

# Operation & Maintenance Manual

EEAM023900

**D31EX, PX-21**

**D37EX, PX-21**

**D39EX, PX-21**

**BULLDOZER**

SERIAL NUMBER

D31EX-21 - 50501 and up

D31PX-21 - 50501 and up

D37EX-21 - 5501 and up

D37PX-21 - 5501 and up

D39EX-21 -1501 and up

D39PX-21 -1501 and up



## 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 inside the cab for reference and periodically reviewed by all personnel who will come into contact with the machine.

**KOMATSU**



# **FOREWORD**

## 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 a hazard when performing operation and maintenance.

### WARNING

**Before beginning operation or maintenance, operators and maintenance personnel must always observe the following points.**

**Read this manual thoroughly and understand its contents fully.**

**Read the safety messages and safety labels given in this manual carefully so that they should be understood fully.**

**Keep this manual at the storage location for the Operation and Maintenance Manual given below so that all personnel involved in working on the machine can consult it periodically.**

**In case this manual should be lost or damaged, immediately contact Komatsu or your Komatsu distributor to obtain a new copy.**

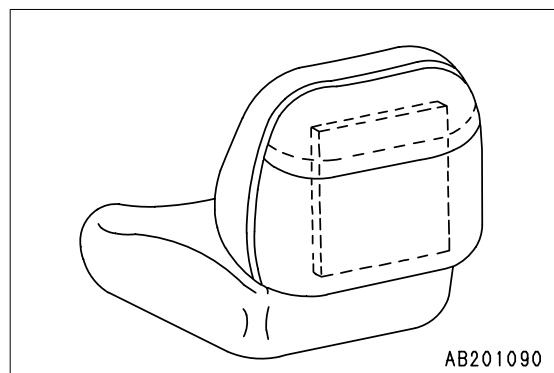
**When you sell the machine, make sure that this manual should be provided to the new owner together with the machine.**

**In this manual, measurements are expressed in international standard units (SI). For the reference purpose, weight units used in the past are also displayed in { }.**

Storage location for the Operation and Maintenance Manual:

If machine is equipped without cab.

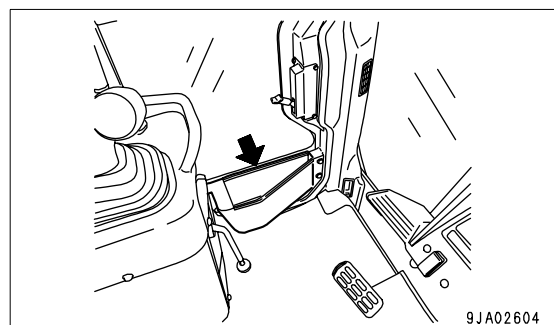
Pocket at rear of operator's seat



If machine is equipped with a cab.

Pocket at rear of operator's seat

Inside of right and left doors



## 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.



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



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



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word is used also to alert against unsafe practices that may cause property damage.

### Example of safety message using signal word



**When standing up from the operator's seat, always place the safety lock lever in the LOCK position. If you accidentally touch the control levers when they are not locked, this may cause a 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

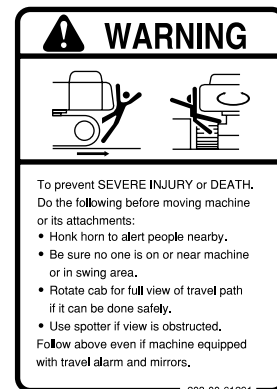
This gives information that is useful to know.

## ● 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.

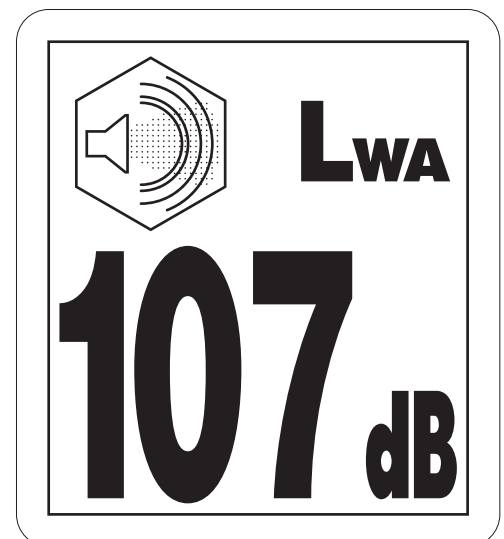
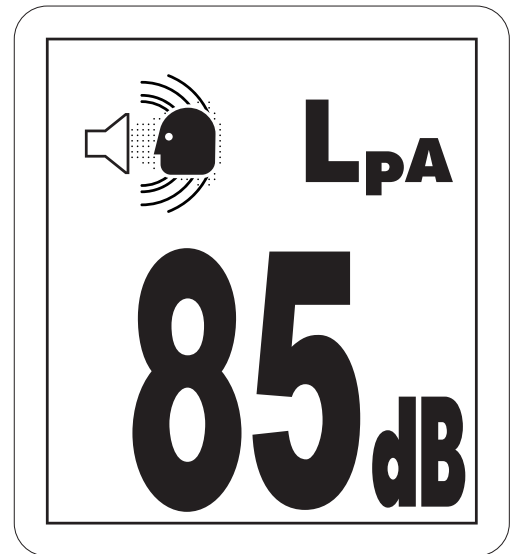
In no event should you engage in prohibited uses or actions described in this manual.

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))

## NOISE

- Sound pressure level at the operator's station, measured according to ISO6396 (Dynamic test method, simulated working cycle)
- Sound power level emitted. This is the guaranteed value as specified in European directive 2000/14/EC.



## VIBRATION

When used for its intended purpose, levels of vibration for the earthworking machine transmitted from the operator's seat are lower or equal to the test vibrations for the relative machinery class in compliance with ISO 7096. The actual acceleration value of the upper limbs is less than 2.5 m/s<sup>2</sup>. The actual acceleration value for the body is less than 0.8 m/s<sup>2</sup>. These values were determined using a representative machine and with the help of the measurement procedures that are defined in the directives ISO 2631/1 and ISO 5349.

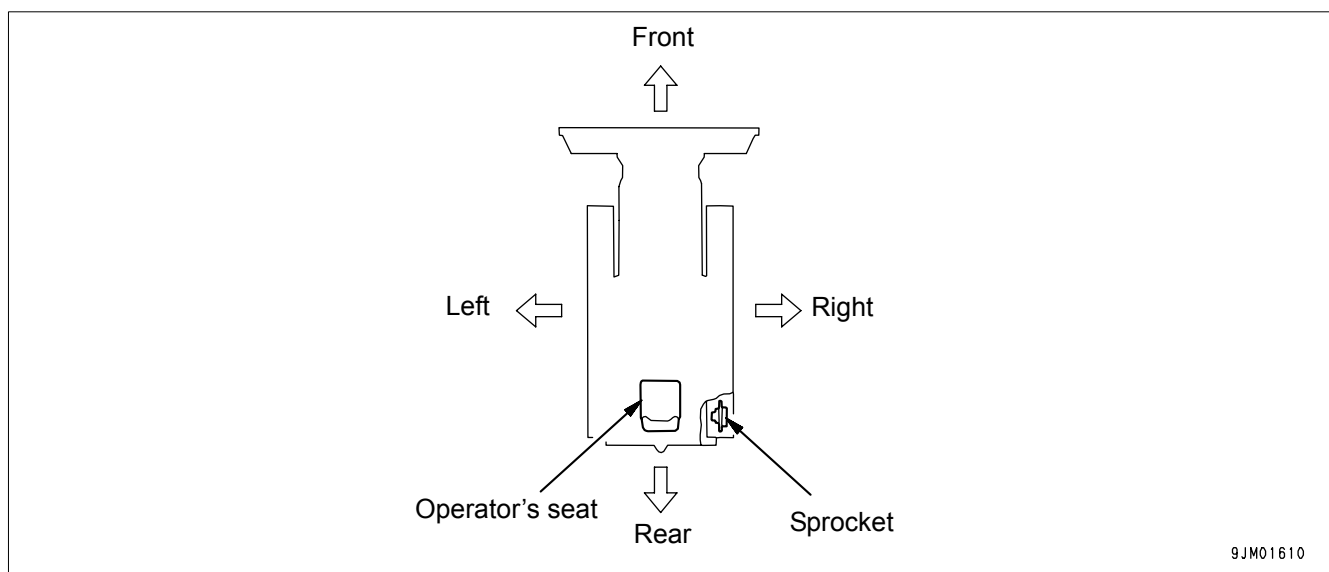
## INTRODUCTION

This Komatsu machine is designed to be used mainly for the following work:

- Dozing
- Smoothing
- Cutting into hard or frozen ground or ditching

See the section "WORK POSSIBLE USING BULLDOZER (3-95)" for further details.

### FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE



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



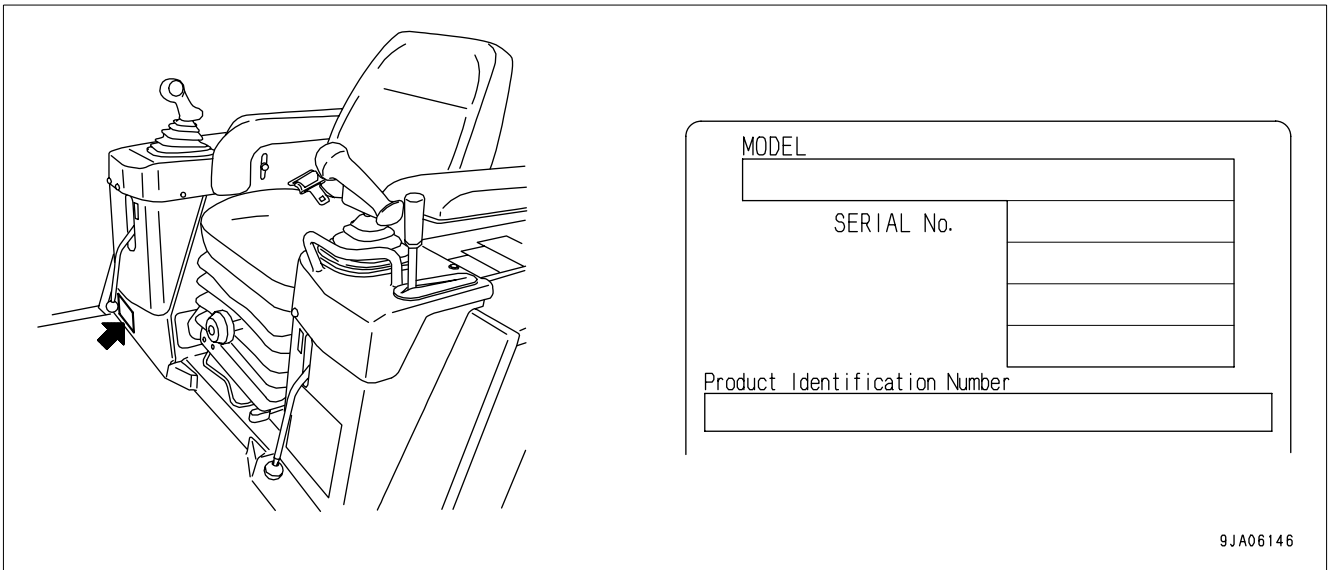
# NECESSARY INFORMATION

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

## PRODUCT IDENTIFICATION NUMBER (PIN)/MACHINE SERIAL NO. PLATE

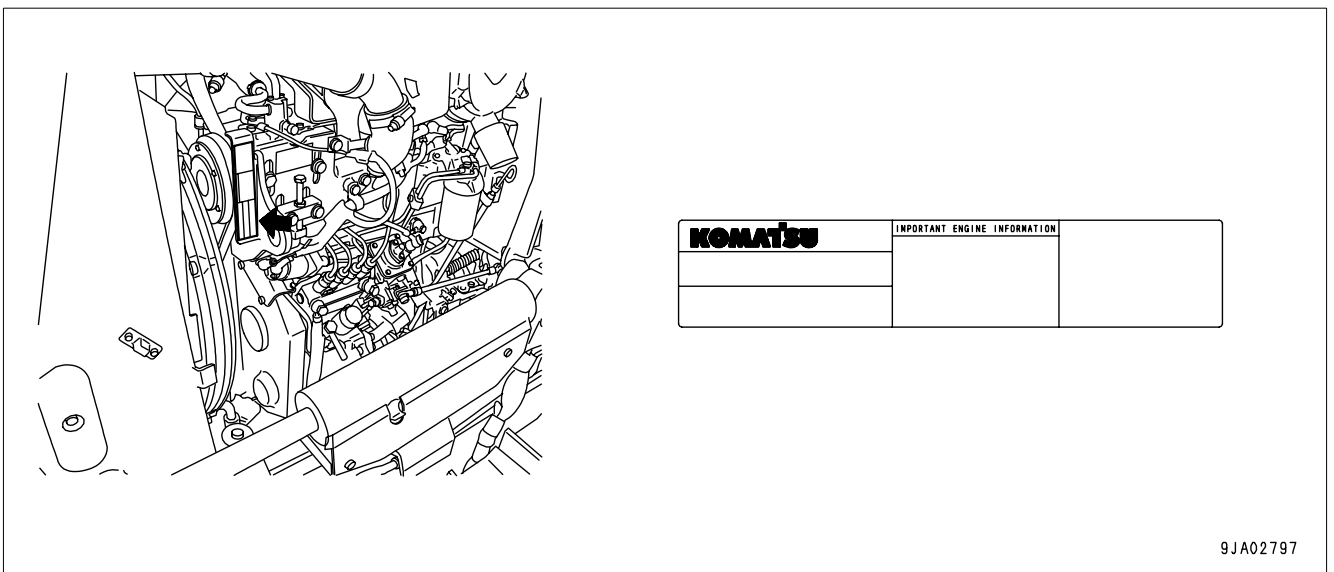
This is at the front bottom right of the operator's seat.

The design of the nameplate differs according to the territory.



## ENGINE SERIAL NO. PLATE

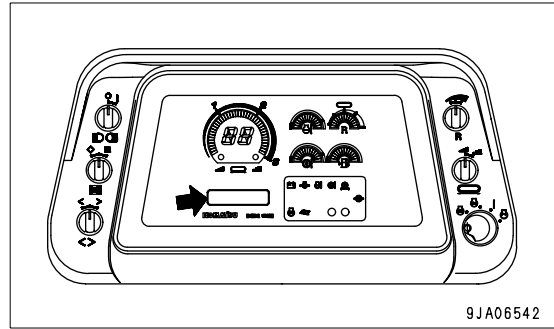
This is at the front top of the engine on the left side machine.



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

### POSITION OF SERVICE METER

The service meter is provided at the lower part of the monitor panel.



### TABLE OF ENTER SERIAL NO. AND DISTRIBUTOR

---

Machine serial No.

---

Engine serial No.

---

Product Identification Number

---

Manufacturers name:	KOMATSU LTD.
Address:	3-6 Akasaka Minato-ku, 101 Tokyo Japan

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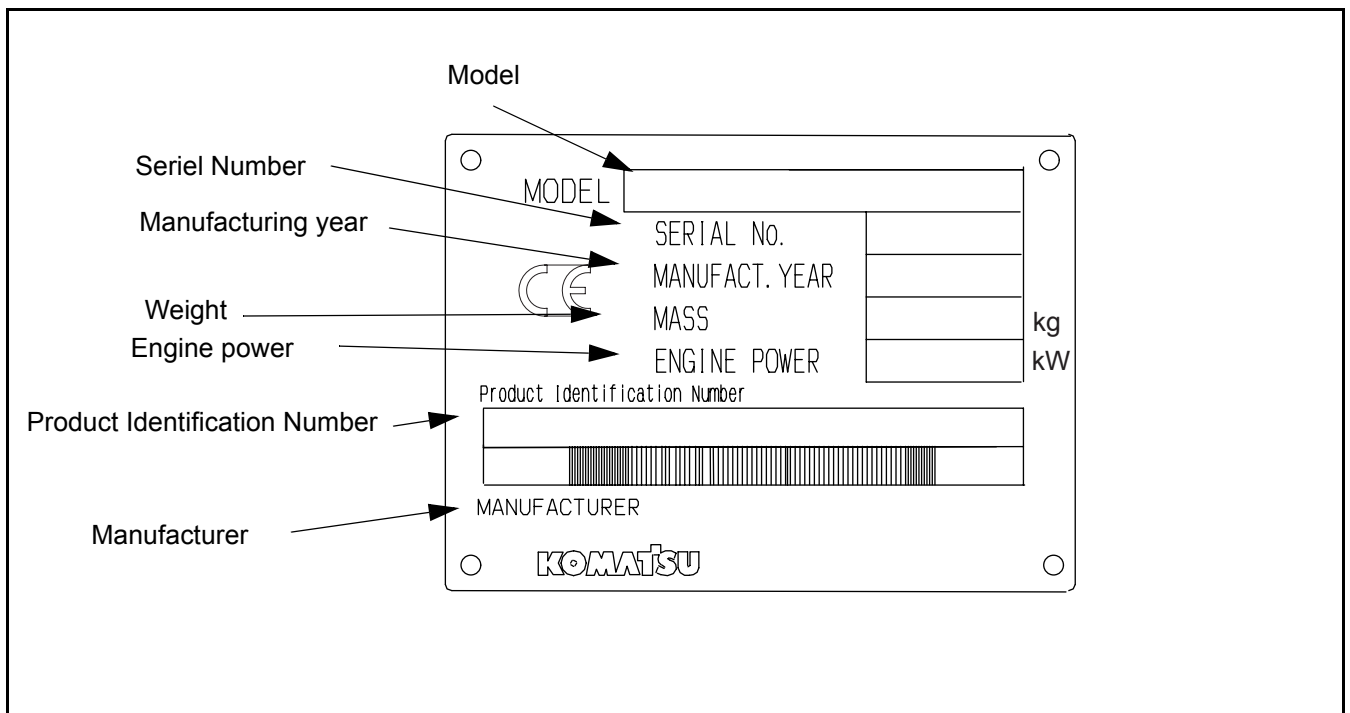
Distributor  
Address

Phone

Service personnel for your  
machine:

---

**MACHINE SERIAL PLATE.**



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## COLOPHON

# SAFETY



## WARNING

Please be sure that you fully understand this manual and the 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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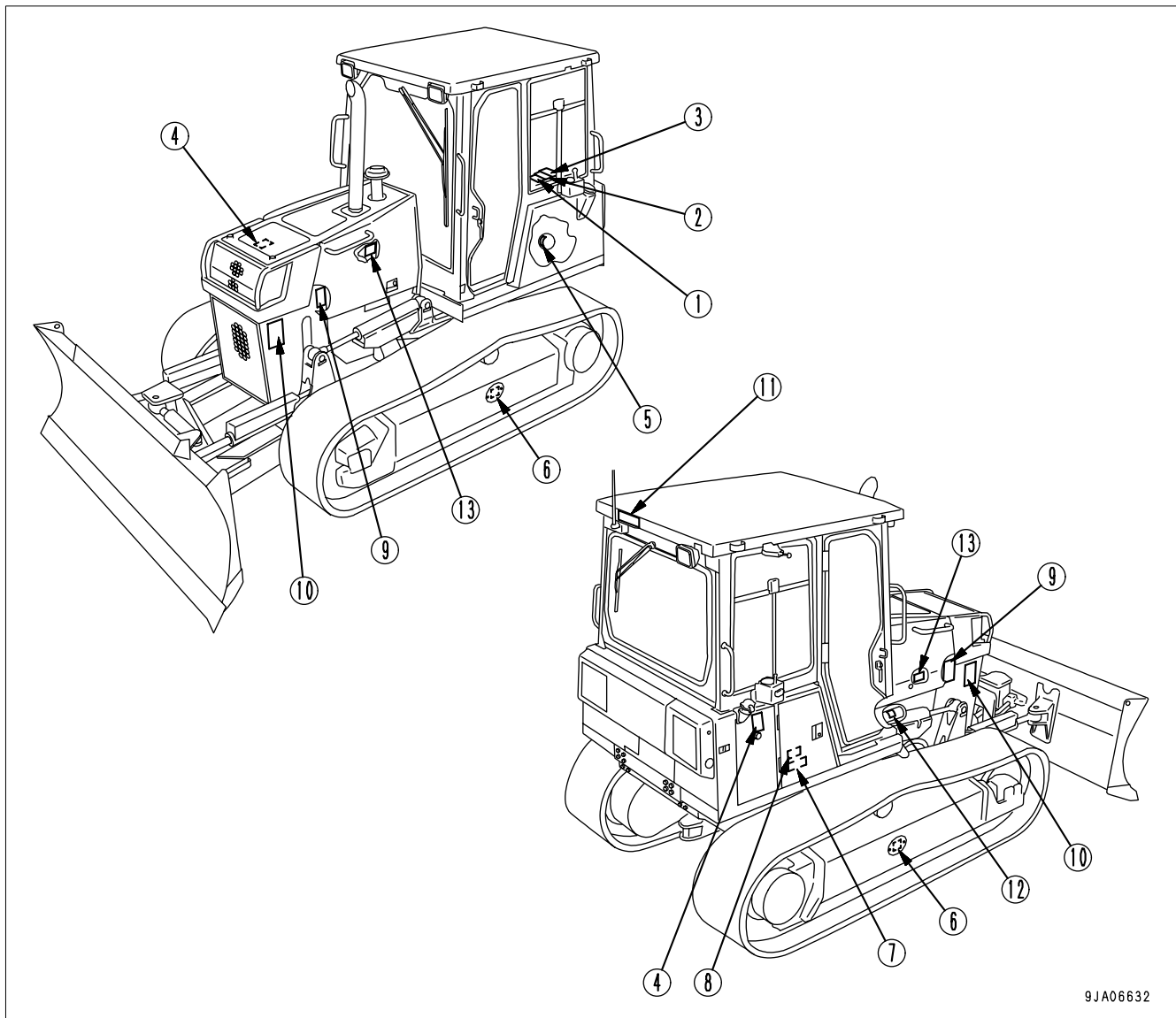
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## SAFETY LABELS

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. These 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.

## POSITIONS OF SAFETY PICTOGRAMS

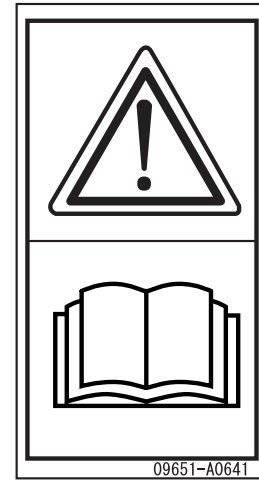


9JA06632

**SAFETY LABELS**

(1) Caution before operating machine (09651-A0481)

- Warning!
- Read manual before operation, maintenance, disassembly, assembly and transportation.



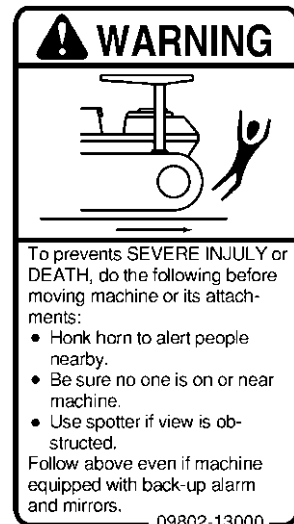
(2) Caution before moving in reverse (09802-13000)

**⚠ WARNING**

To prevent SEVERE INJURY or DEATH, do the following before moving machine or its attachments:

- Honk horn to alert people nearby.
- Be sure no one is on or near the machine.
- Use spotter if view is obstructed.

**Follow above even if the machine is equipped with back-up alarm and mirrors.**



(3) Caution for leaving operator's seat (09654-B0481)

- Sign indicates a hazard of 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) Caution with high-temperature coolant, hydraulic oil

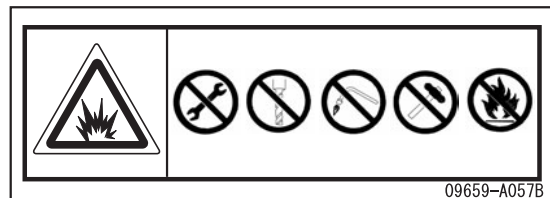
(09653-A0481)

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



(5) Caution for accumulator (09659-A057B) (If equipped)

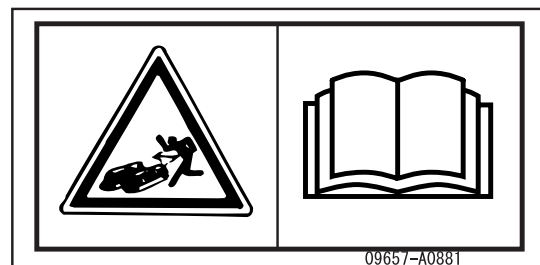
- There is the hazard of explosion causing injury.
- Do not disassemble the accumulator, make holes in it, cut it, hit it roll it or bring it near flame.



(6) Caution for adjusting track tension (09657-A0881)

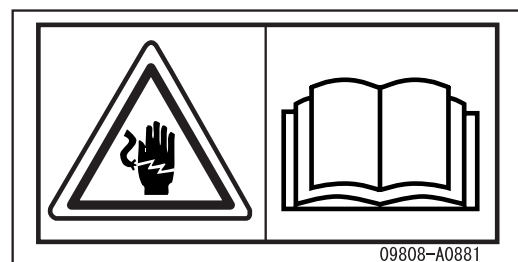
The safety label is attached to the rear side of the track adjustment window cover.

- Sign indicates a hazard of flying plug from track adjuster that could cause injury.
- Read the manual and adjusting track for safe and proper handling.



(7) Caution for battery cable (09808-A0881)

- Sign indicates an electric hazard from handling the cable.
- Read the manual for safe and proper handling.





(8) Caution for battery (This plate is stick on the machine by the battery maker)

**DANGER/POISON**

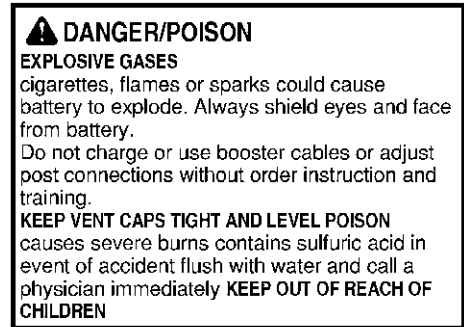
**EXPLOSIVE GASES**

Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery.

Do not charge or use booster cables or adjust post connections without order instruction and training.

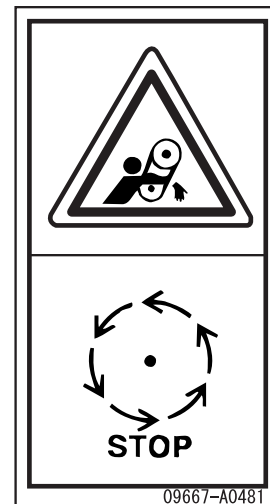
**KEEP VENT CAPS TIGHT AND LEVEL POISON** causes severe burns contains sulfuric acid in event of accident flush with water and call a physician immediately.

**KEEP OUT OF REACH OF CHILDREN**



(9) Caution for engine running (09667-A0481)

- Sign indicates a hazard of rotating parts, such as belt.
- Turn off before inspection and maintenance.



(10) Caution for approach when machine moving (09806-B1201)

- Sign indicates a hazard of being run over by moving equipment.
- Keep a safe distance from equipment when it is moving.



(11) Caution for ROPS (09620-A2000)

ROPS/FOBS CERTIFICATION

This protective structure complies with the standard provided that it is properly equipped on the machine which mass is less than the specified maximum mass.

KOMATSU ROPS/FOBS CERTIFICATION			
This protective structure complies with the standard provided that it is properly equipped on the machine whose mass is less than the specified maximum mass.			
ROPS : ISO 24113/2004, SAE J1363, M/V04		FOBS : ISO 2449/1992	
MODEL	MACHINE MODEL	ROPS LEVEL No.	
SERIAL No.	MAX. MASS	kg	
<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>● If some modification is applied to the ROPS or FOBS, it might not enough strength and might not be complied with the standard. Consult Komatsu Distributor before altering.</li> <li>● ROPS or FOBS may provide less protection if it has been structurally damaged or involved roll-over. Consult Komatsu Distributor in that case.</li> <li>● Always wear seat belt when moving.</li> </ul>			
Komatsu Ltd. 2-3-6 Akasaka, Minami-ku, Tokyo, Japan 150-8501			

MODEL	MACHINE MODEL	ROPS LEVEL No.
SERIAL No.	MAX. MASS (kg)	

**! WARNING**

- If some modification is applied to the ROPS or FOBS, it might not enough strength and might not be complied with the standard. Consult Komatsu distributor before altering.
- ROPS or FOBS may provide less protection if it has been structurally damaged or involved roll-over. Consult Komatsu distributor in that case.
- Always wear seat belt when moving

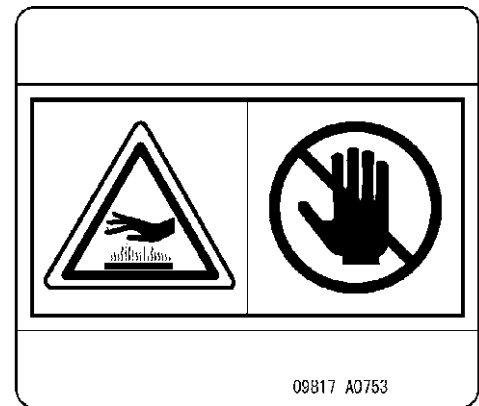
(12) Prohibition of jump start (09842-A0481)

- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.



## (13) Caution with high-temperature parts (09817-A0753)

- Sign indicates a burn hazard from touching heated parts, such as engine, motor, or muffler during or right after operation.
- Never touch when hot.



## GENERAL PRECAUTIONS

### SAFETY RULES

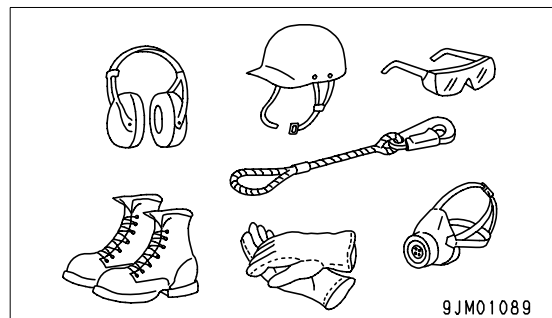
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine 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.

### CLOTHING AND PERSONAL PROTECTIVE ITEMS

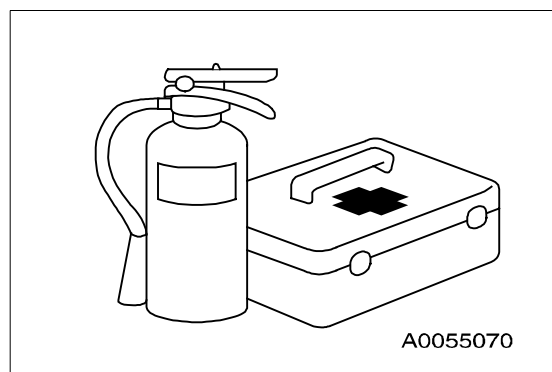
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get 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.

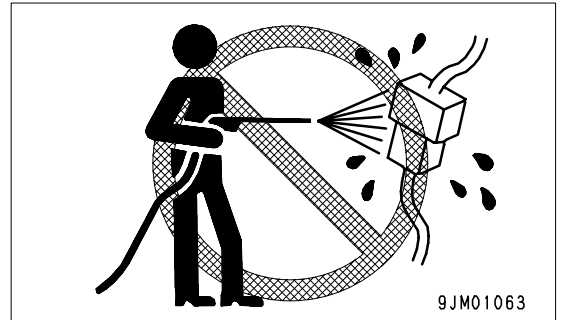


**SAFETY FEATURES**

- 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.



**INSIDE OPERATOR'S COMPARTMENT**

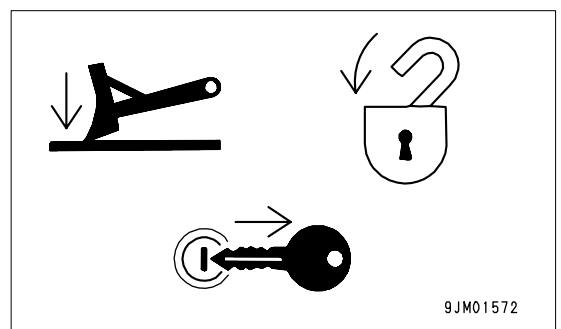
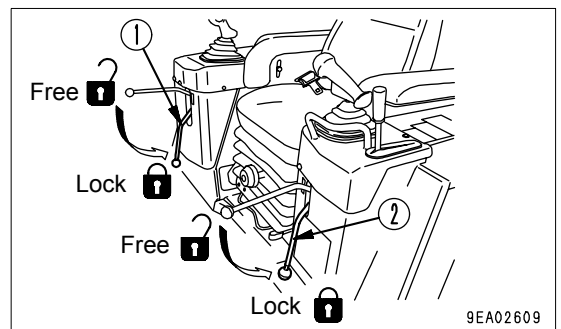
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes.  
If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- 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 compartment.

**ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT**

- Before standing up from the operator's seat (such as when adjusting the operator's seat), lower the work equipment completely to the ground, set safety lock lever (1) and parking lever (2) 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) and parking lever (2) 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.

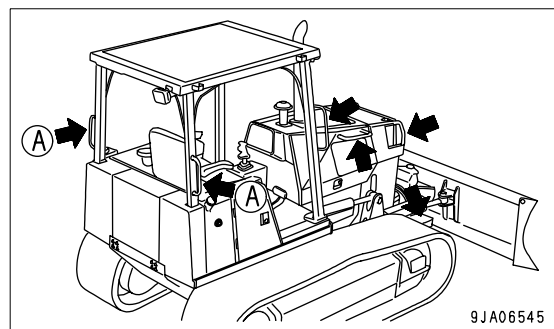
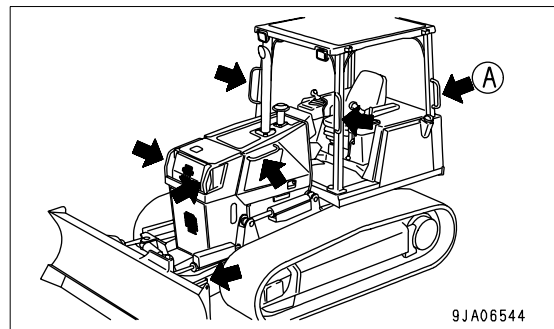


**HANDRAILS AND STEPS**

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

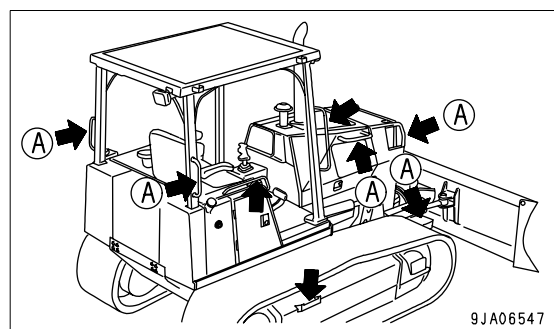
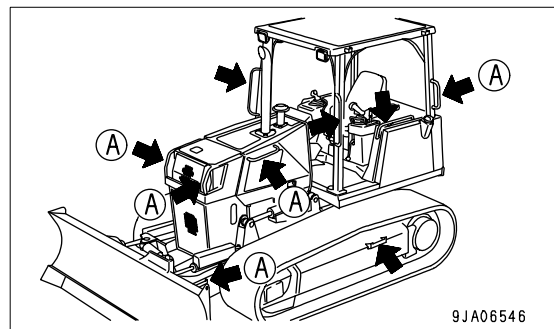
**D31PX,D37PX,D39PX,D39EX**

- Climb up and down from the operator's cab at the machine front. Use the handrails and steps marked by arrows in the diagram on the right when getting on and off the machine.
- Do not climb up and down from the operator's cab at the machine side or at the rear. A handrail marked by arrow (A) in the diagram is provided to support yourself when refilling fuel in the fuel tank. Do not use it for getting on and off the machine.



**D31EX,37EX**

- Climb up and down from the operator's cab at the machine side. Use the handrails and steps marked by arrows in the diagram on the right when getting on and off the machine.
- Do not climb up and down from the operator's cab at the machine front or at the rear. A handrail marked by arrow (A) in the diagram is provided to support yourself when refilling fuel in the fuel tank. Do not use it for getting on and 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 PEOPLE ON ATTACHMENTS**

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

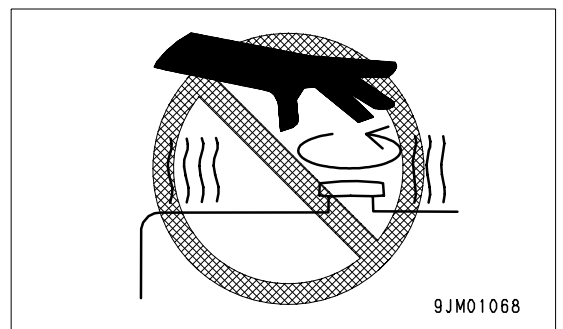
**CRUSHING OR CUTTING PREVENTION**

The clearance around the work equipment will change according to the movement of the link. If you get caught, this may lead to serious personal injury. Do not allow anyone to approach any rotating or telescoping part.

**PREVENTION OF BURNS**

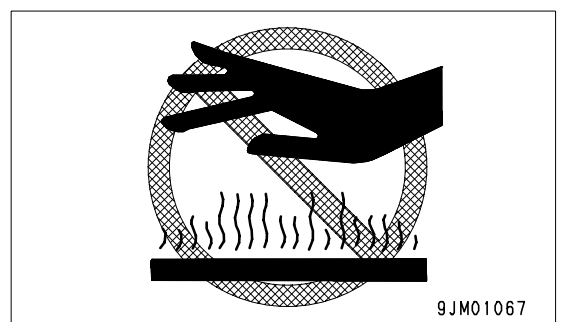
**Hot coolant**

- 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**

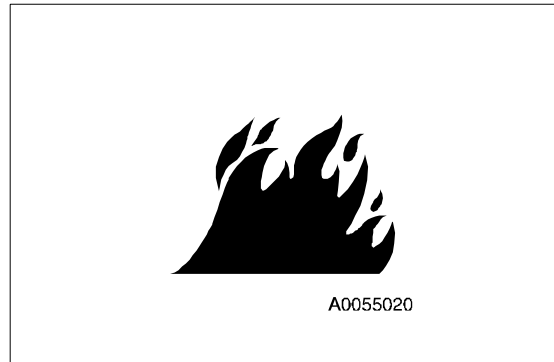
- To prevent burns from hot oil spurting out when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap or plug by hand before starting the operation. Even when the oil has cooled down, loosen the cap or plug slowly to relieve the internal pressure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



**FIRE 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 itself, follow the instructions in this manual.

**ACTION IF FIRE OCCURS**

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

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

**WINDOW WASHER LIQUID**

Use an ethyl alcohol base washer liquid.

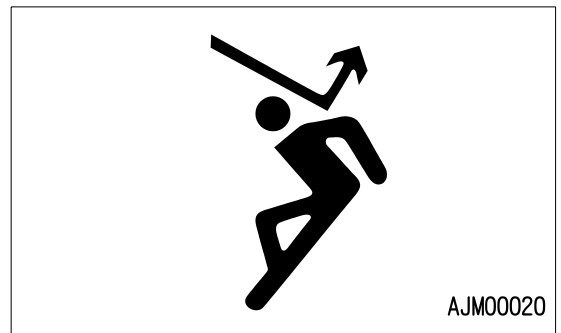
Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

**PRECAUTIONS WHEN USING ROPS**

Install ROPS when working in places where there is danger of falling rocks, such as in mines and quarries, or in places where there is danger of rolling over.

- If ROPS is installed, do not remove it when operating the machine.
- ROPS is installed to protect the operator when machine rolls over. When machine rolls over, ROPS supports its weight and absorbs its impact energy.
- If ROPS is modified, its strength may be reduced. When modifying, consult your Komatsu distributor.
- If ROPS is damaged or deformed by falling objects or by rolling over, its strength will be reduced and it will not be able to fulfill its function properly. In such cases, always Komatsu contact your distributor for advice of the method of repair.

Even if ROPS is installed, always fasten your seat belt properly when operating the machine. If you do not use your fasten your seat belt properly, it cannot display its effect.

**PRECAUTIONS FOR ATTACHMENTS**

- When installing optional parts or attachments, there may be problems with safety or legal restrictions. Therefore 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.

**UNAUTHORIZED MODIFICATION**

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, product failures or other property damages resulting from modifications made without authorization from Komatsu.

**SAFETY AT WORKSITE**

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

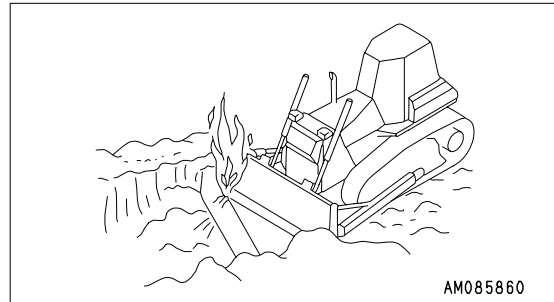
- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations 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 action to prevent unauthorized people from approaching the jobsite.

When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.

- 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.

**DO NOT GO CLOSE 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.

Voltage of Cables	Safety Distance
100 V - 200 V	Over 2 m
6,600 V	Over 2 m
22,000 V	Over 3 m
66,000 V	Over 4 m
154,000 V	Over 5 m
187,000 V	Over 6 m
275,000 V	Over 7 m
500,000 V	Over 11 m

- 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.

### ENSURE GOOD VISIBILITY

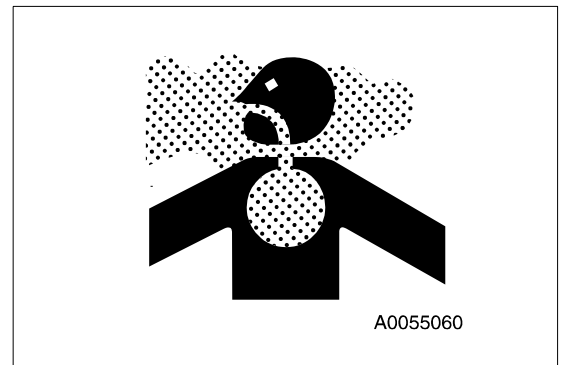
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- Position a signalman if there are areas at the rear of the machine where the visibility is not good.
- 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 AREAS

Exhaust fumes from the engine can kill.

- 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.



### CHECKING SIGNALMAN'S SIGNALS 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

Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

**BE CAREFUL ABOUT ASBESTOS DUST**

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.

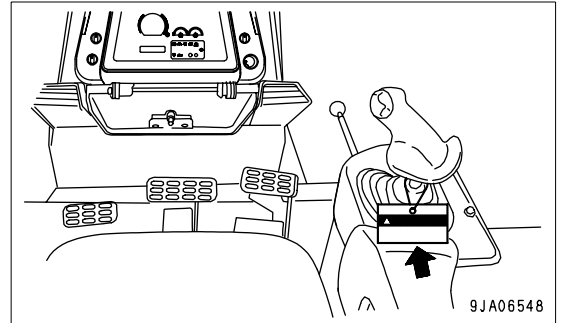
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



## PRECAUTIONS FOR 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.
- Adjust the mirror to a position which gives a good view to the rear from the operator's seat.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

### PRECAUTIONS WHEN STARTING

- Start and operate the machine only while seated.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.

**PRECAUTIONS IN COLD AREAS**

- 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 and cause the battery to explode.

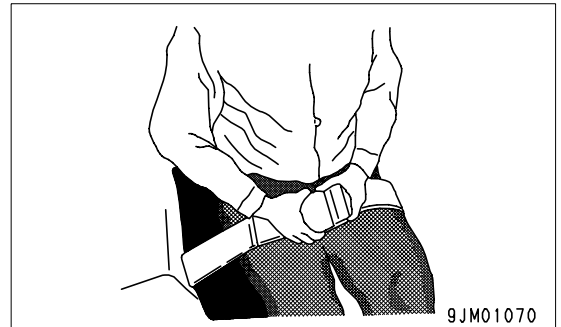
Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

## OPERATION

### CHECKS BEFORE OPERATION

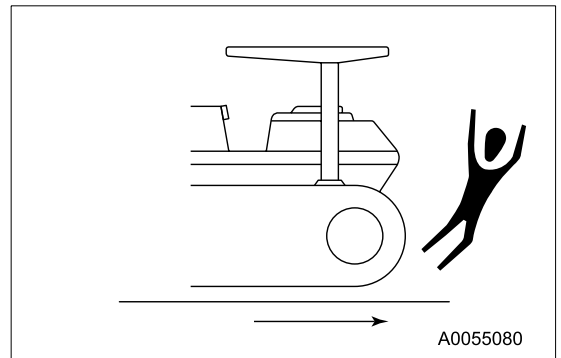
When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

- Always fasten your seat belt.
- Check the operation of travel, steering and brake systems, and work equipment control 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.



### PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

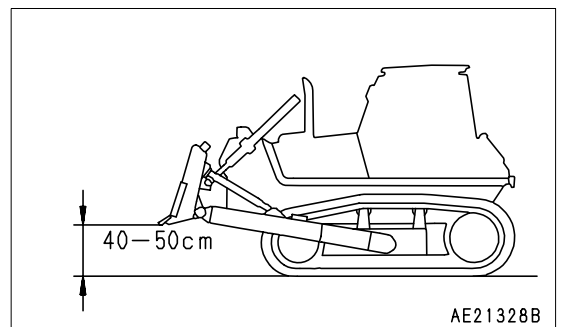
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check that the back-up alarm (alarm buzzer when machine travels in reverse) works properly.
- Fix the operator's compartment doors and windows in position securely.
- 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.



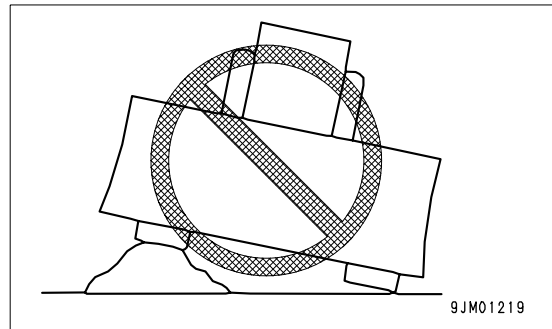
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

### PRECAUTIONS WHEN TRAVELING

- When traveling on level ground, keep the work equipment at a height of 40 to 50 cm 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.



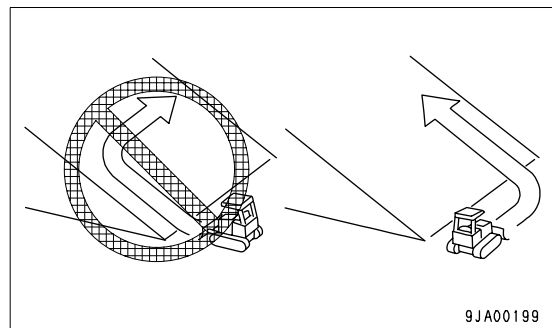
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a 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.
- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, leave soil of one scoop at the edge of the cliff and push it with the next scoop.
- When the machine passes over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, and there is danger that the travel speed rises suddenly. To prevent this, lower the travel speed.
- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.



**TRAVELING ON SLOPES**

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

- Keep the work equipment approx. 20 to 30 cm above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.
- When traveling down a slope, always place the transmission in low speed and travel down the slope slowly.
- 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.



**USING BRAKES**

- Use the deceleration pedal or speed shift switch to adjust the speed. If the brake pedal is suddenly depressed, the mechanical brake is applied to stop the machine suddenly, but this is dangerous if the machine is traveling too fast.
- When traveling downhill, set the travel speed to a low speed and use the engine as a brake.

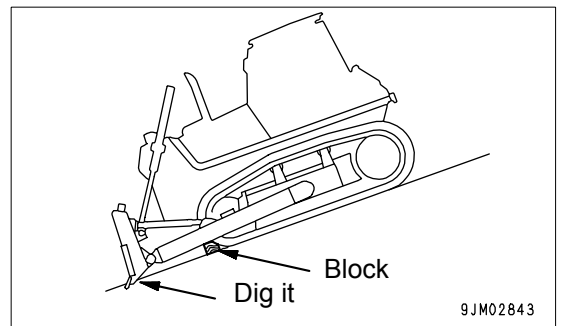
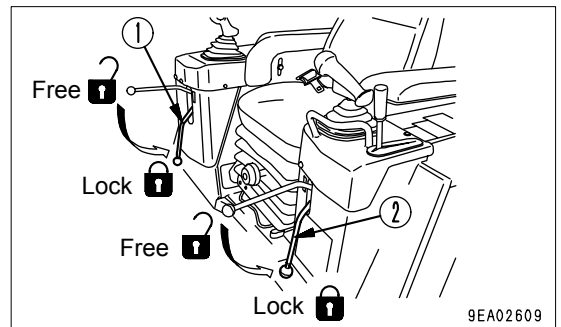
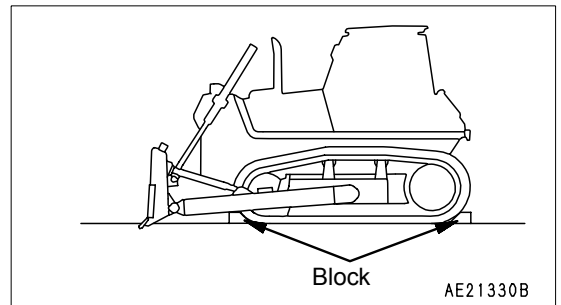


**OPERATE CAREFULLY ON SNOW**

- 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.
- When operating on snow-covered slopes, never use the brakes to stop the machine suddenly. Reduce the speed and use the engine as a brake together with operating the brake pedal. If necessary, lower the blade to the ground to stop the machine.

**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 the steering, directional and gear shift levers in the N (Neutral) position and set the blade lever in the HOLD position, then apply safety lock lever (1) and parking lever (2) and 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 blade on the downhill side, then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.



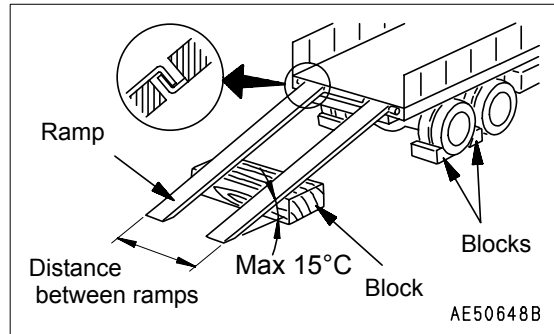
## TRANSPORTATION

### LOADING AND UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
- Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, be extremely careful since the ramp surface is slippery.
- Run the engine at low speed and travel slowly.
- When on the ramps, do not touch any other parts.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- 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 loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- For machines equipped with a cab, always lock the door after boarding the machine. If this is not done, the door may suddenly open during transportation.

Refer to "TRANSPORTATION (3-103)".



### SHIPPING

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

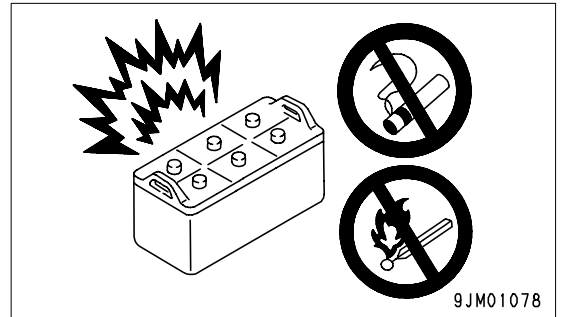
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (3-103)" in the OPERATION section.

## BATTERY

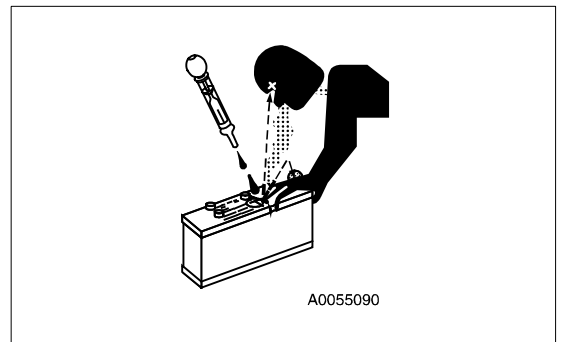
### BATTERY HAZARD PREVENTION

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 amount of water.
- If acid gets into your eyes, flush them immediately with large amount of water and seek medical attention.



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

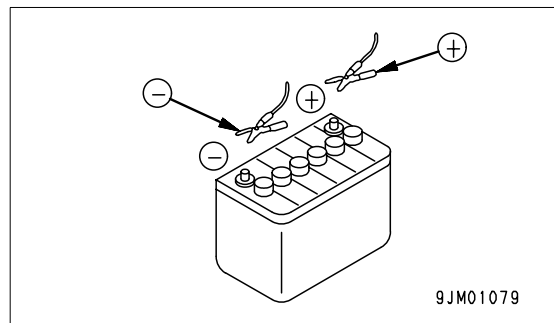
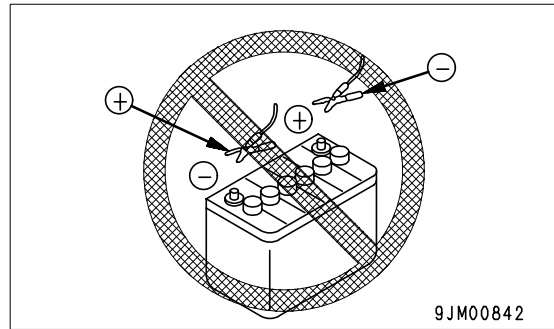
As there is a hazard that sparks will be generated, always do as follows.

- 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 WITH BOOSTER CABLE**

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 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 CABLE (3-122)" in the OPERATION section.



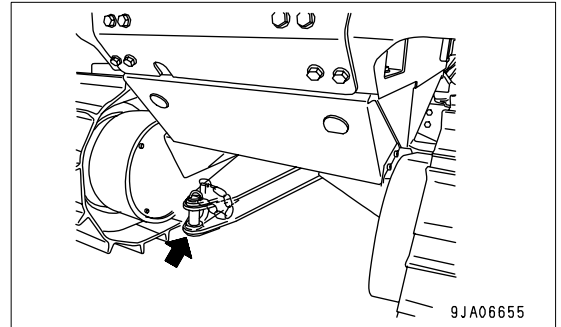
## TOWING

### WHEN TOWING

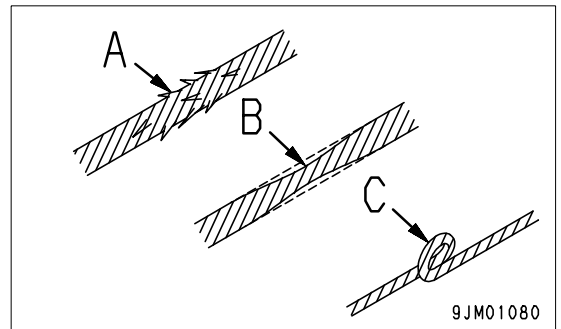
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing method, see section "MACHINE TOWING METHOD (3-113)".

- Always wear leather gloves when handling wire rope.
- Connect a wire rope to the part indicated with the arrow in the diagram at right.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.
- Never pull the towing equipment up or insert a pedestal.



- 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.



- If the engine stops or the oil pressure in the brake circuit lowers because of a trouble in the brake valve solenoid, the brake works and the machine cannot move. To move the machine in this case, the oil pressure in the brake circuit must be heightened to the specified level with a special device. Ask your Komatsu distributor.

