF OPERATION (PAGE 3-51)"



### PRESET BUTTONS (1, 2, 3, 4, 5, 6) (PRESET STATION)

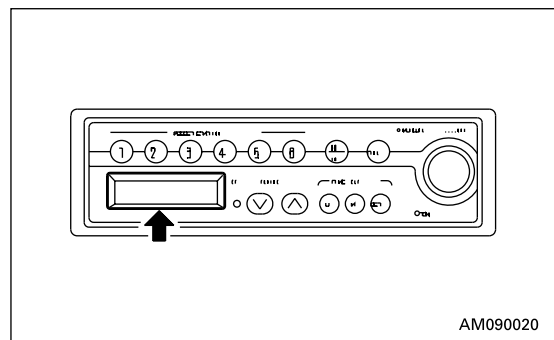
If these buttons are set to the frequency of the desired broadcasting station, the station can be selected at a touch.

For details of the method of presetting, see "METHOD OF OPERATION (PAGE 3-51)".



### DISPLAY

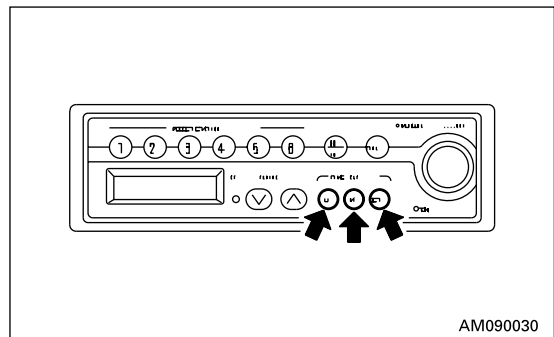
The reception band, frequency, preset number, and time are displayed.



### TIME CORRECTION BUTTON

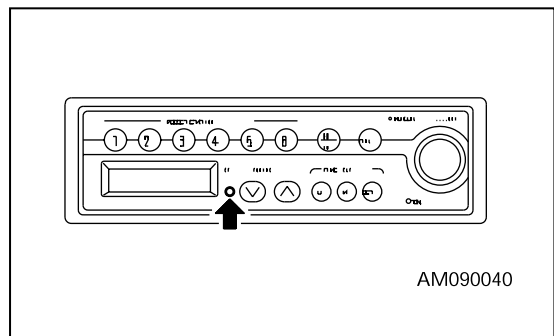
This is used to correct the time.

- H : Hour
- M : Minute
- SET : Sets to start of hour (00 minutes)



### STEREO INDICATOR (ST)

This lamp lights up when a stereo broadcasting is picked up when receiving an FM broadcasting station.

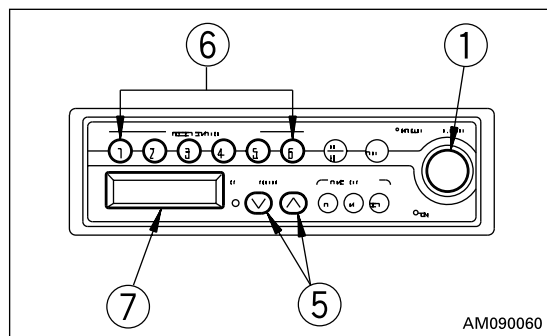


## METHOD OF OPERATION

### METHOD OF SETTING PRESET BUTTONS

1. Press power switch (1) and display the frequency on display (7).
2. Turn the tuning button (5)(manual, auto) to adjust to the desired frequency.
3. Select a preset button to use for recording the frequency setting, and keep that button pressed for at least 1.5 seconds. The sound will disappear, but when the setting is recorded, the sound will appear and the preset number will appear on display (7) to show that the station has been preset.

After completion of presetting, press preset button (6), and release it within approx. 1.5 seconds. The setting will change to the frequency of the broadcasting station recorded for that button. One AM station and one FM station can be recorded for each preset button.



### MANUAL TUNING

Press tuning button (5) and set to the desired frequency.

Each time the button is pressed, the frequency will move up or down in steps of 9 kHz (AM) or 0.1 MHz (FM).

∨ button: Move to a higher frequency station

∧ button: Move to a lower frequency station

- If the frequency reaches the top or bottom limit, it will automatically change as follows: top limit → bottom limit, or bottom limit → top limit

### AUTOMATIC TUNING

Keep tuning button (5) pressed for at least 0.5 seconds. When a broadcasting station is picked up, it will automatically stop. To search for the next station, press tuning button (5) again for at least 0.5 seconds.

∨ button: Move to a higher frequency station

∧ button: Move to a lower frequency station

- If tuning button (5) is pressed during auto tuning, the auto tuning will be canceled and the frequency at the point where it is canceled will be picked up.

**SETTING CORRECT TIME**

1. Press display selector button (4) to display the time.  
 After 5 seconds, the display will return to the frequency display and the time cannot be corrected. If this happens, press display selector button (4) again.

2. Press time correction button (8) and adjust the hour and minute.

H button: Adjusts hour (advances one hour each time it is pressed)

M button: Adjusts minute (advances one minute each time it is pressed)

If the H or M button are kept pressed, the time will advance continuously until the button is released.

SET button: Every time SET button is depressed, hour and minute are reset in the following manner.

If the minute display is between 0 and 05, the minute reading will return to 00.

If the minute display is between 55 and 59, the minute display will return to 00 and the hour will advance by 1.

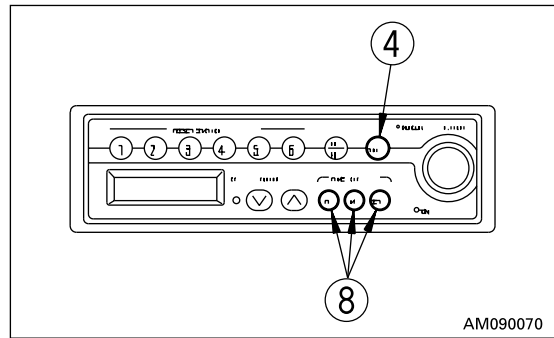
If the minute display is between 06 and 54, no resetting can be made.

Example 10:05 → 10:00

10:59 → 11:00

10:26 → 10:26

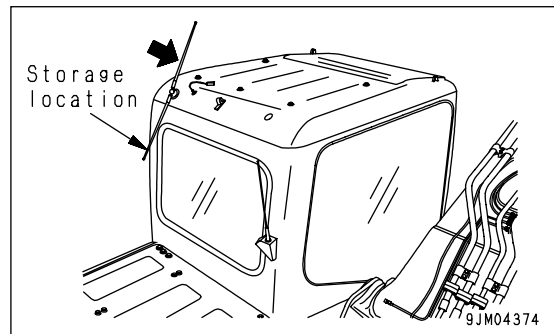
Press the H, M, and SET buttons to set to the correct time.



**ANTENNA**

**NOTICE**

Before transporting the machine or putting it inside a building, stored the antenna to prevent any interference.



**PRECAUTIONS WHEN USING**

- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.
- When the battery is replaced, the settings for the preset buttons are all cleared, so set them again.



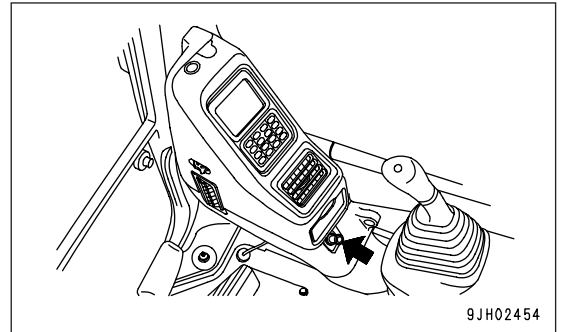
## POWER PICK-UP PORT

### 24V power source

#### NOTICE

**Do not use this as the power source for 12V equipment. It will cause damage to the equipment.**

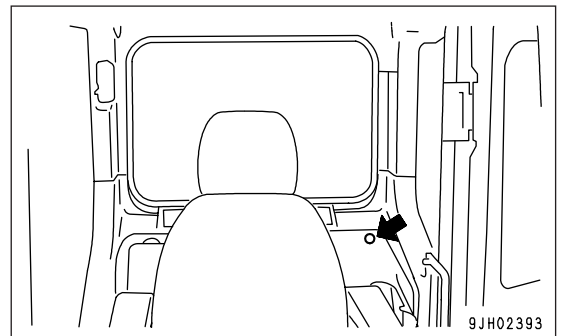
If the cigarette lighter is removed, it can be used as a power source. The capacity of the cigarette lighter is 85W (24V x 3.5A).



### 12V power source

(if equipped)

This power source can be used up to a capacity of 60W (12V x 5A).



## FUSE

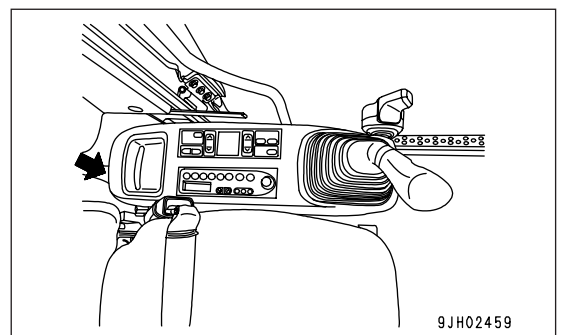
#### NOTICE

**Before replacing a fuse, be sure to turn off the starting switch.**

The fuses protect the electrical equipment and wiring from burning out.

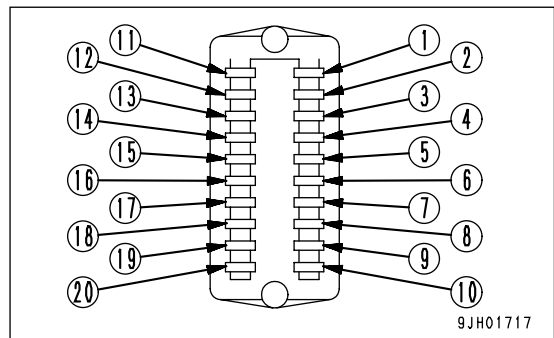
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace the fuse with another of the same capacity.



### FUSE CAPACITIES AND CIRCUIT NAMES

	Fuse capacity	Name of circuit
(1)	10 A	Controller
(2)	20 A	Electromagnetic valve
(3)	10 A	PPC hydraulic lock solenoid
(4)	10 A	Window washer, cigarette lighter
(5)	10 A	Horn
(6)	10 A	12V power source (if equipped)
(7)	10 A	Rotating lamp, arm solenoid
(8)	10 A	Light relay
(9)	10 A	Radio, speaker, left knob switch
(10)	10 A	Spare
(11)	25 A	Air conditioner unit
(12)	20 A	Monitor, wiper monitor
(13)	20 A	Light, light relay drive
(14)	10 A	Optional power source (1)
(15)	10 A	Optional power source (2), travel alarm, 12V power port
(16)	10 A	Radio backup
(17)	20 A	Monitor (normal power source)
(18)	10 A	Starting switch
(19)	10 A	Room lamp
(20)	10 A	Spare

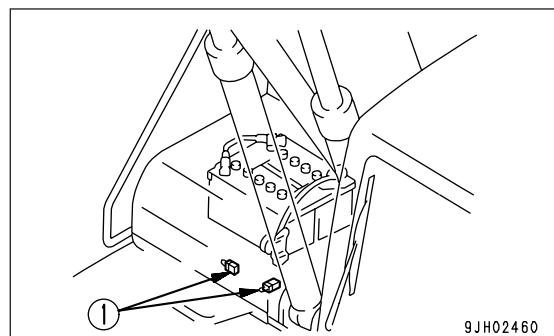


### FUSIBLELINK

If the starting motor does not start even when the starting switch is turned to the ON position, wire-shaped fusible link (1) (2 places) has probably melted, so open the battery box cover on the right side of the machine, check the fusible link, and replace if necessary.

**REMARK**

A fusible link refers to the large-sized fuse wiring installed in the high current flow portion of the circuit to protect electrical components and wiring from burning, in the same way as an ordinary fuse.

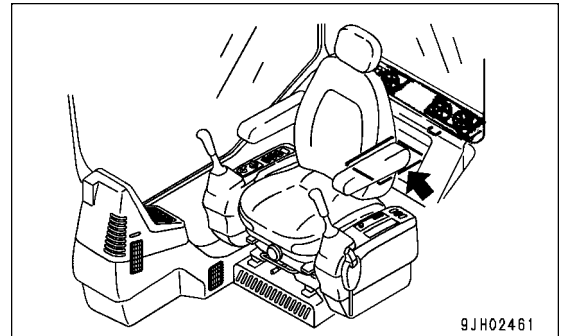


## CONTROLLER (COMPUTER)

An engine throttle and pump controller is installed.

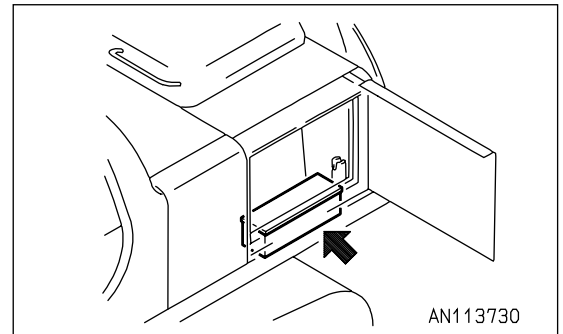
### NOTICE

- Be careful not to get water, mud, or juice on the controller. This will cause failure.
- If any abnormality occurs in the controller, do not disassemble it yourself. Contact your Komatsu distributor for repairs.



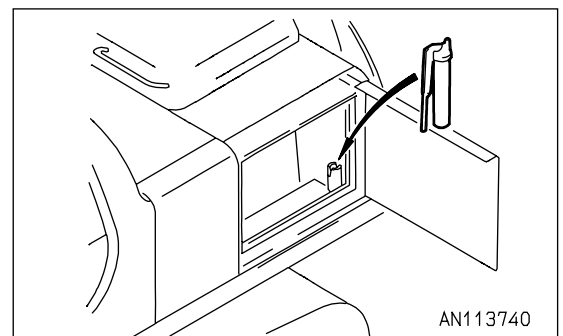
## TOOLBOX

Keep the tools in this toolbox.



## GREASE GUN HOLDER

This is inside the door at the rear left of the machine. When not using the grease gun, fit it in this holder.



## HANDLING ACCUMULATOR

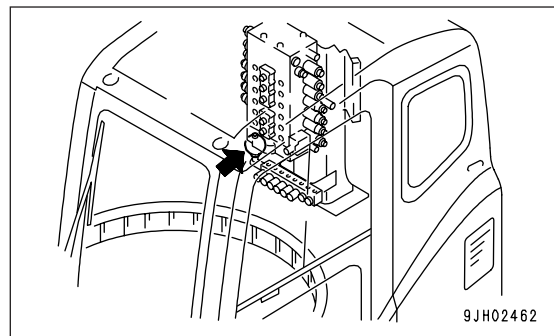
### **⚠ WARNING**

The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion which will lead to serious injury or damage. When handling the accumulator, always do as follows.

- The pressure in the control circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation. Loosen the bolts slowly.
- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it or weld it.
- Do not hit it, roll it, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work carried out.

The machine is equipped with an accumulator in the control circuit. The accumulator in the control circuit is a device to store pressure, and when this accumulator is installed, it is possible to operate the control circuit for a short time even after the engine is stopped. Therefore, it is possible to lower the work equipment under its own weight by operating the control lever in the direction to lower the work equipment.

The accumulator is installed to the position shown in the diagram on the right.



## METHOD OF RELEASING PRESSURE IN CONTROL CIRCUIT ON MACHINE EQUIPPED WITH ACCUMULATOR

1. Lower the work equipment to the ground, then close the crusher or other attachment.
2. Stop the engine.
3. Turn the key in the starting switch to the ON position again to let electric current flow in the circuits.
4. Set the safety lock lever to the FREE position, then operate the work equipment control levers and attachment control pedal (if equipped) backwards and forwards, and to the right and left to the full stroke to release the pressure in the control circuit.
5. Set the safety lock lever to the LOCK position to lock the control levers and attachment control pedal.

# MACHINE OPERATIONS AND CONTROLS

## BEFORE STARTING ENGINE

### WALK-AROUND CHECKS

Before starting the engine, look around the machine and under the machine to check for loose nuts or bolts, or leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check also for loose wiring, play, and accumulation of dust at places which reach high temperatures.

#### WARNING

**Remove any flammable materials from around the battery or engine muffler, or other high temperature engine parts. Leakage of fuel or oil will cause the machine to catch fire. Check carefully, and be sure to repair any abnormalities, or please contact your Komatsu distributor.**

Always check the items in this section before starting the engine each day.

1. Check for damage, wear, play in work equipment, cylinders, linkage, hoses  
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.
2. Remove dirt and dust from around engine, battery, radiator  
Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, grass, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.
3. Check for leakage of water or oil around engine  
Check that there is no leakage of oil from the engine or leakage of water from the cooling system. If any abnormality is found, repair it.
4. Check for oil leakage from hydraulic equipment, hydraulic tank, hoses, joints  
Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.
5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers
6. Check for damage to handrail, loose bolts  
Repair any damage and tighten any loose.
7. Check for damage to gauges, monitor, loose bolts  
Check that there is no damage to the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Clean off any dirt on the surface.
8. Clean rear view mirror, check for damage  
Check that there is no damage to the rear view mirror. If it is damaged, replace it with a new mirror. Clean the surface of the mirror and adjust the angle so that the view to the rear can be seen from the operator's seat.

9. Seat belt option and mounting clamps

Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with new parts.

10. Check bucket with hook (if equipped) for damage.

Check the hook, catcher and hook foot for damage. If damage is found, contact your Komatsu distributor for repair.

## CHECKS BEFORE STARTING

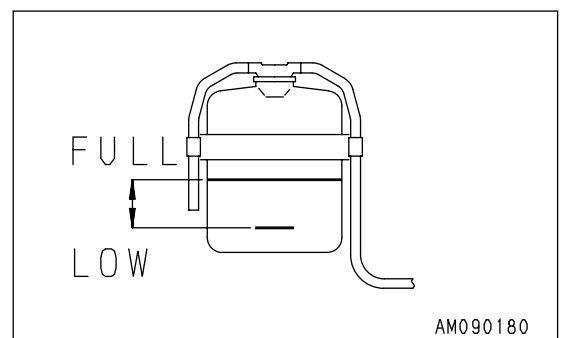
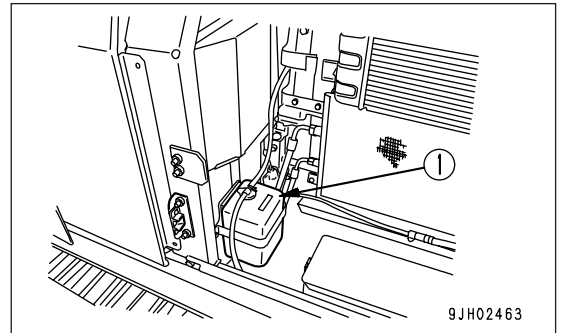
Always carry out the items of the checks in this section before starting the engine.

### CHECK COOLANT LEVEL, ADD WATER

#### WARNING

- Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.
- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.

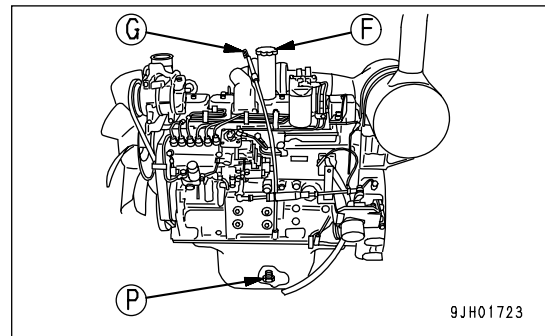
1. Open the door at the rear left of the machine, and check if the cooling water in sub-tank (1) (shown in the diagram on the right) is between the FULL and LOW marks. If the water level is low, add water to the FULL level through the filler port of sub-tank (1).
2. After adding water, tighten the caps securely.
3. If the sub tank is empty, there is probably leakage of water.  
After inspecting, repair any abnormality immediately. If there is no abnormality, check the water level in the radiator. If the water level is low, add water to the radiator, then fill the reserve tank (1).



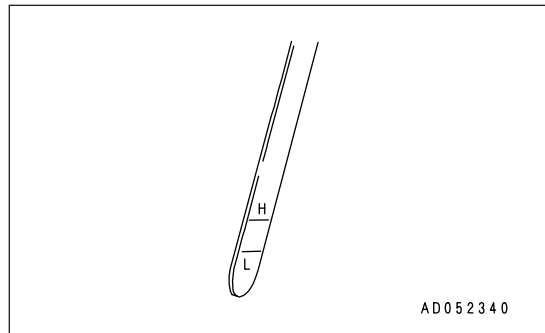
**CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL****⚠ WARNING**

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

1. Open the engine hood on the machine.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Insert dipstick (G) fully in the oil filler pipe, then take it out again.



4. The oil level should be between the H and L marks on dipstick (G).  
If the oil level is below the L mark, add engine oil through oil filler (F).
5. If the oil is above the H line, open drain valve (P) at the bottom of the engine oil pan, drain the excess engine oil, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine hood.

**REMARK**

When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.

If the machine is at an angle, make it horizontal before checking.

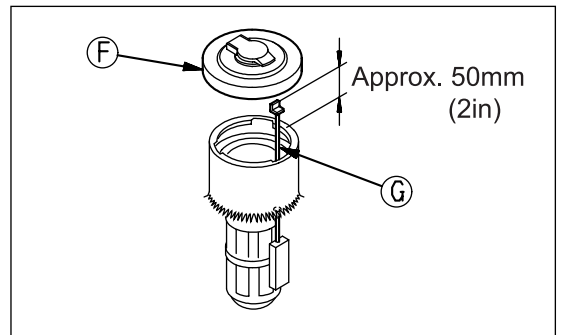
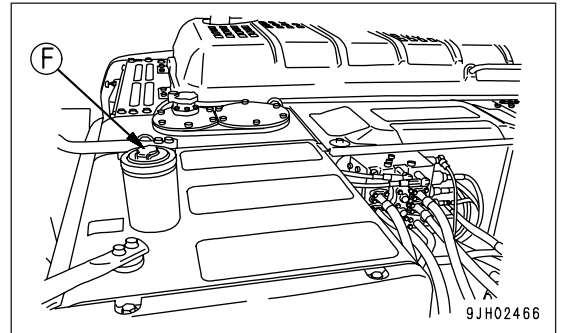


**CHECK FUEL LEVEL, ADD FUEL**

**⚠ WARNING**

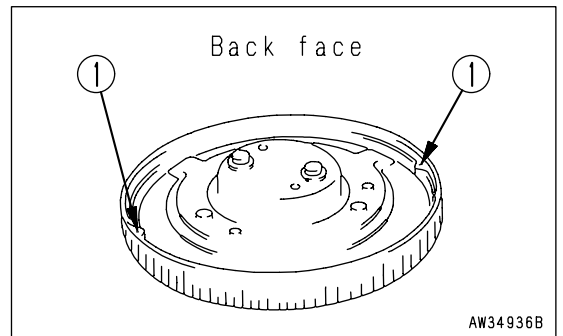
**When adding fuel, never let the fuel overflow. This may cause a fire. If any fuel is spilled, wipe it up completely. Never bring flames near fuel because it is highly flammable and dangerous.**

1. Open fuel filler cap (F) of the fuel tank.
2. When fuel filler cap (F) is opened, float gauge (G) will rise according to the fuel level. Check that the fuel tank is full. Check by looking into the tank and by using float gauge (G).
3. If the tank is not full, add fuel through the fuel filler until float gauge (G) rises to the maximum position.  
 Fuel tank capacity: 400 liters (105.68 US gal)  
 Position of tip of float gauge (G) when tank is full: Approx. 50 mm (2 in) from top surface of fuel tank
4. After adding fuel, push float gauge (G) straight down with fuel filler cap (F). Be careful not to get float gauge (G) caught in the tab of fuel filler cap (F), and tighten fuel filler cap (F) securely.



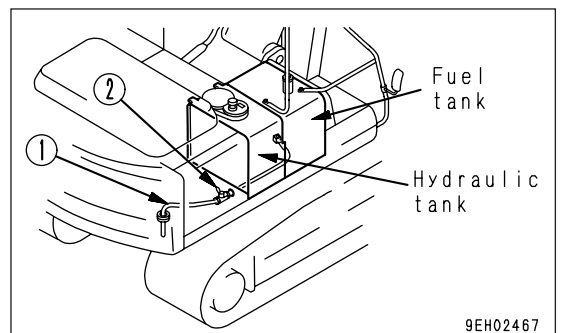
**REMARK**

If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.



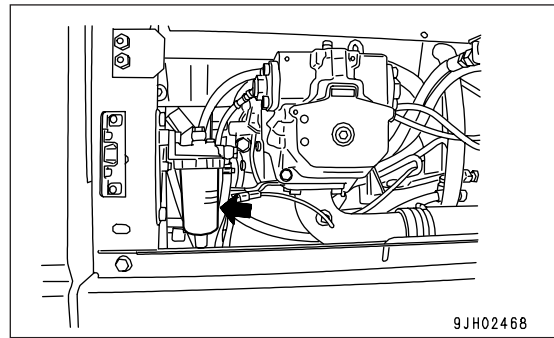
**DRAIN WATER, SEDIMENT FROM FUEL TANK**

1. Open the pump room door on the right side of the machine.
2. Put a container to catch the drained fuel under drain hose (1).
3. Open drain valve (2) at the rear of the hydraulic tank and drain the sediment and water accumulated at the bottom of the tank together with the fuel.
4. When clean fuel comes out, close drain valve (2).
5. Close the pump room door on the right side of the machine.

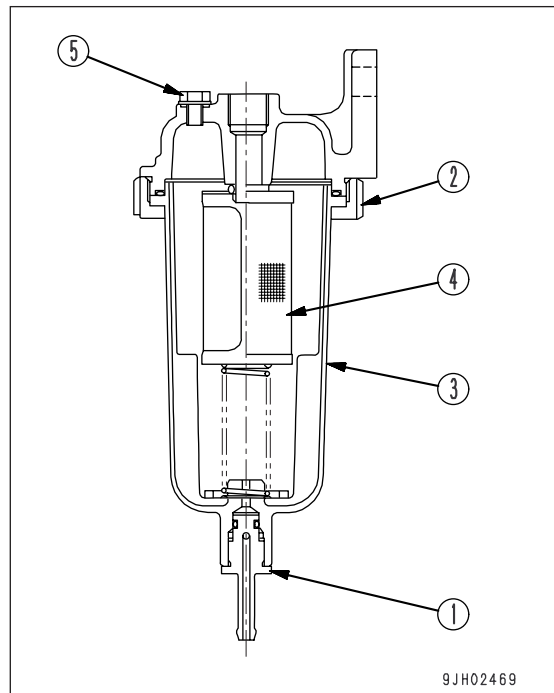


**CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER**

1. Open the cover at the rear right of the machine.
2. Inspect the water separator, and check if the ring inside has risen to the marked line.
3. If the ring has risen to the marked line, carry out the procedure from Step 4.

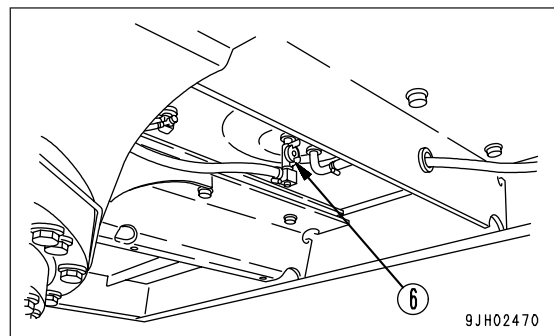


4. Set a container under the water separator to catch the drained oil.
5. Close fuel valve (6) at the bottom of the fuel tank.
6. Remove air bleed plug (5) at the top of the water separator.
7. Loosen drain valve (1) at the bottom of the water separator, and drain the water and sediment into the container.
8. Loosen ring nut (2), then remove filter case (3).
9. Remove element (4) from the separator base.
10. Wash element (4) in clean diesel oil.
11. Check element (4), and replace it if it is damaged.
12. When installing element (4), perform Steps 6 and 7 in the opposite order.



Tightening torque of ring nut (2):  $40 \pm 3 \text{ N}\cdot\text{m}$   $\{4.1 \pm 0.3\text{kgf}\cdot\text{m}\}$

13. Loosen air bleed plug (5) and fill inside of filter case (3) with fuel. When fuel comes out from air bleed plug (5), tighten air bleed plug (5).

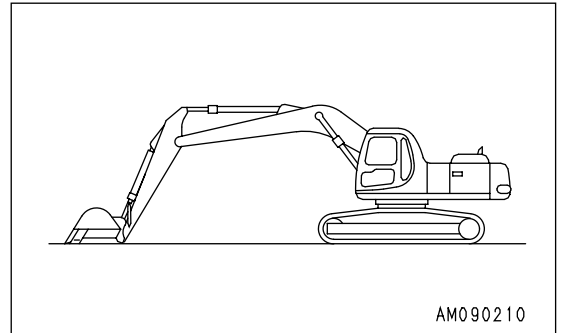


**CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL**

**⚠ WARNING**

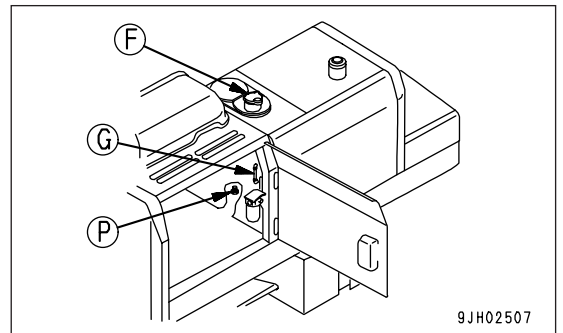
When removing the oil filler cap, oil may spurt out, so turn the cap slowly to release the internal pressure before removing the cap.

1. If the work equipment is not in the condition shown in the diagram on the right, start the engine, run the engine at low speed, retract the arm and bucket cylinders, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.
2. Within 15 seconds after stopping the engine, turn the starting switch to the ON position, and operate the control levers (work equipment, travel) fully in each direction to release the internal pressure.
3. Check sight gauge (G) from the right window installed to the operator's compartment. The oil level should be between the H and L lines.



**NOTICE**

Do not add oil above the H line. This will damage the hydraulic circuit or cause the oil to spurt out. If oil has been added to above the H level, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug (P).

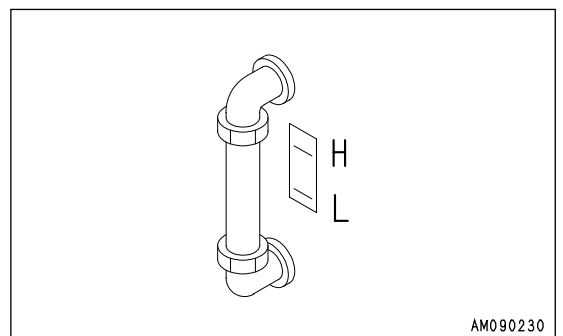


4. If the oil level is below the L line, add oil through oil filler (F) at the top of the hydraulic tank.

**REMARK**

The oil level will vary depending upon the oil temperature. Accordingly, use the following as a guide:

- Before operation: between H and L level (Oil temperature 10 to 30°C (50 to 86°F))
- Normal operation: around H level (Oil temperature 50 to 80°C (122 to 176°F))



## CHECK ELECTRIC WIRINGS

### WARNING

- If the fuses frequently blow or if there are traces of short circuits on the electrical wiring, locate the cause immediately and carry out repairs, or contact your Komatsu distributor for repairs.
- Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clean the breather hole.

Check for damage and wrong capacity of the fuse and any sign of disconnection or short circuit in the electric wiring. Check also for loose terminals and tighten any loose parts.

Check the wiring of the "battery", "starting motor" and "alternator" carefully in particular.

When carrying out walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

Please contact your Komatsu distributor for investigation and correction of the cause.

## CHECK FUNCTION OF HORN

1. Turn the starting switch to the ON position.
2. Confirm that the horn sounds without delay when the horn button is pressed. If the horn does not sound, ask your Komatsu distributor for repair.

## ADJUST BEFORE OPERATION

### ⚠ WARNING

- Adjust the seat position before starting operations or after changing the operator.
- Adjust the seat so that the control levers and switches can be operated freely and easily with the operator back against the backrest.

#### A: Fore-and-aft adjustment

Pull lever (1) up, set the seat to the desired position, then release the lever.

Fore-and-aft adjustment: 160 mm (6.3 in) (16 stages)

#### B: Adjusting reclining

##### NOTICE

The seat can be reclined to a large angle when the seat is pushed fully forward, but the reclining angle is reduced when the seat is moved back, so when moving the seat to the rear, return the seat back to its original position.

Pull lever (2) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.

#### C: Adjusting seat tilt

##### ● Forward tilt

Push lever (3) up to adjust the angle of the front of the seat.(4 stages)

- To raise the angle at the front of the seat, keep the lever pushed up and apply your weight to the rear of the seat.
- To lower the angle at the front of the seat, keep the lever pushed up and apply your weight to the front of the seat.

##### ● Rear tilt

Pull lever (4) up to adjust the angle of the rear of the seat.(4stages)

- To raise the angle at the rear of the seat,keep the lever(3) pulled up and stand up slightly to remove your weight from the seat.
- To lower the angle at the rear of the seat,keep the lever(3) pulled up and apply your weight to the rear of the seat.

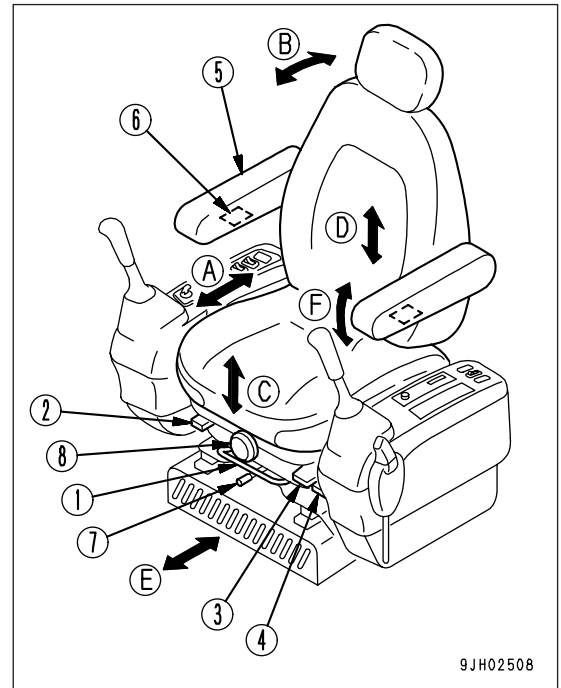
Amount of tilt:Up 13°,down 13°

##### ● Adjusting seat height

It is possible to move the seat up or down by combining adjustments 1 and 2.

After setting the forward tilt or rear tilt to the desired height, operate the opposite part to set the seat horizontal then secure in position.

Height adjustment:60 mm (2.4 in)



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**D:Adjusting armrest angle**

Armrest (5) can be made to spring up by hand approx.90°.

In addition, by turning the bottom (6) of the armrest by hand it is possible to make fine vertical adjustments of the armrest angle.

Armrest adjustment angle:25°

**REMARK**

If the seat back is tipped to the front without raising the armrest(5), the armrest will rise automatically.

**E:Overall fore-and-aft adjustment of seat**

Move lever (7) to right, set to the desired position, then release the lever. In this case, the operator's seat, left and right control levers, and safety lock lever all slide together.

Fore-and-aft adjustment:180 mm (7.1 in) (9 stages)

**F:Adjusting suspension**

Turn knob (8) to the right to make the suspension harder,or to the left to make the suspension softer. Adjust the reading of the dial to match the operator's weight and select the optimum suspension.

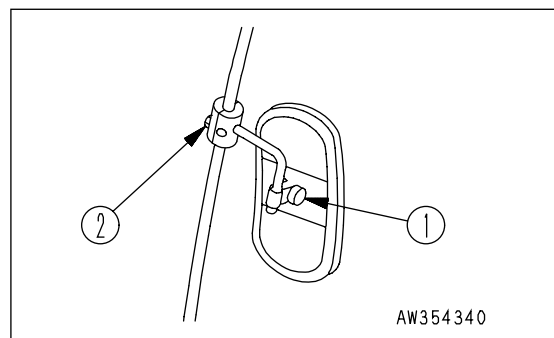
**REMARK**

To obtain the optimum adjustment,turn the knob (8) so that the indicator of the weight display (kg) in the transparent portion of knob (8) is the same as the operator's weight.

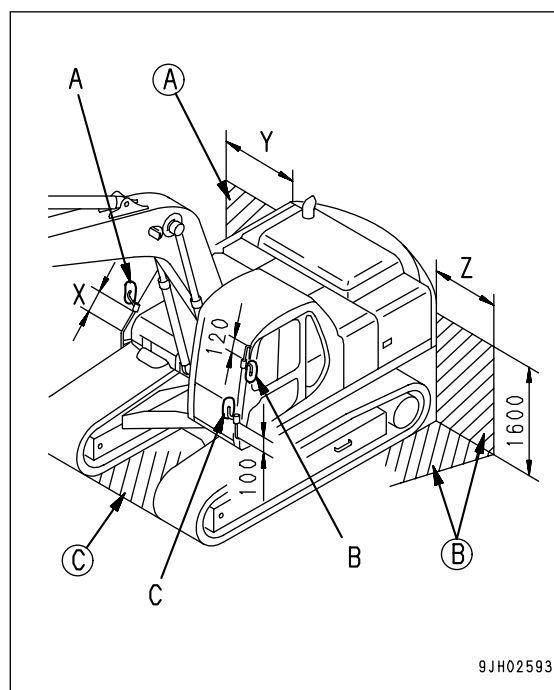
**ADJUSTMENT OF MIRRORS**

Loosen nut (1) and bolt (2) mounting the mirror, and adjust to the position which gives the best view from the operator's seat of the blind spot to the left and right sides at the rear of the machine.

- Adjust the mirror mount so that it is possible to see any person (or object of height 1 m (3 ft 3 in) and diameter 30 cm (11.8 in)) at the rear left and right of the machine.
- Install the mirror to the mounting position and dimensions shown. The values given below are reference values for the range of view.



- Mounting position X : 100 mm (3.9 in)
- Range of view Y (right side): 1500 mm (4 ft 11in)
- Range of view Z. (left side) : 1830 mm (6 ft)
- Mirror A : Must be able to see hatched area (A)
- Mirror B : Must be able to see hatched area (B)
- Mirror C : Must be able to see hatched area (C) (if equipped)



## SEAT BELT

### WARNING

- Before fitting the seat belt, check that there is no abnormality in the belt mount bracket or mounting belt. If it is worn or damaged, replace the seat belt.
- Even if no abnormality can be seen in the belt, replace the seat belt every 3 years. The date of manufacture of the belt is shown on the back of the belt.
- Always wear the seat belt during operations.
- Fit the seat belt so that it is not twisted.

### FASTENING AND REMOVING SEAT BELT

This seat belt has a wind-in device, so it is not necessary to adjust the length.

#### Fastening seat belt

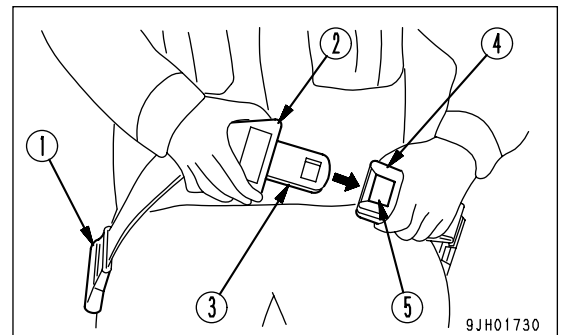
Hold grip (2) and pull the belt out from wind-in device (1), check that the belt is not twisted, then insert tongue (3) into buckle (4) securely.

When doing this, pull the belt lightly to check that it is properly locked.

#### Removing belt

Press button (5) in buckle (4), and remove tongue (3) from buckle (4).

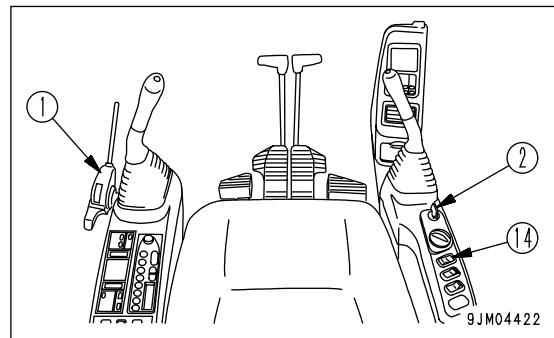
The belt is automatically wound in, so hold grip (2) and return the belt slowly to wind-in device (1).



## OPERATIONS BEFORE STARTING ENGINE

### WARNING

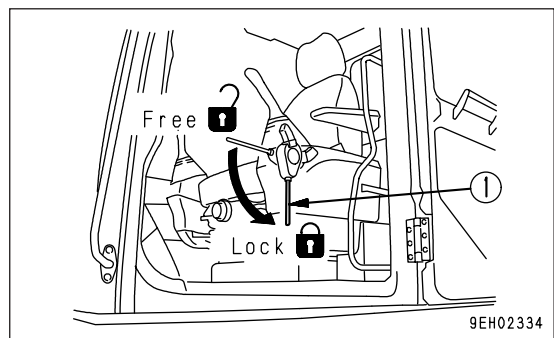
- When starting the engine, check that the safety lock lever is securely at the LOCK position. If the control levers are not locked and they are touched by accident when starting the engine, the work equipment may move unexpectedly, and this may lead to a serious accident.
- When standing up from the operator's seat, always set the safety lock lever to the LOCK position, regardless of whether the engine is running or stopped.



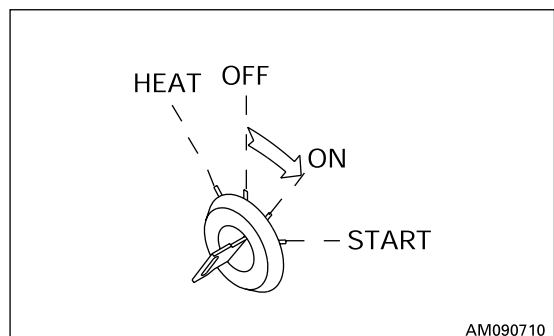
1. Check that safety lock lever (1) is at the LOCK position.
2. Check the position of each lever.

Set the control lever to the neutral position.

When starting the engine, never touch the knob switch.



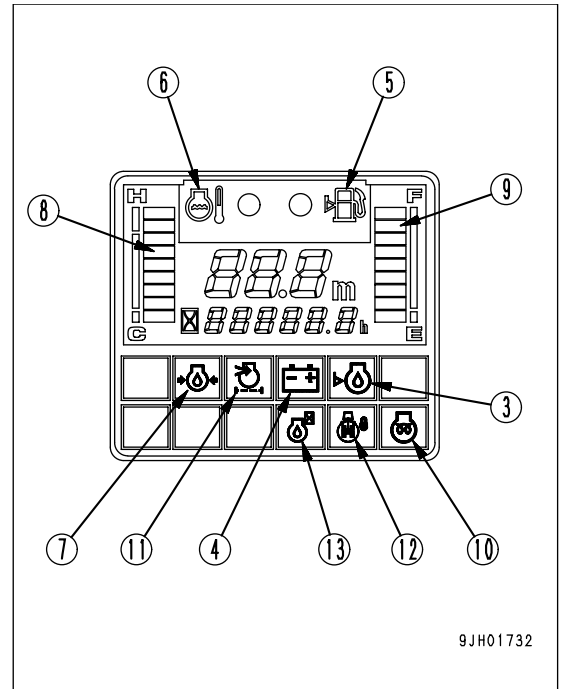
3. Insert the key in starting switch (2), turn the key to the ON position, then carry out the following checks.





1) The buzzer will sound for approx. 1 sec, and the following monitors and gauges will light up for approx. 3 sec.

- Engine oil level monitor (3)
- Charge level monitor (4)
- Fuel level monitor (5)
- Engine water temperature monitor (6)
- Engine oil pressure monitor (7)
- Engine water temperature gauge (8)
- Fuel gauge (9)
- Engine pre-heating lamp(10)
- Air cleaner clogging monitor(11)
- Swing lock lamp (12)
- Replacement monitor of engine oil (13)



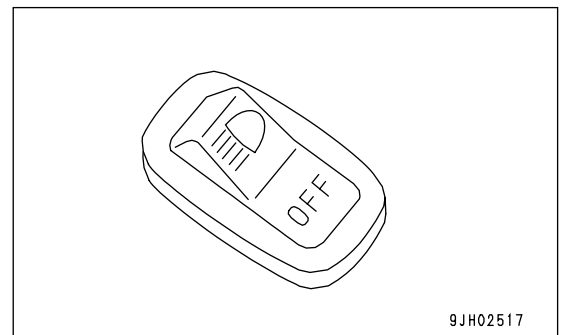
If the monitors or gauges do not light up or the buzzer does not sound, there is probably a broken bulb or disconnection in the monitor wiring, so contact your Komatsu distributor for repairs.

After approx. 3 sec, the following gauges will remain on and the other monitors will go out.

- Charge level monitor (4)
- Engine oil pressure monitor (7)
- Engine water temperature gauge (8)
- Fuel gauge (9)

2) Press lamp switch (14) and check that the front lamp lights up.

If it does not light up, there is probably a blown bulb or disconnection, so contact your Komatsu distributor for repairs.

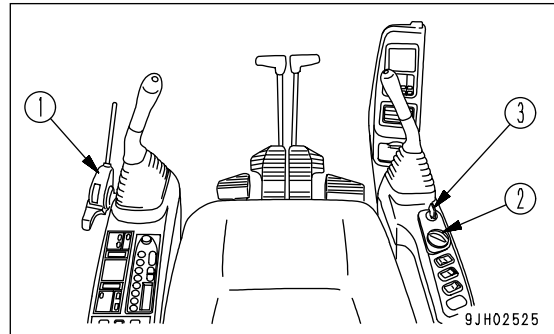


# STARTING ENGINE

## NORMAL STARTING

**⚠ WARNING**

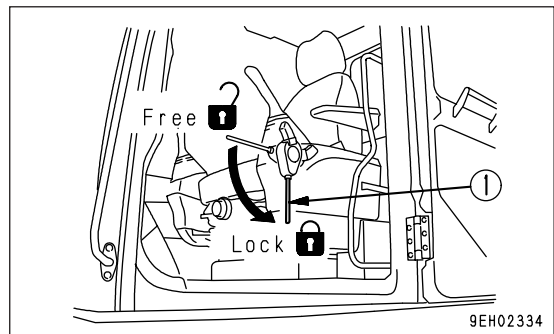
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.



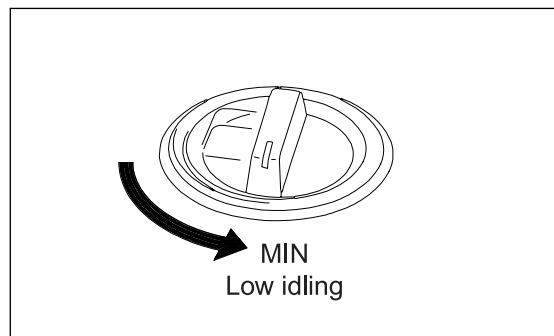
**NOTICE**

- Before starting the engine, check that the fuel control dial is at the low idling (MIN) position.
- Do not crank the starting motor continuously for more than 20 seconds. If the engine does not start, wait for at least 2 minutes before trying again.
- If the fuel control dial is at the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.

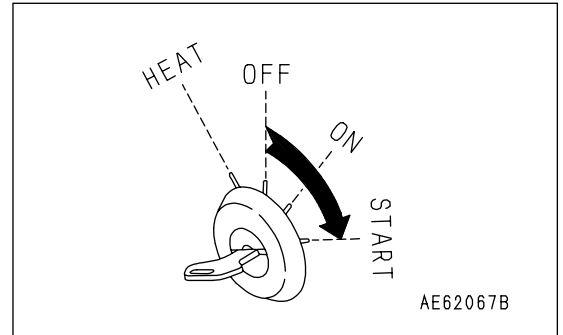
1. Check that safety lock lever (1) is at LOCK position. If safety lock lever (1) is at the FREE position, the engine will not start.



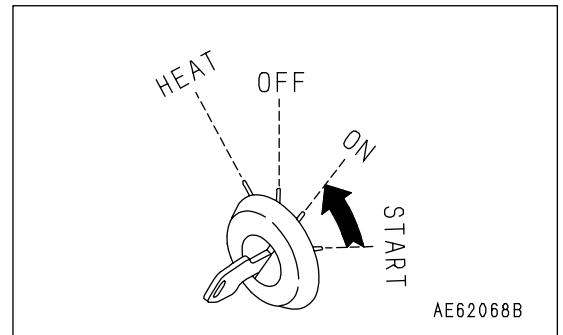
2. Set fuel control dial (2) at the low idling (MIN) position. If it is at the high idling (MAX) position, always change it to the low idling (MIN) position.



3. Turn the key in starting switch (3) to the START position. The engine will start.



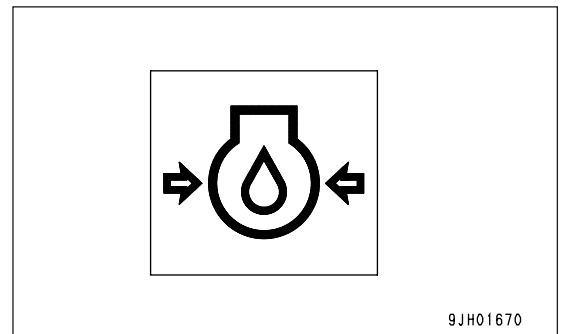
4. When the engine starts, release the key in starting switch (3). The key will return automatically to the ON position.



5. Even after the engine is started, do not touch the work equipment control levers and the travel pedals, while the engine hydraulic pressure monitor lamp is still lighted.