# PRECAUTIONS FOR MAINTENANCE

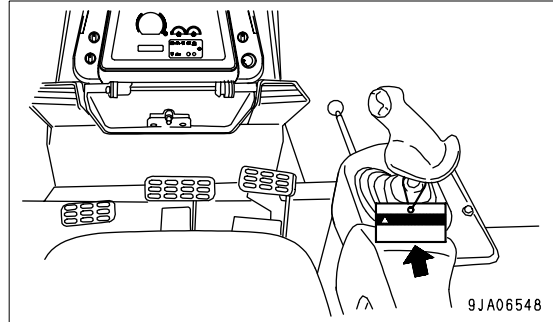
## WARNING TAG

- 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.

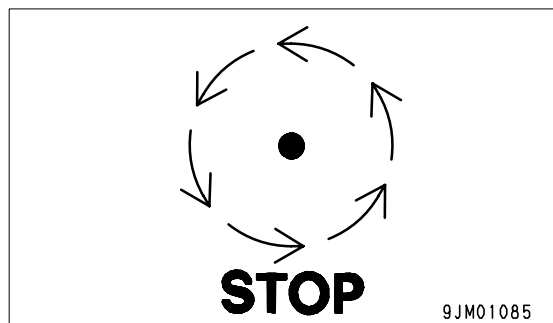
## APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

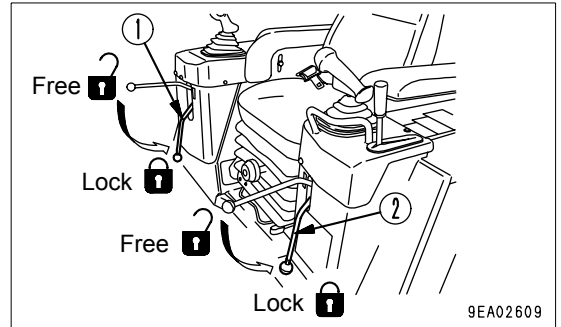
When working with others, misunderstandings between workers can lead to serious accidents.

## STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

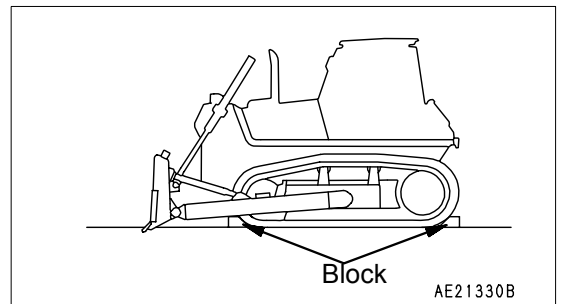
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.
- Open the engine side cover all the way and ensure that it is locked open before letting go.



- Set safety lock lever (1) and parking lever (2) to the LOCK position.



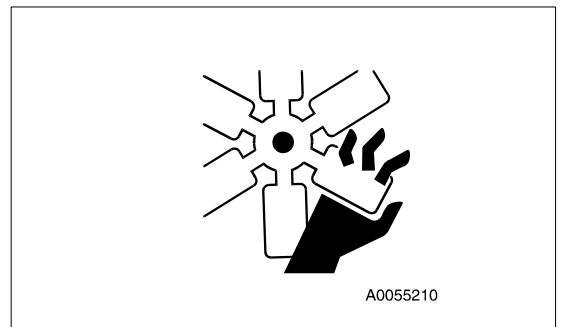
- Put blocks under the track to prevent the machine from moving.



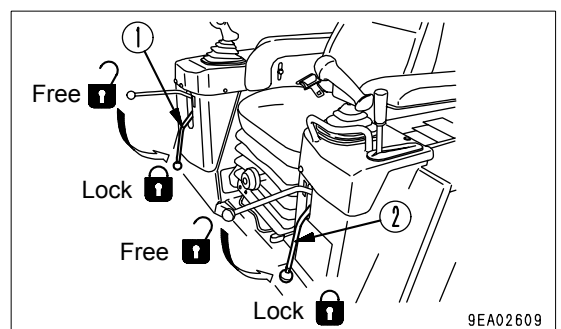
**TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING**

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.

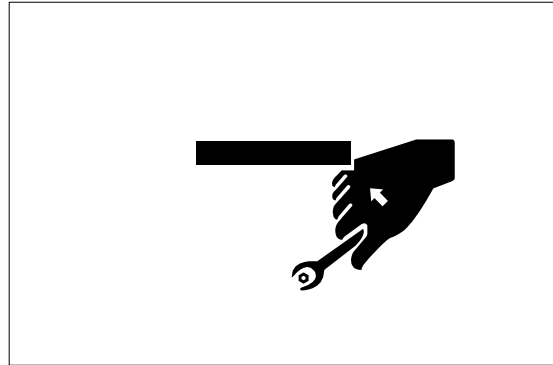


- Set safety lock lever (1) and parking lever (2) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Do not touch any control levers. If any control lever must be operated, 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.



**NO UNAUTHORIZED PERSONNEL INTO AREA**

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 lifted off the ground and the machine is supported only with the work equipment. If any of the control levers is touched by accident, or there is damage occurring to the hydraulic piping, the work equipment or the machine will suddenly drop. This is extremely dangerous. Never work under the work equipment or the machine.

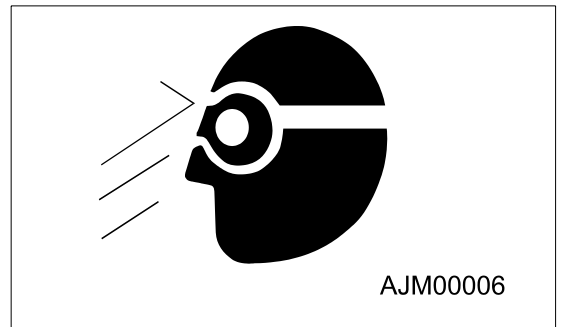
**NOISE**

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.

**PRECAUTIONS 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.
- There is a hazard that the pin hit with strong force may fly out and injure people in the surrounding area.

**REPAIR WELDING**

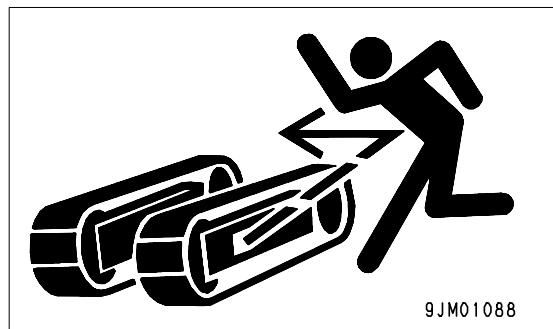
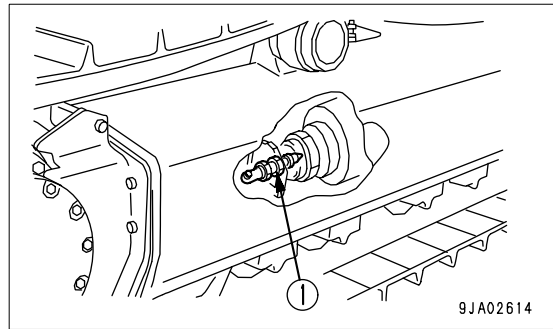
Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

**REMOVING BATTERY TERMINAL**

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

**PRECAUTIONS 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 SPRING**

Never attempt to disassemble the recoils spring assembly. It contains a spring under high pressure which serves as a shock absorber for the idler. If it is disassembled by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask your Komatsu distributor to do the work.

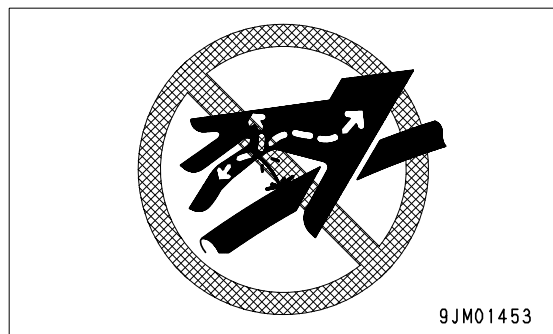
**PRECAUTION WITH HIGH-PRESSURE OIL**

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

- For the procedure to release internal pressure, see “PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM (4-35)”. Do not inspect or replace any part while internal pressure is applied.
- 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.



### HANDLING HIGH-PRESSURE HOSES

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

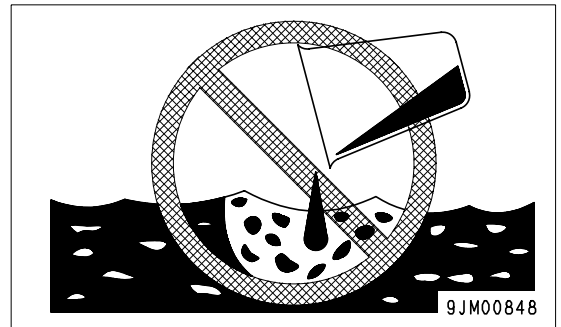
Replace the hose if any of the following problems are found.

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

### WASTE MATERIAL

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.



### MAINTENANCE FOR AIR CONDITIONER

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

Never touch refrigerant.

### COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety 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 "PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (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 death. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety-critical parts if any defect is found, even when they have not reached the time specified interval.



# OPERATION



## **WARNING**

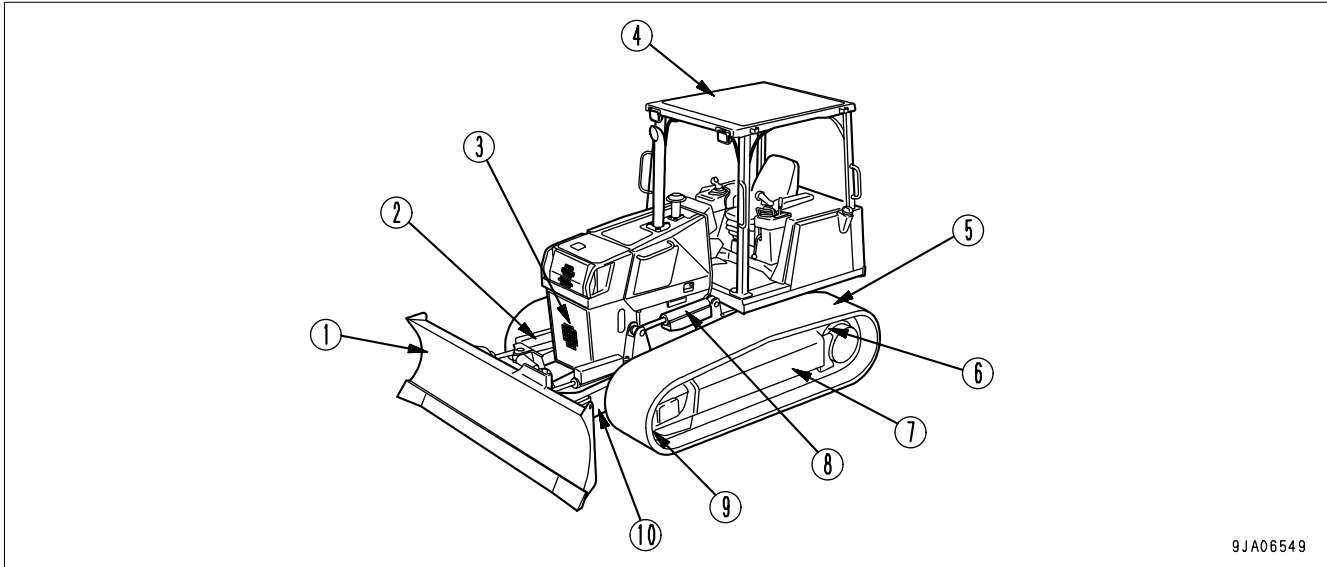
Please read and make sure that you understand the safety volume before reading this section.

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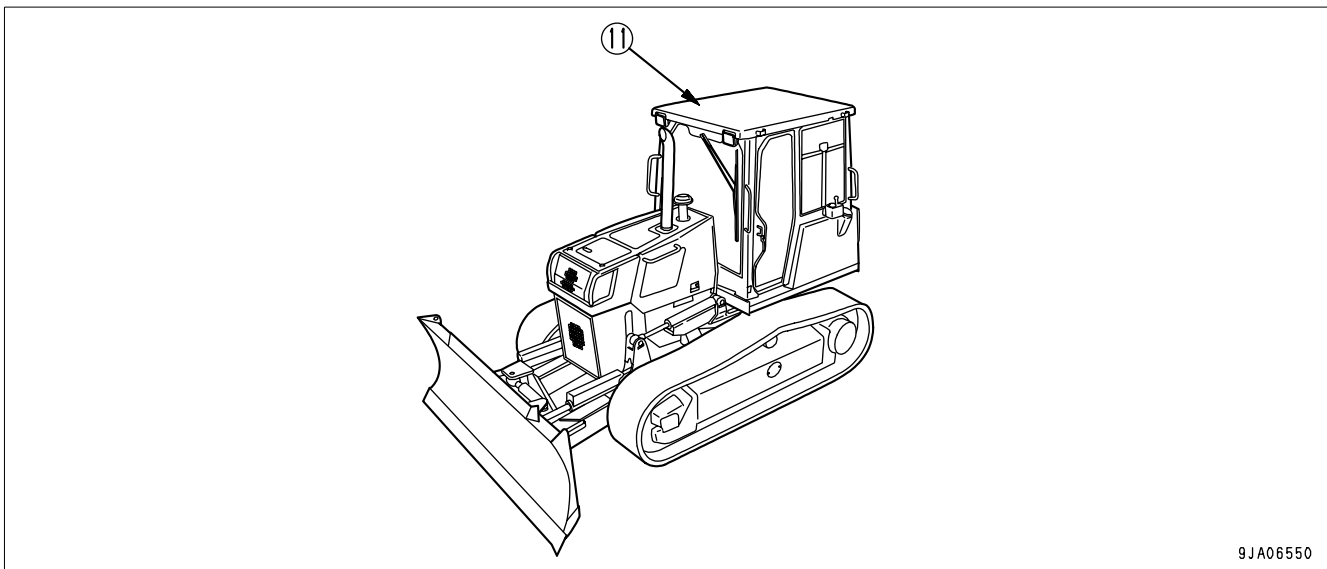
# GENERAL VIEW

## GENERAL VIEW OF MACHINE

Machine equipped with canopy

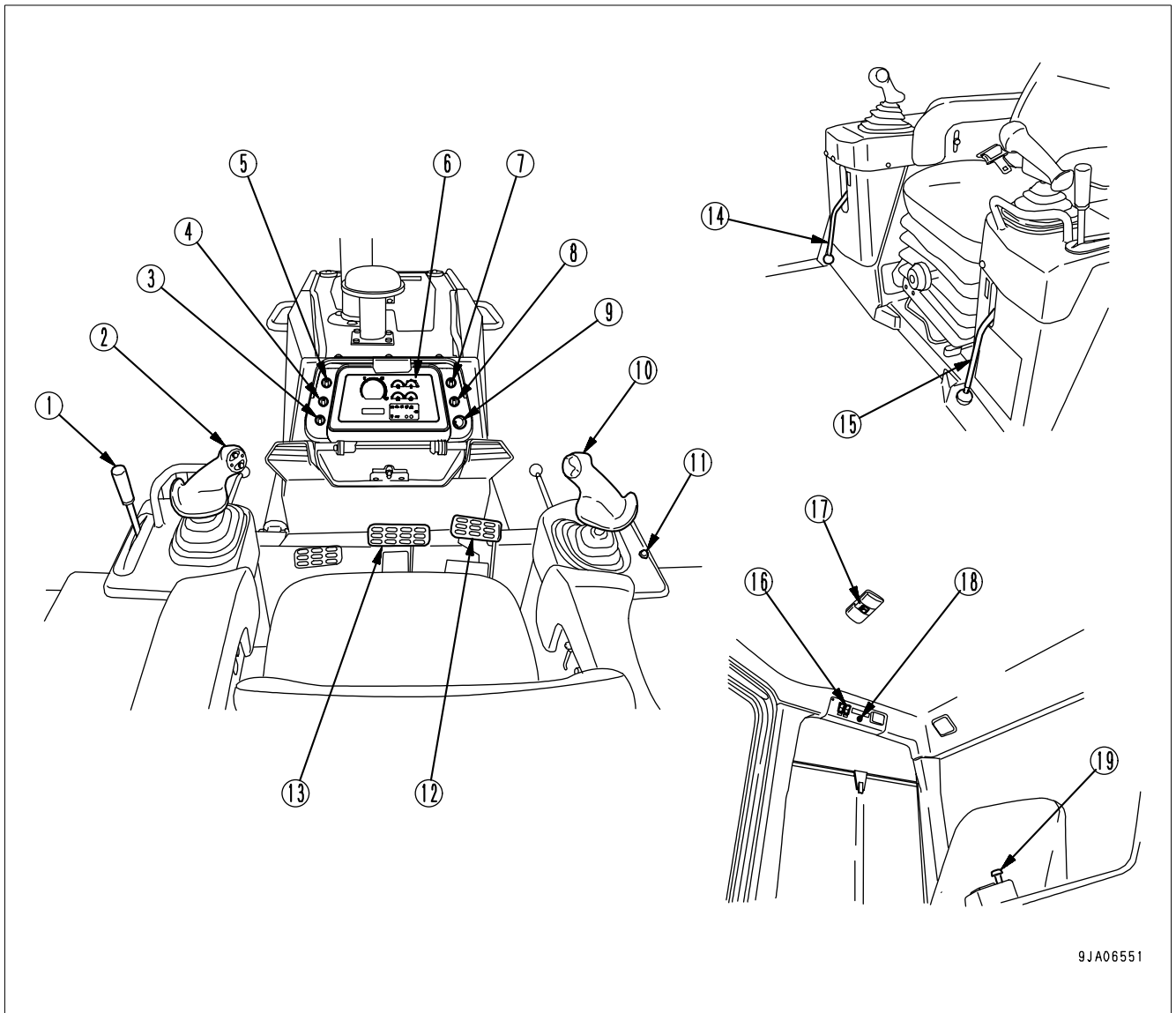


Machine equipped with cab



- (1) Blade
- (2) Angle cylinder
- (3) Radiator mask
- (4) Canopy
- (5) Track shoe
- (6) Sprocket
- (7) Track frame
- (8) Lift cylinder
- (9) Idler
- (10) Frame
- (11) Cab

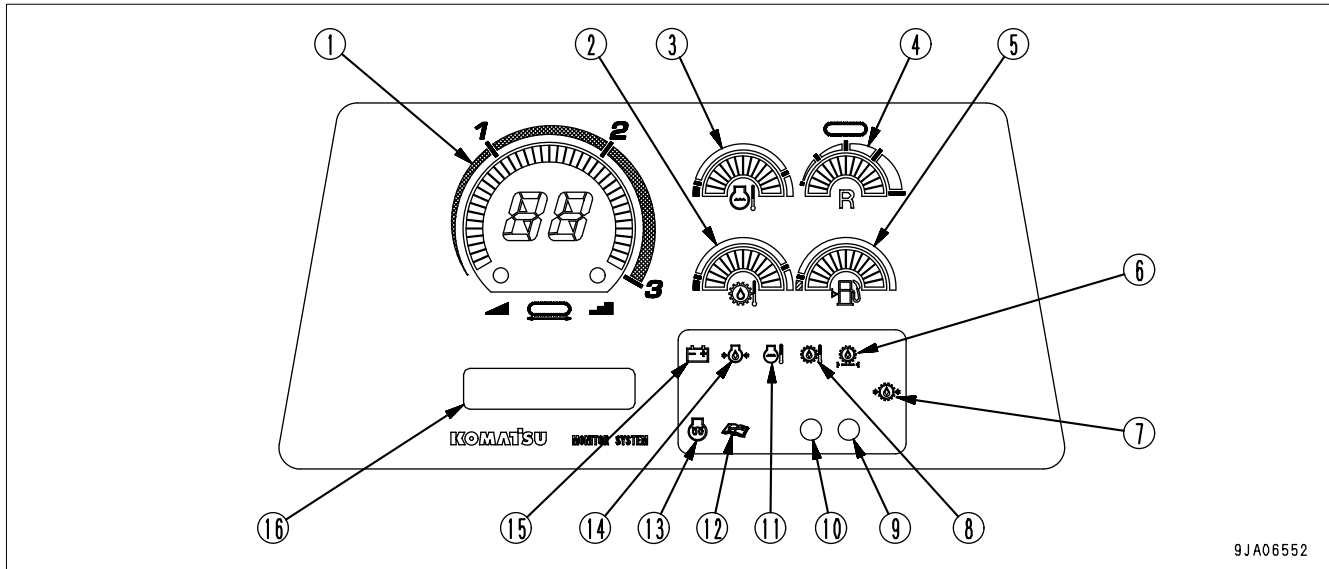
**GENERAL VIEW OF CONTROLS AND GAUGES**



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- |   |   |
|---|---|
| (1) Fuel control lever                                    | (11) Horn switch  |
| (2) Joystick (Steering, directional and gear shift lever) | (12) Decelerator pedal  |
| (3) Information switch                                    | (13) Brake pedal  |
| (4) Buzzer cancel switch                                  | (14) Safety lock lever  |
| (5) Lamp switch   | (15) Parking lever  |
| (6) Monitor panel   | (16) Wiper switch (machine equipped with cab)                     |
| (7) Reverse travel speed setting switch                   | (17) Room lamp switch (machine equipped with cab)                 |
| (8) Shift mode switch                                     | (18) Wiper motor breaker reset button (machine equipped with cab) |
| (9) Starting switch                                       | (19) Cigarette lighter (machine equipped with cab)                |
| (10) Blade control lever                                  |   |

MONITOR PANEL



9JA06552

- |   |  |
|---|--|
| (1) Display panel A (Speed range, Set travel speed, Shift mode Indicator) | (9) Filter/oil replacement interval lamp     |
| (2) HST oil temperature gauge   | (10) Warning lamp                            |
| (3) Engine coolant temperature gauge                                      | (11) Engine coolant temperature caution lamp |
| (4) Reverse travel speed indicator  | (12) Maintenance caution lamp                |
| (5) Fuel level gauge  | (13) Engine preheating pilot lamp            |
| (6) Charge filter clogging caution lamp                                   | (14) Engine oil pressure caution lamp        |
| (7) HST charge pressure caution lamp                                      | (15) Battery charge circuit caution lamp     |
| (8) HST oil temperature caution lamp                                      | (16) Display panel B (Multi-information)     |

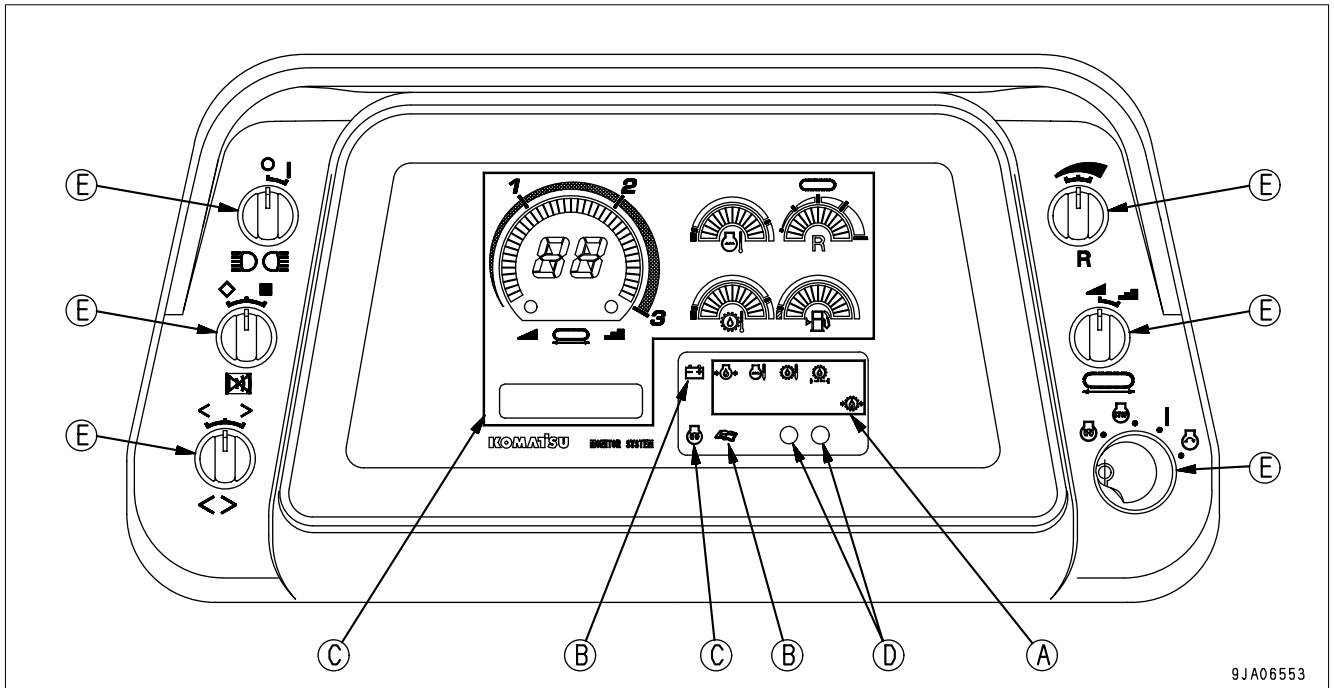


# EXPLANATION OF COMPONENTS

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

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

## FRONT PANEL



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- (A) Emergency caution group
- (B) Caution group
- (C) Meter group

- (D) Lamp
- (E) Switch

## CHECK MONITOR SYSTEM

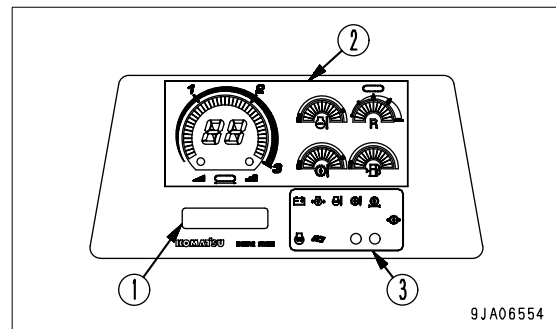
### MONITOR SYSTEM

#### NOTICE

- Stop the machine on level ground and carry out the monitor check.
- Stop the engine, then turn the starting switch to the ON position and check that the lamps light up for approx. 2 seconds. If they do not light up, please ask your Komatsu distributor to carry out inspection.
- The monitor check cannot be carried out until at least 5 seconds has passed after the engine was stopped.

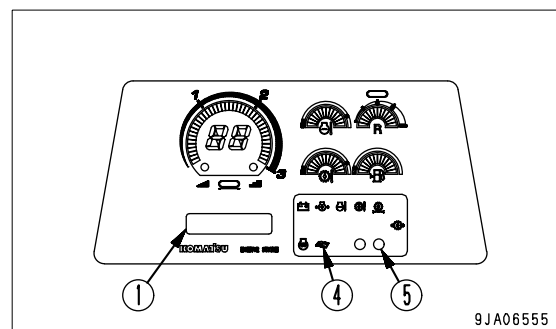
When carrying out the checks before starting, use the monitor system check.

1. Turn the starting switch to the ON position.
2. Check that the monitor liquid-crystal display and the lamps all light up for 2 seconds, that the alarm buzzer sounds for 2 seconds, and that "KOMATSU SYSTEM CHECK" is displayed for 3 seconds on display panel B (multi-information) (1).
  - After 2 seconds, the current status of the machine is displayed on liquid-crystal display (2).
  - After 2 seconds, the lamp portion (3) goes out.
  - After 3 seconds, the operating mode is displayed on display panel B (multi-information) (1).



#### REMARK

The following cases do not indicate any abnormality. When the replacement interval is reached for the oil and filter, maintenance caution lamp (4) and filter/oil replacement interval lamp (5) light up or flash for 30 seconds, and the action code is displayed on display panel B (multi-information) (1).

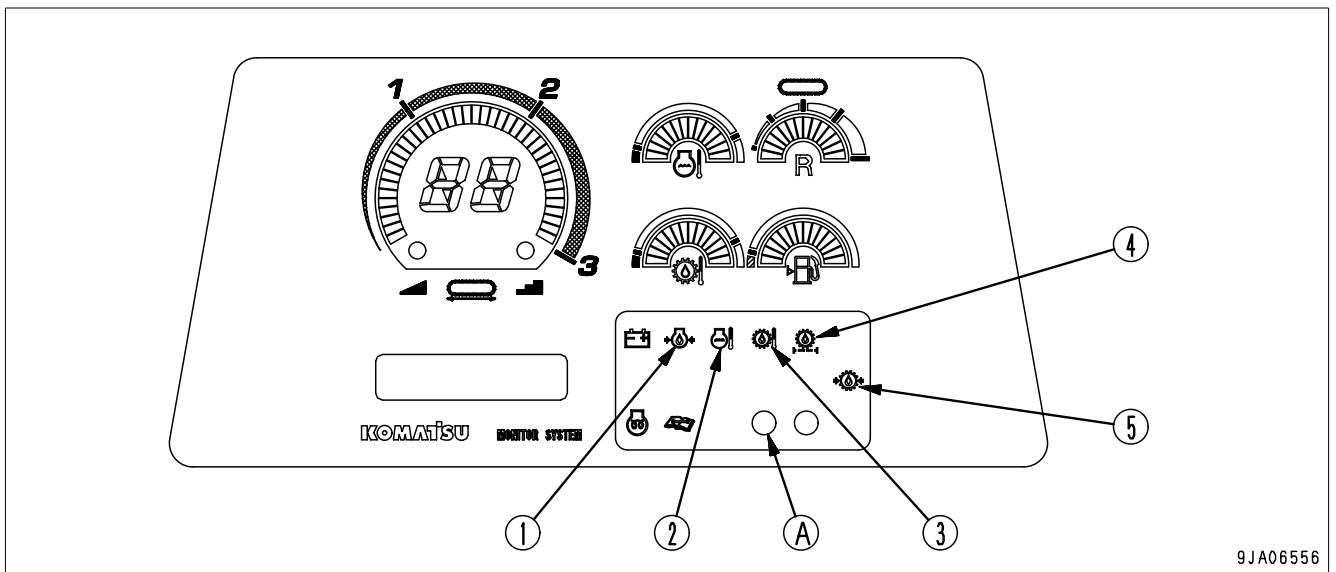


**EMERGENCY CAUTION ITEMS**

**! CAUTION**

**If any of the caution lamps begins to flash, stop the engine or reduce the engine speed to low idling immediately and check the trouble spot for necessary actions.**

These items must be monitored when the engine is running. If there is any abnormality, the caution lamp for the location of the abnormality and warning lamp (A) flash, and the alarm buzzer sounds intermittently. Take the necessary action immediately.



- |   |   |
|---|---|
| (1) Engine oil pressure caution lamp        | (4) Charge filter clogging caution lamp |
| (2) Engine coolant temperature caution lamp | (5) HST charge pressure caution lamp    |
| (3) HST oil temperature caution lamp        |   |

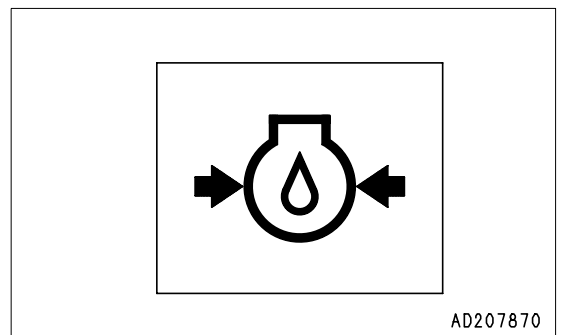
**ENGINE OIL PRESSURE CAUTION LAMP**

This lamp (1) indicates a low engine oil pressure.

If the monitor lamp flashes, stop the engine and check it immediately.

**REMARK**

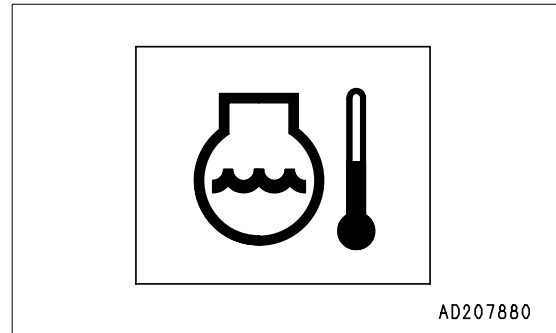
The alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine oil has been changed. It does not indicate an abnormality.



**ENGINE COOLANT TEMPERATURE CAUTION LAMP**

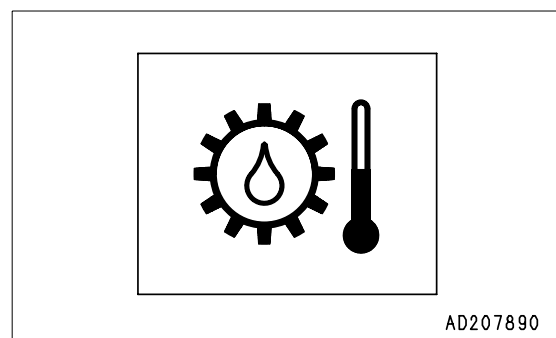
This lamp (2) indicates a raise in the coolant temperature.

When the monitor lamp flashes, run the engine at low idling speed until green range of the engine coolant temperature gauge lights.

**HST OIL TEMPERATURE CAUTION LAMP**

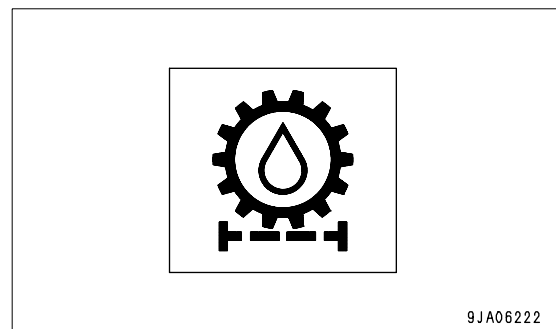
This lamp (3) warns the operator that the HST oil temperature has gone up.

If it flashes, run the engine at low idling until the HST oil temperature gauge indicates the green range.

**CHARGE FILTER CLOGGING CAUTION LAMP**

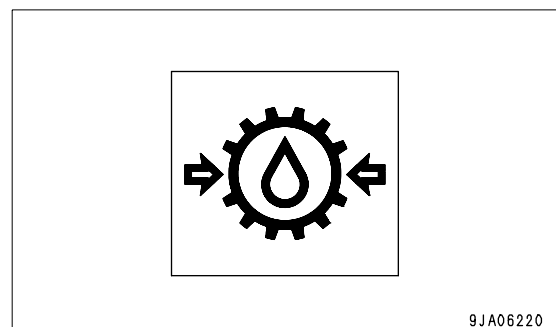
This lamp (4) warns the operator that the HST charge filter is clogged.

If it flashes, stop the machine, check for the cause of clogging, and replace the filter element with a new part.

**HST CHARGE PRESSURE CAUTION LAMP**

This lamp (5) warns the operator that the HST charge pressure has dropped.

If it flashes, stop the machine and check for the cause of the drop in the charge pressure.

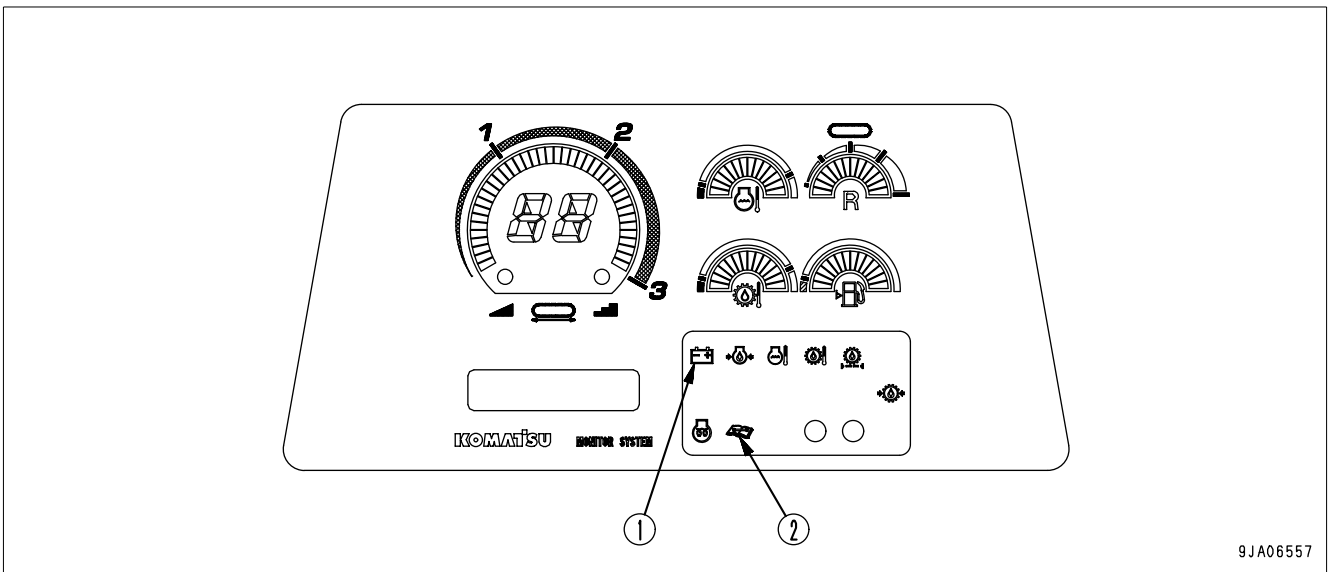


CAUTION CAUTION ITEMS

**! CAUTION**

If these caution lamps item flash, check and repair the appropriate location as soon as possible.

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 caution lamp will flash.



(1) Battery charge circuit caution lamp

(2) Maintenance caution lamp

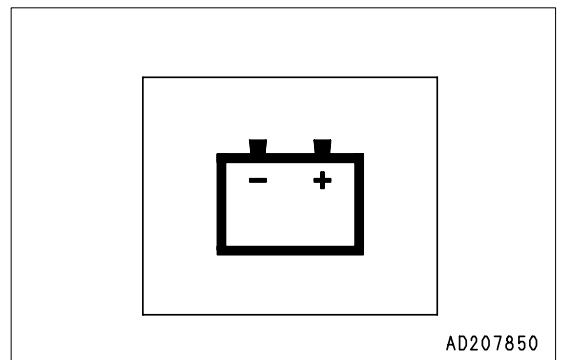
**BATTERY CHARGE CIRCUIT CAUTION LAMP**

This lamp (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 (3-125)".

**REMARK**

This monitor lamp lights when the ignition switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an abnormality.



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**MAINTENANCE CAUTION LAMP**

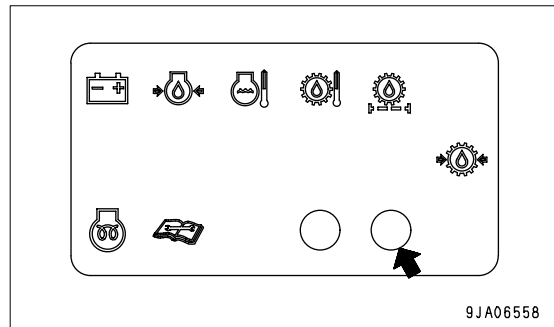
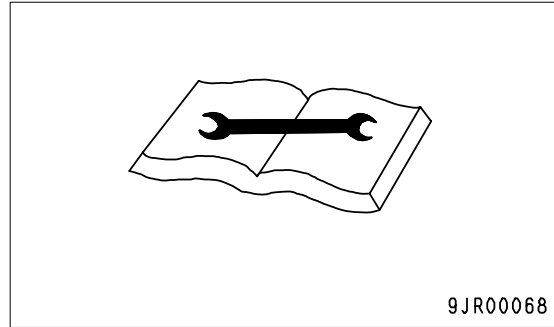
This lamp (2) lights up for approx. 30 seconds after the starting switch is turned to the ON position if the filter or oil replacement interval has been reached.

After replacing the indicated filter or oil displayed on display panel B (multi-information), reset the interval. For details, see "METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-23)".

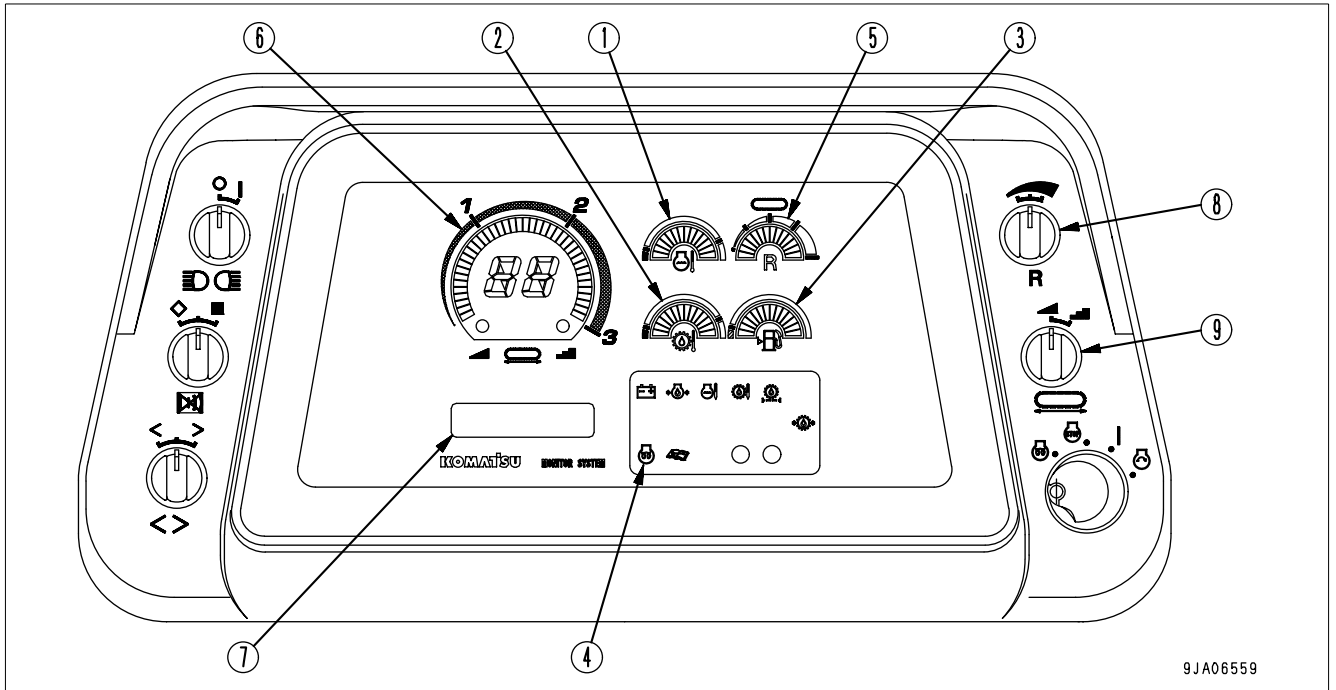
The lamp goes out.

**REMARK**

At the same time, the filter or oil replacement interval lamp also lights up or flashes.



METER GROUP



- |                                      |   |
|--------------------------------------|---|
| (1) Engine coolant temperature gauge | (6) Display panel A (Speed range, Set travel speed, Shift mode Indicator) |
| (2) HST oil temperature gauge        | (7) Display panel B (Multi-information)                                   |
| (3) Fuel level gauge                 | (8) Reverse travel speed setting switch                                   |
| (4) Engine preheating pilot lamp     | (9) Shift mode switch   |
| (5) Reverse travel speed indicator   |   |

ENGINE COOLANT TEMPERATURE GAUGE

NOTICE

If the coolant temperature gauge often enters red range (C), check the radiator for clogging.

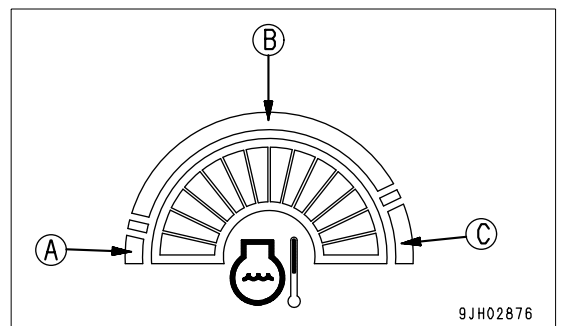
Gauge (1) indicates temperature of the engine coolant.

If the temperature is normal during operation, green range (B) will light.

If red range (C) lights during operation, move the fuel control lever to lower engine speed to approx. 3/4 of the full speed, and run until the coolant temperature enters green range (B).

If red range (C) lights up during operation, and the engine coolant temperature caution lamp flashes and the alarm buzzer sounds, stop the machine, run the engine at low idle, and wait for the coolant temperature to return to green range (B).

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



**HST OIL TEMPERATURE GAUGE**

**NOTICE**

If the HST oil temperature gauge frequently enters red range (C), check for clogging of the oil cooler.

This meter (2) displays the oil temperature in the pump suction piping.

Green range (B) should be lighted up during normal operations.

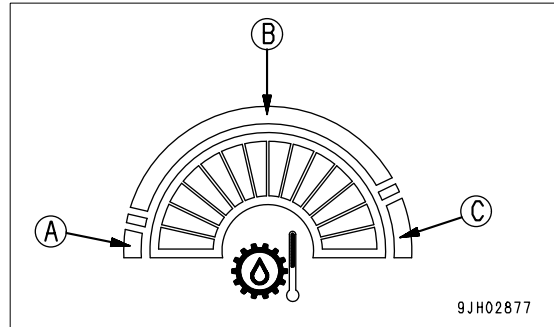
If red range (C) lights up during operation, move the fuel control lever to lower engine speed to approx. 3/4 of the full speed, reduce the load and run until the oil temperature enters green range (B).

If red range (C) lights up during operation, and the HST oil temperature caution lamp flashes and the alarm buzzer sounds, stop the machine, run the engine at low idle, and wait for the oil temperature to go down to green range (B).

(A): White range

(B): Green range

(C): Red range



**FUEL LEVEL GAUGE**

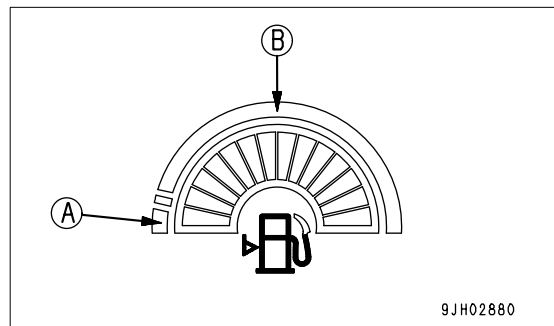
Gauge (3) fuel level in the fuel tank.

During normal operation, the green range (B) should be lighted up.

If red range (A) lights up during operation, add fuel immediately. If this is not done, the engine speed will become irregular or an error display will be shown on the monitor.

(A): Red range

(B): Green range



**REMARK**

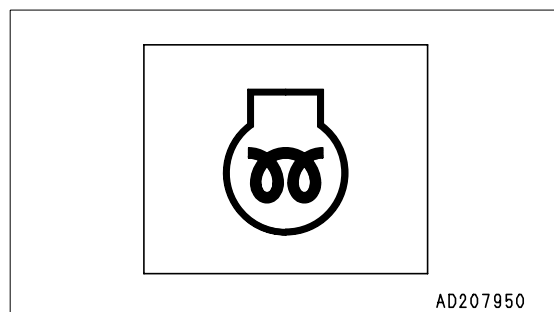
The display is not proportional to the amount of fuel remaining. If only the red range (A) lights up, there is less than 20 liters of fuel remaining.

**ENGINE PREHEATING PILOT LAMP**

When this lamp (4) is lighted up, it indicates that the electric heater is being used to preheat the engine.

This lamp lights up when the starting switch is at the HEAT position.

When the starting switch is released, the lamp will go out.





**REVERSE TRAVEL SPEED INDICATOR**

This indicator (5) displays the travel speed when traveling in reverse.

It is possible to choose the reverse travel speed in five stages according to the nature of the work without changing the forward travel speed. This means that the reverse travel speed can be obtained simply by shifting the directional lever. There is no need to shift gear.

If it is desired to raise the efficiency of dozing work, make the reverse travel speed faster.

When traveling in reverse on rough ground surfaces or when carrying out pushing-up work, make the reverse travel speed slower.

- There are five settings (A) - (E) for the reverse travel speed.

The closer the setting is to (A), the slower the reverse travel speed is in comparison with the forward travel speed; the closer the setting is to (E), the faster the reverse travel speed is in comparison with the forward travel speed.

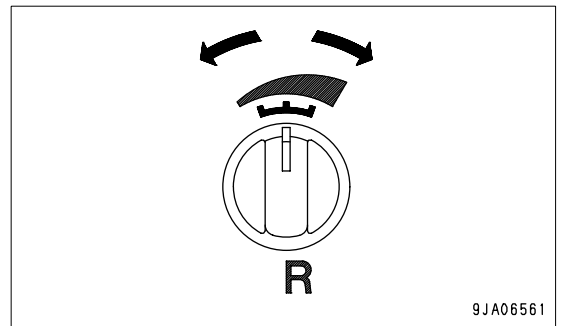
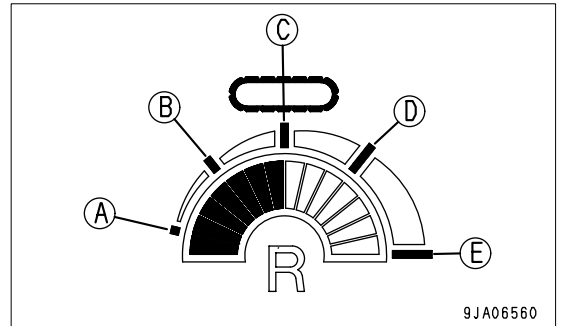
- When the starting switch is turned from the OFF position to the ON position, the travel speed is set by default to position (C).

- Position (B) sets to the same speed as the forward travel speed.

- The reverse travel speed is set by turning reverse travel speed switch (8) to the left or right.

The more it is turned to the right, the faster the set travel speed becomes.

The more it is turned to the left, the slower the set travel speed becomes.

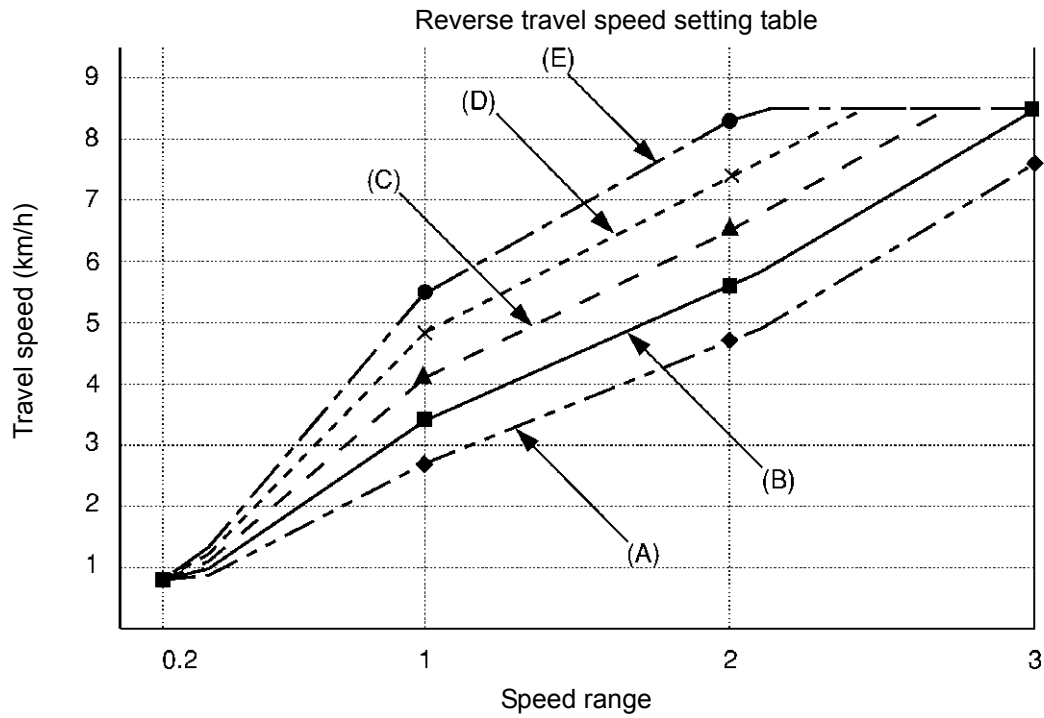


- Examples of the set travel speed compared with the speed range are shown in the table below.

Speed ranges- Mode	0.2	1	2	3
(A)	0.8 km/h 0	2.7 km/h -0.7 km/h	4.7 km/h -0.9 km/h	7.6 km/h -0.9 km/h
(B)	0.8 km/h 0	3.4 km/h 0	5.6 km/h 0	8.5 km/h 0
(C)	0.8 km/h 0	4.1 km/h +0.7 km/h	6.5 km/h +0.9 km/h	8.5 km/h 0
(D)	0.8 km/h 0	4.8 km/h +1.4 km/h	7.4 km/h +1.8 km/h	8.5 km/h 0
(E)	0.8 km/h 0	5.5 km/h +2.1 km/h	8.3 km/h +2.7 km/h	8.5 km/h 0

Upper line: Reverse set travel speed

Lower line: Difference in reverse travel speed compared with forward travel speed



**DISPLAY PANEL A (SPEED RANGE, SET TRAVEL SPEED, SHIFT MODE INDICATOR)**

This meter (6) indicates speed range, travel speed, and shift mode.

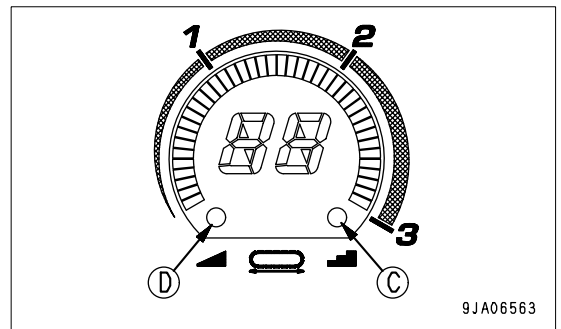
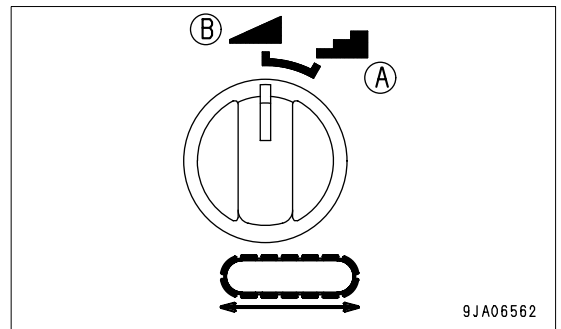
Use the shift mode switch (9) to select the shift mode.

Position (A): Quick shift mode

Pilot lamp (C) on display panel A lights up.

Position (B): Variable shift mode

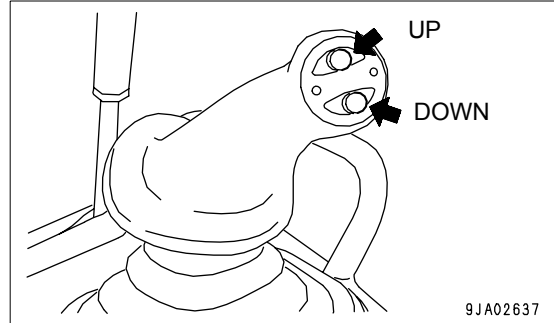
Pilot lamp (D) on display panel A lights up.