**NOTICE**

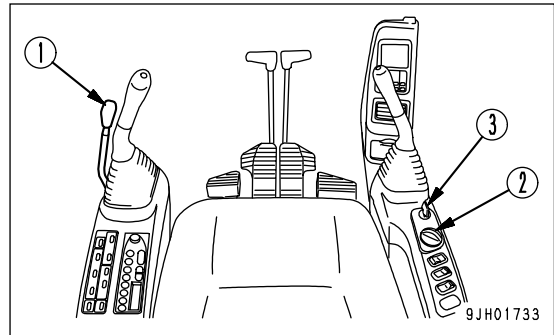
**If the engine oil pressure monitor does not go out even after 4 to 5 seconds have passed, stop the engine immediately. Check the oil level, check for leakage of oil, and take the necessary action.**



## STARTING ENGINE IN COLD WEATHER

### WARNING

- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Never use starting aid fluids as they may cause explosions.

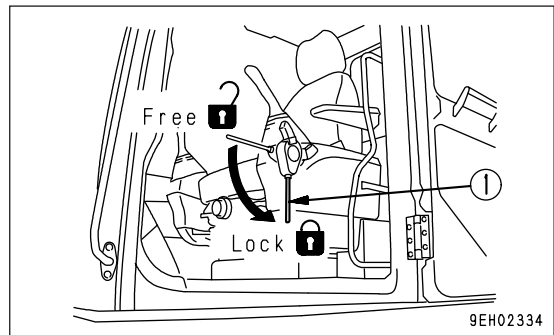


### NOTICE

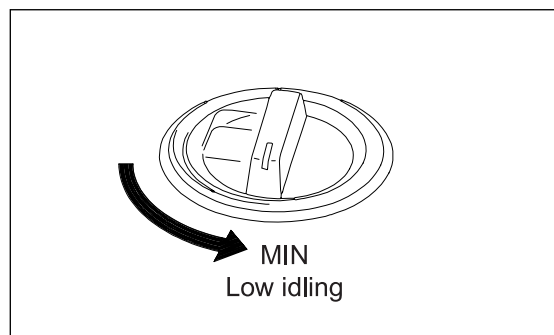
- Before starting the engine, check that fuel control dial (2) is at the low idling (MIN) position.
- Do not keep the starting motor rotating continuously for more than 20 seconds. If the engine fails to start, wait for about 2 minutes and repeat from Step 2.
- If the fuel control dial is at the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.

When starting in low temperatures, do as follows.

1. Check that safety lock lever (1) is in the LOCK position. If it is in the FREE position, the engine cannot be started.



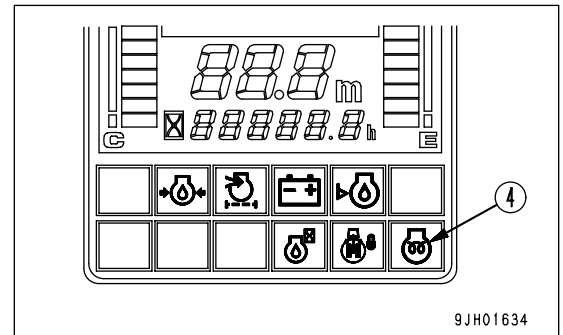
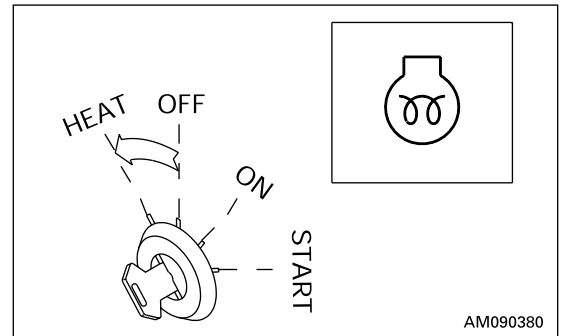
2. Set fuel control dial (2) at a low idling (MIN) position. Do not set fuel control dial (2) at the high idling (MAX) position.



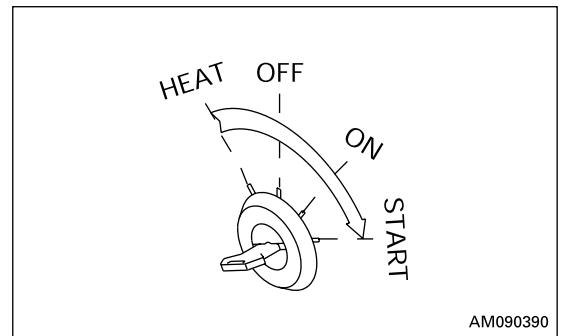
3. Hold the key in starting switch (3) at the HEAT position, and check that preheating monitor (4) lights up. After about 18 seconds, preheating monitor lamp (4) will flash to indicate that preheating is finished.

**REMARK**

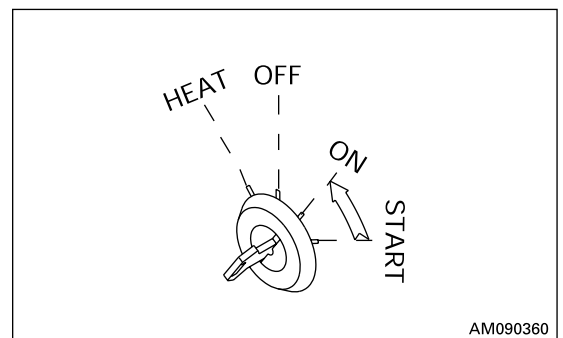
The monitors and gauges will light up also when the key is turned to the HEAT position, but this is not an abnormality.



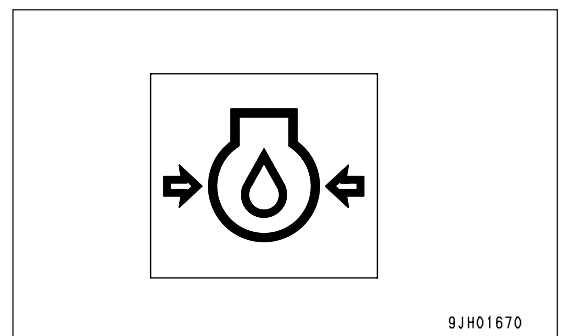
4. When preheating monitor (4) goes out, turn the key in starting switch (3) to the START position to start the engine.



5. When the engine starts, release the key in starting switch (3). The key will return automatically to the ON position.



6. Even after the engine is started, do not touch the work equipment control levers and the travel pedals, while the engine hydraulic pressure monitor lamp is still lighted.



## AFTER STARTING ENGINE

### WARNING

- **Emergency stop**  
If there has been any abnormal actuation or trouble, turn the starting switch key to the OFF position.
- If the work equipment is operated without warming the machine up sufficiently, the response of the work equipment to the movement of the control lever will be slow, and the work equipment may not move as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warming-up operation fully.

## BREAKING-IN THE NEW MACHINE

### CAUTION

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

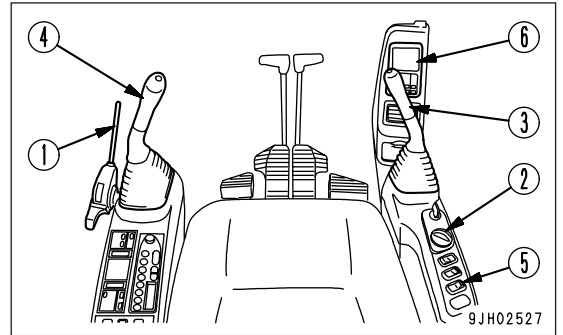
Be sure to running-in the machine for the initial 100 hours (as indicated by the service meter).  
During running-in operations, follow the precautions described in this manual.

- Run the engine at idling for 15 seconds after starting it. During this time, do not operate the control levers or fuel control dial.
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

## WARMING-UP OPERATION

### NOTICE

- When the hydraulic oil is at a low temperature, do not carry out operations or move the levers suddenly. Always carry out the warming-up operation. This will help to extend the machine life.
- Do not suddenly accelerate the engine before the warming-up operation is completed. Do not run the engine at low idling or high idling continuously for more than 20 minutes. This will cause leakage of oil from the turbocharger oil supply piping. If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.

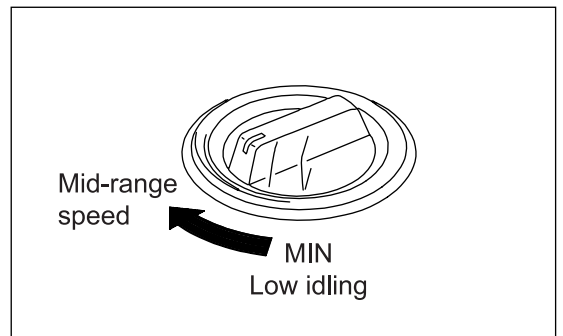


### REMARK

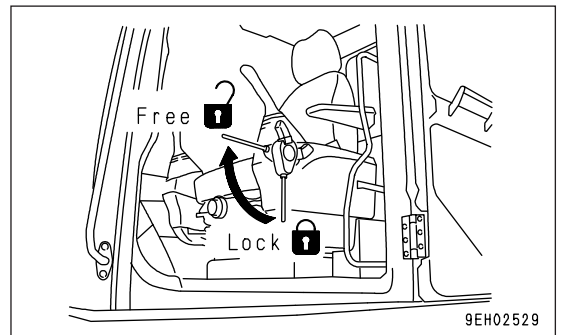
- If the engine water temperature is above 30°C, to protect the turbocharger, the engine speed does not rise for 2 seconds after starting, even if the fuel control dial is turned.
- If the hydraulic oil temperature is low, the hydraulic oil temperature monitor display will be white.

After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

1. Turn fuel control dial (2) to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load.



2. Set safety lock lever (1) to the FREE position, and raise the bucket from the ground.



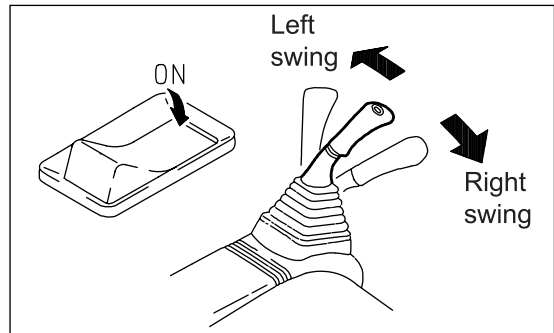
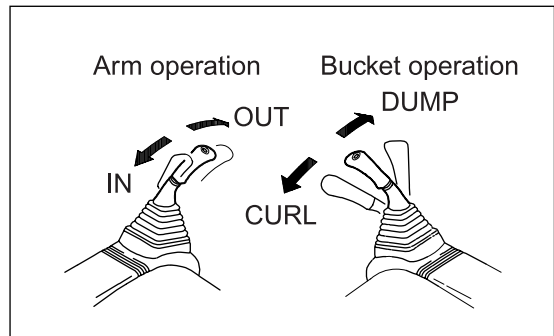
3. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of the stroke.
4. Carry out bucket and arm operation for 5 minutes at full stroke, alternating between bucket operation and arm operation at 30 second intervals.

**REMARK**

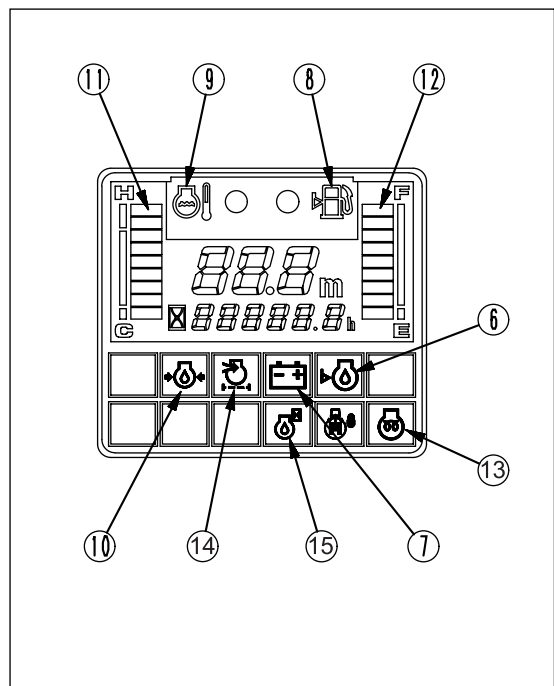
If swing lock switch (5) is operated to the ON position, it is possible to raise the oil temperature faster.

**NOTICE**

When the work equipment is retracted, take care that it does not interfere with the machine body or ground.

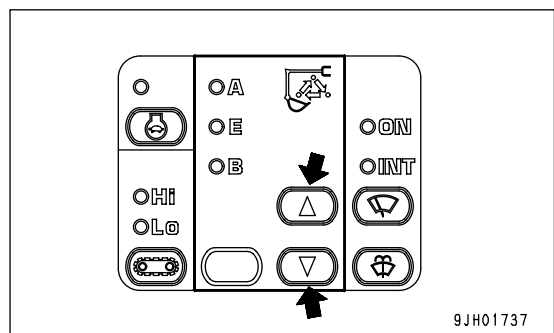


5. After carrying out the warming-up operation, check that each gauge and monitor lamp is in the following condition.
  - Engine oil level monitor (6): OUT
  - Charge level monitor (7): OUT
  - Fuel level monitor (8): OUT
  - Engine water temperature monitor (9): OUT
  - Engine oil pressure monitor (10): OUT
  - Engine water temperature gauge (11): Inside green range
  - Fuel gauge (12): Inside green range
  - Engine pre-heating lamp(13): OUT
  - Air cleaner clogging monitor (14): OUT
  - Replacement monitor of engine oil (15): OUT



6. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

7. Use the working mode switch on monitor panel (16) to set to the desired working mode.



9JH01737



## IN COLD AREAS (AUTOMATIC WARMING-UP OPERATION)

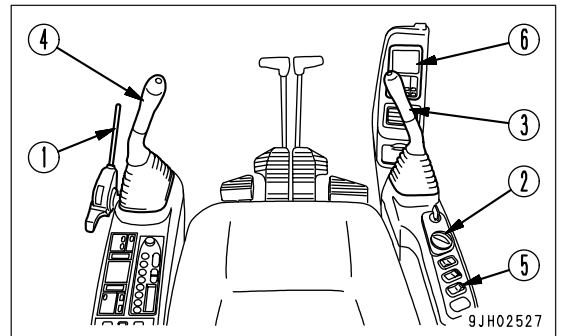
When starting the engine in cold areas, carry out the automatic warming-up operation after starting the engine.

When the engine is started, if the engine water temperature is low (below 30°C (86°F)), the warming-up operation is carried out automatically.

The automatic warming-up operation is canceled if the engine water temperature reaches the specified temperature (30°C (86°F)) or if the warming-up operation is continued for 10 minutes. If the engine water temperature or hydraulic oil temperature are low after the automatic warming-up operation, warm the engine up further as follows.

### NOTICE

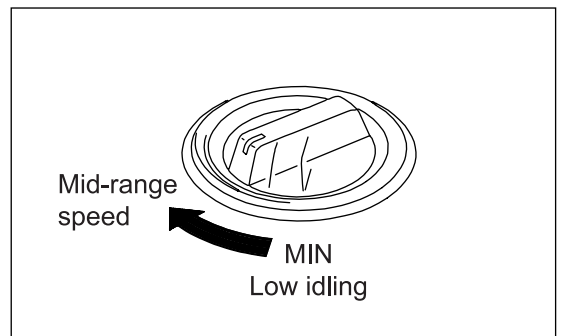
- **Never carry out operations or operate the levers suddenly when the hydraulic oil is still at low temperature. Always continue the warming-up operation until the work equipment monitor display is green. This will extend the service life of the machine.**
- **Do not suddenly accelerate the engine before the warming-up operation is completed. Do not run the engine at low idling or high idling continuously for more than 20 minutes. This will cause leakage of oil from the turbocharger oil supply piping. If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.**



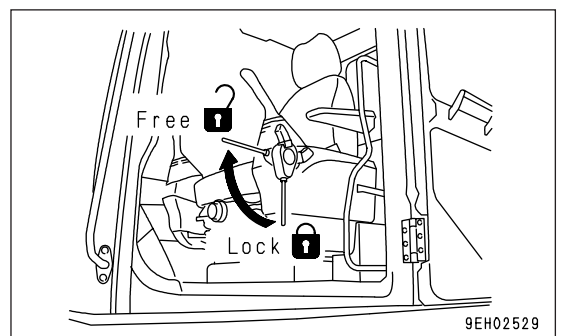
### REMARK

If the hydraulic oil temperature is low, the hydraulic oil temperature monitor display will be white.

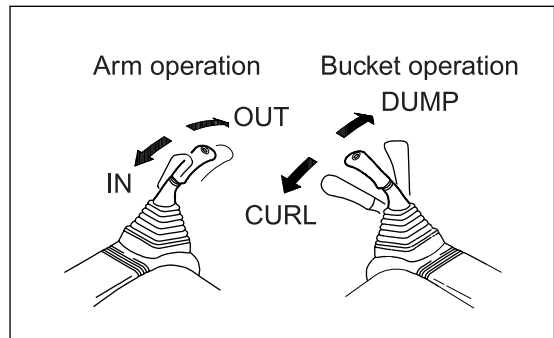
1. Turn fuel control dial (2) to the medium speed position.



2. Set safety lock lever (1) to the FREE position and raise the bucket from the ground.



3. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of their stroke.
4. Operate the bucket for 30 seconds and the arm for 30 seconds in turn fully for 5 minutes.

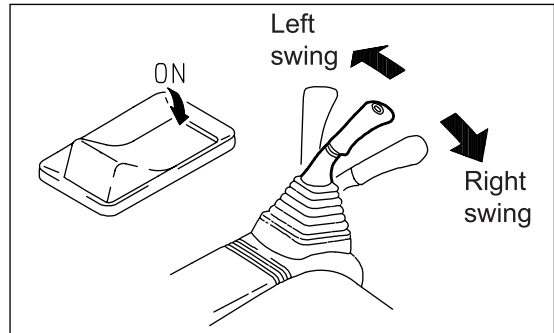


**REMARK**

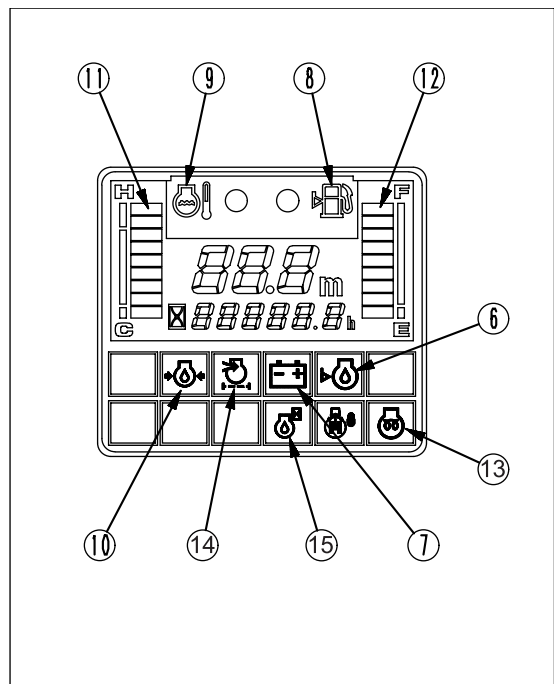
Turn swing lock switch (5) ON (ACTUATED) and operate the lever to make the oil temperature rise more quickly.

**NOTICE**

When the work equipment is retracted, take care that it does not interfere with the machine body or ground.



5. After carrying out the warming-up operation, check that each gauge and monitor lamp is in the following condition.
  - Engine oil level monitor (6): OUT
  - Charge level monitor (7): OUT
  - Fuel level monitor (8): OUT
  - Engine water temperature monitor (9): OUT
  - Engine oil pressure monitor (10): OUT
  - Engine water temperature gauge (11): Inside green range
  - Fuel gauge (12): Inside green range
  - Engine pre-heating lamp (13): OUT
  - Air cleaner clogging monitor (14): OUT
  - Replacement monitor of engine oil (15): OUT
6. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.



7. If air cleaner clogging monitor (14) is lighted up, clean or replace the element immediately. For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-21)".

8. Turn fuel control dial (2) to the full speed (MAX) position and carry out the operation in Step 5 for 3 to 5 minutes.
9. Repeat the following operation 3 to 5 times and operate slowly.
  - Boom operation RAISE ↔ LOWER
  - Arm operation IN ↔ OUT
  - Bucket operation CURL ↔ DUMP
  - Swing operation LEFT ↔ RIGHT
  - Travel (Lo) operation FORWARD ↔ REVERSE

**REMARK**

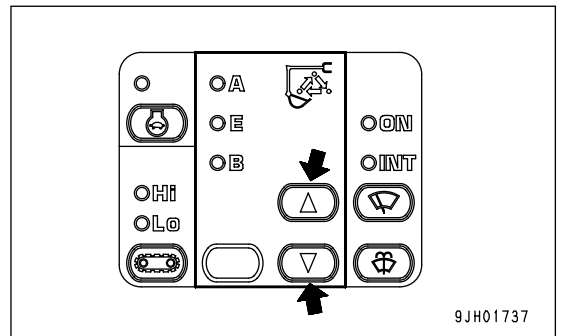
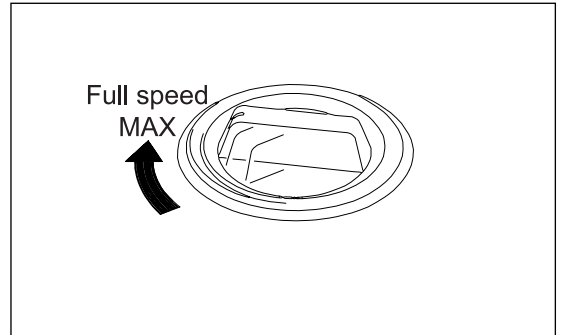
In the above operation is not carried out, there may be a delay in response when starting or stopping each actuator, so continue the operation until it becomes normal.

10. Use working mode switch 2 on the monitor panel to select the working mode to be used.

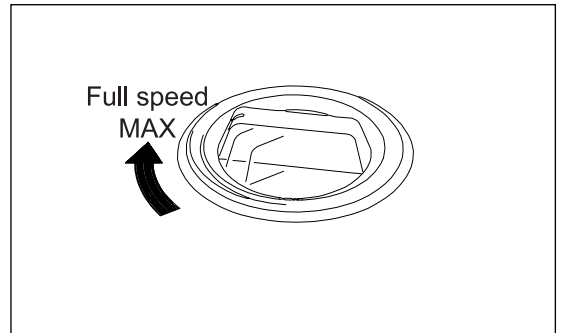
**NOTICE**

**Canceling automatic warming-up operation**

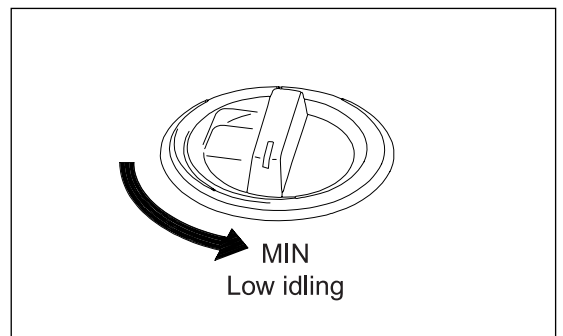
If it becomes necessary in an emergency to lower the engine speed to low idling, cancel the automatic warming-up operation as follows.



- 1) Turn fuel control dial (2) to the full speed (MAX) position and hold it for 3 seconds.



- 2) When fuel control dial (2) is returned to the low idling (MIN) position, the engine speed will drop.



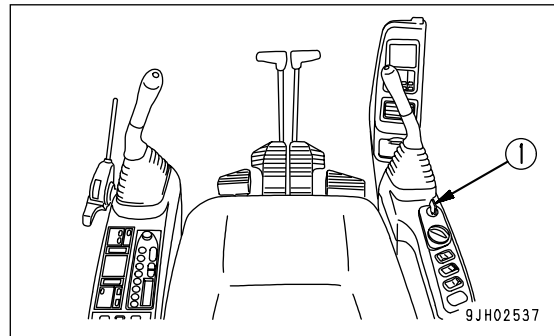
## STOPPING THE ENGINE

### NOTICE

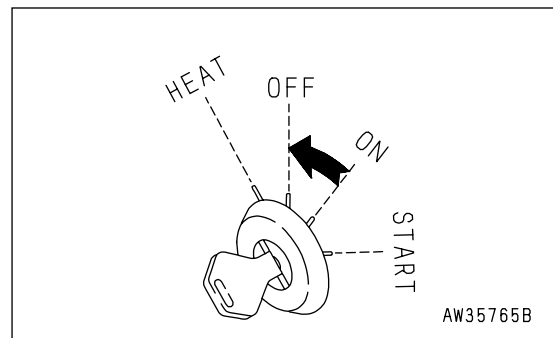
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Turn the key in starting switch (1) to the OFF position and stop the engine.
3. Remove the key from starting switch (1).



## CHECK AFTER SHUT OFF ENGINE

1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

### REMARK

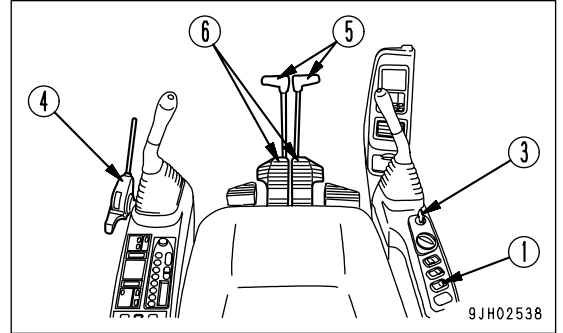
After stopping the engine, if the starting switch is turned within approx. 10 seconds to the ON or START position to start the engine again, the monitor display is not reset, and the screen before the starting switch was turned OFF is displayed.

# MACHINE OPERATION

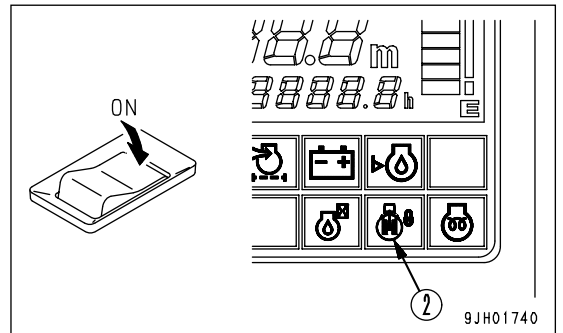
## PREPARATIONS FOR MOVING THE MACHINE OFF

**⚠ WARNING**

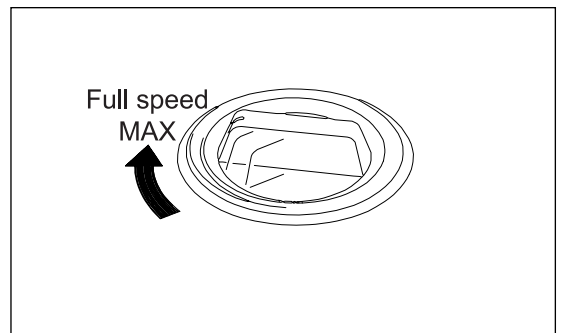
- Before operating the steering levers, check the direction of the track frame.  
If the sprocket is at the front, the operation of the travel levers is reversed.
- When moving off, check that the area around the machine is safe, and sound the horn before moving.
- Do not allow anyone in the area around the machine.
- Remove all obstacles from the travel path of the machine.
- The rear of the machine is a blind spot, so be particularly careful when travel in reverse.
- If the lever is moved inside the deceleration range, engine speed will rise suddenly. Operate the levers carefully.
- For machines equipped with a travel alarm (if equipped), check that the warning equipment works properly.



1. Set swing lock switch (1) to the ON (actuated) position and confirm that swing lock monitor lamp (2) lights up.

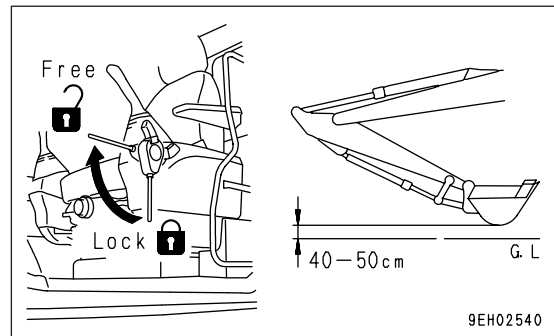


2. Turn fuel control dial (3) towards the full speed position to increase the engine speed.



### MOVING MACHINE FORWARD

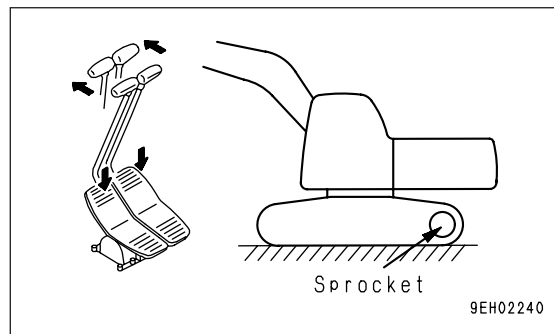
1. Set safety lock lever (4) in the FREE position, fold the work equipment, and raise it 40 to 50 cm (16 to 20 in) from the ground.



2. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.

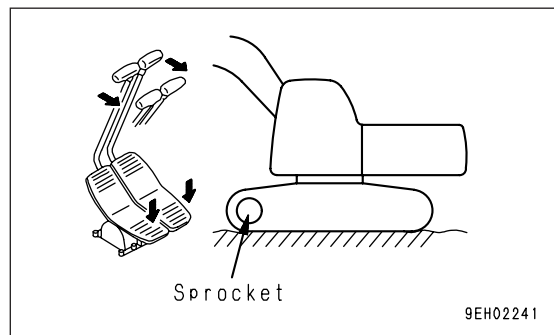
- When the sprocket is at the rear of the machine

Push levers (5) forward slowly or depress the front part of pedals (6) slowly to move the machine off.



- When the sprocket is at the front of the machine

Pull levers (5) backward slowly or depress the rear part of pedals (6) slowly to move the machine off.



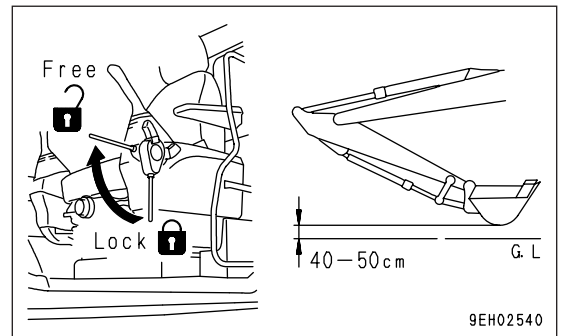
3. For machines equipped with a travel alarm, check that the alarm sounds. If the alarm does not sound, please contact your Komatsu distributor for repairs.

#### REMARK

In cold temperatures, if the machine travel speed is not normal, carry out the warming-up operation thoroughly. In addition, if the undercarriage is clogged with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.

## MOVING MACHINE BACKWARD

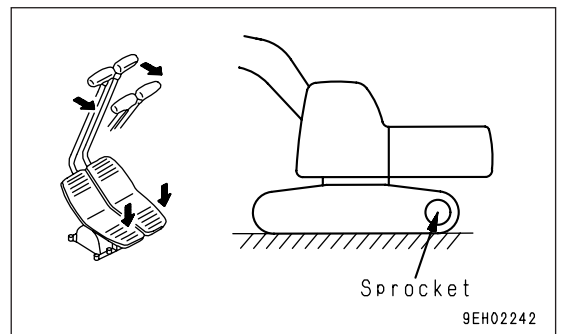
1. Set safety lock lever (4) in the FREE position, fold the work equipment, and raise it 40 to 50 cm (16 to 20 in) from the ground.



2. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.

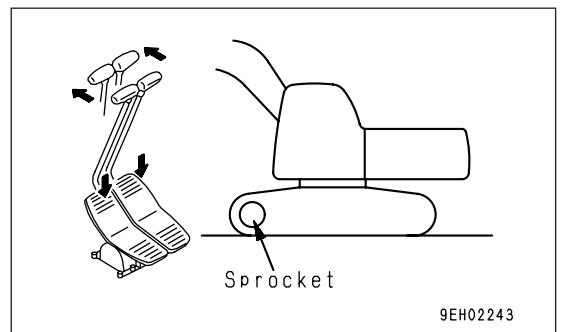
- When the sprocket is at the rear of the machine

Pull levers (5) backward slowly or depress the rear part of pedals (6) to move the machine off.



- When the sprocket is at the front of the machine

Push levers (5) forward slowly or depress the front part of pedals (6) to move the machine off.



3. For machines equipped with a travel alarm, check that the alarm sounds. If the alarm does not sound, please contact your Komatsu distributor for repairs.

### REMARK

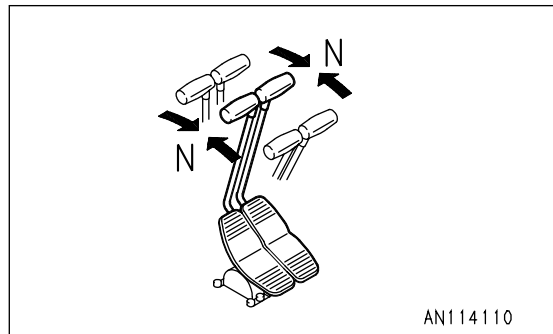
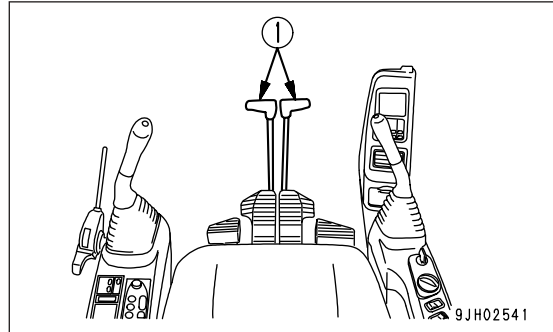
In cold temperatures, if the machine travel speed is not normal, carry out the warming-up operation thoroughly. In addition, if the undercarriage is clogged with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.

## STOPPING MACHINE

### WARNING

Avoid stopping suddenly. Give yourself ample room when stopping.

1. Put the left and right travel levers (1) in the neutral position, then stop the machine.





## STEERING THE MACHINE

### Steering

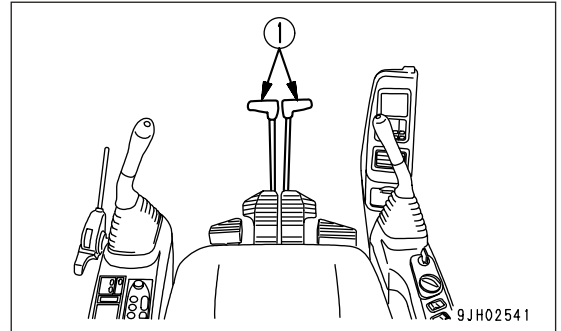
#### WARNING

Before operating the travel levers, check the position of the sprocket. If the sprocket is at the front, the operation of the travel levers is reversed.

Use the travel levers to change direction.

Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.

Operate two travel levers (1) as follows.



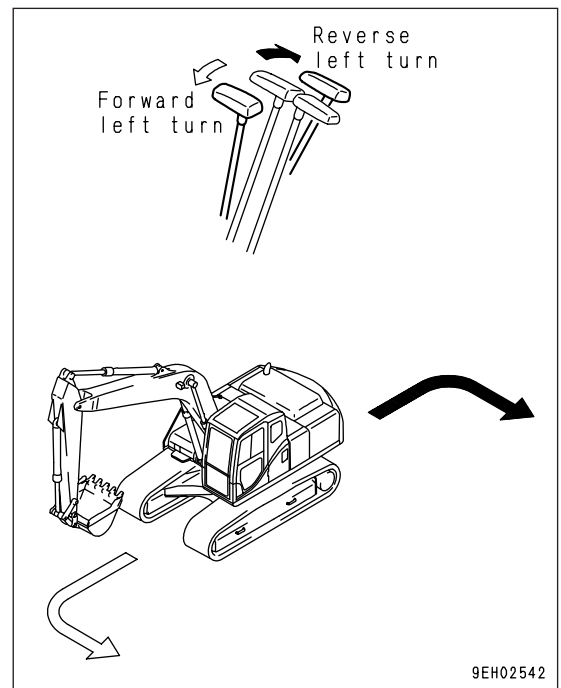
### Steering the Machine when Stopped

When turning to the left:

Push the right travel lever forward to turn to the left when traveling forward; and pull it back to turn left when traveling in reverse.

#### REMARK

When turning to the right, operate the left travel lever in the same way.



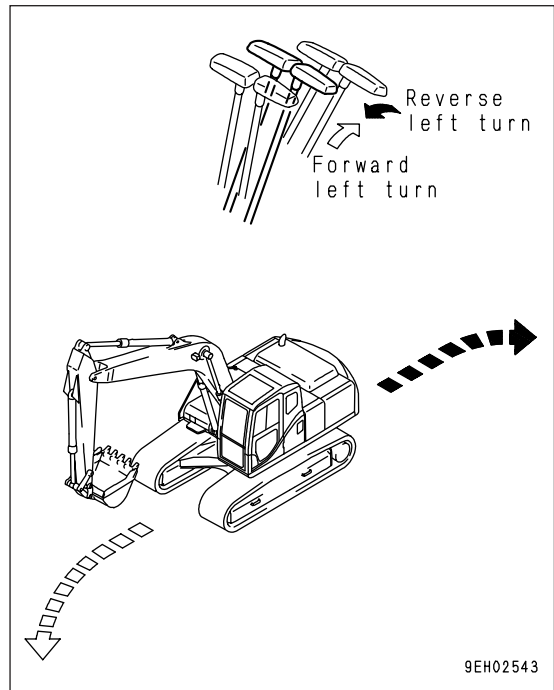
### Changing Direction of the Machine

When turning to the left:

If the left travel lever is returned to the neutral position, the machine will turn to the left.

**REMARK**

When turning to the right, operate the right travel lever in the same way.

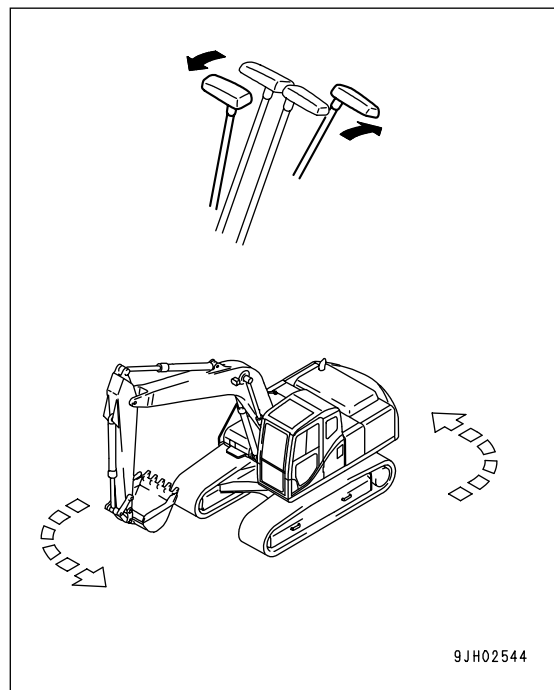


### Counter-rotation Turn (Spin Turn)

When using counter-rotation (spin turn) to turn left, pull the left travel lever back and push the right travel lever forward.

**REMARK**

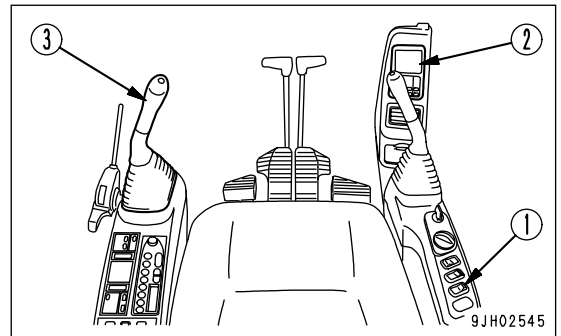
When using counter-rotation to turn right, pull the right travel lever back and push the left travel lever forward.



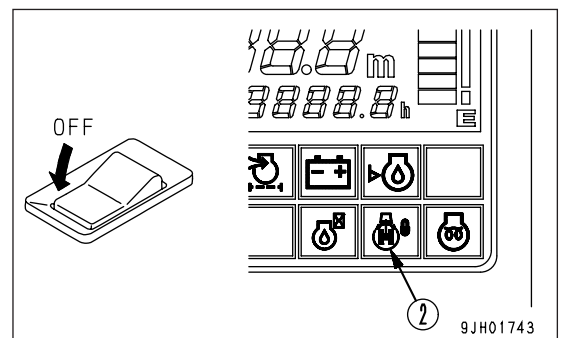
## SWINGING

### **⚠ WARNING**

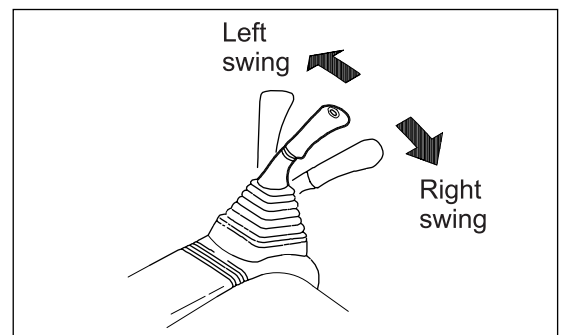
- The rear of the machine extends outside the track width. Check that the surrounding area is safe before swinging the upper structure.
- Check that swing lock monitor is not lighted up.
- If the swing control lever is operated quickly, the upper structure will move quickly; if it is operated slowly, the upper structure will move slowly.



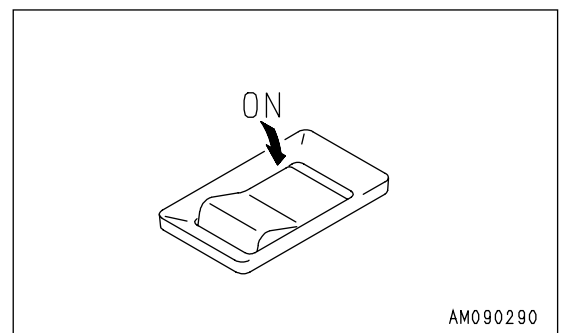
1. Before starting the swing operation, turn swing lock switch (1) OFF and check that swing lock monitor (2) has gone out.



2. Operate left work equipment control lever (3) to operate the swing.  
At the N position, the spring brake is applied.



3. When not using the swing, turn swing lock switch (1) ON. Check that swing lock monitor (2) lights up.



## WORK EQUIPMENT CONTROLS AND OPERATIONS

### WARNING

- If the lever is operated when the auto-deceleration is being actuated, the engine speed will suddenly rise, so be careful when operating the lever.
- If the work equipment control lever is operated quickly, the work equipment will move quickly; if the lever is operated slowly, the work equipment will move slowly.

The work equipment is operated by the left and right work equipment control levers. The left work equipment control lever operates the arm and swing, and the right work equipment control lever operates the boom and bucket.

The movements of the lever and work equipment are as shown in the diagrams on the right. When the levers are released, they automatically return to the neutral position and the work equipment is held in place.

- When the machine is at a standstill, and the work equipment levers are put in neutral, the engine speed is kept at medium speed due to the function of the auto-deceleration, even if the fuel control dial is set at the MAX position.

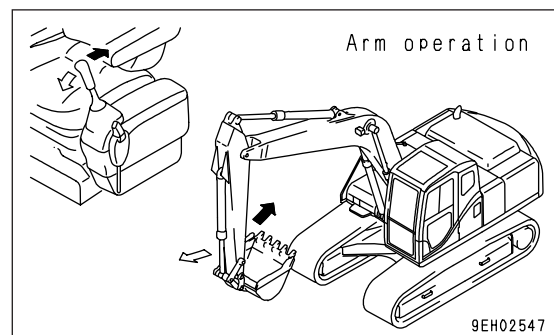
### REMARK

If the levers are operated within 15 seconds after stopping the engine, it is possible to lower the work equipment to the ground.

In addition, the levers can also be operated to release any remaining pressure inside the hydraulic cylinder circuit and to lower the boom after loading the machine on a trailer.

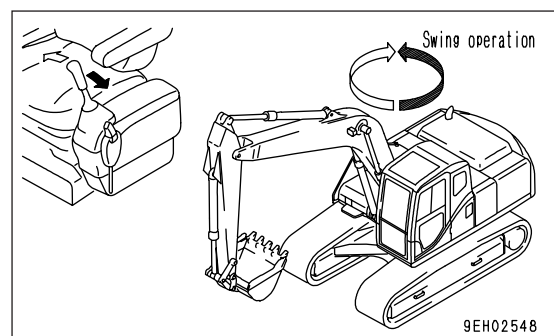
- Arm control

Move the left work equipment control lever to the front or rear to operate the arm.



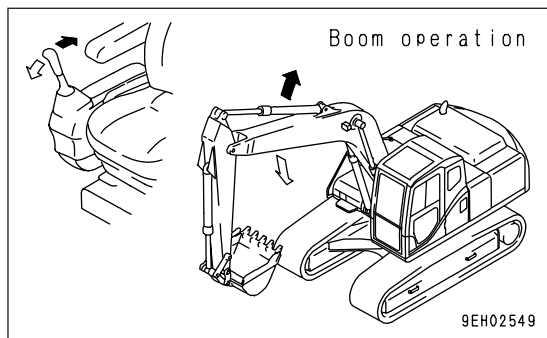
- Swing control

Move the left work equipment control lever to the left or right to swing the upper structure.



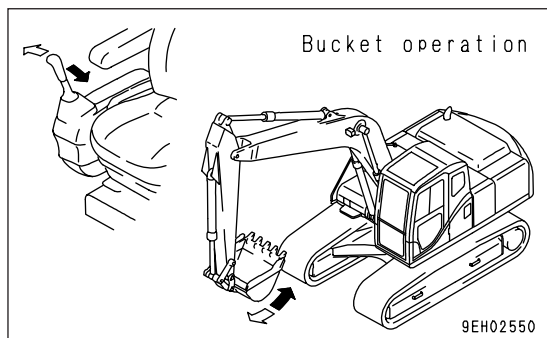
- **Boom control**

Move the right work equipment control lever to the front or rear to operate the boom.



- **Bucket control**

Move the right work equipment control lever to the left or right to operate the bucket.



# OPERATING WORKING MODE

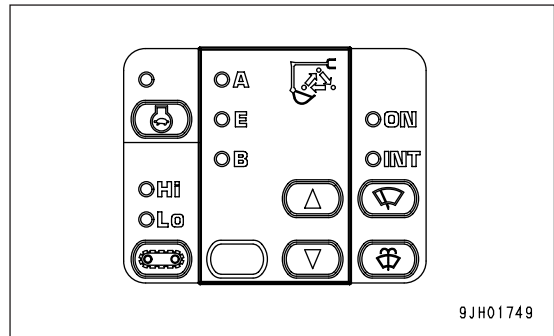
## Working mode

By using the working mode selector switch to select a working mode that matches the operating condition, it is possible to carry out operations efficiently.

Use the following procedure to make effective use of each working mode.

When the starting switch is turned ON, the working mode is set to A mode (digging).

Use the working mode switch to set the mode to the most efficient mode to match the type of work.



Working mode	Applicable operations
A mode	Normal digging, loading operations (Operations with emphasis on productivity)
E mode	Normal digging, loading operations
B mode	Breaker operations

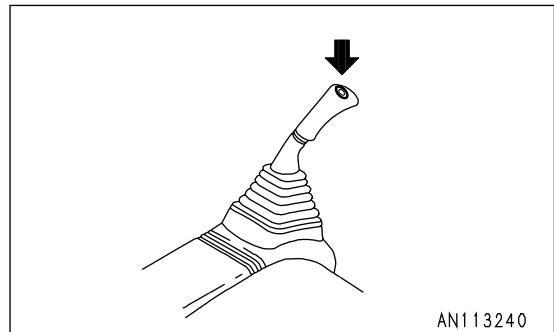
## NOTICE

**If breaker operations are carried out in the heavy digging mode, the hydraulic equipment may be damaged. Operate the breaker only in B mode.**

## ONE-TOUCH POWER MAX. SWITCH

The one-touch power max. switch can be used during operations to increase the power. Make effective use of this function whenever necessary in combination with the working mode.

- Press the left knob switch and keep it pressed. The power is increased as long as the switch is being pressed. However, the increased power is automatically canceled after 8.5 seconds.
  - This function is not actuated when the working mode is set to L mode or B mode.



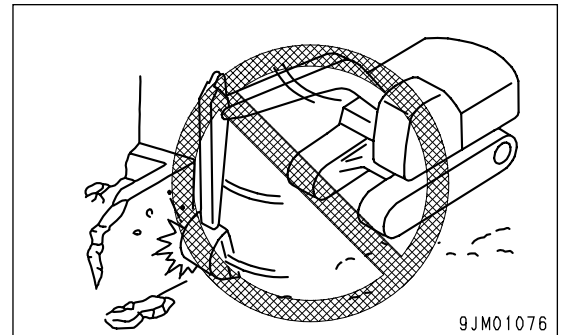
## PROHIBITED OPERATIONS

### WARNING

- If it is necessary to operate the work equipment control lever when the machine is traveling, be extremely careful when operating.
- If any lever is operated when the auto-deceleration is being actuated, the engine speed will suddenly increase, so be careful when operating.

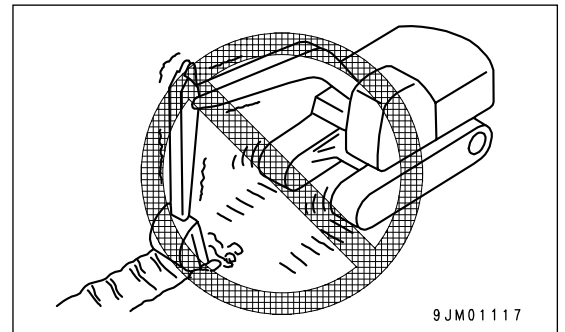
### OPERATIONS USING SWING FORCE

Do not use the swing force to compact soil or break objects. This is not only dangerous, but will also markedly reduce the life of the machine.