**QUICK SHIFT MODE**

The travel speed is set to the travel speed that matches the general operating load. Operation is easy: each time the shift switch on the steering, directional, and gearshift lever is pressed, the speed switches 1st ↔ 2nd ↔ 3rd.

- Each time the UP switch on the steering, directional, and gearshift lever is pressed, the speed switches 1st → 2nd or 2nd → 3rd.
- Each time the DOWN switch on the steering, directional, and gearshift lever is pressed, the speed switches 3rd → 2nd or 2nd → 1st.



- Direction of travel (E) and speed range (F) are displayed on the speed range display in the middle.

(E) F: FORWARD

R: REVERSE

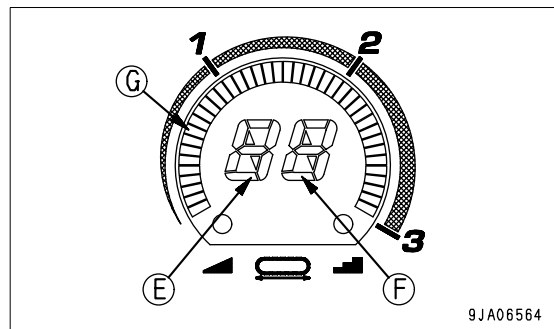
N: Neutral

P: Parking lever is at LOCK position

(F) 1: 1st

2: 2nd

3: 3rd



Example: F1 is displayed for FORWARD 1st

- Bar graph (G) around the outside circumference does not light up.
- When the starting switch is turned from the OFF position to the ON position, the speed range is set by default to 1st.

**VARIABLE SHIFT MODE**

The travel speed can be set in 20 stages from 0.8 km/h to 8.5 km/h.

In particular, the minimum travel speed is set low so that work such as loading the machine onto a trailer or traveling over rough places on the road surface can be carried out more safely.

Furthermore, it is possible to select the optimum travel speed over a wider range for work such as plowing or winch operations.

- Each time the UP switch on the steering, directional, and gearshift lever is pressed, two segments on the bar graph around the outside circumference light up and the set travel speed increases by approx. 0.4 km/h.
- If the UP switch on the steering, directional, and gearshift lever is kept pressed, the segments on the bar graph around the outside circumference light up in turn. When the switch is released, the speed range is set at that position.
- To reduce the set speed, press the DOWN switch on the steering, directional, and gearshift lever in the same way.
- Direction of travel is displayed at (E) on the speed range display in the middle and the set travel speed is displayed on bar graph (G) around the outside circumference.

Nothing is displayed in (F).

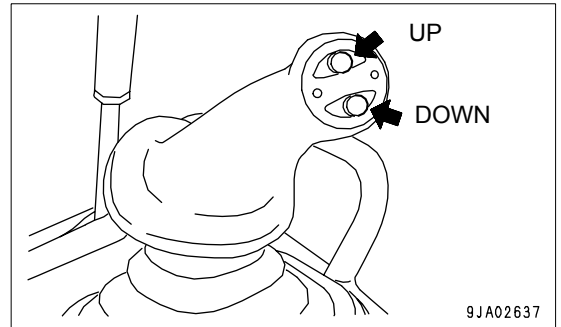
(E) F: FORWARD

R: REVERSE

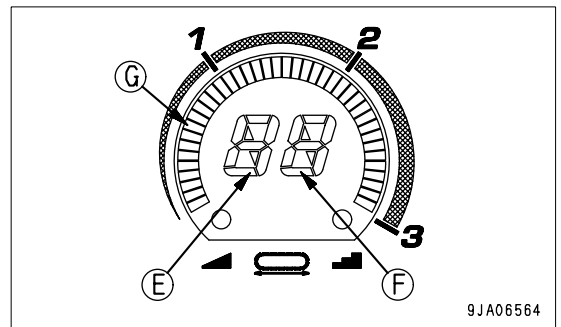
N: Neutral

P: Parking lever is at LOCK position

- When the starting switch is turned from the OFF position to the ON position, the speed range is set by default to 1st.
- If the mode is shifted from variable shift mode to quick shift mode, the speed range is set to the nearest speed range (1st, 2nd, or 3rd).



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- See the chart below for details of the lighting up of bar graph (G) around the outside circumference and the set travel speed.

Gauge No.	Speed range	Set travel Speed km/h	Gauge No.	Speed range	Set travel Speed km/h	Gauge No.	Speed range	Set travel Speed km/h
1 2	0.2	0.8	15 16	1.1	3.8	27 28	2.2	6.0
3 4	0.3	1.0	17 18	1.3	4.1	29 30	2.3	6.4
5 6	0.5	1.5	19 20	1.4	4.5	31 32	2.4	6.8
7 8	0.6	2.0	21 22	1.6	4.9	33 34	2.6	7.3
9 10	0.8	2.4	23 24	1.8	5.2	35 36	2.7	7.7
11 12	0.9	2.9	25 26	2.0	5.6	37 38	2.9	8.1
13 14	1.0	3.4				39 40	3.0	8.5

**DISPLAY PANEL B (multi-information)**

The top and bottom lines in display panel B (multi-information) display information related to the condition of the machine.

The content of the display is divided into “OPERATING MODE“ and “MAINTENANCE MODE“. Use the buzzer cancel switch to switch between the operating mode and maintenance mode.

For details of switching the mode, see“BUZZER CANCEL SWITCH (3-31)“.

**OPERATING MODE (default screen)**

Use this mode when operating the machine.

**REMARK**

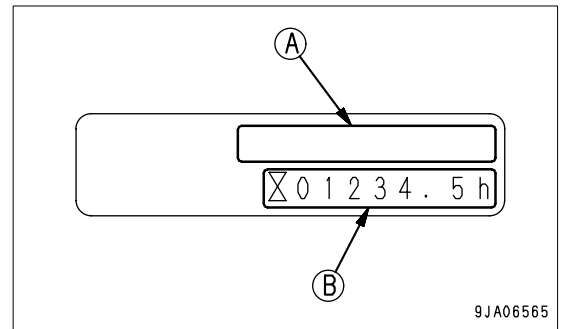
When the starting switch is turned from the OFF position to the ON position, display panel B (multi-information) always displays the operating mode.

The following information is displayed by the operating mode.

Top line (A): Action code

If any abnormality occurs on the machine, an action code is displayed. If an action code appears, take the applicable action. For details, see “OTHER TROUBLE (3-125)“.

This displays various types of filter or oil replacement intervals have been reached.



Bottom line (B): Service meter or engine speed

Use the information switch to switch the display between the service meter and engine speed. For details of switching the display, see “INFORMATION SWITCH (3-31)“.

Service meter

This displays the total number of hours that the machine has been operated. Use the display to determine the intervals for periodic maintenance.

While the engine is running, the service meter advances, even if the machine is not being operated.

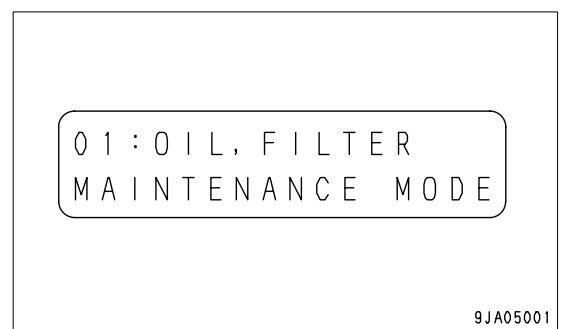
While the engine is running, the hourglass mark at the side of the meter light up to show that the meter is advancing.

The meter advances 0.1h for every 6 minutes that the engine is running,

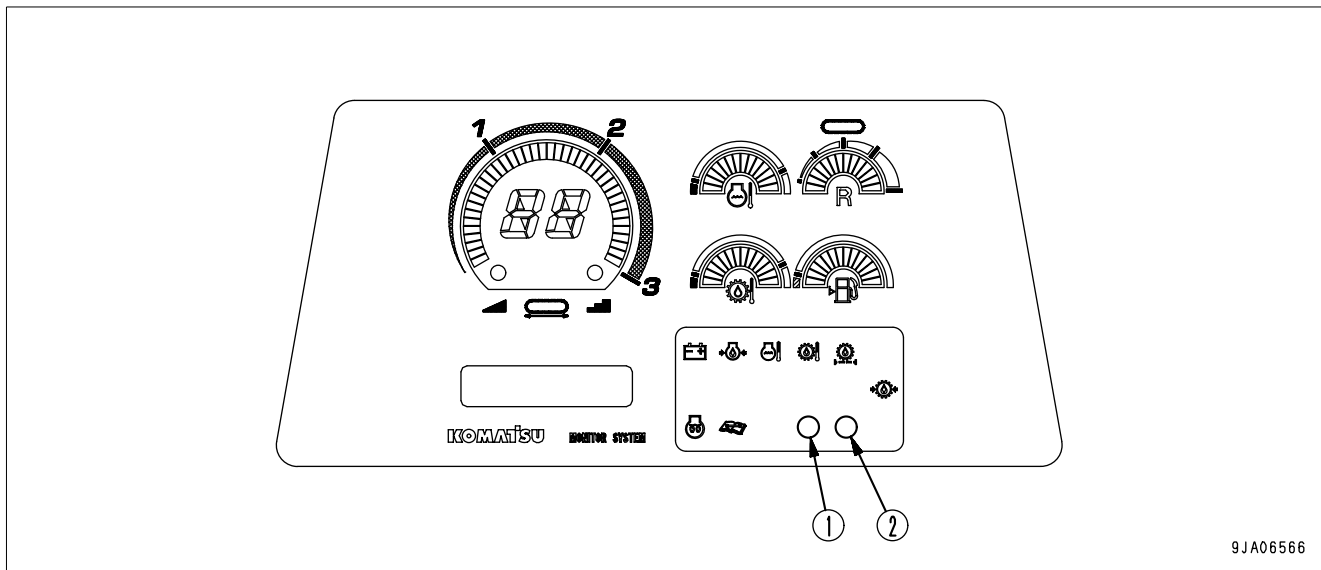
**Maintenance mode**

This displays various types of information related to maintenance of the machine.

For details, see “METHOD OF USING MAINTENANCE MODE (3-21)“.



**LAMPS**



(1) Warning lamp

(2) Filter/oil replacement interval lamp

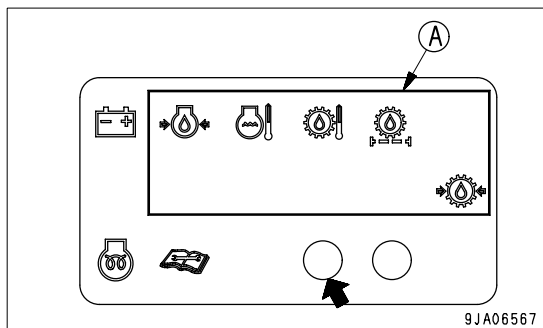
**WARNING LAMP**

(Red)

**NOTICE**

**If alarm buzzer sounds, stop work immediately and perform inspection and maintenance of the appropriate point.**

This lamp (1) flashes when the caution lamp flashes and when an action code is displayed on display panel B (multi-information).

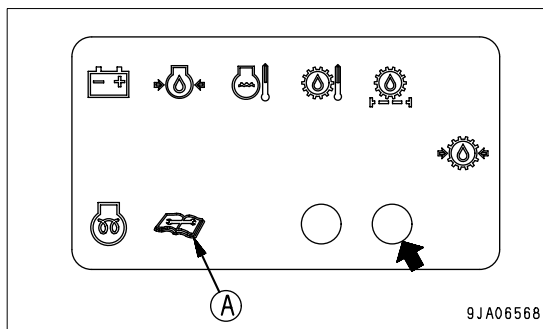


When the caution lamp (A) of an emergency warning item flashes, or when the part of an action code is displayed, the alarm buzzer sounds continuously at the same time.

**FILTER/OIL REPLACEMENT INTERVAL LAMP**

(Yellow)

If it is time to replace a filter or change the oil, this lamp (2) lights up or flashes for approx. 30 seconds after the starting switch is turned ON.



**REMARK**

This lamp (2) lights up if there is less than 30 hours remaining until replacement, and flashes when the replacement interval has passed.


At the same time, maintenance caution lamp (A) also lights up.



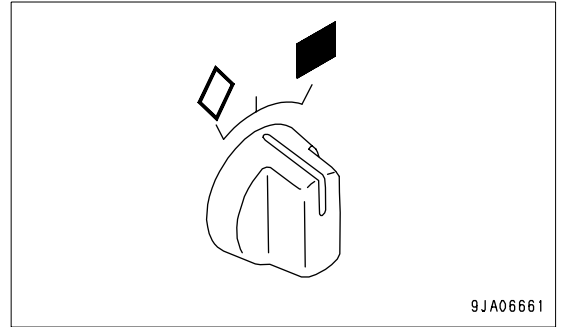
After replacing the indicated filter or oil displayed on display panel B (multi-information), reset the time. For details, see "METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-23)".

The lamp goes out or stops flashing.

**METHOD OF USING MAINTENANCE MODE**

To switch from the operation mode to the maintenance mode, turn the buzzer switch to the  position and hold it there for at least 2.5 seconds. The screen will switch to the maintenance mode.

On the first screen, the oil and filter maintenance mode is displayed.



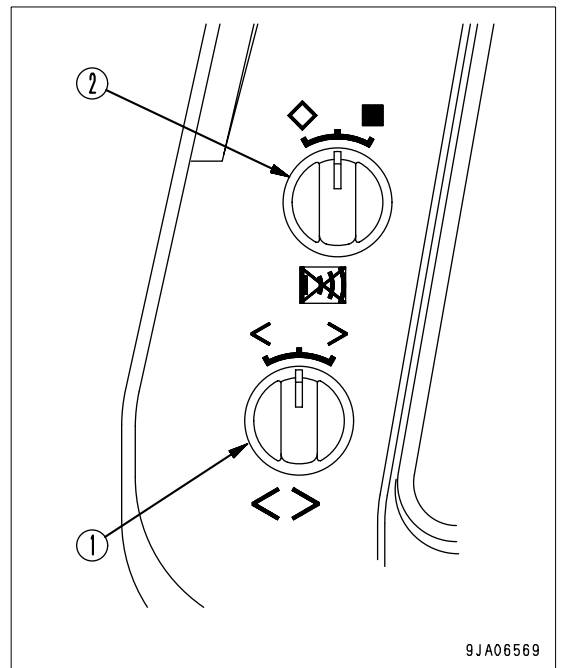
9JA06661

**EXPLANATION OF MODES AND OPERATION**

The maintenance mode has the following 4 sub modes.

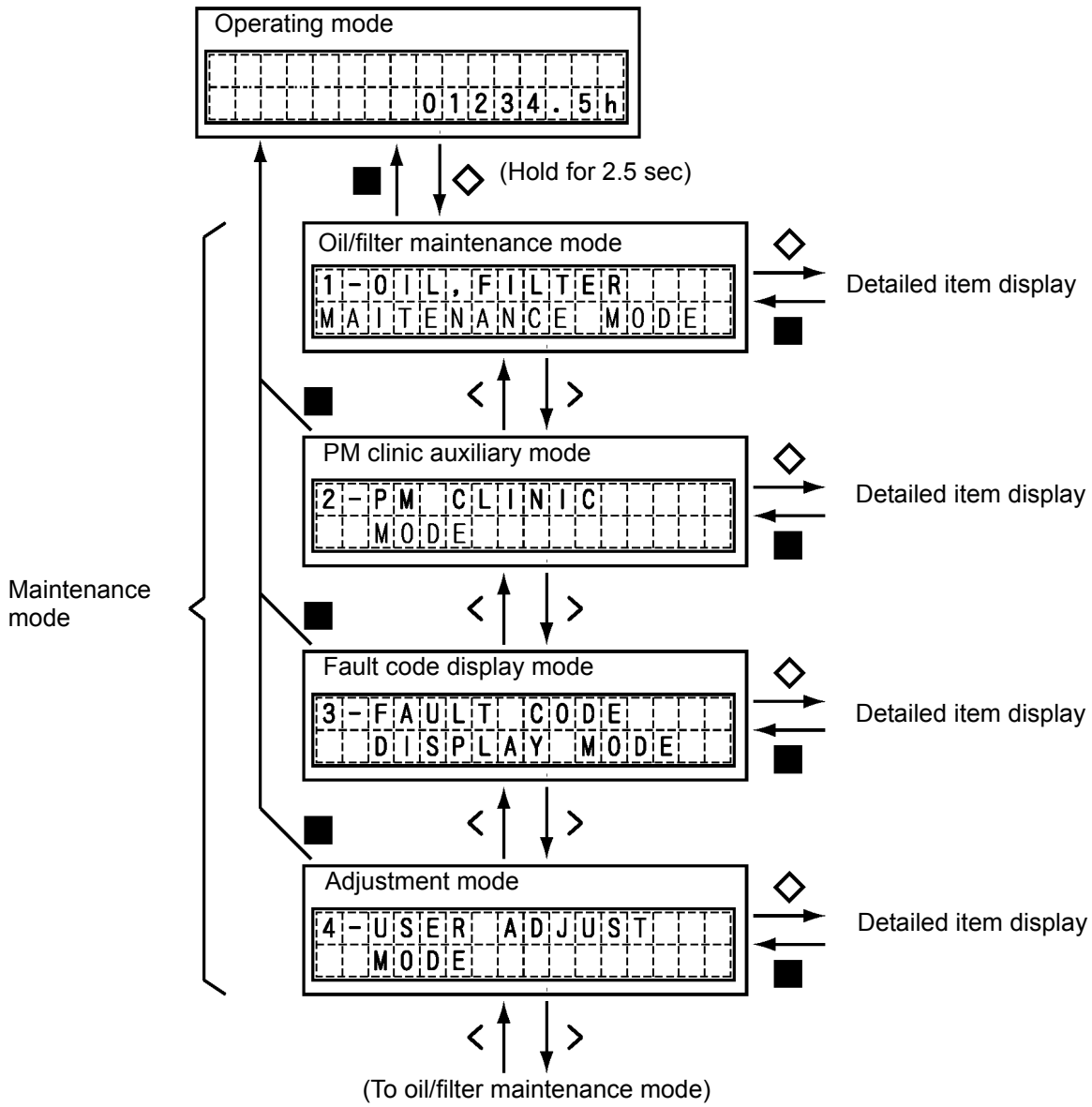
Sub mode	Function	Reference items
Oil/filter maintenance mode	Oil or filter replacement time is displayed	METHOD OF USING OIL AND FILTER MAINTENANCE MODE (3-23)
PM clinic auxiliary mode	Engine speed or HST oil temperature is displayed	METHOD OF USING PM CLINIC AUXILIARY MODE (3-25)
Fault code display mode	Fault codes for electronic control related parts are displayed	METHOD OF USING FAULT CODE DISPLAY MODE (3-26)
Adjustment mode	Adjusts monitor brightness, etc.	METHOD OF USING USER ADJUST MODE (3-27)

Use information switch (1) and buzzer cancel switch (2) to operate each mode.



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METHOD OF SELECTING EACH MODE



**METHOD OF USING OIL AND FILTER MAINTENANCE MODE**

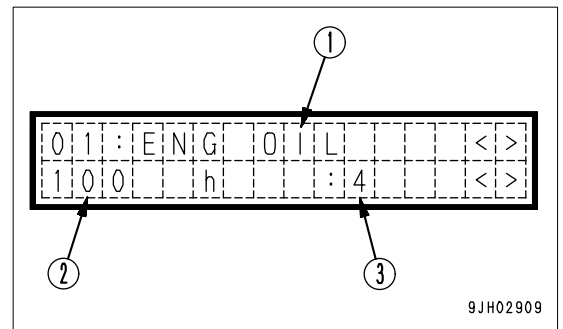
**NOTICE**

This function is only a guideline. If dirty oil or filters are found during daily maintenance, replace them immediately.

If the controllers or monitor panel are replaced, the timer for this function will not work properly. Contact your Komatsu distributor for replacement.

In the oil and filter maintenance mode, the replacement intervals for oil and filters are displayed on display panel B (multi-information).

- (1) The item is displayed.
- (2) The time remaining until replacement is displayed.
- (3) The quantity of replacements until now is displayed.



The display items can be displayed in order by operating the information switch to the left or right (<, >).

Code	Display	Item	Replacement interval	
			1st time (cannot be changed)	2nd and following times (can be changed)
01	ENG OIL	Engine oil	500h	500h
02	ENG FILT	Engine oil filter	500h	500h
03	FUEL FILT	Fuel filter	500h	500h
04	HYD FILT	Hydraulic oil filter	2000h	2000h
05	CORR RES	Corrosion resistor (*)	-	-
06	BYPS FILT	Bypass filter (*)	-	-
07	DAMP OIL	Damper oil (*)	-	-
08	FNL OIL	Final drive oil	1000h	1000h
09	HYD OIL	Hydraulic oil	2000h	2000h
10	POWL OIL	Power train oil (*)	-	-
11	POWL FILT	Power train oil filter (*)	-	-
12	HST FILT	HST charge filter	2000h	2000h

- The timing of the 1st interval cannot be changed. If some special condition makes it desirable to change the 1st interval, use the maintenance mode in the operator mode to change the replacement interval as follows. First, set so that the system thinks that the 1st maintenance has been completed, then set the 2nd and following times.
- (\*) Although the marked item is displayed, it is not used with this machine.

When the oil or filter has been replaced, select the applicable item, then operate the buzzer cancel switch to  $\diamond$ .

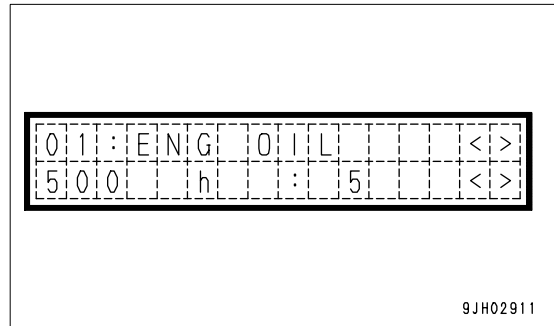
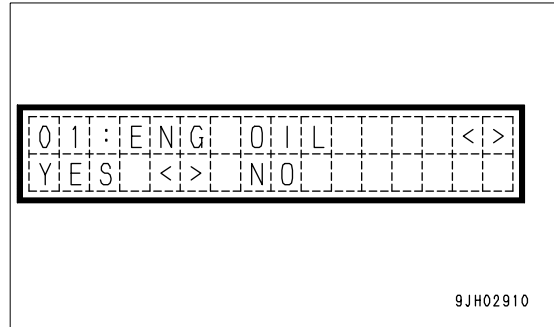
The screen will ask if you want to display the replacement history.

Operate the information switch to select YES, then operate the buzzer cancel switch to  $\diamond$ . The replacement quantity will increase by 1, the replacement interval will be reset, and the oil, filter change interval lamp will go out.

When this is done, if the maintenance caution lamp does not go out, there is another item close to the replacement time, so check that item.

**REMARK**

To return to the maintenance mode, operate the buzzer cancel switch to  $\blacksquare$ .



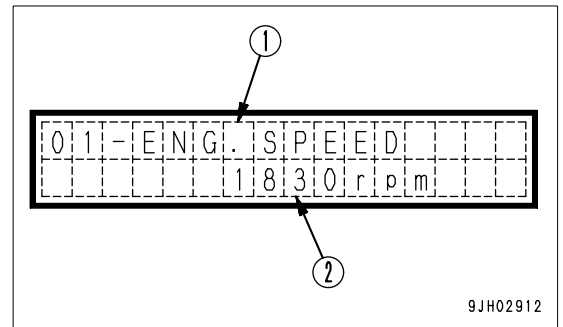
METHOD OF USING PM CLINIC AUXILIARY MODE

**⚠ CAUTION**

When moving the work equipment or setting the transmission to the travel position for carrying out measurements, check carefully that the situation is safe.

The PM clinic auxiliary mode displays the engine speed or hydraulic pressure on display panel B (multi-information).

Display panel B (Multi-information) displays the item on the top line (1) and the measured value on the bottom line (2).



The display items consist of the four items in the table below.

The items can be selected by operating the information switch (<, >).

Display	Item	Measured value
01-ENG.SPEED	Engine speed	rpm
02-BATTERY VOLT	Battery voltage	mV
03-HST TEMP	HST oil temperature	°C
04-VEHICLE SPEED	Vehicle speed	km/h

**REMARK**

Items such as the engine speed fluctuate and are difficult to see during the measurement. In such cases, operate the buzzer cancel switch to ◇. This makes it possible to hold the display of the value.

To cancel this mode, operate the buzzer cancel switch again to ◇.

To return to the maintenance mode, operate the buzzer cancel switch to ■.

When switching the display item of the PM clinic auxiliary mode, set the safety lock lever to the LOCK position. If the safety lock lever is not at the LOCK position, the display item will not change when the information switch is operated.

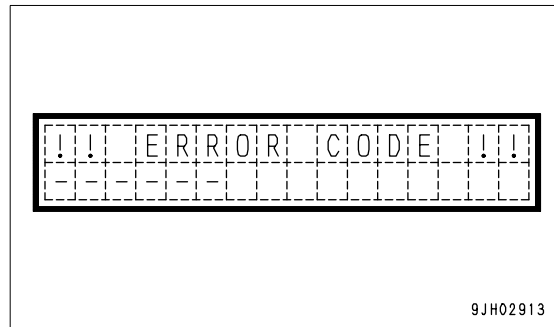
**METHOD OF USING FAULT CODE DISPLAY MODE**

**NOTICE**

The fault items observed by this function are connected with the electronic control, so even if a fault code is not displayed, there is probably some problem with the machine. If the operator feels any abnormality with the machine, the machine should be stopped immediately and checked.

When any disconnection or short circuit in any sensor is detected, the location and fault code are displayed by a 6-digit code on display panel B (multi-information). When contacting your Komatsu distributor, inform your distributor of the code at the same time.

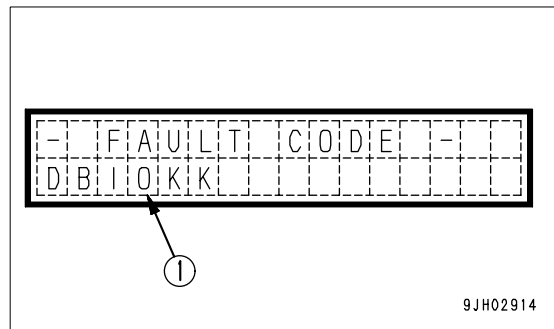
If the failure observation function has not determined the condition of the machine, the display is as shown in the diagram on the right.



With this function, existing failures can be displayed up to a maximum of 20 items.

If multiple failures are occurring, the display automatically changes every 2 seconds, so check the code (1).

The display is shown repeatedly.



**REMARK**

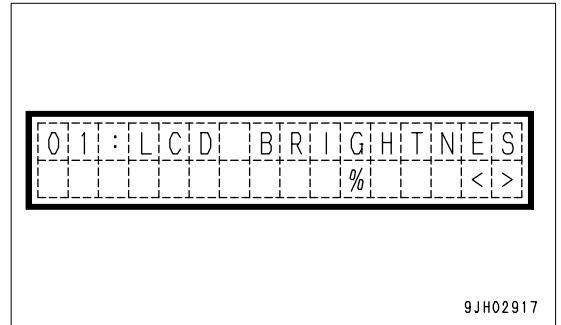
To return to the maintenance mode, operate the buzzer cancel switch to ■.

**METHOD OF USING USER ADJUST MODE**

With the user adjust mode, the brightness of the panel screen backlighting and the contrast of the liquid crystal panel can be changed.

1. Adjusting backlighting of liquid crystal display
2. The diagram on the right is the mode for adjusting the brightness of the backlighting of the liquid crystal panel.

This display will be switched to the screen brightness adjustment display, if the alarm buzzer cancellation switch is turned to the ◇ position.

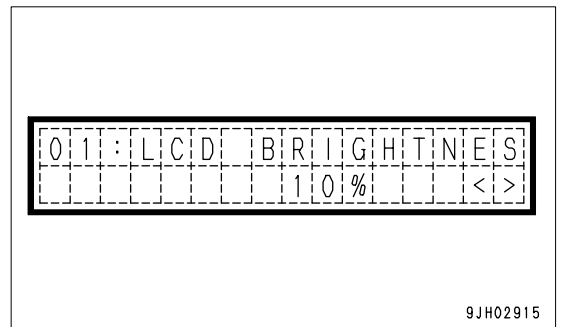


3. The brightness can be adjusted by operating the information switch.

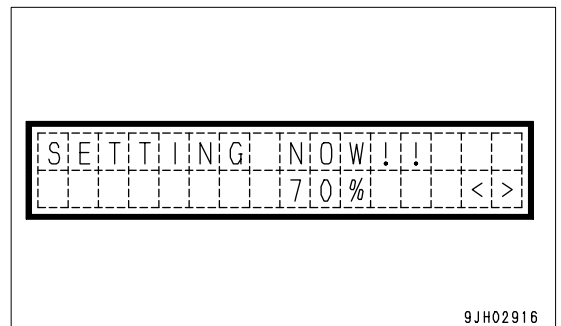
The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.

> position: Number increases

< position: Number decreases



4. The brightness of the backlight for the LCD gauges may be held constant by turning the alarm buzzer cancellation switch to the ◇ position.



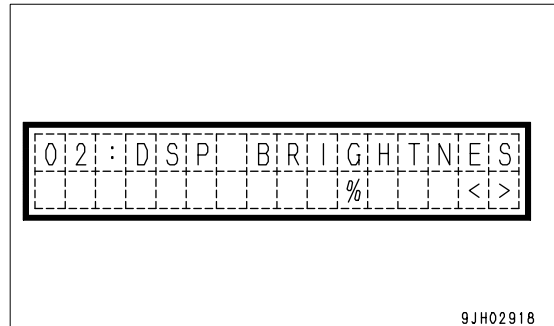
**REMARK**

To return to the maintenance mode, operate the buzzer cancel switch to ■.

The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.

- 5. Adjusting backlighting of display panel B (multi-information)
- 6. The diagram on the right is the mode for adjusting the brightness of the backlighting of the display panel B (multi-information).

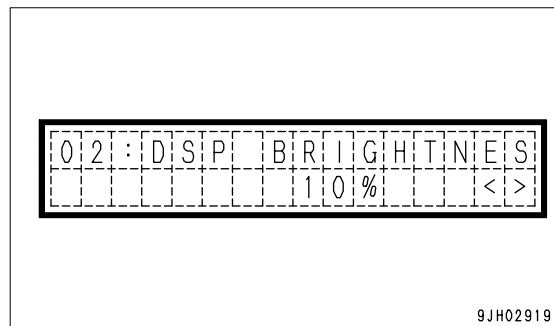
On the screen, operate the buzzer cancel switch to  $\diamond$  to switch to the screen for adjusting the brightness.



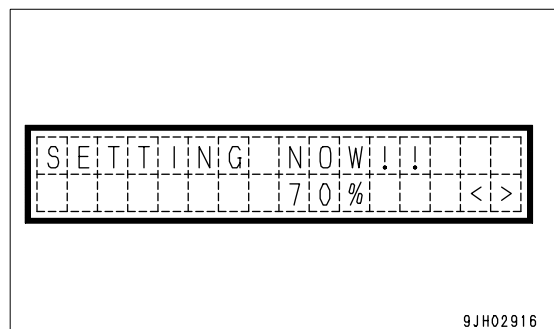
- 7. The brightness can be adjusted by operating the information switch.

The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.

- > position: Number increases
- < position: Number decreases



- 8. When the buzzer cancel switch is operated to  $\diamond$ , the brightness of the display panel B (multi-information) backlighting is set.



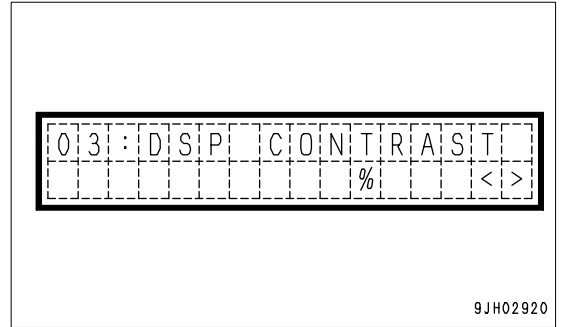
**REMARK**

To return to the maintenance mode, operate the buzzer cancel switch to  $\blacksquare$ .  
 The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lit or not. Entering this mode when the front lamps are lit makes it possible to adjust the brightness when the front lamps are lit. In the same way, entering this mode when the front lamps are not lit makes it possible to adjust the brightness when the front lamps are not lit.



- 9. Adjusting contrast of liquid crystal display panel B (multi-information)
- 10. The diagram on the right is the mode for adjusting the contrast of the liquid crystal display panel B (multi-information).

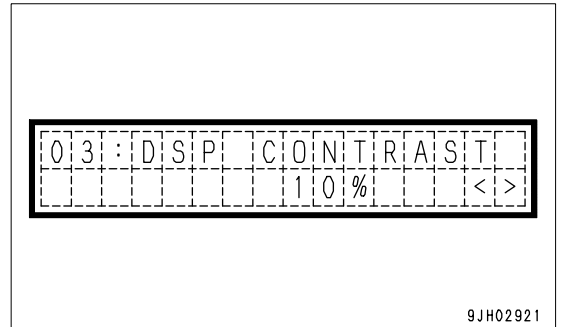
On this screen, operate the buzzer cancel switch to ◇ to switch to the screen to adjust the contrast.



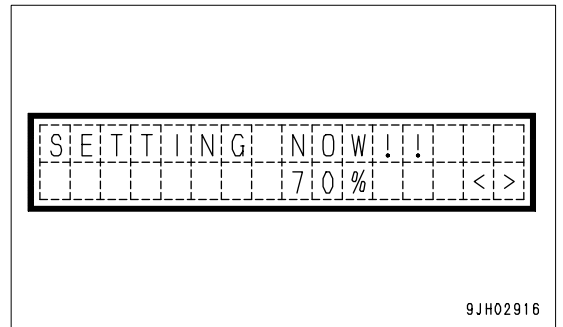
- 11. The contrast can be adjusted by operating the information switch.

The higher the number, the deeper the screen becomes; the lower the number, the lighter the screen becomes.

- > position: Number increases
- < position: Number decreases



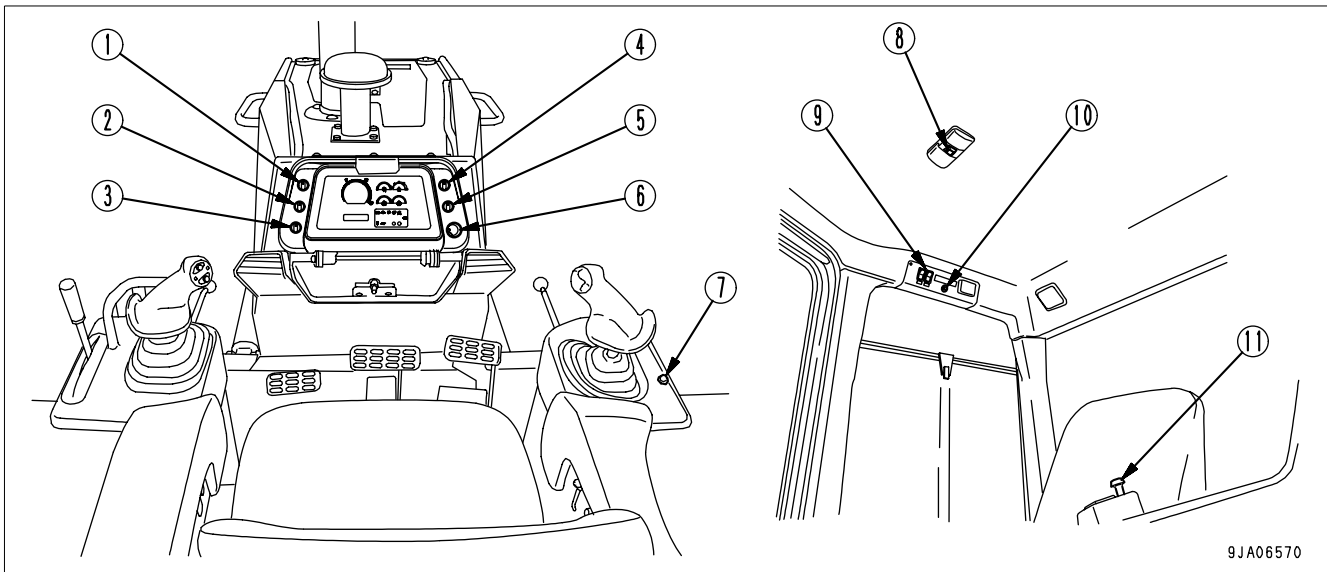
- 12. When the buzzer cancel switch is operated to ◇, the contrast of the liquid crystal display panel B (multi-information) is set.



**REMARK**

To return to the maintenance mode, operate the buzzer cancel switch to ■.

**SWITCHES**



9JA06570

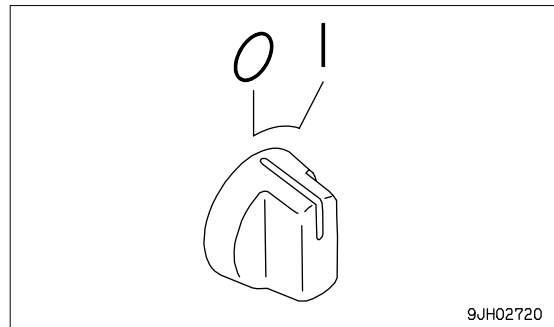
- |   |  |
|---|--|
| (1) Lamp switch                         | (7) Horn switch  |
| (2) Buzzer cancel switch                | (8) Room lamp switch (machine equipped with cab)                   |
| (3) Information switch                  | (9) Wiper switch (machine equipped with cab)                       |
| (4) Reverse travel speed setting switch | (10) Wiper motor breaker reset button (machine equipment with cab) |
| (5) Shift mode switch                   | (11) Cigarette lighter (machine equipped with cab)                 |
| (6) Starting switch                     |  |

**LAMP SWITCH**

This switch (1) lights up when the front and rear lamps, and the panel lamp light up.

O (OFF) position: Lights out

I (ON) position: Lights on



9JH02720

**BUZZER CANCEL SWITCH**

This switch (2) is used to operate control panel B (multi-information) or to stop the alarm buzzer.

When the switch is released, it returns automatically to the center position.

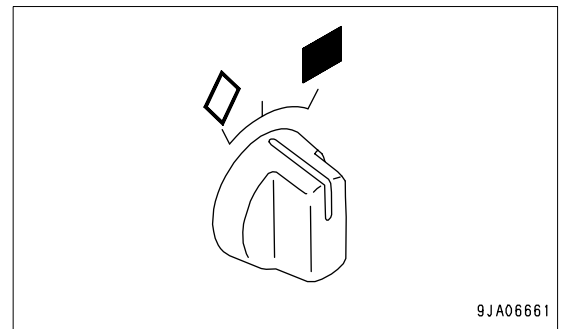
- **When display panel B (multi-information) is in the operation mode**

- When the alarm buzzer is sounding, turn this switch to the ■ position to stop the buzzer.
- If the switch is held at the ◇ position for at least 2.5 seconds, the display switches to the maintenance mode.

- **When display panel B (multi-information) is in the maintenance mode**

- position: Cancel or reset to operation mode
- ◇ position: Confirms selection or selected item

For details, see "METHOD OF USING MAINTENANCE MODE (3-21)".

**INFORMATION SWITCH**

This switch (3) is used to operate display panel B (multi-information).

When the switch is released, it returns automatically to the center position.

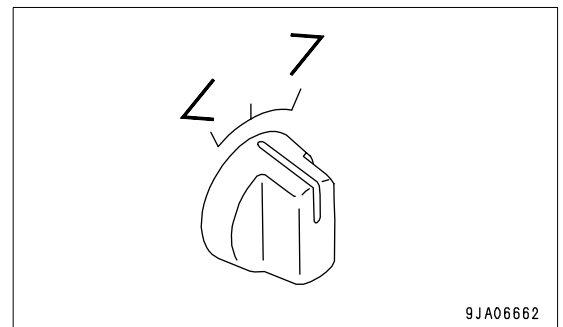
- **When display panel B (multi-information) is in the operation mode**

turn the switch to < or > to switch the display to service meter or engine speed.

- **When display panel B (multi-information) is in the maintenance mode**

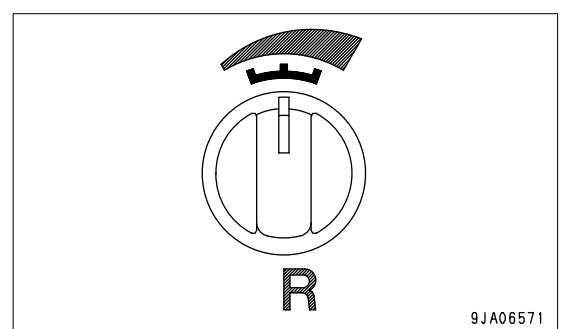
It is used to move between sub modes, between items, to move the cursor, or to change values.

For details, see "METHOD OF USING MAINTENANCE MODE (3-21)".

**REVERSE TRAVEL SPEED SETTING SWITCH**

This switch (4) can be used to set the reverse travel speed to a different setting from the forward travel speed.

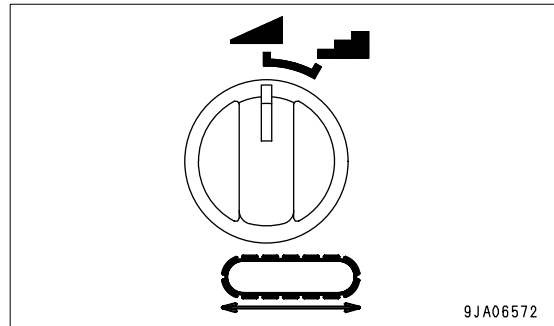
For details, see "REVERSE TRAVEL SPEED INDICATOR (3-13)".



### SHIFT MODE SWITCH

Use this switch (5) to switch the shift mode.

For details, see “DISPLAY PANEL A (SPEED RANGE, SET TRAVEL SPEED, SHIFT MODE INDICATOR) (3-15)“.



### STARTING SWITCH

The switch (6) is used to start and stop the engine.

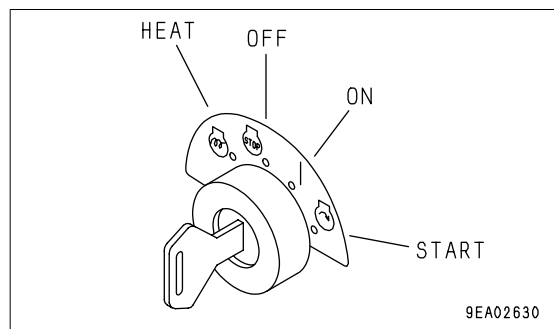
OFF position:

At this position, the starting switch key can be inserted and removed. When the switch is turned to this position, all the electric circuits are turned off and the engine stops.

ON position:

In this 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 position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

HEAT position:

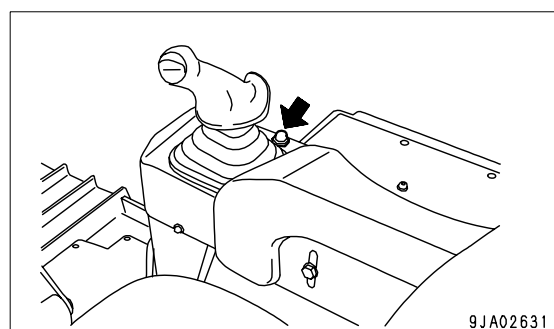
When starting the engine in cold weather, set the switch to this position. If the key is kept at the HEAT position, the engine preheating pilot lamp will light up.

Keep it at the HEAT position for the specified preheating time.

For details, see “STARTING IN COLD WEATHER (3-79)“ in OPERATION portion.

### HORN SWITCH

The horn sounds when the button (7) at the rear of the blade control lever at the right side of the operator's seat is pressed.



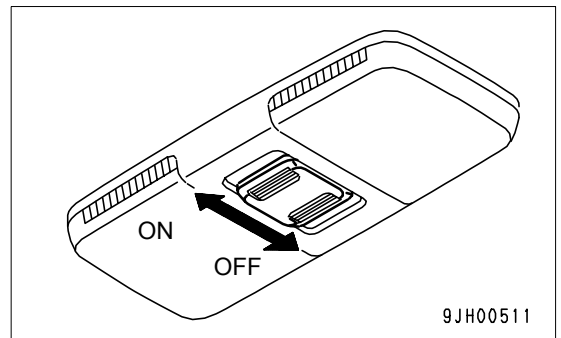
**ROOM LAMP SWITCH**

(Machines equipped with cab)

This switch (8) is used to lights up the room lamp.

OFF position: Lamps are out

ON position: Lamps light up



9JH00511

**WIPER SWITCH**

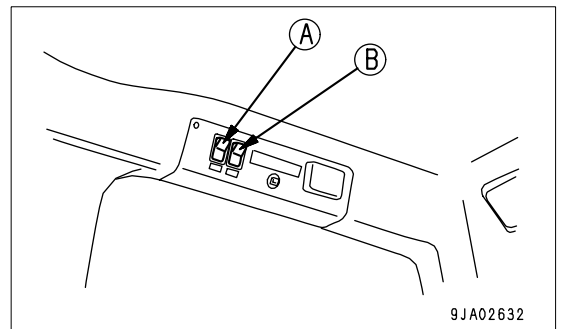
(Machines equipped with cab)

This (9) activates the wipers.

The wiper switches are as follows.

(A) Front window

(B) Rear window



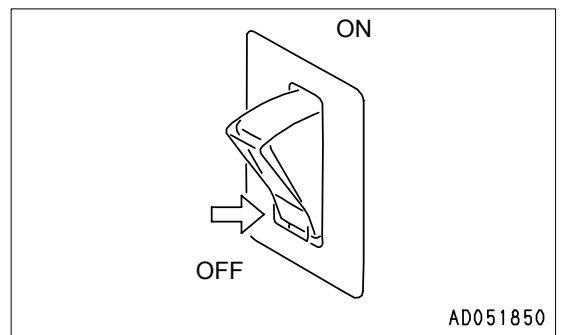
9JA02632

This is also used as the window washer switch.

The switch is operated as follows.

- Window washer only

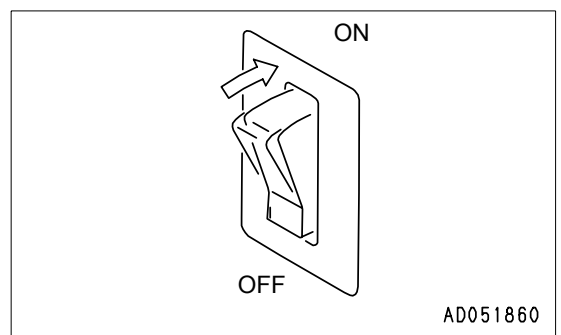
Keep the switch pressed to the OFF position to spray out water.



AD051850

- Wiper only

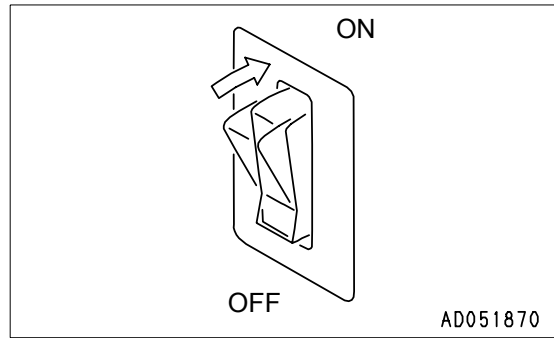
If this is switched on, the wiper will start.



AD051860

● Wiper and window washer

If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.



**WIPER MOTOR BREAKER RESET BUTTON**

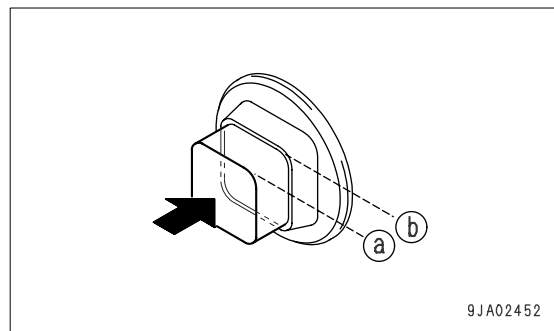
(Machines equipped with cab)

This button (10) is the reset button for the rear window wiper.

Use this when the breaker is actuated. When the breaker is actuated, the button comes out, so push it in to reset.

Position (a): Breaker actuated

Position (b): When normal



**REMARK**

When the wiper blade is operated, if the blade is held and cannot move for some reason, the breaker is actuated. Remove the cause of the problem, then press the reset button.

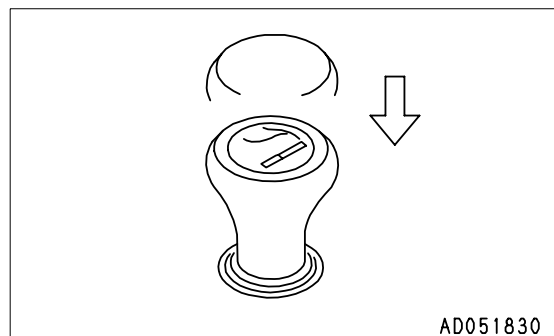
**CIGARETTE LIGHTER**

(Machines equipped with cab)

This (11) is used to light cigarettes.

When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

If the cigarette lighter is removed, the socket can be used as a power source.

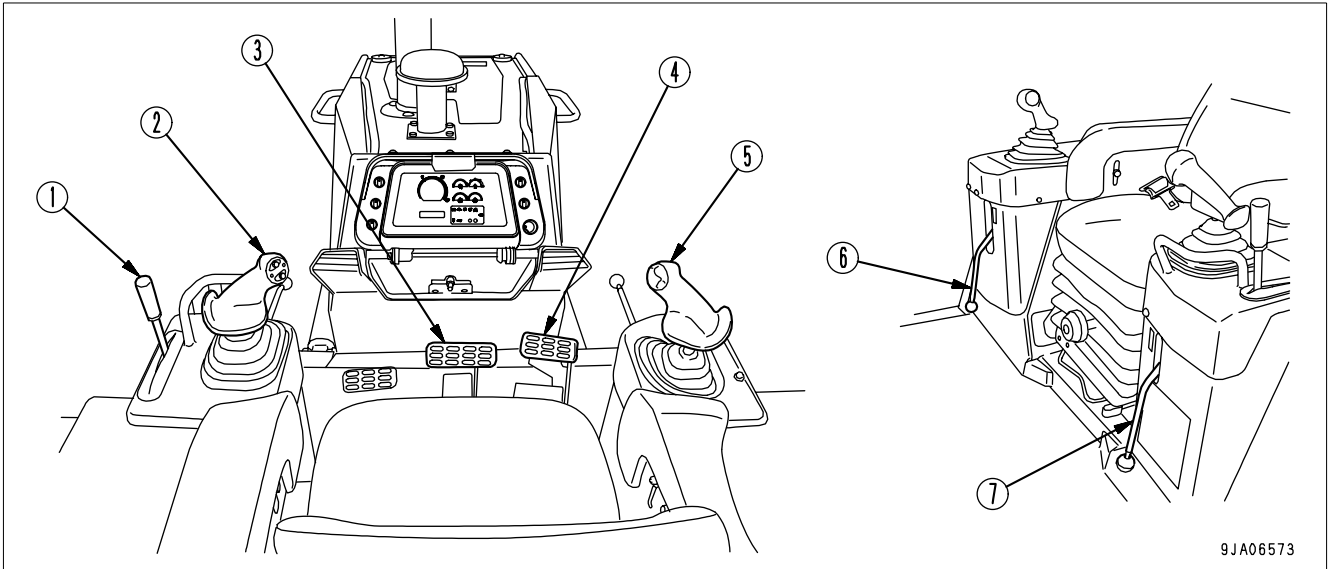


**NOTICE**

**This cigarette lighter is 24V. Do not use it as the power source for 12V equipment. If it is used so, the equipment may fail.**

**The capacity of the cigarette lighter is 120W (24V x 5A).**

**CONTROL LEVERS AND PEDALS**



- |   |   |
|---|---|
| (1) Fuel control lever                                    | (5) Blade control lever                         |
| (2) Joystick (Steering, directional and gear shift lever) | (6) Safety lock lever (for blade control lever) |
| (3) Brake pedal   | (7) parking lever                               |
| (4) Decelerator pedal                                     |   |

**FUEL CONTROL LEVER**

**⚠ WARNING**

- Check that the steering and forward-reverse selector lever is in the N (neutral) position, when operating the fuel control lever to the full stroke, while the machine stands.
- When it is necessary to operate the fuel control lever to the full stroke with the steering and forward-reverse selector lever kept either in the forward or reverse position, operate the fuel control lever slowly, while paying a full attention to the surroundings for safety.

This lever (1) is used to control the engine speed and output.

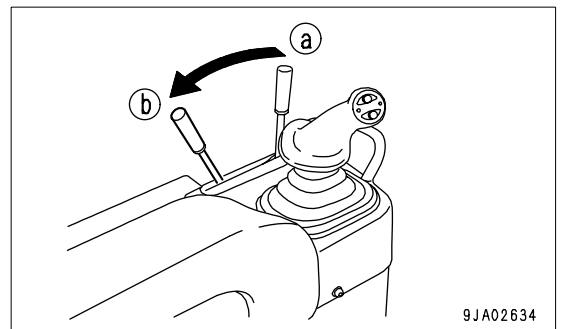
(a) Low idling position: Push the lever forward fully.

(b) High idling position: Pull the lever fully

**REMARK**

If high-speed travel is not needed and the work consists of comparatively light loads, return the fuel control lever slightly from the FULL speed position towards low idling. This improves the fuel consumption efficiency and also reduces noise.

For finishing and leveling work or spreading gravel, return the fuel control lever slightly from the FULL speed position towards low idling. This reduces shoe slip and increases the service life of the undercarriage.



### JOYSTICK (STEERING, DIRECTIONAL AND GEAR SHIFT LEVER)

This lever (2) is used to select the direction of travel, to carry out steering, and to carry out counterrotation turns.

#### ● Forward-reverse shifting

Position (a): FORWARD

Position (b): REVERSE

Position N: Neutral

Move to the front to drive forward; move to the rear to drive in reverse.

#### ● Steering

Position (c): LEFT TURN

Position (d): RIGHT TURN

If the lever is at the FORWARD or REVERSE position and it is operated to the left or right, the machine will turn in the direction that the lever is operated.

If the lever is operated to the left or right to a position where it becomes heavy, the turning radius will become smaller.

#### REMARK

When you are steering, if you release the lever, it will return to the center position and the machine will travel in a straight line.

When you are steering, support your hand with the lever guide to make it easier to carry out the turning operation.

#### ● Counterrotation turn

When steering the machine, if the lever is operated further from the position where it becomes heavy, the left and right tracks will rotate in opposite directions and the machine will carry out a counterrotation turn.

#### ● Gear shifting

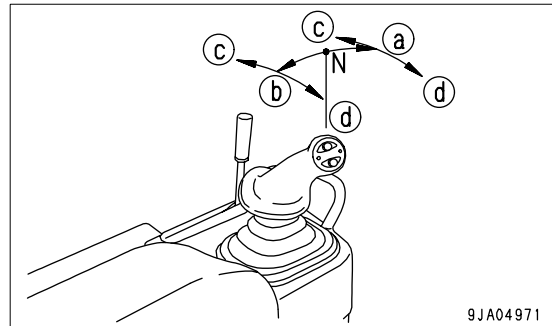
Press the shift switch of the knob of the steering, directional, and gearshift lever to carry out the gearshifting operation.

Press the UP switch to shift up.

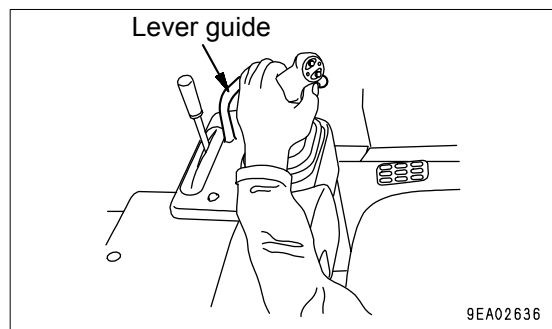
Press the DOWN switch to shift down.

When the starting switch is turned to the ON position, the speed range is set by default to 1st.

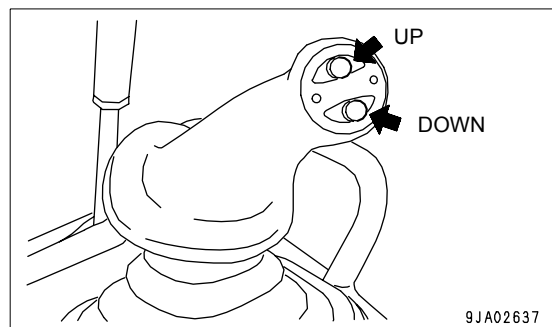
For details of the method of selecting the shift mode, monitor display, and set travel speed, see "DISPLAY PANEL A (SPEED RANGE, SET TRAVEL SPEED, SHIFT MODE INDICATOR) (3-15)".



9JA04971



9EA02636



9JA02637



If the operating load increases, the travel speed will slowly decrease and the transmission will shift down. When the load becomes lighter again, the transmission will shift up to the set travel speed.

When the transmission automatically shifts down, the speed range display does not change.

### BRAKE PEDAL

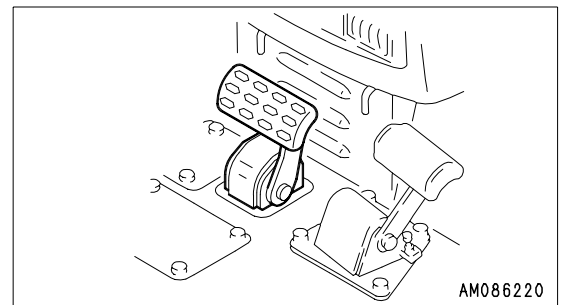
## WARNING

**Do not place your foot on this pedal unnecessarily.**

This pedal (3) is used for making emergency stops; do not use it except in emergencies.

When the pedal is depressed, the parking brake is applied and the machine stops suddenly.

When traveling on flat ground, use the decelerator pedal to stop the machine.



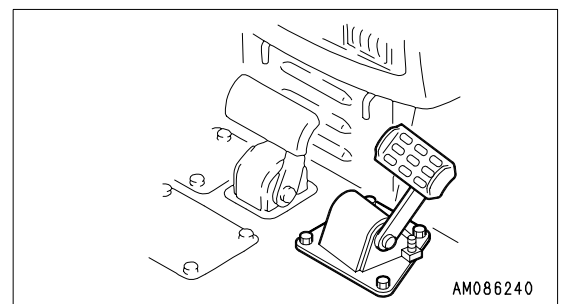
### DECCELERATOR PEDAL

## WARNING

- Do not place your foot on this pedal unnecessarily.
- When passing over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, so there is danger that the travel speed will also increase suddenly. To prevent this, depress the decelerator pedal to reduce the travel speed.
- When traveling on flat ground, the decelerator pedal can be used to stop the machine. However, this does not mean that the brake is applied. On slopes, even if the decelerator pedal is depressed and the engine speed is reduced, the machine may move, so be particularly careful.
- When climbing down a slope, select a gear speed which actuates the engine brake and press the brake pedal, when necessary.

This pedal (4) is used to lower the engine speed or reduce the travel speed.

Depress this pedal to reduce the speed when shifting between forward and reverse or when stopping the machine.



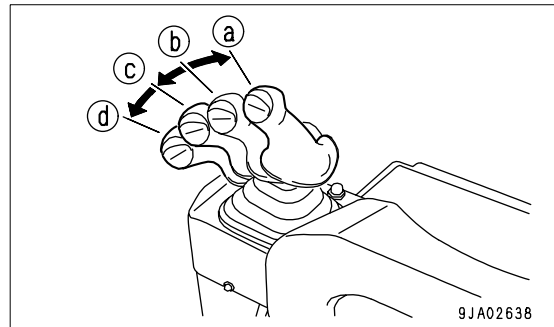
**BLADE CONTROL LEVER**

This lever (5) is used to lift, tilt or angle the blade.

After the engine is stopped, the blade will not move even if the blade control lever is operated.

**LIFTING CONTROL**

- (a) RAISE:
- (b) HOLD: Blade is stopped and held in this position.
- (c) LOWER:
- (d) FLOAT: Blade will move freely according to external force.

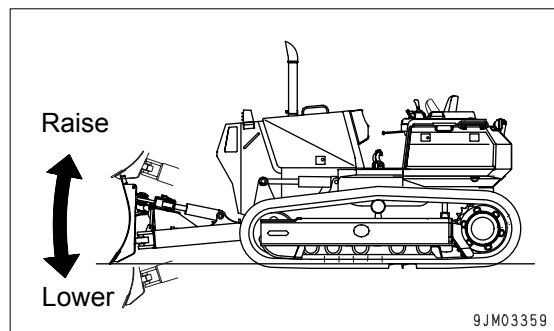


**REMARK**

When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.

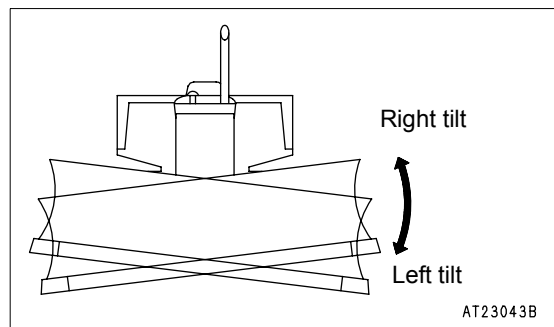
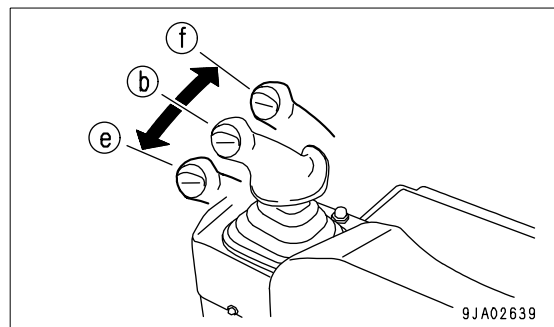
Before starting the engine, check that the blade control lever is at the HOLD position.

In cold weather, it will take time for the lever to be held at the HOLD position, so hold the lever by hand at the HOLD position for at least 1 second.



**TILTING CONTROL**

- (b) HOLD: Blade is stopped and held in this position.
- (e) LEFT TILT
- (f) RIGHT TILT



Machine model	Amount of tilt mm	
	Narrow blade	Wide blade
D31EX	-	330
D31PX	395	435
D37EX	-	375
D37PX	395	445
D39EX	-	395
D39PX	430	480

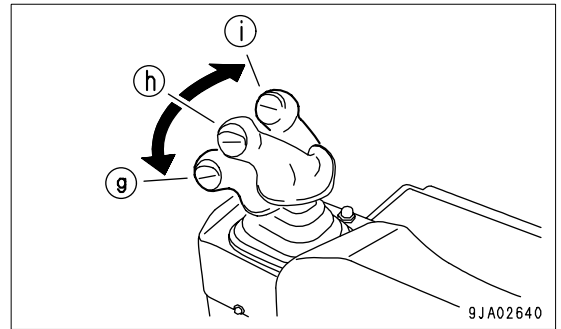
**ANGLING CONTROL**

Turn the knob to the right or left to angle the blade.

(g) LEFT ANGLE

(h) HOLD: Blade is stopped and held in this position.

(i) RIGHT ANGLE

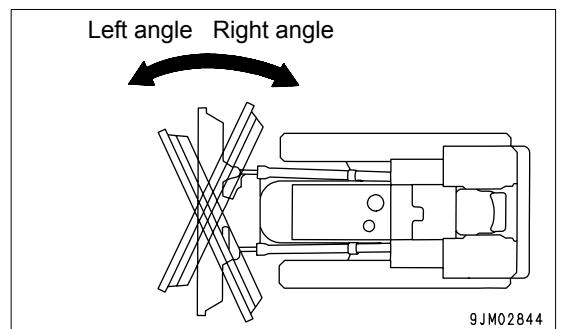


**REMARK**

When performing only angling operation, be sure to set the lever in the neutral (HOLD) position and turn the knob to the right or left.

If the angling operation is performed while the lever is not in the neutral (HOLD) position (while either or both of lifting and tilting operations are performed), all of those operations can be continued, but the moving speed of the blade is lowered. Select the operations according to the type of the work.

If the lifting or tilting operation is performed while angling operation is performed, the machine moves similarly to the above.



**SAFETY LOCK LEVER**

(for work equipment control lever)

**WARNING**

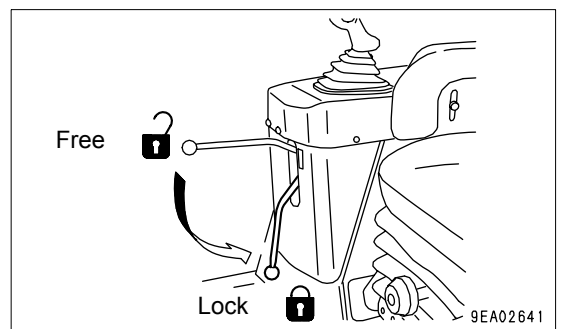
- When leaving the operator's compartment, set the safety lock lever securely to the LOCK position. If the safety lock lever is not at the LOCK position and the control levers are touched by mistake, it may lead to serious personal injury.
- If the safety lock lever is not set securely to the LOCK position, the work equipment may move and cause serious injury. Check that it is in the position shown in the diagram.
- When parking the machine or when carrying out maintenance, always lower the work equipment to the ground, then set the safety lever to the LOCK position.

This lever (6) is a device to lock the work equipment control lever.

When it is set to the LOCK position, the movement of the work equipment is locked.

- The blade control lever can move even when the lever is at the LOCK position, but the control oil pressure of the blade control is locked, so the blade does not move.

If the blade control lever is at the FLOAT position and the safety lever is set to the LOCK position, the blade control lever is automatically returned to the HOLD position.



**REMARK**

After the engine is stopped, even if the blade control lever is operated, the blade will not move. Always lower the blade to the ground and set the safety lock lever to the LOCK position before stopping the engine.

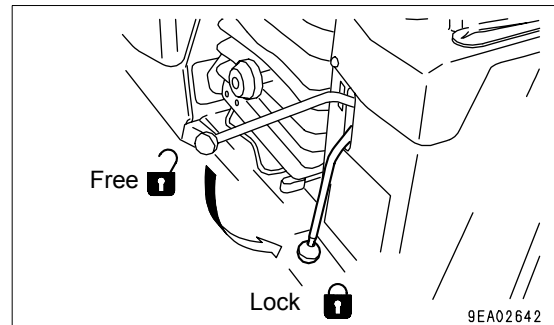
**PARKING LEVER****⚠ WARNING**

- When parking the machine, always set the parking lever in the **LOCK** position.
- If the parking lever is operated, the brake is applied, even when the machine is traveling. The machine will suddenly stop, so this is dangerous. For this reason, do not operate the parking lever when the machine is moving, except in emergencies.

This lever (7) is the control lever for the parking brake.

**REMARK**

If the parking lever is not at the **LOCK** position when the engine is started, the limit switch is actuated and the engine will not start.



**FUSE**

**NOTICE**

Before replacing a fuse, be sure to turn ignition switch to the OFF position.

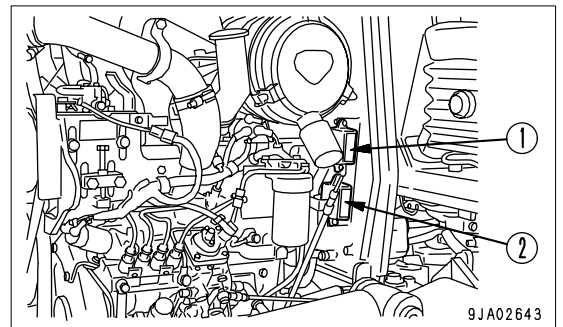
The fuses protect the electrical equipment and wiring from burning out.

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.

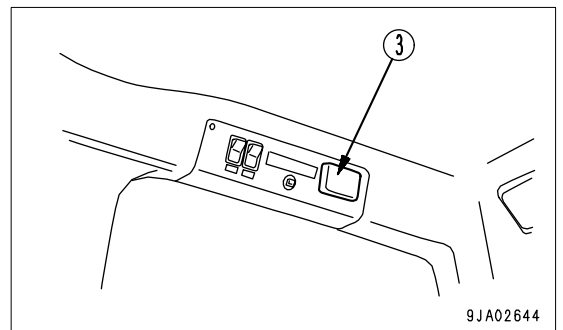
● Chassis

Fuse boxes (1) and (2) are installed inside the engine side cover on the left side.



● Cab (machines equipped with cab)

Fuse box (3) is installed to the rear right of the ceiling.

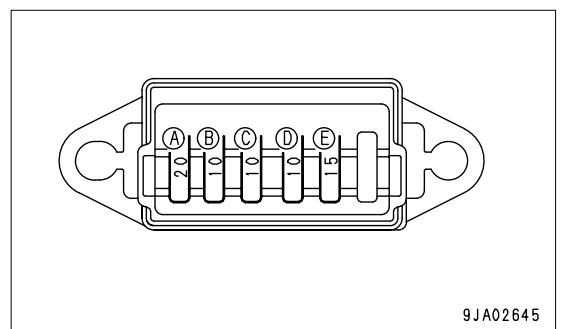


**FUSE CAPACITY AND CIRCUIT NAME**

● Chassis

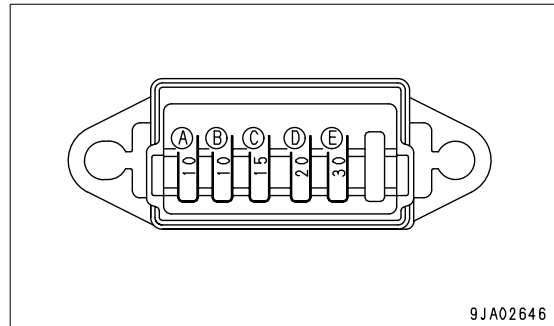
Fuse box (1)

NO.	Fuse capacity	Name of circuit
(A)	20A	Head lamp, Rear lamp
(B)	10A	Chassis power source, monitor panel
(C)	10A	Controller
(D)	10A	Horn
(E)	15A	Stop solenoid



Fuse box (2)

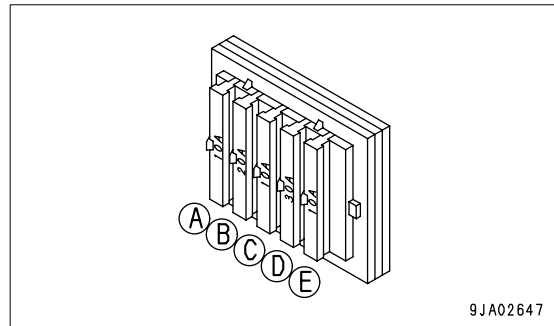
NO.	Fuse capacity	Name of circuit
(A)	10A	Cab power source
(B)	10A	(spare)
(C)	15A	Canopy heater
(D)	20A	Power port
(E)	30A	Chassis power source



- Cab (machines equipped with cab)

Fuse box (3) (Machine equipped with cab)

No.	Fuse capacity	Name of circuit
(A)	10A	Radio memory
(B)	20A	Radio, lamp, cigarette lighter
(C)	10A	Rear wiper
(D)	30A	Air conditioner
(E)	10A	Front wiper



## ELECTRIC POWER TAKE-OUT ADAPTER

### NOTICE

- Do not use as a power supply for 12V equipment. This will cause failure of the equipment.
- When using as a power supply pickup, do not install equipment which exceeds 120W (24V x 5A).

(Machines equipped with cab)

It is possible to remove the cigarette lighter and use the socket as a power supply.

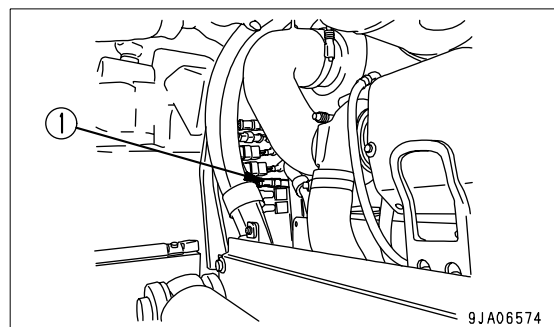
Capacity of cigarette lighter: 120W (24V x 5A)

(Machine not equipment with cab)

1. Open the engine side cover on the right side of the machine.
2. There is a connector for the power takeoff.  
The connector is held securely in position with clamps.

Capacity of each connector:

(1) CN17: 480W (24Vx20A) (Use when the starting switch is ON)



**REMARK**

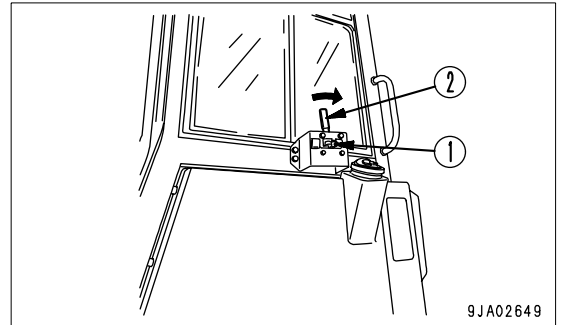
Ground the negative wire to the body work or ROPS. Do not ground it to the rubber mounted engine or valves. This will cause failures.  
If the wire is grounded to a point where there is still paint, the electricity will not flow smoothly, so remove the paint.

**DOOR - OPEN LOCK**

(Machines equipped with cab)

Use this when your want to keep the door held open.

1. Push the door against the door catch (1). The door will be held by the door catch.
2. To release the door, pull lever (2) of the door catch towards the rear of the machine. This will release the catch.



**NOTICE**

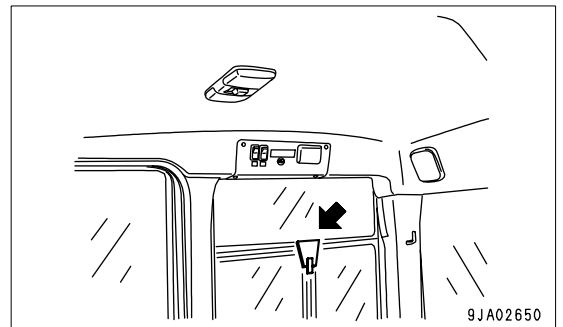
- When keeping the door open, fix it securely to the catch.
- Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.
- Keep the door locked open securely. The door may swing closed because of the vibration.

**SASH GLASS INTERMEDIATE LOCK**

(Machines equipped with cab)

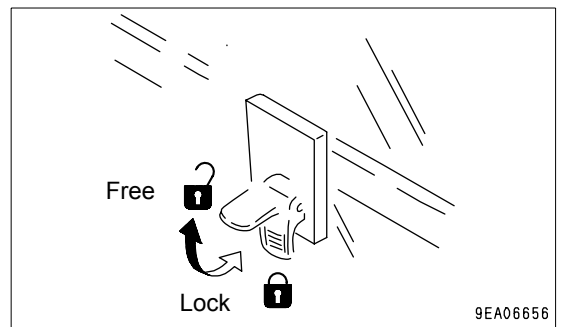
When working with the cab sash glass open, use this lock to prevent the glass from chattering.

- When the lever is in the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK position, the glass is fixed in position.



**NOTICE**

Always close the window when traveling or carrying out operations. Leaving the window open will cause the window to break.

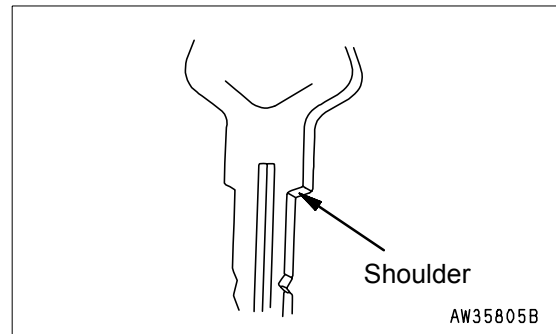


## CAP, COVER WITH LOCK

Use the starting switch key to open and close the caps and covers.

For their locations , see “LOCKING (3-99)“.

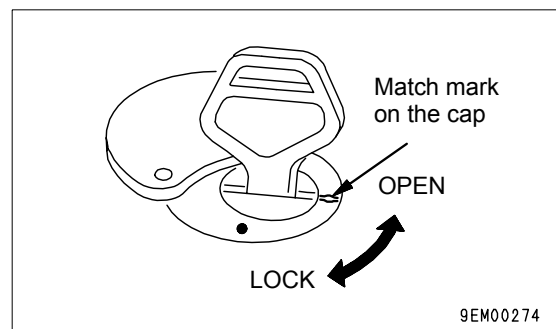
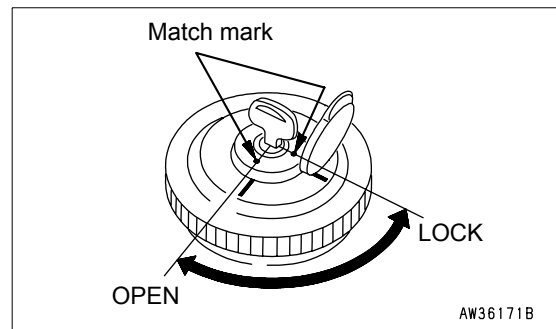
Insert the key as far as it will go to the shoulder. If the key is turned before it is inserted all the way, it may break.



## METHOD OF OPENING AND CLOSING CAP WITH LOCK

### TO OPEN THE CAP

1. Insert the key into the key slot.
2. Turn the key in the OPEN direction, align the key slot with the counter mark on the cap, then open the cap.



### TO LOCK THE CAP

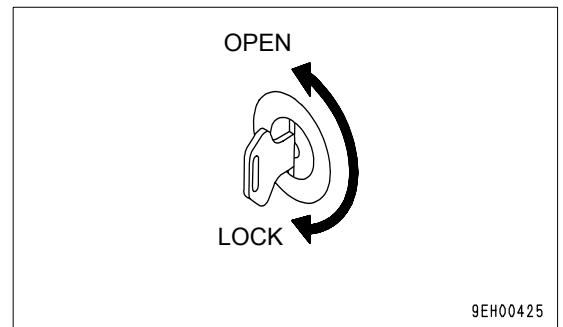
1. Turn the cap until tight, then insert the key into the key slot.
2. Turn the key in the LOCK direction and take out the key.



## 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.



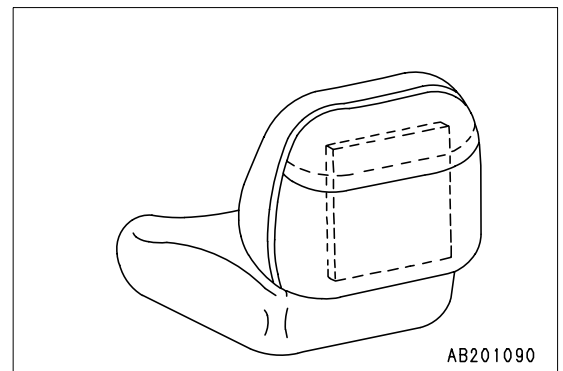
### TO LOCK THE COVER

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

## DOOR POCKET

There is a pocket on the back of the operator's seat.

Keep the Operation & Maintenance manual in this pocket so that the operator can read it whenever necessary.

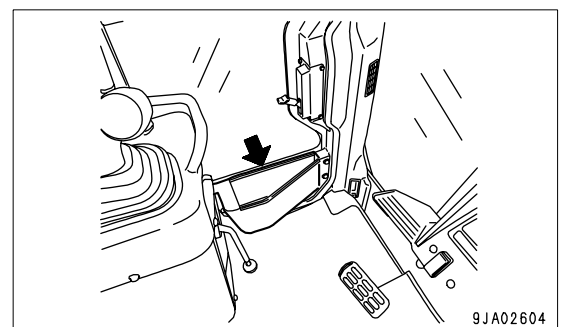


(Machines equipped with cab)

These are on the inside of the left and right doors, and can be used for keeping things or Operation & Maintenance manual.

However, do not put tools or other heavy objects in the pocket.

If the pocket becomes dirty, open the door, lock it in position, then wash with water. There is a hole to drain the water at the bottom of the pocket.

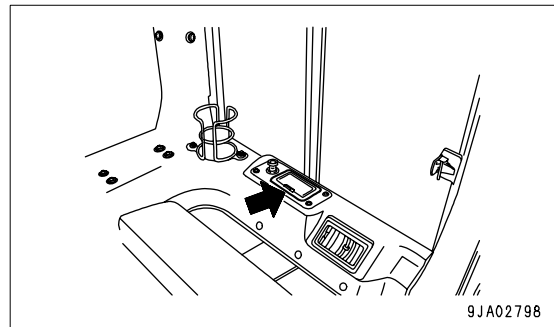


## ASHTRAY

(Machines equipped with cab)

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

Always make sure that you extinguish the cigarette before closing the lid.



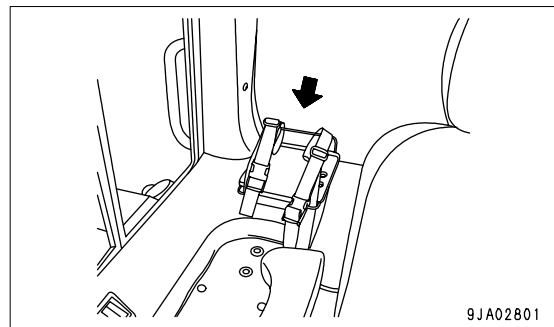
## LUNCHBOX HOLDER BELT

(If equipped)

This is the place to put your lunchbox.

Hold it in position with the belt.

It can also be used for things other than lunchboxes.



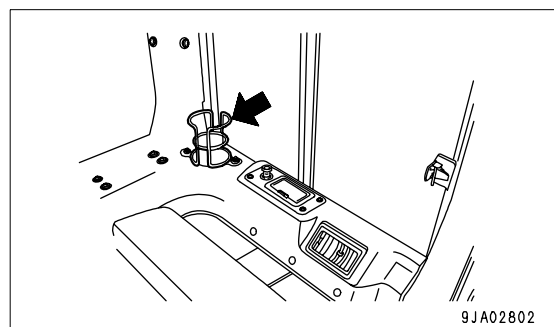
## CUP HOLDER

(If equipped)

This is the place to put cans or cups.

If drinks are put in places other than the cup holder, the can or cup will fall over and make the surrounding area or equipment dirty.

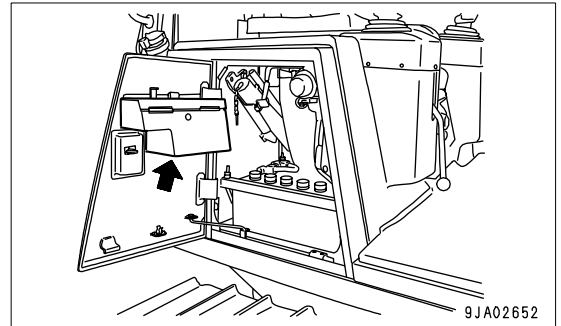
Please make full use of the cup holder.



## TOOL BOX

The tool box is inside the battery inspection cover at the rear right.

Keep the tools in this box.



## GREASE PUMP HOLDER

Set the grease pump in the grease pump holder clamp at the rear inside the battery box at the rear right, then secure it in position with the rubber band.

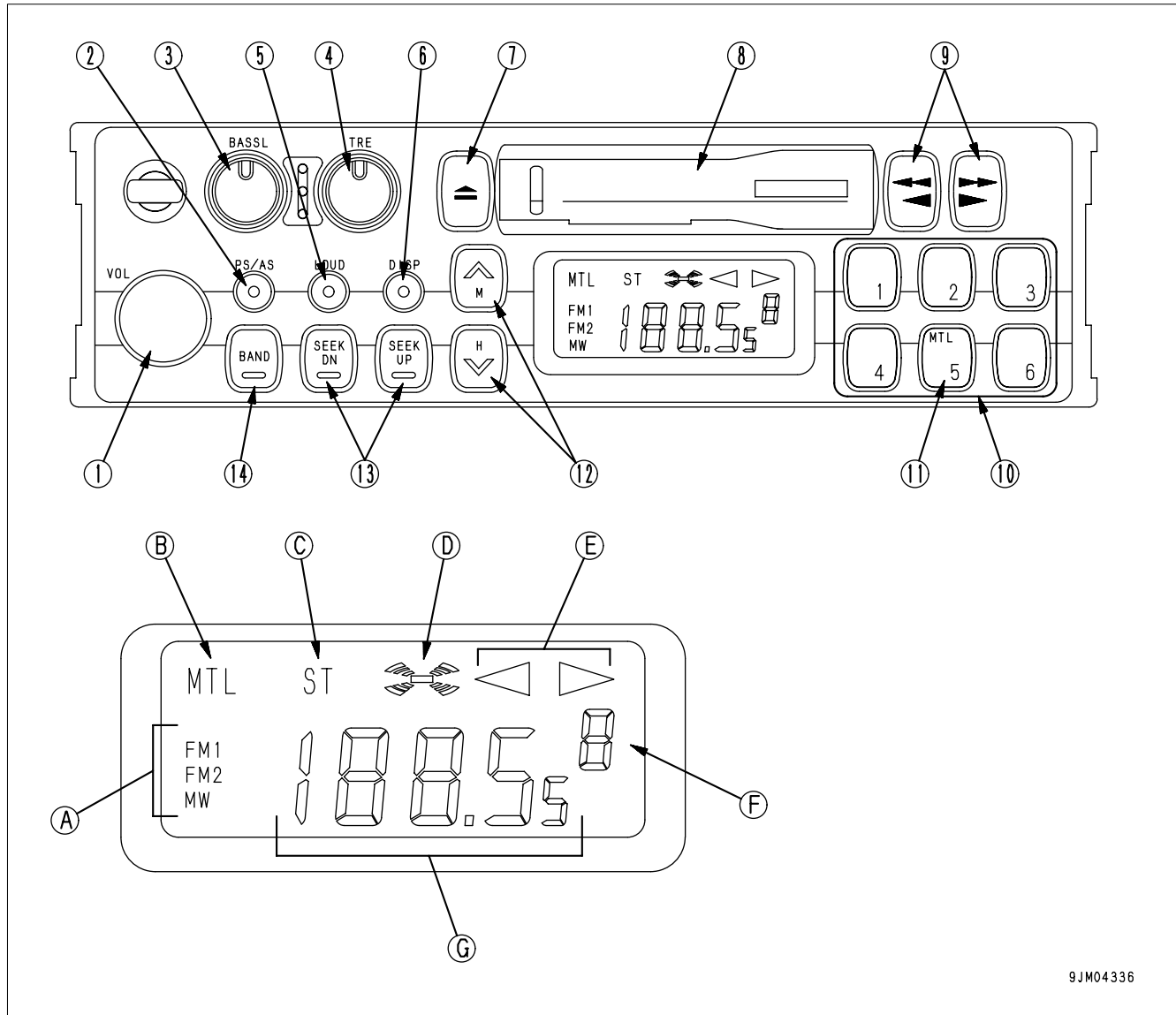
After using, wipe off all the grease from the outside of the pump.



### CAR STEREO, HANDLING

(If equipped)

### EXPLANATION OF COMPONENTS



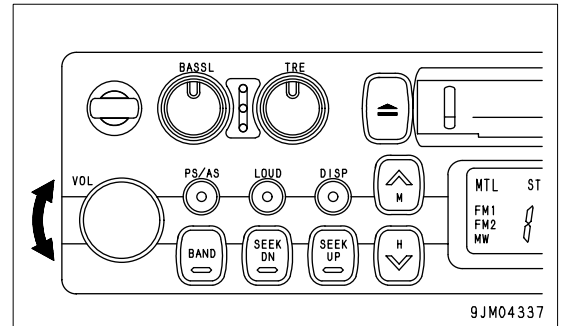
9JM04336

- |  |                                  |
|--|----------------------------------|
| (1) Power switch/volume                | (8) Cassette door                |
| (2) Auto-store/preset scan button      | (9) Fast forward, rewind buttons |
| (3) Bass control knob                  | (10) Preset buttons              |
| (4) Treble control knob                | (11) Metal tape button           |
| (5) Loudness button                    | (12) Manual tuning buttons       |
| (6) Time/radio display selector button | (13) Seek tuning buttons         |
| (7) Tape eject button                  | (14) Band selector button        |

**POWER SWITCH/VOLUME**

Turn this knob (1) to the right until it clicks to turn the power on.

Turn it further to increase the volume.

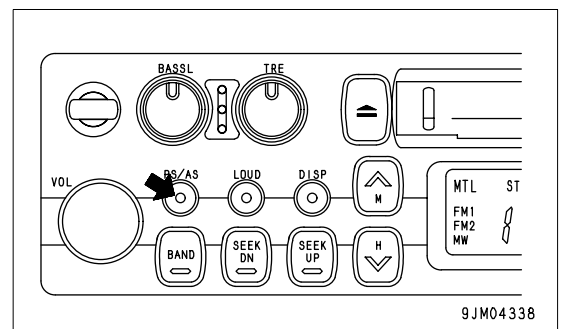


**AUTO-STORE/PRESET SCAN BUTTON**

Use this button (2) to actuate the preset scan and auto-store functions.

● Auto-store

Each time this button is pressed for more than 2 seconds while in radio reception, this auto-store function automatically starts to search for the desired station within a receivable band, and memorize the frequency in the preset memory. During this scanning process, the frequency shown in the right side of display continues to change. This indicates that each frequency is memorized in the auto-store.



**REMARK**

The auto-store function cannot be used when the channel display is flashing.

When the display is flashing, the preset scan function is being used.

● Preset scan

If this button is pressed for less than 0.5 second while in radio reception, programs from the six preset stations in the same band will be broadcast one after another for 5 seconds each, starting from No. 1 through No. 6 stations consecutively.

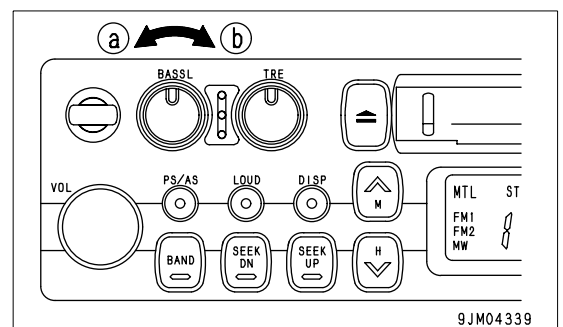
When the desired station is found, press the button again. This stops the preset scan tuning process and switches to ordinary broadcasting. The same process will be repeated continuously until the button is pressed again.

**BASS CONTROL KNOB**

Turn this button (3) to the left to reduce the low tones; turn it to the right to emphasize the low tones.

Direction (a): Low tone reduced

Direction (b): Low tone emphasized

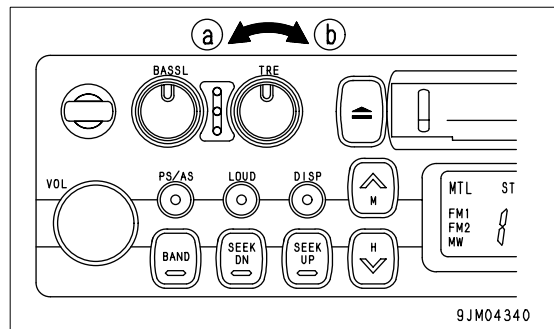


**TREBLE CONTROL KNOB**

Turn this button (4) to the left to reduce the low tones; turn it to the right to emphasize the high tones.

Direction (a): High tone reduced

Direction (b): High tone emphasized

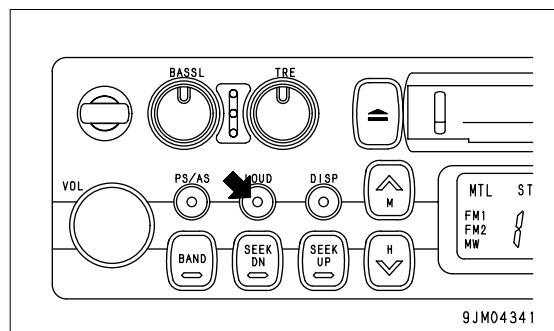


**LOUDNESS BUTTON**

This button (5) is used when playing at low volume. It makes it possible to hear more easily by emphasizing the low tone when the low tones are weak.

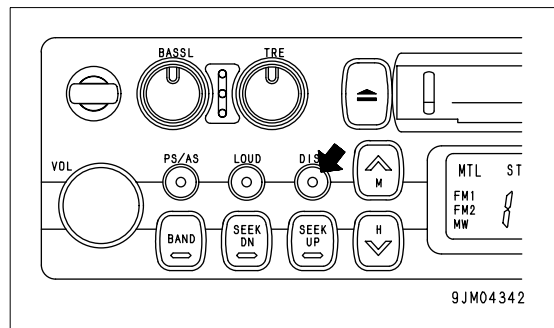
Push button: Actuated (ON)

Push button again: Canceled (OFF)



**TIME/RADIO DISPLAY SELECTOR BUTTON**

This button (6) is used to switch between the "Radio/tape display" and the "Time display".



● Correcting the time

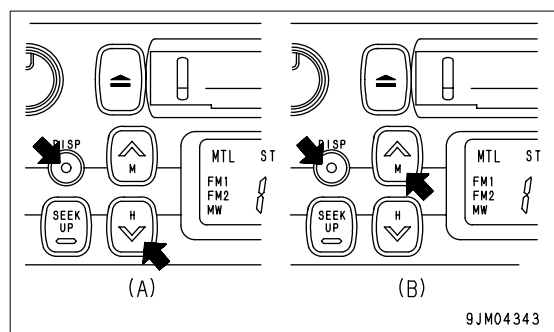
Press the button to set the time display.

(A) Correcting hour:

Keep the DISP button pressed and press the bottom (H) of the TUNING button to correct the hour.

(B) Correcting minute:

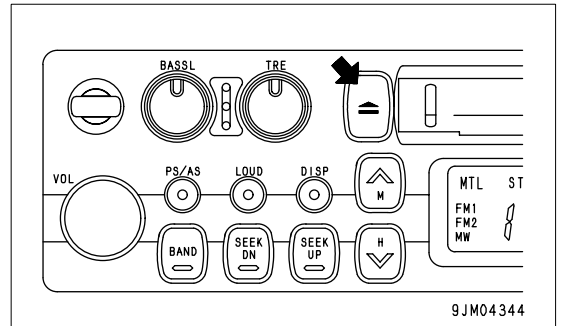
Keep the DISP button pressed and press the top (M) of the TUNING button to correct the minute.



**TAPE EJECT BUTTON**

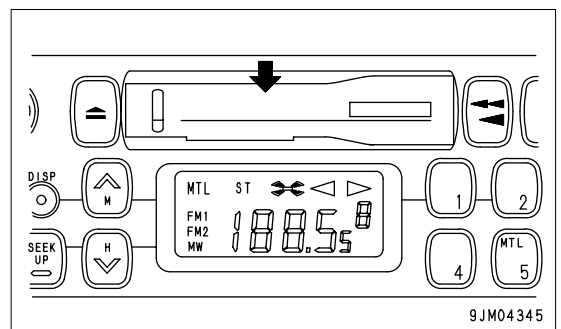
This button (7) is used to stop the tape and to eject the cassette.

When this button is pressed, the tape is ejected and the radio plays.



**CASSETTE DOOR**

Set the cassette with the exposed portion of the tape on the right side and insert it through the cassette door (8).



**FAST FORWARD, REWIND BUTTONS**

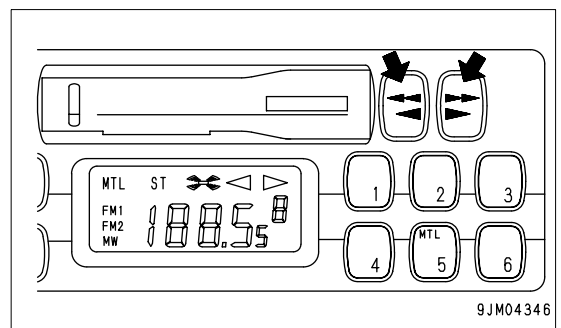
These buttons (9) are used to fast forward or rewind the tape.

- Fast forward/rewind

If you press the button pointing in the same direction as the lighted arrow indicating the direction of play, the tape will be fast forwarded; if you press the button pointing in the opposite direction, the tape will rewind.

To stop the tape, lightly press the button that is not locked. The fast forward or rewind operation will be canceled.

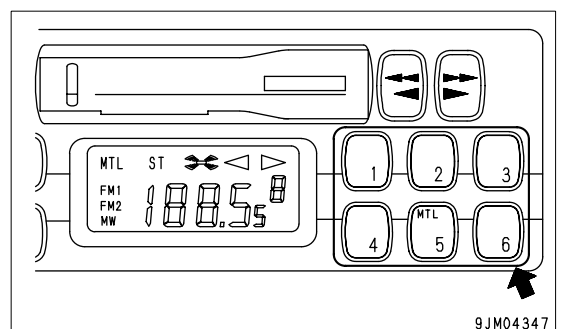
If the fast forward and rewind buttons are pressed at the same time, the tape will change sides.



**PRESET BUTTONS**

These buttons (10) are used to call up the broadcast station frequencies preset in memory for each of buttons No.1 to No.6.

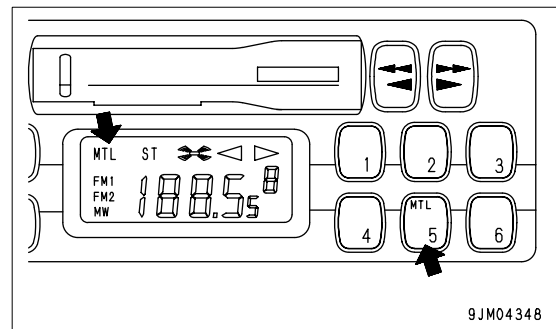
It is possible to preset 18 stations (FM: 12; AM: 6) with these buttons.



**METAL TAPE BUTTON**

(used also for preset button No.5)

This button (11) is used when playing a metal or chrome tape.  
This button is used also for preset button No.5. When it is pressed, "MTL" appears on the display.





**METHOD OF OPERATION**

**METHOD OF SETTING PRESET BUTTONS**

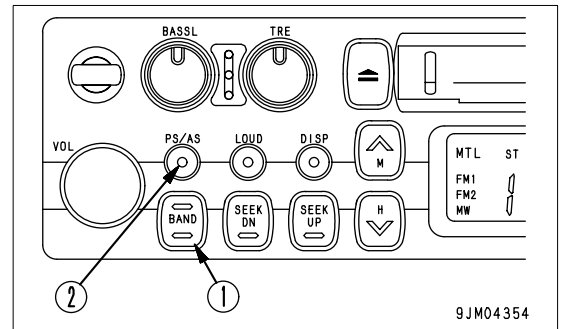
It is possible to preset 6 MW (AM) stations and 12 FM stations (FM1: 6 stations, FM2: 6 stations).

**REMARK**

If you are playing the cassette, press the tape eject button to stop the tape.

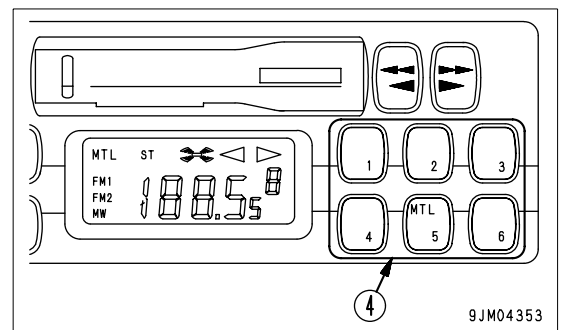
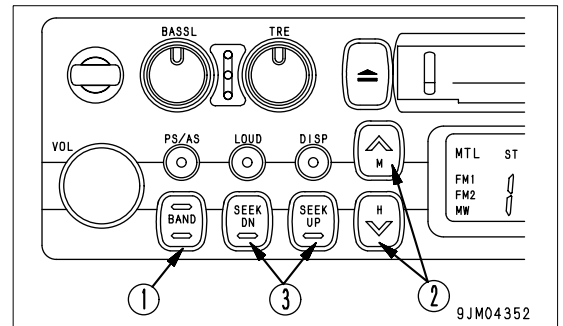
**METHOD OF AUTO PRESET**

1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press auto-store/preset scan button (2) for less than 0.5 seconds.
3. The preset scan tuning function automatically searches for the desired station within the same band and can memorize as many as six stations in the preset memory.



**METHOD OF MANUAL PRESET**

1. Use band selector button (1) to select MW (AM), FM1 or FM2.
2. Press manual tuning buttons (2) or seek tuning buttons (3).
3. Press preset button (4) of the number to be preset for 2 seconds while the frequency display is being shown on the display. (The preset channel and frequency are displayed and the presetting is completed).
4. Repeat the steps explained in Item 2 and 3 above to preset other stations to the subsequent numbers.
5. If you want to preset a station in the other bands, follow the steps explained in Item 1 through 4 above.



**REMARK**

Use Step 2 to 3 also when changing the setting of a preset switch to another station.  
 When the power is disconnected, such as when the battery is replaced, all the settings are deleted, so preset the stations again.

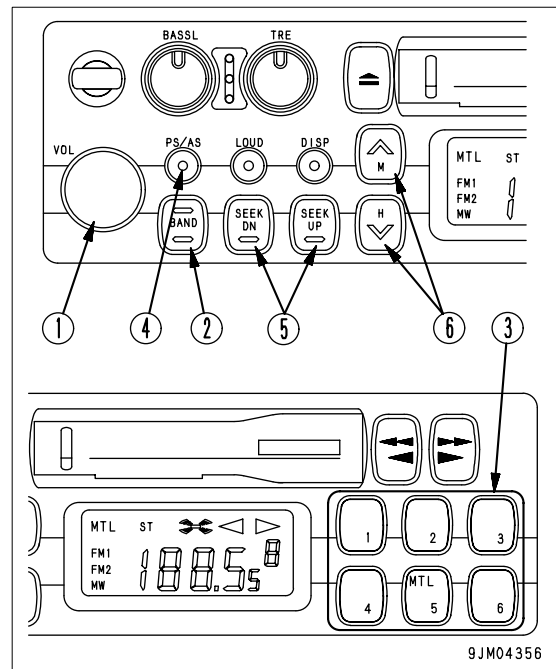
**LISTENING TO RADIO**

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Use band selector button (2) to select MW (AM), FM1 or FM2.
3. Select the station with the preset buttons (3).

**REMARK**

In case you do not promptly remember the number assigned to a certain preset station, press auto-store/preset scan button (4) for less than 0.5 second. The preset six stations will broadcast one after another for five seconds each. When the desired station broadcasts, press the button again and scan tuning stops.

4. If you want to tune in to a station that is not preset, use either seek tuning button (5) or manual tuning button (6).
5. Adjust the volume, balance, and tone as desired.
6. When turning the radio OFF, turn power switch (1) to the left until it clicks.



**REMARK**

To switch to the radio when listening to a cassette, press the cassette eject button to stop the tape. If you insert a cassette when listening to the radio, the tape will start to play.

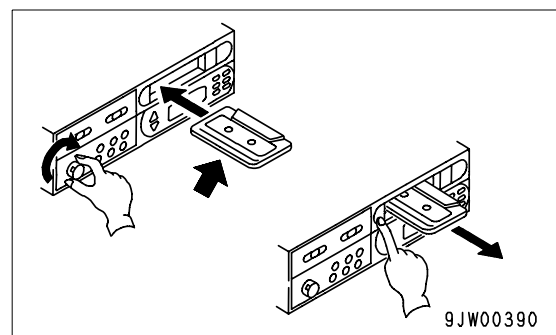
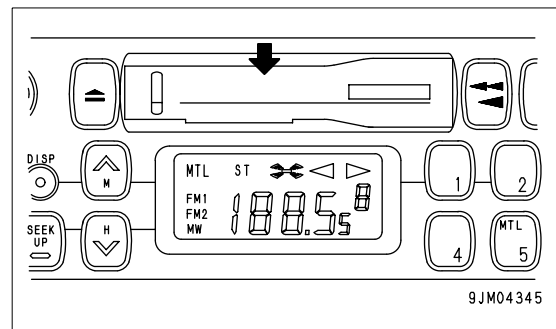
**LISTENING TO A CASSETTE TAPE**

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it past the cassette door. The tape will automatically start playing.

If the arrow indicating the direction of play is pointing to the right, the top side is being played; if the arrow is pointing to the left, the bottom side is being played.

When the tape reaches the end, it is automatically reversed and the other side starts to play.

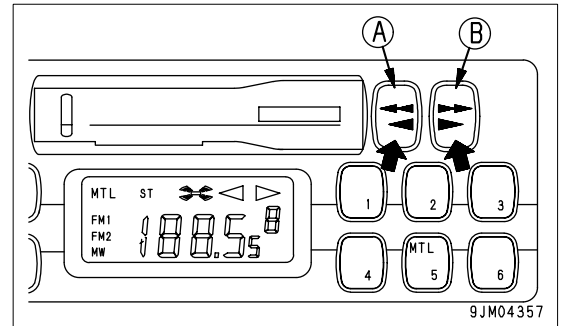
3. When finishing with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.



**REVERSING TAPE**

When listening to the tape, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly.

When this is done, the tape direction display will be reversed.

**PRECAUTION WHEN USING**

**⚠ WARNING**

- If a voltage greater than the specified voltage is input, it may cause fire, electrocution, or other failure. Never input any voltage other than the specified voltage.
  - Places inside the radio are under high voltage. Do not remove the cover.
  - Do not carry out any modifications. This may cause fire, electrocution, or other failure.
  - If the sound cannot be heard, nothing is displayed, or any other abnormality occurs, turn off the power switch and ask your Komatsu distributor, as soon as possible, to carry repairs.
- 
- Stow the antenna when traveling in places with low overhead clearance.
  - To ensure safety during operations, keep the volume at a level where it is possible to hear other machines.
  - If water gets inside the speaker case or radio (auto tuning), it may cause a serious problem, take care not to let water get in these items.
  - 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.

**NOTICE****Handling cassette tape**

Clean the tape head approx. once a month with a commercially available head cleaning tape.

Do not leave the tape any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.

Do not use 120-minute tapes. The tape is thin and it easily gets caught up inside the machine.

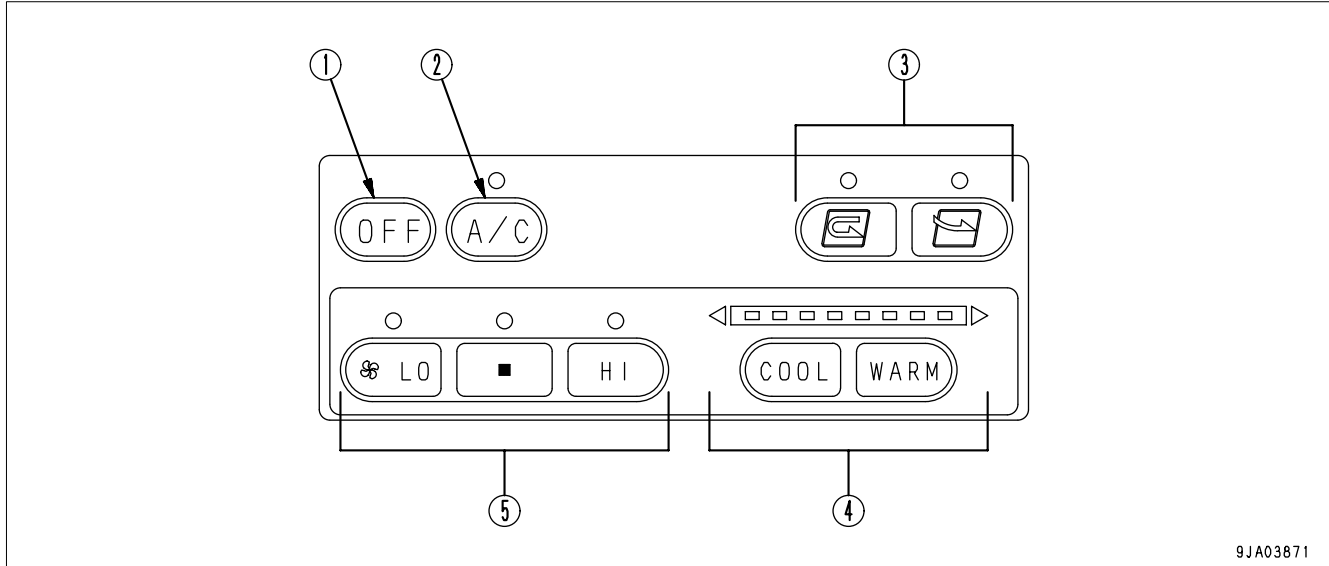
If the tape is slack, it easily gets caught up inside the machine. Use a pencil to wind in the tape to remove any slack.

Do not use any cassette tape if the label has started to come off. It may cause defective rotation, or it may be impossible to get the tape out of the machine.

## AIR CONDITIONER, HANDLING

(Machine equipped with cab, air conditioner)

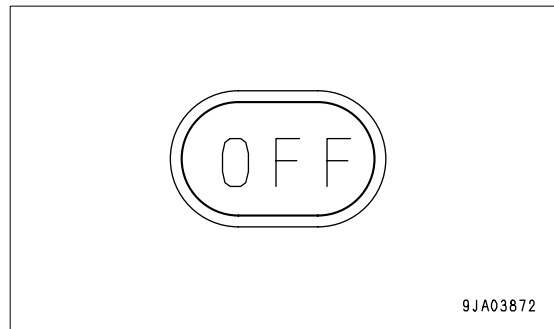
### EXPLANATION OF PARTS



- (1) OFF switch
- (2) Air conditioner switch
- (3) FRESH/RECIRC selector switch
- (4) Temperature control switch
- (5) Air flow selector switch

#### OFF SWITCH

When this switch (1) is depressed, the air conditioner stops sending wind.

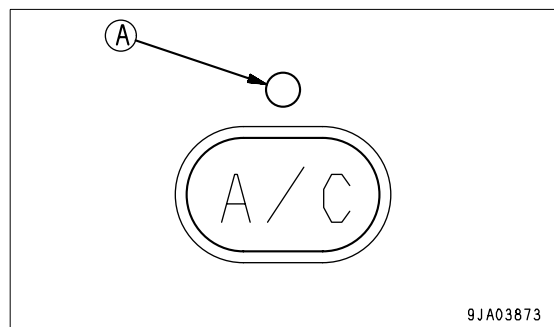


#### AIR CONDITIONER SWITCH

This switch (2) is an ON - OFF switch for the air conditioner.