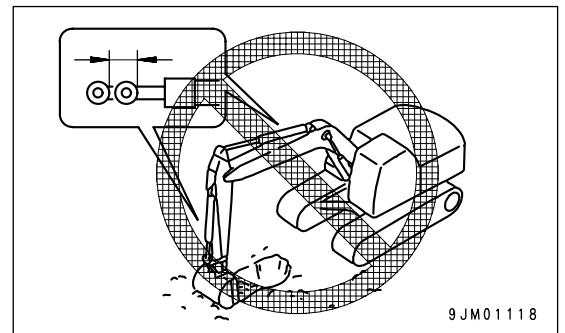
### OPERATIONS USING TRAVEL FORCE

Do not dig the bucket into the ground and use the travel force to carry out excavation. This will damage the machine or work equipment.



### OPERATIONS USING HYDRAULIC CYLINDER STROKE ENDS

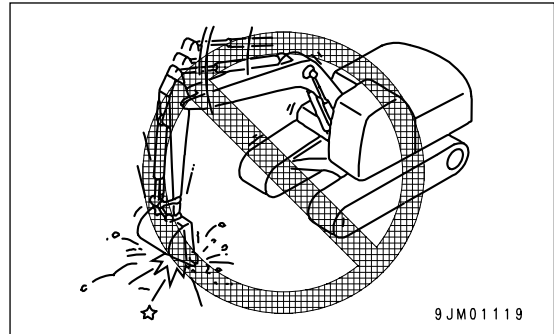
If the cylinder is used when the cylinder rod has been operated to the end of its stroke during operations, external force will cause impact to the work equipment, and this will damage the hydraulic cylinders. Avoid carrying out operations with the hydraulic cylinder fully retracted or fully extended.



## OPERATIONS USING BUCKET DROPPING FORCE

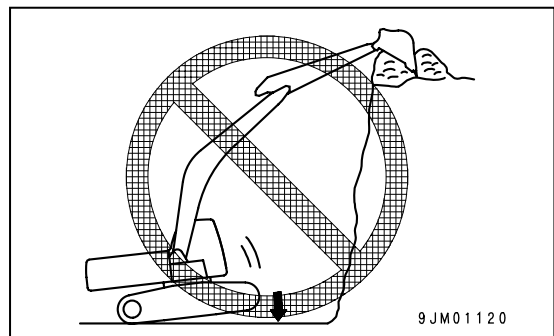
Do not use the dropping force of the machine for digging, or use the dropping force of the bucket as a pickaxe, breaker, or pile driver.

This will markedly reduce the life of the machine.



## OPERATIONS USING MACHINE DROPPING FORCE

Do not use the dropping force of the machine for digging.

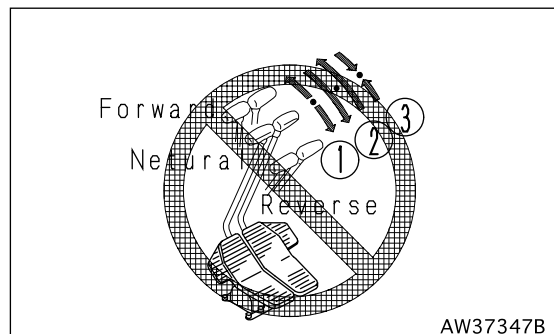


## DIGGING HARD ROCKY GROUND

It is better to excavate hard rocky ground after breaking it up by some other means. This will not only reduce damage to the machine but make for better economy.

## SUDDEN LEVER SHIFTING HIGH SPEED TRAVEL

- (1) Never carry out sudden lever shifting as this may cause sudden starting.
- (2) Avoid sudden lever shifting from forward to reverse (or from reverse to forward).
- (3) Avoid sudden lever shifting change such as sudden stopping from near top speed (lever release operation).

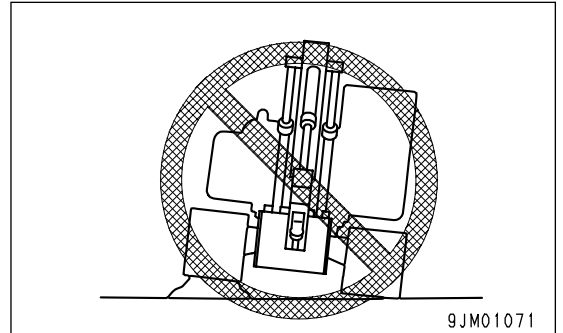




# GENERAL OPERATION INFORMATION

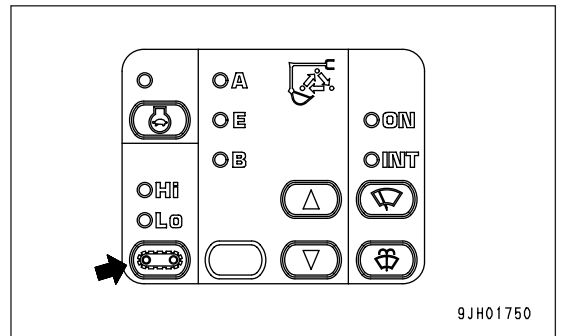
## TRAVELING

When traveling over obstacles such as boulders or tree stumps, the machine (in particular, the undercarriage) is subjected to a large shock, so reduce the travel speed and travel over the obstacle at the center of the tracks. As far as possible, remove such obstacles or avoid traveling over them.



## HIGH SPEED TRAVEL

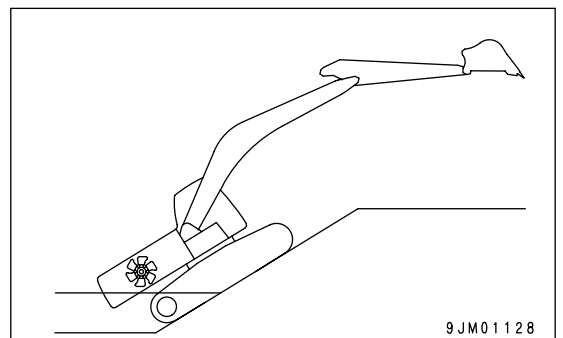
On uneven roadbeds such as rock beds or uneven roads with large locks, travel at Lo speed. When Hi-speed traveling, set the idler in the forward direction.



## PERMISSIBLE WATER DEPTH

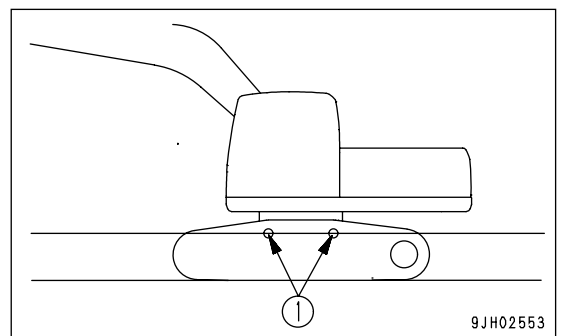
### **⚠ CAUTION**

When driving the machine out of water, if the angle of the machine exceeds 15°, the rear of the upper structure will go under water, and water will be thrown up by the radiator fan. This may cause the fan to break. Be extremely careful when driving the machine out of water.



Do not drive the machine in water deeper than of the center of carrier roller(1).

Supply grease to the parts which have been under water for a long time until the used grease is projected out of the bearings (around the bucket pin, in particular).



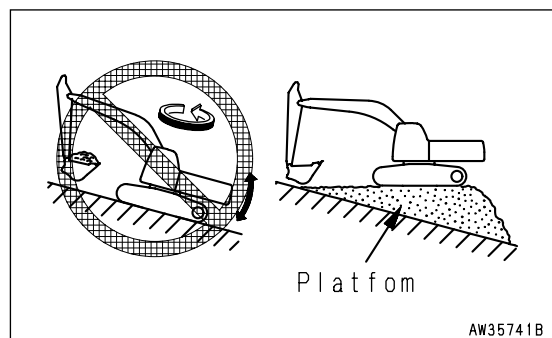
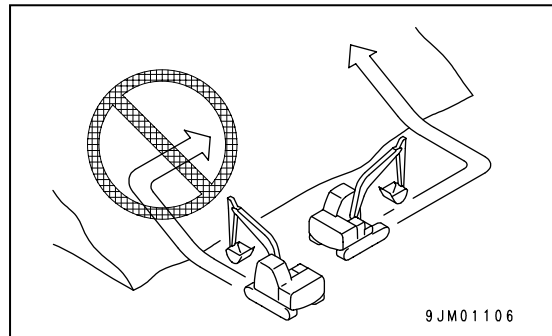
## TRAVELING ON SLOPES

### ⚠ WARNING

When traveling, raise the bucket approx. 20 to 30cm (8 to 12 in) from the ground.

Do not travel downhill in reverse.

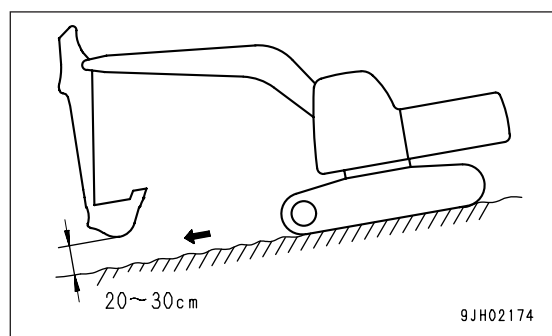
- When traveling over ridges or other obstacles, keep the work equipment close to the ground and travel slowly.
- Never turn on slopes or travel across slopes. Always go down to a flat place to perform these operations. It may be longer, but it will ensure safety.
- Always operate or travel in such a way that it is possible to stop safely at any time if the machine slips or becomes unstable.
- Turning or operating the work equipment when working on slopes may cause the machine to lose its balance and turn over, so avoid such operations. It is particularly dangerous to swing downhill when the bucket is loaded. If such operations have to be carried out, pile soil to make a platform on the slope so that the machine can be kept horizontal when operating.
- Do not travel up or down steep slopes. There is danger that the machine may turn over.
- When traveling uphill, if the shoes slip or it is impossible to travel uphill using only the force of the tracks, do not use the pulling force of the arm to help the machine travel uphill. There is danger that the machine may turn over.



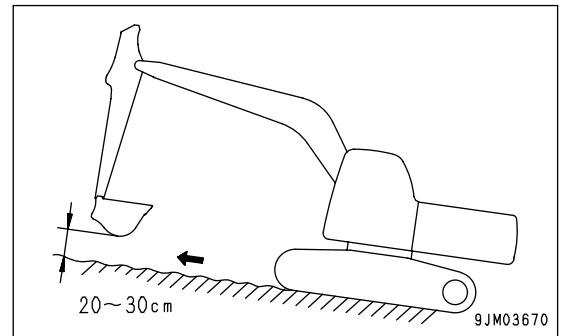
1. When traveling down steep hills, use the travel lever and fuel control lever to keep the travel speed low. When traveling down a steep hill of more than 15°, set the work equipment to the posture shown in the diagram on the right, and lower the engine speed.

### REMARK

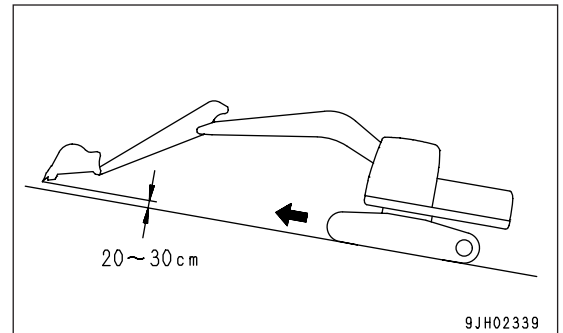
Travel down hills with the sprocket side down. If the machine travels down with the sprocket side up, the track tends to become loose, and that can cause skipping pitches.



2. When traveling up a steep hill of more than 15°, set the work equipment to the posture shown in the diagram on the right.



- When traveling up steep slopes, to ensure the balance, extend the work equipment to the front, keep it raised 20 - 30cm (10 - 20in) from the ground surface, and travel at low speed.



## TRAVELING DOWNHILL

To brake the machine during downhill runs, put the travel lever in the neutral position. This will cause the brake to be automatically applied.

## ENGINE STOPPED ON SLOPE

If the engine stops when traveling uphill, move the all levers to the neutral position, then start the engine again.

## PRECAUTIONS ON SLOPES

- If the engine stops when the machine is on a slope, never use the left work equipment control lever to carry out swing operations. The upper structure will swing under its own weight.
- Be extremely careful when opening or closing the door on slopes. The weight of the door may cause the door to open or close suddenly.  
Always set the door so that it is firmly locked in position.

## ESCAPE FROM MUD

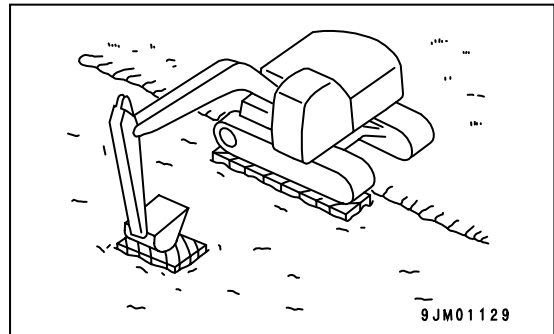
Always operate carefully to avoid getting affixed in mud. If the machine does get affixed in mud, do as follows to get the machine out.

### STUCK ONE SIDE OF TRACK

#### NOTICE

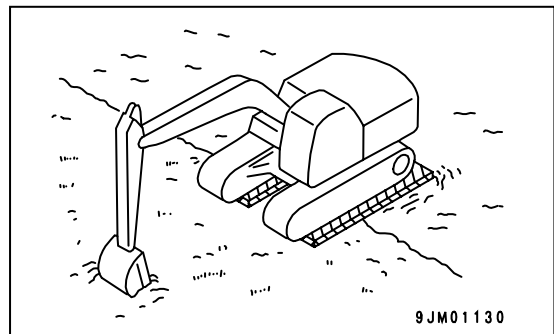
When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. (Never push with the teeth). The angle between the boom and arm should be  $90^{\circ}$  to  $110^{\circ}$ . The same applies when using the inverting bucket.

When only one side is stuck in mud, use the bucket to raise the track, then lay boards or logs and drive the machine out. If necessary, put a board under the bucket also.



### STUCK BOTH SIDES OF TRACKS

If the track on both sides are in mud and the machine slips and cannot move, use the procedure given above to lay logs or timber. dig the bucket into the ground at the front, operate the arm in the same way as when digging, and set the travel lever to FORWARD to pull the machine out.



## RECOMMENDED APPLICATIONS

In addition to the following, it is possible to further increase the range of applications by using various attachments.

### BACKHOE WORK

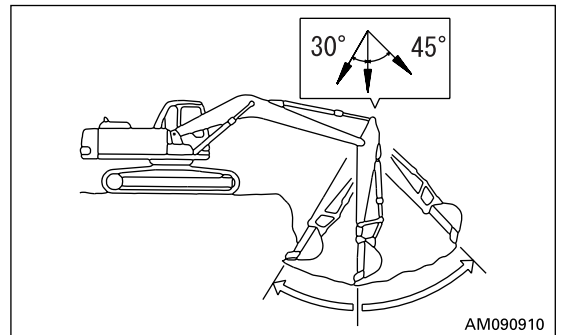
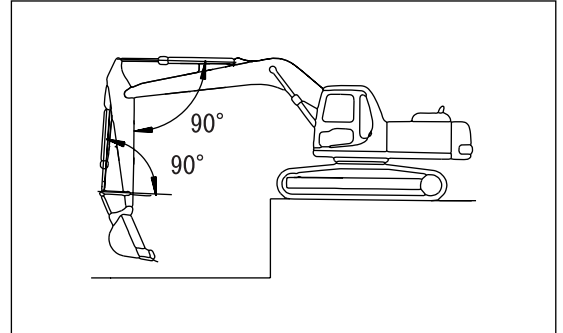
A backhoe is suitable for excavating at a position lower than the machine.

When the condition of the machine is as shown in the diagram at right, each cylinder's maximum pushing excavation force is obtained when the bucket cylinder and link, arm cylinder and arm are at 90°.

When excavating, use this angle effectively to optimize your work efficiency.

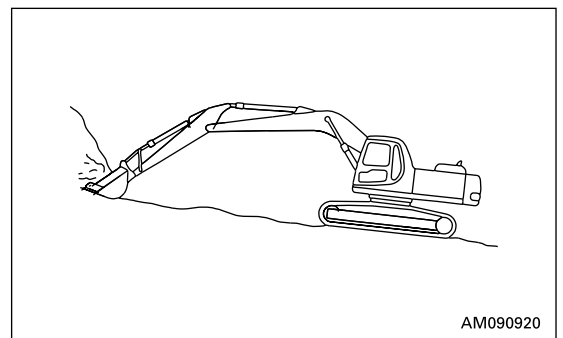
The range for excavating with the arm is from a 45° angle away from the machine to a 30° angle toward the machine.

There may be some differences depending on the excavation depth, but try to stay within the above range rather than operating the cylinder is the end of its stroke.



### SHOVEL WORK

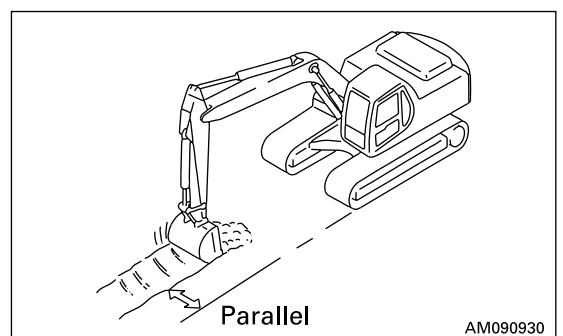
A shovel is suitable for excavating at a position higher than the machine. Shovel work is performed by attaching the bucket in the reverse direction.



### DITCHING WORK

Ditching work can be performed efficiently by attaching a bucket to match the width of the ditch and then setting the tracks parallel to the line of the ditch to be excavated.

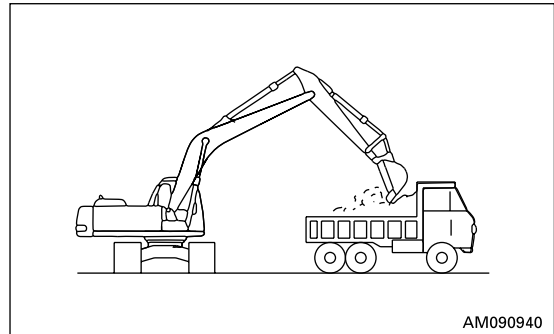
To excavate a wide ditch, first dig out both sides and then finally remove the center portion.



## LOADING WORK

In places where the swing angle is small, work can be carried out more efficiently by stopping the dump truck in a place where it can be seen easily by the operator.

Loading is easier and the capacity is greater if you load from the rear of the dump truck body than if you load from the side.



## REPLACEMENT AND INVERSION OF BUCKET

### ⚠ WARNING

- When the pin is knocked in with a hammer, pieces of metal may fly into your eyes and cause serious injury.  
When carrying out this operation, always wear goggles, hard hat, gloves, and other protective equipment.
- When the bucket is removed, place it in a stable condition.
- If the pins are hit with force, the pin may fly and injure people in the surrounding area, so check that the surrounding area is safe.
- When removing the pin, be extremely careful not to stand behind the bucket or to put your foot or any part of your body behind the bucket from the side.
- When removing or installing the pin, be extremely careful not to get your hands caught.
- Never put your fingers in the pin holes when aligning the holes.

Stop the machine on a firm, flat surface. When performing joint work, make clear signals to each other and work carefully for safety's sake.

### REPLACEMENT

1. Place the bucket in contact with a flat surface.

#### REMARK

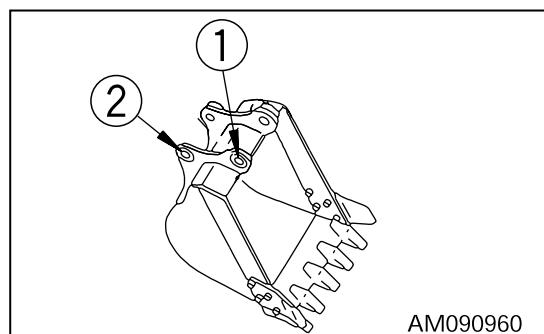
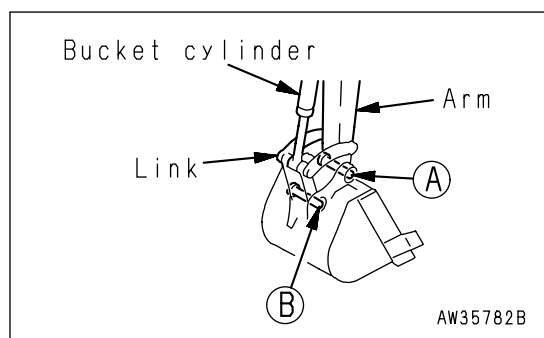
When removing the pins, place the bucket so that it is in light contact with the ground.

If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

#### NOTICE

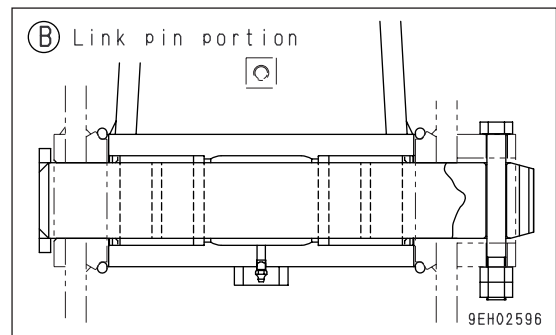
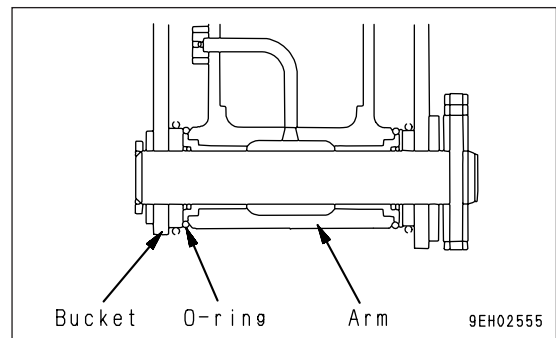
**After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.**

2. Remove the double nut from the stopper bolt of each pin of the arm and link, remove the bolts, then take out arm pin (A) and link pin (B), and remove the bucket.
3. Align the arm with holes (1) and the link with holes (2), then coat with grease and install pins (A) and (B).



**REMARK**

- Carry out installation in the reverse order to removal.
  - When installing the bucket: For arm pin portion (A), fit an O-ring at the position on the bucket shown in the diagram on the right. After inserting the pin, fit it into the proper groove. For link pin portion (B), install the bucket with the O-ring fitted in the proper groove.
4. Install the stopper bolts and nuts for each pin, then grease the pin.





# INVERSION

1. Place the bucket in contact with a flat surface.

**REMARK**

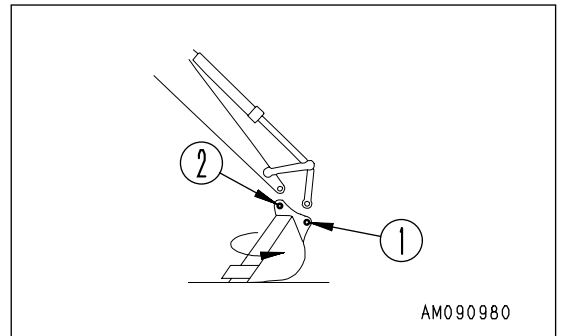
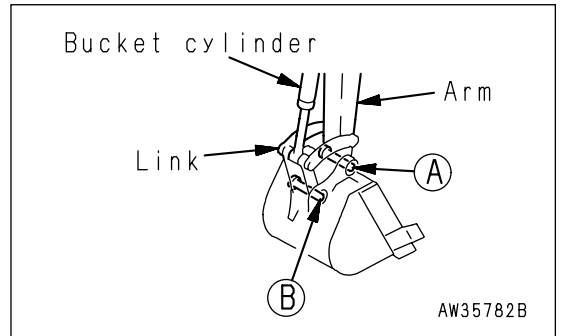
When removing the pins, place the bucket so that it is in light contact with the ground.

If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

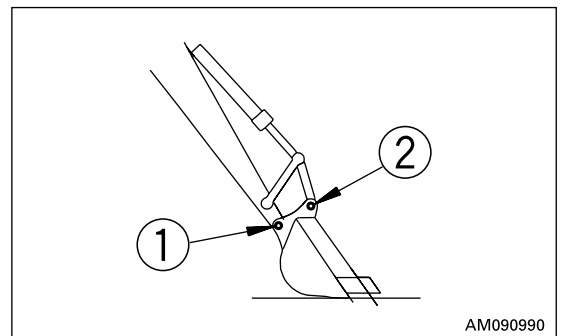
**NOTICE**

**After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.**

2. Remove the double nut from the stopper bolt of each pin of the arm and link, remove the bolts, then take out arm pin (A) and link pin (B), and remove the bucket.



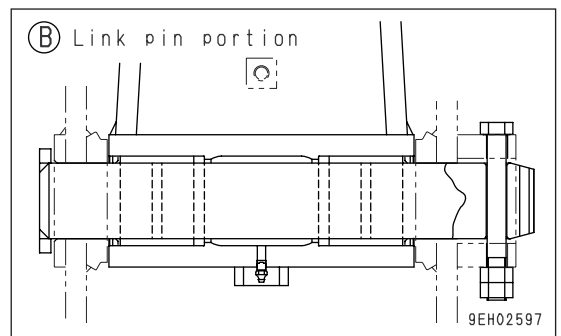
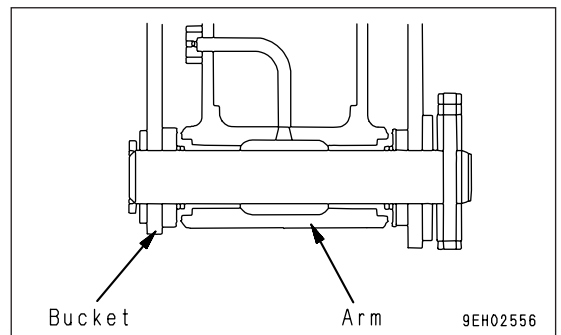
3. Reverse the bucket.  
After reversing the bucket, align the mounting pin hole with the arm and link, align the arm with the link mounting hole, then align the link with the arm mounting hole and install the bucket.
4. Align the arm with holes (1) and the link with holes (2), then coat with grease and install pins (A) and (B).



**REMARK**

When reversing, do not install an O-ring. Keep the O-ring in a safe place until using it next.

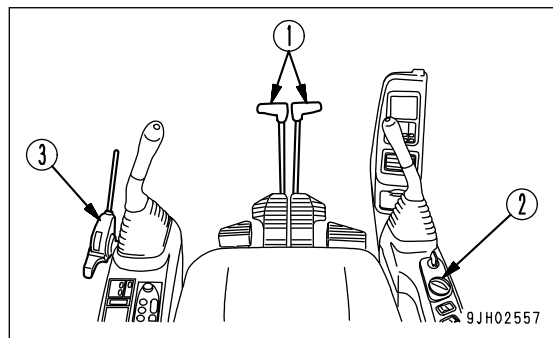
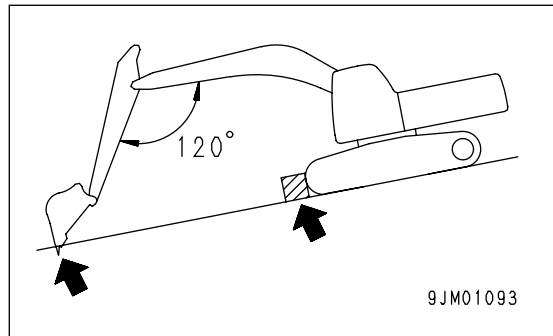
5. Install the stopper bolts and nuts for each pin, then grease the pin.



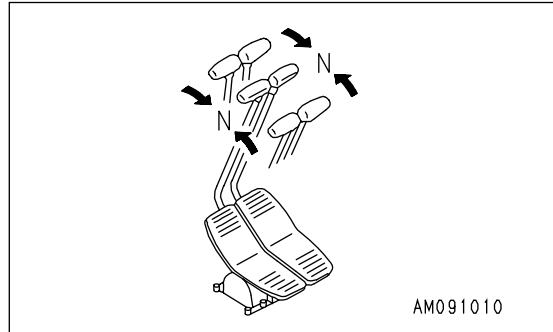
# PARKING MACHINE

**⚠ WARNING**

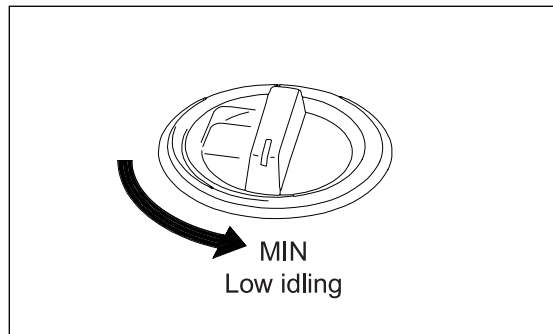
- Avoid sudden stops. Leave as much room as possible when stopping.
- Park the machine on firm level ground. Avoid parking the machine on a slope. If the machine must be parked on a slope, put blocks under tracks and dig the work equipment into the ground to prevent the machine from moving.
- If the work equipment lever is touched by mistake, the work equipment or machine may suddenly move and cause serious personal injury or accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.



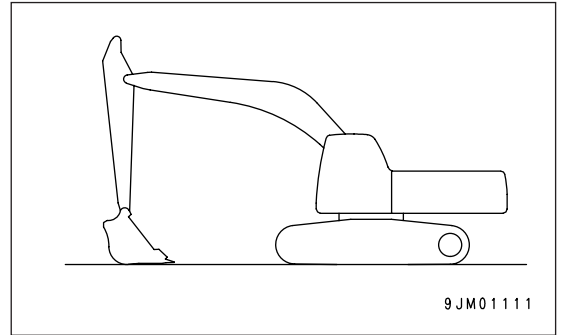
1. Put left and right travel levers (1) in the neutral position. The machine stops.



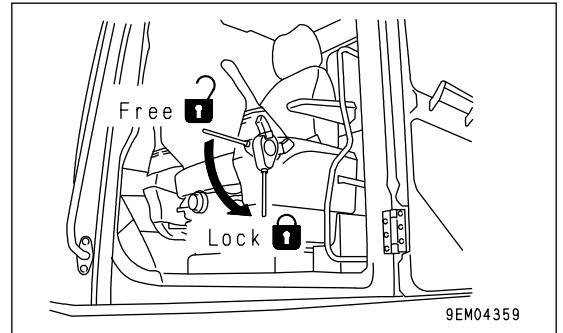
2. Lower the engine speed to low idling by fuel control dial (2).



3. Lower the bucket horizontally until the bottom touches the ground.

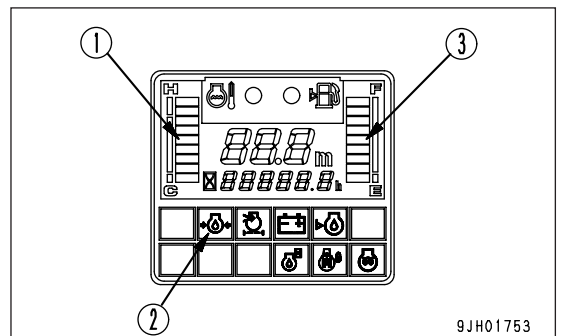


4. Set safety lock lever (3) in the LOCK position.



**CHECK AFTER FINISHING WORK**

Check the engine water temperature gauge (1), engine oil pressure monitor (2), and fuel gauge (3) on the machine monitor.



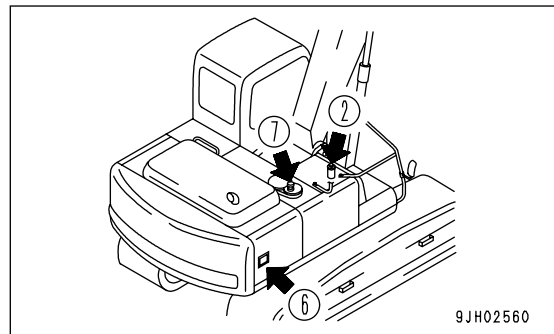
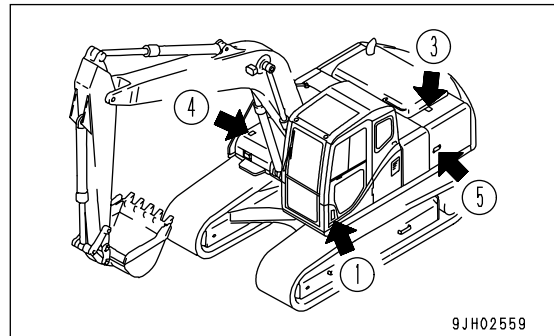
## LOCKING

Always lock the following places.

- (1) Door of operator's cab  
Always remember to close the window.
- (2) Fuel tank filler port
- (3) Engine hood
- (4) Battery box cover
- (5) Left side door of the machine
- (6) Right side door of the machine
- (7) Hydraulic tank filler port

### REMARK

Use the starting switch key to open and close all these places.



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# TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

## TRANSPORTATION PROCEDURE

As a basic rule, transport the machine by trailer.

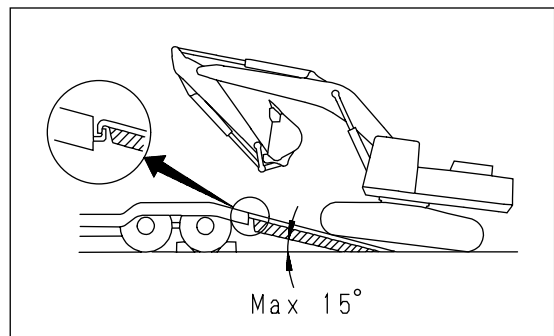
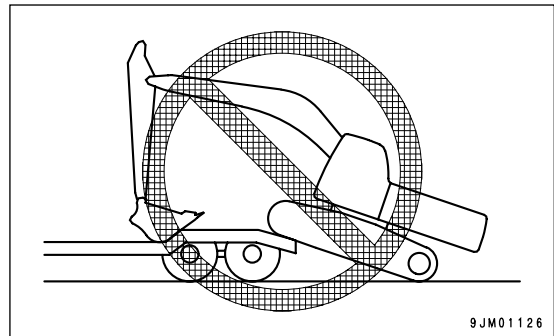
Select the trailer to match the weight and dimensions given in "SPECIFICATIONS (PAGE 5-2)".

Note that the value for the weight and transportation dimensions given in SPECIFICATIONS may differ according to the type of shoe or type of arm or other attachments.

## LOADING AND UNLOADING WITH TRAILER

### **⚠ WARNING**

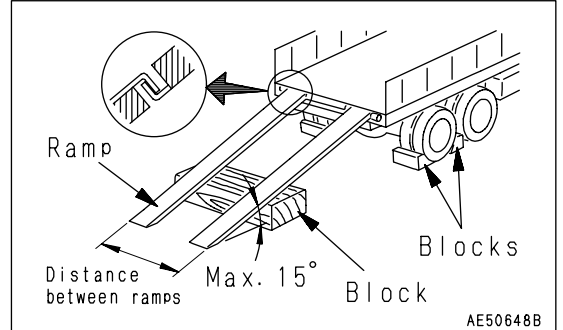
- Always turn the auto-deceleration switch OFF (cancel) during loading and unloading operations. If the auto-deceleration switch is left ON, the machine may suddenly start moving.
- Always drive the machine at low speed when loading or unloading the machine on a trailer. Do not operate the travel speed selector switch.
- Run the engine at low idling, set to low speed, and operate the machine slowly when loading or unloading.
- Do not load or unload the machine during the automatic warming-up operation. If the automatic warming-up operation is canceled during the loading or unloading operation, the speed will suddenly change.
- Select firm, level ground when loading or unloading the machine. Maintain a safe distance from the edge of the road.
- Use ramps with ample width, length, thickness, and strength and install them at a maximum slope of 15°. When using piled soil, compact the piled soil fully and take action to prevent the slope face from collapsing.
- Remove all mud and dirt from the machine tracks before starting in order to prevent the machine from slipping on the ramps. Be sure that the ramp surface is clean and free of water, snow, ice, grease, or oil.
- Never correct your steering on the ramps. There is danger that the machine may turn over. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- Do not use the work equipment for loading and unloading operations. It is dangerous.
- When on the ramps, do not operate any lever except the travel lever.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When swinging the upper structure on the trailer, the trailer is unstable, so pull in the work equipment and swing slowly.



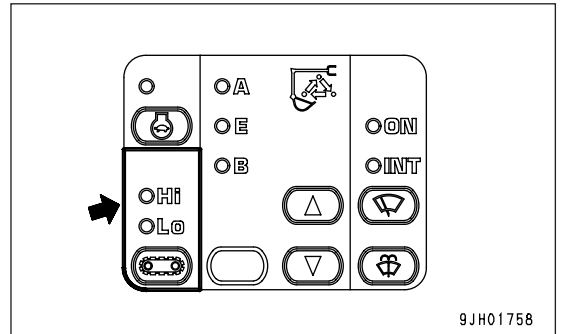
When loading or unloading, always use ramps or a platform and carry out the operation as follows.

**LOADING**

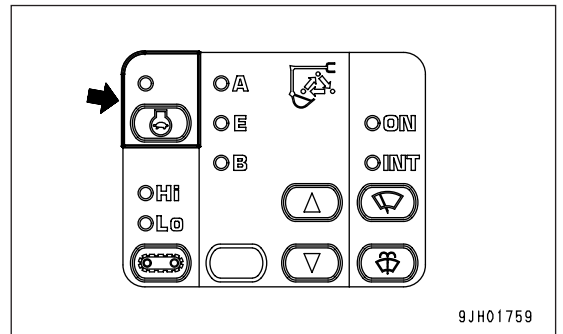
1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move. Then fix the ramps in line with the centers of the trailer and the machine.  
Be sure that the two sides are at the same level as one another.  
Make the slope of the ramps a maximum of 15°.  
Set the distance between the ramps to match the center of the tracks.



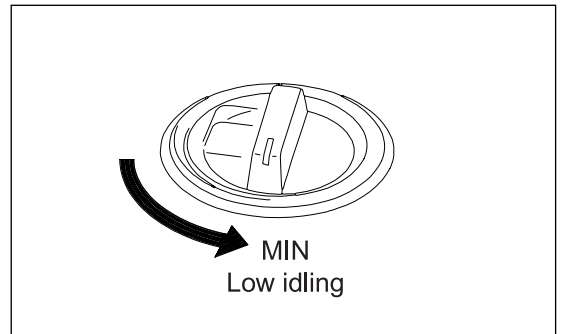
3. Set the travel speed selector switch to the LOW position.



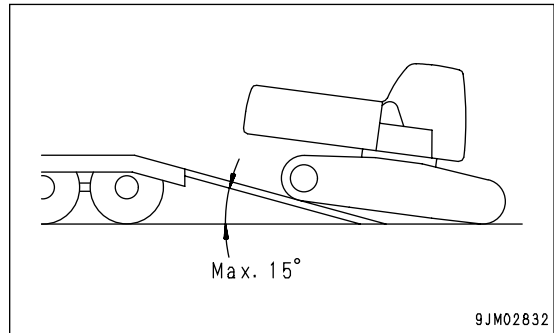
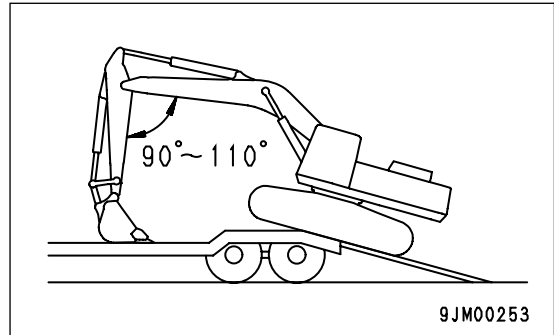
4. Turn the auto-deceleration switch OFF.



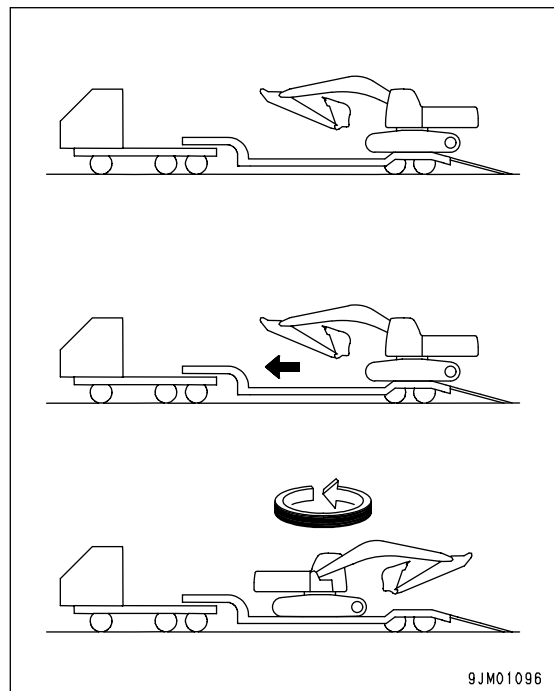
5. Lower the engine speed to low idling fuel control dial.



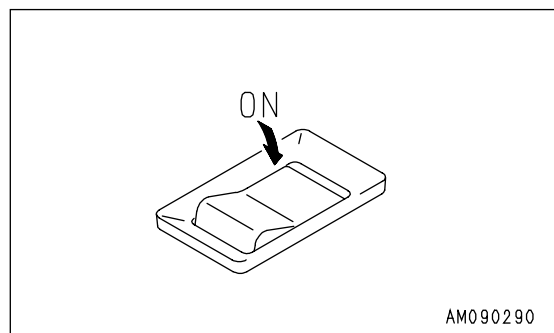
6. If the machine is equipped with work equipment, set the work equipment at the front, and travel forward to load it; if it has no work equipment, travel in reverse to load it.



7. When the machine travels over the rear wheels of the trailer, it will become unstable, so travel slowly and carefully. (Never change the direction of the machine under any circumstances.)
8. Turn the swing lock switch OFF to release the swing lock, then swing the upper structure slowly 180°. When the machine passes the raised area above the rear wheels, it will tilt to the front, so be extremely careful not to let the work equipment hit the body of the trailer, then travel forward to the specified position.



9. Stop the machine at the specified position on the trailer.
10. Turn the swing lock switch ON to lock the swing lock.





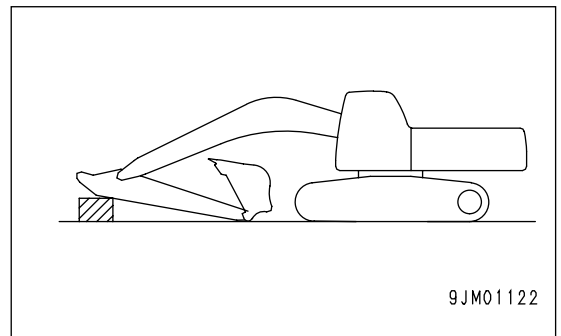
## SECURING MACHINE

### NOTICE

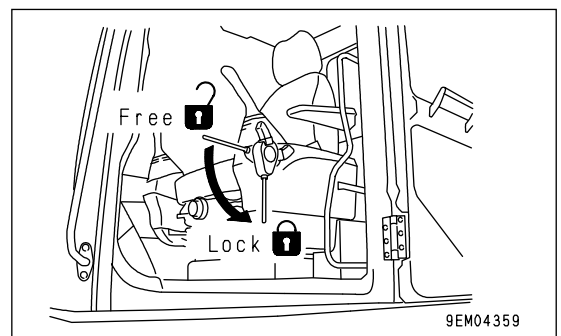
- Stow the car radio antenna. In addition, remove the mirrors. Tie the removed parts securely to the trailer.
- To prevent damage to the bucket cylinder during transportation, fit a wooden block at one end of the bucket cylinder to prevent it from touching the floor.

After loading the machine on the trailer, secure the machine as follows.

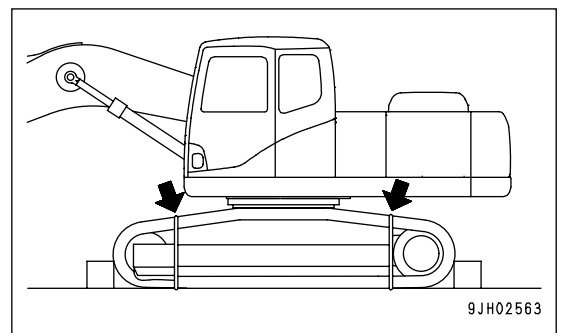
1. Extend the bucket and arm cylinders fully, then lower the boom slowly.
2. Stop the engine, then remove the key from the starting switch.



3. Lock the control levers securely with the safety lock lever.
4. Lock the operator's cab, side cover, battery box cover and engine hood.



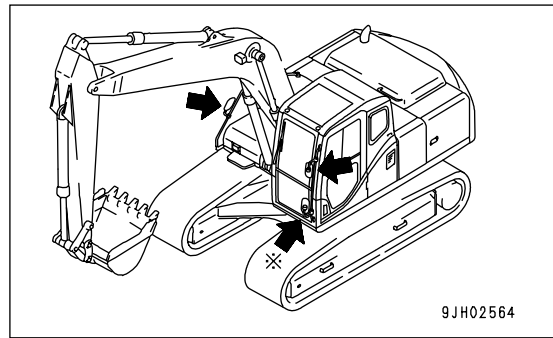
5. Put blocks under both ends of the tracks to prevent the machine from moving during transportation, and tie the machine down securely with chains or wire rope of suitable strength. Be particularly careful to fix the machine in position securely so that it does not slip to the side.



### REMOVING, INSTALLING MIRRORS

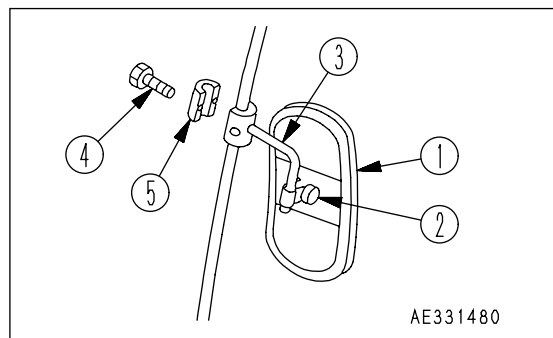
The mirrors are at the positions shown in the diagram on the right. (※: if equipped)

If they are damaged, or are to be removed for shipment, or are to be installed again, use the following procedure.



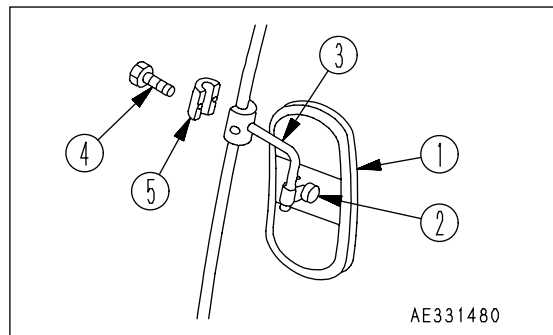
#### Removal

1. Loosen locknut (2) of mirror (1), then remove mirror (1) from support (3).
2. Loosen bolt (4), then remove support (3) and clamp (5) from the handrail.



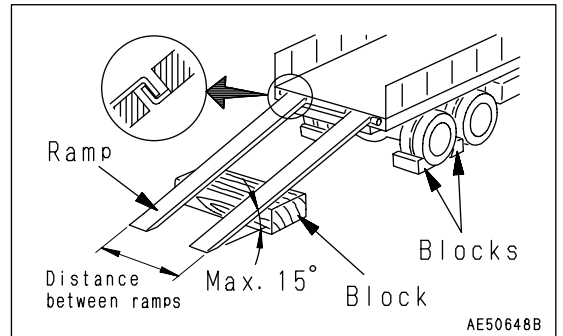
#### Installation

1. Install support (3) and clamp (5) to the handrail, then tighten bolt (4).
2. Install mirror (1) to support (3), then tighten locknut (2).



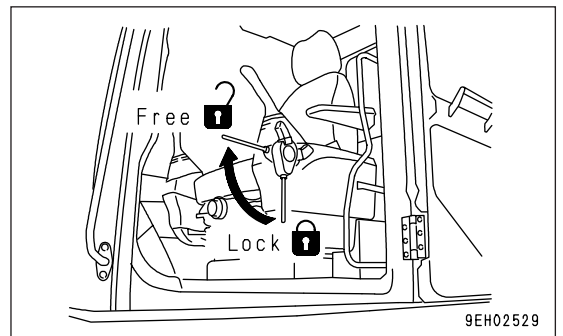
# UNLOADING

1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move. Then fix the ramps in line with the centers of the trailer and the machine.  
Be sure that the two sides are at the same level as one another.  
Make the slope of the ramps a maximum of 15°.  
Set the distance between the ramps to match the center of the tracks.

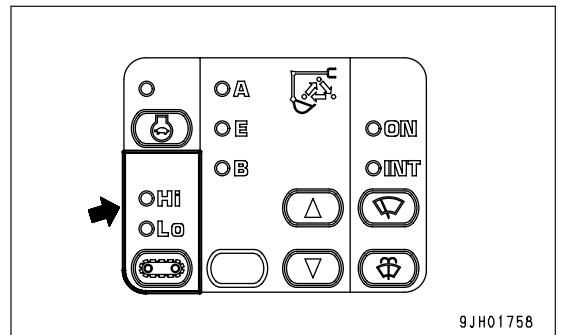


3. Remove the chains or wire rope holding the machine.
4. Start the engine.  
Carry out the warming-up operation thoroughly in cold weather.

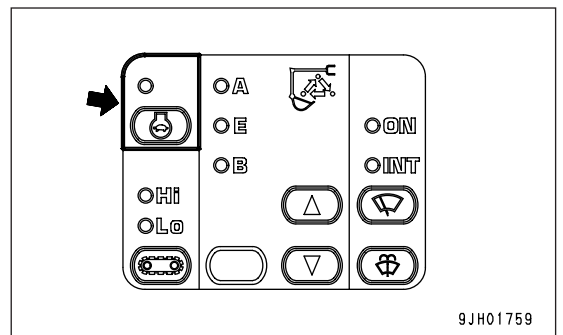
5. Set the safety lock lever (1) to the FREE position.