Every time this switch is depressed, ON and OFF are alternated.

When the switch is ON, indicator (A) above lights up.



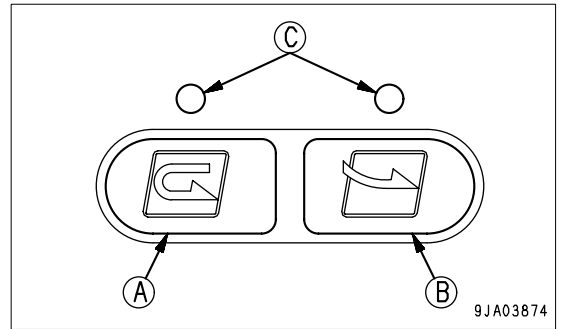
#### REMARK

This switch (2) is not in place with the heater specifications.

**FRESH/RECIRC SELECTOR SWITCH**

This switch (3) serves to change the air intake port when cooling or warming up the cab interior.

- Inside air: When switch (A) is depressed, the air conditioner takes in air inside the cab. Set the switch to this position, when strong cooling or warming is desired. There is no air ventilation or pressurizing function with this mode.
- Outside air: When switch (B) is depressed, the air conditioner takes in air outside the cab. Set the switch to this position, when normal cooling or warming is desired. With this mode, the inside air is ventilated and pressurized, preventing dust from entering the cab.



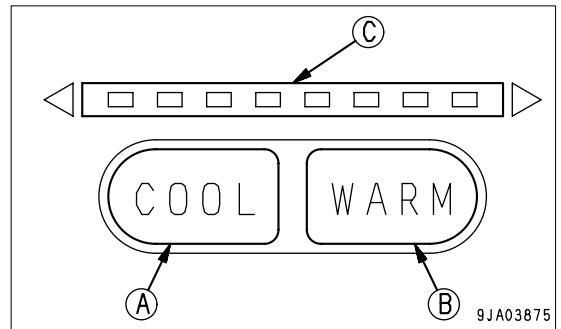
When pressing this switch, indicator (C) above lights up.

**TEMPERATURE CONTROL SWITCH**

This switch (4) serves to set the temperature in the cab when cooling or warming up the cab interior.

- If this switch (A) is kept depressed, the temperature of breeze continues to go down.
- If this switch (B) is kept depressed, the temperature of breeze continues to go up.

As the number of red lights in indicator lamp (C) increases, the room temperature becomes higher. Conversely, as the number of blue lights increases, the room temperature becomes lower.



**AIR FLOW SELECTOR SWITCH**

This switch (5) serves to adjust wind power from the air conditioner in three stages.

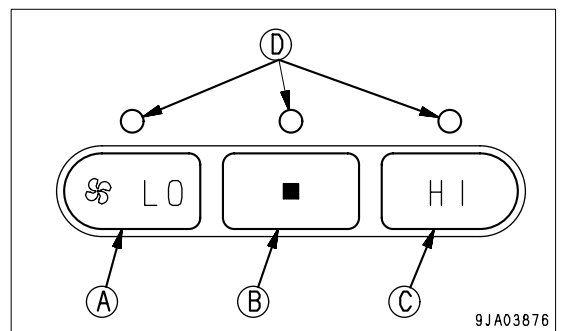
Switch (A): Low

Switch (B): Medium

Switch (C): High

When pressing this switch, indicator (D) above lights up.

When stopping breeze, press OFF switch (1).



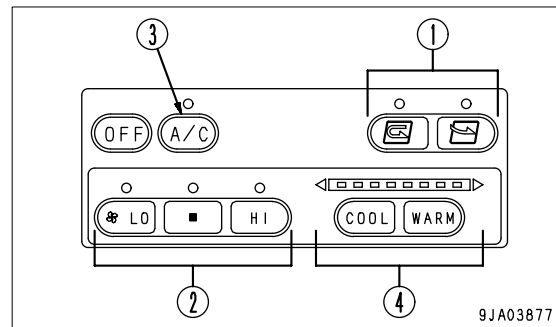
## PREVENTION METHOD OF ENTRY OF DUST

Dust may be prevented from entering the cab room by pressurizing the inside air to be slightly higher than the outside air.

When working in a dusty job site or when preventing dust from entering the cab, use this function.

- Close the windows and doors.
- Set FRESH/RECIRC selector switch (1) to FRESH.
- Set air flow selector switch (2) to LOW, MEDIUM, or HIGH.
- Set air conditioner switch (3) and cab temperature control switch (4) to the desired positions.

Set temperature control switch (4) to the desired position.



## PRECAUTION WHEN USING AIR CONDITIONER

### CARRY OUT VENTILATION 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 turn the lever to FRESH to remove the smoke while continuing the cooling.
- When the air conditioner is used for long periods, carry out ventilation once every 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 to 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.

### DIRECTION OF VENTS WHEN COOLING

- If the temperature and humidity of the outside air is high, and the air conditioner is used for a long time with the grill of the vents for the front window defroster open, moisture may condense on the outside of the glass and reduce the visibility. If this happens, close the grill or change the direction of the louvers.

## INSPECTION DURING OFF-SEASON

Even during the off-season, run the compressor at low speed for several minutes once a week to prevent the loss of the oil film at the lubricated parts of the compressor. (Run the engine at low speed and set the temperature control lever at the central position.)

### REMARK

When the ambient temperature is low, if the compressor is suddenly run at high speed, it may cause failure of the compressor. Note that the system is set so that the compressor will not run when the cooler switch is turned on, if the ambient temperature is less than 2 to 6.5°C.

## PROCEDURE FOR REPLACING RECEIVER

Replace the receiver once every two years.

After replacing the receiver, add compressor oil. Turn the receiver at an angle and measure the oil remaining inside the receiver, then add the same amount of oil (Denso Oil 6) to fill the receiver.

### REMARK

Depending on the condition of use, the replacement interval may be shorter.

If the receiver is used when the desiccant has exceeded the water absorption limit, the refrigerant circuit may become clogged and cause failure of the compressor.

### PRECAUTIONS WHEN REPLACING RECEIVER

- If the receiver is left for more than 15 minutes with the blind cover removed, the moisture in the air will be absorbed, and this will reduce the life of the desiccant. If you remove the blind cover, connect the piping quickly, evacuate the system and fill with refrigerant.
- When removing the refrigerant from the refrigerant circuit, release it gradually from the low pressure side to prevent oil from flowing out.

### CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop.

In places where there is a lot of dust, clean the air with compressed air once a week. For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (4-44)".

## ACCUMULATOR, HANDLING

(If equipped)

### 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.

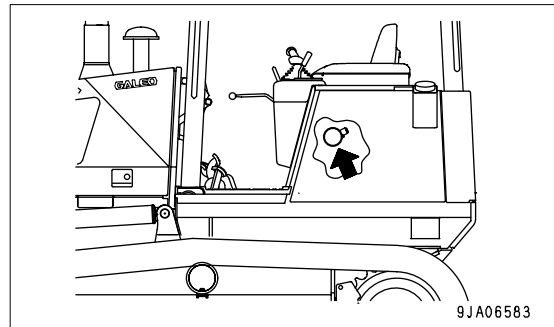
Do not hit it, roll it, or subject it to any impact.

When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work carried out.

The accumulator is a device to store the pressure in the control circuit, and when it is installed, the control circuit can be operated for a short time even after the engine is stopped.

Therefore, if the control lever is moved in the direction to lower the work equipment, it is possible for the work equipment to move under its own weight.

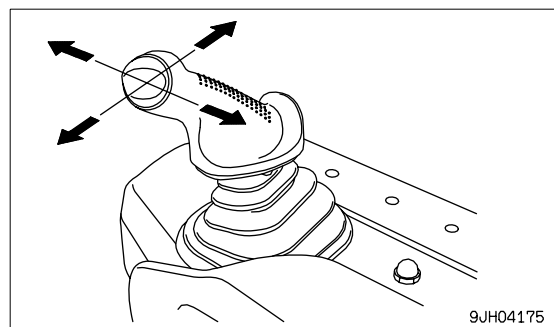
The accumulator is installed in the position shown in the diagram on the right.



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

1. Lower the work equipment and stop the engine.
2. After stopping the engine, operate control lever full strokes to the front, rear, left, and right to release pressure inside the work equipment circuit.

However, the pressure cannot be completely released, so if accumulator in the work equipment circuit is removed, loosen the screws slowly, and never stand in the direction oil spurts out.





# OPERATION

## CHECK BEFORE STARTING ENGINE, ADJUST

### WALK-AROUND CHECK

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 in places which reach high temperatures.



### WARNING

- **Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.**  
Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.
- **Do not get on or off the machine from the rear. The footing is usually slippery and can hardly be seen well from the operator's seat. Be sure to get on and off the machine at the machine front in the case of D31PX and D37PX and D39EX and D39PX and at the machine sides in the case of D31EX and D37EX, using the handrails and steps in either case.**

If the machine is at an angle, reposition it level before checking.

Carry out the following inspections and cleaning every day before starting the engine for the day's work.

1. Check for damage, wear, play in work equipment, cylinders, linkage, and 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 the dirt from around the engine, battery, and radiator.

Check that there is no dirt accumulated around the engine or radiator. Check also that there is no flammable material (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature parts of the engine. If any dirt or flammable materials are found, remove them.

3. Check for leakage of water or oil around engine.

Check that there is no leakage of oil from the engine or leakage of coolant from the cooling system. If any abnormality is found, repair it.

4. Check that there is no leakage of oil from the HST pump, final drive, hydraulic tank, hoses, and joints.

If any abnormality is found, repair the leaks.

When checking for oil leakage, check for signs of oil leaking from the undercover or signs of oil dripping on the ground.

5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.

If any abnormality is found, repair it.

6. Check for abnormality in handrails, steps, loose bolts.

If any abnormality is found, repair it. Tighten any loose bolts.

7. Check for damage to gauges, lamps on instrument panel, loose bolts

Check that there is no damage to the panel, gauges and lamps. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

8. Seat belt 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.

**CHECK BEFORE STARTING**

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

**CHECK COOLANT LEVEL, ADD COOLANT****⚠ WARNING**

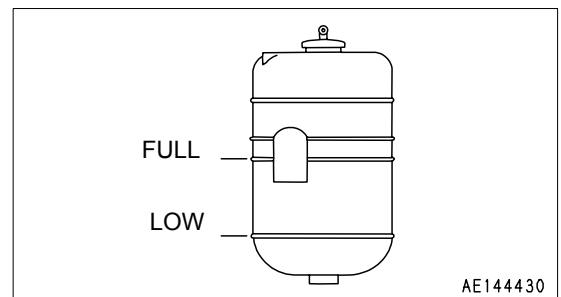
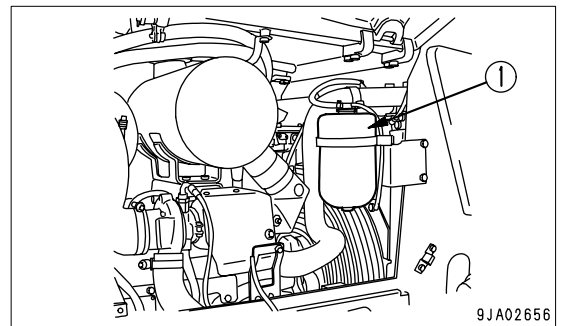
- Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.
- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to check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

1. Open the engine side cover on the left side of the chassis, and check that the coolant is between the FULL and LOW marks on sub-tank (1). If the water level is low, add water to the FULL level through the water filler port in sub-tank (1).

**REMARK**

In summer, the coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding coolant, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of coolant, then add it to the radiator and sub-tank.
4. After adding coolant, close the engine side cover.

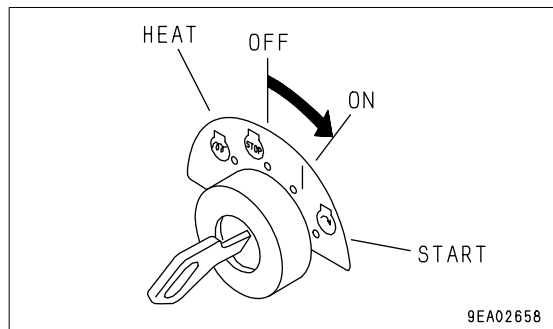
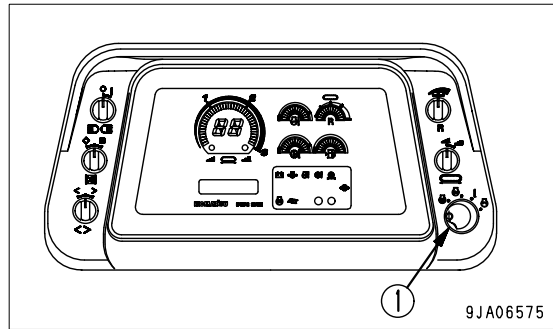


**CHECKING WITH MONITOR**

1. Turn starting switch (1) to the ON position.
2. Check that all the monitors and gauges light up for approx. 2 seconds and the alarm buzzer sounds for approx. 2 sec.

**REMARK**

If the lamps do not light up, there may be a failure or disconnection in the monitor, please contact your Komatsu distributor.



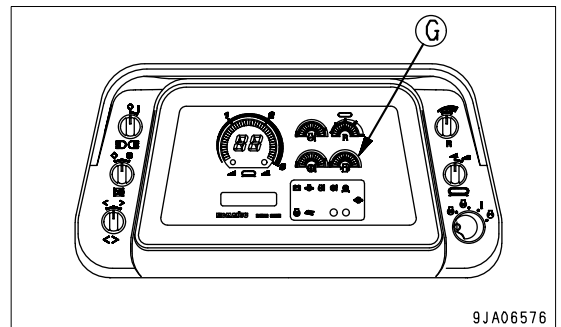
## CHECK FUEL LEVEL, ADD FUEL

 **WARNING**

When adding fuel, never spill the fuel or let it overflow. It will cause fire.  
If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.  
Fuel is highly flammable and dangerous. Never bring flames near fuel.

1. Turn the engine starting switch to the ON position and check the fuel level gauge (G) on the monitor panel for fuel level.

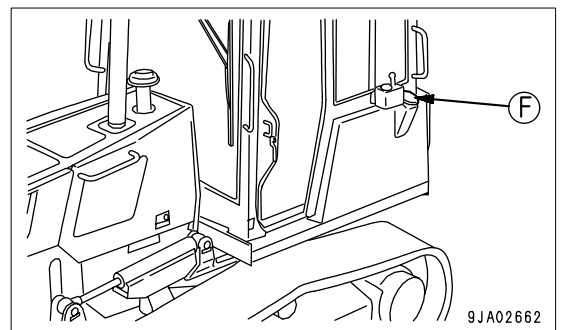
After checking, turn the switch back to the OFF position.



2. After completing work, fill the fuel tank through oil filler port (F).

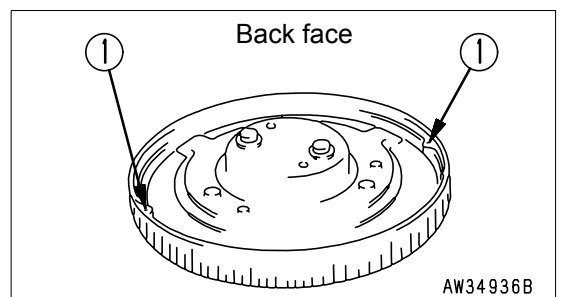
Fuel tank specified capacity: 165 liters

3. After filling, tighten the cap of oil filler (F) securely.

**REMARK**

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

When carrying out work on slopes, check carefully that the fuel level is high enough to prevent air from being sucked into the engine when the machine is at an angle.

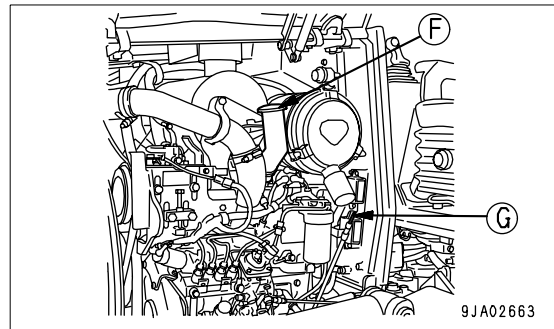


**CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL**

**⚠ WARNING**

Engine parts and oil are at high temperature immediately after the engine is stopped, and will cause serious burns. Wait for the temperature to cool down before starting the operation.

1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Completely insert dipstick (G) into the oil filler pipe, then remove it and check the oil level.



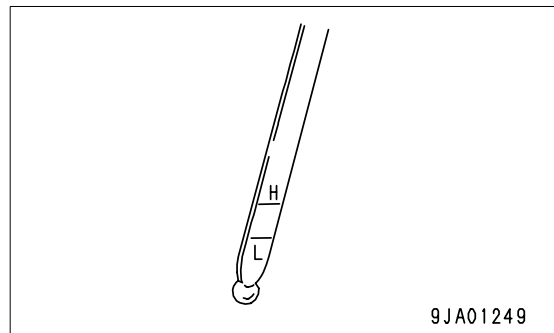
4. The oil level should be between the H and L marks on dipstick (G).

If the oil level is below the L mark, add oil through oil filler (F).

5. If the oil level is above the H mark, remove cover (1) at the bottom of the machine.

Loosen drain plug (P), drain the excess oil, then check the oil level again.

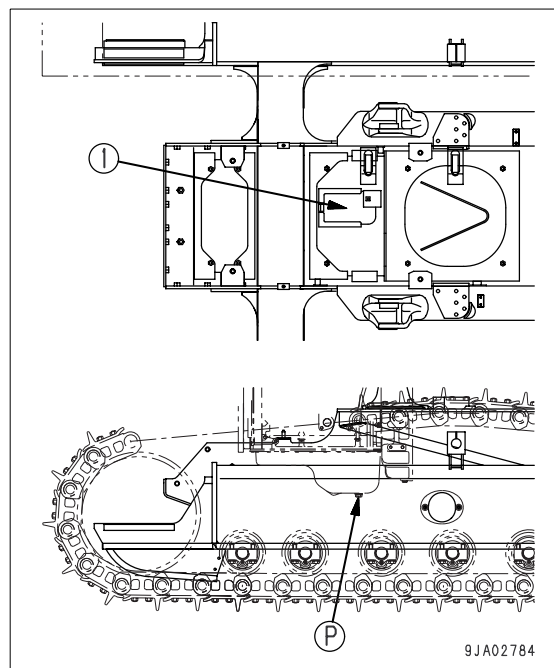
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.



**REMARK**

If the machine is at an angle, reposition it to level before checking.

When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.



**CHECK, CLEAN WATER SEPARATOR**

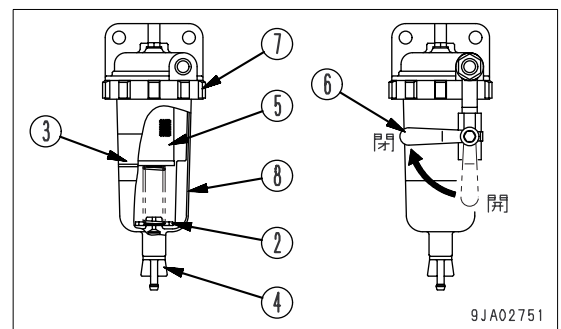
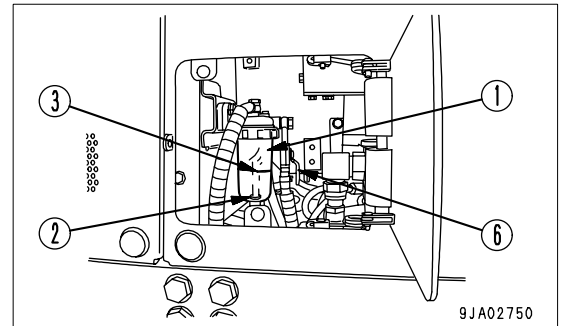
This is inside the inspection cover at the left side at the rear of the machine.

Water separator (1) separates the water and dirt from the fuel. If float (2) goes above water drain level (3), drain the water as follows.

1. Loosen drain (4) and drain the accumulated water until the float (2) reached the bottom.
2. Tighten drain plug (4).
3. If the air is sucked into fuel line when draining and water, be sure to bleed air in the same manner as for the fuel filter. See "REPLACE FUEL FILTER CARTRIDGE (4-45)".

If element (5) inside the water separator is clogged with dirt, remove the dirt as follows.

4. Set handle (6) at the side of the water separator to the CLOSE position.
5. Using the filter wrench, loosen ring (7), remove element cup (8), then take out element (5).

**REMARK**

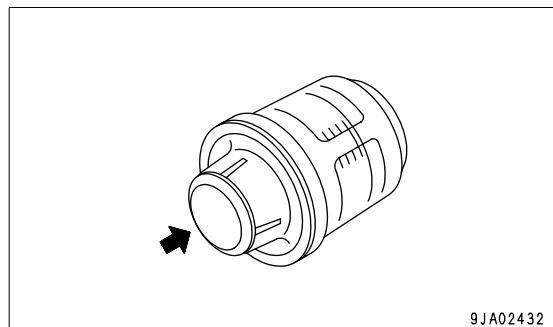
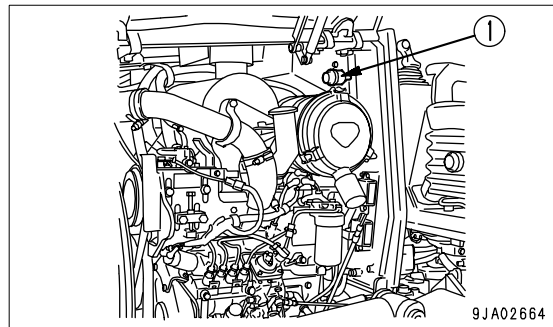
Be careful not to lose the O-ring, float, or spring. Be sure to assemble them after washing.

6. Wash element cup (8) and element (5) in diesel oil or flushing oil.
7. Assemble element (5) in element cup (8), then fill with fuel.
8. Set element cup (8) in position, then tighten ring (7) to install it.
9. Turn handle (6) to the OPEN position.
10. After washing the water separator, bleed the air from the fuel circuit. For details of the procedure for bleeding the air, see "REPLACE FUEL FILTER CARTRIDGE (4-45)".

**CHECK DUST INDICATOR**

1. Open engine side cover on the left side of machine.
2. If the yellow piston at the display portion of dust indicator (1) becomes red (7.5 kPa), clean the outer element.  
After cleaning, press the reset button to reset.
3. Replace any outer element, which has been cleaned 6 times or used for one year. Replace the inner element at the same time.
4. If the yellow piston rises to above 3/5 (5 kPa) of the transparent portion, replace the inner and outer element.

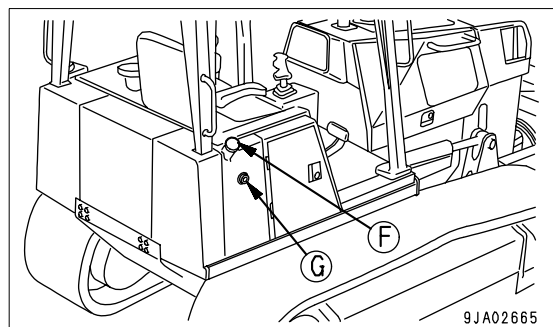
For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (4-19)".



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

**⚠ WARNING**

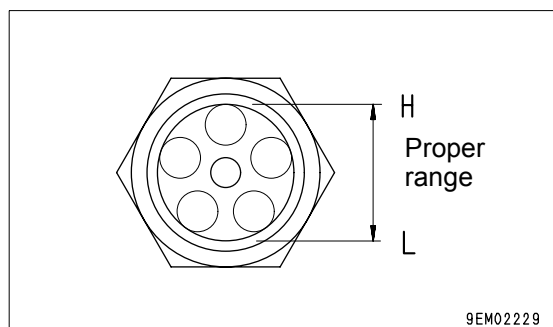
- When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.
- If oil has been added to above proper range, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.



**NOTICE**

- Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.
- Always lock the cap with the key.

1. Lower blade to the ground and stop the engine. Wait for 5 minutes before checking oil level. Oil level should be between the H and L in sight gauge (G).
2. If the level is below the L mark, add oil through oil filler (F).
3. After adding oil, be sure to screw on the oil filler cap and lock it with the key.





## CHECK ELECTRIC WIRING

 **CAUTION**

If fuses are frequently blown or if there are traces of short-circuiting on the electrical wiring, promptly ask your Komatsu distributor to locate the cause and make the repair.

Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clear the breather hole.

Check 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.

Particularly, check the wiring of the "battery", "starting motor" and "alternator" carefully.

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

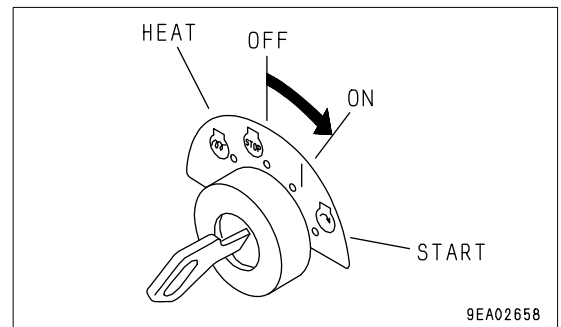
Please contact your Komatsu distributor for investigation and correction of the cause.

**CHECK THAT LAMPS LIGHT UP**

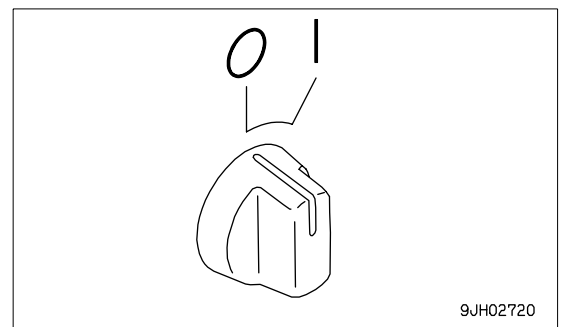
Check that the head lamp, rear lamp, and instrument lamp light up normally and they are free from stain and damage.

If the lamps do not light, check for a broken bulb or disconnected wire, contact your Komatsu distributor for repairs.

1. Turn the starting switch to the ON position.



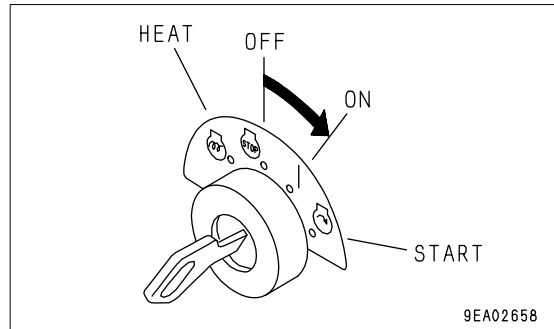
2. Turn the lamp switches to the I (ON) position, and check that all the lamps light up.



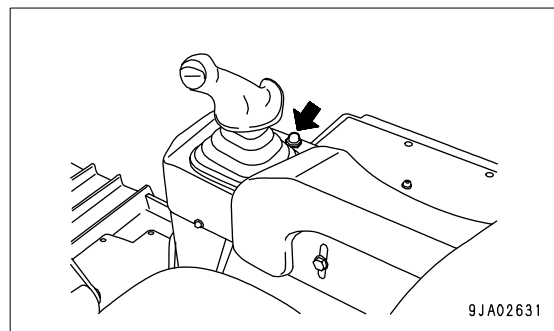
**DOES THE HORN SOUND NORMALLY?**

Check that the horn sounds. If it does not sound at all or the sound is extremely feeble, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn the starting switch to the ON position.



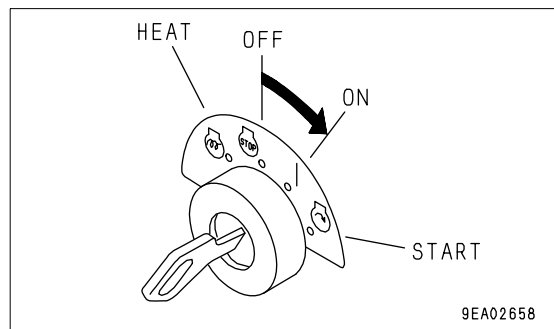
2. Push the horn switch and check that the horn sounds.



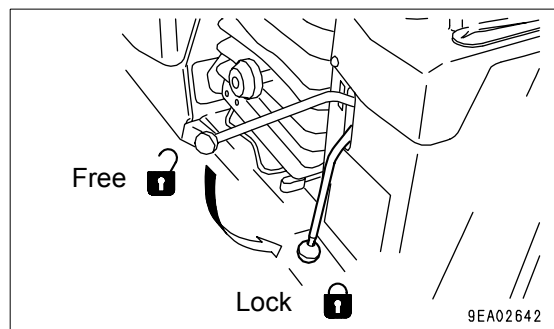
**CHECK OF OPERATION OF BACKUP ALARM**

Check that the backup alarm sounds normally. If it does not, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn the starting switch to the ON position.

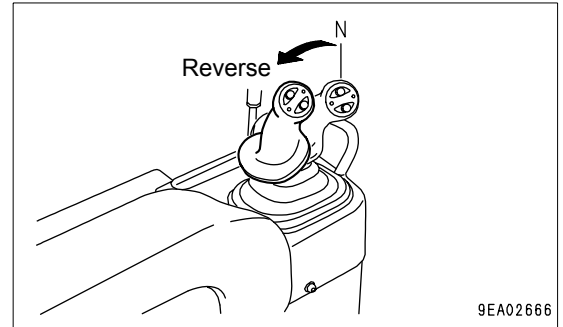


2. Check that parking lever is in the LOCK position.



3. Set the steering, directional and gear shift lever in the REVERSE position.

The alarm must sound immediately at this time. The alarm keeps sounding until the steering, directional and gear shift lever is set to the NEUTRAL or FORWARD position.



## ADJUSTMENT

### ADJUST OPERATOR'S SEAT

#### **WARNING**

When adjusting the position of the operator's seat, always set the safety lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

#### (A) Fore-and-aft adjustment

Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm

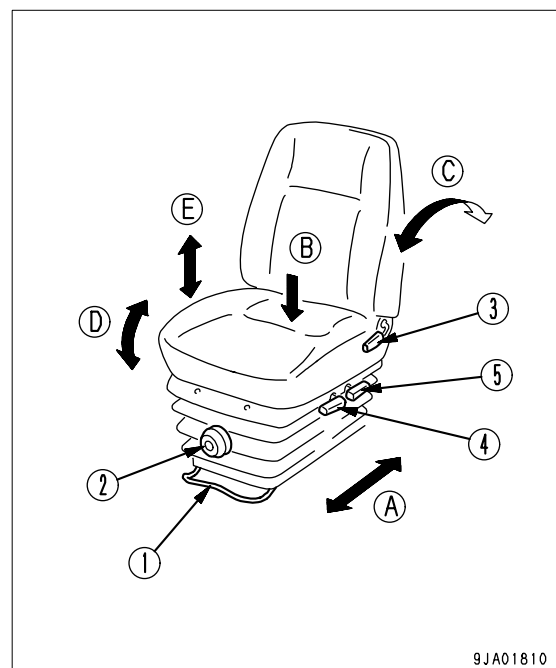
#### (B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted to 50 to 120 kg.

#### REMARK

If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight. When operating on uneven surfaces, adjust the seat to a harder setting.



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#### (C) Adjust reclining angle

Pull up lever (3) 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.

#### REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

**(D) Seat angle adjustment**

- Front angle adjustment of seat (5 stages)

To raise the front of the seat, apply your weight to the seatback, while pulling up lever (4).

To lower the front of the seat, apply your weight to the front of the seat, while pulling up lever (4).

- Rear angle adjustment of seat (5 stages)

To raise the rear of the seat, stand up on your feet a little, while pulling up lever (5).

To lower the rear of the seat, apply your weight to the rear of the seat, while pulling up lever (5).

**(E) Seat height adjustment**

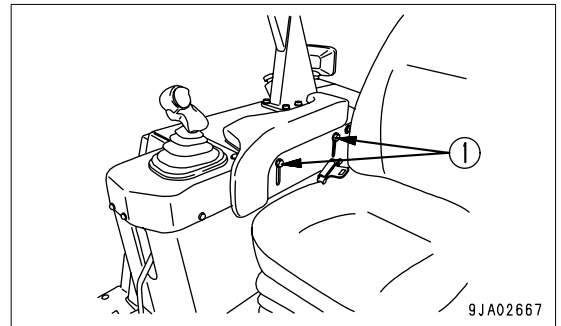
Pull up levers (4) and (5) in turn to adjust the height of the seat. After adjusting, release the levers and lock them.

(Height adjustment: 5 stages, 60 mm)

**ADJUST ARMREST**

The height of the armrests on both sides can be adjusted steplessly. After adjusting the operator's seat, adjust the armrests to a suitable height.

1. Loosen bolts (1) on both side of the operator's seat.
2. Adjust the armrests on both sides of the operator's seat to a suitable height.
3. Tighten bolts (1) securely.

**FASTENING AND REMOVING SEAT BELT**

Always install a seat belt on machines equipped with ROPS.

## **WARNING**

- Before fitting the seat belt, check that there is no abnormality in the mounting bracket and mounting belt of the belt. If the belt is worn or damaged, replace it.
- Replace the seat belt every three years, even if their outside is free from abnormality. The year of manufacture is woven on the back side of the belt.
- Always fasten the seat belt before starting operations.
- Always use the seat belt during operations.
- Do not twist the left or right side of the seat belt when fastening it.

Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose.

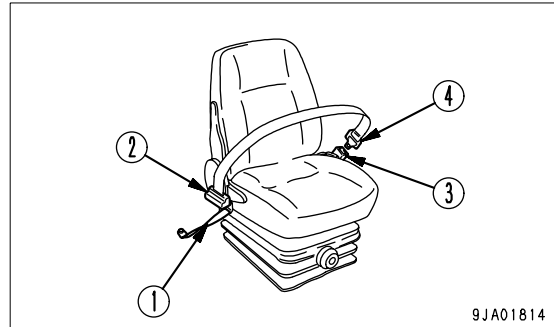
The tightening torque for the mounting bolt is  $24.5 \pm 4.9$  N·m ( $2.5 \pm 0.5$  kgf·m).

If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

**FASTENING AND REMOVING SEAT BELT**

1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.

2. After adjusting the seat position, adjust tether belt (1). Tense the tether belt and install it when there is no one sitting on the seat.
3. Sit on the seat and hold tongue (4) connected to wind-in mechanism (2) and pull out the belt slowly so that the belt will cover your abdomen sufficiently.
4. Insert tongue (4) in buckle (3) until it clicks. The belt is pulled back into wind-in mechanism (2) until it is fitted to your abdomen. The belt is locked under this condition and cannot be extended anymore. Fit the belt to your abdomen without twisting it.



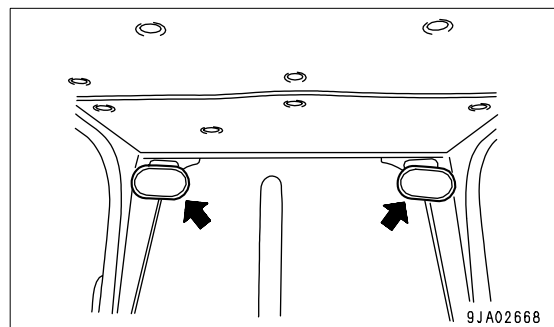
### REMARK

If the belt is locked before the tongue is inserted in the buckle, let it return to the wind-in mechanism, then repeat the above procedure from the start.

5. Pull the belt to check that it is securely locked in position.
6. When removing the belt, press the red button on buckle (3).  
The belt will automatically be wound in.

### ADJUST MIRROR

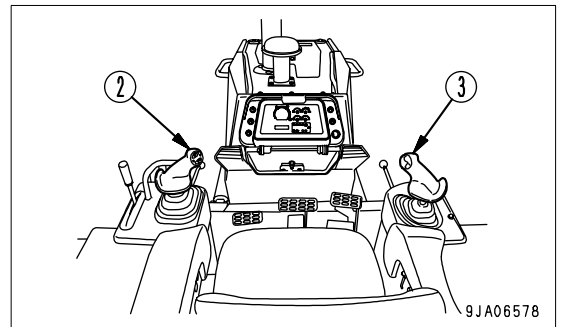
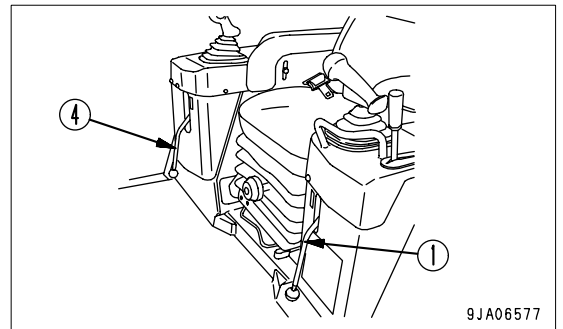
Adjust the position so that the mirror gives a good view from the operator's seat. In particular, be careful to adjust so that it is possible to see people on the left and right sides at the rear of the machine.



**OPERATION AND CHECK BEFORE STARTING ENGINE**

**⚠ WARNING**

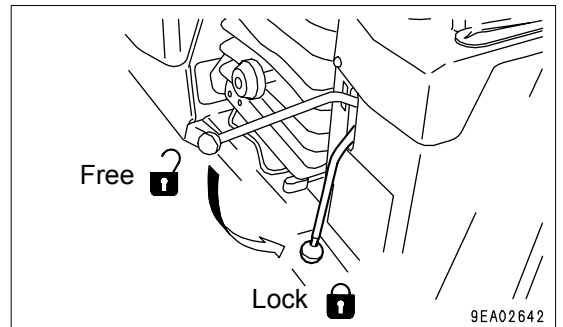
When starting the engine, check that the parking lever and safety lock lever are placed securely at the LOCK position. If the work equipment control lever is touched by accident when the engine is started, the work equipment may move unexpectedly and cause serious injury or damage.



1. Check that parking lever (1) is in the LOCK position.

**REMARK**

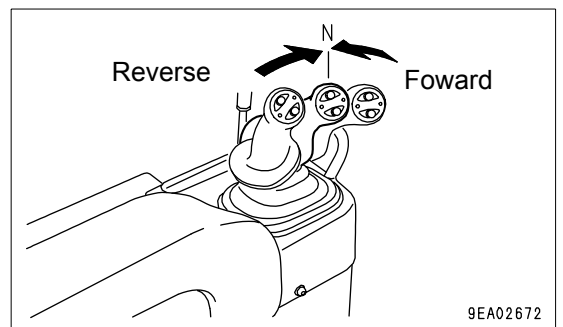
If this parking lever is not in the LOCK position, the engine will not start.



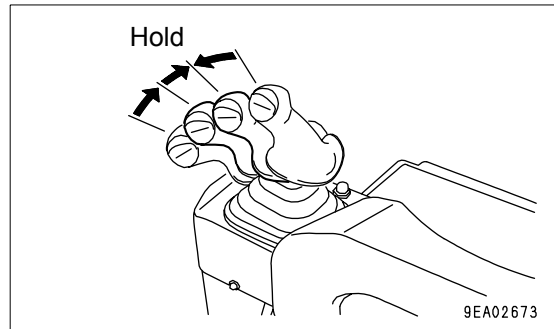
2. Check that joystick (2) is in the N (neutral) position.

**REMARK**

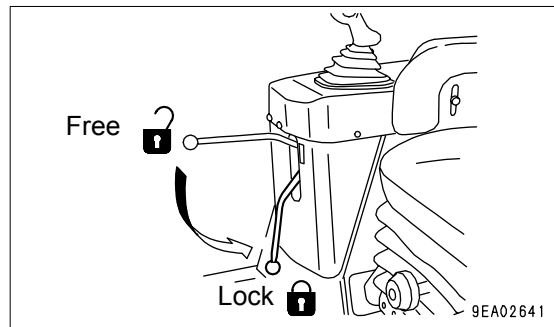
The engine cannot be started if joystick (2) is not in the N position. If joystick (2) is in F or R, the letter P on display panel A will flash.



3. Check that the blade control lever (3) is HOLD position.



4. Check that the safety lock lever (4) is locked.





## STARTING ENGINE

### NORMAL STARTING

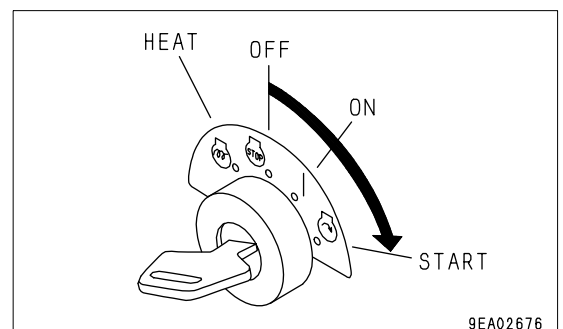
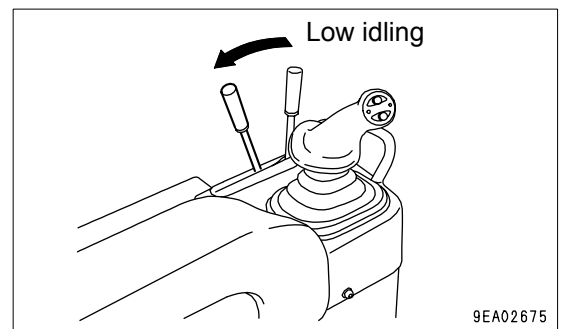
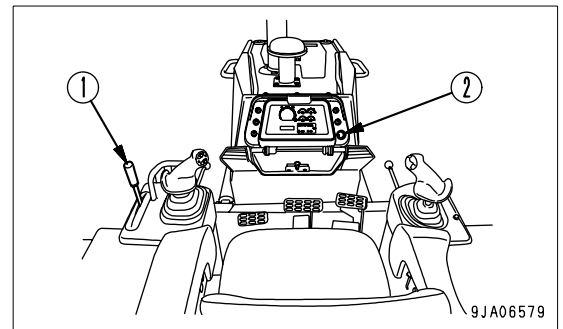
#### WARNING

- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.
- 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

- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 3.
- Do not start the engine with the fuel control lever near the FULL position. It may lead to damage of the engine parts.

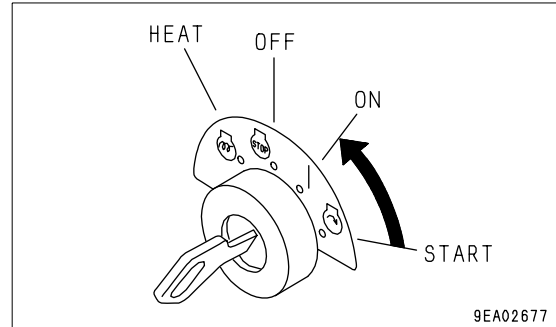
1. Before starting the engine, check that fuel control lever (1) is at the low idling position.
2. Pull fuel control lever (1) to a position midway between the low idling and full speed positions.
3. Insert the key into starting switch (2) and turn the key to the START position. The engine will start.



4. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.

5. Continue to run the engine at idling for 15 seconds after starting.

During this time, do not operate the control levers or fuel control lever.



6. After starting the engine, run at the engine at mid-range speed and travel slowly in forward and reverse to equalize the temperature in all the equipment.

## STARTING IN COLD WEATHER

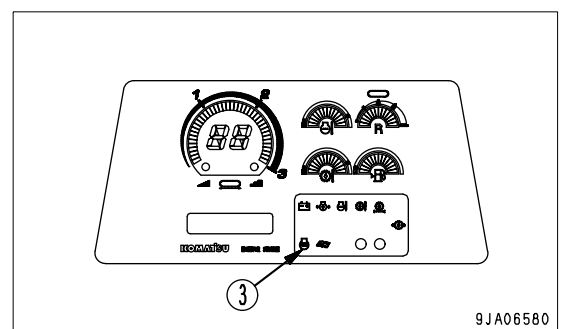
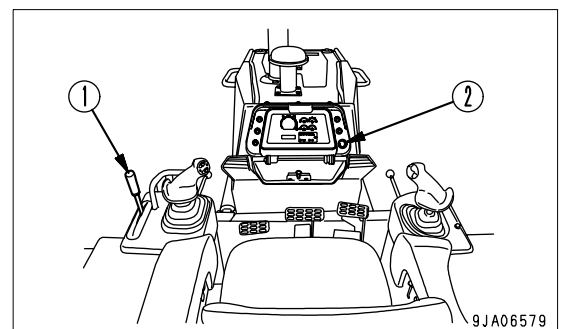
 **WARNING**

- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- 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.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

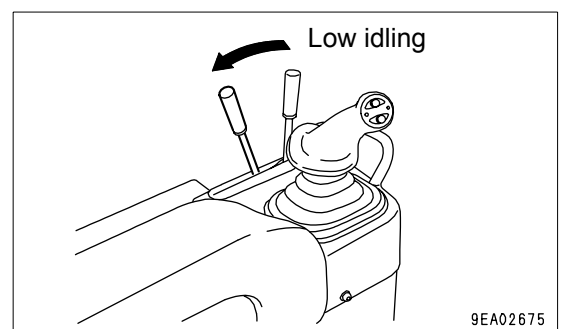
When starting in low temperatures, do as follows.

**NOTICE**

- There is danger of breakage cause by snow or water getting into the fan or fan belt and freezing. Check around the engine before starting the engine.
- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 3.
- If the engine is started with the fuel control lever at a mid-range position or above, the engine will start up suddenly, and this may damage the engine parts.

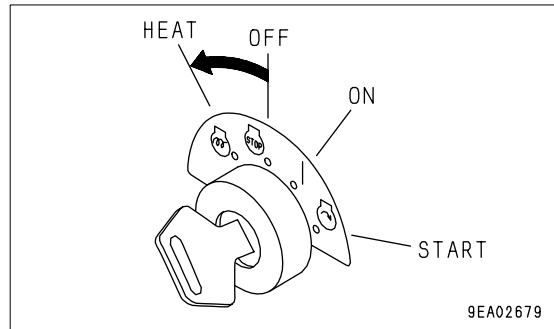


1. Before starting the engine, check that fuel control lever (1) is at the low idling position.
2. Pull fuel control lever (1) to a position midway between the low idling and full speed positions.



- Insert the key into starting switch (2) and turn it to the HEAT position. Engine preheating pilot lamp (3) will light up.

Keep it at the HEAT position for the specified preheating time.

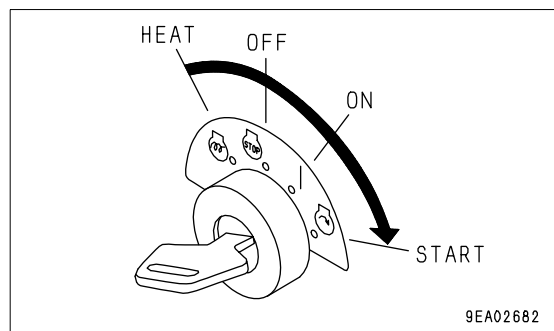


The preheating times are as shown below.

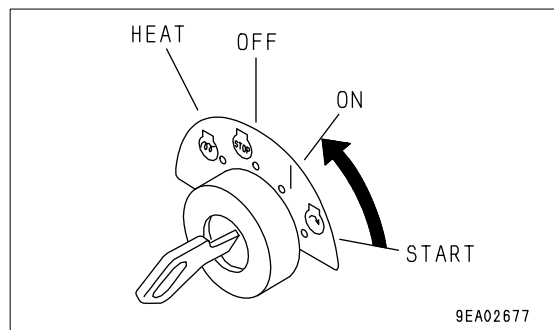
Ambient temperature	Preheat time
Above 0°C	-
0°C to -10°C	Approx. 20 seconds
-10°C to -20°C	Approx. 30 seconds

If the preheating time is too long or too short, the engine will not start easily. Observe the correct preheating time.

- When the preheating is completed, turn the key in starting switch (2) to the START position to start the engine.



- When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



- When the engine rotation stabilizes, return to the low idle position of fuel control lever (1) and then carry out the warming-up operation.

## OPERATIONS AND CHECKS AFTER STARTING ENGINE

### WARNING

- 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 and HST to the movement of the control lever will be slow and the work equipment may not respond as the operator desires, so always carry out the warming-up operation thoroughly. Be particularly sure to carry out the warming-up operation thoroughly in cold areas.

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

- If the engine oil pressure caution lamp does not go out within 10 seconds after starting the engine, stop the engine and investigate the cause.
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

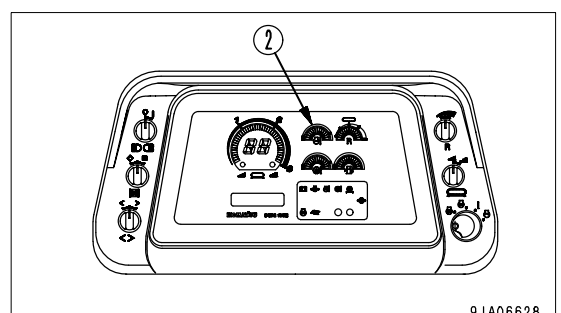
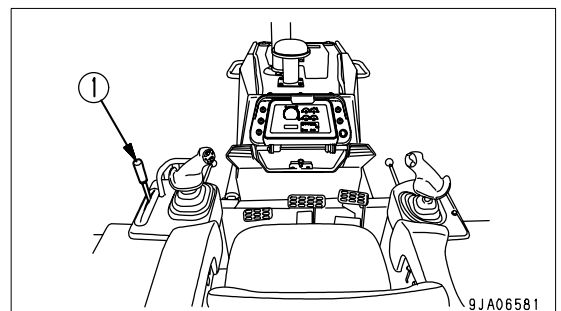
## WARMING UP OPERATIONS

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

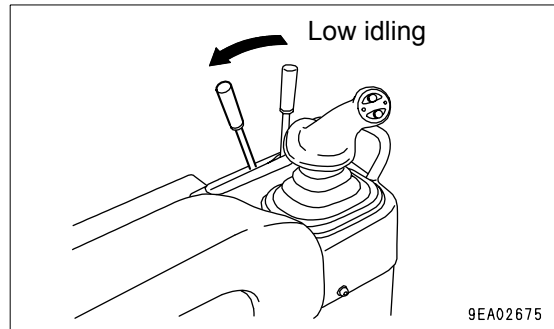
### NOTICE

Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idle or high idle for more than 20 minutes.

If it is necessary to run the engine at idle, apply a load or run at a medium speed from time to time.



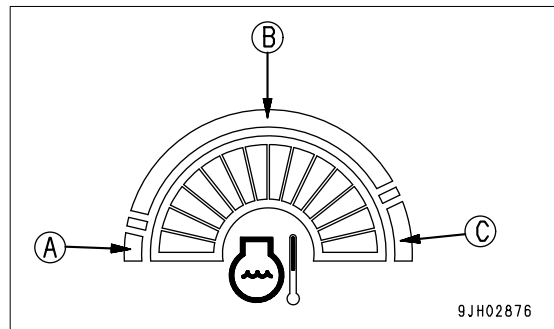
1. Pull fuel control lever (1) to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load.



2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.

Continue to run the engine under a light load until engine coolant temperature gauge indicator (2) is within the green range (B).

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



3. Check that there is no abnormal exhaust gas color, noise or vibration. If any abnormality is found, contact your Komatsu distributor.

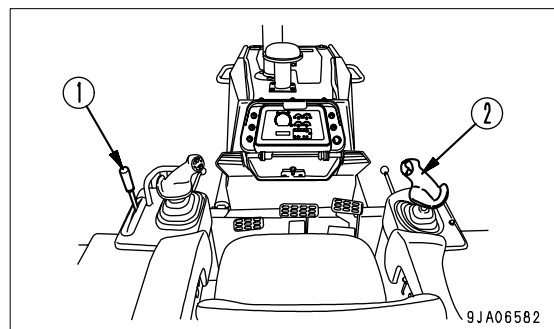
### STARTING IN COLD WEATHER

(Ambient temperature below 10°C)

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

#### **CAUTION**

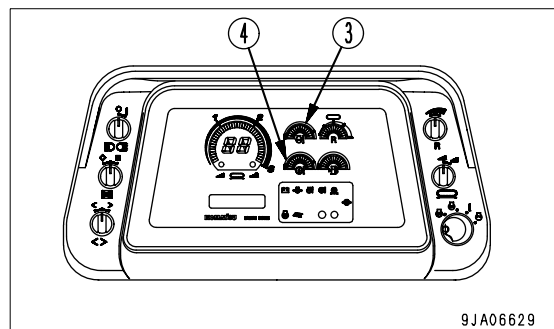
If the warming-up operation is not carried out thoroughly, the movement of the HST and work equipment will be slow, and there may be damage to the gauges and instruments.



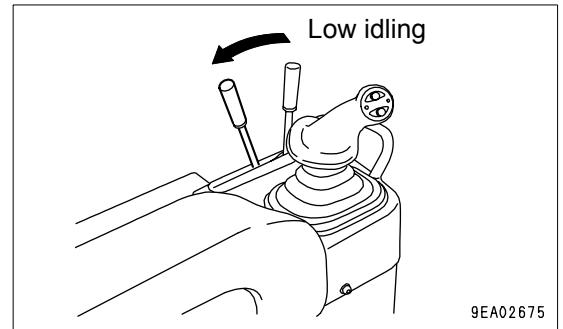
#### **NOTICE**

Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idle or high idle for more than 20 minutes.

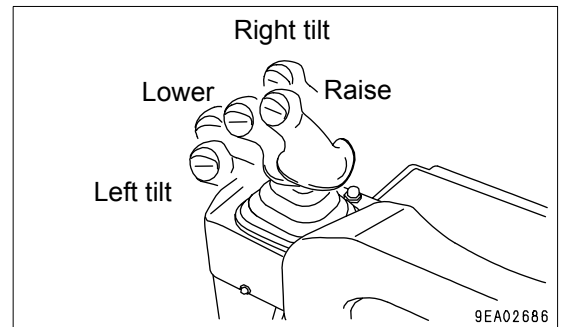
If it is necessary to run the engine at idle, apply a load or run at a medium speed from time to time.



1. Pull fuel control lever (1) to a position midway between the low idling and full speed positions, run the engine at a mid-range speed, and continue to run under no load for approx. 10 minutes.

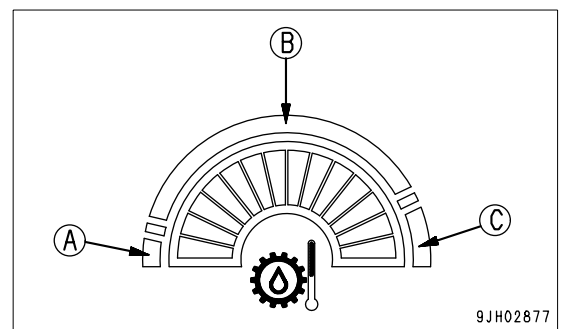
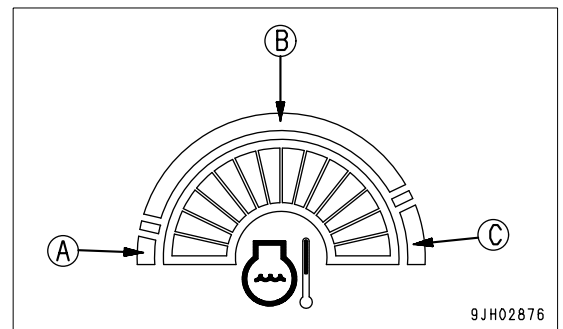


2. Blade control lever (2) to the full RAISE position, then hold the lever in position, and operate slowly to the left tilt relief and right tilt relief positions for 5 minutes.
3. After this, operate the blade control lever (2) fully to the RAISE position, hold the lever in position, and relieve the left and right tilt intermittently. Next, move the lever to the LOWER position and lower the blade to the ground, then move the lever to the full FLOAT position, hold the lever in position, and relieve the left and right tilt intermittently for 5 minutes.



4. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
  - Continue to run the engine at light load until engine coolant temperature gauge indicator (3) and HST oil temperature gauge (4) fall within the green range (B).

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



**NOTICE**

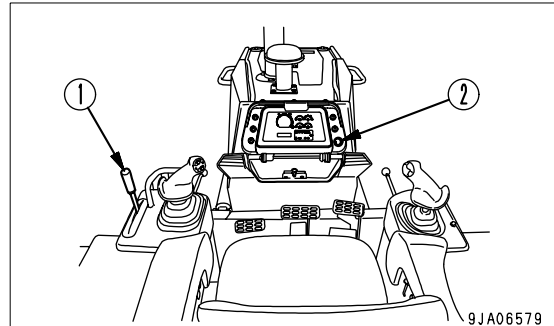
If the HST oil temperature is low, the machine may deviate slightly when stopping or starting. Be particularly careful if the machine has to be operated when the HST oil temperature gauge is still in white range (A).

5. Check that there is no abnormal exhaust gas color, noise or vibration. If any abnormality is found, contact your Komatsu distributor.
6. After carrying out the warming-up operation, to make the temperature of all equipment the same, run the engine at a mid-range speed and travel slowly forward and in reverse.

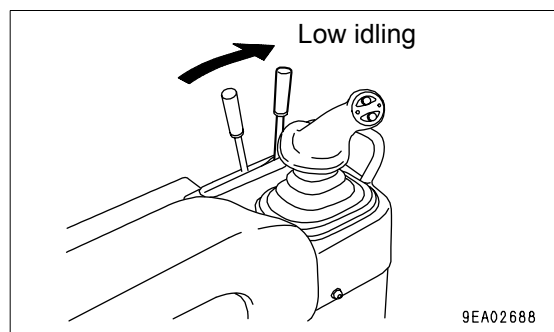
## STOPPING ENGINE

### NOTICE

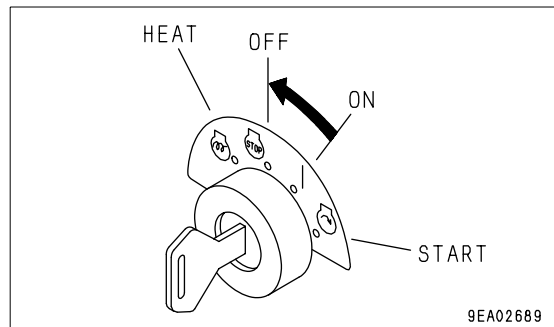
If the engine is stopped abruptly, service life of component parts of the engine may be considerably reduced. Hence do not stop the engine abruptly except in an emergency. If the engine has overheated, do not try to stop it abruptly but run it at medium speed to allow it to cool down gradually, and then stop it.



1. Lower the work equipment to the ground.
2. Place fuel control lever (1) in the low idling position and run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



3. Turn the key in ignition switch (2) to the OFF position.  
The engine will stop.



### REMARK

When the key in starting switch (2) is turned to the OFF position, the engine stops, but the machine power supply is not cut immediately.

The power supply is maintained for several seconds to enable the controller to save the operating condition to memory and shuts down the system after that. The length of time that the power supply is maintained depends on the operating condition.

4. Remove the key from starting switch (2).

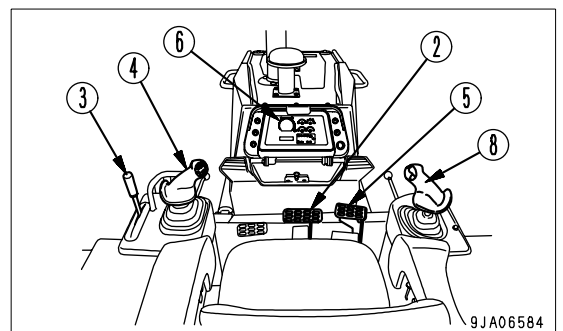
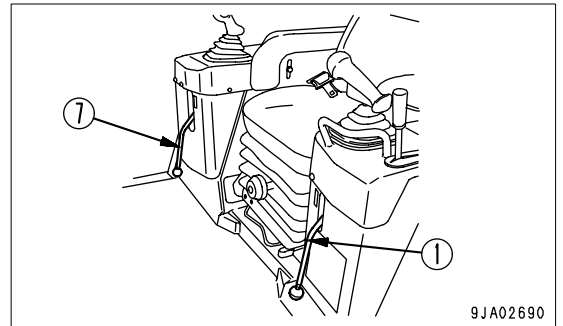


# MACHINE OPERATION

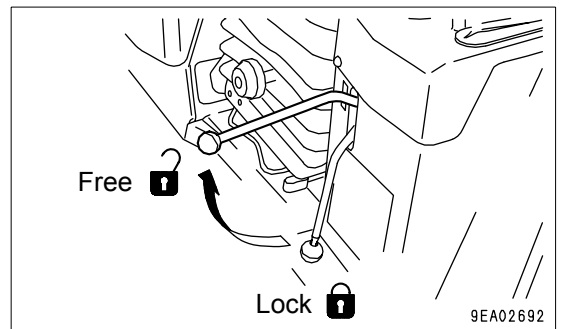
## MOVING MACHINE

### **WARNING**

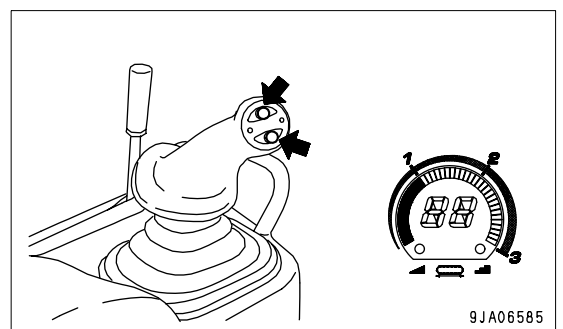
- When moving machine, check that the area around the machine is safe, and sound the horn before moving. Clear all personnel from the machine and the area. Use extreme care when reversing the machine. Note there is a blind spot behind the machine.
- When starting on slopes, always keep brake pedal (2) depressed, even after releasing parking lever (1).
- When starting the machine off on an uphill slope, pull fuel control lever (3) fully to run the engine at full speed. Keep brake pedal (2) to pressed, set the speed range to 1st, then operate steering, directional, and gearshift lever (4) in the direction of travel. Release brake pedal (2) slowly, and after the machine starts to move (or the shoes start to slip), release brake pedal (2) completely.
- On flat ground, when deceleration pedal (5) is depressed, or when fuel control lever (3) is at the low idling position, the machine is stopped, but this does not mean that the brake is applied. Be particularly careful on slopes. Even when the engine is running at low idling, the machine may move.



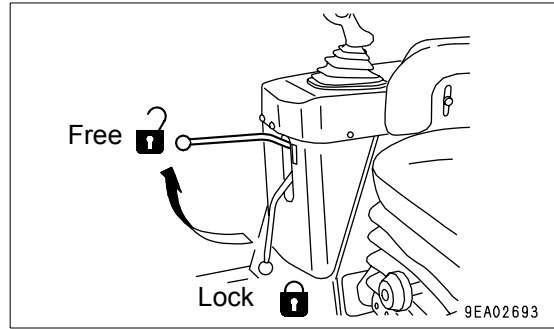
1. Set parking lever (1) to the FREE position.



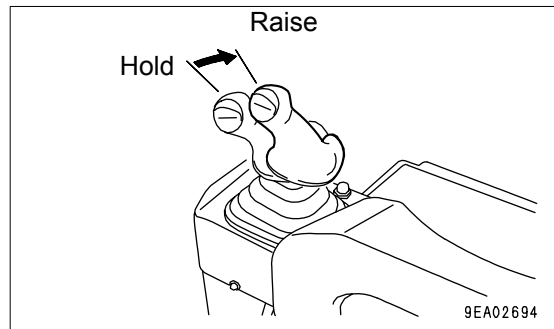
2. Operate steering, directional and gear shift lever (4) to the desired position, and check that speed range indicator (6) shows the correct position.



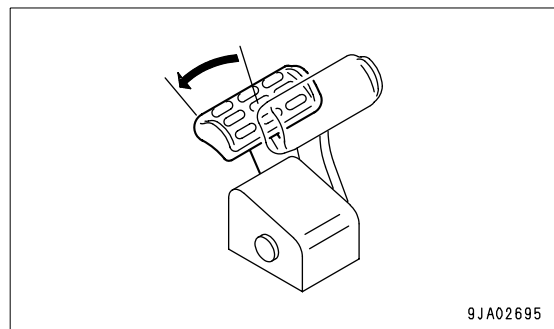
3. Set the safety lock lever (7) to the FREE position.



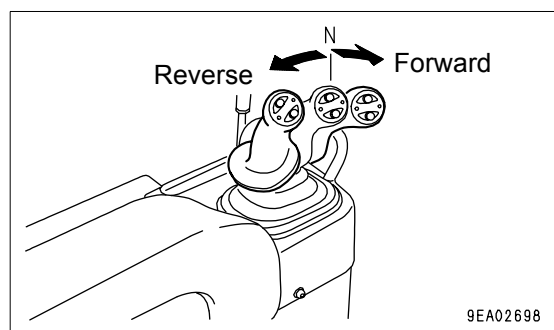
4. Put blade control lever (8) in the RAISE position to raise the blade 40 to 50 cm off the ground.



5. Depress decelerator pedal (5).



6. Move steering, direction and gear shift lever (4) to the F (forward) or R (reverse) position to move the machine off.

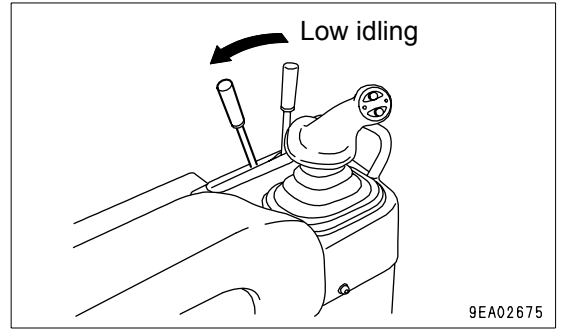


**REMARK**

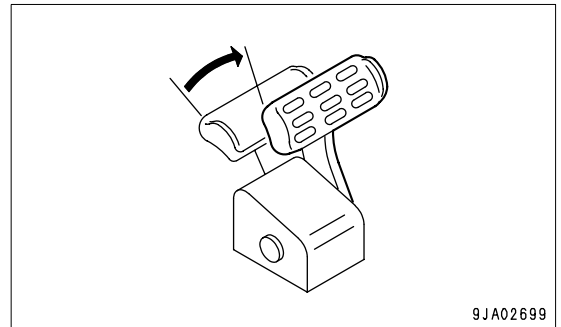
Check that the backup alarm sounds when joystick is placed in REVERSE. If the alarm does not sound, please contact your Komatsu distributor.

When the steering, directional, and gearshift lever is placed in FORWARD or REVERSE, the machine may deviate slightly to the left or right, but this is caused by the actuation of the straight-travel compensation mechanism and does not indicate any abnormality.

- 7. Pull fuel control lever (3) to increase engine speed.



- 8. Release decelerator pedal (5) slowly and move the machine off.

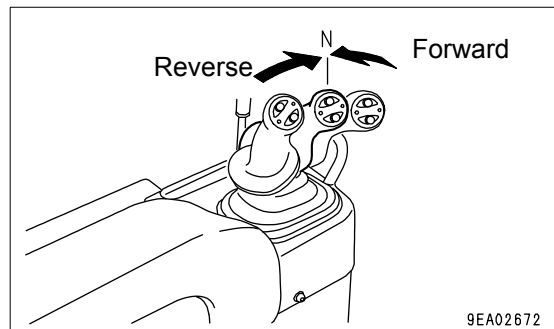
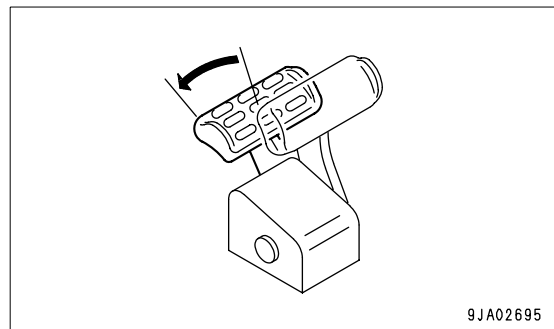
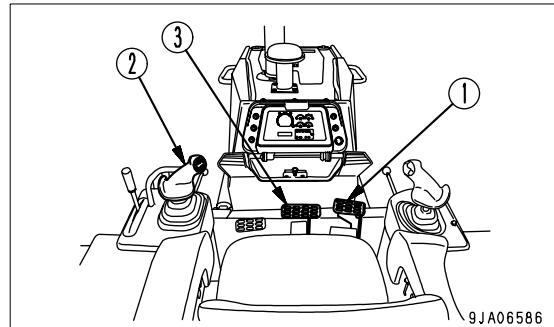


### STOPPING MACHINE

#### **WARNING**

Avoid stopping suddenly. Give yourself ample room when stopping.

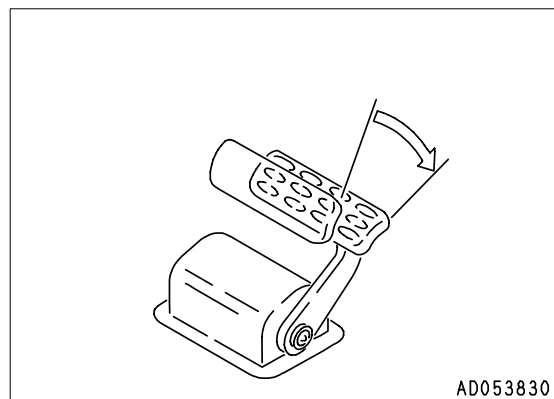
1. Depress decelerator pedal (1) and return steering, directional, and gearshift lever (2) to the N position.  
The machine will stop.



#### **REMARK**

If it is difficult to stop the machine on a downhill slope using only the decelerator pedal, use brake pedal (3) in addition to the decelerator pedal.

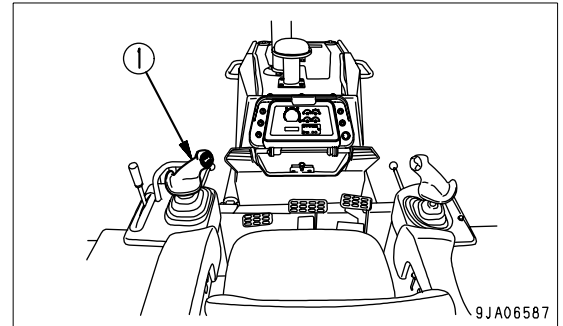
If it is necessary to stop the machine suddenly, depress the brake pedal.



## SHIFTING GEARS

The machine does not have to be stopped to shift gears.

Press the shift switch on the knob of steering, directional, and gearshift lever (1) and select the desired speed range.



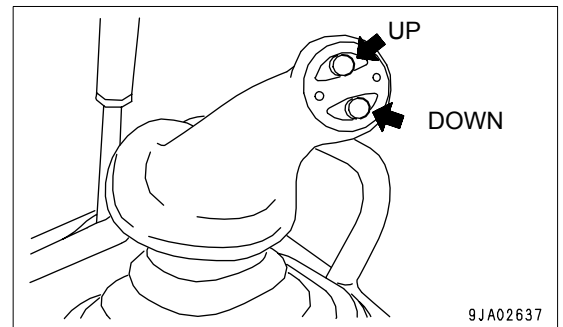
### ● Gear shifting

Press the shift switch of the knob of the steering, directional, and gearshift lever to carry out the gearshifting operation.

Press the UP switch to shift up.

Press the DOWN switch to shift down.

When the starting switch is turned to the ON position, the speed range is set by default to 1st.



For details of the method of selecting the shift mode, monitor display, and set travel speed, see "DISPLAY PANEL A (SPEED RANGE, SET TRAVEL SPEED, SHIFT MODE INDICATOR) (3-15)".

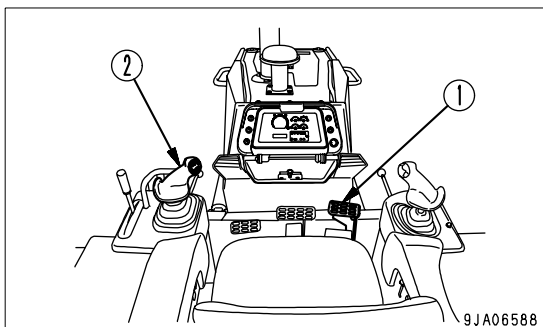
If the operating load increases, the travel speed will slowly decrease and the transmission will shift down. When the load becomes lighter again, the transmission will shift up to the set travel speed.

When the transmission automatically shifts down, the speed range display does not change.

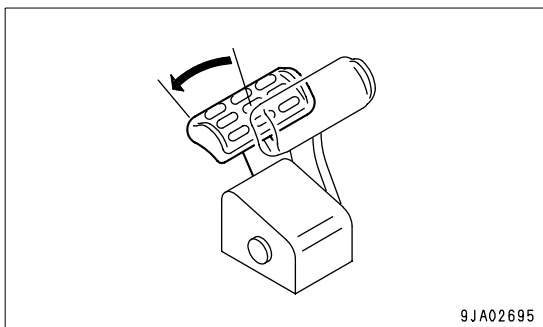
### SHIFTING BETWEEN FORWARD AND REVERSE

#### CAUTION

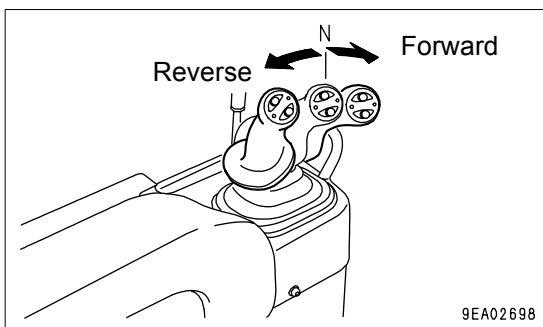
The direction of travel can be changed without stopping the machine. But to ensure safety and riding comfort, and to extend the service life of the power train, do not keep the machine running at full throttle when changing direction. Depress decelerator pedal (1) and reduce the engine speed before changing direction.



1. Depress decelerator pedal (1) to reduce the engine speed.



2. Shift steering, directional and gear shift lever (2) to the desired position.

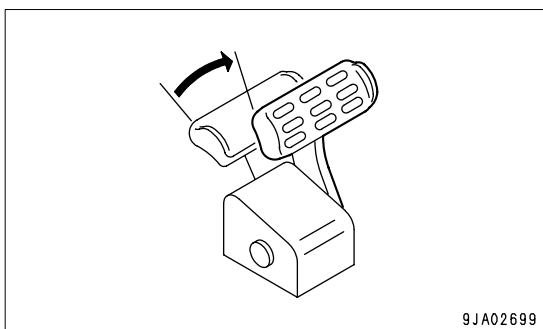


#### REMARK

Check that the backup alarm sounds when joystick is placed in REVERSE. If the alarm does not sound, please contact your Komatsu distributor.

When the steering, directional, and gearshift lever is placed in FORWARD or REVERSE, the machine may deviate slightly to the left or right, but this is caused by the actuation of the straight-travel compensation mechanism and does not indicate any abnormality.

3. Release decelerator pedal (1) and raise the engine speed.



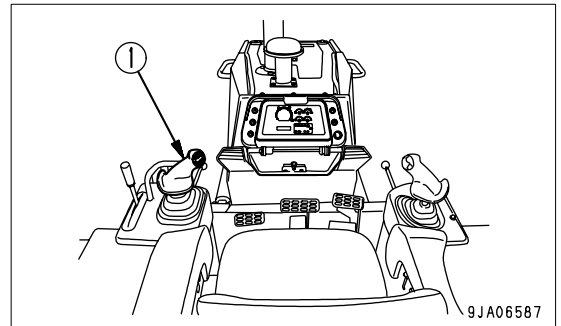
## STEERING MACHINE

### WARNING

- Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.
- Never make a pivot turn at high speed.

### NORMAL TURNING

To turn the machine while traveling, incline joystick (1) in the direction to turn.



### TURNING LEFT WHILE TRAVELING FORWARD

If the steering, directional, and speed lever (1) is operated to the FORWARD position and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further towards the position where it becomes heavy to give the desired turning radius.

### REMARK

To turn gradually to the right while traveling FORWARD, if the steering, directional, and speed lever (1) is operated to the FORWARD position and moved slowly to the right, the machine will start to turn gradually. After that, the lever can be moved further towards the position where it becomes heavy to give the desired turning radius.

Do the same when traveling in reverse.

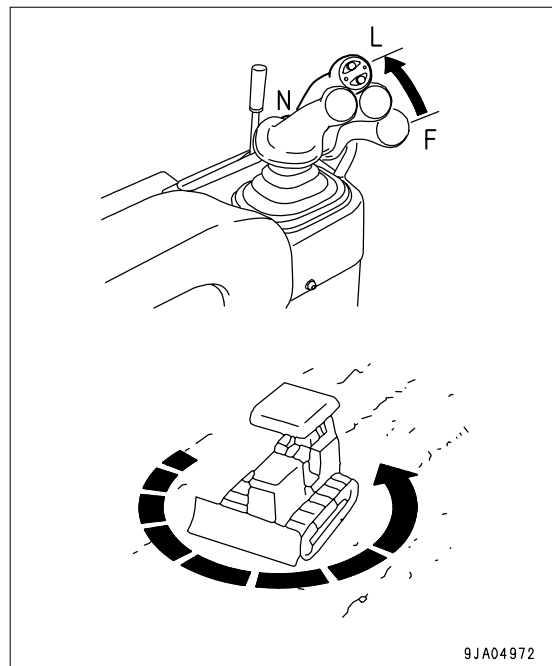


**WHEN MAKING PIVOT TURN TO LEFT WHILE TRAVELING**

When steering the machine, if the lever is operated further from the position where it becomes heavy, the left and right tracks will rotate in opposite directions and the machine will carry out a counterrotation turn.

**REMARK**

When carrying out a counterrotation turn to the right, move the joystick (1) to the right in the same way.



9JA04972

**TURNING WHILE DESCENDING A SLOPE**

This machine does not cross-steer even when it descends a steep slope where it is driven down by its own weight or when it is pushed down by a towed machine on a slope.

**REMARK**

Cross steering means the phenomenon that the machine turns in the opposite direction to the actual steering direction.

**WHEN DRIVING FORWARD AND TURNING TO LEFT**

If the steering, directional, and speed lever (1) is operated to the FORWARD position and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further towards the position where it becomes heavy to give the desired turning radius.

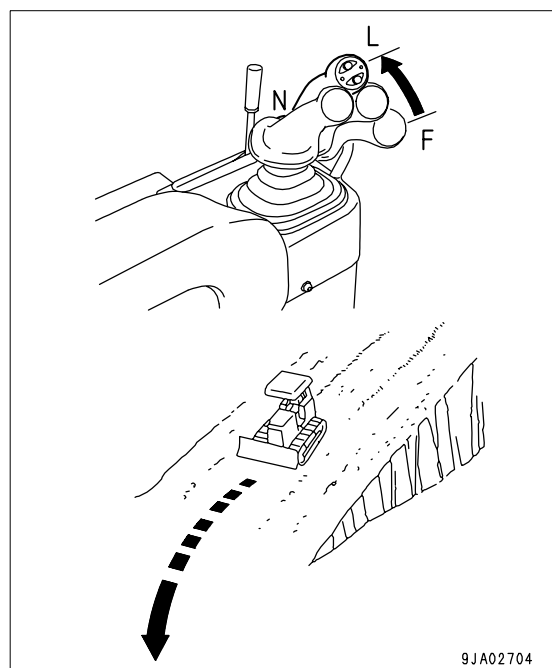
(Does not become reverse steering)

**REMARK**

To turn gradually to the right while traveling FORWARD, if the steering, directional, and speed lever (1) is operated to the FORWARD position and moved slowly to the right, the machine will start to turn gradually. After that, the lever can be moved further towards the position where it becomes heavy to give the desired turning radius.

Do the same when traveling in reverse.

(Does not become reverse steering)



9JA02704



## PRECAUTIONS FOR OPERATION

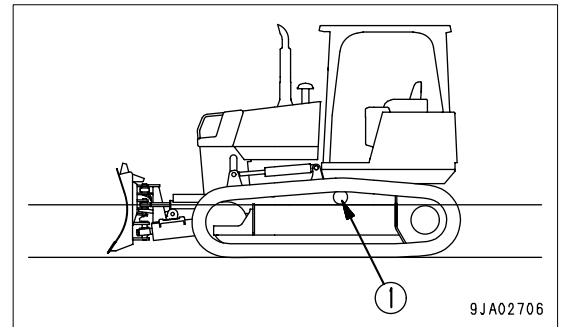
### PAY ATTENTION TO GAUGES

When the red range lights on the HST oil temperature gauge while operating, reduce the load and wait for the temperature to decrease.

### PERMISSIBLE WATER DEPTH

When operating in water, always keep the bottom of carrier rollers (1) above the surface of the water. Also, be careful that the engine cooling fan will not come in contact with water. The fan can be damaged.

After operating the machine for a long time in water, carry out greasing of the greasing points.



### METHOD OF USING BRAKES

Do not use the brakes suddenly when traveling at full speed. This will cause premature wear and damage.

#### REMARK

Always depress the decelerator pedal to lower the engine speed before actuating the brakes.

## PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

### USE ENGINE AS BRAKE

When going downhill, move gear shift lever into low speed to run engine at slow speed and travel down slope using the engine as a brake.

Do not move the joystick to the N position.

When traveling down hills of more than 15°, shift down to 1st speed.

### BRAKING WHEN TRAVELING DOWNHILL

When traveling downhill and using the braking force of the engine, use the steering, directional, and gearshift lever to adjust the engine speed.

Failure to brake may result in overrunning, causing engine trouble.

#### REMARK

When the machine travels in a straight line down a slope, the machine may deviate slightly to the left or right, but this is caused by the actuation of the straight-travel compensation mechanism and does not indicate any abnormality.

## PRECAUTIONS ON SLOPES

### BE CAREFUL OF FUEL LEVEL

If the fuel level in the fuel tank becomes low when working on slopes, the engine may suck in air because of the angle of the machine or the swaying of the machine. This makes the engine stop, so be careful not to let the fuel level in the fuel tank become too low.

### PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops while working or driving on a slope, the brake is applied automatically. Take care since the machine stops suddenly at this time.

## IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(Machines equipped with cab)

Always keep the door closed when traveling or carrying out operations.

If the door is open, there is danger of damage from obstacles or strong vibration.

## IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW

(Machines equipped with cab)

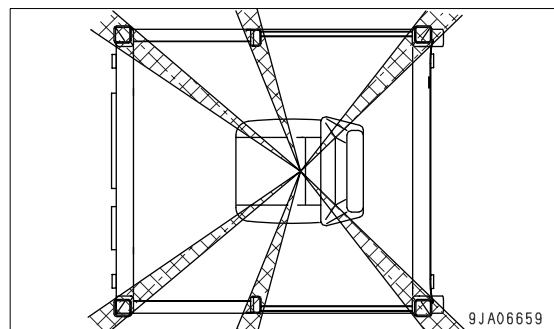
- For safety reasons, do not install anything to the cab glass that will obstruct the view.
- Always keep the glass clean to ensure safety during operations.

## PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB STAY

(Machines equipped with cab)

### **WARNING**

**The cab structure may cause blind spots.  
When operating, always be sure to check carefully that  
there is no obstacle or worker in the surrounding area.**

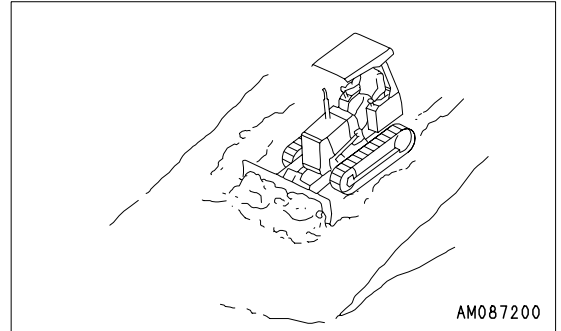


## WORK POSSIBLE USING BULLDOZER

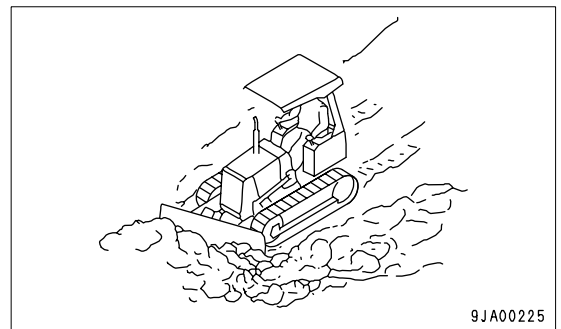
In addition to the following, it is possible to further increase the range of applications by using various attachments.

### DOZING

A bulldozer digs and transports dirt in a forward direction. Slope excavation can always be most effectively carried out by proceeding from the top downward.



When dozing toward one side only, operate with angled blade.

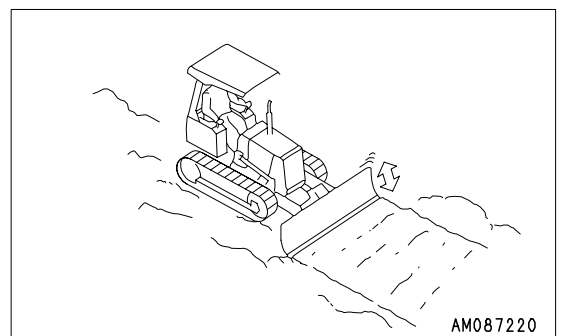


### SMOOTHING

#### NOTICE

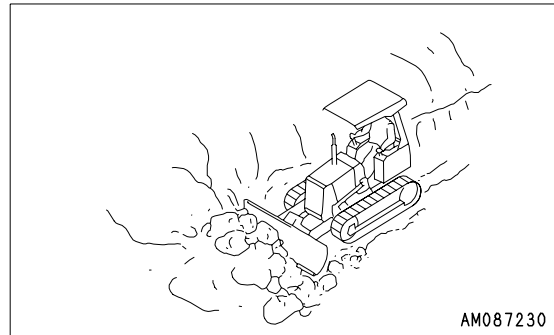
**Avoid smoothing on rocky or stony ground. It can damage the blade.**

To finish the ground to a flat surface after digging or leveling, put a full load of soil in front of the blade and operate the blade up and down in small movements while traveling forward. Finally, place the blade at FLOAT and travel at low speed in reverse while pulling the blade over the ground surface. Before doing this, hold the lever by hand at the FLOAT position for at least 1 second to make sure that it stays in position. To prevent damage to the blade, be careful not to travel over any stones or rocks.



## CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade.



## FELLING TREES, REMOVING STUMPS

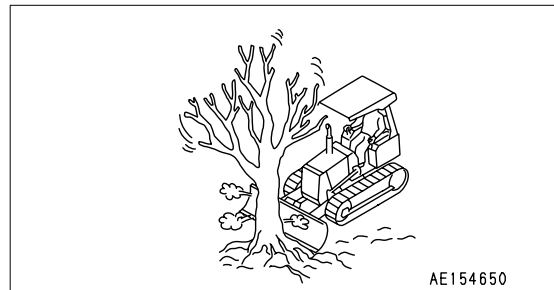
### NOTICE

**Do not uproot trees or stumps or fell trees by angling or tilting the blade.**

Raise the blade high and push two or three times to fell the tree.

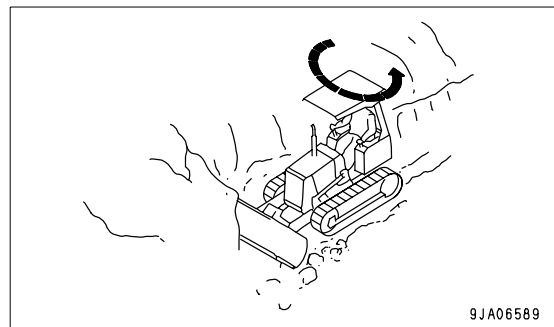
Next, travel in reverse and push the cutting edge of the blade into the ground to cut the roots, then push the blade in to uproot the tree.

When doing this, never hit the tree at high speed or apply any shock to fell the tree.



## SIDE-CUTTING OPERATIONS

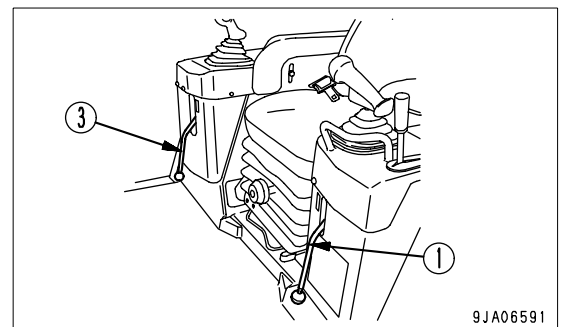
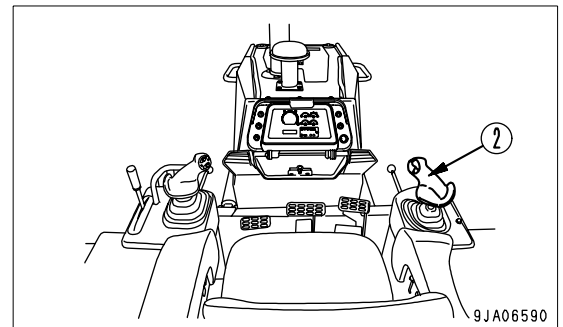
When carrying out side-cutting operations with the load on one side of the blade, the work can be carried out efficiently by using counter-rotation to correct the direction.



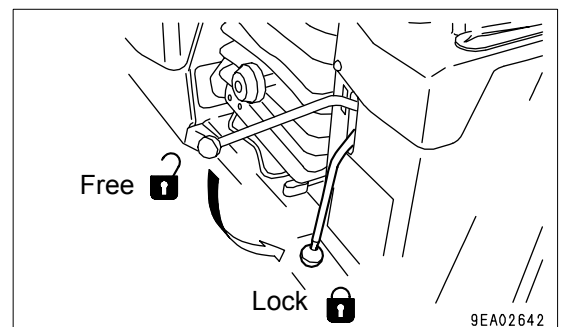
## PARKING MACHINE

**⚠ WARNING**

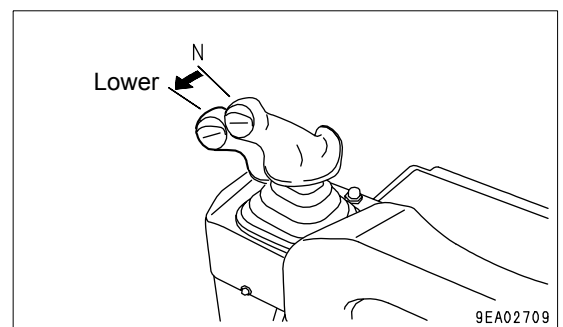
- When parking the machine, select flat hard ground.
- Avoid parking the machine on a slope.
- On slopes, even if steering, directional and gear shift lever is set to the N position, the machine may move slowly down the slope.  
If it is unavoidably necessary to park the machine on a slope, place the parking lever at the LOCK position and insert blocks under the track shoes. As an additional safety measure, lower the work equipment and thrust the blade into the ground.
- If the work equipment control lever is touched by accident, the work equipment may move suddenly, and this may lead to a serious accident. Before standing up from the operator's seat, always place the safety lock lever and parking lever securely at the LOCK position.



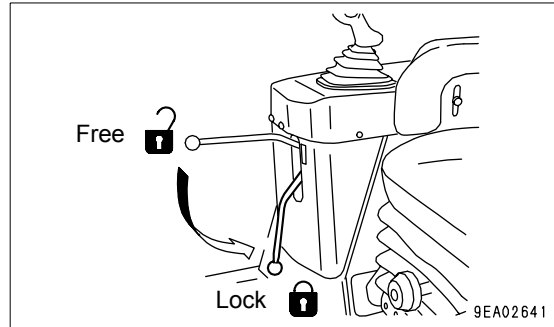
1. Stop the machine. For details, see "STOPPING MACHINE (3-88)".
2. Set parking lever (1) to the LOCK position and apply the parking brake.



3. Move blade control lever (2) to the LOWER position, and lower the blade to the ground.



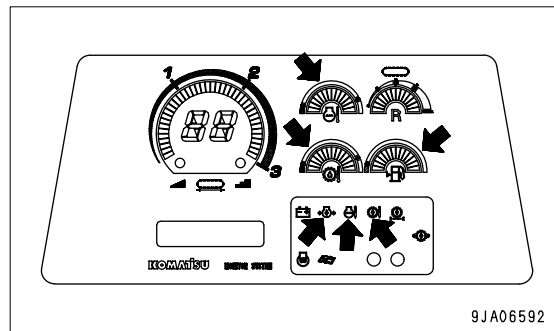
- Set safety lock lever (3) in the LOCK position.



## CHECK AFTER FINISHING WORK

### BEFORE STARTING ENGINE

Use the meters and caution lamps to check the engine water temperature, engine oil pressure, fuel level, and HST oil temperature.



### AFTER STARTING ENGINE

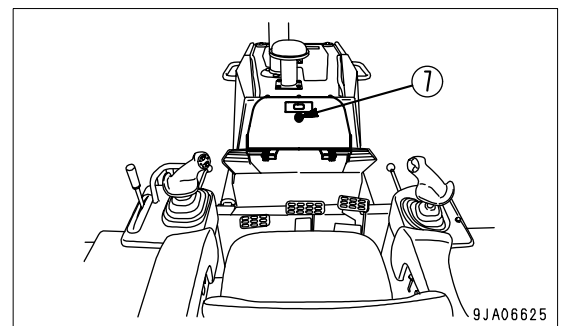
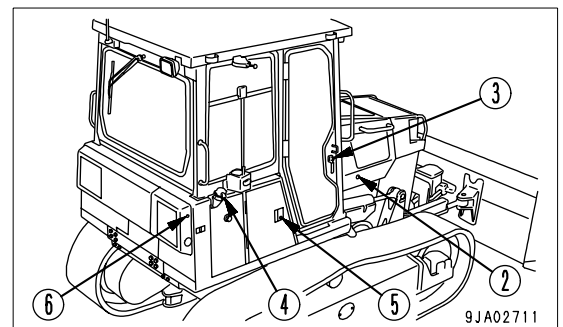
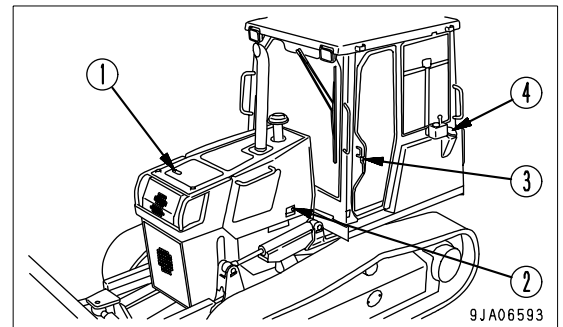
- Walk around the machine and check the work equipment, machine exterior, and undercarriage, also check for any leakage of oil or coolant. If any abnormalities are found, repair them.
- Fill the fuel tank.
- Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a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

## LOCKING

To prevent vandalism, there are locks at the following places.

Places that can be locked with the ignition switch key.

- Top cover at front of chassis (1)
- Right and left engine side covers (2)
- Cab door opener (3) (machine equipped with cab)
- Cap with lock (4)
  - Fuel tank cap
  - Hydraulic tank cap
- Battery inspection cover (5)
- Air conditioner filter inspection cover (6) (machine equipped with air conditioner)
- Monitor panel cover (7) (optional on canopy specification machines)

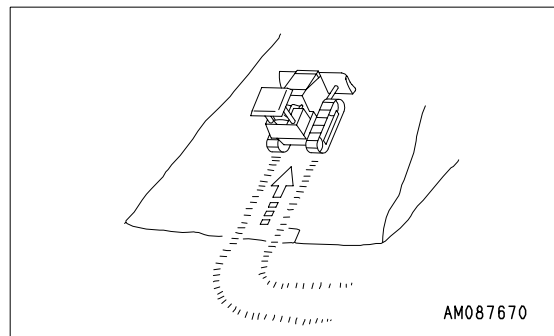


## TIPS FOR LONGER UNDERCARRIAGE LIFE

Undercarriage life greatly varies depending on operation method, inspection and maintenance. For most efficient operation, keep the following point in mind.

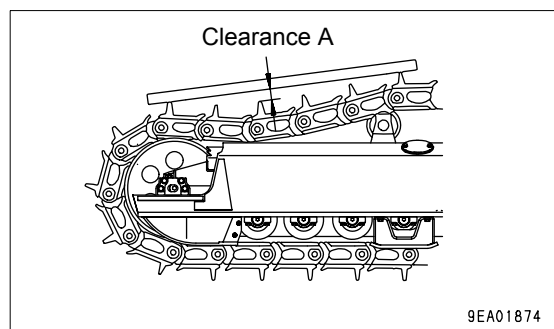
### OPERATION METHOD

- Select the track shoe that best suits the type of soil to be encountered in service.  
Please consult your Komatsu distributor when selecting track shoes.
- Do not allow shoe slipping to occur during operation.  
If shoe slipping occurs, reduce load to the blade until slipping stops.
- Avoid sudden starts, acceleration or stops, unnecessary high speeds and sharp turns.
- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.
- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.
- When ground inclines to the left or right during digging operations, do not continue to dig with the incline. Move the machine back to level ground and start to dig again.
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.



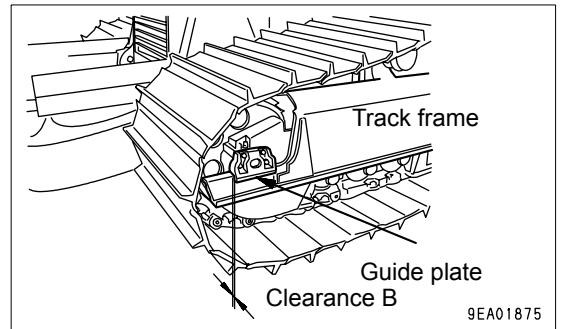
### INSPECTION AND ADJUSTMENT

- Properly adjust the track tension.  
The tension should be measured at clearance (A) between the idler and carrier roller shown in the right diagram - usually 20 to 30 mm at this point. For rocky terrain, tighten the tracks slightly. In clay or sandy areas, loosen them slightly. (For inspection and adjustment procedures, refer to "CHECK TRACK SHOE TENSION, ADJUST (4-25)")
- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.





- Check clearance (B) between the idler guide plate and track frame. If clearance (B) increases, idler may move sideways and the tracks may come off. (For inspection and adjustment procedure, refer to “ADJUST IDLER CLEARANCE (4-29)”.)



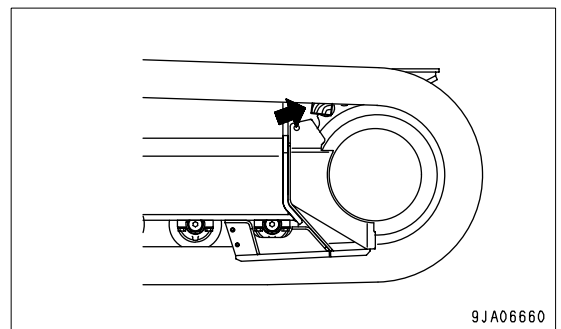
**INSPECTION AND REPAIR**

Frequent inspection and prompt repair will reduce repair costs.

The following items for inspection will serve as a guide to maintenance service of each undercarriage part. Perform periodical inspection and contact the Komatsu distributor in your area when machine has approached repairable limits and reversing limits.

**MEASURING LINK PITCH**

1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.



2. Measure pitch length of 4 links in stretched portion at more than 2 links away from master pin. Of length obtained, 1/4 is the link pitch.

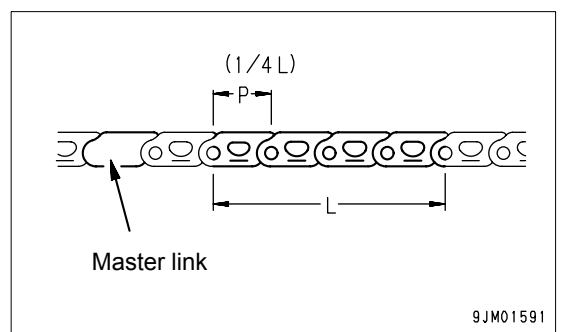
There is no link window on the master link.

D31,37

- Basic link pitch (P): 154.3 mm
- Link pitch limit for turning: 157 mm

D39

- Basic link pitch (P): 171.5 mm
- Link pitch limit for turning: 174.5 mm



**REMARK**

The measured value under decimal of Link pitch is different from the basic value depending upon the precision of measure or the tolerance of product even if it isn't worn out. Don't judge it's worn out too soon, do it with the trend of measured value after that.

**MEASURING HEIGHT OF GROUSER**

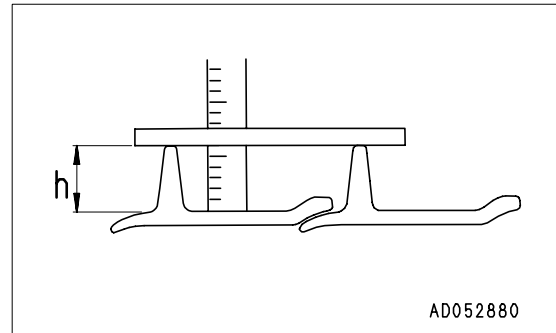
After taking up slack in track shoes, measure height at center of shoe as shown below.

D31,37

- Standard height (h): 47 mm
- Repair limits: 20 mm

D39

- Standard height (h): 53 mm
- Repair limits: 25 mm

**MEASURING OUTSIDE DIAMETER OF TRACK ROLLER**

1. Measure the height (dimension C) of the link tread as shown in the diagram.
2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.

3. Calculate outside diameter of tread (size A):

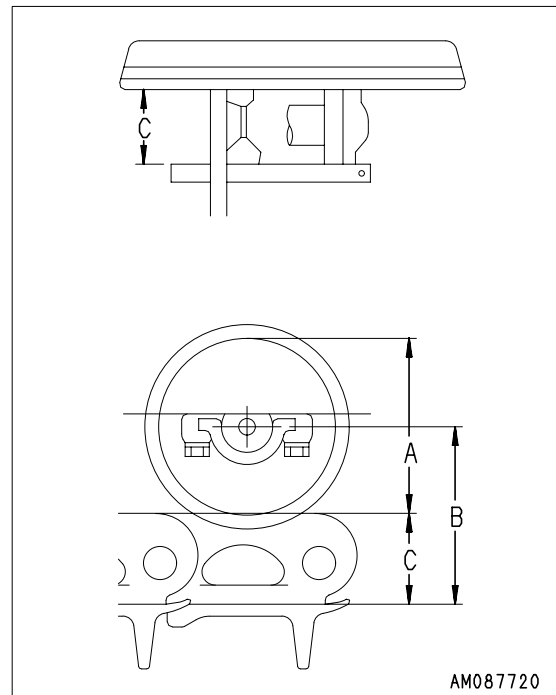
$$A = (B - C) \times 2$$

D31,37

- Standard size (h): 170 mm
- Repair limits: 156 mm

D39

- Standard size (h): 175 mm
- Repair limits: 150 mm



# TRANSPORTATION

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

## TRANSPORTATION MEANS

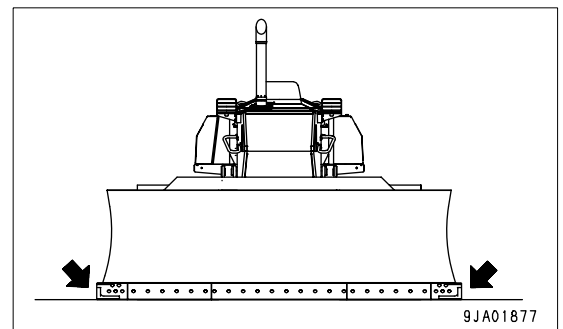
As a rule, transport the machine on a trailer.

Select a trailer according to the mass and dimensions of the machine shown in "SPECIFICATIONS (5-2)".

Note that the mass and dimensions for transportation shown in SPECIFICATIONS depend on the types of shoe, blade, etc.

## PRECAUTIONS WHEN REMOVING WORK EQUIPMENT

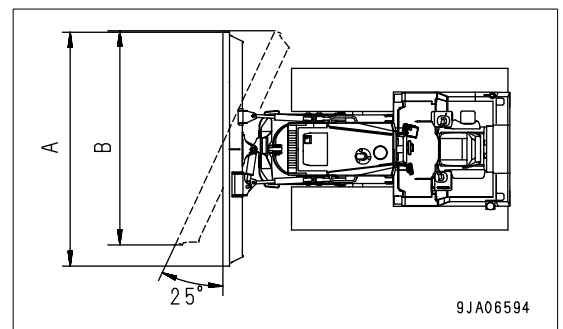
1. Lower the blade to the ground and set it horizontal to the ground surface.
2. Remove the blade assembly.



### REMARK

To overall width can be reduced by angling the blade to the maximum. Determine whether or not it is necessary to detach the blade for transportation, referring to the drawing on the right.

Machine mode		A mm	B mm
D31EX		2,435	2,250
D37EX		2,720	2,505
D39EX		2,740	2,510
D31PX	Narrow blade	2,875	2,645
	Wide blade	3,200	2,935
D37PX	Narrow blade	2,875	2,645
	Wide blade	3,250	2,985
D39PX	Narrow blade	2,980	2,800
	Wide blade	3,330	3,040



## REMOVING CAB

If it is necessary to remove the cab for transportation, there is danger that the seal may be damaged when removing or installing the cab, so please contact your Komatsu distributor.

When installing the cab, please contact your Komatsu distributor, too.

## LOADING, UNLOADING WORK

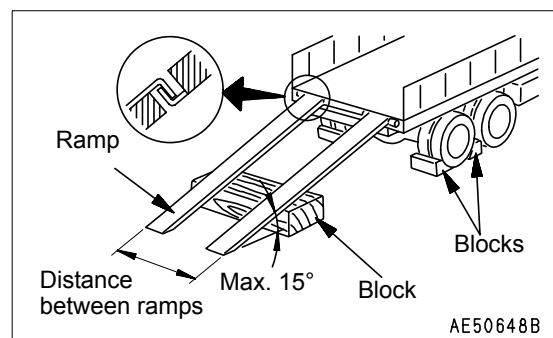
### WARNING

- Since loading and unloading of the machine is dangerous, be extremely careful.
- When loading or unloading the machine, operate it slowly with the engine speed low and the speed range at 1st or less.
- Use ramps having sufficient width, length, thickness, and strength. Install them securely and set their angle to 15° or less.  
If the ramps are deflected appreciably, reinforce them with blocks.
- Perform the loading work of the machine on firm, level ground. Secure sufficient distance between the shoulder of the road and the trailer.
- Remove mud from the undercarriage of the machine so that the machine will not slip sideways on the ramps. In addition, remove water, snow, ice, grease, oil, etc. from the ramps.
- Never steer the machine on the ramps, since steering on the ramps can cause the machine to tip over. If it is necessary to change the travel direction, return to the ground or to the bed of the trailer, then change the travel direction.
- The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.

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

### LOADING WORK

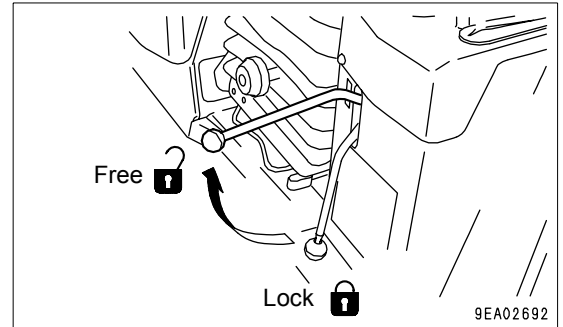
1. Load and unload on firm level ground only.  
Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.  
Make the slope of the ramps a maximum of 15°.



3. Start the engine.

In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (3-82)", in this manual.

4. Set parking lever to the FREE position
5. Use the variable mode to set the speed range to 1st or less, and travel slowly.
6. Set the travel direction toward the ramps and drive slowly.
7. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
8. Stop the machine at the specified position on the trailer.



## SECURING MACHINE

 **WARNING**

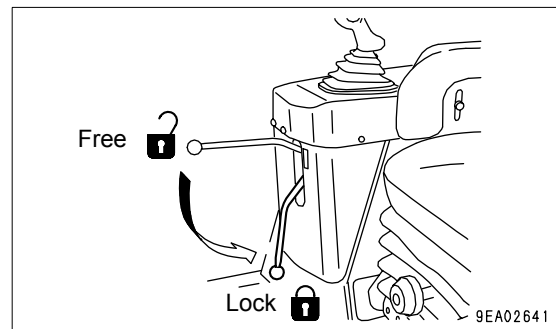
When the edge of the blade protrudes beyond the trailer, angle the blade.

**NOTICE**

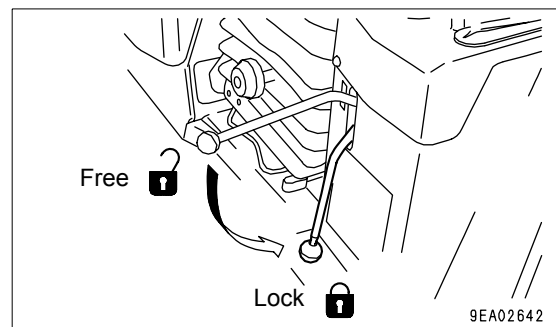
Always loosen the screw at the rotating portion and set the car radio (machine equipped with cab) antenna facing down.

Load the machine onto a trailer as follows:

1. Lower the work equipment slowly.
2. Set the safety lock lever to the LOCK position securely.



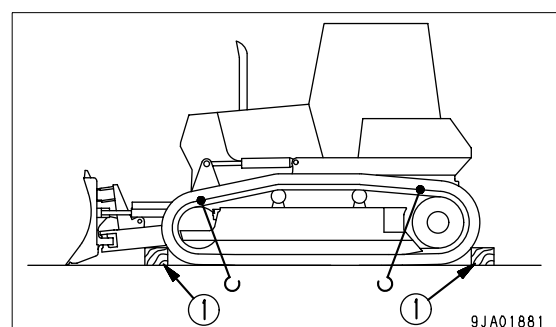
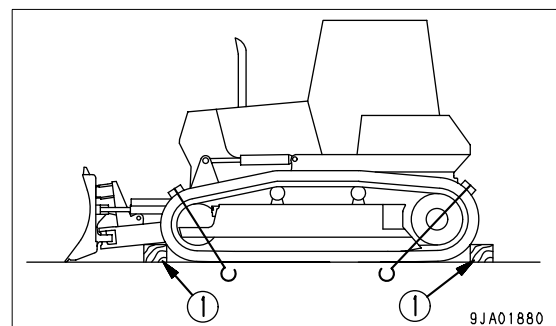
3. Set the parking lever to the LOCK position.
4. Turn the starting switch to the OFF position to stop the engine, and pull out the starting switch key.



5. Fix the machine as explained below so that it will not move during transportation.

In particular, fix the machine securely to prevent it from slipping sideways.

6. Put blocks (1) in front and behind the track shoes of both sides.
7. Set up chain or wire, following (A) or (B).
  - A: Secure chain or wire around the track shoes.
  - B: Secure chain or wire through the holes of track links.
8. Protect the wire from contacting directly with angular parts of the machine, by inserting pads.



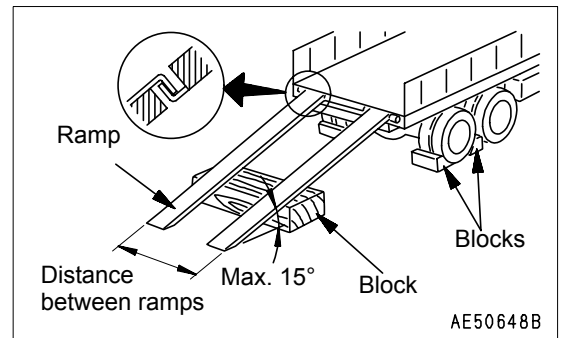
**UNLOADING WORK**

1. Load and unload 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.

Make the slope of the ramps a maximum of 15°.

3. Remove the chains and wire ropes fastening the machine.

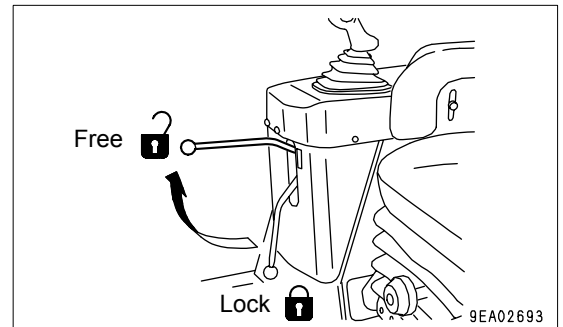


4. Start the engine.

In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (3-82)", in this manual.

5. Set the safety lock lever to the FREE position.

6. Raise the blade.



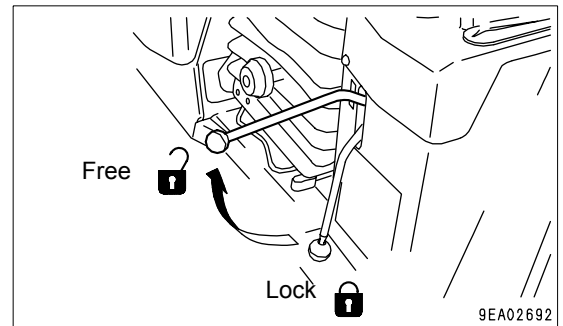
7. Set parking lever to the FREE position

8. Use the variable mode to set the speed range to 1st or less, and travel slowly.

9. Set the travel direction toward the ramps and drive slowly.

10. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.

11. Drive down the ramps slowly and carefully until the machine leaves the ramps perfectly.



## LIFTING MACHINE

### WARNING

- Do not lift the machine with any worker on it.
- Use wire ropes having sufficient strength for the weight of the machine.
- Lift the machine only in the position shown below. If it is lifted in another position, it may be unbalanced.
- Lift the machine level.

### NOTICE

The lifting procedure applies to machines with standard specifications.

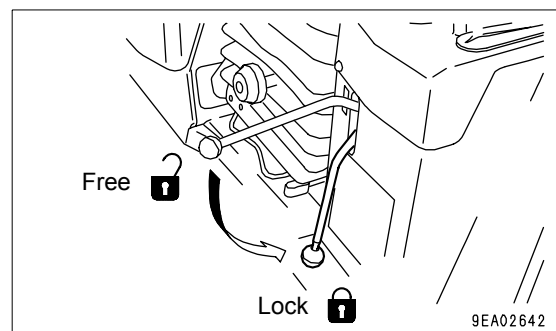
The method of lifting differs according attachments and options actually installed on the machine. For the proper lifting procedures, contact your Komatsu distributor.

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

### PROCEDURE FOR LIFTING OPERATIONS

When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the parking lever to the LOCK position.

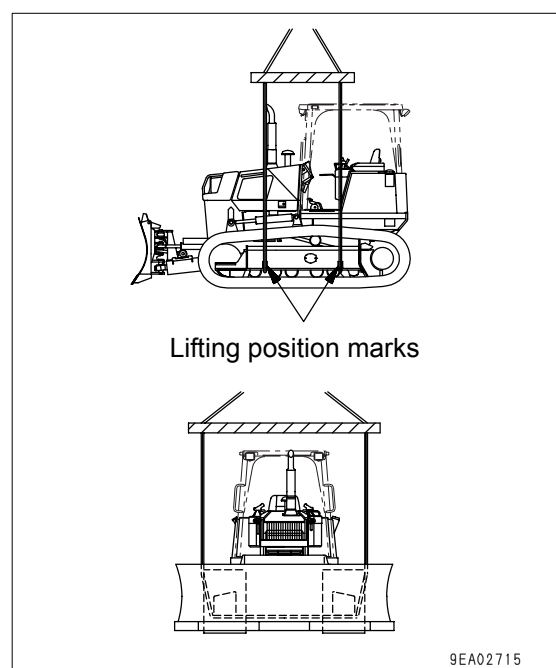


2. Use a wire rope and sling that matches the weight of the machine.

Pass the wire rope under the track frame at the point where the machine is to be lifted.

### NOTICE

- Use protectors, etc. so that the wire ropes will not be broken at sharp edges or narrow places.
  - Use spreaders and bars having sufficient width so that they will not touch the machine.
3. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.





## COLD WEATHER OPERATION

### PRECAUTIONS FOR LOW TEMPERATURE

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 the fuel and oil for each component to those of lower viscosity. For the specific viscosity, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (4-11)".

#### 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 amounts of fresh water and see a doctor at once.
- When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor. Antifreeze is toxic, so do not let it flow into drainage ditches or spray it 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.
- Never use any water-leakage prevention agent or any antifreeze containing such an agent.
- Do not mix different types of antifreeze.

For details on the amount of antifreeze mixture and on when to change the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (4-23)".

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.

Standard requirements for permanent antifreeze

- SAE J1034
- FEDERAL STANDARD O-A-548D

#### REMARK

In areas where permanent antifreeze is not available, it is possible to use antifreeze whose main component is ethylene glycol and does not contain any corrosion inhibitor. (Such antifreeze can be used for the winter season only.) However, in such a case, the coolant must be changed twice a year (spring and fall), so use permanent antifreeze when possible.

**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 a large amount of water and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on 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.
- Battery electrolyte is toxic, so do not let it flow into drainage ditches or spray it on to the ground surface.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, 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.

Charging Rate (%)	Temperature (°C)			
	20	0	-10	-20
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 during the night.

## AFTER COMPLETION OF WORK

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.

- Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rod clean to prevent damage to the seal caused by mud or dirt on the rod surface getting inside the seal together with 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 so the machine can move next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to the full in order to prevent moisture from forming dew in the tank room, as the ambient temperature goes down.

## AFTER COLD WEATHER

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 (4-11)".

- If for any reason permanent antifreeze cannot be used, and an ethylene 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 coolant.

# LONG-TERM STORAGE

## BEFORE STORAGE

When keeping in long-term storage (more than one month), store 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.
- Fill the fuel tank to prevent moisture from accumulating.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Place all control levers at the neutral position, operate the safety lever and parking lever to the LOCK position, then move the fuel control lever to the low idling position.

## DURING STORAGE

### **WARNING**

**When it is necessary to perform 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.
- When operating the work equipment, wipe off all the grease from the hydraulic cylinder rod.
- If the machine is equipped with an air conditioner, operate it for 3 to 5 minutes once a month to lubricate each portion of its compressor. Be sure to idle the engine at low speed for this purpose. Also, check the quantity of refrigerant twice a year.

## AFTER STORAGE

### NOTICE

**If the machine has been stored without the monthly rust prevention operation, consult your Komatsu distributor for service.**

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

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease at all lubrication points.
- When the machine is stored for a long period, moisture in the air can contaminate the oil over time. Check the oil for presence of water before and after starting the engine. If there is water in the oil, change the oil.

## TROUBLESHOOTING

### AFTER RUNNING OUT OF FUEL

When restarting the machine 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 (4-45)".

### MACHINE TOWING METHOD



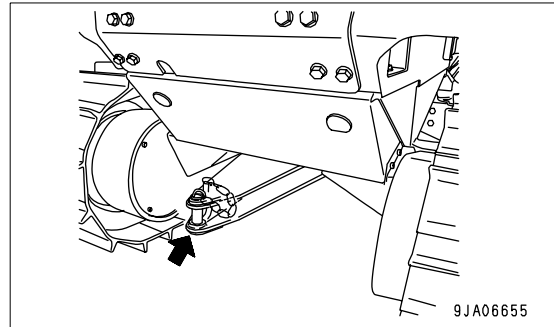
#### WARNING

- If the engine does not start, put blocks under the tracks to prevent the machine from moving, then release the brake. If blocks are not put under the tracks, the machine may suddenly move.
- Be sure to use a wire rope sufficiently strong for the towing weight.
- When using the towing hook, be sure to use a shackle.
- Set the wire rope horizontally and align it with the track frame.
- Tow the machine slowly.
- When returning a towed machine to the jobsite, first check that the necessary repairs and adjustments have been made.

For details of the method of towing, please contact your Komatsu distributor.

- With this machine, if the engine stops or there is an abnormality in the hydraulic system and the oil pressure in the brake circuit drops, the brake is actuated to prevent the machine from moving. To move the machine, it is necessary to use a special device to set the oil pressure in the brake circuit to above the specified pressure, so see the section "WHEN ENGINE DOES NOT START (3-115)" to release the brake, or contact your Komatsu distributor.
- Moving a machine by towing is only used to move it to a place where it is possible to carry out inspection and maintenance. It is not intended for moving the machine long distances. Do not use this method for towing the machine for long distances.
- Before towing, check that the tow rope or bar are in good condition, and that they have ample strength for the towing operation. If the machine being towed may get stuck in mud or may have to be towed uphill, the tow rope or bar must be of a strength of at least 1.5 times greater than the weight of the machine being towed.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- To protect the operator if the towing rope or bar should break, fit a shield to the machine being towed.
- When towing a machine, travel slowly. If the machine is suddenly pulled, the towing rope may break. Before starting to move the towed machine, remove any slack in the rope, and keep the rope taut during the towing operation.
- Keep the angle of the towing line to the minimum. Operate the machine so that the angle does not become greater than 30° from the straight line.

If the machine gets stuck in the mud or a heavy thing needs to be towed, install a towing wire rope to the draw bar pin.



## WHEN IT IS POSSIBLE TO START ENGINE

### CAUTION

The operator of the machine being towed should always operate the steering so that the machine faces in the direction of the towing line.

If the steering or brake system are actuated and the engine is running, it is possible to pull the machine out of mud, move it to the side of the road, or tow it for short distances.

Always read the section "MACHINE TOWING METHOD (3-113)" and carry out the operation extremely carefully.

**WHEN ENGINE DOES NOT START****WARNING**

- If action has been taken to release the brakes, the brakes cannot be used, so never let anyone travel on the machine when it is being towed.
- When towing a machine downhill, connect another machine behind the machine being towed and use the brakes on this machine to control the braking.
- When carrying out the towing operation, do not let any person enter the area around the machine being towed.

If the engine does not work and the machine is to be moved, it is necessary to carry out preparatory work to install a pump to release the brakes.

For details of the equipment needed to tow a machine when the engine does not work, please contact your Komatsu distributor.

To release the brakes, install a brake release pump on the machine to be towed and connect the hose at the pressure side of the pump to the brake valve. Use the pressure of the pump to apply pressure to the brake valve and release the brake. For details, see the next page. Follow the procedure and carry out the operation correctly.

**CONNECTING BRAKE RELEASE PUMP**

It is possible to use a service hydraulic pump to release the brakes on the problem machine and tow it.

- Part number of hydraulic pump: 790-190-1500

**Main specifications of hydraulic pump**

Discharge amount: 25 cc/stroke

Discharge pressure: 60 kg/cm<sup>2</sup> (5.88 MPa)

Tank capacity: 20 liters

Oil used: SAE10W

Weight: 9.5 kg

Hose length: 1.5 m

## PUMP TEST

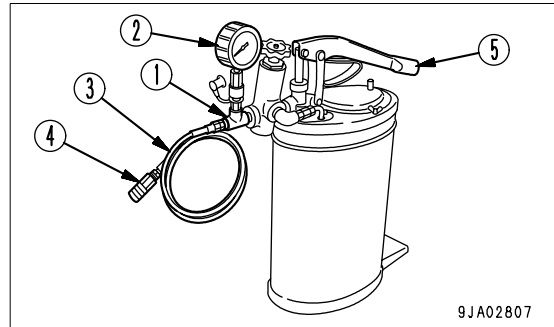
 **CAUTION**

If the operation is carried out without inspecting the hydraulic pump, it may lead to damage of the brake system seal. Always inspect the hydraulic pump before connecting it.

1. Install tee (1) to the discharge portion of the pump, then install oil pressure gauge (2) and rubber hose (3).

Install quick coupler (4) to the end of rubber hose (3) that is mounted to the machine.

2. Pump handle (5) and check that the pressure gauge becomes 2.7 to 3.1 MPa (28 to 32 kg/cm<sup>2</sup>).



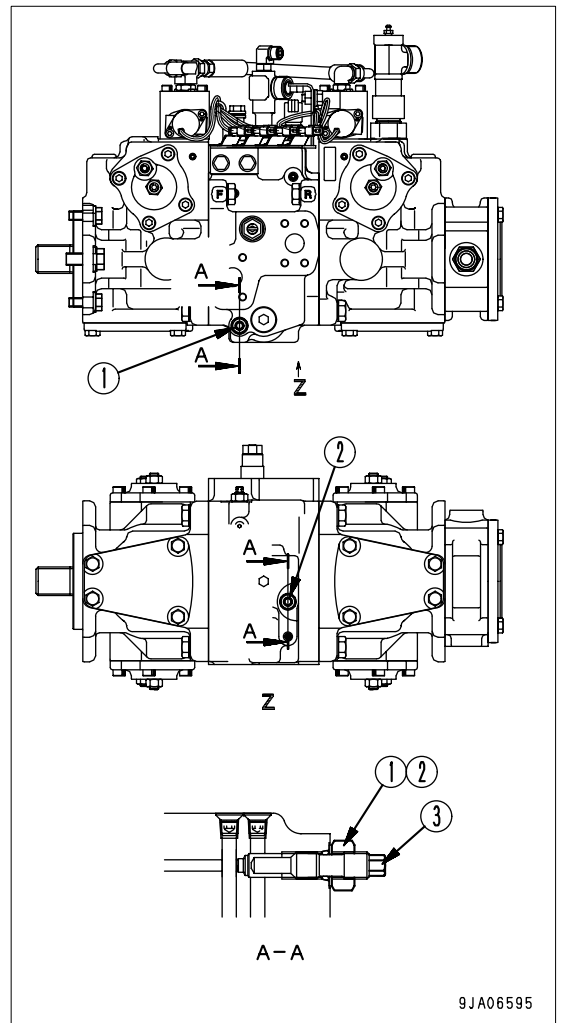


CONNECTING PUMP TO MACHINE

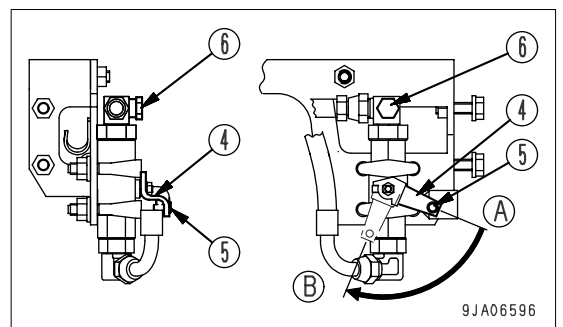
**⚠ WARNING**

- Fit blocks under the tracks to prevent the machine from moving, then release the brake.
- Immediately after the engine is stopped, all parts are at high temperature, so do not carry out the operation to install the brake release pump immediately. Wait for the temperature to go down until it is possible to touch the pump by hand.

1. Fit blocks securely under the tracks to prevent the machine from moving.
2. Remove the left floorplate.
3. Loosen locknuts (1) and (2) of the towing valve on the top surface of the pump, then loosen valve (3) at the locknut portion 2 turns.
4. Tighten locknuts (1) and (2) lightly to hold in position so that it does not fall out during the towing operation.



5. To close the brake and pump circuit, remove pin (5) that is locking lever (4) of the bypass valve, then turn lever (4) in a downward direction until it stops (fully closed position (B)).
6. To connect the hose of the brake release pump, remove the plug installed to port (6) of the bypass valve, then install the quick coupler.
7. Connect the quick coupler of the brake release pump (installed to the hose) to the quick coupler at port (6) of the bypass valve.



- Set the brake release pump in front of the operator.

## RELEASING BRAKE

### CAUTION

When a machine is towed, the brakes must be fully released. If the brakes are partially applied, this may lead to overheating and damage to the brakes.

To release the brakes, set the pump pressure to 2.7 to 3.1 MPa (28 to 32 kg/cm<sup>2</sup>).

If the pump pressure exceeds 3.1 MPa (32 kg/cm<sup>2</sup>), the components of the brake may be damaged.

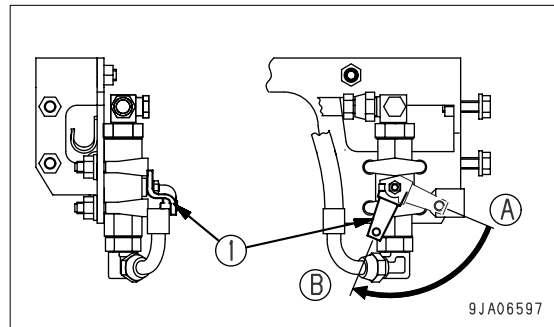
When towing, leakage from the oil pressure circuit will cause the pump pressure to go down with time.

Always keep the pump pressure above 1.5 MPa (15 kg/cm<sup>2</sup>) during the towing

operation, stop the operation, pump the handle of the brake release pump, and raise the pump pressure to 2.7 to 3.1 MPa (28 to 32 kg/cm<sup>2</sup>).

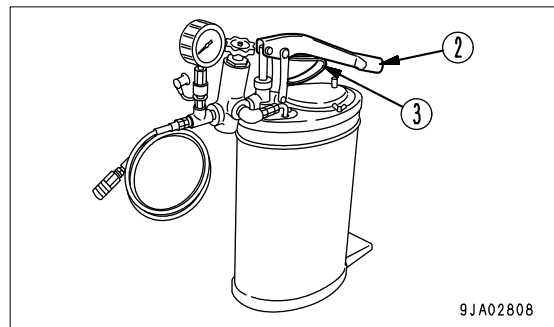
When towing, do not use the brakes to control the travel speed of the machine. This will further damage the brakes and there may be defective operation of the brake system.

- Check that lever (1) of the bypass valve is at the FULLY CLOSED position (B). If it is not at the FULLY CLOSED position (B), turn it in a downward direction until it stops.



- Operate handle (2) of the brake release pump and send pressure oil to the brake circuit until it reaches the specified pressure.

Specified pump pressure: 2.75 to 3.14 MPa (28.0 to 32.0 kg/cm<sup>2</sup>)



### REMARK

If it is necessary to move the brake release pump during the operation, hold lever (3) under handle (2) and move the pump.

- It is now possible to tow the machine.

Remove the blocks, and tow the machine at a speed of less than 2 km/h.

## OPERATING BRAKE

 **CAUTION**

To operate the brakes, and open the bypass valve and drain all the oil.

The brake system is operated only by opening the bypass valve. If the valve is not at the OPEN position, the brake pedal and parking lever will not work.

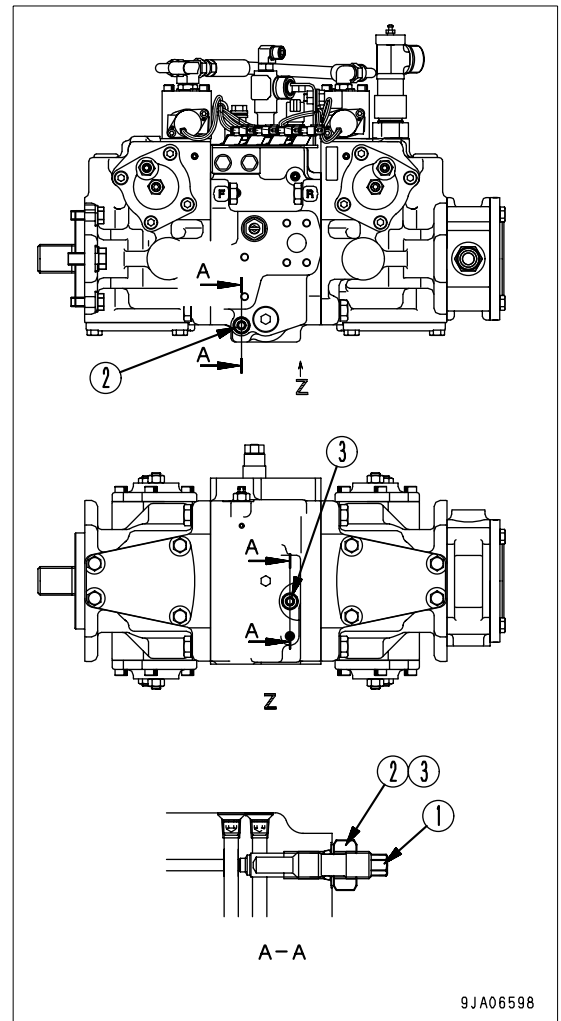
1. After completing the towing operation, cool the pump.
2. Tighten 2 valves (1) used when being towed on the top surface of the pump, then tighten lock nuts (2) and (3) to hold valve (1) in position.

Tightening torque of valve: 2.5 to 3.5 kgf·m

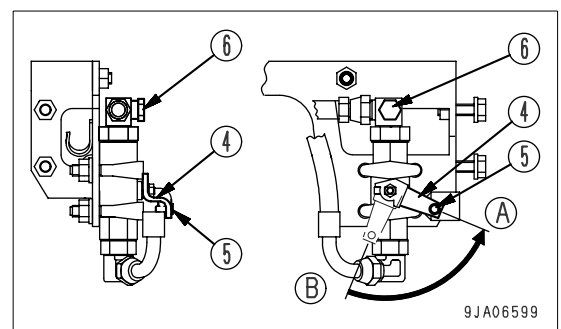
(24.5 to 34.3 N·m)

Tightening torque of locknut: 2.5 to 3.5 kgf·m

(24.5 to 34.3 N·m)



3. Turn lever (4) of the bypass valve in an upward direction until it stops (fully open position (A)), then lock lever (4) with lock pin (5).
4. Remove the quick coupler at port (6) of the bypass valve, then install the plug and O-ring.
5. Install the floorplate.

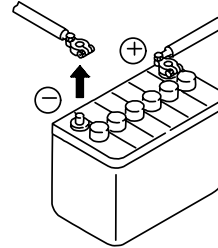


## IF BATTERY IS DISCHARGED

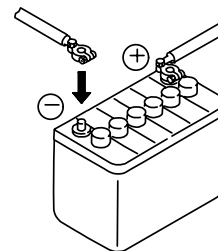
### WARNING

- It is dangerous to charge a battery when mounted on a machine. Make sure that it is dismantled before charging.
- 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, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.
- When handling batteries, always wear 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 removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.

When removing, disconnect the cable from the ground terminal first



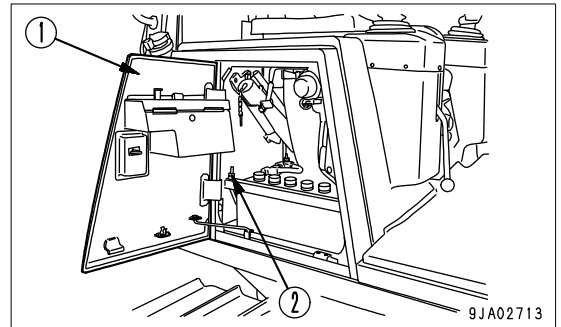
When installing, connect the cable to the positive (+) terminal first



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## REMOVE AND INSTALL BATTERY

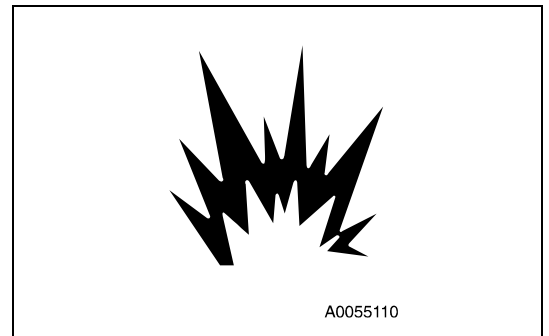
1. Open the battery cover (1), then remove 4 nuts (2) of the battery mounting holder.
2. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nuts of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery hold down.  
Tightening torque: 3.92 to 5.88 N·m (0.4 to 0.6 kgf·m)
4. When installing the battery, connect the ground cable last.  
Insert the hole of the terminal on the battery and tighten the nut.  
Tightening torque: 5.9 to 9.8 N·m (0.6 to 1.0 kgf·m)



## PRECAUTIONS FOR BATTERY CHARGING

If the battery is charged improperly, it may explode. Accordingly, charge it according to "IF BATTERY IS DISCHARGED (3-120)" and the instruction manual attached to the charger, and observe the following items.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to 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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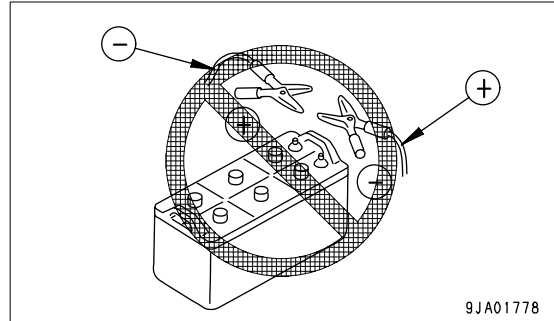
## STARTING ENGINE WITH BOOSTER CABLE

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

### PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

#### **WARNING**

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.



#### NOTICE

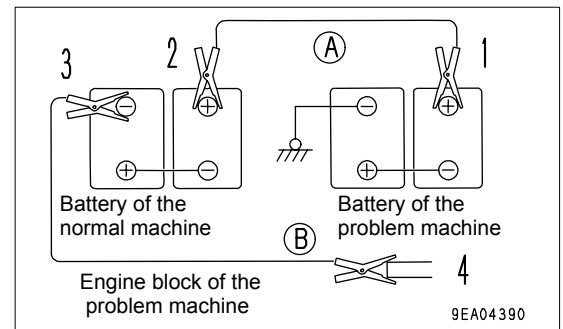
- The starting system for this machine uses 24V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and 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.

### CONNECTING THE BOOSTER CABLE

Keep the starting switch of the normal machine and problem machine in the OFF position.

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

1. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
2. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
3. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
4. Connect the other clip of booster cable (B) to the engine block of the problem machine.



### STARTING ENGINE

## ⚠ WARNING

**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 in the HOLD or neutral position.**

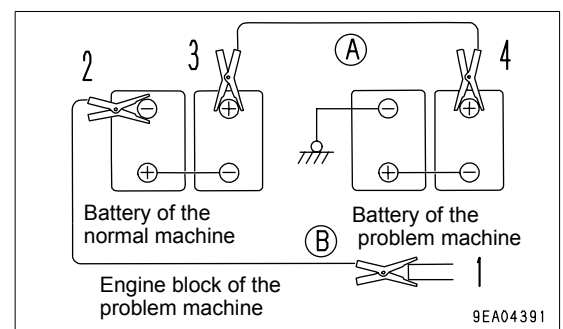
1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it running at high idle.
3. Turn the starting switch of the problem machine to the START position and start the engine.

If the engine doesn't start at first, try again after 2 minutes or so.

### DISCONNECTING THE BOOSTER CABLE

After the engine has started, disconnect the booster cables in reverse order of connection.

1. Remove one clip of booster cable (B) from the engine block 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.



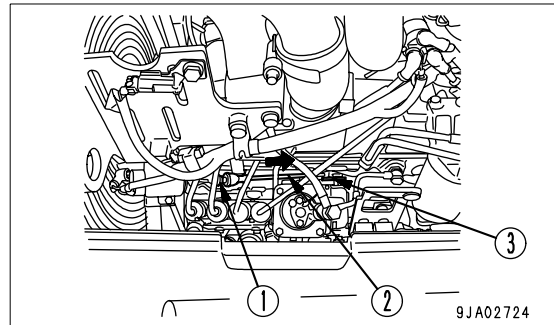
## WHEN ENGINE DOES NOT STOP

### CAUTION

**Do not start the engine again until the repairs are completed.**

If the engine does not stop even when the starting switch is turned to the OFF position, use the following procedure to stop the engine.

1. Open the engine side cover on the left side of the chassis.
2. Remove nut (1) of the stop solenoid, then disconnect the stop solenoid and rod (2).
3. Extend the rod (2) or push lever (3) extending from the fuel injection pump to the rear and stop the engine.
4. Installed nut (1) of the stop solenoid and connect rod (2).



There is probably a failure or disconnection, so after stopping the engine, contact your Komatsu distributor for repairs.



## OTHER TROUBLE

### ELECTRICAL SYSTEM

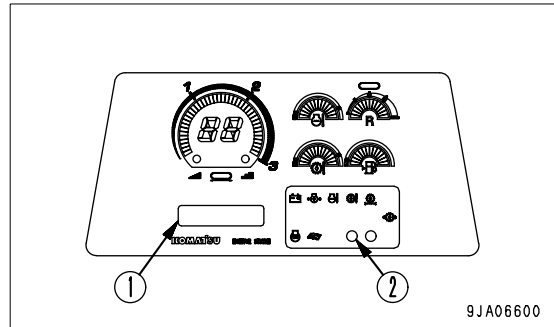
- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	•Defective wiring	(•Check, repair loose terminals, disconnections)
Lamp flackers while engine is running	•Defective adjustment of belt tension	•Adjust fan belt tension. For details, see EVERY 250 HOURS SERVICE
Charge lamp does not goes out even when engine is running	•Defective alternator •Defective wiring •Defective alternator belt	(•Replace) (•Check, repair) (•Replace)
Abnormal noise is generated from alternator	•Defective alternator	(•Replace)
Starting motor does not turn when starting switch is turned to ON	•Defective wiring •Insufficient battery charge •Defective safety switch	(•Check, repair) •Charge (•Replace)
Pinion of starting motor keeps going in and out	•Insufficient battery charge	•Charge
Starting motor turns engine sluggishly	•Insufficient battery charge •Defective starting motor	•Charge (•Replace)
Starting motor disengages before engine starts	•Defective wiring •Insufficient battery charge	(•Check, repair) •Charge
Engine preheating pirot lamp dose not go out	•Defective wiring •Defective heater relay	(•Check, repair) (•Replace)
Outside of electrical intake air heater is not warm when touched by hand	•Defective wiring •Disconnection in electrical intake air heater •Defective operation of heater relay switch	(•Check, repair) (•Replace)  (•Check, repair heater switch)
Air conditioner does not work properly	•Blown fuse •Insufficient battery charge •Defective aie conditioner switch •Defective air flow selector switch •Defwective compressor	(•Check repair) •Charge (•Repalce air conditioner switch) (•Replace air flow selector switch) (•Replace)

### MONITOR PANEL

When an error code appears on the display panel B (multi-information), take appropriate remedies based upon the table below.

- (1): Display panel B
- (2): Warning lamp (red)



#### REMARK

If different kinds of failures occur at the same time, their failure codes are arranged in the order of seriousness in the display. The order of seriousness in this case is E04, E03, E02 and E01, starting from the most serious one.

Action code	Display panel B	Warning lamp	Alarm buzzer	Remedy
E01	Top line: Displays E01 Bottom line: Displays service meter	-	-	Part of function has failed or stopped, but operations can be carried out safely. However, after completing operations, contact your Komatsu distributor for repairs.
E02	Top line: Displays E02 Bottom line: Displays service meter	Flashes	Sounds	Serious failure in part of function, stops. When continuing operations, be extremely careful of location of failure. After completing operations, contact Komatsu distributor for repairs
E03	Top line: Displays E03 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	After moving to safe place, stop machine immediately. Contact Komatsu distributor for repairs
E04	Top line: Displays E04 Bottom line: Displays telephone number (If no telephone number is set, displays 0)	Flashes	Sounds	Stop machine immediately. Contact Komatsu distributor for repairs

Note: If an abnormality display appears on display panel B, check the fault code. For details, see “METHOD OF USING FAULT CODE DISPLAY MODE (3-26)”.

When contacting your Komatsu distributor, please give the fault code also.

**CHASSIS**

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
When brake pedal is depressed, machine does not stop	<ul style="list-style-type: none"> <li>•Defective adjustment of brake limit switch</li> <li>•Defective brake valve solenoid</li> </ul>	<ul style="list-style-type: none"> <li>(•Adjust, check, repair)</li> <li>(•Check, repair)</li> </ul>
Track comes off	•Track too loose	•Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket	•Track too loose or too tight	
Blade, rise slowly, does not rise	<ul style="list-style-type: none"> <li>•Lack of hydraulic oil</li> <li>•Safety lock lever in LOCK position</li> <li>•Wear, scuffing of charge pump</li> <li>•Defective work equipment PPC valve</li> <li>•Defective main control valve</li> </ul>	<ul style="list-style-type: none"> <li>•Add oil to specified level, see CHECK BEFORE STARTING</li> <li>•Set lever in free position</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> </ul>
Does not steer even when steering is operated	<ul style="list-style-type: none"> <li>•Parking lever in LOCK position</li> <li>•Wear, scuffing of charge pump</li> <li>•Defective EPC valve of HST pump</li> <li>•Defective travel lever</li> </ul>	<ul style="list-style-type: none"> <li>•Set lever in free position</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> </ul>
Noise is generated from idler	•Lack of oil in idler	•Add oil to specified level, see WHEN REQUIRED
Lacks drawbar pull (cannot travel at full speed)	<ul style="list-style-type: none"> <li>•Lack of drive power from engine</li> <li>•Defective HST pump, motor</li> <li>•Defective relief valve</li> </ul>	<ul style="list-style-type: none"> <li>•See ENGINE</li> <li>(•Check, repair)</li> <li>(•Adjust, check, replace)</li> </ul>
Travel speed does not rise quickly	<ul style="list-style-type: none"> <li>•Low temperature of HST oil</li> <li>•Lack of drive power from engine</li> </ul>	<ul style="list-style-type: none"> <li>•Warm up machine</li> <li>•See ENGINE</li> </ul>
Machine does not move off when steering, directional and gear shift lever is placed in gear	<ul style="list-style-type: none"> <li>•Parking lever in LOCK position</li> <li>•Wear, scuffing of charge pump</li> <li>•Brake valve lever in LOCK position</li> <li>•Does not work brake release solenoid</li> <li>•Defective EPC valve of HST pump</li> <li>•Defective travel lever</li> </ul>	<ul style="list-style-type: none"> <li>•Set lever in free position</li> <li>(•Check, replace)</li> <li>•Set lever in free position</li> <li>(•Check, repair, replace)</li> <li>(•Check, replace)</li> <li>(•Check, replace)</li> </ul>
Only one track operates	•Defective HST pump	(•Check, replace)
Machine steers when steering is not operated	<ul style="list-style-type: none"> <li>•Defective travel lever</li> <li>•Defective HST pump, motor</li> <li>•Defective motor rotation sensor</li> <li>•Low temperature of HST oil</li> <li>•Air in HST oil system</li> </ul>	<ul style="list-style-type: none"> <li>(•Adjust, check, repair)</li> <li>(•Adjust, check, repair, replace)</li> <li>(•Adjust, check, replace)</li> <li>•Warm up machine</li> <li>(•Bleeding air)</li> </ul>
HST oil temperature overheats (indicator enters red range)	<ul style="list-style-type: none"> <li>•Excessive load when operating</li> <li>•Clogged oil cooler fin or damaged fin</li> </ul>	<ul style="list-style-type: none"> <li>•Shift down one position, or reduce the load and increase the speed when operating</li> <li>•Clean or repair, see EVERY 500 HOURS SERVICE</li> </ul>

**ENGINE**

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure caution lamp remains alight when engine speed is raised after completion of warm-up	<ul style="list-style-type: none"> <li>•Engine oil pan oil level is low (sucking air)</li> <li>•Clogging oil filter cartridge</li> <li>•Defective tightening of oil pipe, pipe joint, oil leakage from damaged part</li> <li>•Defective monitor panel</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>(•Repair)</li> </ul>
Steam is emitted from top part of radiator (pressure valve)	<ul style="list-style-type: none"> <li>•Cooling water level low, water leakage</li> <li>•Loose fan belt</li> </ul>	<ul style="list-style-type: none"> <li>•Add cooling water, repair, see CHECK BEFORE STARTING</li> <li>•Adjust fan belt tension, see EVERY 250 HOURS SERVICE</li> <li>•Change cooling water, clean inside of cooling system, see WHEN REQUIRED</li> </ul>
Engine water temperature caution lamp flashes	<ul style="list-style-type: none"> <li>•Dirt or scale accumulated in cooling system</li> <li>•Clogged radiator fin or damaged fin</li> <li>•Defective thermostat</li> <li>•Loose radiator filler cap (high altitude operation)</li> <li>•Defective monitor panel</li> </ul>	<ul style="list-style-type: none"> <li>•Clean and repair, see EVERY 500 HOURS SERVICE</li> <li>(•Replace thermostat)</li> <li>•Tighten cap or replace packing</li> <li>(•Repair)</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 nozzle</li> <li>•Starting motor cranks engine sluggishly</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 sucking</li> <li>(•Replace pump or nozzle)</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>•Add oil to specified level, see CHECK BEFORE STARTING</li> <li>•Change to specified fuel</li> </ul>
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> </ul>	<ul style="list-style-type: none"> <li>•Clean or replace, see WHEN REQUIRED</li> <li>(•Replace nozzle)</li> <li>(•Adjust valve clearance)</li> </ul>
Combustion noise occasionally makes breathing sound	<ul style="list-style-type: none"> <li>•Defective nozzle</li> <li>•Lack of fuel (air in fuel)</li> </ul>	<ul style="list-style-type: none"> <li>(•Replace nozzle)</li> <li>•Add fuel (bleed air)</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>•See item "indicator of water temperature gauge is in red range on right side of gauge"</li> <li>(•Replace muffler)</li> <li>(•Adjust valve clearance)</li> </ul>

# MAINTENANCE



## **WARNING**

Please read and make sure that you understand the safety volume before reading this section.

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## GUIDE TO MAINTENANCE

Do not carry out any inspection and maintenance operation that is not found in this manual.

### **CHECK SERVICE METER:**

Check the service meter reading every day to see if the time has come for any necessary maintenance to be performed.

### **KOMATSU GENUINE REPLACEMENT PARTS:**

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

### **KOMATSU GENUINE OILS:**

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

### **ALWAYS USE CLEAN WASHER FLUID:**

Use automobile window washer fluid, and be careful not to let any dirt get into it.

### **CLEAN OIL AND GREASE:**

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

### **CHECKING FOREIGN MATERIALS IN DRAINED OIL:**

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

### **FUEL STRAINER:**

Do not remove the strainer from the filler port when adding fuel.

### **WELDING INSTRUCTIONS:**

- Turn off the engine ignition switch.
- Do not apply more than 200 V continuously.
- Connect grounding cable within 1 m of the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- If a seal or bearing happens to come between the part being welded and grounding point, change the the grounding point to avoid such parts.
- 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 may cause damage and/or 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 WORKSITES:

When working at dusty worksites, do as follows:

- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- 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.

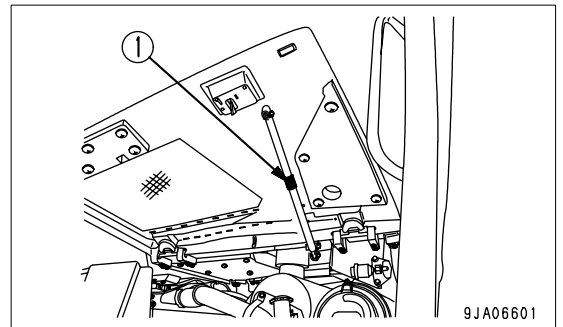
## AVOID MIXING OILS:

If a different brand or grade of oil has to be added, drain the old oil and replace all the oil with the new brand or grade of oil. Never mix different brand or grade of oil.

## PRECAUTIONS FOR OPENING AND CLOSING ENGINE SIDE COVER:

- Open the engine side cover all the way and ensure that it is locked open before letting go.
- If the lock for the engine side cover is not released, it will not close. If any attempt is made to close it without releasing the lock, the gas damper may break.

When closing the cover, push the orange button in the center of the gas damper (1) to release the lock, then close the cover.



## LOCKING THE INSPECTION COVER:

Lock inspection cover securely into position with the lock bar. If inspection or maintenance is performed with inspection cover not locked in position, there is a hazard that it may suddenly be blown shut by the wind and cause injury to the worker.

## HYDRAULIC SYSTEM-AIR BLEEDING:

After repairing or replacing hydraulic equipment or after removing the hydraulic piping, it is necessary to bleed the air from the circuit. For details, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (4-34)".

## PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:

- 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 or bend them into loops with a small radius.

This will cause damage to the hose and drastically reduce its service life.

**CHECKS AFTER INSPECTION AND MAINTENANCE WORK:**

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do the following:

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been performed correctly?
  - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
  - Is there any coolant or oil leaks?  
Have all nuts and bolts been tightened?
- Checks when engine is running
  - For the checks when the engine is running, see “TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (2-29)” in the SAFETY section, and take care of safety sufficiently.
  - Check that the inspected and maintained parts work normally.
  - Raise the engine speed and check for fuel leakage and oil leakage.



## OUTLINE OF SERVICE

### OUTLINE OF OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

#### OIL

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with the use.

Always use oil that matches the grade and maximum and minimum ambient temperatures recommended 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 machines 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 at the same time.
- We recommend you 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

- After completing the day's operations, fill the fuel tank to force out any air containing moisture. This will prevent the moisture from condensing and mixing with the 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). It is necessary to use the fuel that is suitable for the temperature.

- 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.

## COOLANT

- River water contains large amount 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 antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze is also effective in preventing corrosion on the parts of the engine cooling system. It may be continuously used for two years or 4000 hours of operation, therefore it may be used throughout the year.
- Antifreeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proper mixing proportion of the antifreeze depends on the ambient temperature. For the mixing proportion, see "CLEAN INSIDE OF COOLING SYSTEM (4-23)".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

## GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease.

If any part becomes stiff after being used for long time, add grease.

- 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)

The oil clinic samples the oil periodically and analyzes it. This is a preventive maintenance service, which provides early discovery of abnormal parts and wear of the drive parts of the machine. This then makes it possible to ensure prevention of failures and reduction in downtime.

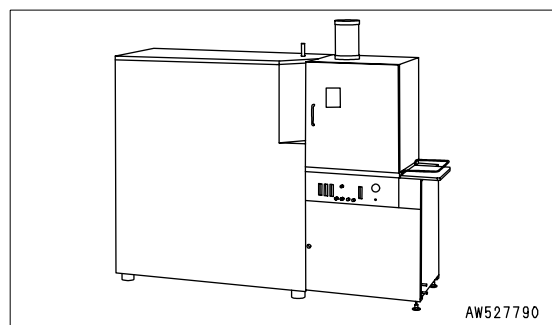
Komatsu's long years of experience and rich supply of accumulated data make it possible to accurately determine the condition of your machine. This enables us to locate the problems and to recommend suitable and timely repair methods.

The oil clinic charges the customer only the actual costs, and provides an immediate report of the results of the analysis and recommendations for action to take. This low-cost service can save you high costs and inconvenience in the future, so we strongly recommend you to avail yourself of this service.

### KOWA ANALYSIS ITEMS

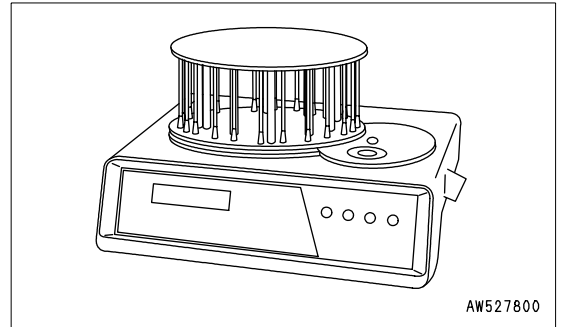
- Analysis of metal wear particles

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) machine 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.

**STORING OIL AND FUEL**

- 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 drums is at the side to prevent moisture from being sucked in.

If drums 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, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

## RELATING TO ELECTRIC SYSTEM

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause an electrical short circuit 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 checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electro-magnetic 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 electrical equipment, connect it to the special power source connector.  
Do not connect the optional power source to the fuse, starting switch, or battery relay.

## WEAR PARTS LIST

Replace wear parts such as the filter element or air cleaner element at the time of periodic maintenance or before they reach the wear limit. The wear parts should be replaced correctly in order to ensure more economic use of the machine. When replacing parts, always use Komatsu genuine parts.

As a result of our continuous efforts to improve product quality, the part number may change, so inform your Komatsu distributor of the machine serial number and check for the latest part number when ordering parts.

### WEAR PARTS LIST

The parts in parentheses are to be replaced at the same time.

Item	Part NO.	Part Name	Weight kg	Q'ty	Replacement frequency
Fuel filter	6732-71-6111	Cartridge	-	1	Every 500 hours service
Engine oil filter	6733-51-5141	Cartridge	-	1	
Corrosion resistor (if equipped)	600-411-1151	Cartridge	-	1	
Hydraulic oil filter	113-60-43321	Cartridge	-	1	Every 2000 hours service
HST charge filter	714-07-28712	Cartridge	-	1	
Air cleaner	600-185-2500	Element assembly (inner and outer)	-	1	-
Air conditioner	Fresh filter	14X-911-7750	Filter	-	-
	Recirc filter	14X-911-7741	Filter	-	

Item	Part No.	Part Name	Weight kg	Q'ty	Replacement frequency	
Blade	D31EX Power angle power tilt dozer	12F-70-31251	Cutting edge	13.3	1	-
		12F-70-31261	Cutting edge	16.5	1	
		11G-71-31170	End bit (left and right)	6.9	2	
		(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(19) (19)	
	D31PX Power angle power tilt dozer (Narrow blade)	12F-70-31281	Cutting edge	21.9	1	-
		12F-70-31261	Cutting edge	16.5	1	
		112-946-1510	End bit (left and right)	6.8	2	
		(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(22) (22)	
	D31PX Power angle power tilt dozer (Wide blade)	12F-70-31281	Cutting edge	21.9	2	-
		11G-71-31170	End bit (left and right)	6.9	2	
		(02090-11055)	(Bolt)	-	(24)	
		(02290-11016)	(Nut)	-	(24)	
	D37EX Power angle power tilt dozer	12F-70-31251	Cutting edge	13.3	1	-
		12F-70-31281	Cutting edge	21.9	1	
		112-946-1510	End bit (left and right)	6.8	2	
		(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(21) (21)	
	D37PX Power angle power tilt dozer (Wide blade)	12F-70-31281	Cutting edge	21.9	2	-
		11Y-72-15220	End bit (left and right)	7.2	2	
(02090-11055)		(Bolt)	-	(24)		
(02290-11016)		(Nut)	-	(24)		
D37PX Power angle power tilt dozer (Narrow blade)	12F-70-31281	Cutting edge	21.9	1	-	
	12F-70-31261	Cutting edge	16.5	1		
	112-946-1510	End bit (left and right)	6.8	2		
	(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(22) (22)		
D39EX Power angle power tilt dozer	12F-70-31251	Cutting edge	13.3	1	-	
	12F-70-31281	Cutting edge	21.9	1		
	11G-71-31170	End bit (left and right)	6.9	2		
	(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(21) (21)		
D39PX Power angle power tilt dozer (Wide blade)	12F-70-31251	Cutting edge	13.3	1	-	
	12F-70-31261	Cutting edge	21.1	2		
	112-946-1510	End bit (left and right)	6.8	2		
	(02090-11055) (02290-11016)	(Bolt) (Nut)	- -	(25) (25)		
D39PX Power angle power tilt dozer (Narrow blade)	11Y-72-12330	Cutting edge	13.0	3	-	
	112-946-1510	End bit (left and right)	6.8	2		
	(02090-11055)	(Bolt)	-	(23)		
	(02290-11016)	(Nut)	-	(23)		

**NOTICE**

When handling parts that weigh more than 25 kg, remember that they are heavy objects, and take the necessary care.

# USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

## PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

Reservoir	Kind of fluid	AMBIENT TEMPERATURE		Type
		Min	Max	
Engine oil pan	Engine oil	0°C	40°C	SAE 30
Idler (each)		-20° C	10° C	SAE 10W
Hydraulic system		-20° C	40° C	SAE 10W-30
		-15° C	40° C	SAE 15W-40
Final drive case (each)		-20°C	40°C	SAE30
Fuel tank	Diesel fuel	-10° C	40° C	ASTM D975 No. 2
		-30° C	-10° C	ASTM D975 No. 1 (for winter use)
Cooling sytem	Water	Add antifreeze		
Grease fitting	Grease	-30° C	40° C	NLGI No. 2

\*1: ASTM D975 No.1

		Engine oil pan	Final drive case (each)	Hydraulic system	Idler (each)	Fuel tank	Cooling system (incl. sub-tank)	
							D31,37	D39
Specified capacity	liter	14	3.5	97	0.16	165	27	32
Refill capacity	liter	12.5	3.5	47	0.16	-	-	-

**REMARK**

When fuel sulphur content is less than 0.5%, change oil in the oil pan according to the periodic maintenance hours described in this manual.

Change oil according to the following table if fuel sulphur content is above 0.5%.

When starting the engine with an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though the atmospheric temperature goes up to 10°C more or less during the day.

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 range 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

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



# MAINTENANCE

## USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

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	Antifreeze and cool- ant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgease 77 Mobilgrease special	-

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
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
15	PETRO- FINE	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 prestige 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

# STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

## TORQUE LIST

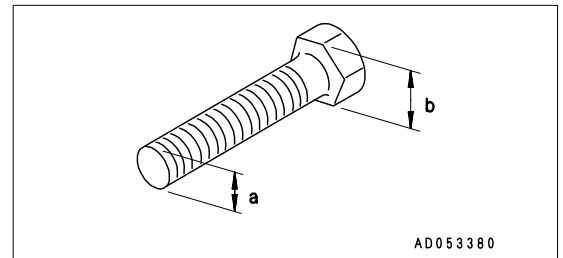
**⚠ CAUTION**

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.

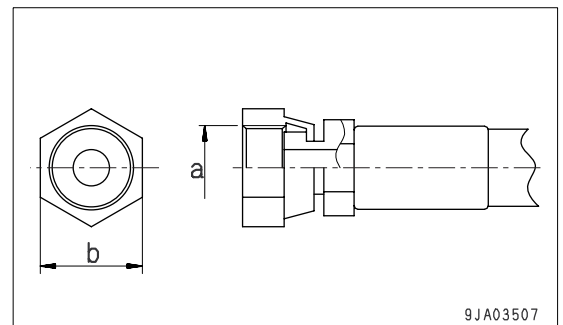
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque			
		Target value		Service limit	
		N-m	kgf-m	N-m	kgf-m
6	10	13.2	1.35	11.8-14.7	1.2-1.5
8	13	31	3.2	27-34	2.8-3.5
10	17	66	6.7	59-74	6.0-7.5
12	19	113	11.5	98-123	10.0-12.5
14	22	172	17.5	153-190	15.5-19.5
16	24	260	26.5	235-285	23.5-29.5
18	27	360	37	320-400	33.0-41.0
20	30	510	52.3	455-565	46.5-58.0
22	32	688	70.3	610-765	62.5-78.0
24	36	883	90	785-980	80.0-100.0
27	41	1295	132.5	1150-1440	118.0-147.0
30	46	1720	175.0	1520-1910	155.0-195.0
33	50	2210	225.0	1960-2450	200.0-250.0
36	55	2750	280.0	2450-3040	250.0-310.0
39	60	3280	335.0	2890-3630	295.0-370.0



Apply the following table for Hydraulic Hose.

Nominal - No. of threads (a)	Width across flats (b) (mm)	Tightening torque			
		Target value		Permissible range	
		N-m	kgf-m	N-m	kgf-m
9/16 -18UNF	19	44	4.5	35 - 63	3.5 - 6.5
11/16 -16UN	22	74	7.5	54° 93	5.5° 9.5
13/16 -16UN	27	103	10.5	84° 132	8.5° 13.5
1 -14UNS	32	157	16.0	128° 186	13.0° 19.0
13/16 -12UN	36	216	22.0	177° 245	18.0° 25.0



## PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

For using the machine safely for an extended period of time, you must periodically replace the safety critical and fire prevention-related parts listed in the table of important parts.

Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times.

Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.

If any of the hose clamps show deterioration like deformation or cracking, replace the clamps at the same time as the hoses.

Also perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.

When replacing hoses, always replace O-rings, gaskets, and other such parts at the same time.

Have your Komatsu distributor replace the critical parts.

### SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacemen	Q'tyt	Replacement interval
1	Fuel hose (fuel tank - water separator)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (water separator - fuel feed pump)	1	
3	Fuel return hose (injection pump - fuel tank)	1	
4	Fuel return hose (injection nozzle - fuel tank)	1	
5	Fuel drain hose (fuel tank - drain valve)	1	
6	Case, plug and O-ring of water separator	1	
7	Turbocharger lubrication hose	1	
8	Hose (PPC circuit) [hydraulic tank - block (center portion under floor)]	1	
9	Hose [4-spool solenoid valve (left side under floor) - block (center portion under floor)]	1	
10	Hose (L.H travel motor brake port - R.H travel motor brake port)	1	
11	Hose (L.H travel motor brake port - towing valve)	1	
12	Hose (towing valve - parking brake control valve)	1	
13	Hose [L.H. travel motor FORWARD port (MA) - HST pump (PA1)]	1	
14	Hose [L.H. travel motor BACKWARD port (MB) - HST pump (PB1)]	1	
15	Hose [R.H. travel motor FORWARD port (MA) - HST pump (PB2)]	1	
16	Hose [R.H. travel motor BACKWARD port (MB) - HST pump (PA2)]	2	
17	Suction hose [hydraulic tank - charge pump (HSS pump)]	2	
18	Suction hose (divider tube for hydraulic tank - hydraulic pump)	2	
19	Hose (hydraulic pump - main control valve)	2	
20	Seat belt	1	Every 3 years

# MAINTENANCE SCHEDULE CHART

## MAINTENANCE SCHEDULE CHART

### WHEN REQUIRED

Check, clean and replace air cleaner element.....	4-19
Clean inside of cooling system.....	4-23
Check track tension.....	4-25
Check and tighten track shoe belt.....	4-27
Check electrical intake air heater.....	4-27
Reverse and replace end bits and cutting edges.....	4-28
Check idler oil level, add oil.....	4-29
Adjust idler clearance.....	4-29
Adjust play in center ball.....	4-30
Grease door hinge.....	4-30
Check door lock striker.....	4-31
Check, adjust air conditioner.....	4-31
Check window washer fluid level, add fluid.....	4-33
Replace wiper blade.....	4-33
Procedure for bleeding air in hydraulic system.....	4-34
Procedure for releasing internal pressure of hydraulic system.....	4-35

### CHECK BEFORE STARTING

#### EVERY 50 HOURS SERVICE

Drain water, sediment from fuel tank.....	4-37
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#### EVERY 250 HOURS SERVICE

Lubricating.....	4-38
Check oil level in final drive case, add oil.....	4-40
Check level of battery electrolyte.....	4-41
Check brake performance.....	4-43
Clean air conditioner air filter (fresh/recirc filter).....	4-44

#### EVERY 500 HOURS SERVICE

Replace fuel filter cartridge.....	4-45
Change oil in engine oil pan, replace engine oil filter cartridge.....	4-48
Replace corrosion resistor cartridge.....	4-49
Clean, check radiator fins and oil cooler fins.....	4-50

#### EVERY 1000 HOURS SERVICE

Change oil in final drive case.....	4-51
Check fan belt tension, adjust.....	4-51
Check all tightening parts of turbocharger.....	4-51
Check play of turbocharger rotor.....	4-52
Check for loose rope mount bolts.....	4-52

**EVERY 2000 HOURS SERVICE**

Change oil in hydraulic tank, replace oil filter cartridge and clean suction strainer ..... 4-53  
Clean, check turbocharger ..... 4-55  
Check vibration damper ..... 4-55  
Check alternator, starting motor ..... 4-55  
Check engine valve clearance, adjust..... 4-55

**EVERY 4000 HOURS SERVICE**

Check water pump ..... 4-56

## SERVICE PROCEDURE

### WHEN REQUIRED

#### CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

#### WARNING

- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger that dirt may be blown around and cause serious injury. Always use safety glasses, dust mask, and other protective equipment.