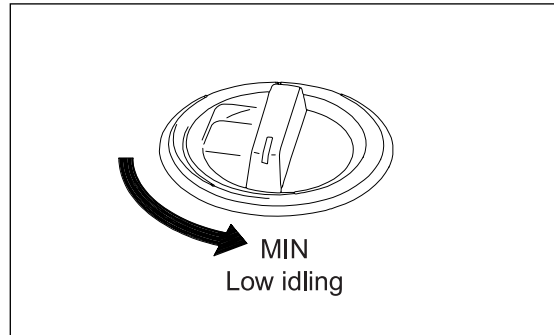
6. Set the travel speed selector switch to the LOW position.



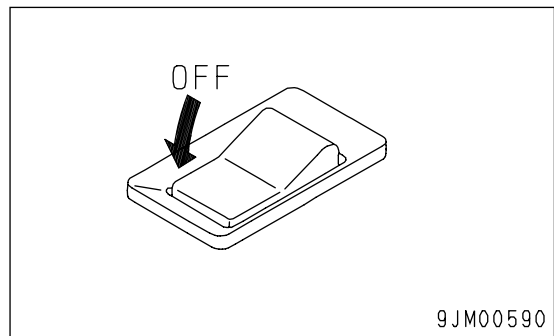
7. Turn the auto-deceleration switch OFF.



8. Set fuel control dial (1) at the LOW IDLING position.

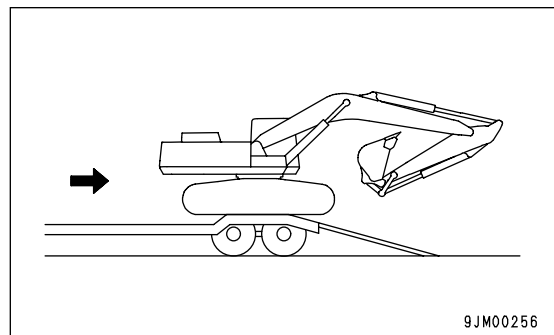


9. Turn the swing lock switch OFF to release the swing lock.



9JM00590

10. Raise the work equipment, pull in the arm under the boom, then move the machine slowly.
11. When the machine is horizontal on top of the rear wheels of the trailer, stop the machine.

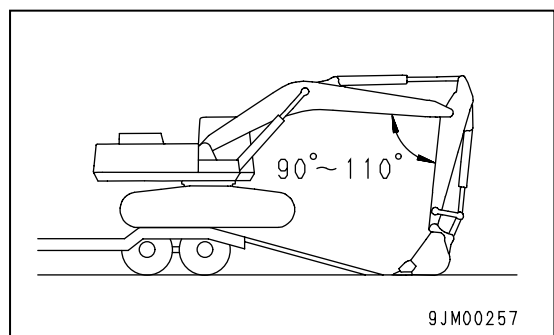


9JM00256

**NOTICE**

- If the machine is unloaded with the arm pulled in, the work equipment will be damaged.
- When moving on to the ramps, to prevent damage to the hydraulic cylinders, do not let the bucket hit the ground.

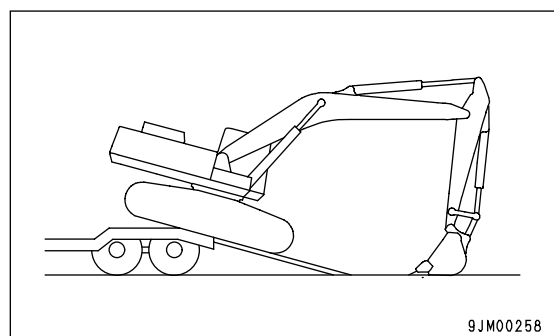
12. When moving from the rear of the trailer on to the ramps, set the angle of the arm and boom to 90 - 110°, lower the bucket to the ground, then move the machine slowly.



9JM00257

13. When moving down the ramps, operate the boom and arm slowly to lower the machine carefully until it is completely off the ramps.

14. Turn the swing lock switch ON to apply the swing lock



9JM00258

## LIFTING MACHINE

### WARNING

- Never raise the machine with any worker on it.
- Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.
- Never try to lift the machine in any posture other than the posture given in the procedure below. There is a hazard that the machine may lose its balance.
- Never lift the machine with the upper structure swung to the side. Swing the work equipment so that it is at the sprocket end and set the undercarriage and upper structure parallel before lifting.
- When lifting, keep the machine horizontal.
- It is dangerous to go under the machine when it is raised. Never go under the machine in such cases.

## STANDARD SPECIFICATION MACHINE

### NOTICE

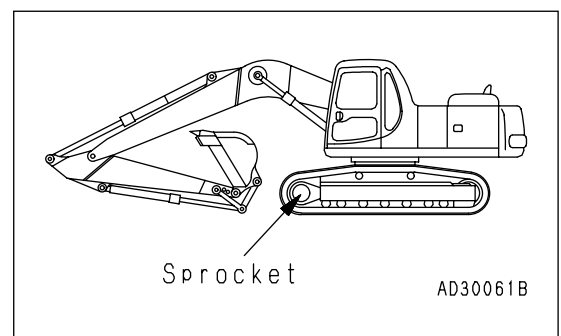
The lifting procedure applies to machines with standard specifications.

The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

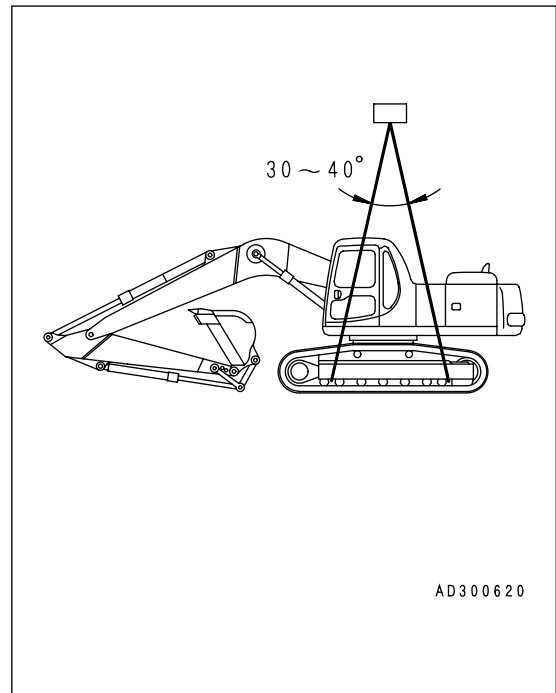
For details of the weight, see "SPECIFICATIONS (PAGE 5-2)".

When lifting the machine, carry out the operation on flat ground as follows.

1. Swing the upper structure so that the work equipment is at sprocket end.
2. Extend the bucket cylinder and arm cylinder fully, then lower the work equipment to the ground as shown in the diagram on the right using the boom cylinder.
3. Stop the engine, check that there is nothing around the operator's compartment, then get off the machine. Close the cab door and front glass securely.



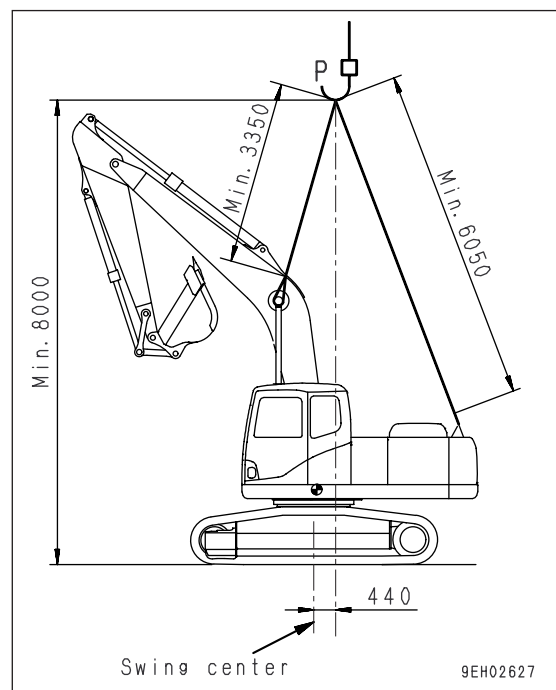
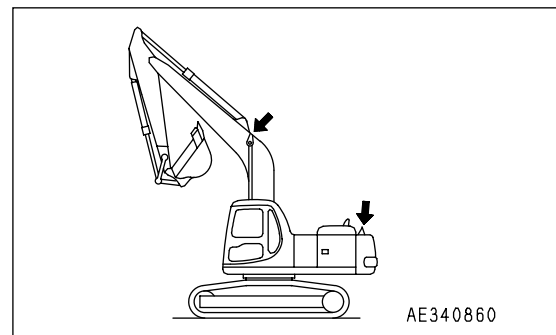
4. Pass wire ropes between the 1st and 2nd track rollers from the front and between the 1st and 2nd track rollers from the rear.  
However, for machines equipped with a full roller guard for the track roller, pass the wire rope under the track.
5. Set the lifting angle of the wire rope to 30° to 40°, then lift the machine slowly.
6. After the machine comes off the ground, check carefully that the machine is balanced, then lift slowly.



**REMARK**

For machines equipped with lifting hooks, raise the machine as follows.

- 1) Start the engine and set the work equipment to the posture shown in the diagram on the right. (Boom raised fully, arm, bucket pulled in fully.) Set the upper structure facing directly to the front (idler end).
- 2) Set the safety lock lever to the LOCK position.
- 3) Stop the engine, check that the area around the machine is safe, then get down from the machine. Close the cab door window and front window, left and right doors, and engine hood securely.
- 4) Install shackles to the lifting hooks on the boom and the top of the counterweight, then fit the wire rope.
- 5) Select the wire rope so that lifting position P is immediately above the center of gravity of the machine (a point 400 mm (15.8 in) behind the swing center) as shown in the diagram on the right.
- 6) When lifting, check that leakage of oil in the hydraulic circuit at the head end of the boom cylinder does not cause the posture to change.
- 7) When the machine leaves the ground, stop the lifting operation and check that the machine is balanced. When the machine becomes stable, continue the lifting operation.



# COLD WEATHER OPERATION

## COLD WEATHER OPERATION INFORMATION

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

### FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

### COOLING SYSTEM COOLANT

#### WARNING

- Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large quantities of fresh water and see a doctor at once.
- Antifreeze is toxic. Be extremely careful when handling it. When replacing coolant containing antifreeze or when handling coolant when repairing the radiator, contact your Komatsu distributor or ask your local antifreeze dealer. Be careful not to let the water flow into drainage ditches or spray on to the ground surface.
- Antifreeze is flammable, so do not bring any flame close. Do not smoke when handling antifreeze.

#### NOTICE

- Never use methanol, ethanol or propanol based antifreeze.
- Absolutely avoid using any water leak preventing agent irrespective of weather it is used independently or mixed with an antifreeze.
- Do not mix one antifreeze with a different brand.

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-26)".

#### REMARK

Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-26)".

## BATTERY

### WARNING

- The battery generates flammable gas, so do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on to the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

### REMARK

Measure the specific gravity and calculate the rate of charge from the following conversion table.

Temp. of fluid \ Rate of charge	20°C	0°C	-10°C	-20°C
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add the water after the day's work so as to prevent fluid in the battery from freezing in the night.



## AFTER DAILY WORK COMPLETION

### WARNING

- Performing idle-running of the tracks is dangerous, so stay well away from the tracks.
- After completion of operations, fill the fuel tank to prevent the formation of water caused by condensation of moisture in the empty space in the tank when the temperature goes down.

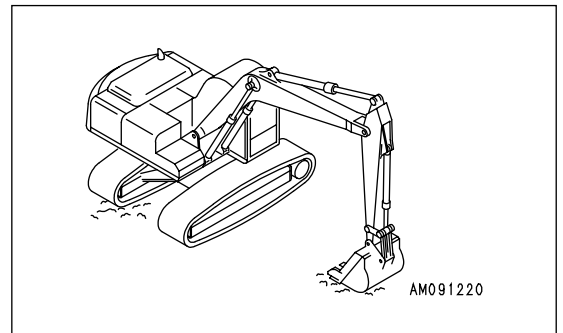
To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on hard, dry ground.

If this is impossible, park the machine on wooden boards.

The boards help protect the tracks from being frozen in soil and the machine can start next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- After operation in water or mud, remove water from undercarriage as described below to extend undercarriage service life.
  1. Swing 90° with engine at low idling and bring the work equipment to the side of the track.
  2. Jack up the machine until the track is raised slightly from the ground. Rotate the track under no load. Repeat this procedure on both the left and right sides.



## AFTER COLD WEATHER SEASON

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.

For details, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh soft water.

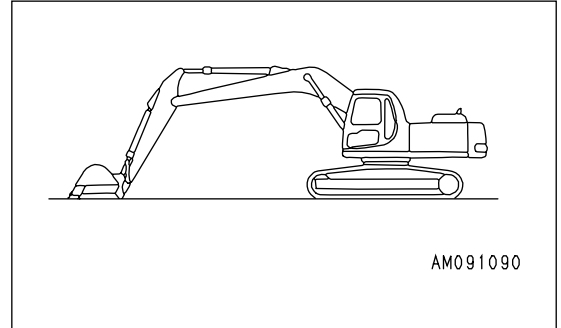
# LONG TERM STORAGE

## BEFORE STORAGE

### NOTICE

When storing the machine, set the machine in the posture shown in the diagram on the right to protect the cylinder rod.

(To prevent rusting of the cylinder rod)



When putting the machine in storage for a long time, do as follows.

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C (32°F), always add antifreeze to the cooling water.
- Lock each control lever and pedal with the lock lever and pedal lock.
- Set the stop valve to the LOCK position on machines which can install attachments. Install a plug in the elbow.
- Set the selector valve on the machines which can install attachments to the "Where no attachment is mounted" position.

## DURING STORAGE

### WARNING

If it is unavoidably necessary to carry out the rust-preventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- During storage, always operate the machine once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.
- For machines equipped with an air conditioner, run the air conditioner.
- Rotate the tracks.

## AFTER STORAGE

### NOTICE

**If the machine is to be used when the monthly rust prevention operation has not been carried out, please contact your Komatsu distributor.**

When using the machine after long-term storage, do as follows before using it.

- Wipe off all the grease coating the hydraulic cylinder rods.
- Add oil and grease to all places.
- When the machine has been stored for a long time, the moisture in the atmosphere will get into the oil. Check the oil at all parts before and after starting the engine. If there is water in the oil, change all the oil.

## STARTING MACHINE AFTER LONG-TERM STORAGE

When starting the engine after long-term storage, cancel the automatic warming-up operation as follows.

1. Turn the starting switch key to the ON position.
2. Turn the fuel control dial from the low idling (MIN) position to the full (MAX) position, hold it there for 3 seconds, then return it to the low idling (MIN) position and start the engine.

# TROUBLESHOOTING

## AFTER RUNNING OUT OF FUEL

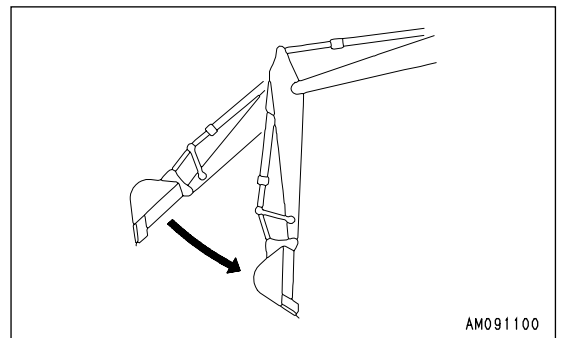
When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before starting.

For details of bleeding the air, see "REPLACE FUEL FILTER CARTRIDGE (PAGE 4-56)".

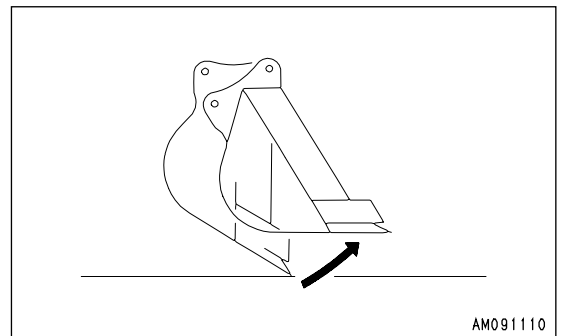
## PHENOMENA THAT ARE NOT FAILURES

Note that the following phenomena are not failures:

- When the arm is pulled in, the speed of movement will drop momentarily when the arm is more or less vertical.



- The arm speed will drop momentarily when the bucket teeth are more or less horizontal.
- Bucket or arm shakes during heavy-duty digging operations.



- When starting or stopping the swing, noise will be emitted from the brake valve.
- When going down a steep slope at low speed, a noise will be emitted from the travel motor.

## TOWING THE MACHINE

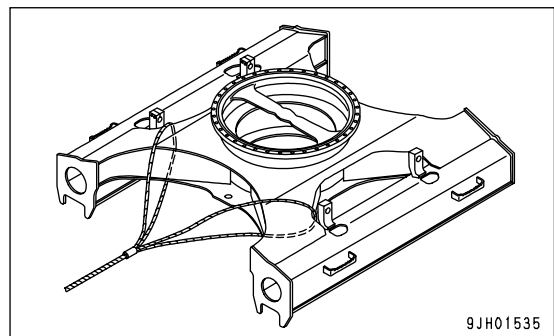
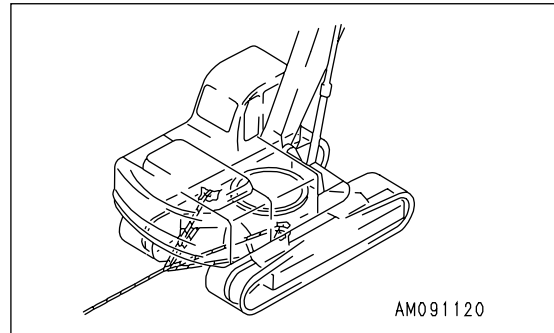
### WARNING

- When towing the machine, use a wire rope that has ample strength for the weight of the machine that is being towed.
- Do not apply a sudden load to the wire rope.

If the machine sinks in mud and cannot get out under its own power, or if the drawbar pull of the excavator is being used to tow a heavy object, use a wire rope as shown in the diagram on the right.

Place pieces of wood between wire ropes and body to prevent damage to ropes and body.

At this time, never use the hook for light-weight towing.



## LIGHTWEIGHT TOWING HOOK

### WARNING

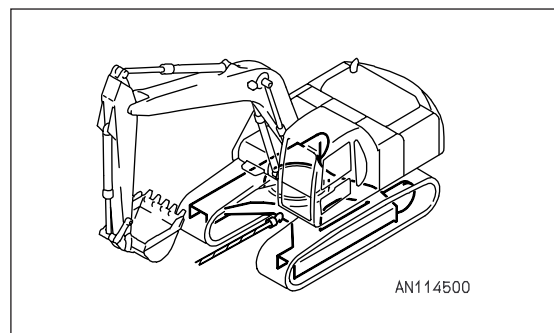
- The shackle must always be used.
- Hold the rope level and direct it straight to the track frame.
- Move the machine slowly.

The track frame has been equipped with a hook to pass the shackle for towing light objects.

Permissible towing load:

PC200 : Max. 58800 N (6000 kgf)

PC220 : Max. 78400 N (8000 kgf)



## PRECAUTIONS ON PARTICULAR JOBSITES

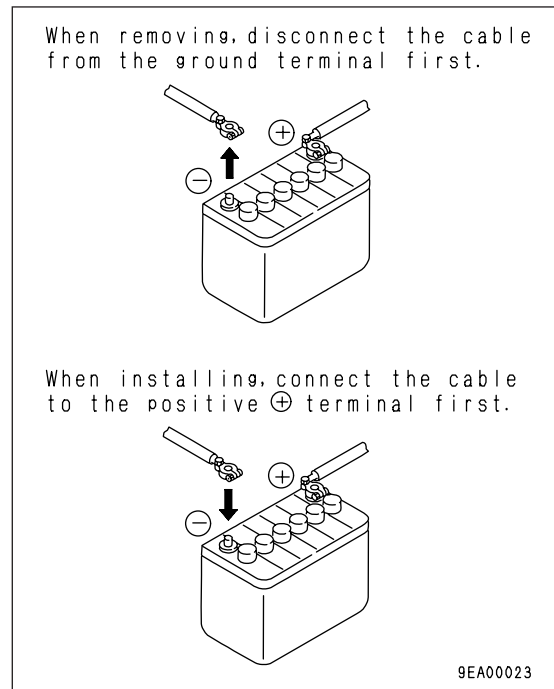
- When carrying out digging operations in water, if the work equipment mounting pin goes into the water, carry out greasing every time the operation is carried out.
- For heavy-duty operations and deep digging, carry out greasing of the work equipment mounting pins every time before operation.

After greasing, operate the boom, arm, bucket, and blade several times, then grease again.

## DISCHARGED BATTERY

### **⚠ WARNING**

- It is dangerous to charge the battery while it is still mounted on the machine. Always remove the battery before charging it.
- When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
- The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
- Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.
- When handling batteries, always wear protective goggles and rubber gloves.
- When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first. If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
- When installing the terminals, install them tightly. When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.
- Green rust around the terminals is a cause of self-discharge of the battery. Polish the terminals with sandpaper. After removing the rust, coat the terminals thinly with grease before installing.





## REMOVAL AND INSTALLATION OF BATTERY

### NOTICE

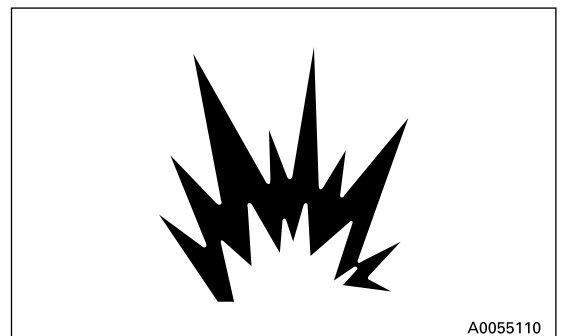
After fixing the battery in position, check that it does not move. If it moves, install it again.

- When removing, remove from the ground side first (normally the (-) terminal).  
Be careful not to touch between the (+) terminal and the machine with any tool. Letting a tool touch is dangerous as it causes sparks.
- When installing, connect the ground side last.
- When replacing the battery, fix the battery securely with the battery mount clamp.
- Tightening torque of mounting bolts : 9.8 to 14.7 N•m (1 to 1.5 kgf•m, 7.2 to 10.8 lbft)

## BATTERY CHARGES

When charging the battery, there is danger that the battery may explode if it is handled wrongly, so follow the instructions in "OTHER TROUBLE (PAGE 3-128)" and the instruction manual supplied with the charger, and be sure to observe the following precautions.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the voltage is not selected correctly, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to fix the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity.  
If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.



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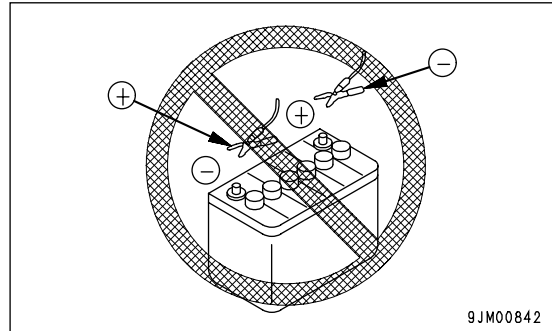
## STARTING ENGINE WITH BOOSTER CABLES

When starting the engine with a booster cable, do as follows:

### CONNECTING AND DISCONNECTING BOOSTER CABLES

#### **⚠ WARNING**

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.
- Make sure that there is no mistake in the booster cable connections.  
The final connection is to the upper structure frame, but sparks will be generated when this is done, so connect to a place as far as possible from the battery. (However, avoid connecting the cable to the work equipment, as conduction is poor.)
- Use care when removing the cables from the machine that has been started. To avoid hydrogen explosion, do not allow the cable ends to contact each other or the machine.



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#### NOTICE

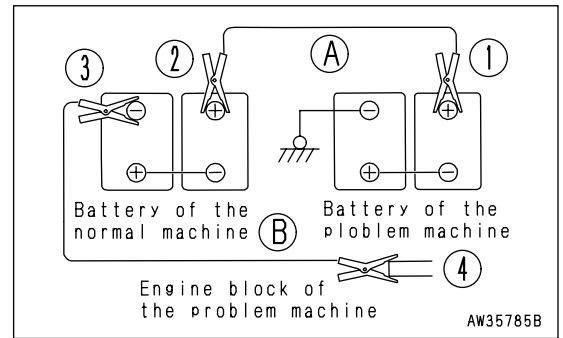
- The starting system for this machine uses 24 V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the safety lock levers and parking brake levers of both machine are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

## BOOSTER CABLE CONNECTION

Keep the starting switch of the normal machine and problem machine are both at the OFF position.

Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
3. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
4. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
5. Connect the other clip of booster cable (B) to the upper structure of the problem machine.



## STARTING THE ENGINE

### ⚠ CAUTION

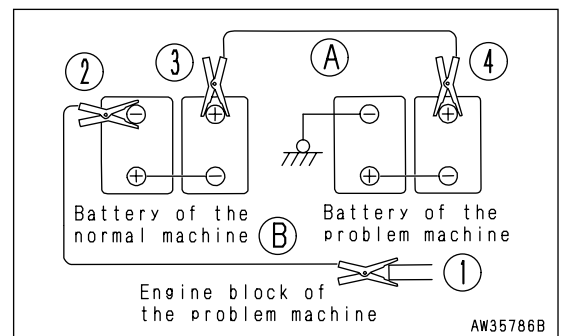
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are at the HOLD or neutral position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, try again after 2 minutes or so.

## BOOSTER CABLE DISCONNECTION

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

1. Remove one clip of booster cable (B) from the upper structure of the problem machine.
2. Remove the other clip of booster cable (B) from the negative (-) terminal of the normal machine.
3. Remove one clip of booster cable (A) from the positive (+) terminal of the normal machine.
4. Remove the other clip of booster cable (A) from the positive (+) terminal of the problem machine.



## OTHER TROUBLE

### ELECTRICAL SYSTEM

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	<ul style="list-style-type: none"> <li>● Defective wiring, deterioration of battery</li> </ul>	( ● Check, repair loose terminals, disconnections, replace battery)
Lamp flickers while engine is running	<ul style="list-style-type: none"> <li>● Loose fan belt</li> </ul>	● Check fan belt tension, replace
Charge level monitor does not go out even when engine is running	<ul style="list-style-type: none"> <li>● Defective alternator</li> <li>● Defective wiring</li> </ul>	( ● Replace) ( ● Check, repair)
Abnormal noise is generated from alternator	<ul style="list-style-type: none"> <li>● Defective alternator</li> </ul>	( ● Replace)
Starting motor does not turn when starting switch is turned to ON	<ul style="list-style-type: none"> <li>● Defective wiring</li> <li>● Defective starting motor</li> <li>● Insufficient battery charge</li> </ul>	( ● Check, repair) ( ● Replace) ● Charge
Pinion of starting motor keeps going and out	<ul style="list-style-type: none"> <li>● Insufficient battery charge</li> <li>● Defective safety relay</li> </ul>	● Charge ( ● Replace)
Starting motor turns engine sluggishly	<ul style="list-style-type: none"> <li>● Insufficient battery charge</li> <li>● Defective starting motor</li> </ul>	● Charge ( ● Replace)
Starting motor disengages before engine starts	<ul style="list-style-type: none"> <li>● Defective wiring, defective ring gear pinion</li> <li>● Insufficient battery charge</li> </ul>	( ● Check, repair) ● Charge
Pre-heating monitor does not light	<ul style="list-style-type: none"> <li>● Defective wiring</li> <li>● Defective heater relay</li> <li>● Defective monitor</li> </ul>	( ● Check, repair) ( ● Replace) ( ● Replace)
Oil pressure monitor does not light up when engine is stopped (starting switch at ON position)	<ul style="list-style-type: none"> <li>● Defective monitor</li> <li>● Defective caution lamp switch</li> </ul>	( ● Replace) ( ● Replace)
Outside of electrical heater is not warm when touched by hand	<ul style="list-style-type: none"> <li>● Defective wiring</li> <li>● Disconnection in electric heater</li> <li>● Defective operation of heater relay switch</li> </ul>	( ● Check, repair) ( ● Replace) ( ● Replace)

## CHASSIS

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Speed of travel, swing, boom, arm, bucket is slow	<ul style="list-style-type: none"> <li>● Lack of hydraulic oil</li> </ul>	<ul style="list-style-type: none"> <li>● Add oil to specified level, see CHECK BEFORE STARTING</li> </ul>
Pump generates abnormal noise (sucking in air)	<ul style="list-style-type: none"> <li>● Clogged element in hydraulic tank strainer, lack of oil</li> </ul>	<ul style="list-style-type: none"> <li>● Clean, see EVERY 2000 HOURS SERVICE</li> </ul>
Excessive rise in hydraulic oil temperature	<ul style="list-style-type: none"> <li>● Loose fan belt</li> <li>● Dirty oil cooler</li> <li>● Lack of hydraulic oil</li> </ul>	<ul style="list-style-type: none"> <li>● Check fan belt tension, replace</li> <li>● Clean, see EVERY 500 HOURS SERVICE</li> <li>● Add oil to specified level, see CHECK BEFORE STARTING</li> </ul>
Track comes off	<ul style="list-style-type: none"> <li>● Track too loose</li> </ul>	<ul style="list-style-type: none"> <li>● Adjust track tension, see WHEN REQUIRED</li> </ul>
Abnormal wear of sprocket		
Bucket rises slowly, does not rise	<ul style="list-style-type: none"> <li>● Lack of hydraulic oil</li> </ul>	<ul style="list-style-type: none"> <li>● Add oil to specified level, CHECK BEFORE STARTING</li> </ul>
Does not swing	<ul style="list-style-type: none"> <li>● Swing lock switch still applied</li> </ul>	<ul style="list-style-type: none"> <li>● Turn swing lock switch OFF</li> </ul>

## ENGINE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure monitor lights up	<ul style="list-style-type: none"> <li>● Engine oil pan oil level is low (sucking in air)</li> <li>● Clogged oil filter cartridge</li> <li>● Defective tightening of oil pipe, pipe joint, oil leakage from damaged point</li> <li>● Defective engine oil pressure sensor</li> <li>● Defective monitor</li> </ul>	<ul style="list-style-type: none"> <li>● Add oil to specified level, see CHECK BEFORE STARTING</li> <li>● Replace cartridge, see EVERY 500 HOURS SERVICE</li> <li>( ● Check, repair)</li> <li>( ● Replace sensor)</li> <li>( ● Replace)</li> </ul>
Steam spurts out from top of radiator (pressure valve)	<ul style="list-style-type: none"> <li>● Cooling water level low, leakage of water</li> <li>● Loose fan belt</li> <li>● Dirt or scale accumulated in cooling system</li> </ul>	<ul style="list-style-type: none"> <li>● Check, add water, repair, see CHECK BEFORE STARTING</li> <li>● Check fan belt tension, adjust, replace</li> <li>● Change coolant, flush inside of cooling system, see WHEN REQUIRED</li> </ul>
Radiator water level monitor lights up	<ul style="list-style-type: none"> <li>● Clogged radiator fins or damaged fins</li> <li>● Defective thermostat</li> <li>● Loose radiator filler cap (high-altitude operations)</li> <li>● Defective water level sensor</li> <li>● Defective monitor</li> </ul>	<ul style="list-style-type: none"> <li>● Clean or repair, see EVERY 500 HOURS SERVICE</li> <li>( ● Replace thermostat)</li> <li>● Tighten cap or replace packing</li> <li>( ● Replace sensor)</li> <li>( ● Replace sensor)</li> </ul>
Engine does not start when starting motor is turned	<ul style="list-style-type: none"> <li>● Lack of fuel</li> <li>● Air in fuel system</li> <li>● Defective fuel injection pump or defective nozzle</li> <li>● Starting motor cranks engine sluggishly</li> <li>● Preheating monitor does not light up</li> <li>● Defective compression <ul style="list-style-type: none"> <li>○ Defective valve clearance</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Add fuel, see CHECK BEFORE STARTING</li> <li>● Repair place where air is sucked in, see EVERY 500 HOURS SERVICE</li> <li>( ● Replace pump or nozzle)</li> <li>● See ELECTRICAL SYSTEM</li> <li>● See ELECTRICAL SYSTEM</li> <li>( ● Adjust valve clearance)</li> </ul>
Exhaust gas is white or blue	<ul style="list-style-type: none"> <li>● Too much oil in oil pan</li> <li>● Improper fuel</li> </ul>	<ul style="list-style-type: none"> <li>● Set oil to specified level, see CHECK BEFORE STARTING</li> <li>● Change to specified fuel</li> </ul>

Problem	Main causes	Remedy
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> <li>● Clogged air cleaner element</li> <li>● Defective nozzle</li> <li>● Defective compression</li> <li>● Defective turbocharger</li> </ul>	<ul style="list-style-type: none"> <li>● Clean or replace, see WHEN REQUIRED</li> <li>( ● Replace nozzle)</li> <li>( ● See defective compression above)</li> <li>● Clean or replace turbocharger</li> </ul>
Combustion noise occasionally make breathing sound	<ul style="list-style-type: none"> <li>● Defective nozzle</li> </ul>	<ul style="list-style-type: none"> <li>( ● Replace nozzle)</li> </ul>
Abnormal noise generated (combustion or mechanical)	<ul style="list-style-type: none"> <li>● Low-grade fuel being used</li> <li>● Overheating</li> <li>● Damage inside muffler</li> <li>● Excessive valve clearance</li> </ul>	<ul style="list-style-type: none"> <li>● Change to specified fuel</li> <li>● Refer to "Radiator water level monitor lights up" as above</li> <li>● Replace muffler</li> <li>( ● Adjust clearance)</li> </ul>

## ELECTRONIC CONTROL SYSTEM

If an error code appears on the machine monitor display (normally displays TIME), follow the countermeasure table as shown below in the self-diagnosis.

### Machine monitor trouble display

Monitor display	Error mode	Countermeasure
E02	PC-EPC valve system error	If the pump override switch is set to the ON position, operation can be carried out. However, immediately have the TVC valve system inspected by your Komatsu distributor.(*)
E03	Swing brake system error	Turn the swing prolix switch ON to cancel the brake. When applying the swing brake, operate the swing lock switch manually. Depending on the cause of the failure, it may be impossible to release the brake. In any case, have the system inspected immediately by your Komatsu distributor.(*)
E05	Governor system error	Governor will not execute the control function. Manually operate the governor-lever. To fix the governor lever at the full stroke position, use the retaining bolt holes on bracket. In this case, immediately have the governor system inspected by your Komatsu distributor.
In the case where the monitor will not display error codes and work equipment operation and swing operation cannot be carried out.		Have the machine inspected immediately by your Komatsu distributor.

(\*): For details of handling the emergency pump drive switch, swing holding brake cancel switch, and emergency work equipment actuation switch, see "SWITCHES (PAGE 3-17)".



# MAINTENANCE

 **WARNING**

Please read and make sure that you understand the safety volume before reading this section.

---

# MAINTENANCE INFORMATION

Do not carry out any inspection and maintenance operation that is not found in this manual.

## SERVICE METER READING

Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

## KOMATSU GENUINE REPLACEMENT PARTS

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

## KOMATSU GENUINE LUBRICANTS

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

## WINDSHIELD WASHER FLUID

Use automobile windshield washer fluid, and be sure not to let any dirt get into it.

## FRESH AND CLEAN LUBRICANTS

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

## CHECK DRAINED OIL AND USED FILTER

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantities of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

## FUEL STRAINER

If your machine is equipped with a fuel strainer, do not remove it while fueling.

## WELDING INSTRUCTIONS

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1m (3.3 ft) from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

## DO NOT DROP THINGS INSIDE MACHINE

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.  
If such things are dropped inside the machine, it will cause damage and malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

## DUSTY JOBSITE

When working at dusty worksites, do as follows:

- Check the clogging of the air cleaner more frequently with the dust indicator. Clean the air cleaner element more frequently.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

## AVOID MIXING LUBRICANTS

Never mix different kinds of oil. If a different type of oil has to be added, drain the old oil and replace all the oil with the new type of oil.

## LOCKING THE INSPECTION COVERS

When carrying out maintenance with the inspection cover open, lock it in position securely with a lock bar. If inspection or maintenance is carried out with the inspection cover open and not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

## HYDRAULIC SYSTEM - AIR BLEEDING

When hydraulic equipment has been repaired or replaced, or the hydraulic piping has been removed and installed again, the air must be bled from the circuit. For details, see "BLEEDING AIR FROM HYDRAULIC SYSTEM (PAGE 4-43)".

## HYDRAULIC HOSE INSTALLATION

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.

When doing this, be careful not to forget to assemble the O-rings and gaskets.

- When installing the hoses, do not twist them or bend them into loops with a small radius.

This will cause damage to the hose and markedly reduce its service life.

## CHECKS AFTER INSPECTION AND MAINTENANCE WORKS

If you forget to carry out the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do as follows.

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been carried out correctly?
  - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside machine and get caught in the lever linkage mechanism.
  - Is there any leakage of water or oil? Have all the bolts been tightened?
- Checks when operating engine
  - For details of the checks when operating the engine, see "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-34)" and pay careful attention to safety.
  - Are the inspection and maintenance items working properly?
  - Is there any leakage of oil when the engine speed is raised and load is applied to the oil pressure?

## SELECTING FUEL AND LUBRICANTS TO MATCH AMBIENT TEMPERATURE

It is necessary to use fuel and lubricants that match the ambient temperature.

For details, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

# LUBRICANTS, COOLANT AND FILTERS

## HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

### OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and is deteriorates with use.

Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual.

Even if the oil is not dirty, always change the oil after the specified interval.

- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.

The majority of problems with machine are caused by the entry of such impurities.

Take particular care not to let any impurities get in when storing or adding oil.

- Never mix oils of different grades or brands.
- Always add the specified amount of oil.

Having too much oil or too little oil are both causes of problems.

- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters. In particular, when replacing the engine oil filter, fill the new filter with fresh, clean specified oil before installing.
- We recommend you to have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.

### FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.

Fuel may congeal depending on the temperature when it is used (particularly in low temperature below -15°C (5°F)), so it is necessary to change to a fuel that matches the temperature.

- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

## COOLING SYSTEM COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.

Do not use water that is not suitable for drinking.

- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu specified anti-freeze in the coolant.

This anti-freeze is effective in preventing corrosion of the cooling system.

The anti-freeze can be used continuously for 2 years or 4000 hours. Therefore, it can be used as it is even in hot areas.

- Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
- The ratio for the mixture of water and anti-freeze differs according to the ambient temperature.

For details of the ratio, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-26)".

- If the engine overheats, wait for the engine to cool before adding coolant.
- In addition to causing overheating, lack of cooling water also causes corrosion of the cooling circuit due to entry of air.

## GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the MAINTENANCE section are nipples used when overhauling, so they do not need grease.

If any part becomes stiff or generates noise after being used for a long time, grease it.

- Always wipe off all of the old grease that is pushed out when greasing.

Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

## CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

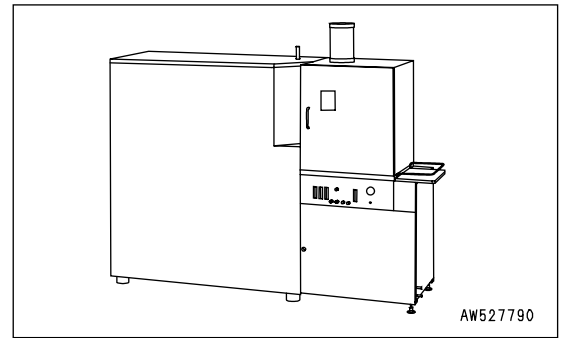
KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

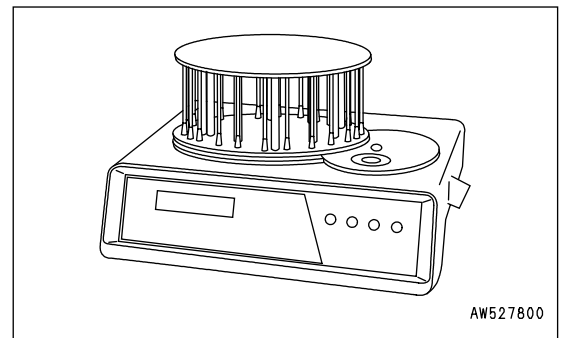
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

**KOWA ANALYSIS ITEMS**

- Analysis of metal wear particles  
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.



- Measurement of particle quantity  
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.



- Others  
Measurements are made of items such as the ratio of water or fuel in the oil, and the dynamic viscosity.

**OIL SAMPLING**

- Sampling interval  
250 hours: Engine  
500 hours: Other components
- Precautions when sampling
  - Make sure that the oil is well mixed before sampling.
  - Carry out sampling regularly at fixed intervals.
  - Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

**OIL AND FUEL STORAGE**

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drum can is at the side. (To prevent moisture from being sucked in)  
If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

## FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.

Replace all filters periodically. For details, see the Operation and Maintenance Manual.

However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.

- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are affixed to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

## ELECTRIC SYSTEM MAINTENANCE

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause electrical leakage and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is check of fan belt tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electrical interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, please contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing an operator's cab cooler or any other electrical equipment, connect it to an independent power source connector. The optional power source must never be connected to the fuse, starting switch, or battery relay.

## HANDLING HYDRAULIC SYSTEM

- During and after operations, the hydraulic system is at high temperature. During operations, it is also under high pressure, so always pay careful attention to the following when carrying out inspection and maintenance of the hydraulic system.
- Stop the machine on level ground, lower the bucket to the ground, and set so that there is no pressure on the cylinder circuit.
- Always stop the engine.
- Immediately after operations, the hydraulic oil and lubricating oil are under pressure and at high temperature, so always wait for the temperature to go down before starting maintenance.
- Even when the temperature goes down, there may still be internal pressure, so when loosening plugs, screws, or hose connections, do not stand directly in front, and loosen gradually to release the internal pressure before removing.



- When carrying out inspection or maintenance of the hydraulic circuits, always bleed the air to release the internal pressure.
- Inspection or maintenance consists of checking the hydraulic oil level, replacing the filters, and changing the hydraulic oil.
- When removing high-pressure hoses, check that the O-ring is not damaged. If it is damaged, replace it.

# WEAR PARTS LIST

Wear parts such as the filter element, bucket tooth, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.

The wear parts should be changed correctly in order to use the machine economically.

For part change, Komatsu genuine parts of excellent quality should be used.

When ordering parts, please check the part number in the parts book.

**The parts in parentheses are to be replaced at the same time.**

Item	Part No.	Part Name	Q' ty	Replacement frequency
Engine oil filter	6736-51-5142	Cartridge	1	Every 500 hours service
Fuel filter	6732-71-6111	Cartridge	1	Every 500 hours service
Additional fuel filter	600-311-9121	Filter	1	Every 500 hours service
Hydraulic tank breather	20Y-60-21470	Element	1	Every 500 hours service
Hydraulic oil filter	207-60-71180 (07000-15160)	Element (O-ring)	1 (1)	Every 1000 hours service
Anti-corrosion filter	600-411-1191	filter	1	Every 1000 hours service
Air cleaner	600-185-3100 (PC200/210) 600-185-4100 (PC220)	Element assembly	1	-
Additional filter for breaker (if equipped)	20Y-970-1820 (07000-12115)	Element (O-ring)	1 (1)	-
Electric heater (optional)	6732-11-4811	Gasket	2	-
Bucket	205-70-19570 (PC200/210) (09244-02496)	Horizontal pin type Tooth (Pin)	5 (5)	-
	20Y-70-D1310 20Y-70-D1320 (176-32-11210) (01803-02430)	Cutter (left) Cuttler(right) (Bolt) (Nut)	1 1 (8) (8)	
	206-70-48610 (PC220) (09244-02516)	Horizontal pin type Tooth (Pin)	4 (4)	

# USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

## PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE									CAPACITY	
		-22	-4	14	32	50	68	86	104	122°F	Specified	Refill
		-30	-20	-10	0	10	20	30	40	50°C		
Engine oil pan	Engine oil				SAE30CD						26.3 liters 6.95 US gal	24 liters 5.28 US gal
		SAE 10W										
		SAE 10W-30										
		SAE 15W-40										
Swing machinery case											6.6 liters 1.74 US gal	6.6 liters 1.74 US gal
Final drive case (each)		SAE 30									4.7 liters 1.24 US gal	4.5 liters 1.19 US gal
Damper case											0.75 liters 0.20 US gal	-
Hydraulic system	Engine oil	SAE 10W									240 liters 63.14 US gal (PC200) 247 liters 65.26 US gal (PC220)	143 liters 33.29 US gal
		SAE 10W-30										
	SAE 15W-40											
	Hydraulic oil	HO46-HM (※)										
Fuel tank	Diesel fuel	ASTM D975 No.2									400 liters 105.68 US gal	-
		*										
Grease fitting	Grease	NLGI No. 2									-	-
Cooling system	Water	Add antifreeze									22.8 liters 6.02 US gal (PC200) 30.9 liters 8.16 US gal (PC220)	-

※ For HO46-HM, use the oil recommended by Komatsu.

\*ASTM D975 No. 1

**REMARK**

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.  
Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT(Winter, one season type)
2	AGIP	Diesel sigma S super dieselmulti- grade *Sigma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	*Amoco 300	Multi-purpose gear oil	PYKON premium grease	-
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifeeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-
14	PENNZOIL	*Superme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimura X	Spirax EP Spirax heavy duty	Albania EP grease	-
17	SUN	-	Sunoco GL5 gear oil	Sunoco ultra pres- tige 2EP Sun prestige 742	Sunoco antifreeze and summer cool- ant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total Transmission TM	Multis EP2	Antigal/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	-	Antifreeze

# TIGHTENING TORQUE SPECIFICATIONS

## TIGHTENING TORQUE LIST

**⚠ CAUTION**

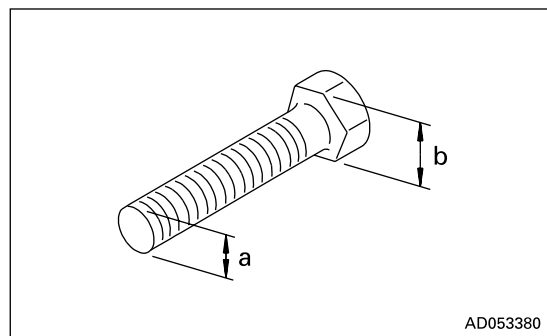
If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts.

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below.

The tightening torque is determined by the width across the flats of the nut and bolt.

If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

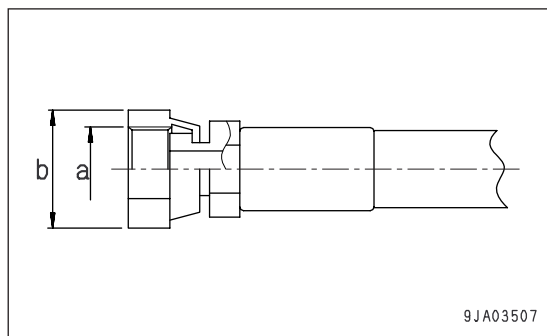
Thread diameter a(mm)	Width across flat b(mm)	Tightening torque					
		Target value			Service limit		
		N•m	kgf•m	lbft	N•m	kgf•m	lbft
6	10	13.2	1.35	9.8	11.8 - 14.7	1.2 - 1.5	8.7 - 10.8
8	13	31	3.2	23.1	27 - 34	2.8 - 3.5	20.3 - 25.3
10	17	66	6.7	48.5	59 - 74	6.0 - 7.5	43.4 - 54.2
12	19	11	11.5	83.2	98 - 123	10.0 - 12.5	72.3 - 90.4
14	22	177	18	130.2	157 - 196	16.0 - 20.0	115.7 - 144.7
16	24	279	28.5	206.1	245 - 309	25.0 - 31.5	180.8 - 227.8
18	27	382	39	282.1	343 - 425	35.0 - 43.5	253.2 - 314.6
20	30	549	56	405.0	490 - 608	50.0 - 62.0	361.7 - 448.4
22	32	745	76	549.7	662 - 829	67.5 - 84.5	488.2 - 611.2
24	36	927	94.5	683.5	824 - 1030	84.0 - 105.0	607.6 - 759.5
27	41	1320	135.0	976.5	1180 - 1470	120.0 - 150.0	868.0 - 1085.0
30	46	1720	175.0	1265.8	1520 - 1910	155.0 - 195.0	1121.1 - 1410.4
33	50	2210	225.0	1627.4	1960 - 2450	200.0 - 250.0	1446.6 - 1808.3
36	55	2750	280.0	2025.2	2450 - 3040	250.0 - 310.0	1808.3 - 2242.2
39	60	3280	335.0	2423.1	2890 - 3630	295.0 - 370.0	2133.7 - 2676.2



- The torques marked ☆ indicate the tightening torques for the hoses at the top of the swivel joint.

Apply the following table for Hydraulic Hose.

Nominal - No. of threads (a)	Width across flat (b) (mm)	Tightening torque					
		Target value			Permissible range		
		N•m	kgf•m	lbft	N•m	kgf•m	lbft
9/16 - 18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16 - 16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 - 16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 - 14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16 - 12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8
☆1 -7/16 - 12UN - 2B	41	215	22.0	159.1	176 - 234	18.0 - 24.0	130.2 - 180.8



# PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the user should also carry out periodic replacement of the parts given in the table. These parts are particularly closely connected to safety and fire prevention.

With these parts, the material changes as time passed, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses.

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

Ask your Komatsu distributor to replace the safety critical parts.

## SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q' ty	Replacement interval
1	Fuel hose (Fuel tank - Water separator)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (water separator - Additional fuel filter)	1	
3	Fuel hose (Additional fuel filter - Fuel pump)	1	
4	Fuel return hose (Fuel injection pump - Fuel tank)	2	
5	Spill hose (Engine output connector - Fuel tank)	1	
6	Pump outlet hose (Pump - Control valve)	2	
7	Work equipment hose (Boom cylinder inlet)	4	
8	Work equipment hose (Bucket cylinder line - Boom foot section)	2	
9	Work equipment hose (Bucket cylinder inlet)	2	
10	Work equipment hose (Arm cylinder line - Boom foot section)	2	
11	Work equipment hose (Arm cylinder inlet)	2	
12	Additional attachment line hose (Boom foot section)	2	
13	Additional attachment line hose (Boom top section)	2	
14	Swing line hose (Swing motor inlet)	2	
15	Main suction hose	1	
16	Heater hose(Optional)	2	
17	Travel line hose (Control valve - Swivel joint)	4	
18	Travel line hose (Swivel joint - Travel motor)	4	
19	Seat belt	1	Every 3 years



# MAINTENANCE SCHEDULE

If the machine is equipped with a hydraulic breaker, the maintenance schedule for some parts will be different. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-19)" to confirm the correct maintenance schedule when carrying out maintenance.

## MAINTENANCE SCHEDULE CHART

### Initial 250 Hours Maintenance (Only after the first 250 hours)

REPLACE FUEL FILTER CARTRIDGE.....	4-56
CHECK ENGINE VALVE CLEARANCE, ADJUST.....	4-67

### When Required

CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT .....	4-21
CLEAN INSIDE OF COOLING SYSTEM.....	4-26
CHECK AND TIGHTEN TRACK SHOE BOLTS .....	4-29
CHECK AND ADJUST TRACK TENSION.....	4-30
CHECK ELECTRICAL INTAKE AIR HEATER .....	4-32
REPLACE BUCKET TEETH (VERTICAL PIN TYPE).....	4-33
REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE) .....	4-36
ADJUST BUCKET CLEARANCE.....	4-37
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID .....	4-38
CHECK AND ADJUST AIR CONDITIONER (ONLY MACHINES EQUIPPED WITH AIR CONDITIONER).....	4-39
WASHING WASHABLE FLOOR.....	4-40
METHOD OF SETTING MACHINE ANGLE .....	4-42
BLEEDING AIR FROM HYDRAULIC SYSTEM.....	4-43
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### Checks Before Starting

#### Every 100 Hour Maintenance

LUBRICATING .....	4-47
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**Every 250 Hours Maintenance**

CHECK OIL LEVEL IN MACHINERY CASE, ADD OIL ..... 4-49

CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL..... 4-50

CHECK LEVEL OF BATTERY ELECTROLYTE ..... 4-51

CHECK, ADJUST TENSION OF AIR CONDITIONER COMPRESSOR BELT ..... 4-53

**Every 500 Hours Maintenance**

LUBRICATE SWING CIRCLE (2 POINTS) ..... 4-54

CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE ..... 4-55

REPLACE FUEL FILTER CARTRIDGE ..... 4-56

CHECK SWING PINION GREASE LEVEL, ADD GREASE ..... 4-57

CLEAN AND INSPECT RADIATOR FINS, OIL COOLER FINS AND CONDENSER FINS..... 4-58

CLEAN INTERNAL AND EXTERNAL AIR FILTERS OF AIR CONDITIONER SYSTEM ..... 4-59

REPLACE BREATHER ELEMENT IN HYDRAULIC TANK ..... 4-61

**Every 1000 Hours Maintenance**

REPLACE HYDRAULIC FILTER ELEMENT..... 4-62

CHANGE OIL IN SWING MACHINERY CASE ..... 4-64

CHECK OIL LEVEL IN DAMPER CASE, ADD OIL ..... 4-65

CHECK ALL TIGHTENING PARTS OF TURBOCHARGER..... 4-65

CHECK PLAY OF TURBOCHARGER ROTOR ..... 4-65

CHECK FAN BELT TENSION AND REPLACE FAN BELT ..... 4-65

**Every 2000 Hours Maintenance**

CHANGE OIL IN FINAL DRIVE CASE ..... 4-66

CLEAN HYDRAULIC TANK STRAINER..... 4-67

CLEAN, CHECK TURBOCHARGER ..... 4-67

CHECK ALTERNATOR, STARTING MOTOR..... 4-67

CHECK ENGINE VALVE CLEARANCE, ADJUST ..... 4-67

CHECK VIBRATION DAMPER ..... 4-67

**Every 4000 Hours Maintenance**

CHECK WATER PUMP..... 4-68

**Every 5000 Hours Maintenance**

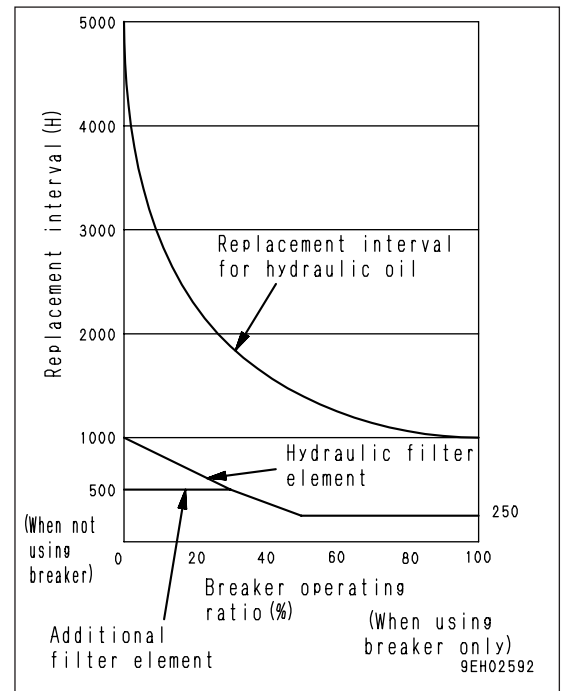
CHANGE OIL IN HYDRAULIC TANK ..... 4-69

## MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER

For machine equipped with a hydraulic breaker, the hydraulic oil deteriorates faster than for normal bucket digging operations, so set the maintenance intervals as follows.

### REPLACING HYDRAULIC ELEMENT

- On new machines, replace the element after the first 100 to 150 hours, then carry out further replacement of the element according to the table on the right.



### CHANGING OIL IN HYDRAULIC TANK

- Change the oil according to the table on the right.

### REPLACING ADDITIONAL FILTER ELEMENT FOR BREAKER

- Use a guideline of 250 hours for use of the breaker (operating ratio for the breaker: 50 % or more), and replace the element according to the table on the right.

# MAINTENANCE PROCEDURE

## INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

Carry out the following maintenance only after the first 250 hours of operation on new machines.

- Replace Fuel Filter Cartridge
- Check and adjust engine valve clearance,adjust

Special tools are needed for inspection and maintenance, so contact your Komatsu distributor.

For details of the method of replacing or maintaining, see the section on EVERY 500 HOURS and 2000 HOURS SERVICE.

# WHEN REQUIRED

## CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

### ⚠ WARNING

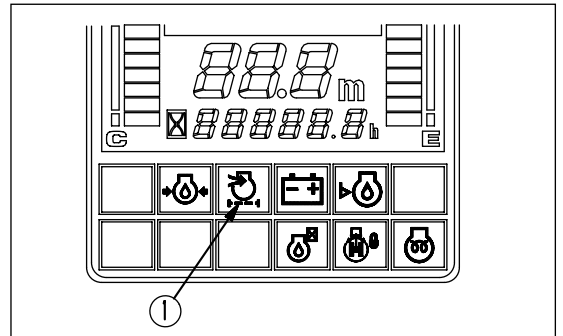
- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will enter the engine and cause damage to the engine. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger of dirt flying and causing personal injury. Always wear protective glasses, dust mask, or other protective equipment.
- When removing the outer element from the air cleaner body, it is dangerous to pull it out by force. When working at high places or where the foothold is poor, be careful not to fall because of the reaction when pulling out the outer element.

#### Checking

If air cleaner clogging monitor(1) of the monitor panel flashes, clean the air cleaner element.

#### Replacing

- Replacing element, O-ring
  - If one year has passed since installing the element or if air cleaner clogging monitor (1) on the monitor panel flashes immediately after the element is cleaned, replace the outer element, inner element, and O-ring.
- Replacing evacuator valve
  - Replace it if it is damaged or the rubber is markedly deformed.



#### NOTICE

Do not clean the air cleaner element until the air cleaner clogging monitor on the monitor panel flashes. If the element is cleaned frequently before the clogging monitor flashes, the air cleaner will not be able to display its performance fully, and the cleaning efficiency will also go down.

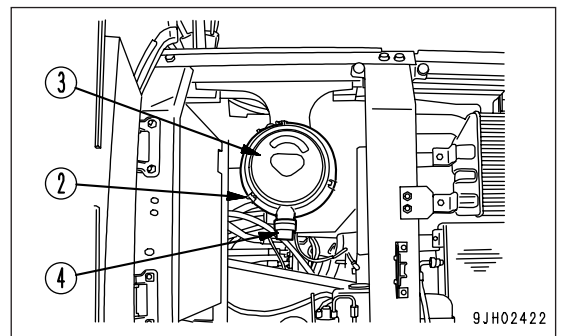
In addition, during the cleaning operation, more dirt stuck to the element will fall inside the inner element.

#### Outer Element - Clean

1. Open the rear door at the left side of the machine, remove 3 hooks (2), then remove cover (3).

#### NOTICE

Before and after cleaning the element, do not leave or keep it in direct sunlight.

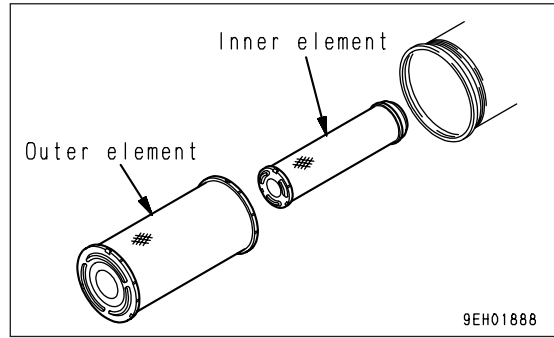


2. Hold the outer element, rock it lightly up and down and to the left and right, and rotate the element to the left and right to pull it out.

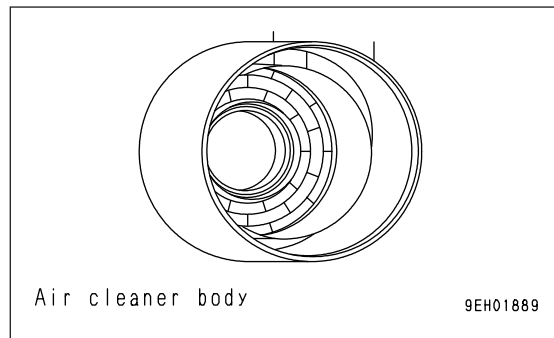
**NOTICE**

- **Never remove the inner element. It will allow dirt to enter and cause failure of the engine.**
- **Do not use a screwdriver or other tool.**

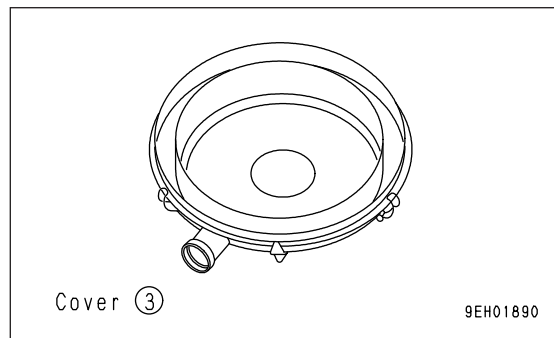
3. After removing the outer element, cover the air connector inside the air cleaner body with a clean cloth or tape to prevent dirt or dust from entering.



4. Wipe off or brush off the dirt stuck to cover (3) and the inside of the air cleaner body.

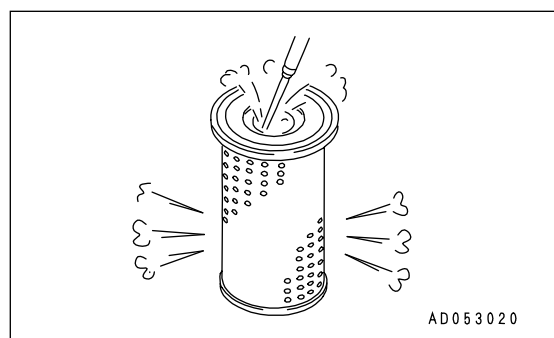
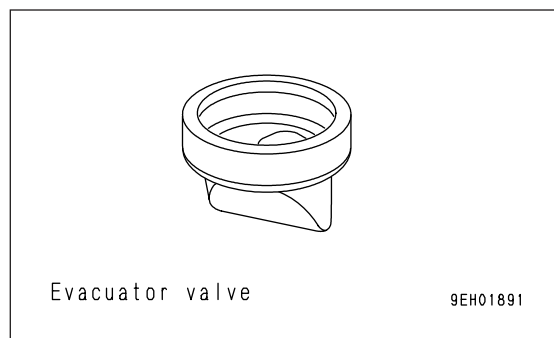


5. Remove any dirt or dust that is accumulated to evacuator valve (4) installed to cover (3).



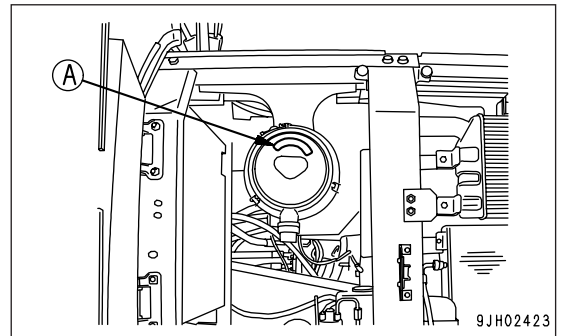
6. Direct dry compressed air (less than 0.69MPa (7kgf/cm<sup>2</sup>, 99.4PSI)) to the outer element from inside along its folds, then direct it from outside along its folds and again from inside.

- 1) Remove one seal from the element whenever the element has been cleaned.
- 2) Replace the outer element which has been cleaned 5 times repeatedly or used throughout a year. Replace the inner element at the same time.



- 3) Replace both inner and outer elements when the monitor lamp (1) flashed soon after installing the cleaned outer element even though it has not been cleaned 5 times.
- 4) When replacing the element, stick on seal (A) packed in the same box as the element. Stick the seal in the position shown in the diagram on the right.

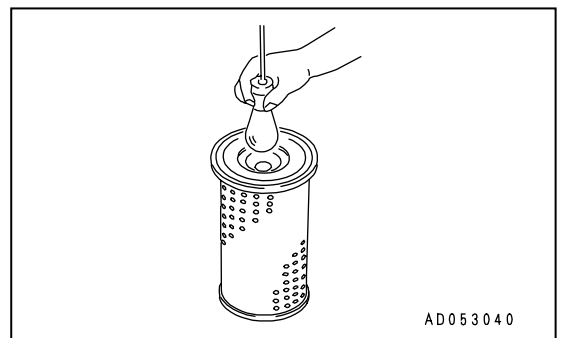
7. Remove the cloth or tape cover installed in Step 3.



8. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.

**NOTICE**

- When cleaning the element, do not hit or beat it against anything.
- Do not use an element whose folds or gasket or seal are damaged.



**Air Cleaner Element - Install**

**NOTICE**

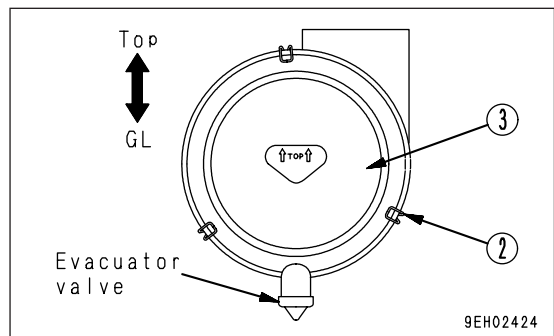
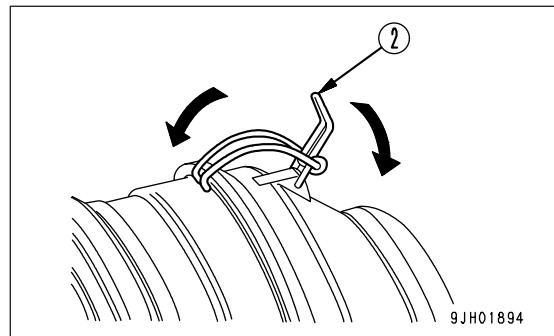
- Do not use any damaged gasket or seal or element with damaged pleats.
- Cleaning the element or O-ring after one year has passed and using them again will cause problems. Always replace them with new parts.
- The seal portion on imitation parts lacks precision, and allows the entry of dust, which leads to damage of the engine. Do not use such imitation parts.
- Do not run the engine with the inner element removed. It will cause damage to the engine.

1. Check that there is no dirt or oil stuck to the seal portion of the new element or cleaned element. Wipe off any dirt or oil.
2. When the outer element has been removed, check that the inner element has not come out of position and is not at an angle. If it is at an angle, insert your hand and push it in straight.
3. Push the outer element in straight with your hand when installing it to the air cleaner body. If the element is held and rocked lightly up and down and to the left and right while pushing it in, the element can be inserted easily.

**NOTICE**

When inserting the element, if the rubber at the tip is swollen or the outer element is not pushed in straight, and cover (3) is assembled by force to hook (2), there is danger that the hook and air cleaner body may be damaged, so be careful when assembling.

4. Install cover (3) as follows.
  - 1) Align cover (3) with the element.
  - 2) Hook the tip of hook (2) to the protruding part of the air cleaner body and lock it in position.
  - 3) When locking hooks (2) in position, apply the hooks in turn on opposite sides (top, bottom, left, right) in the same way as when tightening bolts.
  - 4) Always install cover (3) so that the evacuator is facing the ground.
  - 5) When cover (3) is installed, check that the clearance between the air cleaner body and cover (3) is not too large. If it is too large, install again.





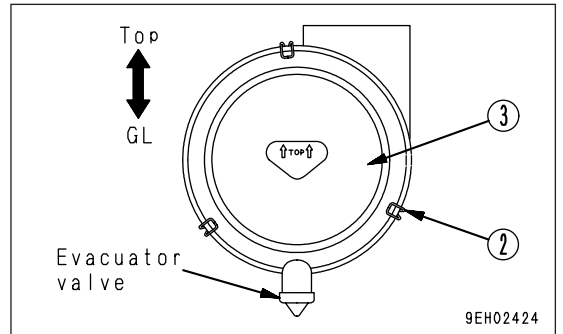
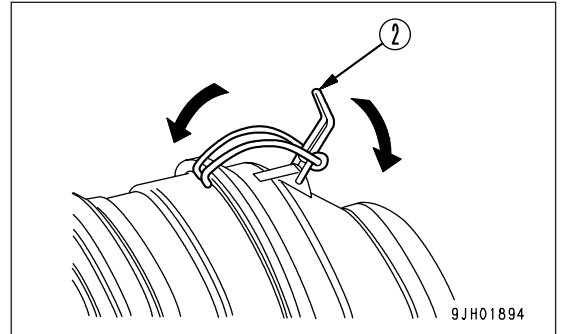
**Air Cleaner Inner Element - Replace**

1. First remove the outer element, and then remove the inner element.
2. Cover the air connector side (outlet side) with a clean cloth or tape.
3. Clean the air cleaner body interior, then remove the cover from the air intake port in Step 2.
4. Install a new inner element to the connector, then tighten the nut.

**NOTICE**

The inner element must not be cleaned and used again. When replacing the outer element, replace the inner element at the same time.

5. Set the outer element in position, then lock cover (3) with hooks (2).



## CLEAN INSIDE OF COOLING SYSTEM

### WARNING

- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure.  
If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.
- Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.
- For details of starting the engine, see "BEFORE STARTING ENGINE (PAGE 3-57)" and "STARTING ENGINE (PAGE 3-70)" in the OPERATION section.
- There is danger of touching the fan if the undercover is left removed.  
Never enter behind the machine when the engine is running.

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor agent KI according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Adding corrosion resistor agent KI
Permanent type anti-freeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Nom permanent type antifreeze containing ethylene glycol (winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using anti-freeze	Every 6 months or every 1000 hours whichever comes first	

Stop the machine on level ground when cleaning or changing the coolant.

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

Super Coolant (AF-NAL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

In areas where the water is hard, always add Komatsu genuine corrosion resistor agent KI. One packet of corrosion resistor agent contains 100g (0.22 lb). The standard density of the mixture should be 7g/liters (0.065 oz/US gal).

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C (50°F) lower when deciding the mixing rate.

Mixing rate of water and antifreeze

**PC200**

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	liters	6.9	8.2	9.3	10.5	11.4
	US gal	1.82	2.17	2.46	2.77	3.01
Amount of water	liters	15.9	14.6	13.5	12.3	11.4
	US gal	4.20	3.86	3.57	3.25	3.01

**PC220**

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	liters	9.3	11.1	12.7	14.2	15.4
	US gal	2.46	2.93	3.36	3.75	4.07
Amount of water	liters	21.6	19.8	18.2	16.7	15.5
	US gal	5.71	5.23	4.81	4.41	4.10

**⚠ WARNING**

Antifreeze is flammable, so keep it away from flame.

Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large quantities of fresh water and see a doctor at once.

Use city water for the cooling water.

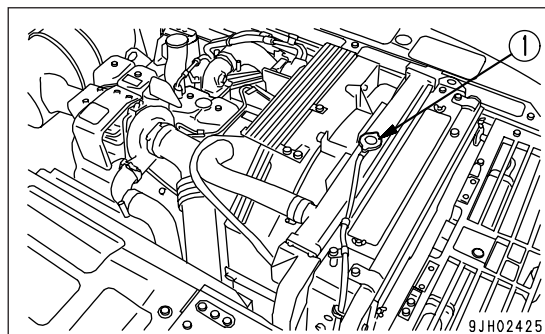
If river water, well water or other such water supply must be used, contact your Komatsu distributor.

We recommend use of an antifreeze density gauge to control the mixing proportions.

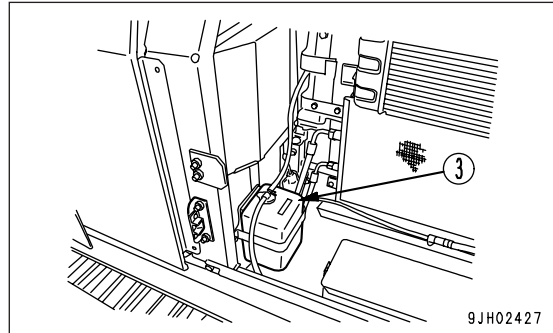
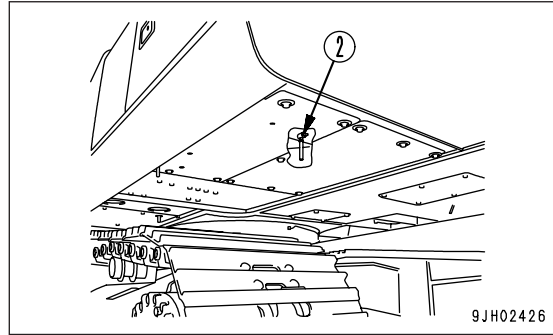
- Prepare a container to catch drained coolant: Min 21.5 liters (5.68 US gal) capacity.

Prepare a hose to supply water.

1. Turn radiator cap (1) slowly and remove it.
2. Remove the undercover, then set the container under drain valve (2) to catch the coolant mixture. Open drain valve (2) at the bottom of the radiator and drain the coolant.
3. After draining the coolant, close drain valve (2), and fill with city water. When the radiator is full, start the engine and run at low idling to raise the temperature to at least 90°C, then continue to run for approx. 10 minutes.

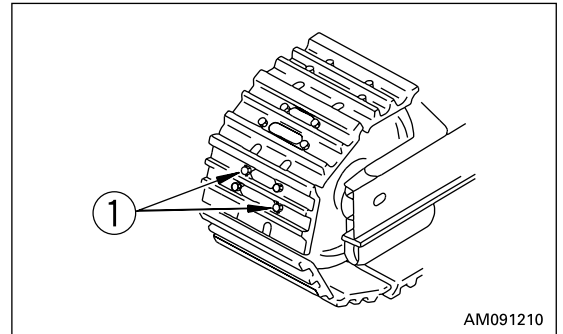


4. Stop the engine, open drain valve (2), and drain the water.
5. After draining the water, clean the radiator with detergent. For the cleaning method, follow the instruction of detergent.
6. Close drain valve (2).
7. Install the undercover.
8. Add water through the water filler up to the filler port.
9. Run the engine idle at a low speed for 5 minutes, then at a high speed for 5 minutes to bleed air mixed in the cooling water. (At this time, keep the radiator cap (1) removed.)
10. After draining off the cooling water of reserve tank (3) , clean the inside of the reserve tank and refill the water between FULL and LOW level.
11. Stop the engine. About 3 minutes later, supply city water up to the water filler, then close radiator cap.



## CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.



AM091210

### Method for tightening

- Track shoe

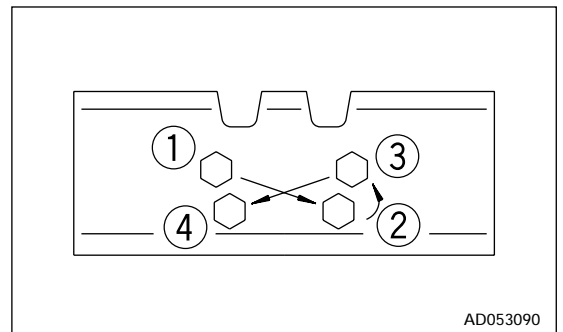
1. First tighten to a tightening torque of  $490 \pm 49 \text{ N}\cdot\text{m}$  ( $50 \pm 5 \text{ kgf}\cdot\text{m}$ ,  $360 \pm 36 \text{ lbft}$ ) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further  $120^\circ \pm 10^\circ$ .

- Road liner

1. Tighten to a tightening torque of  $549 \pm 59 \text{ N}\cdot\text{m}$  ( $56 \pm 6 \text{ kgf}\cdot\text{m}$ ,  $405 \pm 43 \text{ lbft}$ ).  
After tightening, check that the nut and shoe are in close contact with the link contact surface.

### Order for tightening

Tighten the bolts in the order shown in the diagram on the right. After tightening, check that the nut and shoe are in close contact with the link mating surface.



AD053090

## CHECK AND ADJUST TRACK TENSION

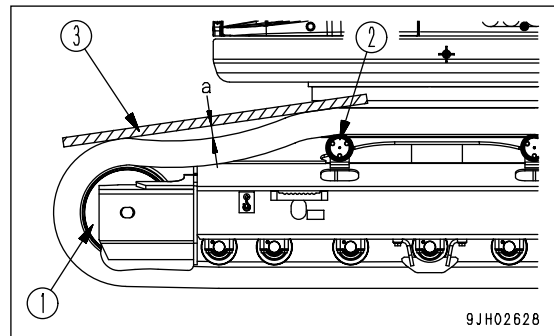
### WARNING

For details of starting the engine and operating the work equipment, see "BEFORE STARTING ENGINE (PAGE 3-57)", "STARTING ENGINE (PAGE 3-70)", "AFTER STARTING ENGINE (PAGE 3-74)", and "WORK EQUIPMENT CONTROLS AND OPERATIONS (PAGE 3-88)" in the OPERATION section.

The wear of the pins and bushings on the undercarriage will vary with the working conditions and type of soil, so inspect the track tension frequently in order to maintain the standard tension. Stop the machine on firm, horizontal ground when carrying out the inspection and maintenance.

#### Checking

1. Run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
2. Choose wooden block (3) that will reach from idler (1) to carrier roller (2), then place it on top of the track.
3. Measure the maximum deflection between the top surface of the track and the bottom surface of the wooden block.
  - Standard deflection  
Deflection "a" should be 10 to 30 mm (0.4 to 1.2 in).



If the track tension is not at the standard value, adjust it in the following manner.

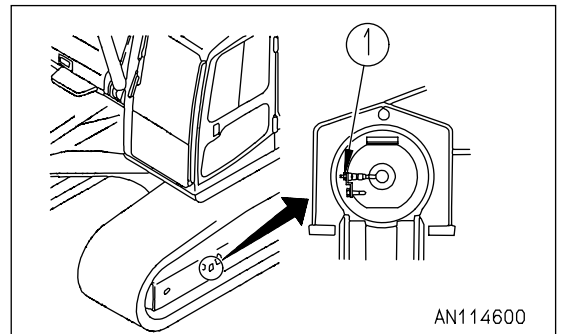
**Adjustment**

**⚠ WARNING**

There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.

Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).

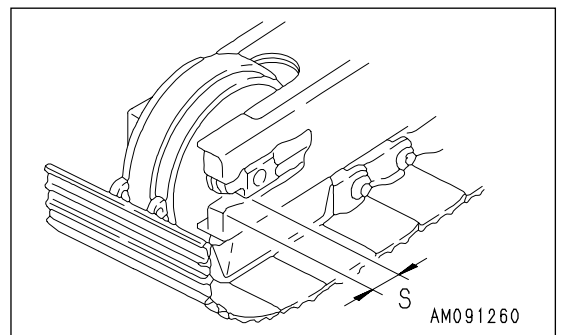
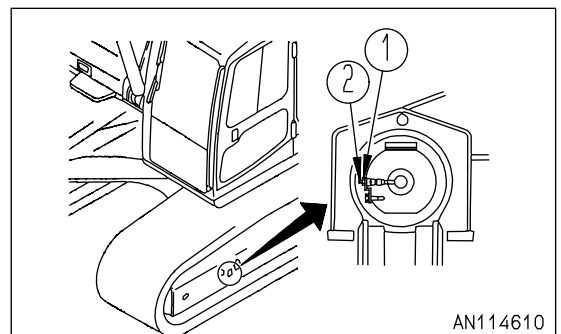
If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



**When increasing tension**

Prepare a grease gun.

1. Pump in grease through grease fitting (2) with a grease gun.  
(Grease fitting (2) forms one unit with plug (1).)
2. To check that the tension is correct, move the machine slowly forward (7 - 8 m (23 ft - 26 ft 3 in)).
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. Continue to pump in grease until dimension S becomes zero (0). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced.  
Please contact your Komatsu distributor for repairs.

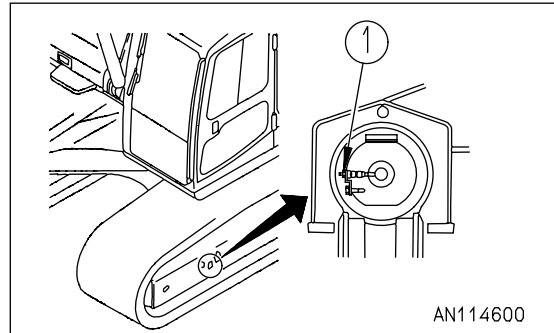


**When loosening tension****⚠ WARNING**

It is extremely dangerous to release the grease by any method except the procedure given below.

If the track tension is not relieved by this procedure, please contact your Komatsu distributor for repairs.

1. Loosen plug (1) gradually to release the grease.
2. Turn plug (1) a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (1).
5. To check that the tension is correct, move the machine slowly forward (7 - 8 m (23 ft - 26 ft 3 in)).
6. Check the track tension again, and if the tension is not correct, adjust it again.

**CHECK ELECTRICAL INTAKE AIR HEATER**

Before the start of the cold season (once a year), contact your Komatsu distributor to have the electrical intake air heater repaired or checked for dirt or disconnections.

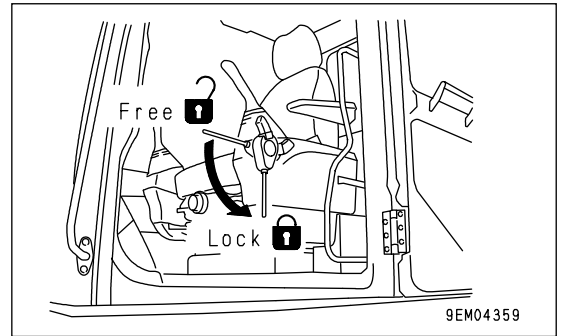


## REPLACE BUCKET TEETH (VERTICAL PIN TYPE)

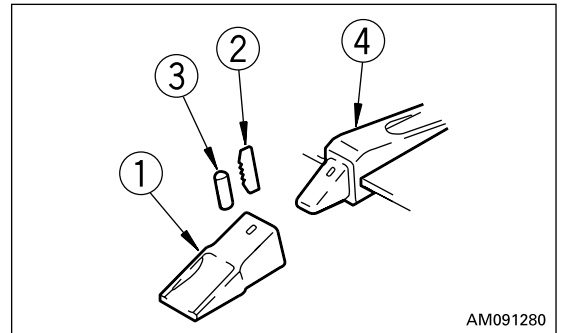
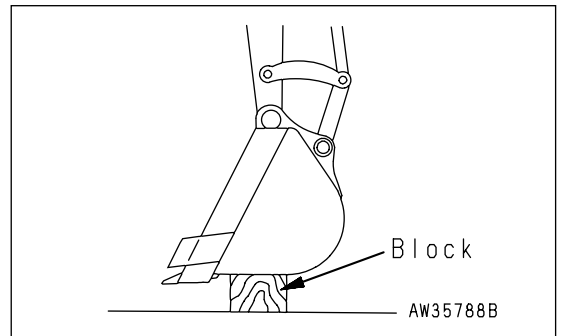
Replace the point before the adapter starts to wear.

### **⚠ WARNING**

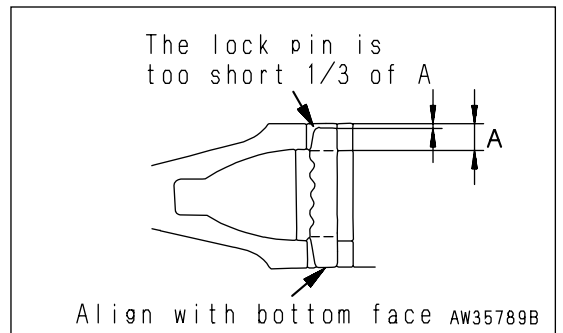
- It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the levers.
- If the locking pin is knocked out with excessive force, there is a hazard that the pin may fly out. Check that there is no one in the surrounding area.
- Pieces will often fly during the replacement operation, so always wear safety glasses, gloves, and other protective equipment.



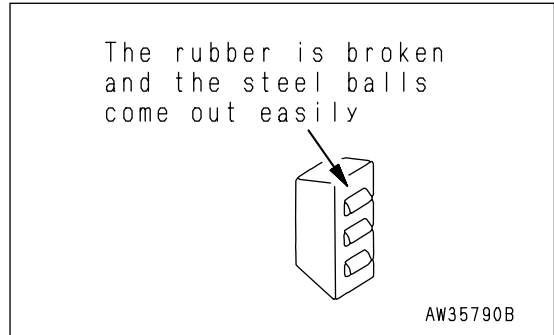
1. To make it possible to knock out the pin of tooth (1), set the bottom surface of the bucket on a block, check that the work equipment is in a stable condition, then set the safety lock lever to the LOCK position. Set so that the bottom face of the bucket is horizontal.
2. Use a hammer and drift to knock out lock pin (2). (If the drift is set against rubber pin lock (3) when it is hit, the rubber pin lock may break. Set it against the back of the pin.)
3. After removing lock pin (2) and rubber pin lock (3), check them.  
If lock pins and rubber pin locks with the following defects are used, the teeth may come off the bucket. Replace them with new ones.



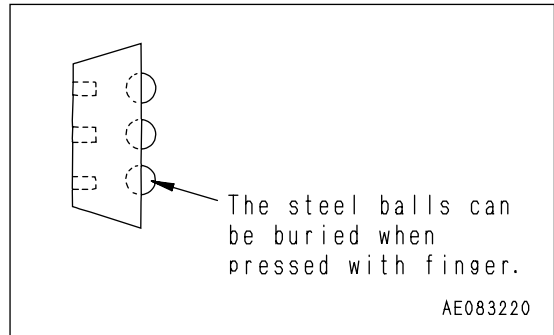
- The lock pin is too short.



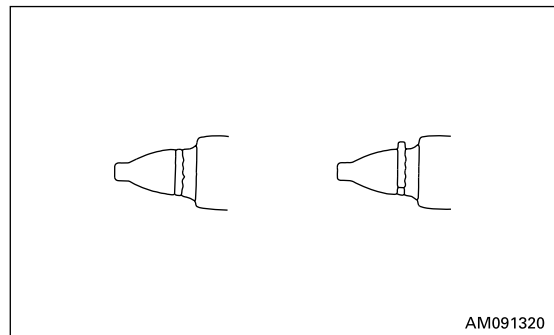
- The rubber of the rubber pin lock is torn, and the steel balls may come out.



- The steel balls are buried when they are pressed by hand.

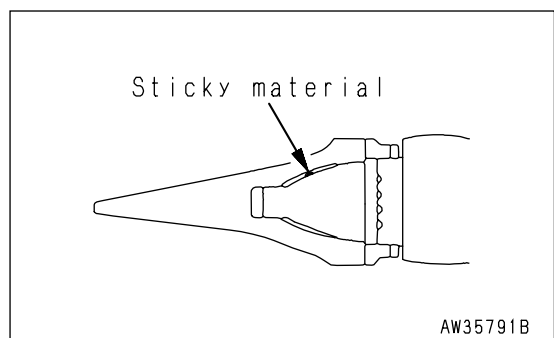


4. Clean the surface of adapter (4) and remove the soil with a knife.
5. Use your hand or a hammer to push rubber pin lock (3) into the hole of the adapter.  
When doing this, be careful that the rubber pin lock does not fly out from the adapter surface.
6. Clean the inside of teeth (1), then install it to adapter (4).  
If there is mud affixed to it or if there are protrusions, the teeth will not enter the adapter properly, and there will not be proper contact at the mating portion.

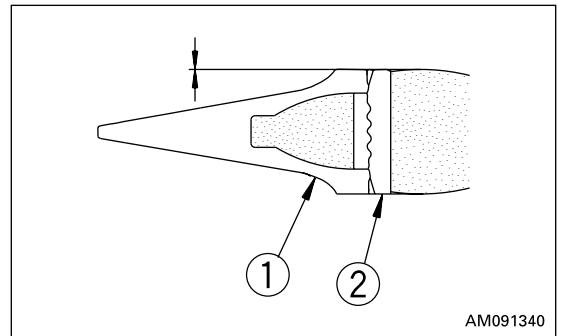


7. Fit teeth (1) to adapter (4), and confirm that when the pointer is pressed strongly, the rear face of the hole for the pin of the teeth (1) is at the same level as the rear face of the hole for the pin of the adapter.  
If the rear face of the hole for the pin of teeth (1) is protruding to the front from the rear face of the pin hole for adapter (4), do not try to knock the pin in.

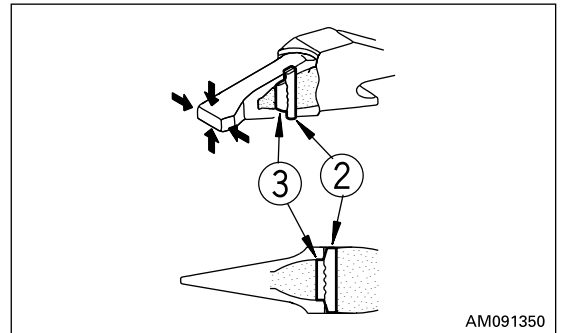
There is something preventing teeth (1) from entering adapter (4) fully, so remove the obstruction. When teeth (1) enters adapter (4) fully, knock in lock pin (2).



8. Insert lock pin (2) in the hole of the teeth and hit it until its top is the same level as the surface of teeth (1).



9. After replacing a bucket tooth, always check the following.
  - 1) After the lock pin has been knocked in completely, check that it is secured by the point and surface.
  - 2) Lightly hit lock pin (2) in the reverse direction from which it was hit in.
  - 3) Lightly hit the tip of the point from above and below, and hit its sides from right and left.
  - 4) Confirm that rubber pin lock (3) and lock pin (2) are set as shown in the figure.



The life of the teeth can be lengthened and the frequency of its replacement can be reduced by turning it upside down so that it will wear evenly.

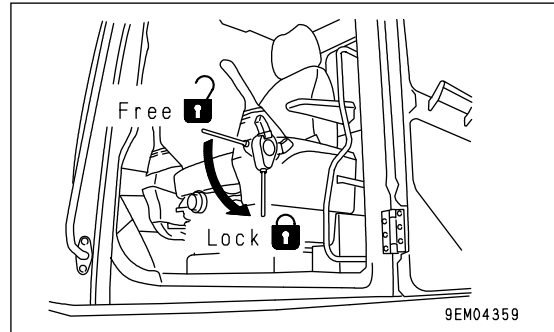
Replace the rubber pin lock and locking pin at the same time as replacing the teeth. This makes it possible to prevent the teeth from falling out.

## REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE)

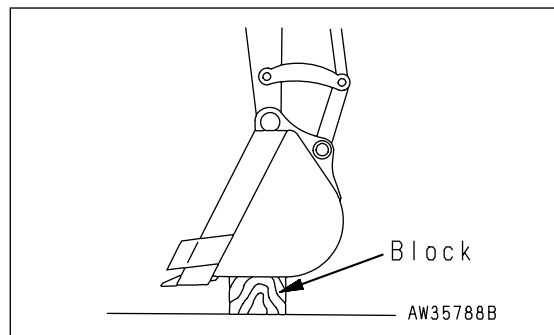
Replace the teeth before the wear reaches the adapter.

### WARNING

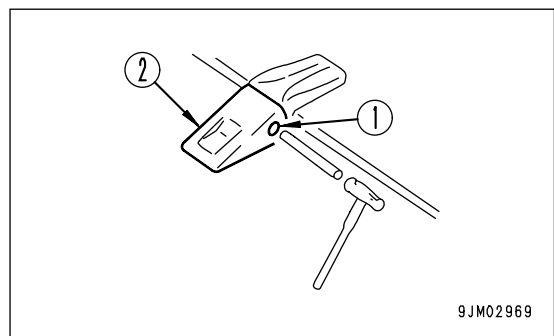
- It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the levers.
- If the locking pin is knocked out with excessive force, there is a hazard that the pin may fly out. Check that there is no one in the surrounding area.
- Pieces will often fly during the replacement operation, so always wear safety glasses, gloves, and other protective equipment.



1. Set the bottom of the bucket on a block to make it possible to remove pin (1), check that the work equipment is stable, then set the safety lock lever to the LOCK position. Set so that the bottom of the bucket is horizontal.



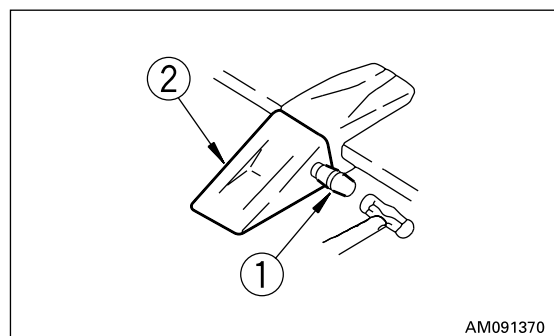
2. Place a bar on the pin head and strike the bar with a hammer to knock out pin (1). Remove tooth (2).



### REMARK

Use a round bar with a smaller diameter than that of the pin.

3. Clean the mounting face. Fit a new tooth (2) in the adapter, push in pin (1) partially by hand, then lock it with a hammer to install the tooth to the bucket.

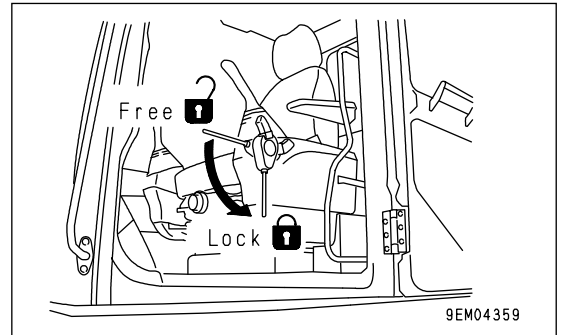


## ADJUST BUCKET CLEARANCE

**⚠ WARNING**

It is dangerous if the work equipment moves by mistake when the clearance is being adjusted.

Set the work equipment in a stable condition, then stop the engine and lock the safety lock lever securely.



1. Set the work equipment to the position shown in the diagram at right, stop the engine and set the lock lever to the locked position.

2. Shift O-ring (1) of the linkage and measure the amount of play "a".  
Measurement is easier if you move the bucket to one side or the other so all the play can be measured in one place. (In the diagram this is on the left-hand side)

Use a gap (clearance) gauge for easy and accurate measurement.

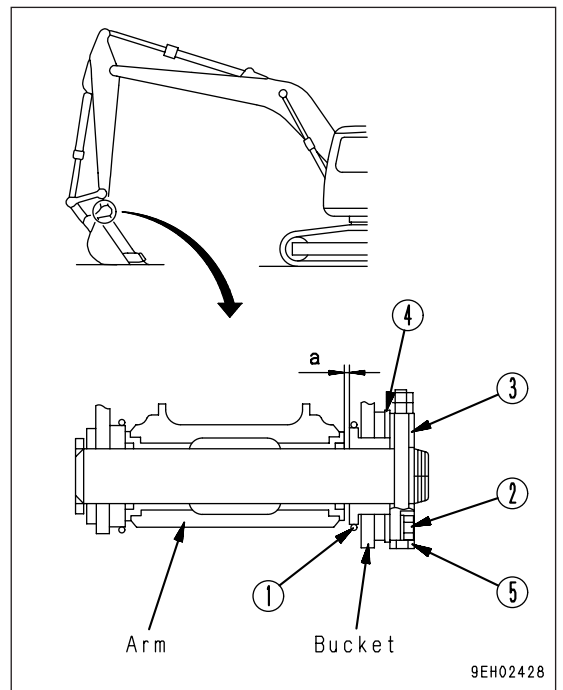
3. Loosen the four plate fixing bolts (2) and loosen plate (3). Because it uses split shims, you can carry out the operation without removing the bolts entirely.
4. Remove shim (4) corresponding to the amount of play "a" measured above.

[Example]

In the case of play of 3 mm, remove two 1.0 mm shims and one 0.5 mm shim. Play becomes 0.5 mm. For shim (4), two types of 1.0 mm and 0.5 mm are used.

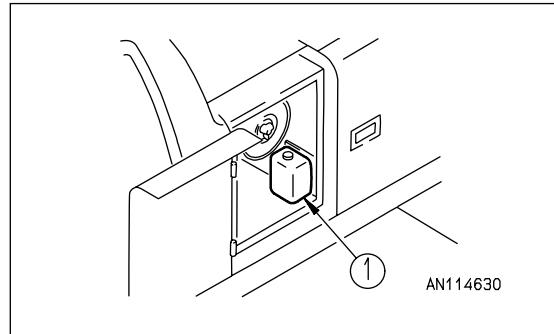
When play a is smaller than one shim, do not carry out any maintenance.

5. Tighten the four bolts (2).  
If the bolts (2) are too stiff to tighten, pull out pin stopper bolt (5) for easier tightening.



## CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

If there is air in the window washer fluid, check the level of the fluid in window washer tank (1). Add automobile window washer fluid if necessary.



When adding fluid, be careful not to let any dust get in.

### Mixture ratio of pure washer fluid and water

Since the ratio should be varied depending on atmospheric temperature, replenish washer fluid at the following mixture ratio, taking temperature into account.

Operation area and season	Mixture ratio	Freezing temperature
Normal	Pure washer fluid 1/3: water 2/3	- 10°C (14°F)
Winter in cold region	Pure washer fluid 1/2: water 1/2	- 20°C (- 4°F)
Winter in extremely cold region	Pure washer fluid	- 30°C (- 22°F)

Pure washer fluid comes in two types: for -10°C (14°F) (for general use) and for -30°C (-22°F) (cold regions).

Use pure washer fluid according to operation area and season.

## CHECK AND ADJUST AIR CONDITIONER (ONLY MACHINES EQUIPPED WITH AIR CONDITIONER)

### CHECK LEVEL OF REFRIGERANT (GAS)

**⚠ WARNING**

If the refrigerant used in the cooler gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.  
Do not bring any flame close to any point where the refrigerant gas is leaking.

If there is a lack of refrigerant (Freon 134a), the cooling performance will be poor.

When operating the cooler at high speed, there should be no bubbles in the sight glass (inspection window) mounted on the condenser unit receiver.

- No bubbles in refrigerant flow: Correct
- Bubbles in refrigerant flow (bubbles continuously pass through): Refrigerant level low
- Colorless, transparent: No refrigerant

**REMARK**

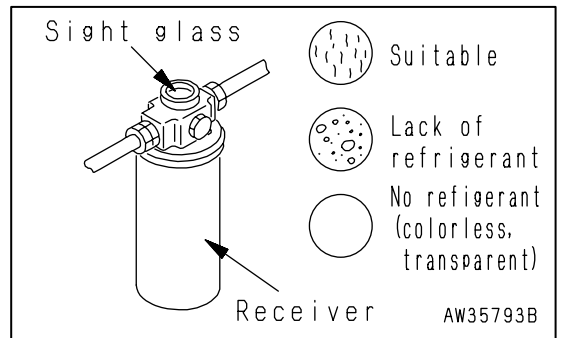
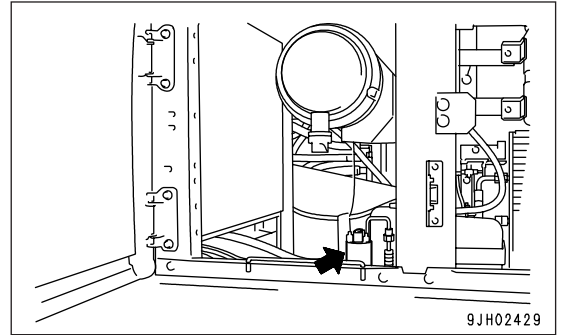
When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

**Check in off-season**

When not being used for a long period, operate the cooler for 3 to 5 minutes once a month to supply lubricant to each component of the compressor.

**Inspection and maintenance items list for cooler**

Inspection and maintenance items	Contents	Maintenance interval
Refrigerant (gas)	Filling quantity	Twice a year; spring and autumn
Condenser	Clogging of fin	Every 500 hours
Compressor	Function	Every 4000 hours
V belt	Damage and tension	Every 250 hours
Blower motor and fan	Function (Check for abnormal sound)	When required
Control mechanism	Function (Check for normal function)	When required
Piping for connection	Installation condition looseness of tightening connection portions gas leakage, damage	When required



## WASHING WASHABLE FLOOR

### WARNING

- When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.
- If the control levers are touched by mistake, the work equipment or machine may suddenly move, and this may lead to a serious accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.

### NOTICE

- When carrying out this operation, be careful not to get water on the monitor and connectors inside the operator's cab.
- Never spray water above the pedestal of the operator's seat (2).
- If any water splashes on the surrounding equipment, be sure to wipe it off.

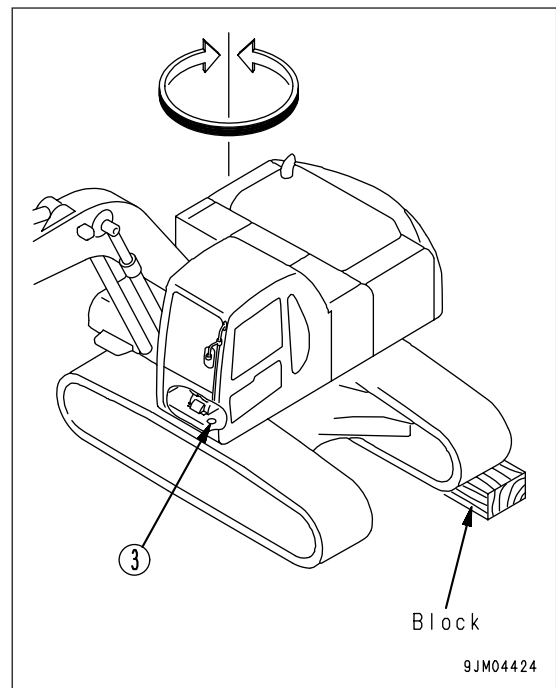
With the washable floor, it is possible to flush out the dirt on the cab floor directly with water.

## WASHING WASHABLE FLOOR MAT

1. Stop the machine on horizontal ground, lower the bucket to the ground, then stop the engine.
2. When washing the floor mat, use a brush to remove the dust, or direct the water onto the mat and wash it with a brush.

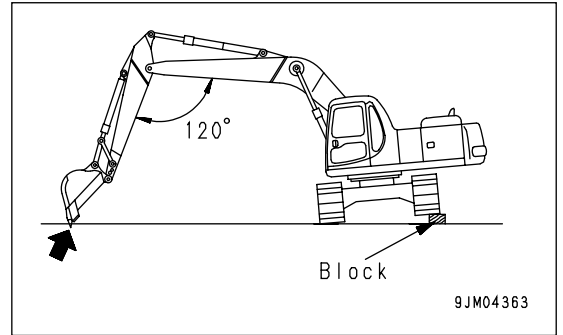
### Method of washing

1. Set the machine at an angle.
2. Swing the upper structure slowly so that water drain holes (3) in the cab floor are at a low position.

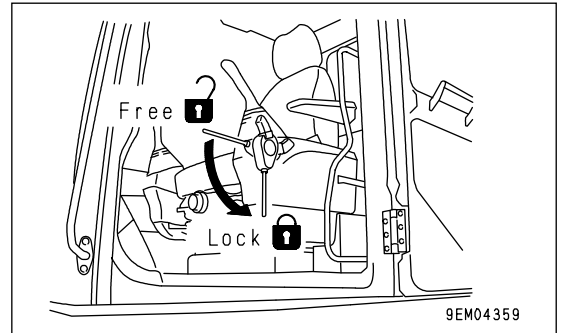




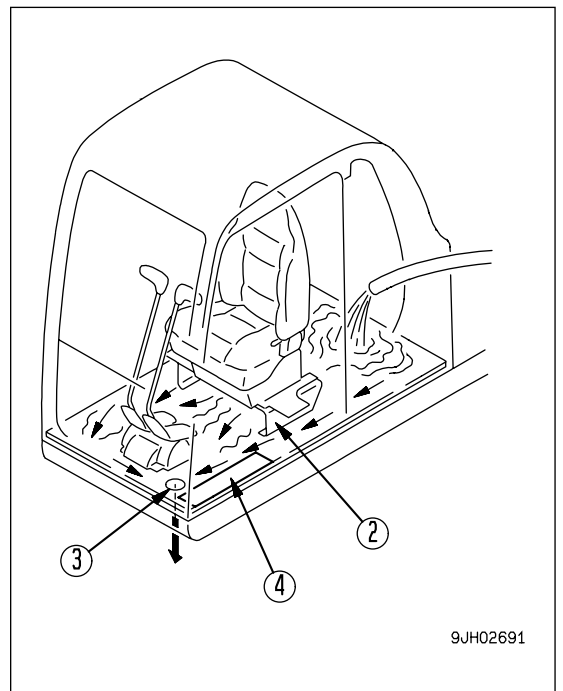
3. Lower the work equipment to the ground and set the machine in a stable condition.



4. Set the safety lock lever to the LOCK position, then stop the engine.



5. Remove the floor mat holder plate (4).
6. Remove the floor mat.
7. Remove the cap from water drain port (3).
8. Flush out the dirt on the floor directly with water through water drain port (3).
9. After completing the washing operation, install the cap in water drain port (3).
10. Fit the floor mat, then secure it with floor mat holder plate (4).



## METHOD OF SETTING MACHINE ANGLE

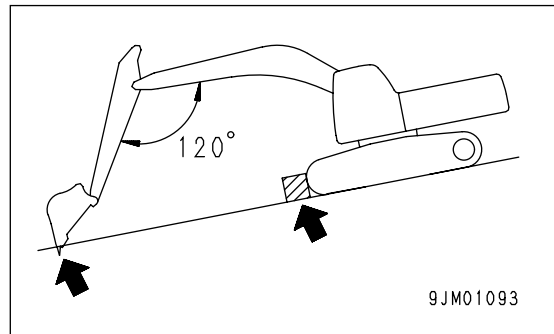
### Method Using Slope

**⚠ WARNING**

Select a firm flat place.

Always put blocks under the track to prevent the machine from moving, and dig the work equipment into the ground.

1. Stop machine so that the work equipment is on the down-hill side.
2. Put blocks under the track and dig the work equipment into the ground.



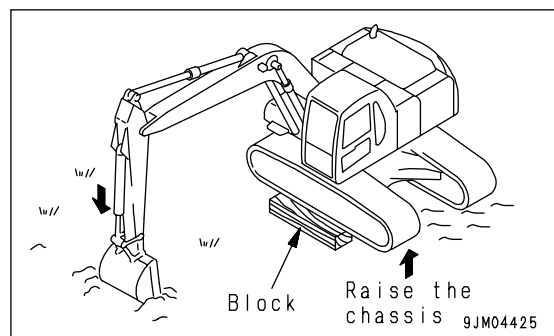
### Method Using Block

**⚠ WARNING**

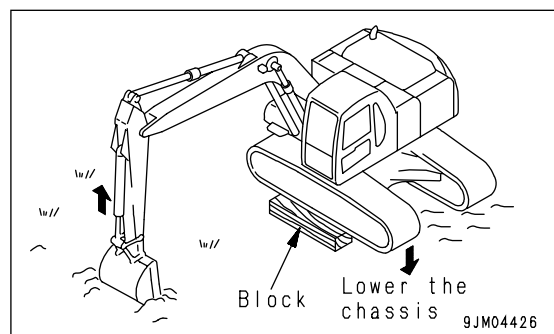
Select a firm flat place.

Put strong blocks under the undercarriage to stabilize the machine and be extremely careful when carrying out the operation.

1. Raise the chassis with the boom and arm. When doing this, operate the levers slowly.
2. Insert a block securely between the ground surface and the raised track and make sure that the machine is stable.



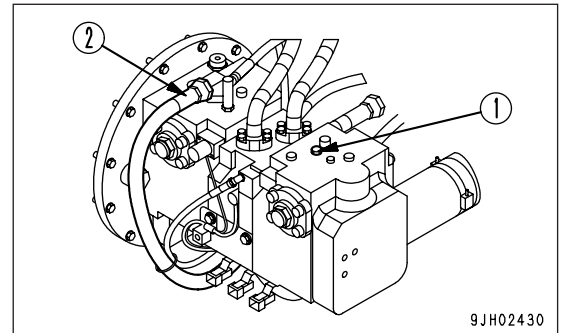
3. Raise the boom slowly and lower the machine. When doing this, check that the machine is always stable.



## BLEEDING AIR FROM HYDRAULIC SYSTEM

For details, see "STARTING ENGINE (PAGE 3-70)". If it is necessary to refer to the items for starting the engine, moving the machine off, steering, or stopping, see the OPERATION section.

1. Bleeding air from pump
  - 1) Loosen air bleed plug (1) and check if oil oozes out.
  - 2) If the oil does not ooze out, remove the drain hose from the hydraulic pump case and fill the pump case completely with hydraulic oil through drain port (2). Hold the removed hose firmly, keeping the mouth-piece higher than the oil level in the hydraulic tank so that oil will not spill out of the hose.
  - 3) After air bleeding is completed, first tighten air bleed plug (1) and then install the drain hose.



### NOTICE

**If the drain hose is installed first, oil will spurt out of air bleed plug (1).**

**If the pump is run when the pump case is not full of oil, there will be abnormal generation of heat, and this will lead to premature failure of the pump.**

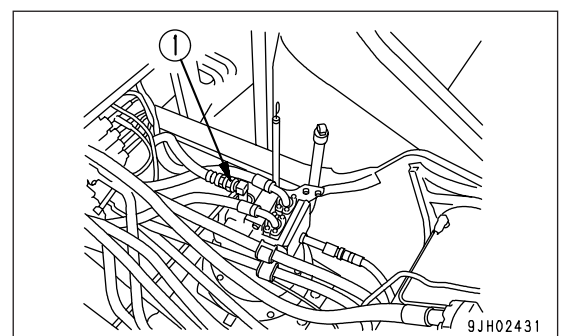
2. Starting engine
 

Start the engine. For details, see "STARTING ENGINE (PAGE 3-70)".  
Run the engine at low idling for 10 minutes after starting, then start operations.
3. Bleeding air from cylinders
  - 1) Run the engine at a low idling and extend and retract the cylinders 4 to 5 times to a point 100 mm(3.9in) from the end of the stroke. (Be careful not to operate to the end of the stroke.)
  - 2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
  - 3) Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

### NOTICE

**If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder may cause damage to the piston packing.**

4. Bleeding air from swing motor
  - 1) Run the engine at low idling, loosen hose (1) at port S, and check that oil oozes out from port S hose (1).



### NOTICE

**Do not operate the swing under any circumstances.**

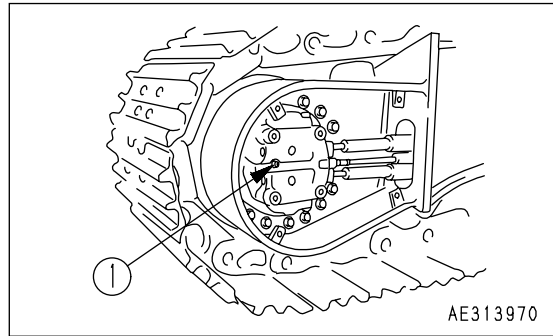
- 2) If oil does not ooze out, stop the engine, remove port S hose (1), and fill the inside of the motor case with hydraulic oil.
- 3) After completely bleeding the air, tighten port S hose (1).
- 4) Run the engine at low idling and slowly swing at least two times uniformly to the left and right. This will automatically bleed the air.

### NOTICE

- **If the air is not bled from the swing motor, there is danger that the motor bearings will be damaged.**
- **If the swing motor safety valve is to be replaced, ask your Komatsu distributor to carry out the replacement and air bleed operation.**

5. Bleeding air from travel motor (only when oil inside travel motor case has been drained)

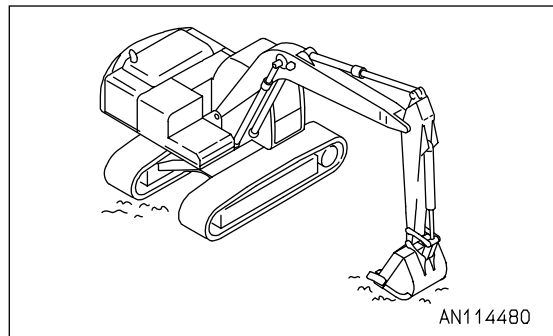
- 1) Run the engine at low idling and loosen air bleed plug (1). If oil spills out, tighten the plug.



- 2) Run the engine at low idling and swing the work equipment 90° to bring it to the side of the track.

- 3) Jack up the machine until the track is raised slightly from the ground. Rotate the track under no load for 2 minutes.

Repeat this procedure on both the left and right sides, and rotate the track equally both forward and in reverse.



6. Bleeding air from attachment (when installed)

If a breaker or other attachment has been installed, run the engine at low idling and operate the attachment pedal repeatedly (approx. 10 times) until the air has been bled from the attachment circuit.

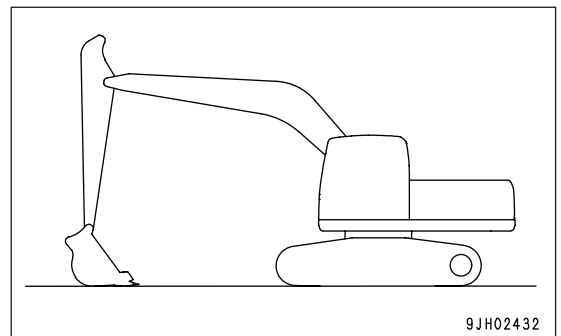
**NOTICE**

- If the method of bleeding the air from the attachment itself is specified by the manufacturer, bleed the air according to the specified procedure.
- After completing the air bleeding operation, stop the engine, and leave the machine for 5 minutes before starting operations. This will remove the air bubbles in the oil inside the hydraulic cylinders.
- Check that there is no leakage of oil and wipe off any oil that has been spilled.
- After completing the air bleeding operation, inspect the oil level, and if the oil level is low, add oil.

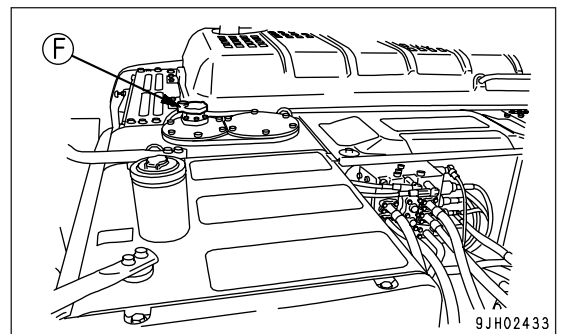
**METHOD FOR RELEASING INTERNAL PRESSURE IN HYDRAULIC CIRCUIT****⚠ WARNING**

- The hydraulic circuit is always under pressure, so release the pressure inside the circuit before inspecting or replacing the piping or hoses. If the pressure is not released, high-pressure oil will spurt out and may cause serious personal injury.
- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure before removing the cap.

1. Stop the machine on horizontal, firm ground.



2. Within 15 seconds after stopping the engine, turn the starting switch to the ON position, and operate the control levers (work equipment, travel) fully in each direction to release the internal pressure.
3. Slowly loosen oil filler cap (F) at the top surface of the hydraulic tank to release the internal pressure.



## CHECK BEFORE STARTING

For details of the following items, see "CHECKS BEFORE STARTING (PAGE 3-59)" in the OPERATION section.

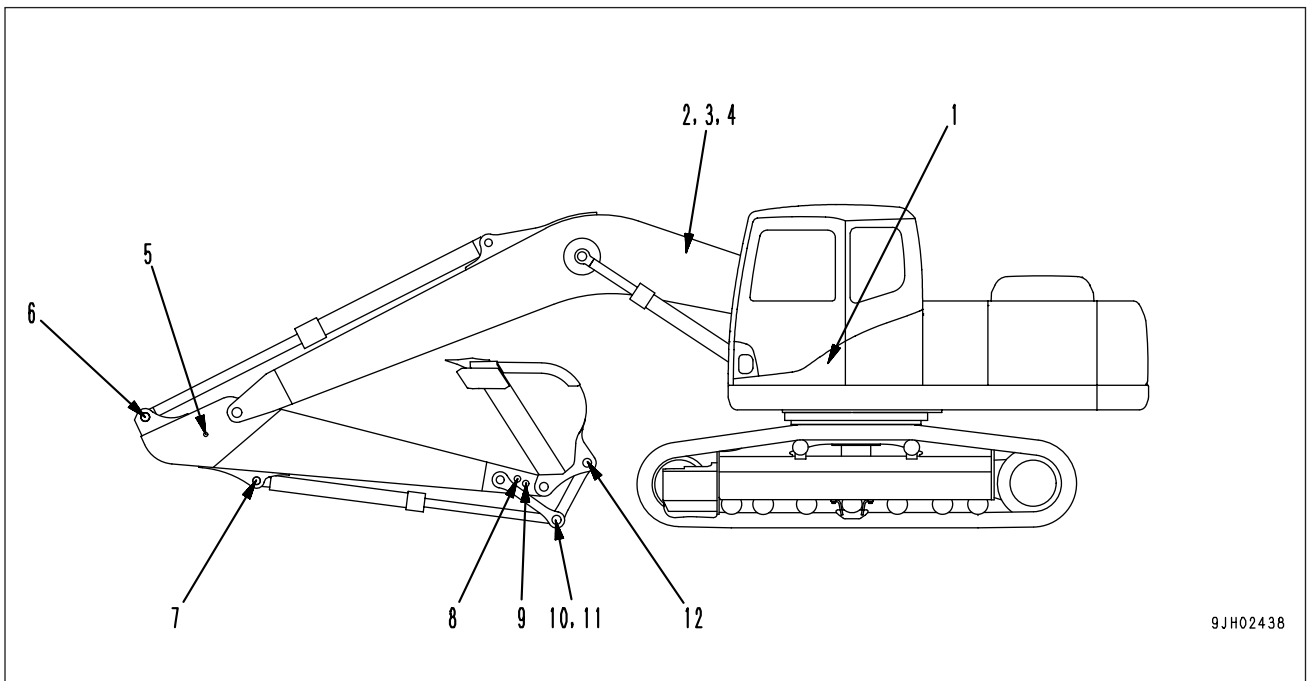
- Check coolant level, add water
- Check oil level in engine oil pan, add oil
- Check fuel level, add fuel
- Drain water, sediment from fuel tank
- Check for water and sediment in water separator, drain water
- Check oil level in hydraulic tank, add oil
- Check electric wirings
- Check function of horn

# EVERY 100 HOURS MAINTENANCE

## LUBRICATING

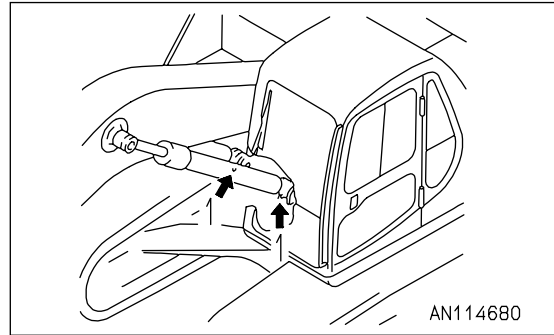
### NOTICE

- If any abnormal noise is generated at the greasing point, carry out greasing regardless of the maintenance interval.
  - When operating the machine for the first 50 hours, carry out the greasing every 10 hours.
  - After carrying out digging work in water, always greasing the pins that were under water.
1. Set the work equipment in the greasing posture below, then lower the work equipment to the ground and stop the engine.
  2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
  3. After greasing, wipe off any old grease that was pushed out.

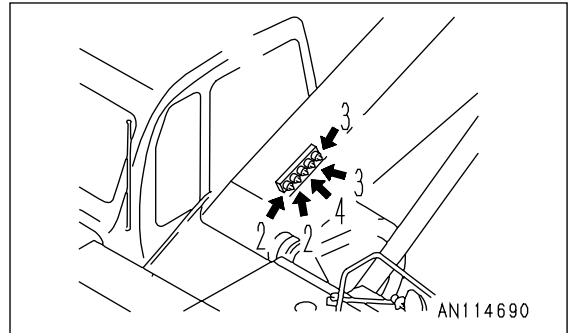


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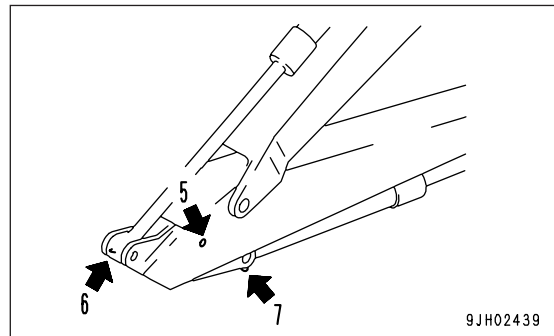
- (1) Boom cylinder foot pin (2 points)



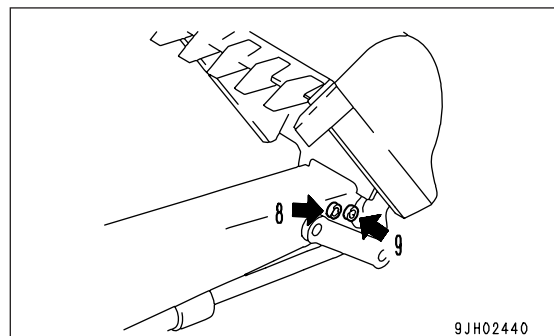
- (2) Boom foot pin (2 points)
- (3) Boom cylinder rod end (2 points)
- (4) Arm cylinder foot pin (1 point)



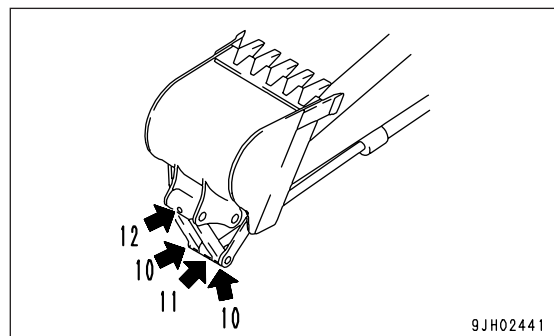
- (5) Boom-Arm coupling pin (1 point)
- (6) Arm cylinder rod end (1 point)
- (7) Bucket cylinder foot pin (1 point)



- (8) Arm-Link coupling pin (1 point)
- (9) Arm-Bucket coupling pin (1 point)



- (10) Link coupling pin (2 points)
- (11) Bucket cylinder rod end (1 point)
- (12) Bucket-Link coupling pin (1 point)





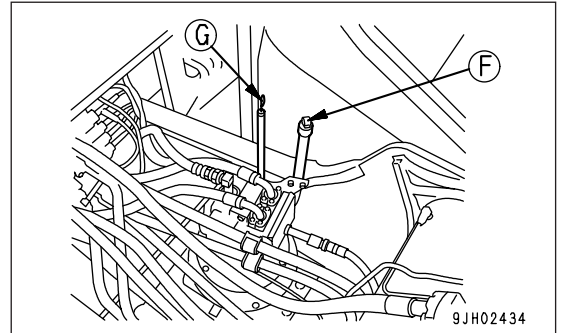
## EVERY 250 HOURS MAINTENANCE

### CHECK OIL LEVEL IN MACHINERY CASE, ADD OIL

#### WARNING

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

1. Remove dipstick (G) and wipe the oil from the dipstick with a cloth.
2. Insert dipstick (G) fully in the guide.
3. When dipstick (G) is pulled out, if the oil level is between the H and L marks of the gauge, oil level is proper.
4. If the oil does not reach the L mark on dipstick (G), remove oil filler (F), and add engine oil.
5. If the oil level exceeds the H mark on the dipstick, loosen drain plug to drain the excess oil.
6. After checking oil level or adding oil, insert the dipstick into the hole and install oil filler cap.



## CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

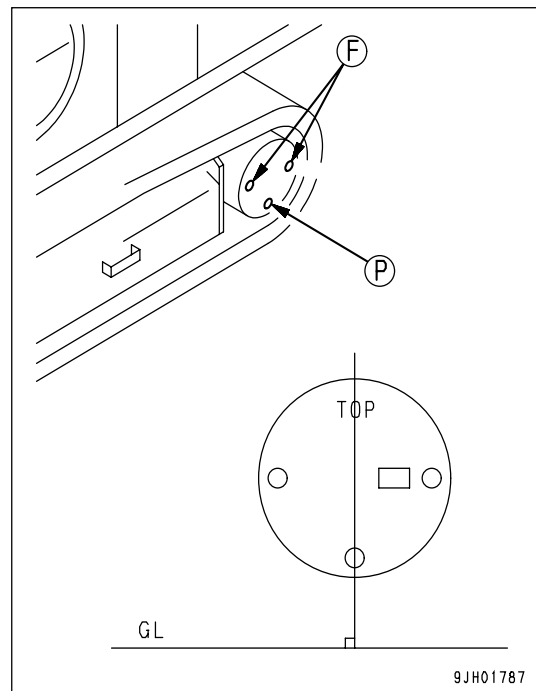
**⚠ WARNING**

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

- Prepare a hexagonal wrench.
1. Set the final drive so that TOP mark comes to the top and the mark and plug (P) are perpendicular to the ground.
  2. Using a hexagonal wrench, remove plug (F) and check that the oil level is within a range from the bottom of the plug hole to a point 10 mm(0.4 in) below it.
  3. If the oil level is too low, install plug (F), operate the travel levers, and drive forward or in reverse to rotate the sprocket one turn. Then repeat Step 2 to check again.
  4. If the oil level is still too low, add engine oil through the hole in plug (F) until the oil overflows.
  5. After checking, install plug (F).

**REMARK**

There are two plugs (F). Add oil through the one easier to fill oil and through which no internal gears are to be seen.



## CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.

### ⚠ WARNING

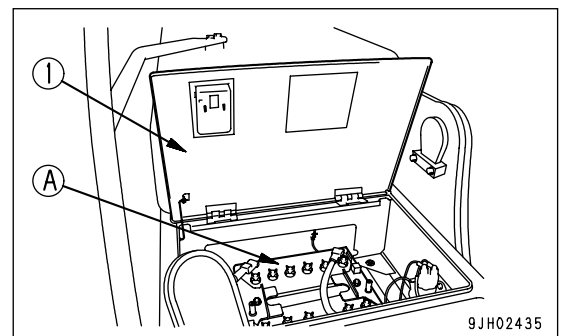
- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may also cause an explosion.
- The battery generates flammable gas and there is danger of explosion, so do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

### NOTICE

When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

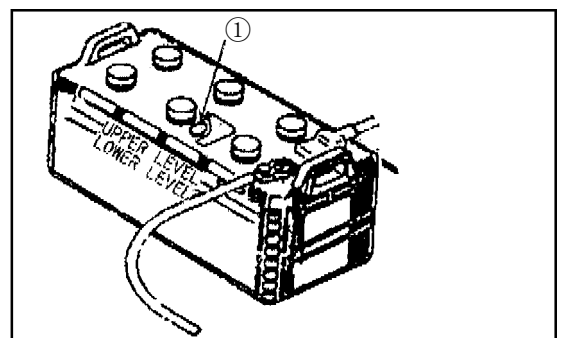
1. Open cover (1) at the rear left side of the machine. The batteries are installed at (A) part.



### When Checking Electrolyte Level from side of Battery

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L) and LOWER LEVEL (L.L) lines. If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



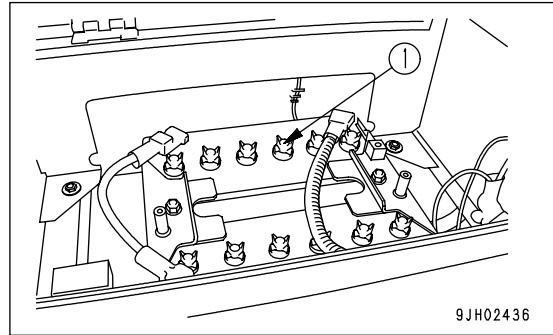
## MAINTENANCE PROCEDURE

- If the electrolyte level is below the midway point between the U.L and L.L lines, remove cap (1) and add distilled water to the U.L line.
- After adding distilled water, tighten cap (1) securely.

### REMARK

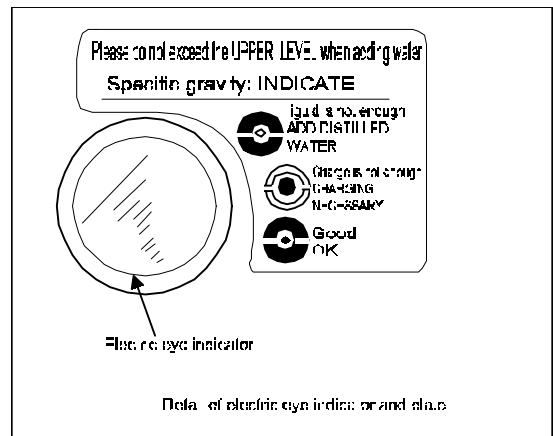
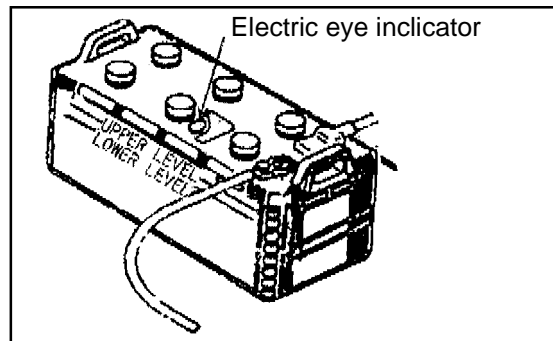
If distilled water is added to above the U.L line, use a pipette to lower the level to the U.L line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

## MAINTENANCE



### Check the condition of battery with indicator.

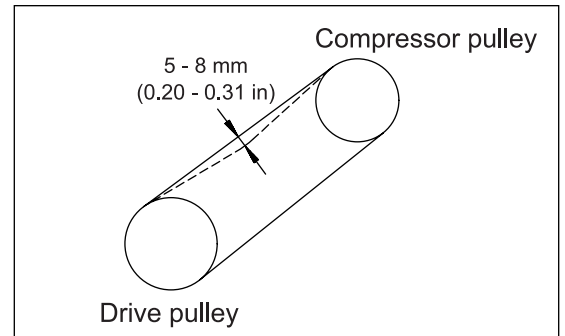
The working condition of battery can be judged by the electric eye indicator on the upper surface of battery. Under normal condition, the electric eye indicator indicates blue. If the electric eye indicator indicates white or red, it means the battery is under the condition of lack of electricity or electrolyte, and need to change electricity or add electrolyte immediately.



## CHECK, ADJUST TENSION OF AIR CONDITIONER COMPRESSOR BELT

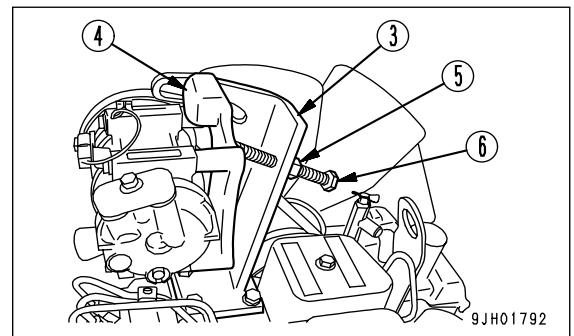
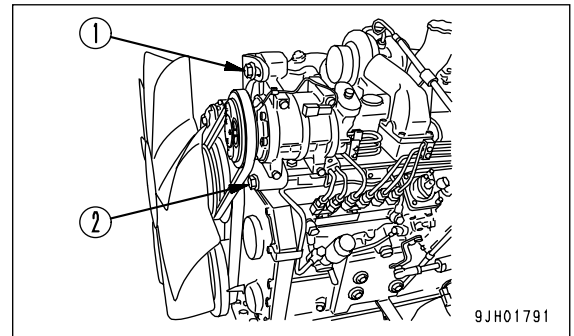
### Checking

Press the belt at a point midway between the drive pulley and compressor pulley with a finger force of approx. 58.8 N (6 kgf) and check that the deflection is 5 - 8 mm (0.20 in - 0.31 in).



### Adjusting

1. Loosen bolts (1) and (2).
  - Bracket (4) holds the compressor in place. When bolts (1) and (2) are loosened, bracket (4) moves with the securing position of bolt (2) as a fulcrum.
2. Loosen nut (5) attached to the fixed bracket (3) and then tighten bolt (6).
  - Tighten bolt (6) so that the deflection of the belt will be 5 - 8 mm (approx. 58.8N (6 kgf)).
3. Tighten bolts (1) and (2) to secure bracket (4).
4. Loosen bolt (6) to remove from bracket (4).
5. Tighten nut (5).
6. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
7. Replace belt if it has stretched, leaving no allowance for adjustment, or if there is a cut or crack on V-belt.
8. When the new V-belt is set, readjust it after operation for an hour.

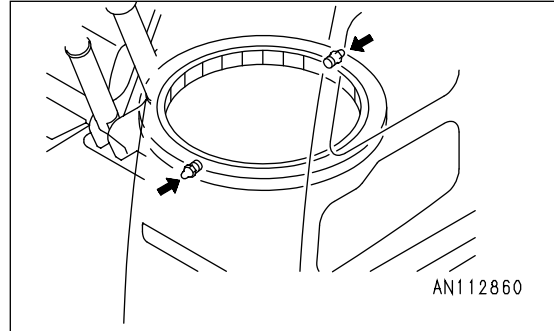


## EVERY 500 HOURS MAINTENANCE

Maintenance for every 100 and 250 hours service should be carried out at the same time.

### LUBRICATE SWING CIRCLE (2 POINTS)

1. Lower the work equipment to the ground.
2. Using a grease gun, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off all the old grease that was pushed out.



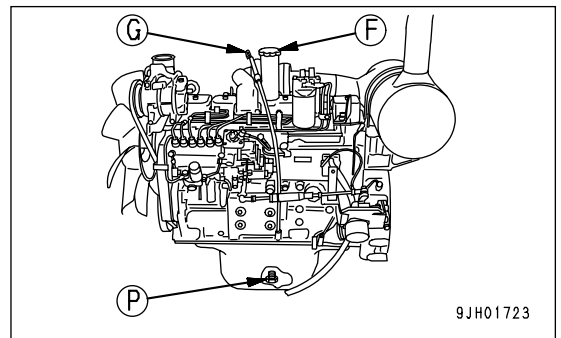
# CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

**⚠ WARNING**

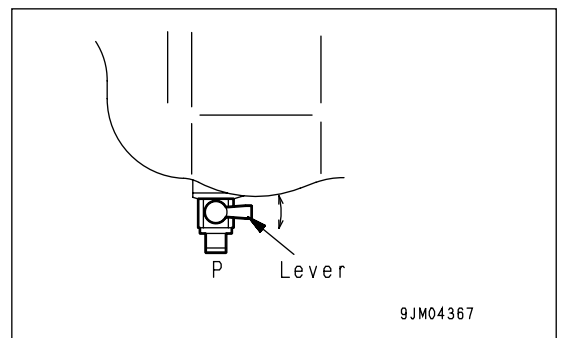
The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

Prepare the following:

- Refill capacity of oil pan: 24 liters (5.28 US gal)
  - Filter wrench
1. Remove undercover (1) at the bottom of the machine, then set a container under drain valve (P) to catch the drained oil.
  2. To prevent getting oil on yourself, lower the lever of drain valve (P) slowly, drain the oil, then raise the lever to close the valve.



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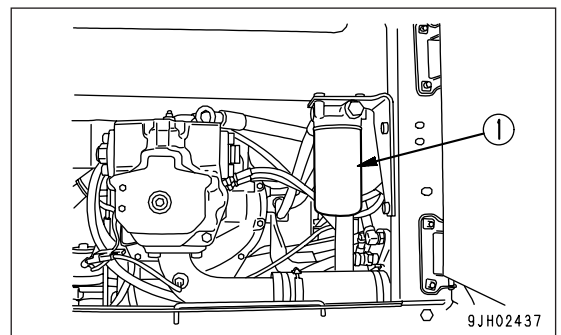
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3. Open the cover at the rear right, then use a filter wrench to turn filter cartridge (1) to the left to remove it.
4. Clean the filter holder, fill the new filter cartridge with clean engine oil, coat the packing surface and thread of the filter cartridge with engine oil (or coat it thinly with grease), then install the filter cartridge to the filter holder.

**REMARK**

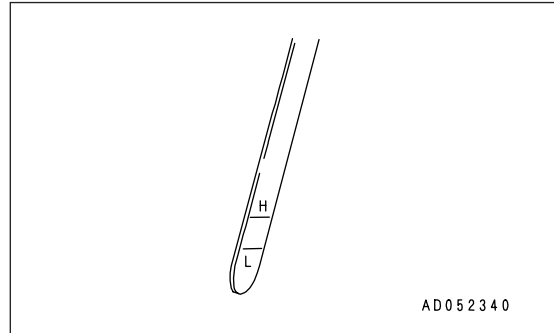
Check that there is no old packing stuck to the filter holder. If there is any old packing remaining, it will cause oil leakage.

5. When installing, bring the packing surface into contact with the seal surface of the filter holder, then tighten a further 3/4 - 1 turn.



9JH02437

6. After replacing the filter cartridge, open the engine hood and add engine oil through oil filler (F) to between the H and L marks on dipstick (G).
7. Run the engine at idling for a short time, then stop the engine and check again that the oil level is between the H and L marks on dipstick (G).  
For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (PAGE 3-60)".
8. Install the undercover.



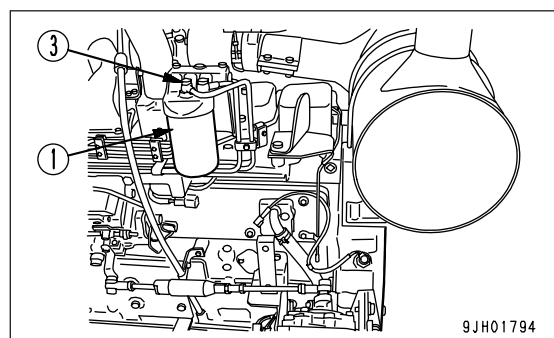
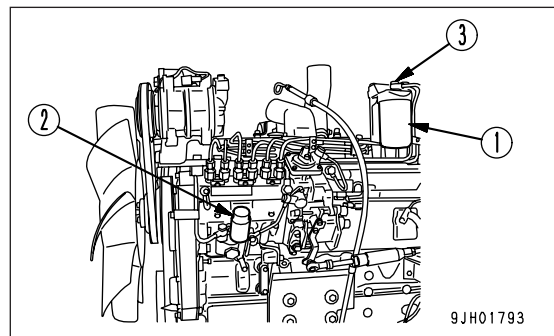
## REPLACE FUEL FILTER CARTRIDGE

### WARNING

- The parts are at high temperature immediately after the engine has been operated. Wait for all parts to cool down before replacing the filter.
- Do not bring fire or sparks near the fuel.

Prepare a filter wrench and a container to catch the fuel.

1. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
4. After bringing the packing surface into contact with the seal surface of the filter holder, tighten it a further 1/2 turns.  
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
5. After replacing the fuel filter cartridge, bleed the air from the system. Bleed the air as follows.
6. Fill the fuel tank with fuel (to the position where the float is at the highest position).



7. After replacing filter cartridge (1), loosen air bleed plug (3).
8. Loosen the knob of feed pump (2), pump it up and down, and continue to make the fuel overflow until no more bubbles come out from air bleed plug (3). Then tighten the knob of feed pump.
9. Tighten air bleed pug (3).  
Always use a genuine Komatsu filter cartridge.  
After replacing the filter cartridge, start the engine and check for any leakage of oil from the filter seal surface.

### REMARK

Use the feed pump to bleed air from the fuel system, when the machine has run out of fuel, too.



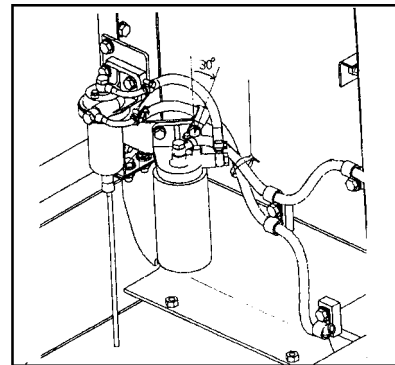
## REPLACE ADDITIONAL FUEL FILTER

### ⚠ WARNING

- The engine is at high temperature after machine operation. wait for the engine to cool down before replacing filter.
- Do not bring any fire or flame close to the fuel.

Prepare a filter wrench and an oil container.

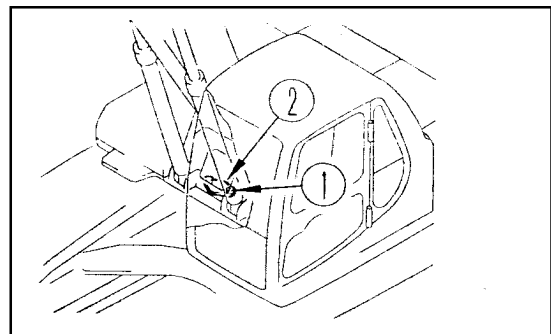
1. Place the container under filter to receive oil.
2. Rotate filter (2) counter-clockwise with filter wrench to remove the filter .
3. Clean the filter head, and use clean fuel to clean new filter, and apply engine oil to the matching surface. Then, install it to filter head.
4. Tighten to make the sealing surface contact the sealing surface of filter head while installing, then tighten another 1/2 turn.  
If the filter is excessively tightened, the matching surface will be damaged, causing oil leak  
If the filter is too loose, fuel will leak from the matching surface, so tighten it properly.
5. Bleeding air after additional fuel filter is replaced.



## RCHECK SWING PINION GREASE LEVEL, ADD GREASE

Prepare a scale.

1. Remove bolts (1) (2 bolts) on the top of the revolving frame and remove cover (2).
2. Insert a scale into the grease and check that the height of the grease in the portion where the pinion passes is at least 14 mm (0.6 in). Add more grease if necessary.
3. Check if the grease is milky white. If it is milky white, it is necessary to change the grease. Please contact your Komatsu distributor.



The total amount of grease

PC200,PC210 : 14.6 liters (3.86 US gal)

PC220 : 15.8 liters (4.17 US gal)

4. Install cover (2) with bolts (1).

# CLEAN AND INSPECT RADIATOR FINS, OIL COOLER FINS AND CONDENSER FINS

## ⚠ WARNING

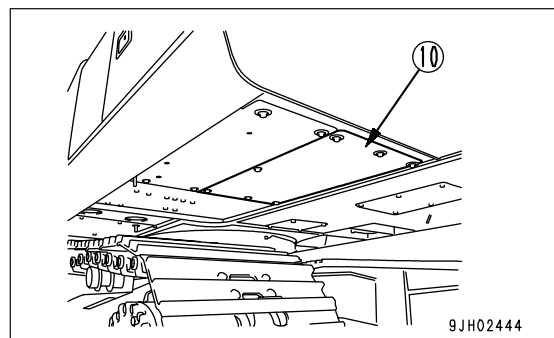
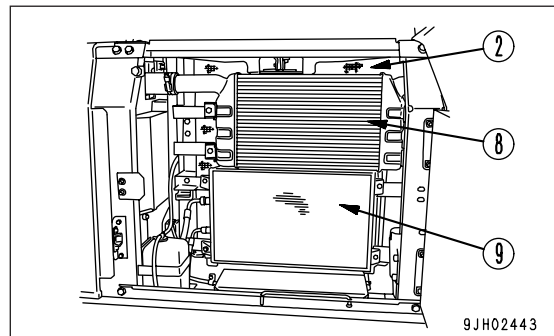
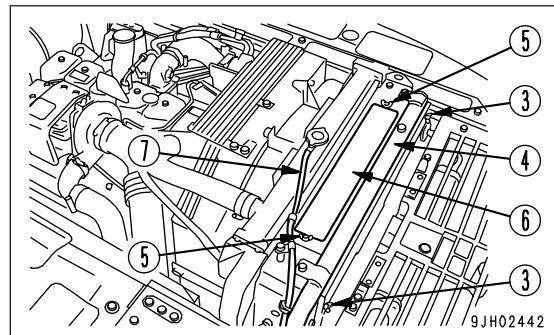
If compressed air, high-pressure water, or steam hit your body directly, or they cause dirt or dust to be blown up, there is a hazard of serious injury. Always use safety glasses, dust mask, or other protective equipment.

### NOTICE

When using compressed air, if the nozzle is brought too near the fins, the fins may be damaged. Carry out the cleaning from a reasonable distance to prevent damage to the fins.

Do not direct the jet directly at the core. If the fins are damaged, it will cause leakage of water and overheating. On dusty jobsites, carry out this inspection every day, regardless of the maintenance interval.

1. Open engine hood (1).
2. Loosen screw (3) and pull up net (2).
3. Clean net (2). (it is to be installed again, as instructed in the item 8)
4. Loosen screw (5) and detach net (6) between the radiator and the oil cooler.
5. Inspect the front and rear of oil cooler fins (4), radiator fins (7), after-cooler fins (8) and condenser fins (9) for dirt, dust, dry leaves, etc. Blow them away with compressed air, if any. Steam or water may be used instead of compressed air.
6. Check the rubber hose. Replace with a new one, if the hose is found to have cracks or to be hardened by aging. Further, check the hose cramps for looseness.
7. Remove cover (10) of the under cover and dispose of the dirt, dust, dry leaves, etc. fallen on it.
8. Push in cleaned net (2) back to the original place and secure it with screw (3).
9. Secure net (6) with screw (5).



## CLEAN INTERNAL AND EXTERNAL AIR FILTERS OF AIR CONDITIONER SYSTEM

### WARNING

If compressed air, high-pressure water, or steam hit your body directly, or they cause dirt or dust to be blown up, there is a hazard of serious injury. Always use safety glasses, dust mask, or other protective equipment.

### NOTICE

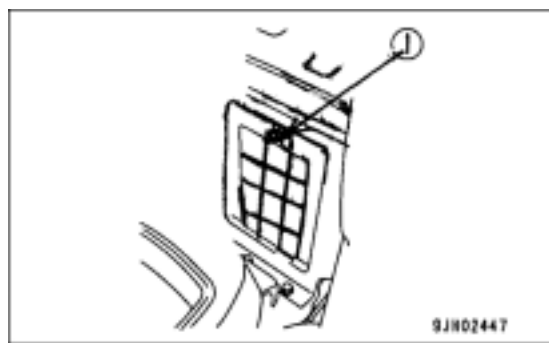
The guide for cleaning the filter is 500 hours, but if the machine is used on an extremely dusty jobsite, reduce the maintenance interval and clean the filter more frequently.

### REMARK

If the filter is clogged, the air flow is reduced and a muffled sound can be heard from the air conditioner unit.

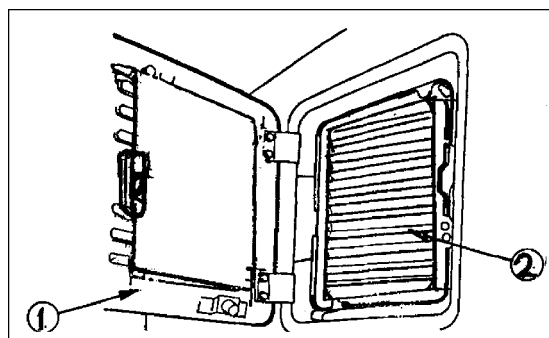
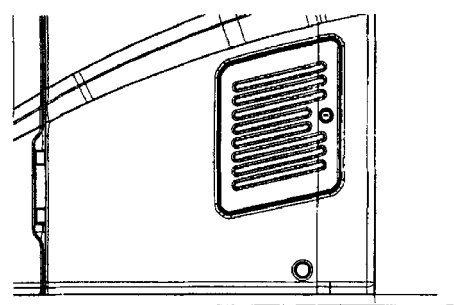
### CLEANING RECIRCULATED AIR FILTER

1. Remove wing bolts (1) from the inspection window at the bottom rear left on the inside of the operator's cab, then take out the recirculated air filter.
2. Clean the filter with compressed air. If there is oil on the filter, or if the filter is extremely dirty, wash it in a neutral agent. After rinsing it in water, dry it thoroughly before using it again.  
If the clogging of the filter cannot be removed by blowing with air or washing in water, replace the filter with a new part.



### CLEANING FRESH AIR FILTER

1. Open the side door of air cleaner on the left outside cab using a key.
2. Open the side door on the left lower of cab by hand, to draw out element from air cleaner.
3. Clean the filter with compressed air. If there is oil on the filter, or if the filter is extremely dirty, wash it in a neutral agent. After rinsing it in water, dry it thoroughly before using it again.  
If the clogging of the filter cannot be removed by blowing with air or washing in water, replace the filter with a new part.



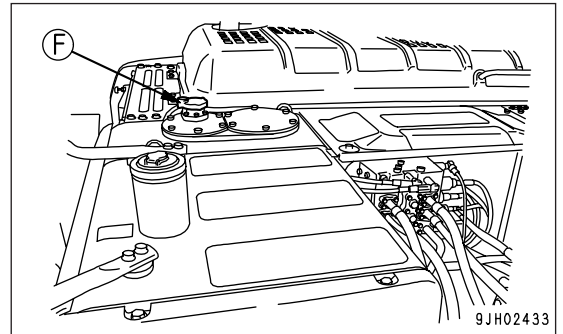
4. After cleaning, insert the filter in filter case (3) again, open the cover at the bottom left of the operator's cab by hand, return the filter case to its original position, then close the cover. When doing this, check that the lock is applied.

## REPLACE BREATHER ELEMENT IN HYDRAULIC TANK

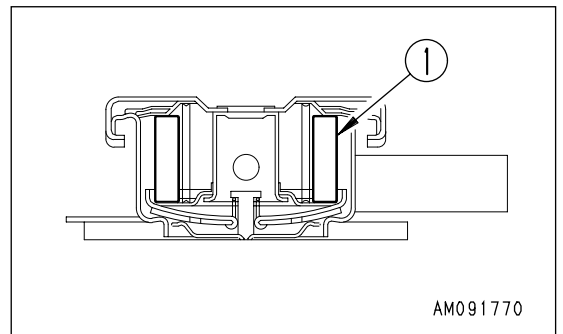
### WARNING

- The parts and oil are still at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the breather element in the hydraulic tank.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

1. Remove the cap from oil filler (F) at the top of the hydraulic tank.



2. Replace internal element (1).



# EVERY 1000 HOURS MAINTENANCE

Maintenance for every 100, 250 and 500 hours service should be carried out at the same time.

## REPLACE HYDRAULIC FILTER ELEMENT

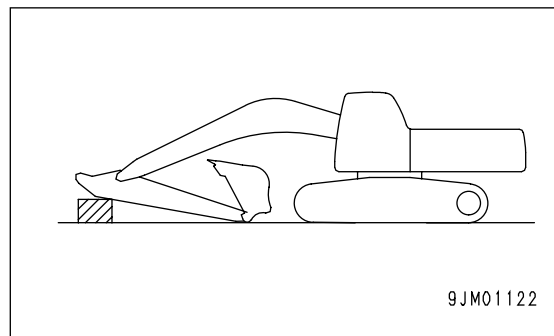
**⚠ WARNING**

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the hydraulic tank strainer.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

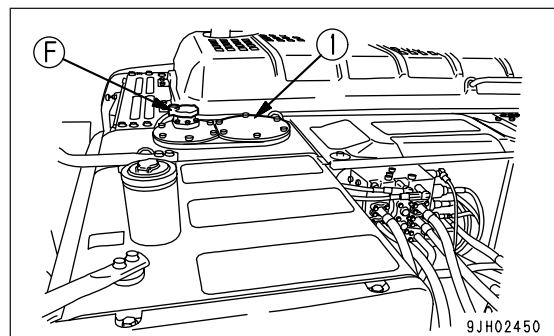
**NOTICE**

If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-19)" when carrying out maintenance.

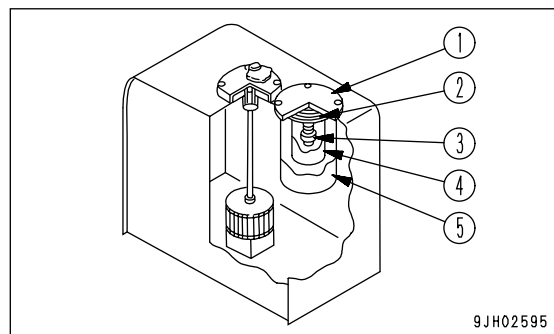
1. Set the work equipment on the hard and flat ground in the maintenance posture as shown in the figure, then lower it to the ground and stop the engine.



2. Remove the cap from oil filler (F), and release the internal pressure.
3. Loosen 6 bolts, then remove cover (1). When doing this, the cover may fly out under the force of spring (2), so hold the cover down when removing the bolts.
4. After removing spring (2), valve (3) and strainer (4), take out element (5).
  - Inspect the bottom of the filter case for dirt, and remove it, if any. Take good care then not to let fall the dirt into the hydraulic tank.



5. Clean the removed parts in diesel oil.
6. Install the new element in the place where old element (4) was installed.
7. Set valve (3), strainer (4) and spring (2) on top of the element.
8. Set cover (1) in position, push it down by hand, and install the cover with the mounting bolts.
9. Install the oil filler cap.



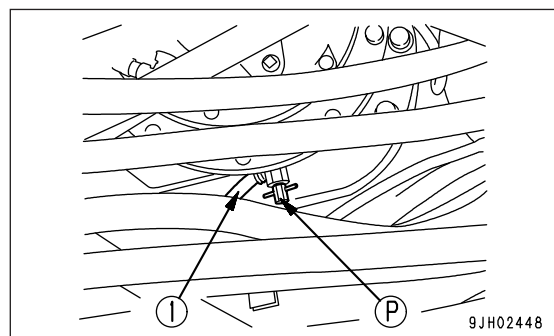
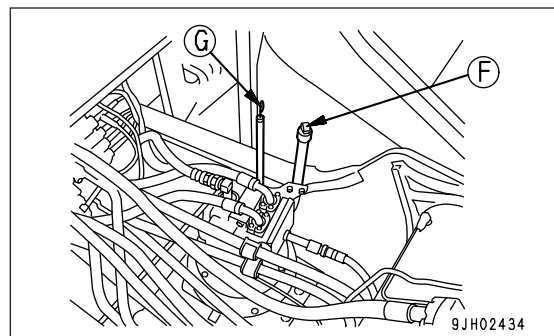
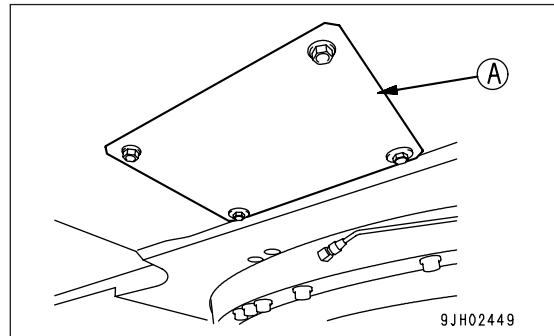
10. To bleed the air, start the engine according to "STARTING ENGINE (PAGE 3-70)" and run the engine at low idling for 10 minutes.
11. Stop the engine.

## CHANGE OIL IN SWING MACHINERY CASE

**⚠ WARNING**

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

- Refill capacity: 6.6 liters (1.74 US gal)
1. Remove cover (A) of the inspection hole.
  2. Set an oil container under drain valve (P) under the machine body.
  3. Loosen drain valve (P) under the body, drain the oil, then tighten the drain valve again.
  4. Remove the cap of oil filler (F), then add the specified amount of engine oil through oil filler (F).
  5. Pull out dipstick (G) and wipe off oil on the dipstick with cloth.
  6. Insert dipstick (G) into the gauge pipe thoroughly and then pull out it again.
  7. When the oil level is between the H and L marks, on dipstick (G), it is normal. If the oil does not reach the L mark, add more oil through oil filler (F).
  8. If the oil level exceeds the H mark, drain the excess engine oil from drain valve (P), and check the oil level again.
    - When draining the excess engine oil, pull out hose (1) from the check hole and then open the drain valve.





## CHECK OIL LEVEL IN DAMPER CASE, ADD OIL

### WARNING

The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait the temperature to go down before starting the work.

### NOTICE

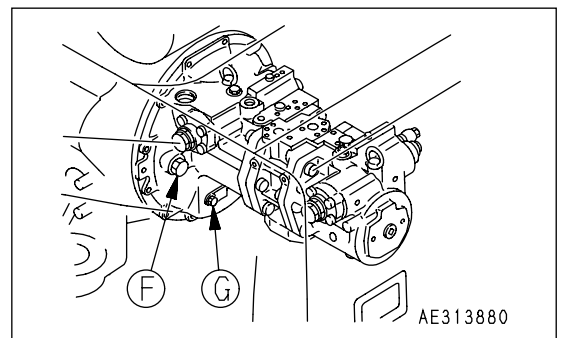
For the oil level check, park the machine on a flat ground and start the work more than 30 minutes after the engine was stopped.

1. Open the cover on the right side of the machine.
2. Remove oil inspection plug (G) and check that the oil is near the bottom of the check hole. If the oil level is low, remove the plug from oil filler (F), and add oil through oil filler (F) until the oil level is close to the bottom of the hole of oil inspection plug (G).

### NOTICE

If the oil level is found too high, be sure to drain the oil to the specified level. The excess oil may cause overheating.

3. Install oil inspection plug (G) and the plug of oil filler (F).
4. Close the cover.



## CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

## CHECK PLAY OF TURBOCHARGER ROTOR

Ask Komatsu distributor to check the play of the turbocharger rotor.

## CHECK FAN BELT TENSION AND REPLACE FAN BELT

Special tools are required for inspection and replacement of the fan belt. Contact your Komatsu distributors for inspection and replacement.

### REMARK

An installed auto fan belt tension adjuster, "Auto Tensional Fan Belt", dispenses with the belt deflection adjustment.

## EVERY 2000 HOURS MAINTENANCE

Maintenance for every 100, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN FINAL DRIVE CASE

**⚠ WARNING**

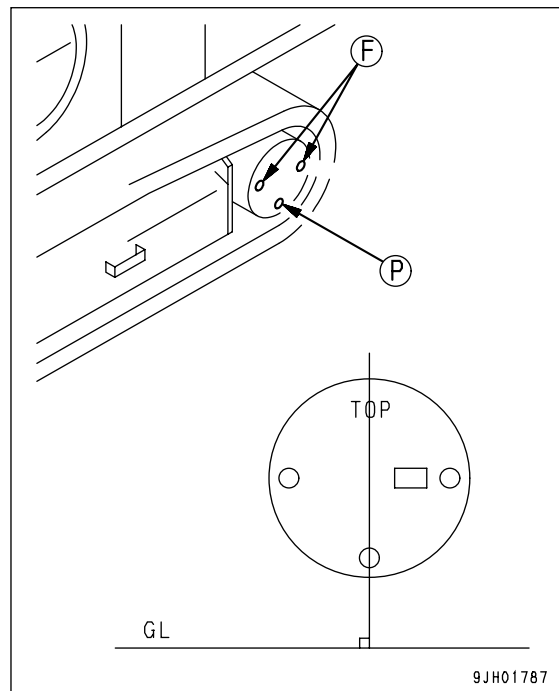
- The oil is at high temperature after the engine is stopped. Wait for the temperature to go down before starting the operation.
- If there is pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

- Refill capacity (each): 4.5 liters (1.19 US gal)
  - Hexagon wrench
1. Set the final drive the way TOP mark comes to the top and the mark and plug (P) are perpendicular to the ground.
  2. Set a container under plug (P) to catch the oil.
  3. Remove plugs (P) and (F) with the hexagon wrench and drain the oil.

**REMARK**

Check the O-rings in the plugs for damage. If necessary, replace with new ones.

4. Tighten plug (P).
5. Add engine oil trough the hole of plug (F).
6. When the oil overflows from the hole of plug (F), install plug (F).  
Plugs (P) and (F) are tightened to the torque of  $68.6 \pm 9.8 \text{ N}\cdot\text{m}$  ( $7 \pm 1 \text{ kgf}\cdot\text{m}$ ).



**REMARK**

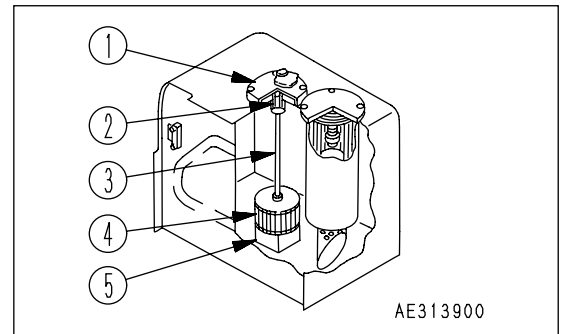
There are two plugs (F). Add oil through the one easier to fill oil and through which no internal gears are to be seen.

## CLEAN HYDRAULIC TANK STRAINER

### WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the hydraulic tank strainer.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

1. Loosen 6 bolts, then remove cover (1).  
When doing this, the cover may fly out under the force of spring (2), so push the cover down when removing the bolts.
2. Pull up the top of rod (3), and remove spring (2) and strainer (4).
3. Remove the dirt stuck to strainer (4), then wash it in clean diesel oil or flushing oil.  
If strainer (4) is damaged, replace it with a new one.
4. Refit strainer (4) by inserting it into tank projecting part (5).
5. Assemble so that the protruding part at the bottom of cover (1) holds spring (2), then tighten with the bolt.



## CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning or inspection.

## CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

## CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

## CHECK VIBRATION DAMPER

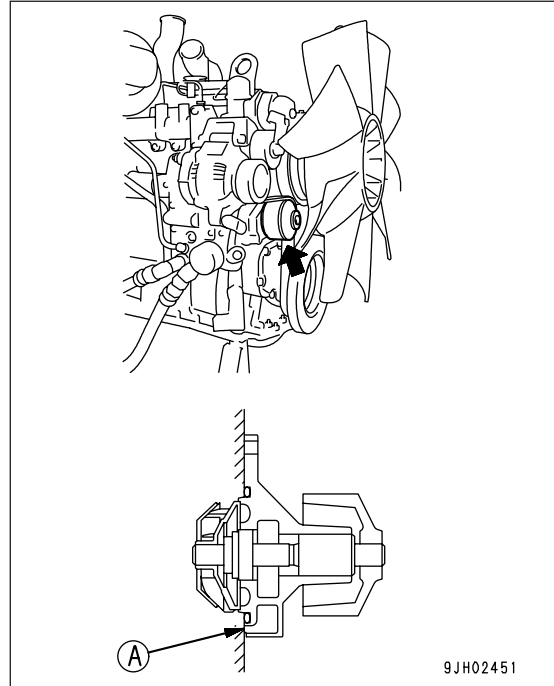
As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

## EVERY 4000 HOURS MAINTENANCE

Maintenance for every 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

### CHECK WATER PUMP

Since the pulley may have play, oil may leak, water may leak and the drain hole (A) may be clogged, contact your Komatsu distributor for inspection, overhaul or replacement.



## EVERY 5000 HOURS MAINTENANCE

Maintenance for every 100, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN HYDRAULIC TANK

#### WARNING

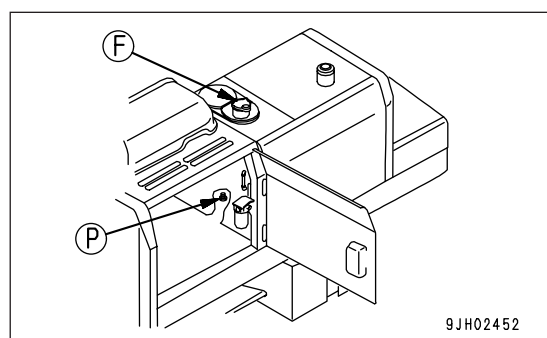
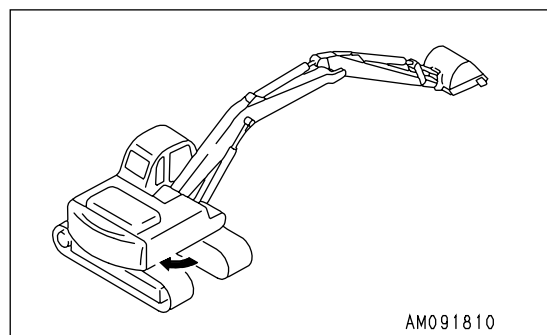
- The parts and oil are still at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the breather element in the hydraulic tank.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

#### NOTICE

If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-19)" when carrying out maintenance.

Prepare the following.

- Refill, capacity: 115 liters (30.38 US gal)
  - Prepare a handle for the socket wrench set.
1. Swing the upper structure so that drain plug at the lower part of the suction tube comes to the middle of the left or right track.
  2. Retract the arm and bucket cylinders to the stroke end, then lower the boom and put the bucket teeth in contact with the ground.
  3. Lock the safety lock lever and stop the engine.
  4. Remove the cap of oil filler (F) over the hydraulic tank.
  5. Set the oil container under the drain plug under the machine. Using the handle, remove drain plug (1) and drain the oil.  
Check the O-ring installed to plug (1), and if it is damaged, replace the O-ring. After draining the oil, tighten drain plug (1).  
Tightening torque:  $69 \pm 10 \text{ N}\cdot\text{m}$  ( $7 \pm 1 \text{ kgf}\cdot\text{m}$ ,  $51 \pm 7 \text{ lbf}\cdot\text{ft}$ ).



When removing drain plug (1), be careful not to get oil on yourself.

6. Add the specified amount of engine oil through oil filler port (F).  
Check that the oil level is between H and L on the sight gauge.

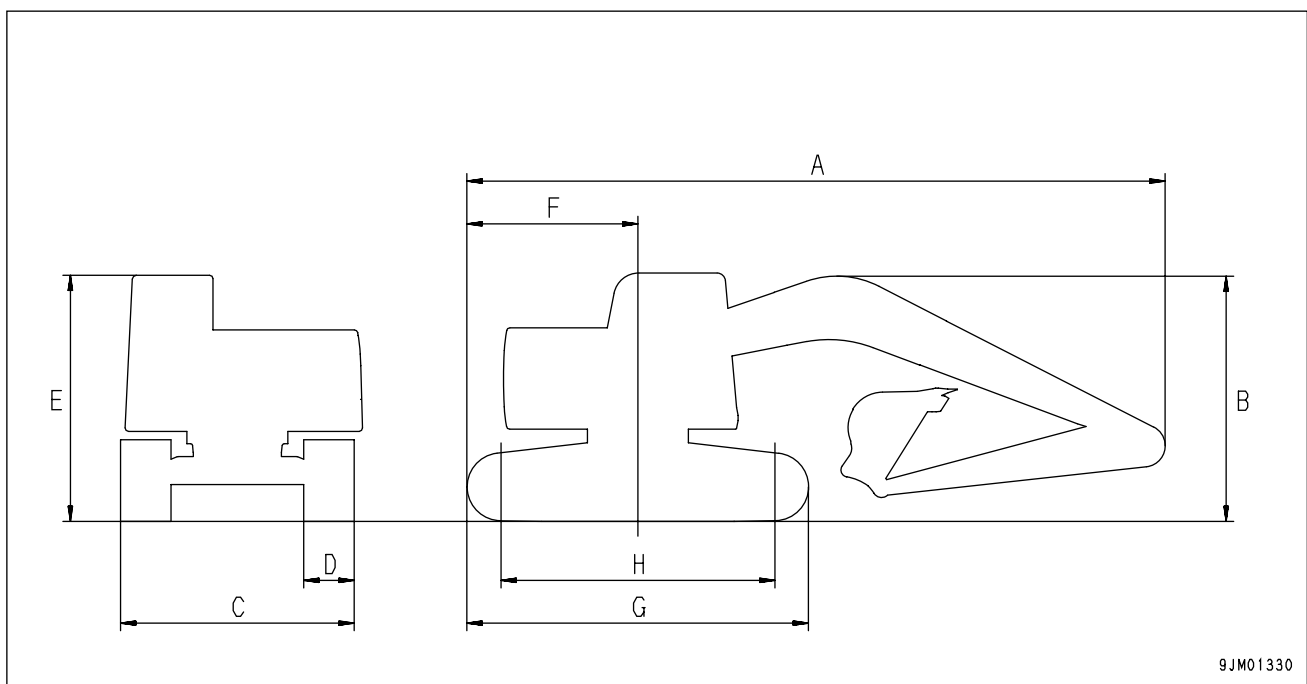
For details of the method of bleeding the air, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 3-63)".

**MEMO**

# **SPECIFICATIONS**

# SPECIFICATIONS

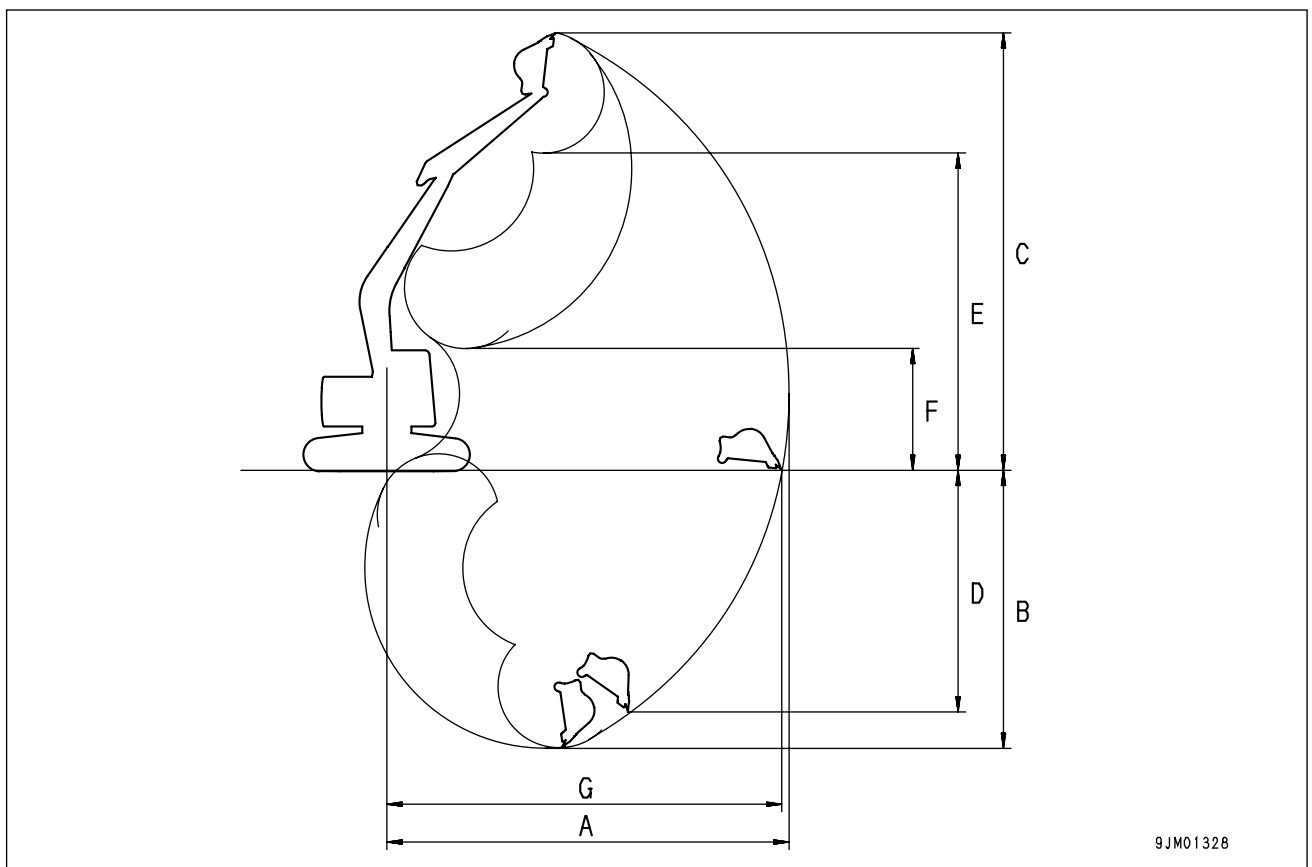
	Item	Unit	PC200-7	PC200LC-7	PC220-7	PC220LC-7
	Operating weight	kg (lb)	19,700 (43,439)	21,100 (46,526)	22,800 (50,294)	25,050 (55,236)
	Bucket capacity	m <sup>3</sup> (cu.yd)	0.8(1.05)	0.8(1.05)	1(1.31)	1(1.31)
	Name of engine		KOMATSU SAA6D102E diesel engine			
	Engine horsepower	kW (HP)/rpm	107(145)/1950		125(168)/2000	
A	Overall length	mm (ft in)	9425 (30'11")	9,425 (30'11")	9,885 (32'5")	9,885 (32'5")
B	Overall height	mm (ft in)	2,970(9'9")	2,970(9'9")	3,160(9'9")	3,160(9'9")
C	Overall width	mm (ft in)	2,800(9'2")	3,080(10'1")	2,980(9'10")	3,280(10'9")
D	Track width	mm (ft in)	600(1'12")	700(2'2")	600(1'12")	700(2'2")
E	Height of cab	mm (ft in)	3,000(9'10")	3,000(9'10")	3,015(9'11")	3,015(9'11")
F	Radius of upper structure	mm (ft in)	2750(9')	2750(9')	2,940(9'8")	2,940(9'8")
G	Length of track	mm (ft in)	4,080(13'5")	4,450(14'7")	4,250(13'11")	4,640(15'3")
H	Tumbler center distance	mm (ft in)	3,270(10'9")	3,640(11'11")	3,460(11'4")	3,845(12'7")
	Min. ground clearance	mm (ft in)	440(1'5")	440(1'5")	440(1'5")	440(1'5")
	Travel speed (Low/High)	km/h (MPH)	3.0/5.5 (1.9/3.4)	3.0/5.5 (1.9/3.4)	3.1/5.5 (1.9/3.4)	3.1/5.5 (1.9/3.4)
	Swing speed	rpm	12.4	12.4	11.7	11.7



9JM01330



	Working ranges	Unit	PC200-7	PC200LC-7	PC220-7	PC220LC-7
A	Max. digging reach	mm (ft in)	9,875(32'5")		10,180(33'5")	
B	Max. digging depth	mm (ft in)	6620(21'9")		6920(22'8")	
C	Max. digging height	mm (ft in)	10,000(32'10")		10,000(32'10")	
D	Max. vertical wall depth	mm (ft in)	5,980(19'7")		6,010(19'9")	
E	Max. dumping height	mm (ft in)	7,110(23'4")		7,035(23'1")	
F	Min. dumping height	mm (ft in)	2,645(8'8")		2,530(8'4")	
G	Max. reach at ground level	mm (ft in)	9,700(31'10")		10,020(32'10")	



**MEMO**

# ATTACHMENTS AND OPTIONS

 **WARNING**

Please read and make sure that you understand the safety volume before reading this section.

---

# GENERAL PRECAUTIONS

## PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.

### WARNING

#### General precautions

- **Attachments are powerful tools. To prevent serious injury or damage, use the attachment correctly.**
  - **Read the instruction manual for the attachment thoroughly, and do not use this attachment unless you are sure that you have understood the guides completely.**  
**If you lose the instruction manual, always ask the manufacturer or attachment sales company for a new copy.**
  - **Depending on the attachment, install the necessary front guard to the machine.**
  - **Depending on the attachment, the impact noise may make it difficult for fellow workers to transmit instructions for the operation. Before starting operation, decide a leader and determine the signals to be used.**
  - **Do not carry out swinging operations to the side with a heavy load on the attachment. This is particularly dangerous on slopes.**
  - **Compared with a machine equipped with a bucket, a machine equipped with a breaker has a heavy load at the front of the work equipment and is unstable. To avoid the danger of tipping over, do not carry out operations with the attachment swung to the side.**
  - **When an attachment is installed, the swing range and center of gravity of the machine are different, and the machine may move in an unexpected way. Be sure that you understand the condition of the machine properly.**
  - **Before starting operations, set up a fence around the machine to prevent people from entering. Never operate the machine when there are people near the machine.**
  - **To prevent serious accidents caused by misoperation, do not put your foot on the pedal except when operating the pedal.**
-

 **WARNING****Precautions for removal and installation operations**

When removing or installing the attachment, always do as follows to ensure safety in the operation.

- Carry out the removal and installation operation on firm, level ground.
- When carrying out the operation with two or more workers, determine the signals and follow these during the operation.
- Always use a crane when you lift or carrying heavy objects (more than 25kg or 55 lb).
- When removing heavy components, always support the component before removing it. When lifting with a crane, be particularly careful about the position of the center of gravity.
- It is dangerous to carry out operations with a load left raised by a crane. Always prepare a stand and ensure that the condition is safe.
- When leaving an attachment removed or when installing the attachment, make sure that it is in a stable condition and cannot fall over.
- Never go under a load raised by a crane. Stay in a safe place where there is no danger if the load should fall.

**NOTICE**

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

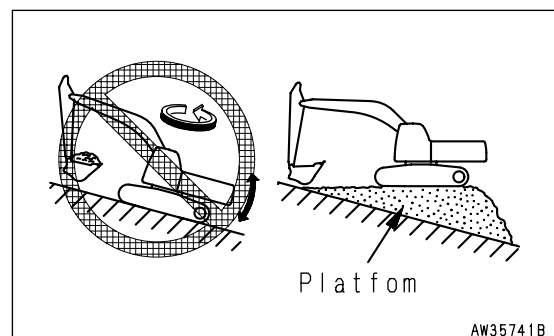
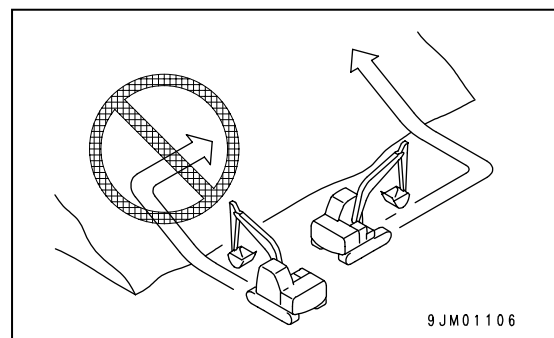
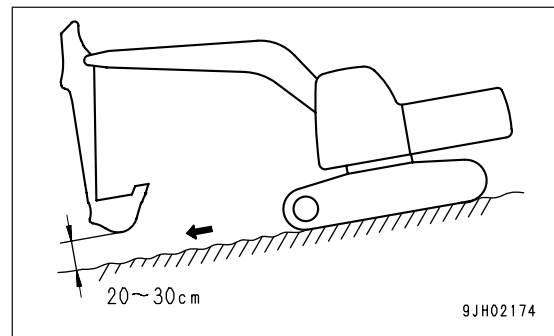
## PRECAUTIONS WHEN INSTALLING ATTACHMENTS

### WARNING

Long work equipment reduces the stability of the machine, so if the swing is operated on a slope, or when going down a steep hill, the machine may lose its balance and overturn.

The following operations are particularly dangerous, so never operate the machine in these ways.

- If heavy work equipment is installed, the overrun of the swing becomes greater (the distance from the point where the operator operates the control levers to stop the swing to the point where the upper structure stops completely), so there is danger of mistaking the distance and hitting something. Always operate so that there is an ample margin to the stopping point. Furthermore, the hydraulic drift also becomes larger (when the work equipment is stopped in mid-air, it will gradually move down under its own weight).
- Always follow the correct procedure when installing the boom and arm. If the correct procedure is not followed, this may lead to serious damage or injury, so consult your Komatsu distributor before carrying out installation.
- If long work equipment is installed, the working range will suddenly become larger, so there is danger of mistaking the distance and hitting something. Always operate the work equipment so that there is ample space from any obstacles in the area.



# HANDLING BUCKET WITH HOOK

## CHECKING FOR DAMAGE TO BUCKET WITH HOOK

Check that there is no damage to the hook, stopper, or hook mount. If there is any abnormality, contact your Komatsu distributor.

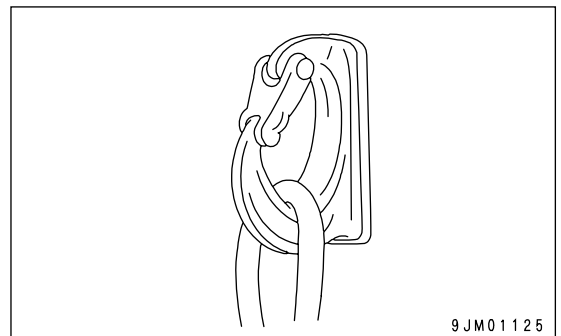
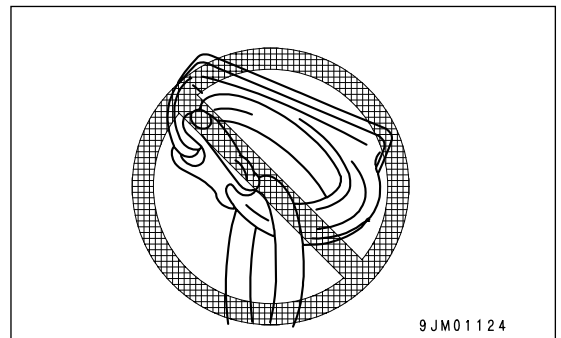
## PROHIBITED OPERATIONS

### PRECAUTIONS DURING OPERATIONS

- When carrying out lifting operations, reduce the engine speed and use the lifting operation mode.
- Depending on the posture of the work equipment, there is the danger that the wire or load may slip off the hook.

Always be careful to maintain the correct hook angle to prevent this from happening.

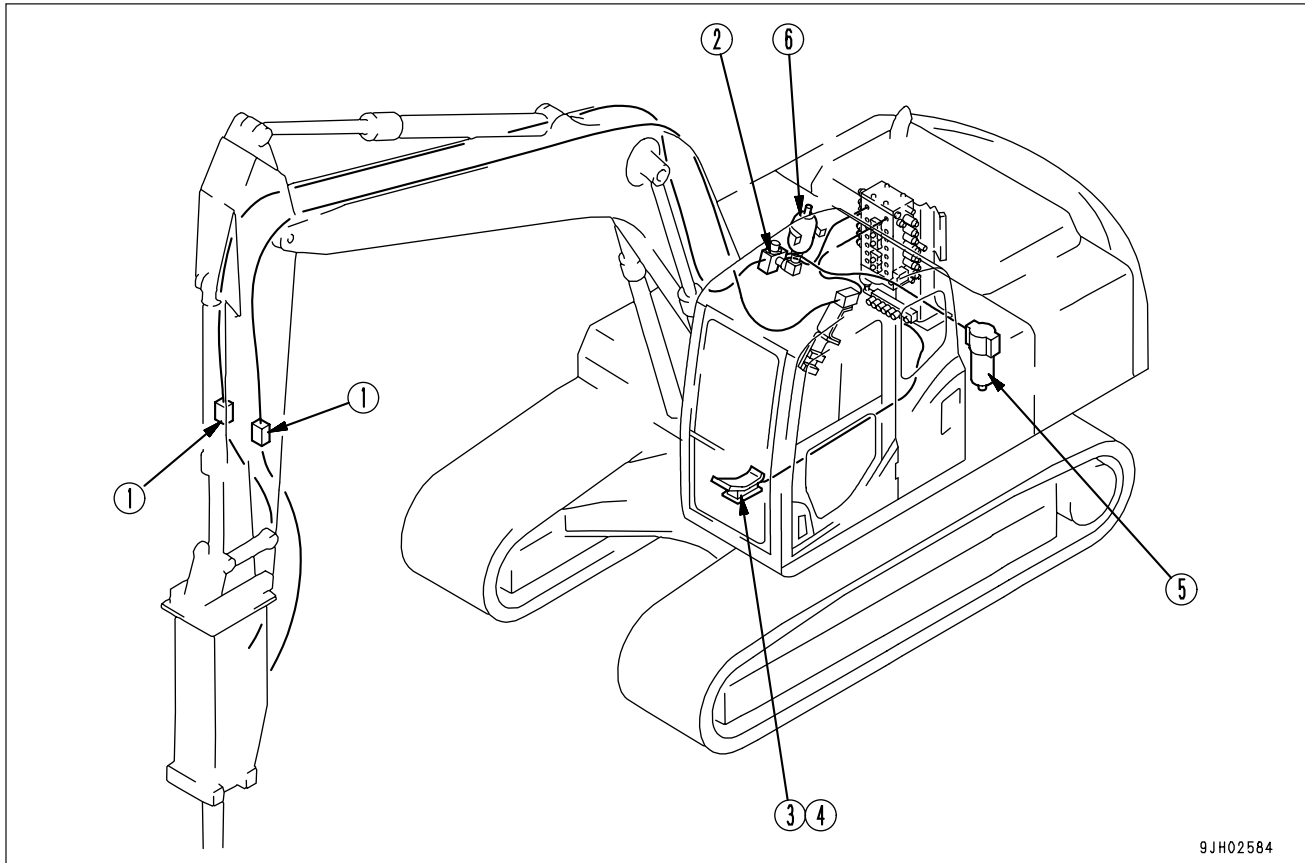
- Never steer the machine while lifting a load.
- If the bucket with hook is turned and used for operations, it will hit the arm during dumping operations, so be careful when using it.



- If you are planning to install a hook, contact your Komatsu distributor.

# MACHINES READY FOR ATTACHMENTS

## EXPLANATION OF COMPONENTS



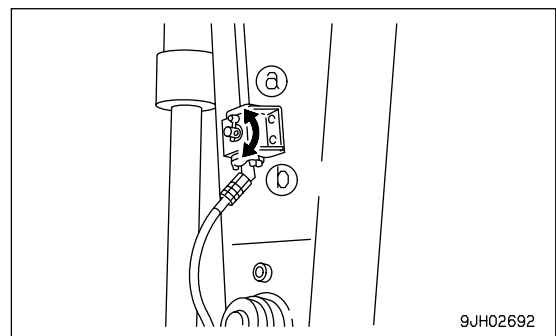
- (1) Stop valve
- (2) Selector valve
- (3) Attachment control pedal
- (4) Lock pin
- (5) Additional filter for breaker
- (6) Accumulator

## STOP VALVE

This valve (1) stops the flow of the hydraulic oil.

- (a) FREE: Hydraulic oil flows
- (b) LOCK: Hydraulic oil stops

Set this valve to the LOCK position when removing or installing attachments.





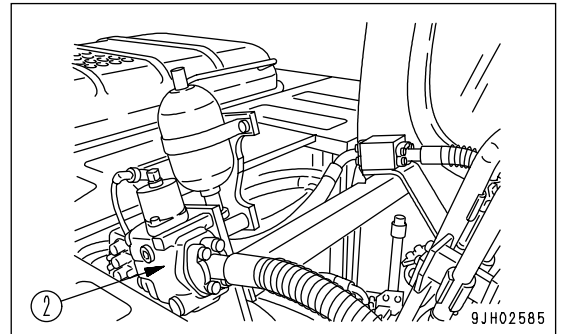
## SELECTOR VALVE

This valve (2) switches the flow of hydraulic oil.

It is automatically switched according to the selected working mode. It is necessary to switch the working mode to match the attachment that is installed. For details of switching the working mode, see "HYDRAULIC CIRCUIT (PAGE 6-9)".

### NOTICE

**If a service circuit from the attachment maker has been added, the return circuit may not switch automatically.**



## ATTACHMENT CONTROL PEDAL

This pedal (3) is used to control the attachment.

When the front, center (neutral), and rear of the pedal are depressed, the movement of the attachment is as follows.

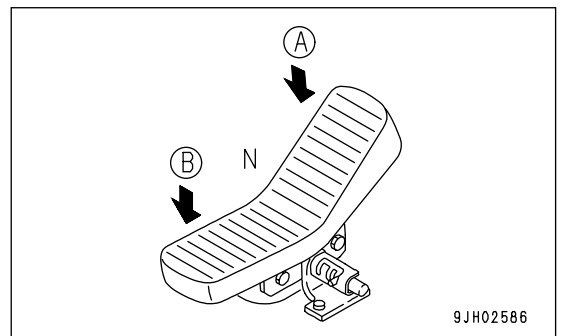
### Hydraulic breaker

Front of pedal (A) : Actuated

Center of pedal N : Stopped

Rear of pedal (B) : Stopped

Regarding other attachments, hold a meeting with the attachment maker at the time of installation to confirm the operation of the pedal and attachment before using it.



### REMARK

This pedal cover (3) differs in thickness at both ends. It can be stalled facing in either direction, so install it according to your own preference.

## LOCK PIN

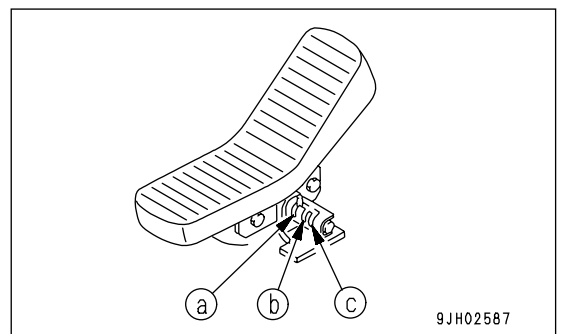
This pin (4) locks the control pedal.

Position (a) : Locked

Position (b) : Only front of pedal can be operated to full position (rear is locked)

Position (c) : Both front and rear of pedal can be operated to full position

- When using a breaker, select B mode on the monitor and set the lock pin to position (b).  
When not using the attachment, set the lock pin to position (a).
- When using a breaker, select A or E mode on the monitor and set the lock pin to position (c).



### NOTICE

**When using a breaker, if the lock pin is set to position (c) and the rear portion (B) of the pedal is depressed, it will cause defective operation or breakage of the breaker, so always set the lock pin to position (b) when using the breaker.**

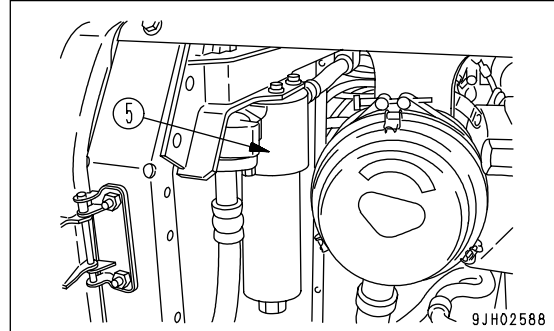
## ADDITIONAL FILTER FOR BREAKER

This filter (5) prevents deterioration of the hydraulic oil when using a breaker.

Oil only flows when B mode is selected on the monitor.

### NOTICE

**Always install an additional filter in the return circuit on machines equipped with a hydraulic breaker.**



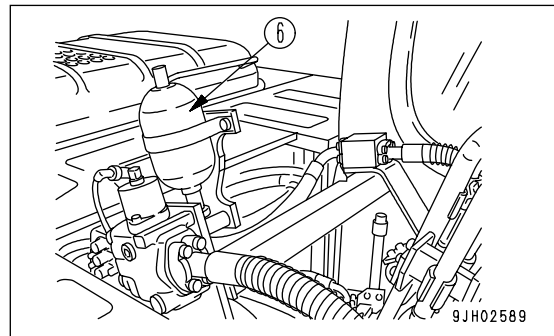
## ACCUMULATOR

### WARNING

The accumulator is charged with high-pressure nitrogen gas, so it is extremely dangerous if it is handled incorrectly.

For details of handling, see “HANDLING ACCUMULATOR (PAGE 3-56)”.

This accumulator (6) is installed to reduce the peak pressure in the hydraulic circuit when a breaker is used. Normally, do not touch it.



### NOTICE

The need to install an accumulator depends on the breaker manufacturer. When installing a breaker made by another manufacturer, please consult your Komatsu distributor.

Depending on the breaker manufacturer, it may be necessary to install the accumulator at the inlet or outlet port of the breaker.

## HYDRAULIC CIRCUIT

### NOTICE

- When a breaker is installed, it is necessary to connect the return circuit directly to the return filter, so use only B mode. Do not use any other mode.
- The standard set pressure of the service valve safety valve depends on the mode selected when the machine is shipped from the factory.  
If B mode is selected: 20.6 MPa (210 kgf/cm<sup>2</sup>, 2980 PSI)  
If A or E mode is selected: 27.4 MPa (280 kgf/cm<sup>2</sup>, 3980 PSI)  
Adjustment may be needed depending on the attachment, so in such a case, please contact your Komatsu distributor.

## SWITCHING HYDRAULIC CIRCUIT

- Depending on the type of attachment, set the working mode on the monitor as follows.
- The set pressure of the service valve safety valve and the hydraulic circuit switch is according to the working mode selected.

Attachment	Working mode	Hydraulic circuit	Set pressure of service safety valve
Breaker or other attachment with one-way circuit	B mode	Return circuit automatically switched so that it does not pass through control valve	When shipped from factory : 20.6 MPa (210 kgf/cm <sup>2</sup> , 2980 PSI)
Crusher or other attachment with two-way circuit	A mode or E mode	Return circuit automatically switched so that it passes through control valve	When shipped from factory : 27.4 MPa (280 kgf/cm <sup>2</sup> , 3980 PSI)

## ADJUSTING OIL FLOW

Depending on the attachment, it is necessary to change the oil flow in the service circuit.

For details of setting the oil flow, see "OPERATION (PAGE 6-15)".

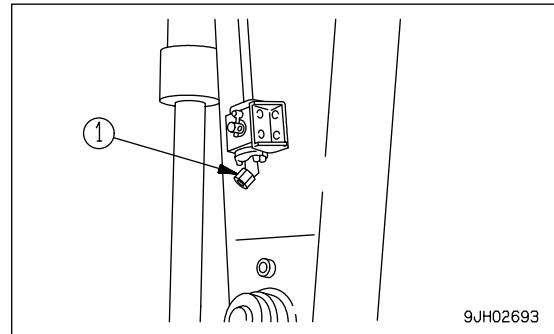
## SWITCHING BETWEEN BREAKER AND GENERAL ATTACHMENT

- When a possible attachment (if equipped) is installed and B mode is selected:
  - 1) The circuit becomes a circuit for breaker operation (1-way circuit).
  - 2) The hydraulic oil flowing in the breaker circuit flows to the additional filter for the breaker.
  - 3) The relief valve is set to a lower pressure.  
When shipped from factory: 20.6 MPa (210 kgf/cm<sup>2</sup>, 2980 PSI)
  - 4) It is possible to adjust the maximum flow with the select mode.
- When a possible attachment (if equipped) is installed and A mode or E mode is selected:
  - 1) The circuit becomes a circuit for crusher operation (2-way circuit).
  - 2) The hydraulic oil flowing in the crusher circuit does not flow to the additional filter for the breaker.
  - 3) The relief valve is set to a higher pressure.  
When shipped from factory: 27.4 MPa (280 kgf/cm<sup>2</sup>, 3980 PSI)
  - 4) It is possible to adjust the maximum flow with the select mode.

## HYDRAULIC CIRCUIT CONNECTION

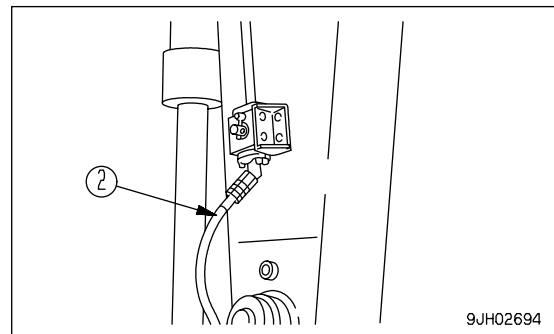
When connecting the attachment, connect the hydraulic circuit as follows.

1. Remove blind plugs (1) at the end of the stop valve piping. (Two spots on the left and right) Be careful not to lose or damage any part that has been removed.



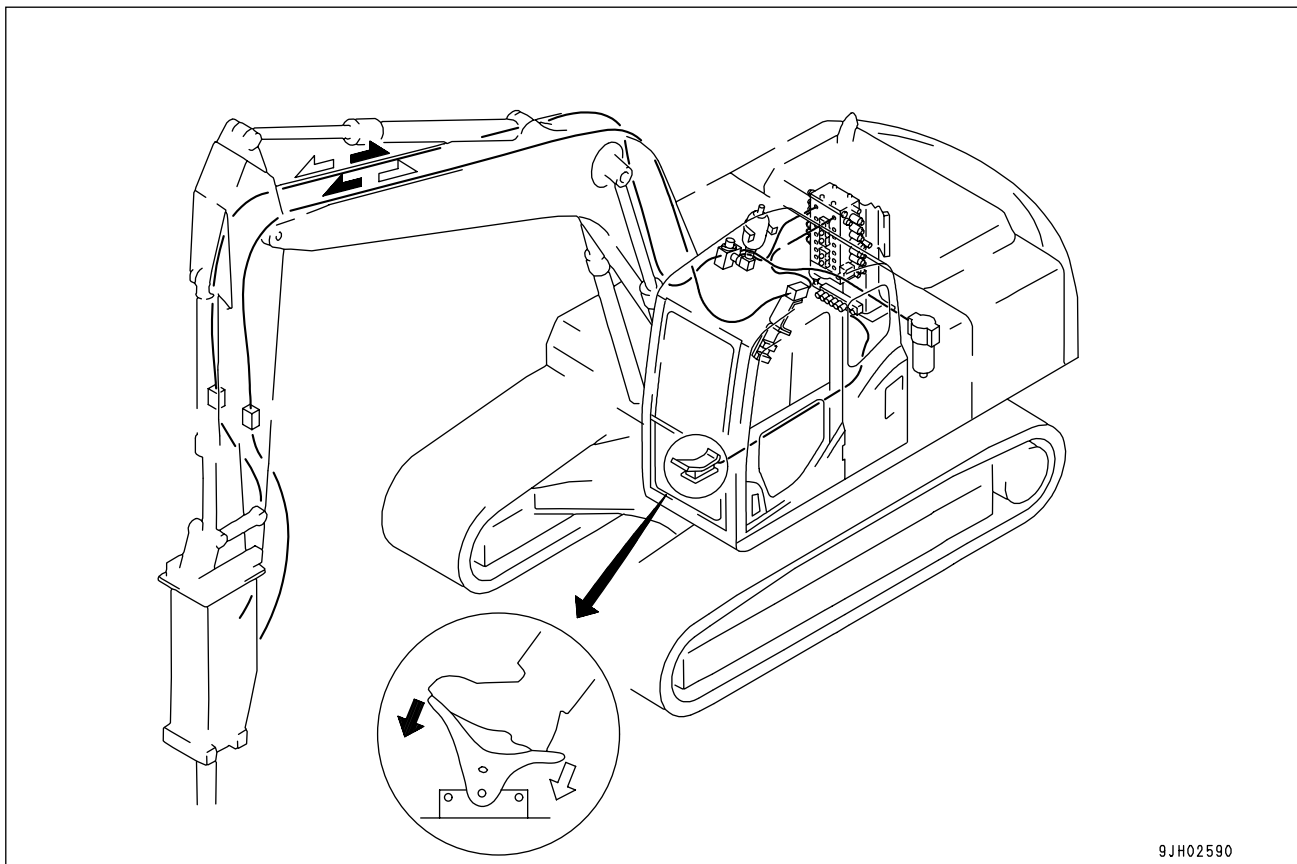
2. Connect attachment piping (2) provided by the attachment manufacturer to the hole for the plug removed in Step 1.

For the mouthpiece size and accumulator add-on, the action to take differs according to the attachment manufacturer, so please consult your Komatsu distributor.



### PATH OF OIL

The direction of operation of the pedal and the path of the oil are as shown in the diagram below.



When the front of the pedal is depressed, oil flows to the piping on the left side of the work equipment; when the rear of the pedal is depressed, oil flows to the piping on the right side of the work equipment. (When a breaker is installed, only the front of the pedal can be used.)

## REPLACE ADDITIONAL BREAKER FILTER ELEMENT

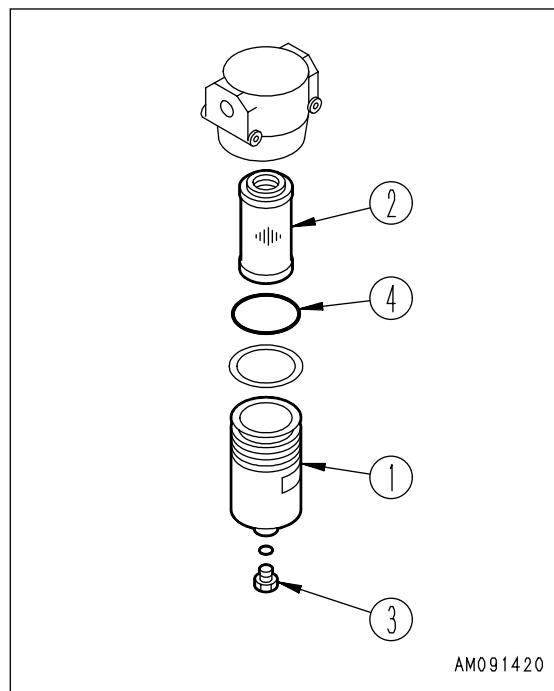
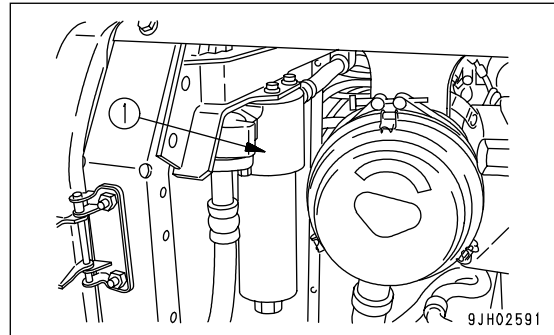
### WARNING

Immediately after operating the engine, all parts still retain high temperature. Never replace the filter in such condition. Replace it only after each part has sufficiently cooled.

- Prepare a container for draining off oil.
  1. Place the container under the filter element.
  2. Turn filter case (1) counterclockwise to remove it. Remove element (2) from the case.
  3. Unscrew plug (3) from filter case (1).
  4. Clean the removed parts. Mount a new element (2) and O-ring (4).
  5. After the case reaches the filter holder, additionally tighten the case by more than a 1/2 turn.

### NOTICE

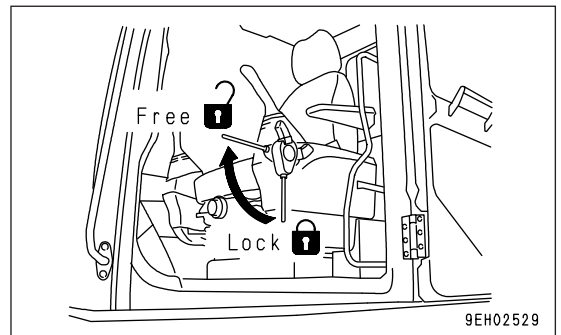
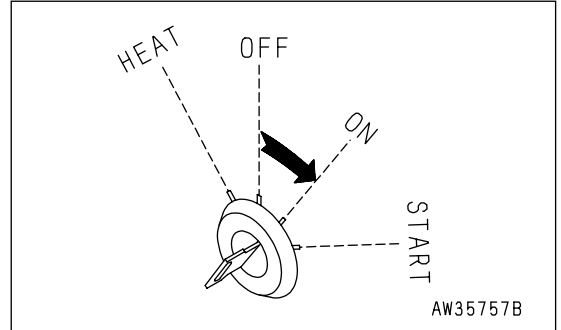
For the element replacement interval, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-19)".



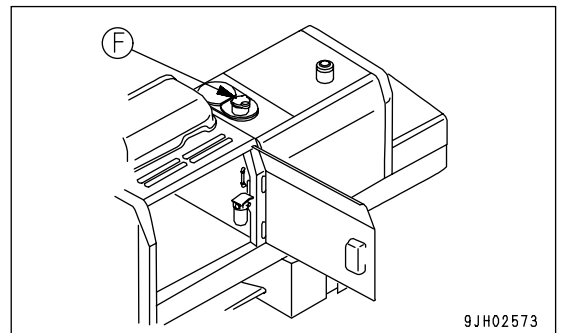
# ATTACHMENT MOUNTING/DISMOUNTING PROCEDURE

## DISMOUNTING PROCEDURE

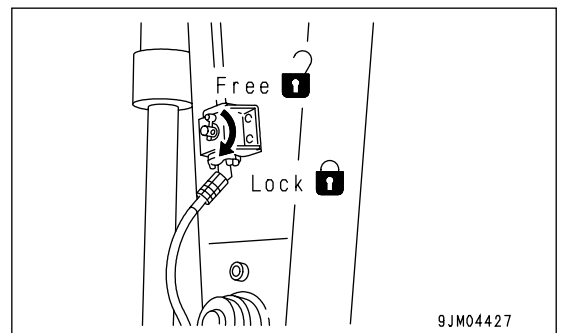
1. Place the attachment on the ground and stop the engine.
2. Turn the starting switch to ON position and push down the safety lock lever to FREE position.
3. Operate each work equipment control lever and the attachment control pedal back and forth, left and right at full stroke 2 to 3 times to eliminate the internal pressure in the hydraulic circuit.



4. Loosen slowly oil filler cap (F) on top of the hydraulic tank to eliminate the internal pressure in the hydraulic circuit.

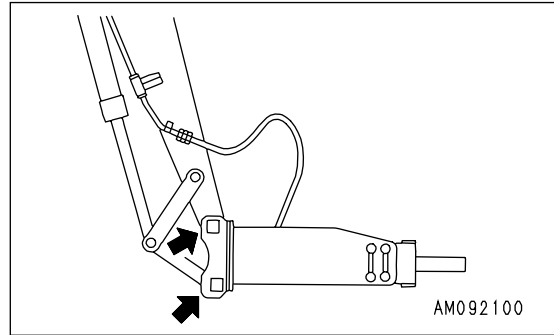


5. After confirming low oil temperature, turn the rotor of the stop valve connected to the inlet and outlet piping on the arm side face toward the lock side.
6. Remove the hoses on the attachment side. Install the blind plugs to the two outlets.



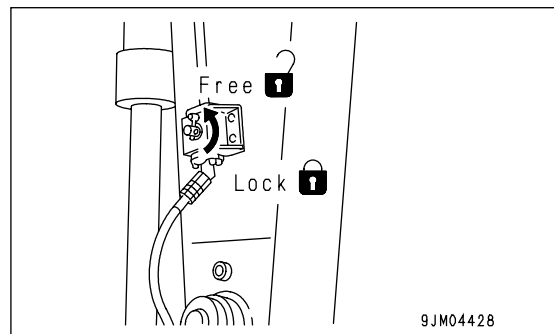
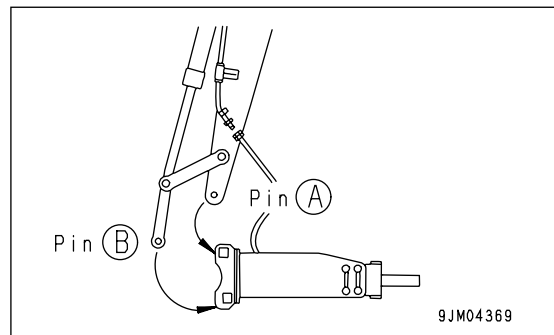
The blind plugs are used to prevent the attachment from incorrect operation caused by mixing in of foreign matter. After the plugs are correctly installed, store the attachment.

7. Dismount the attachment by removing the retaining pins (2 pins). Then, mount the bucket.  
For the bucket mounting procedure, see "REPLACEMENT AND INVERSION OF BUCKET (PAGE 3-99)".
8. After the bucket is mounted, check the hydraulic oil level.



**MOUNTING PROCEDURE**

1. Remove the bucket.  
For bucket dismounting procedure, see "REPLACEMENT AND INVERSION OF BUCKET (PAGE 3-99)".
2. Place the attachment on a flat place, install pins (A) and (B) to the arm in that order.
3. After confirming low oil temperature, remove the blind plug from the outlet and inlet port respectively.  
Take care that no dust, mud etc. adheres to the hose mousepiece portions.  
If O-ring is damaged, replace it with a new one.
4. Connect the hose at the attachment side.  
When doing this, check the direction of flow of the oil and be careful not to make any mistake.
5. Turn the rotor of the stop valve connected to the inlet and outlet piping on the arm side face toward the free side.
6. Confirm that oil level in the hydraulic oil tank is correct, after mounting the attachment.





# OPERATION

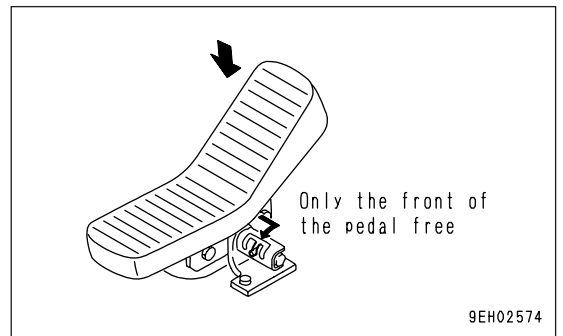
## ⚠ WARNING

- Do not rest the foot on the pedal and depress it, when the auto deceleration switch is in ON position. The engine speed rises all of sudden and the attachment will move suddenly and cause serious damage or injury.
- Do not put your foot on the pedal except when operating the pedal. If rest your foot on the pedal during operations, and it is depressed by accident, the attachment may move suddenly and cause serious damage or injury.

The operation of the attachment is as follows.

### WHEN USING BREAKER

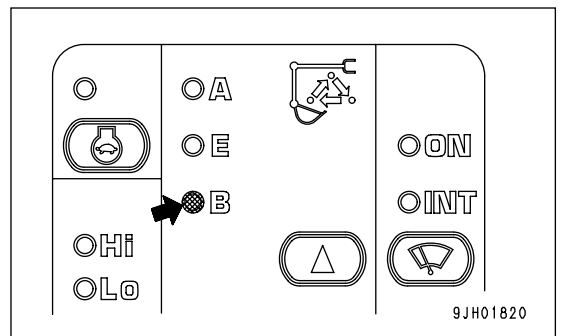
When the B mode control switch is ON and the lock pin position makes only the front of the pedal free, if the front of the pedal is depressed, the breaker is actuated.



Check that the operation mode selector is at the position of B Mode.

#### Precautions when using

- Check that the stop valve is at the FREE position.
- Check of the selector valve is installed to the breaker position.  
For details of the path of the oil, See "HYDRAULIC CIRCUIT (PAGE 6-9)".
- Consult with the attachment manufacturer as to whether the accumulator is required for the attachment circuit or not.
- For other precautions when using the breaker, see the instruction manual provided by the breaker manufacturer.
- When the breaker is used, the hydraulic oil degrades faster than in normal operation. Shorten the maintenance interval of the hydraulic oil and filter element.  
See "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-19)".



**WHEN USING GENERAL ATTACHMENT SUCH AS CRUSHER**

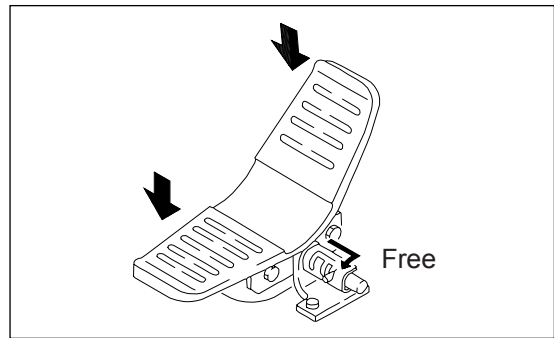
Set the lock pin to FREE position and depress the pedal forward or backward to operate the attachments.

**Precautions when using**

- Check that the stop valve is at the FREE position.
- Confirm that the selector valve is set to the position for general attachments such as the crusher.

For details of the oil path, see "HYDRAULIC CIRCUIT (PAGE 6-9)".

- For other precautions when using the attachment, see the instruction manual provided by the attachment manufacturer.



## LONG-TERM STORAGE

If the equipment is not to be used for a long period, do as follows.

- Set the stop valve to the LOCK position.
- Install the blind plugs and O-rings to the valves.
- Set the selector valve to the "when not use" position.
- Lock the lock pin to the lock position.

If the pedal is operated when there is no breaker or general attachment installed, it will cause overheating and other problems.

## SPECIFICATIONS

### Hydraulic specifications

- Max. merging oil flow 214×2 liters / min
- Safety valve of service valve Relief setting pressure 27.47MPa (280kgf / cm<sup>2</sup>) (except B mode)
- Safety valve of service valve Cracking pressure 24.53MPa (250kgf / cm<sup>2</sup>) (except B mode)
- Safety valve of service valve Relief setting pressure 20.60MPa (210kgf / cm<sup>2</sup>) (B mode)
- Safety valve of service valve Cracking pressure 15.21MPa (155kgf / cm<sup>2</sup>) (B mode)

In addition to the valves listed above, a safety valve with relief setting pressure of 24.53 MPa (250kgf / cm<sup>2</sup>) and a safety valve with cracking pressure of 20.11 MPa (205 kgf / cm<sup>2</sup>) are available. Consult the Komatsu distributor in the territory.

# ATTACHMENT GUIDE

## WARNING

- Please read the instruction manual for the attachment and the sections of this manual related to attachments and options.
- When installing any attachment or option, there may be problems with safety, so please contact your Komatsu distributor before installing.
- Installing attachments or options without consulting your Komatsu distributor may not only cause problems with safety, but may also have an adverse effect on the operation of the machine and the life of the equipment.
- Any injuries, accidents, or damage resulting from the use of unauthorized attachments or options will not be the responsibility of Komatsu.

## COMBINATIONS OF WORK EQUIPMENT

### WARNING

Depending on the type or combination of work equipment, there is danger that the work equipment may hit the cab or machine body.

When using unfamiliar work equipment for the first time, check before starting if there is any danger of interference, and operate with caution.

### PC200,220

This table lists the combination of attachments which can be installed to the long arm (standard), short arm and extension arm.

- : Can be used
- △ : Can be used only for light-duty work
- × : Cannot be used

### NOTICE

- When the extension arm is equipped, if the bucket is drawn to the machine body, the arm interferes with the body. Operate the extension arm carefully.
- When the boom is fully lowered during oblique digging, the boom interferes with the undercarriage. Operate the boom carefully.

### Categories of use

- For general digging : Digging or loading sand, gravel, clay etc.
- For light duty digging : Digging or loading dry, uncaked earth and sand, mud etc.
- For loading work : Loading dry, loose earth and sand

- For digging or loading hard soil or soft rock, it is recommended that the strengthened bucket with high durability and high wear resistance be employed.

\*: Equipped with side cutter

Name of bucket	Capacity (m <sup>3</sup> ) SAE (CECE)	Outside width (mm)	Use	Standard arm (2.9 m)	Short arm (2.4 m)	Short arm (1.8 m)	Extension arm (1.1 m)
* Narrow bucket	0.50 (0.45)	750 (30")	Narrow digging	○	○	○	○
* Narrow bucket	0.60 (0.55)	970 (38")	Narrow digging	○	○	○	×
* Standard bucket	0.8 (0.7)	1150 (45")	General digging	○	○	○	×
* Light duty bucket	0.9 (0.8)	1200 (47")	Loading	△	△	△	×
Light duty bucket	1.0 (0.9)	1330 (52")	Loading	×	△	△	×
Light duty bucket	1.17 (1.0)	1450 (57")	Loading	×	△	△	×
Slope finishing bucket	0.40 (0.35)	–	Slope finishing	○	○	○	×
Trapezoidal bucket (Variable slope type)	0.55 (0.5)	–	Trapezoidal shaped ditching	○	○	○	×
Ripper bucket	0.61 (0.56)	950 (37")	Digging rocks	×	○	○	×
Clamshell bucket	0.66 (0.6)	866 (34")	Ditching, loading	○	○	○	×
Ditch cleaning bucket	0.8 (0.7)	1800 (71")	Ditching, cleaning	○	○	○	×
One tooth ripper	–	–	Digging, removing rocks	○	○	○	×
Three teeth ripper	–	–	Digging, removing rocks	○	○	○	×

**PC220,220LC**

For trimming of a slope and rolling compaction.

○ : available

△ : available only for light-duty work

× : not available

**NOTICE**

**When the boom is fully lowered during oblique digging, the boom interferes with the undercarriage. Operate the boom carefully.**

## Categories of use

For general digging : Digging or loading sand, gravel, clay etc.

For light duty digging : Digging or loading dry, uncaked earth and sand, mud etc.

For loading work : Loading dry, loose earth and sand

- For digging or loading hard soil or soft rock, it is recommended that the strengthened bucket with high durability and high wear resistance be employed.

\*: Equipped with side cutter. \*1 is available only during loading operation.

Name of bucket	Capacity (m <sup>3</sup> ) SAE (CECE)	Outside width (mm)	Use	Standard arm (3.0 m)	Long arm (3.5 m)	Short arm (2.5 m)	Short arm (2.0 m)
*Narrow bucket	0.72 (0.65)	900 (35")	Narrow digging	○	○	○	○
*Standard bucket	1.0 (0.9)	1260 (50")	General digging	○	△ *1	○	○
*Light duty bucket	1.17 (1.0)	1300 (51")	Light duty digging	△	×	△	△
Light duty bucket	1.26 (1.1)	1400 (55")	Loading	△	×	△	△
Slope finishing bucket	0.40 (0.35)	—	For trimming of a slope and rolling compaction	○	○	○	○
Trapezoidal bucket (Variable slope type)	0.55 (0.5)	—	Trapezoidal shaped ditching	○	○	○	○
Ripper bucket	0.61 (0.56)	950 (37")	Digging rocks	○	○	○	○
Clamshell bucket	0.66 (0.6)	866 (34")	Ditching, loading	○	○	○	○
Ditch cleaning bucket	0.8 (0.7)	1800 (71")	Ditching, cleaning	○	○	○	○
One tooth ripper	—	—	Digging, removing rocks	○	×	○	○
Three teeth ripper	—	—	Digging, removing rocks	○	×	○	○

## SELECTION OF TRACK SHOES

Select suitable track shoes to match the operating conditions.

### METHOD OF SELECTING SHOES

Confirm the category from the list of uses in Table 1, then use Table 2 to select the shoe.

Categories B and C are wide shoes, so there are limitations on their use. When using these shoes, check the precautions, then investigate and study fully the conditions of use to confirm that these shoes are suitable.

When selecting the shoe width, select the narrowest shoe possible that will give the required flotation and ground pressure. If a wider shoe than necessary is used, the load on the track will increase, and this will cause the shoes to bend, links to crack, pins to break, shoe bolts to come loose, and various other problems.

**Table 1**

Category	Use	Precautions when using
A	Rocky ground, riverbeds, normal soil	<ul style="list-style-type: none"> <li>On rough ground with large obstacles such as boulders or fallen trees, travel at low speed.</li> </ul>
B	Normal soil, soft ground	<ul style="list-style-type: none"> <li>These shoes cannot be used on rough ground where there are large obstacles such as boulders or fallen trees.</li> <li>Travel at Hi or Mi speed only on flat ground, and if it is impossible to avoid going over obstacles, shift down and travel at half speed in Lo.</li> </ul>
C	Extremely soft ground (swampy ground)	<ul style="list-style-type: none"> <li>Use the shoes only in places where the machine sinks and it is impossible to use A or B shoes.</li> <li>These shoes cannot be used on rough ground where there are large obstacles such as boulders or fallen trees.</li> <li>Travel at Hi or Mi speed only on flat ground, and if it is impossible to avoid going over obstacles, shift down and travel at half speed in Lo.</li> </ul>
D	Paved road	<ul style="list-style-type: none"> <li>Take note of low gradeability due to the flat shoes and exercise a due care.</li> </ul>
E	Paved road	<ul style="list-style-type: none"> <li>Be sure to follow the instructions set forth in the "Handling of Road Liner" section for the protection of the rubber pad shoes.</li> </ul>

**Table 2**

	PC200, 220-7		PC200LC, 220LC-7	
	Specifications	Category	Specifications	Category
Standard	600mm Triple	A	700mm Triple	B
Option	600mm Road Liner (Rubber pat type)	E	600mm Road Liner (Rubber pat type)	E
Option	610mm Flat	D	610mm Flat	D
Option	700mm Triple	B	600mm Triple	A
Option	800mm Triple	C	800mm Triple	C
Option	860mm Swamp	C	860mm Swamp	C

## SELECTION OF BUCKET TEETH

Depending on the working conditions, there is danger that an adapter and teeth may break, so select from the vertical pin and horizontal pin teeth to give teeth that are suitable for the purpose.

While the standard teeth of both vertical and horizontal pin types may be used widely, the following kinds of teeth are recommended depending on the working conditions.

### METHOD OF SELECTING TEETH

#### Use of vertical pin teeth

General digging: Digging and loading normal soil, such as sand, gravel, clay, etc.

Light-duty digging: digging and loading dry and loose sandy soil, or muddy soil

Loading: loading of dry and loose earth

#### Use of horizontal pin teeth

Heavy-duty digging: digging hard soil, soil with rocks involving hammering work, scraping and the like

- The heavy-duty bucket is of a horizontal pin type and as such, use it for heavy duty-digging.

#### Use of long-life teeth

- Jobsites where long wear life is demanded, such as when loading hard rocks.
- jobsites where no penetration is needed, such as when working with crushed rocks after blasting or ripping
- Jobsites where heavy-duty operations are carried out, such as hitting or pulling up rocks with the tips of the teeth

#### Self-sharpening teeth (both vertical pin type and horizontal pin type)

- Jobsites demanding penetration such as digging and loading sandy or clayey soil

## STANDARDS FOR SELECTING VERTICAL PIN TYPE AND HORIZONTAL PIN TYPE TEETH

		Applicable Work Site			
		Rock	Crushed stone	Clayey soil, Decompressed weathered granite	Sand
Work Contents	Heavy ↑	Digging with hammering work	Horizontal pin type teeth		Horizontal pin type teeth Vertical pin type teeth
		Scraping down	Horizontal pin type teeth		Horizontal pin type teeth Vertical pin type teeth
	↓ Light	General excavation	Horizontal pin type teeth Vertical pin type teeth		
		Loading	Horizontal pin type teeth Vertical pin type teeth		



## HANDLING OF RUBBER PAD SHOE AND ROAD LINER

Be sure to observe the following instructions, when using a machine equipped with rubber pad shoes or Road Liner.

### WORKING ENVIRONMENT

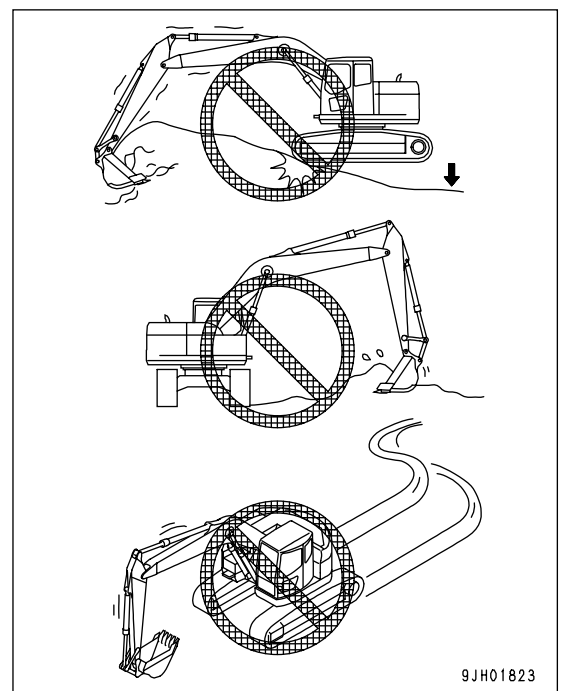
- Use a machine equipped with rubber pad shoes or Road Liner mainly for jobs on the paved roads. If used otherwise, breakage or chipping will occur on the rubber and the service life will be considerably reduced. Particularly the following jobsites must be avoided.
  - Jobsite strewn with crushed concrete or on sand
  - Jobsite with protruding edged objects like steel bar, glass and the like
  - Jobsite on rocky terrain or in a river with many rocks

A ride over a concrete road shoulder or above all the tip of sheet piles driven into the ground must be avoided.

- Be careful of machine skidding on the road covered with water, ice, snow or gravel. Pay special attention when unloading a machine from a truck.
- Use a machine equipped with rubber pad shoes or Road Liner in the ambient temperature range of  $-25^{\circ}\text{C}$  -  $65^{\circ}\text{C}$  due to the properties of rubber.

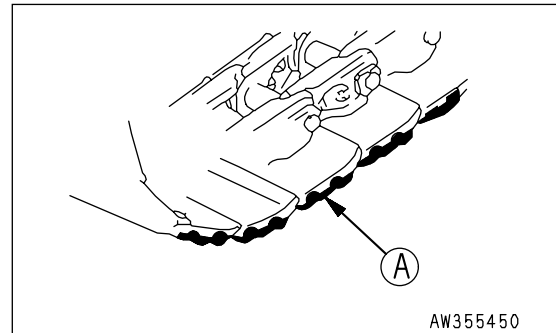
### WORKING CONDITIONS

- A job using the undercarriage as a fulcrum, side digging job, digging job on a slope and a job requiring frequent steering, as shown in the picture, cause an excessive load on the rubber and there is danger that it may be damaged.
- Durability of rubber pad shoes may not be covered with warranty, if a special work equipment is mounted.



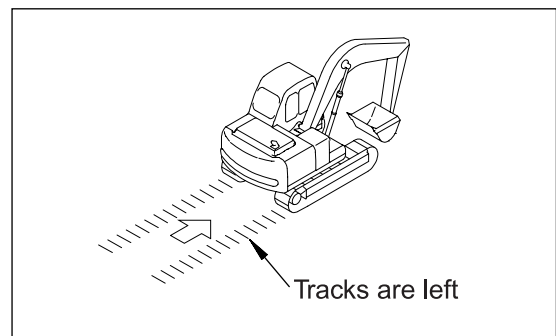
## STORAGE AND MAINTENANCE

- Take care that no oil or grease sticks to the rubber. If it does, wipe it off immediately.
- Install rubber pad shoes and Road Liner (A) corresponding to the number of the links. If there is any missing pad or liner, the rubber will be greatly deformed and damaged.
- If rubber pad shoes or Road Liner (A) has to be stored for a long period, keep it indoors to avoid direct sunlight and rain.



## EXTENT OF DAMAGE TO RUBBER

- When traveling on a concrete pavement, rubber may stick to the road surface, leaving a dark track behind. It is the time for replacement.



- The rubber is still usable, even if it does not look in good shape with part of the rubber chipped or cuts developed on the surface, so long as damage has not developed all over the shoe or it does not damage a road surface.

## CHECK ROAD LINER (MACHINES EQUIPPED WITH ROAD LINER)

If the road liner are in the following condition, they must be repaired or replaced, so please contact your Komatsu distributor for repair or replacement.

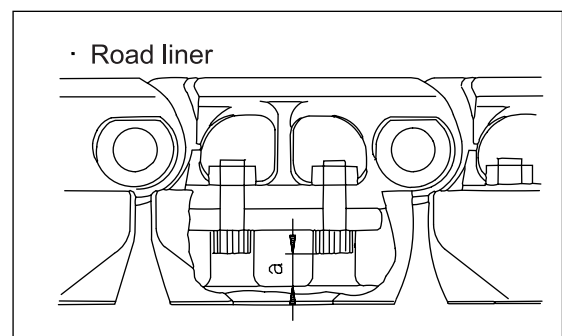
### Height of lug

- If lug height "a" is reduced by wear, the drawbar pull will drop. If "a" is less than 5 mm (0.2 in), replace with a new part.

When making judgement whether to replace, repair, or continue using road liner, please contact your Komatsu distributor.

### Replace road liner

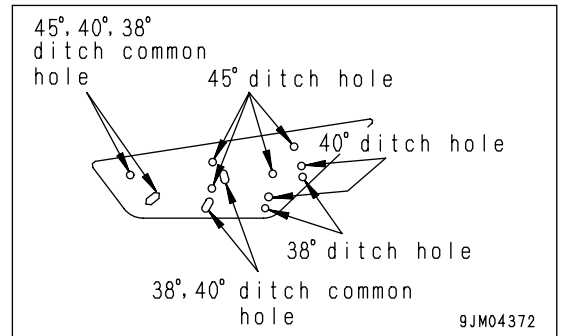
- When all the road liners of the machine need to be replaced, ask your Komatsu distributor to replace them.
- When only some of the road liners need to be replaced, replace them by using the road liner replacing tools. Order the tools from your Komatsu distributor.



## HANDLING TRAPEZOIDAL BUCKET

This bucket is used to dig trapezoidal ditches in paddy fields, farmland etc. and it can dig 3 types of ditch gradients (45°, 40° and 38°) when a movable plate is attached.

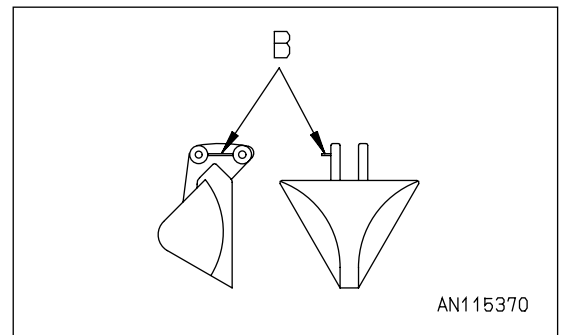
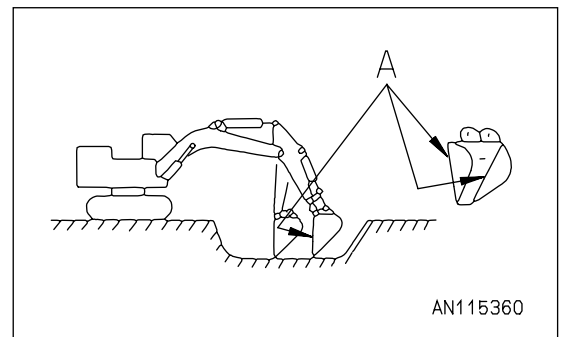
- The mounting position of the movable plate varies depending on whether the ditch gradient is 45°, 40° or 38°.



## HOW TO PERFORM EXCAVATION

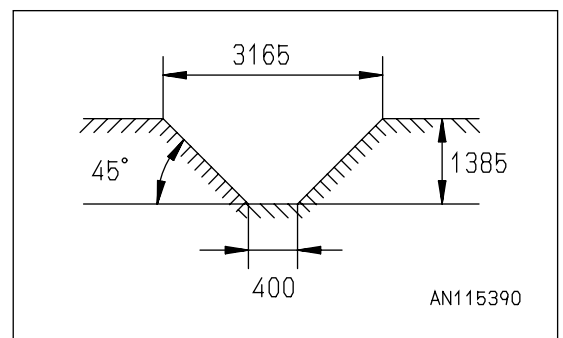
Operate the boom, the arm and the bucket to make the line (A) of the side-plate of the bucket vertical.

The guide plate (B) to check this position is installed beside the bucket pins. Accordingly, hold this plate horizontal when digging.



### Ditch gradient of 45°

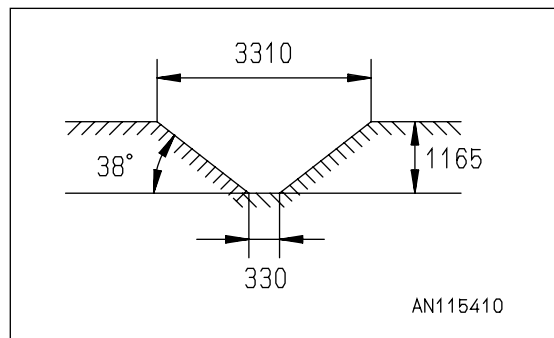
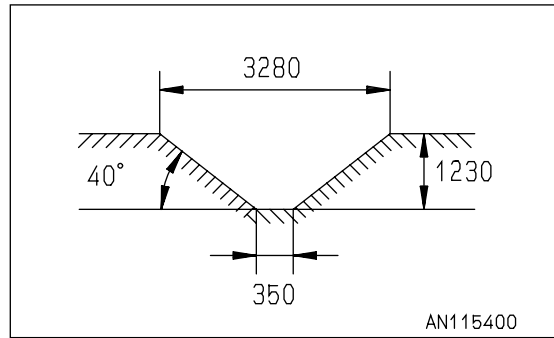
Attach the bucket only or the movable plate by selecting the related ditch holes. Perform digging by the above method.



### Ditch gradient of 40° and 38°

Attach the movable plate by selecting the related ditch holes. Perform digging according to the above method.

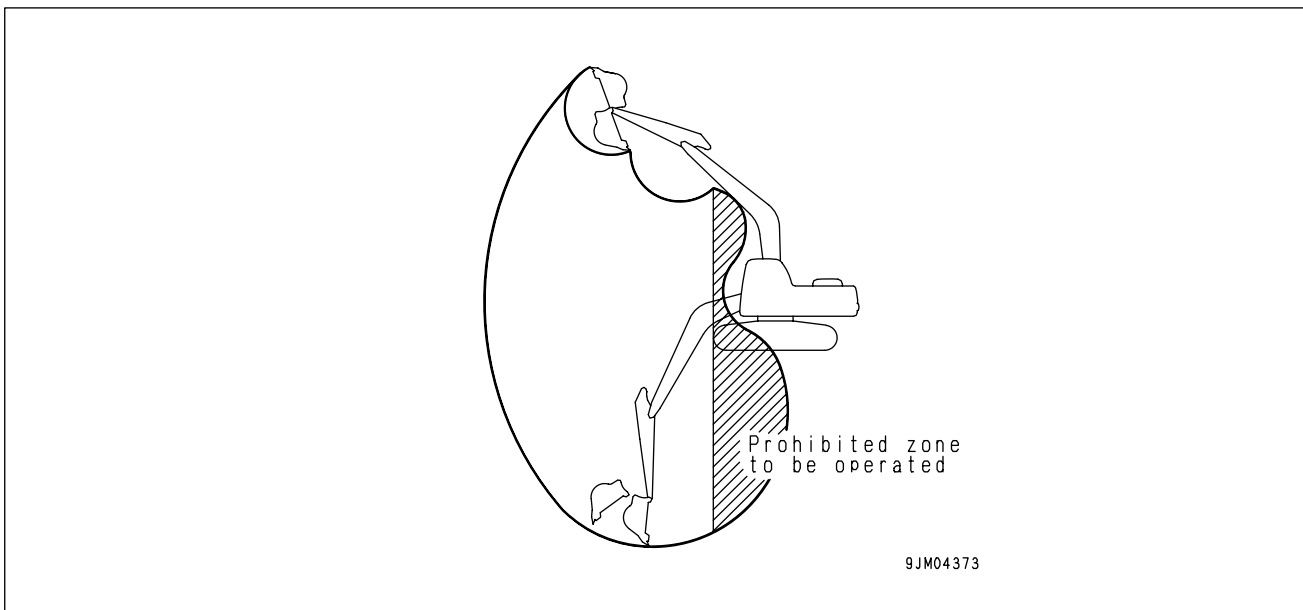
Even if the trapezoidal bucket is provided with the movable plate, always perform digging with the bucket side face perpendicular to the ground.



### HANDLING EXTENSION ARM

When the extension arm is equipped, if the arm is retracted, the bucket interferes with the boom cylinder foot and the revolution frame. Be careful at operation and transportation.

- When the extension arm is equipped, use the narrow bucket (bucket width:750 mm (30")and 560 mm (22")) without the side cutter. Since the standard bucket causes body instability and the bucket interferes with the operator's cab when retracting the arm, do not mount the standard bucket.
- Work in hard soil or rocky terrain will shorten the life of the extension arm, the boom and the arm. It is better not to use the extension arm in such conditions.



## HANDLING CLAMSHELL BUCKET

This bucket is used for digging and loading in side-ditches or the confined spaces.

### How to perform excavation

This clamshell digs by pushing the boom against the ground.

However, when perform bucket operation, perform digging while gradually raising the boom.

If the clamshell bucket rotates, relieve the bucket cylinder pressure then set the lever to the neutral position. This can temporarily stop the rotation.

### PRECAUTIONS WHEN USING

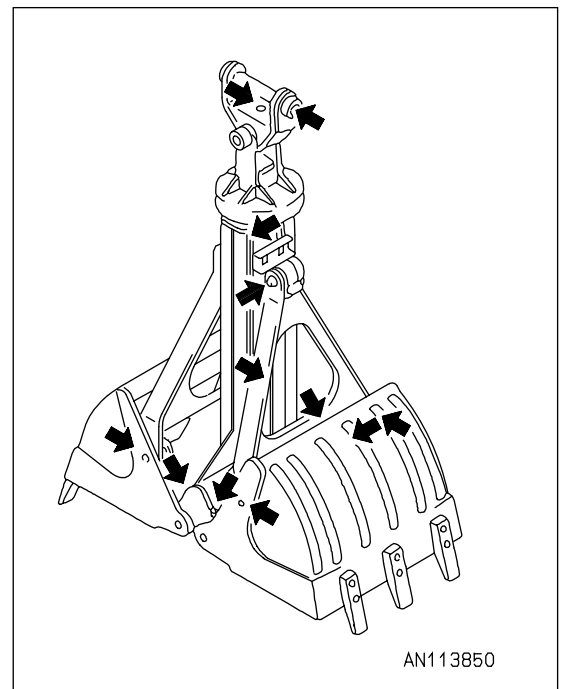
- For safety, always avoid abrupt traveling, swing and stopping.
- Make the teeth of the bucket vertical in digging.
- Do not swing the bucket to crush the rock or to cut through soil.
- Do not use the bucket for hammering or pulling out piles etc.
- Before leaving the machine, open the bucket and lower it to the ground.

### REMARK

Remove the bucket from the arm when transporting the machine.

### LUBRICATING

- Prepare a grease pump.
1. Stop the machine on firm horizontal ground, lower the work equipment to the ground, then stop the engine.
  2. Using a grease pump, pump in grease through grease fittings (12 points) shown by arrows.
  3. After greasing, wipe off any old grease that was pushed out.



# RECOMMENDED ATTACHMENT OPERATIONS

This section describes the necessary precautions to be observed when operating a hydraulic excavator equipped with an attachment.

## NOTICE

Select the attachment most suited to the machine body.

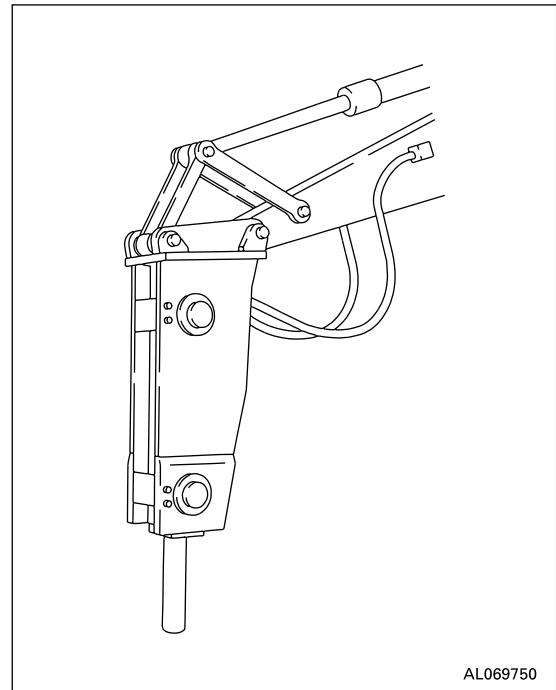
- The machine models to which attachments can be mounted vary. For selection of attachment and machine model, consult your Komatsu distributor.

## HYDRAULIC BREAKER

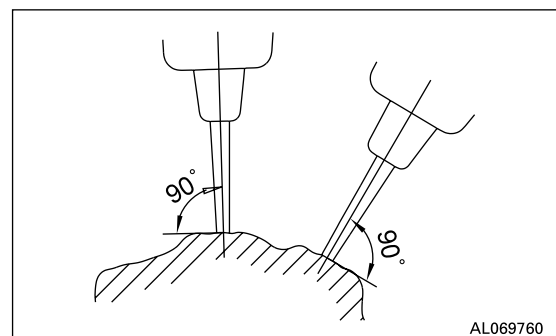
### MAIN APPLICATIONS

- Crushed rock
- Demolition work
- Road construction

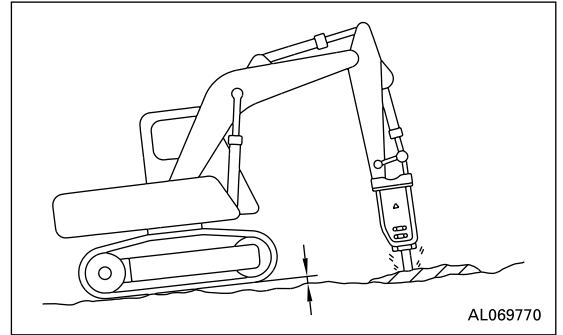
This attachment can be used for a wide range of work including demolition of buildings, breaking up of road surfaces, tunnel work, breaking up slag, rock crushing, and breaking operations in quarries.



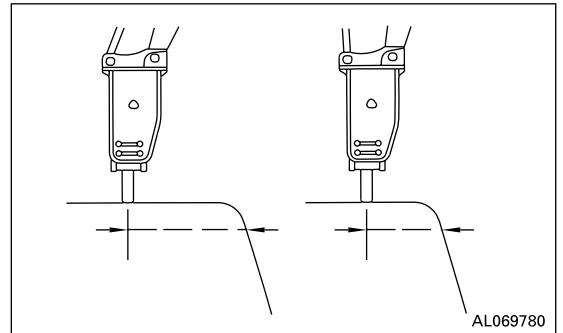
Keep the chisel pushed perpendicularly against the impact surface when carrying out breaking operations.



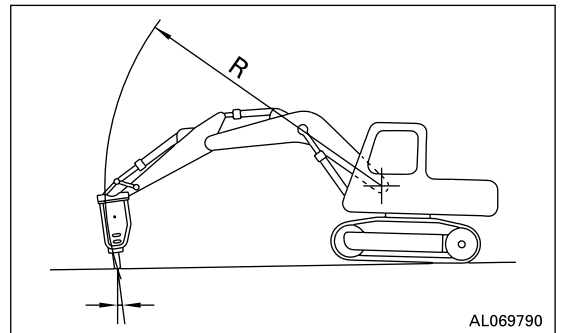
When applying impact, push the chisel against the impact surface and operate so that the chassis rises approx. 5 cm (2 in) off the ground. Do not let the machine come further off the ground than this amount.



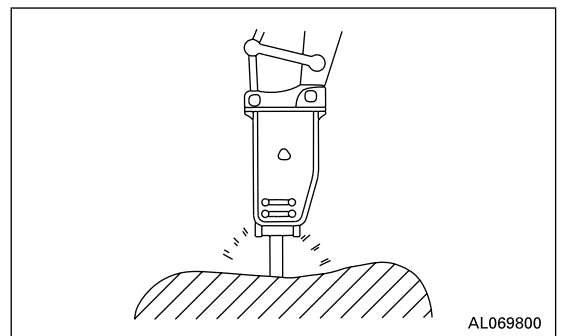
When applying continuous impact to the same impact surface, if the chisel does not penetrate or break the surface within 1 minute, change the point of impact and carry out breaking operations closer to the edge.



The direction of penetration of the chisel and the direction of the breaker body will gradually move out of line with each other, so always adjust the bucket cylinder to keep them aligned.



Always keep the chisel pressed against the impact surface properly to prevent using the impact force when there is no resistance.

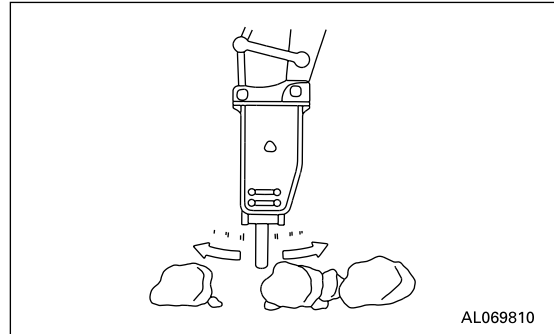


### PROHIBITED WORKS

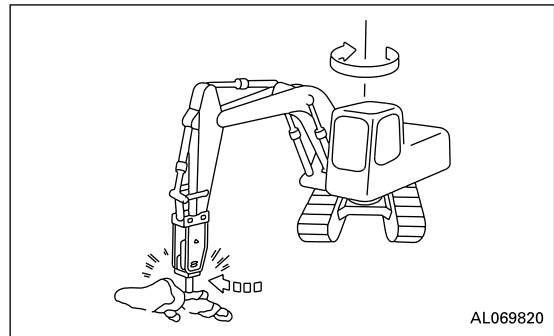
To ensure that the machine has a long life, and to ensure that operations are carried out in safety, do not operate the machine in any of the following ways.

- Do not operate all cylinders to the end of their strokes. Always leave approx. 5 cm (2 in) to spare.

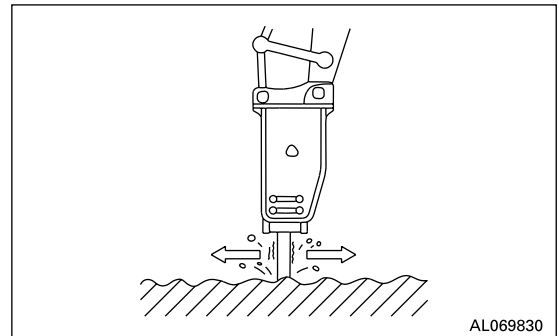
Using the mount to gather in pieces of rock



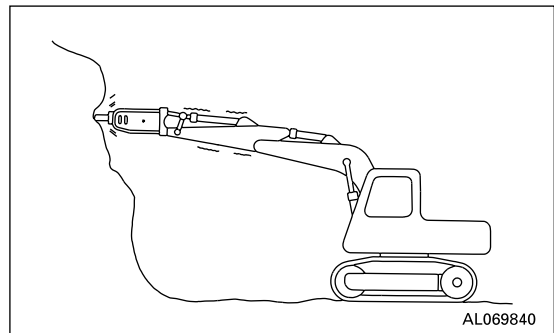
Operations using the swing force



Moving the chisel while carrying out impacting operations

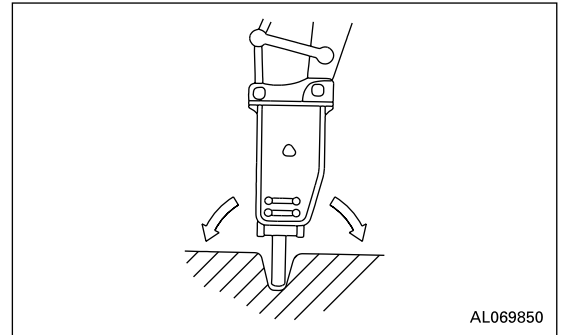


Applying impact horizontally or in upward direction

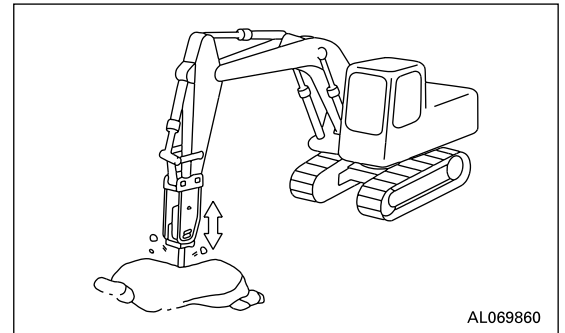




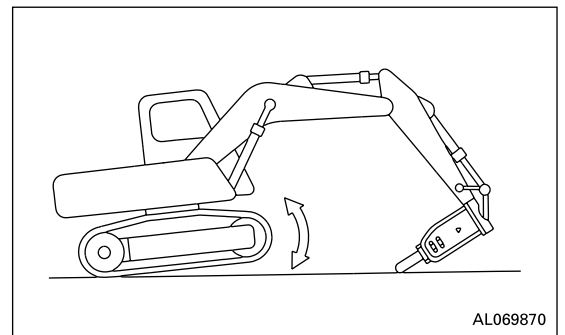
Twisting the chisel when it has penetrated the rock



Pecking operations



Extending the bucket cylinder fully and thrusting to raise the machine off the ground

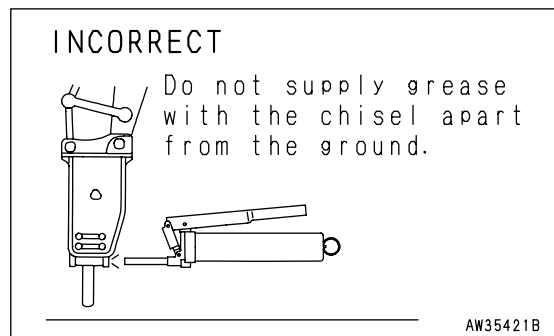
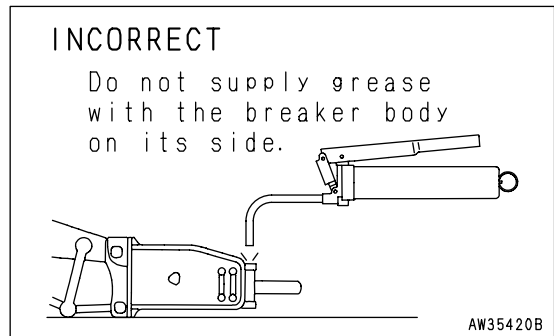
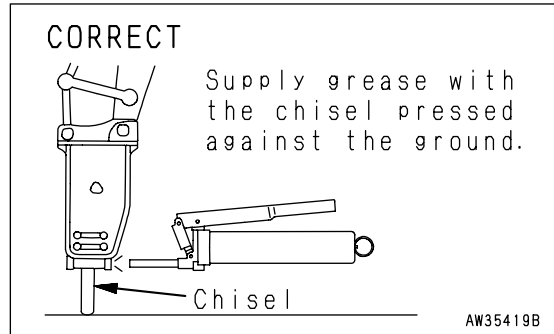


### GREASING POSITION FOR HYDRAULIC BREAKER

Supply grease in the correct position.

**NOTICE**

If grease is supplied in an incorrect position, the breaker is filled with more grease than necessary. As a result, soil and sand will enter the hydraulic circuit and can damage the hydraulic devices while the breaker is used. Accordingly, be sure to supply grease in the correct position.



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# MEMO

**KOMATSU**