#### CHECKING

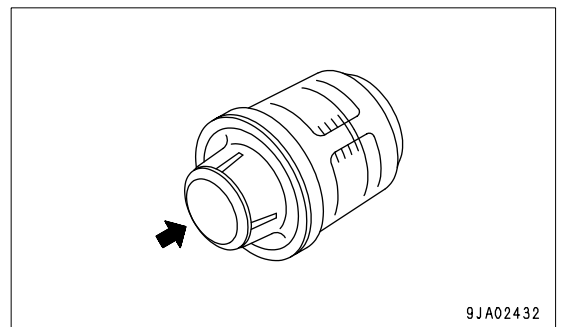
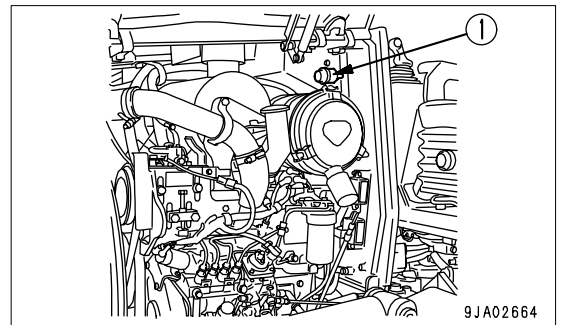
1. Open engine side cover on the left side of machine.
2. If the yellow piston at the display portion of dust indicator (1) becomes red (7.5 kPa), clean the element.

#### NOTICE

Do not clean the filter element until after a yellow piston in the dust indicator display has come in the red area (7.5 kPa).

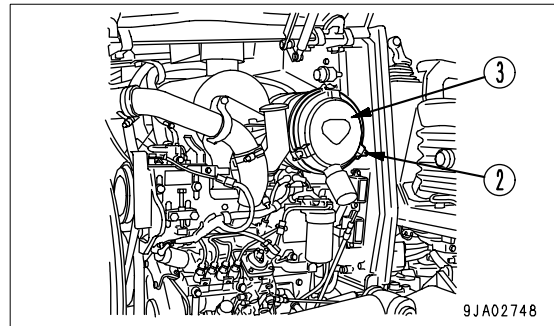
If the filter element is cleaned frequently before the yellow piston in the dust indicator display comes in the red area (7.5 kPa), the air cleaner cannot exert its inherent cleaning capability, reducing its cleaning effect.

In addition, dust sticking to the element falls into the inner element each time the element is cleaned.



**CLEANING OR REPLACING OUTER ELEMENT**

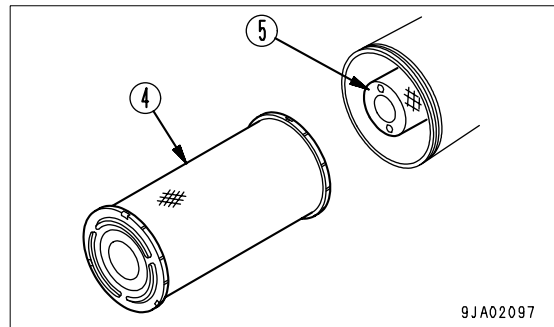
1. Open engine side cover on the left side of machine.
2. Remove three clips (2), then remove dust cup (3).



**NOTICE**

Never remove inner element (5). If it is removed, dust will enter and cause engine trouble.

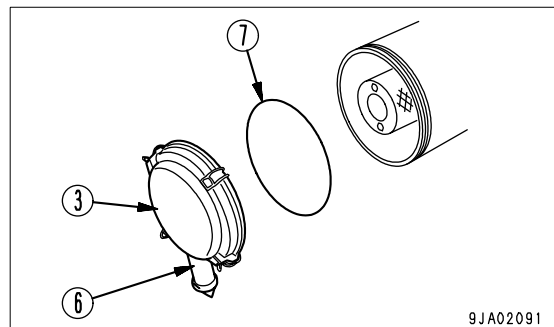
3. Remove outer element (4).



**NOTICE**

When cleaning the dust cup, do not remove evacuator valve (6).

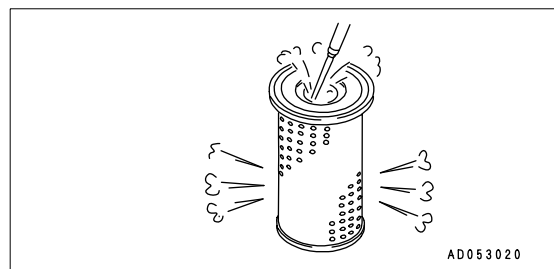
4. Clean the inside of the air cleaner body and dust cup.



**NOTICE**

The inner element must not be used again even after its cleaning. When replacing the outer element, replace the outer element at the same time.

5. Direct dry compressed air (less than 0.69 MPa (7 kgf/cm<sup>2</sup>)) to the outer element (3) from inside along its folds, then direct it from outside along its folds and again from inside
6. Replace any outer element, which has been cleaned 6 times or used for one year. Replace the inner element at the same time.
7. If the yellow piston rises to above 3/5 (5 kPa) of the transparent portion, replace the inner and outer element.



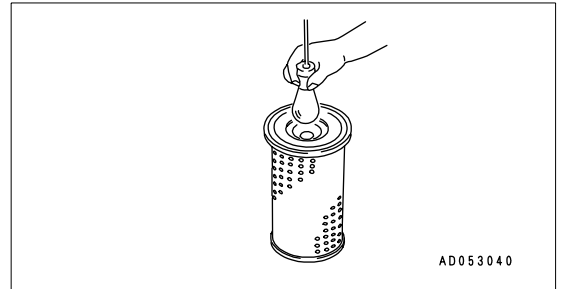


8. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.

**NOTICE**

**When cleaning the element, do not hit or beat it against anything.**

**Do not use an element whose folds, gasket or seal are damaged.**



9. Set the cleaned outer element and install dust cup (3), then secure them with clips (2).



**CAUTION**

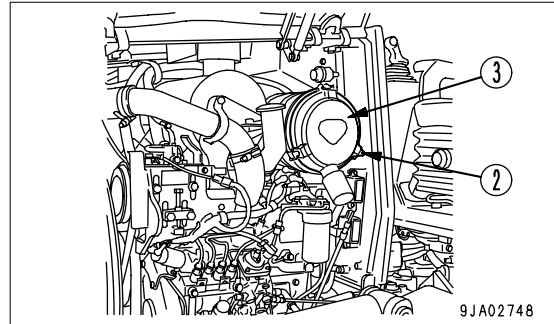
**When installing the dust cup, check O-ring (7). If the O-ring has any defect, replace it.**

**When installing the dust cup, hold the case down securely and check that all three clips (2) are fitted correctly to the body.**

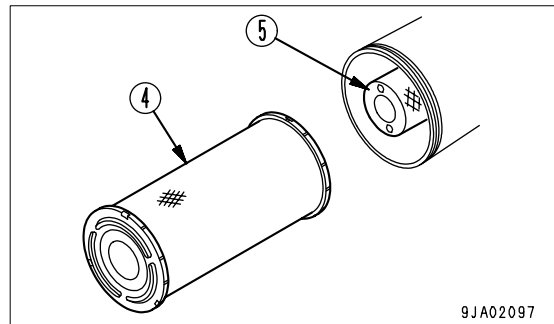
10. Push the button of dust indicator (1) and return the yellow piston to its original position.
11. Close the left engine side cover.

**REPLACING ELEMENT**

1. Open engine side cover on the left side of machine.
2. Remove three clips (2), then remove dust cup (3).

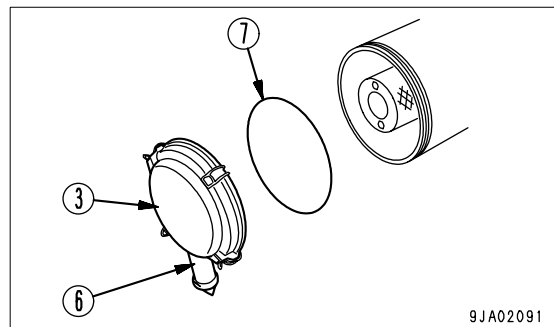


3. Remove outer element (4).  
Do not remove inner element (5) at this time, however.

**NOTICE**

When cleaning the dust cup, do not remove evacuator valve (6).

4. Clean the inside of the air cleaner body and dust cup.



5. Remove inner element (5), then install a new inner element immediately.
6. Set new outer element (4) and install dust cup (3), then secure them with clips (2).

## ⚠ CAUTION

When installing the dust cup, check O-ring (7). If the O-ring has any defect, replace it.  
When installing the dust cup, hold the case down securely and check that all three clips (2) are fitted correctly to the body.

7. Push the button of dust indicator (1) and return the yellow piston to its original position.
8. Close the left engine side cover.

**CLEAN INSIDE OF COOLING SYSTEM**

** WARNING**

- Just after the engine is stopped, the cooling water is still hot and the internal pressure in the radiator is still high. If the radiator cap is removed under this condition, you may scald yourself. Accordingly, wait until the temperature goes down, then loosen the cap slowly to release the pressure.
- Start the engine to clean the cooling system. When standing up from the operator's seat or leaving the machine, set the safety lock lever and brake lock lever to the LOCK positions.
- For the starting method of the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (3-61)" and "STARTING ENGINE (3-77)" in the OPERATION section of the manual.
- Never go under the machine body while the engine is running. It is very dangerous since the machine may move suddenly.

Stop the machine on level ground when cleaning or changing the coolant.

When flushing the inside of the cooling system, do as follows.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replace corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 500 hours and when cleaning the inside of the cooling system and when changing coolant
Non 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 antifreeze	Every 6 months or every 1000 hours whichever comes first	

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

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.

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 lower when deciding the mixing rate.

Mixing rate of water and antifreeze

- D31EX,PX , D37EX,PX

Min. atmospheric temperature	°C	Above -10	-15	-20	-25	-30
Amount of anti-freeze	Liters	8.1	9.7	11.1	12.4	13.5
Amount of water	Liters	18.9	17.3	15.9	14.6	13.5

- D39EX,PX

Min. atmospheric temperature	°C	Above -10	-15	-20	-25	-30
Amount of anti-freeze	liters	9.6	11.5	13.1	14.7	16.0
Amount of water	liters	22.4	20.5	18.9	17.3	16.0

**⚠ 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 amount of fresh water and see a doctor at once.**

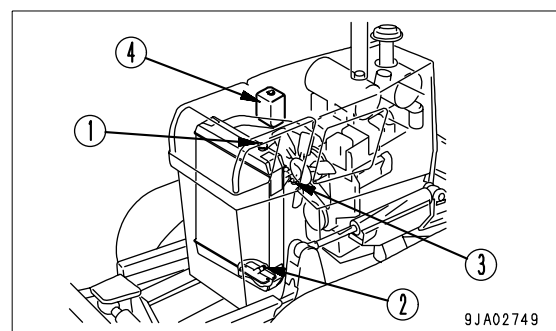
Use city water for the coolant.

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 minimum 40 liters capacity.

1. Stop the engine.
2. Turn radiator cap (1) slowly until it hits the stopper and by so doing, relieving the internal pressure.
3. Turn radiator cap (1) until it hits the next stopper, while depressing it. Keep turning the radiator cap (1) until it hits the last stopper.
4. Place containers to catch the drained cooling water under drain valve (2) at the bottom of the radiator and under drain plug (3) at the bottom of the cooling water inlet port. Open drain valve (2) and drain plug (3), and drain the water.
5. After draining the antifreeze solution, close drain valve (2) and tighten drain plug (3), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C, run the engine for about 10 minutes.



6. Stop the engine and open drain valve (2) and remove drain plug (3) to drain the water.

7. After draining the water, clean the cooling system with cleaning agent.

For the cleaning method, see the instructions for the cleaning agent.

8. Close drain valve (2). Wind seal tapes onto drain plug (3), then tighten it.

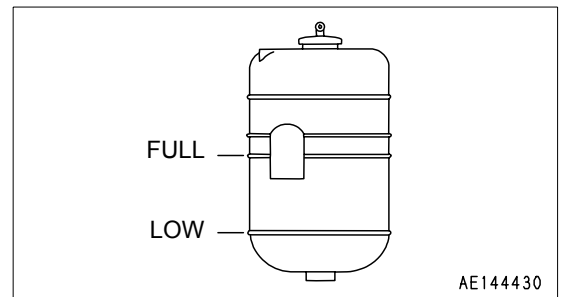
9. Add coolant until it overflows from the water filler.

Decide the proportions of antifreeze and water according to the table for the mixing rate of water and anti-freeze.

10. To remove the air in the coolant, run the engine for 5 minutes at low idling, then for another 5 minutes at high idling. (While doing this, leave the radiator cap removed)

11. Drain the cooling water inside sub-tank (4), clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.

12. Stop the engine and tighten the cap. Check the coolant level, and add water if the level is low.



**CHECK TRACK SHOE TENSION, ADJUST**

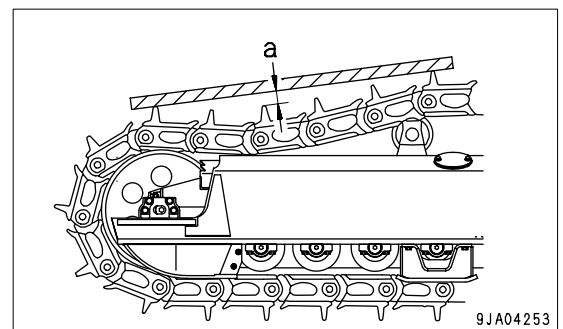
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

**INSPECTION**

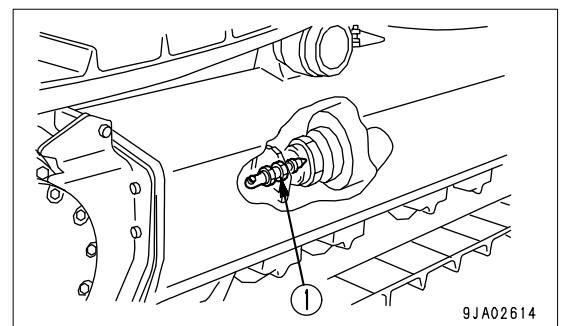
Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance (a) is 20 to 30 mm, the tension is standard.

If the track tension is not at the standard value, adjust it in the following manner.



**ADJUSTMENT**

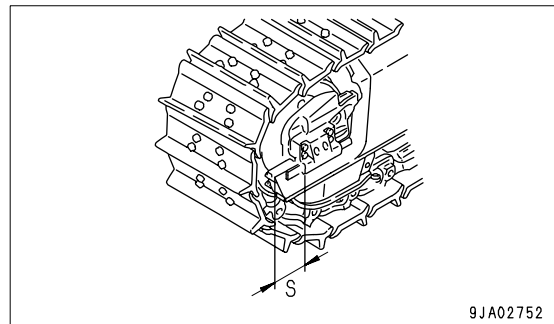
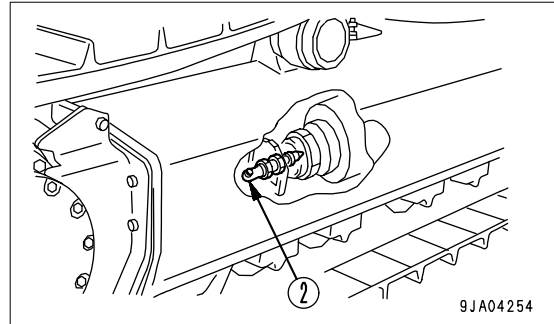
**⚠ WARNING**  
 There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.  
 Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).  
 If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



**WHEN INCREASING TENSION**

Prepare a grease gun.

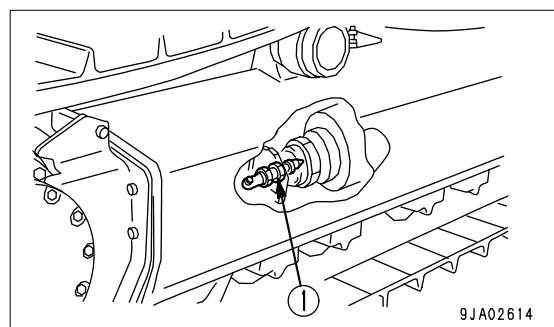
1. Pump in grease through grease fitting (2) with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. It is also possible to pump in grease until dimension S becomes 20 mm, but if the tension is still loose, there is excessive wear of the pin and bushing, so it is necessary to turn or replace the pin and bushing. Please contact your Komatsu distributor for repairs.

**WHEN LOOSENING TENSION**

**⚠ WARNING**

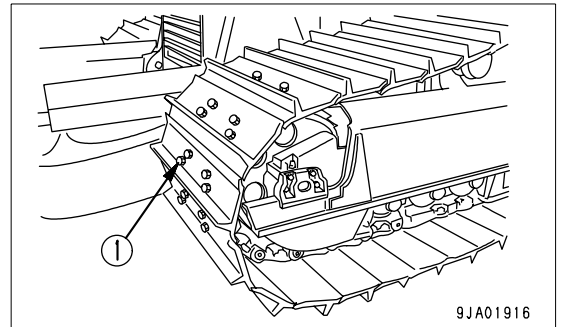
**It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.**

1. Loosen plug (1) gradually to release the grease.
2. When loosening plug (1), turn it 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 correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.



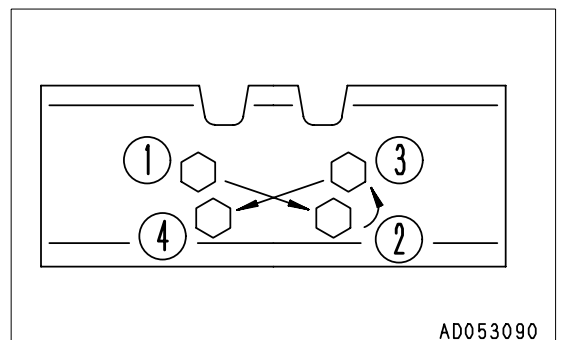
**CHECK AND TIGHTEN TRACK SHOE BOLTS**

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.



**ORDER FOR TIGHTENING**

Tighten the bolts in the order shown in the diagram on the right.



**METHOD OF TIGHTENING (TRACK SHOE BOLTS)**

1. First, tighten to tightening torque (A), then check that the nut and shoe are in tight contact with the link mating face.
2. After checking, tighten further to tightening angle (B).

	D31EX,PX D37EX,PX	D39EX,PX
Tightening torque (A)	118 ± 19.6N·m (12 ± 2kg·m)	196 ± 19.6N·m (20 ± 2kg·m)
Tightening angle (B)	90° ± 10°	120° ± 10°

**METHOD OF TIGHTENING (MASTER CONNECTING BOLT)**

1. First, tighten to tightening torque (A), then check that the link mating face is in tight contact.
2. After checking, tighten further to tightening angle (B).

	D31EX,PX D37EX,PX	D39EX,PX
Tightening torque (A)	147 ± 19.6N·m (15 ± 2kg·m)	196 ± 19.6N·m (20 ± 2kg·m)
Tightening angle (B)	180° ± 10°	180° ± 10°

**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.

**REVERSE AND REPLACE END BITS AND CUTTING EDGES**

**⚠ WARNING**

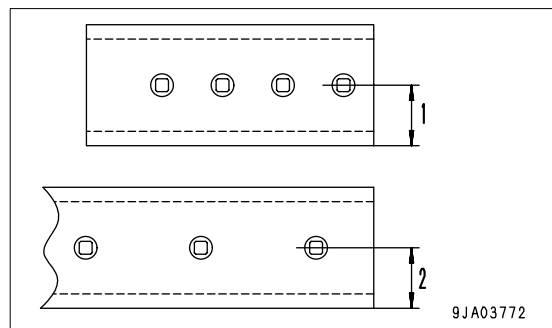
It is dangerous if the work equipment moves by mistake when the cutting edges and end bits are being reversed or replaced.

Set the work equipment in a stable condition, then stop the engine and lock the blade control lever securely with the safety lock lever.

Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height, apply a block under the frame to prevent the blade from falling.
2. Operate the safety lock lever to the LOCK position.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Item		Judgement standard	
No.	Measurement point	Standard dimension (mm)	Repair limit (mm)
1	Height of end bit	80	55
2	Height of cutting edge	80	55

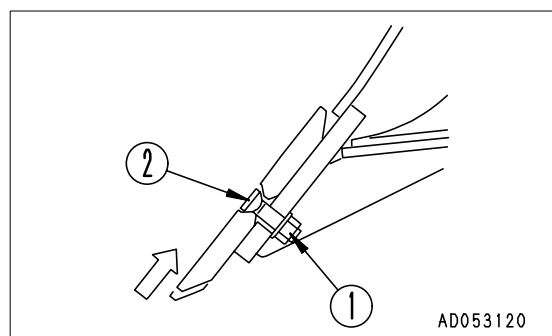


**REMARK**

If the cutting edge and the end bit on both sides are worn out, replace with new one.

If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

4. Remove the cutting edge and the end bit and clean the mounting surface.
5. Reverse or replace the cutting edge and the end bit when worn out.
6. Remove nut (1) and bolt (2), then replace or reverse the cutting edge and the end bit.
7. Install the cutting edge to the blade and tighten the bolt temporarily. Press the blade against the ground to eliminate the play of bolt (2), then tighten the bolt to the specified torque.



Tightening torque of mounting nut:  $255 \pm 34.3 \text{ N}\cdot\text{m}$   
 $(26 \pm 3.5 \text{ kg}\cdot\text{m})$

If bolt (2) and nut (1) are damaged, replace them with new ones at the same time.

8. After several hours of running, retorque the nuts.



**CHECK IDLER OIL LEVEL, ADD OIL**

**⚠ WARNING**

**If the oil level in the idler is low, new oil must be added, and the machine body must be inclined in this case. Since this work is dangerous, ask your Komatsu distributor.**

If the oil level in the idler is low, noise will be generated and there will be seizure, so check the oil level and add oil as follows.

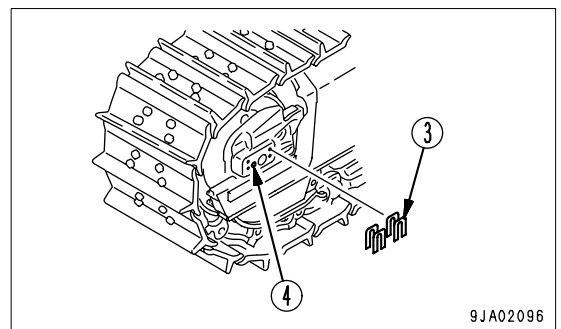
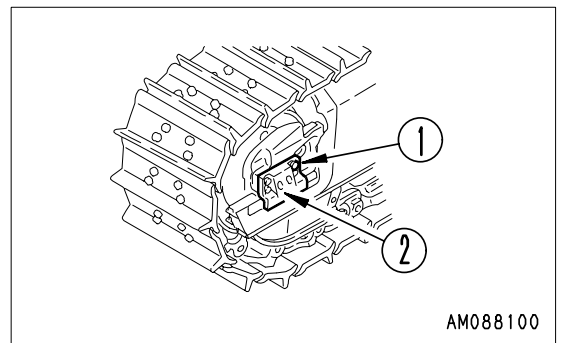
**INSPECTION**

1. Remove bolt (1), then remove guide plate (2) and shim (3).

**REMARK**

When removing shim (3) keep it in a safe place and be careful not to lose it.

2. Loosen plug (4) slowly. If oil oozes through the threads at this time, the quantity of oil is sufficient. Tighten plug (4).
3. If any oil does not flow out when plug (4) is removed, the quantity of oil is insufficient. In this case, ask your Komatsu distributor for repair.
4. Install guide plate (2) and shim (3) with bolt (1).



**REMARK**

When installing guide plate (2), install the same number and thickness of shim (3) as removed in Step 1. The optimum clearance may be obtained, if the adjustment is made at the same time. For details of adjusting the shim thickness, see “ADJUST IDLER CLEARANCE (4-29)”.

**ADJUST IDLER CLEARANCE**

Since the idlers are forced to move forward and backward by an external force guide plates will be worn out.

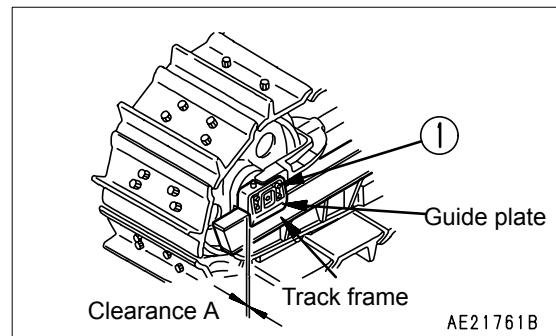
Wear of these plates will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn idler and links may result.

Therefore, adjust the idlers according to the following procedure.

**ADJUSTMENT**

1. Move the machine by 1 to 2 m on a level place, then measure clearance A between the track frame and guide plate (at four places of both sides, inside, and outside).
2. If the clearance A exceeds 4.0 mm, loosen bolt (1), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0 mm.

Thickness of one shim is 1.0 mm.

**ADJUST PLAY IN CENTER BALL**

### ⚠ WARNING

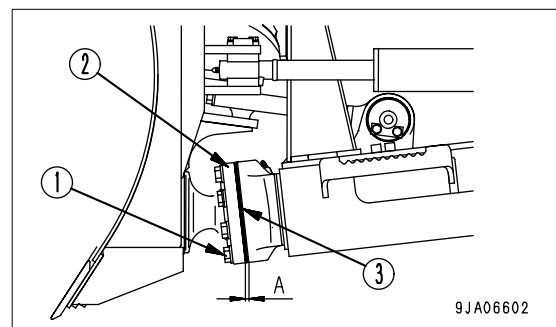
**Always lock the blade control lever securely with the safety lock lever except when operating the blade during the adjustment operation.**

When the blade assembly has been removed for transportation, the play of the center ball must be adjusted when assembling it again. If this is not done, soil will enter and cause premature wear or damage of the ball and vibration of the work equipment, so adjust as follows.

1. Remove bolt (1) and cap (2), then remove shim (3).
2. With shim (3) removed, install cap (2) and tighten with bolt (1).
3. Measure clearance A, then add 0.2 to 1.2 mm to calculate the shim thickness. Assemble this shim thickness.

Shim thickness: 1 mm x 2

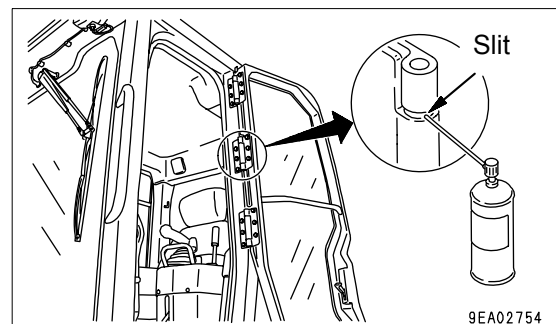
2 mm x 3

**GREASE DOOR HINGE**

(Machines equipped with cab)

If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the slit in the hinge bushing.

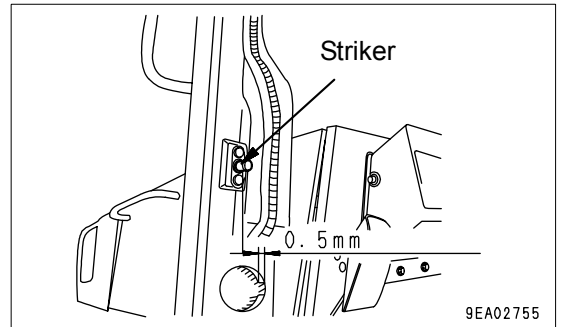
If the bushing is worn, replace the hinge.



**CHECK DOOR LOCK STRIKER**

(Machines equipped with cab)

If the wear of the door lock striker exceeds 0.5 mm, replace the striker. If it is used at it is, the play will increase and this may result in breakage of the hinge or door lock.



**CHECK, ADJUST AIR CONDITIONER**

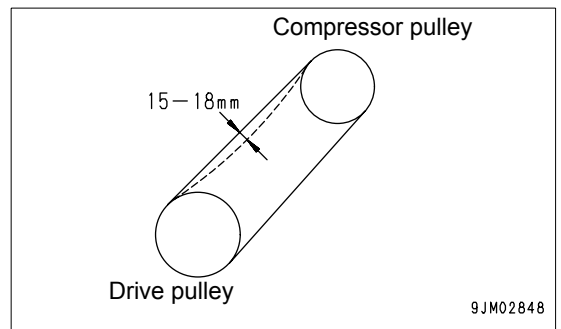
(Machines equipped with cab)

**CHECKING TENSION OF COMPRESSOR BELT**

If the belt is loose, it will slip and the cooling effect will be reduced.

From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx. 98 N (10 kgf)) and check that the tension is 15 to 18 mm.

When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.



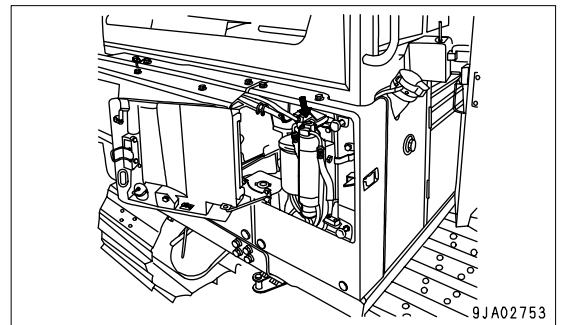
**CHECK LEVEL OF REFRIGERANT**

**⚠ 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.**

This is inside the inspection cover on the right side at the rear of the machine.

If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.



- No bubbles in refrigerant flow: Suitable (A)
- Some bubbles in flow  
(bubbles pass continuously): Lack of refrigerant (B)
- Colorless, transparent: No refrigerant (C)

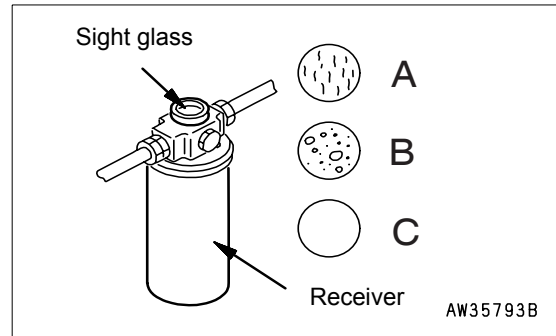
**REMARK**

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.

New Freon R134a is used as the refrigerant.

**OPERATING AIR CONDITIONER OFF-SEASON**

Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.



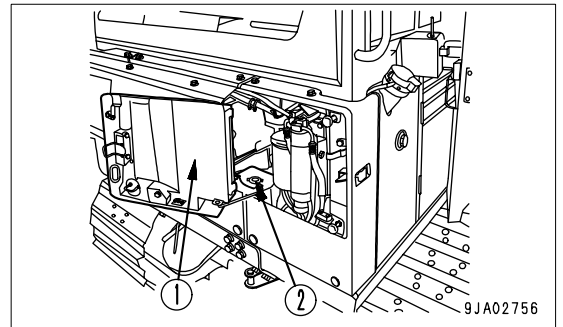
**CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID**

(Machines equipped with cab)

Do this when no more window washer fluid is sprayed out.

Open cover (1), check the level of the fluid in window washer tank (2), and if it is low, add automobile window washer fluid.

When adding fluid, be careful not to let any dirt or dust get in.



**PROPORTION FOR MIXING FLUID WITH WATER**

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

Area, season	Proportions	Freezing temperature
Normal	Washer fluid 1/3: water 2/3	-10°C
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C
Winter in extremely cold area	Pure washer fluid	-30°C

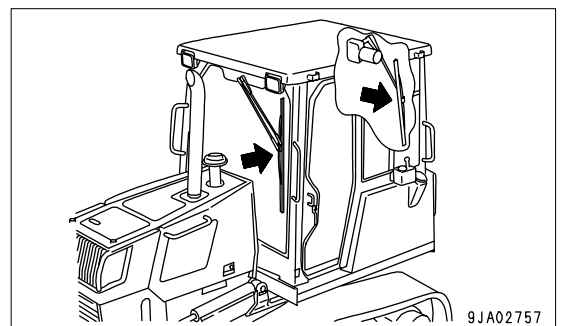
There are two types depending on the freezing temperature:

-10°C (general use) and -30°C (cold area use), so select according to the area and season.

**REPLACE WIPER BLADE**

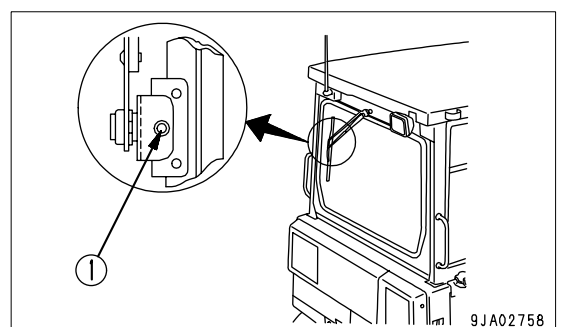
(Machines equipped with cab)

If the blade is damaged, it will not wipe the window clean, so replace the blade.



**REPLACEMENT**

1. Remove screw (1), then remove the blade.
2. Install a new blade, then tighten screw (1) securely.



## PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

When the hydraulic oil filter elements or strainers are cleaned or replaced, or when any hydraulic component has been repaired or replaced, or when a hydraulic piping has been disconnected, bleed air from the hydraulic oil circuit.

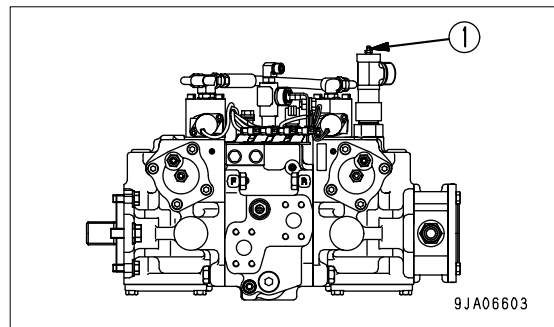
See "STARTING ENGINE (3-77)".

Since the engine must be started and the blade must be operated, see OPERATION.

1. Bleeding air from pump
2. Loosen air bleed plug (1) installed to the drain port and check that oil oozes out (air bleeding is completed).
3. After completion of the air bleeding operation, tighten the air bleed plug.

### NOTICE

**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.**



4. Starting engine

Start the engine and run for 10 minutes at low idling. For details, see "STARTING ENGINE (3-77)".

After running for 10 minutes at low idling, move to the next operation.

5. Bleeding air from cylinders
6. Run the engine at low idling, and extend and retract each cylinder 4 to 5 times, taking care so that a cylinder may not be brought up to its stroke end. (Stop the cylinder approx. 100 mm short of its stroke end)
7. Next, operate each cylinder 3 to 4 times to the end of its stroke.
8. 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 at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.**

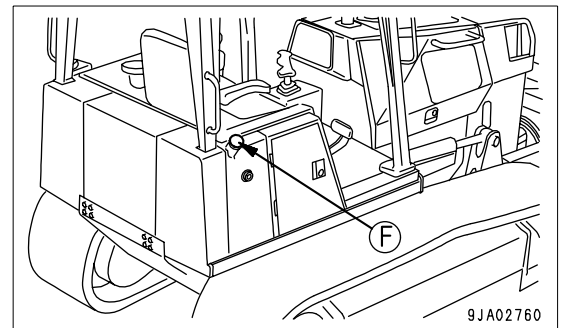
9. Operation

10. After completing the bleeding of the air, stop the engine, and wait for at least 5 minutes before starting operations. This will release the bubbles in the oil inside the tank.
11. Check that there is no oil leakage, and wipe off any oil that has been spilled.

**PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM**** WARNING**

- The hydraulic system is always under internal pressure, so when inspecting or replacing the piping or hoses, always release the pressure in the circuit before starting. If the pressure is not released, high pressure oil may spurt out and 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 pressure before removing the cap.

1. Stop the machine on firm level ground.
2. Lower the blade to the ground, then stop the engine.
3. To release the internal pressure, operate the blade control lever in each direction to the end of its stroke within 15 seconds after stopping the engine.
4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.



## CHECK BEFORE STARTING

For details of the following items, see “CHECK BEFORE STARTING (3-63)” in the OPERATION section.

- Check coolant level, add coolant
- Checking with monitor
- Check fuel level, add fuel
- Check oil level in engine oil pan, add oil
- Check, clean water separator
- Check dust indicator
- Check oil level in hydraulic tank, add oil
- Check electric wiring
- Check that lamps light up
- Check horn sound
- Check of operation of backup alarm



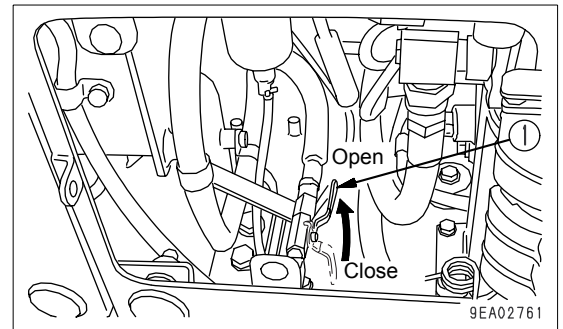
**EVERY 50 HOURS SERVICE****DRAIN WATER, SEDIMENT FROM FUEL TANK**

Carry out this check before operating the machine.

- Prepare a container to catch the fuel that is drained.
1. Open drain valve (1) at the bottom inside the inspection cover on the left side at the rear of the machine and drain the water and sediment accumulated at the bottom together with fuel.

When doing this, be careful not to get fuel on yourself.

2. After clear fuel comes out, close drain valve (1).



## EVERY 250 HOURS SERVICE

Maintenance for every 50 hours service should be carried out at the same time.

### LUBRICATING

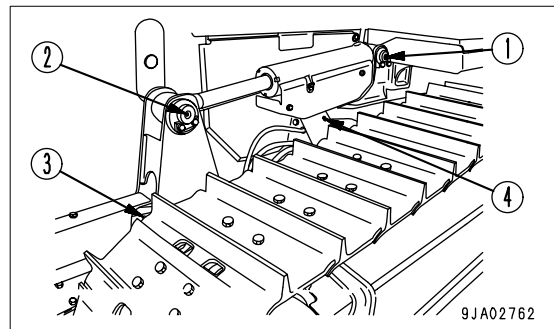
#### NOTICE

If dirt or sand is found sticking due to work in the soft ground, carry out greasing every 10 hours of operation.

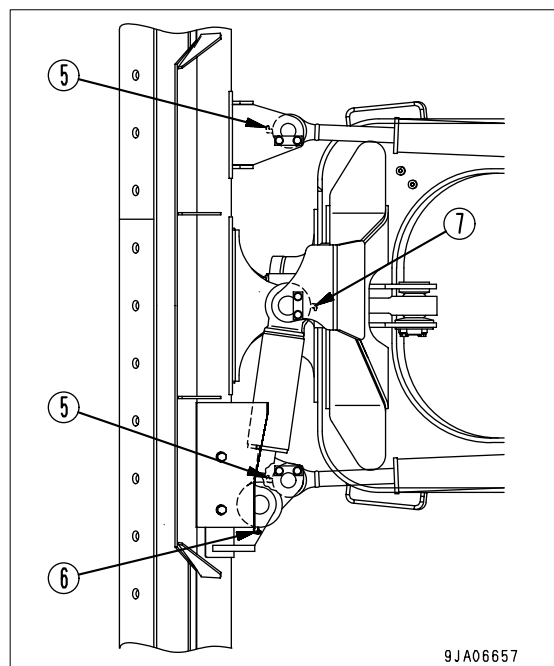
1. Lower the blade to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

#### ● D31EX,PX , D37EX,PX

- (1) Lift cylinder bottom pin (2 places)
- (2) Lift cylinder head pin (2 places)
- (3) Angle cylinder bottom pin (2 places)
- (4) Frame mounting pin (2 places)

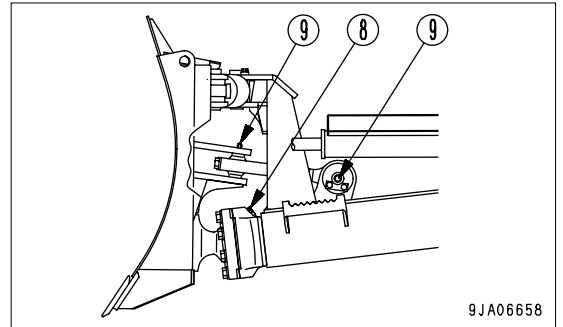


- (5) Angle cylinder head pin (2 places)
- (6) Tilt cylinder head pin (1 place)
- (7) Tilt cylinder bottom pin (1 place)



(8) Frame center ball (1 place)

(9) Rod pin (2 places)



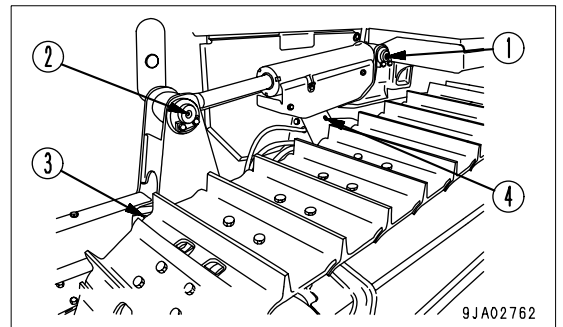
● D39EX,PX

(1) Lift cylinder bottom pin (2 places)

(2) Lift cylinder head pin (2 places)

(3) Angle cylinder bottom pin (2 places)

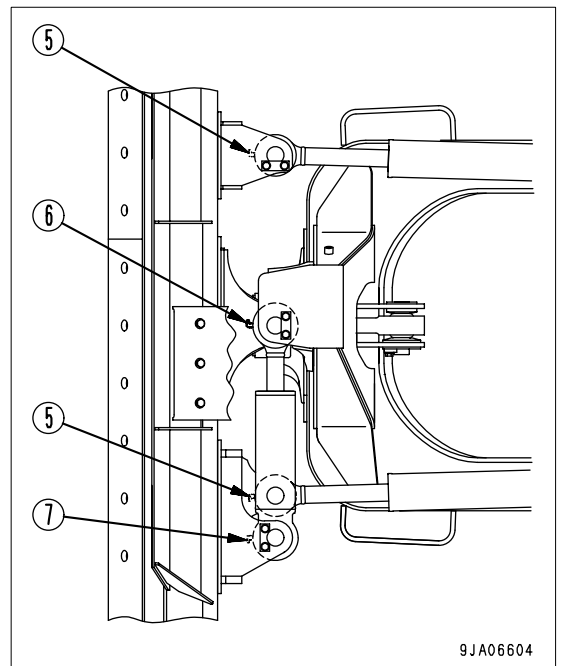
(4) Frame mounting pin (2 places)



(5) Angle cylinder head pin (2 places)

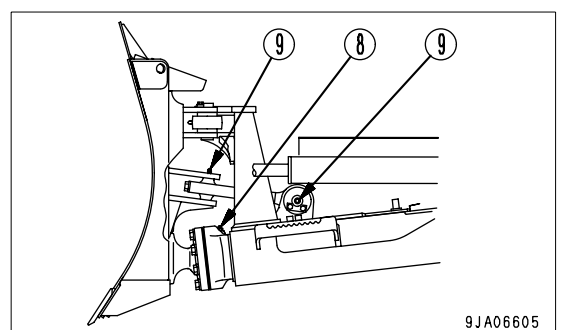
(6) Tilt cylinder head pin (1 place)

(7) Tilt cylinder bottom pin (1 place)



(8) Frame center ball (1 place)

(9) Rod pin (2 places)

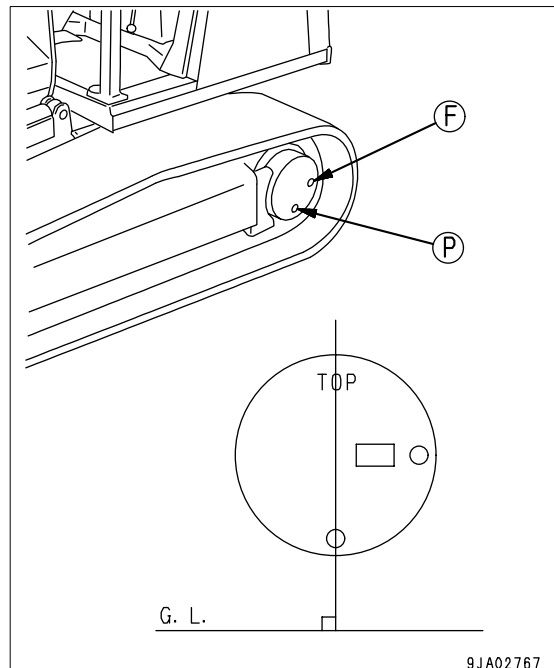


**CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL****⚠ WARNING**

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool 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 handle.
1. Set the TOP mark at the top, with the UP mark and plug (P) perpendicular to the ground surface.
  2. Using the handle, remove plug (F). If the oil is up to the bottom of the plug hole, the level is correct.
  3. If the oil level is low, check again. Install plug (F), and operate the steering, directional and gear shift lever to drive the machine forward or in reverse to rotate the sprocket one turn. Then repeat the procedure in Step 2 to check the oil level again.
  4. If the oil level is low, add oil through the hole of plug (F). Add oil until oil overflows from the hole of plug (F).
  5. After checking, install plug (F).

Tightening torque:  $68.6 \pm 9.8 \text{ N}\cdot\text{m}$  ( $7 \pm 1 \text{ kg}\cdot\text{m}$ )



9JA02767

**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 a large amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the **UPPER LEVEL** line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

**NOTICE**

When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

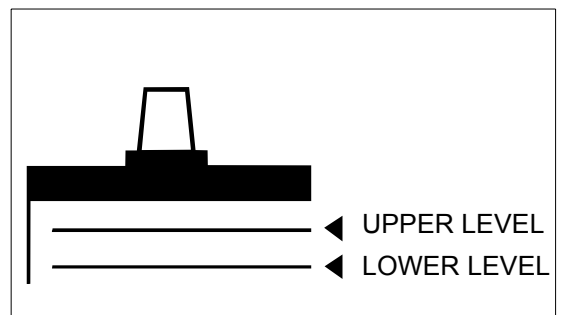
Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

**WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY**

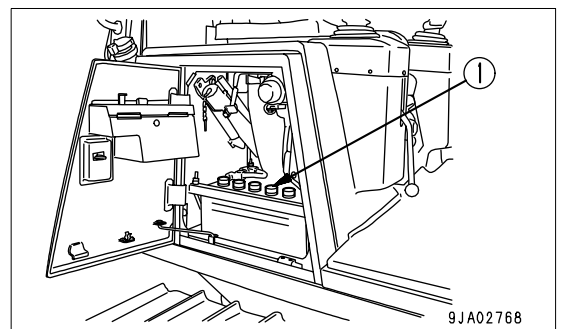
If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the battery inspection cover at the rear on the right side of the machine.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the **UPPER LEVEL (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.



3. 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.
4. After adding distilled water, tighten cap (1) securely.



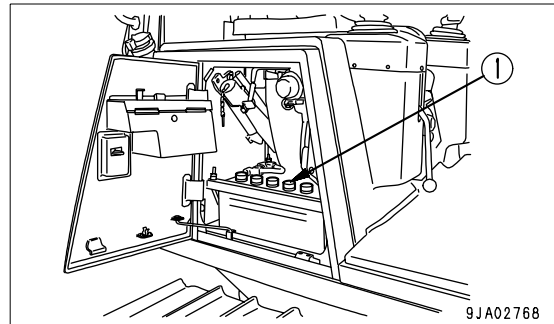
**REMARK**

If distilled water is added to above the U.L. line, use a syringe 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.

**WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SYDE OF BATTERY**

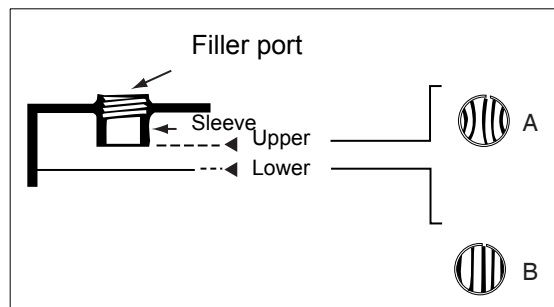
If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Open the battery inspection cover at the rear on the right side of the machine.
2. Remove cap (1) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.

A	<p>Correct level The electrolyte level is up to the bottom of the sleeve, so the surface tension causes the surface to rise and the plate appears to be warped.</p>
B	<p>Too low (level) The electrolyte level is not up to the bottom of the sleeve, so the plate appears to be normal.</p>



3. After adding distilled water, tighten cap (1) securely.

**REMARK**

If distilled water is added to above the bottom of the sleeve, use a syringe to lower the level to the bottom of the sleeve. 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.

**WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL**

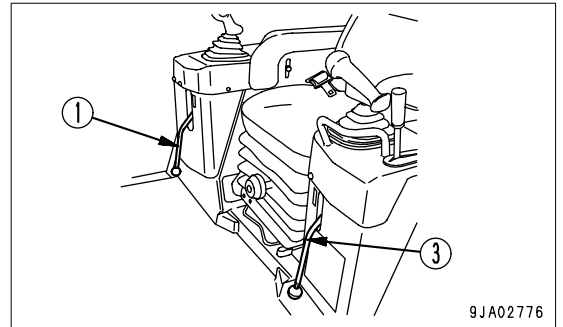
If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

CHECK BRAKE PERFORMANCE

**⚠ WARNING**  
**If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.**

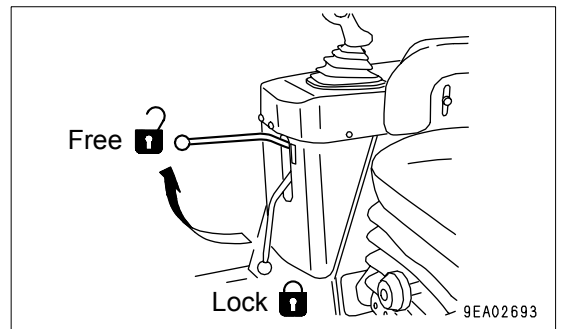
Before starting the engine, check that the area around the machine is safe, then do as follows.

1. Start the engine.

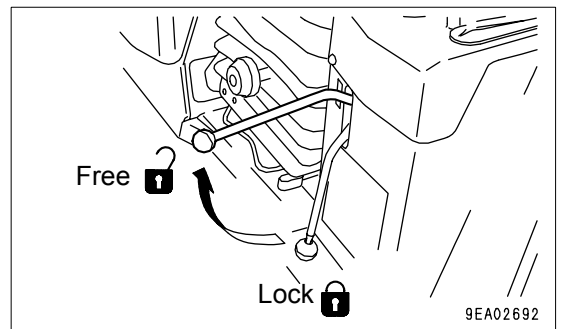


2. Set safety lock lever (1) to the FREE position then operate blade control lever (2) to raise the blade.

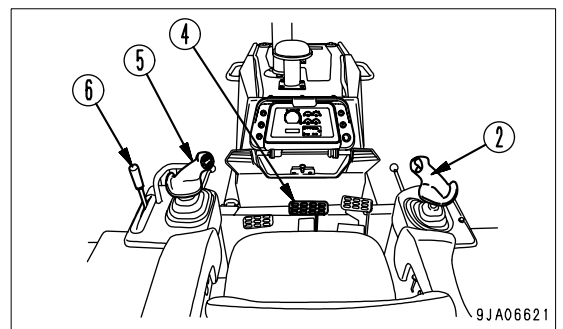
Leave the safety lock lever to the FREE position.



3. Set parking lever (3) to the FREE position



4. Depress brake pedal (4) and move steering, directional and gear shift lever (5) in 1nd.
5. Operate fuel control lever (6) to raise the engine speed gradually to full throttle.
6. If the machine does not move with the above operation and no error appears on the monitor panel, the brakes are correct.



**CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)**

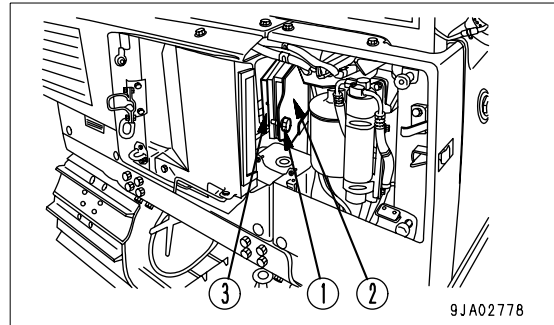
(Machines equipped with cab)

Clean the air conditioner air filter if it becomes clogged or if there is dirt or oil stuck to it.

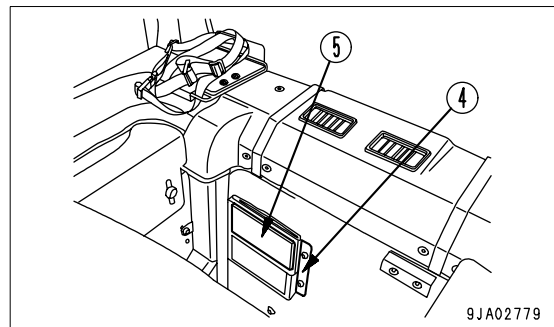
In places where there is a lot of dust, clean the air filter once a week. In addition, clean the air conditioner air filter at the same time, when cleaning the engine air cleaner.

1. Open the inspection cover at the right side at the rear of the machine, turn knob (1), remove inside cover (2), then remove FRESH filter (3).
2. Remove the filter box, then brush out the dirt accumulated inside the box through the cleaning hole in the hood.

When doing this, be careful not to let any dirt or dust get into the fresh air intake port leading to the cab.



3. Remove cover (4) at the rear of the operator's seat, then remove RECIRC filter (5).
4. Clean filters (3) and (5) with compressed air. If the filters are stained with oil or extremely dirty, wash them in neutral detergent. After washing the filters, dry them, and then install them.

**REMARK**

If the filters cannot be cleaned with air or in water, replace them with new ones.



## EVERY 500 HOURS SERVICE

Maintenance for every 50 and 250 hours service should be carried out at the same time.

### REPLACE FUEL FILTER CARTRIDGE

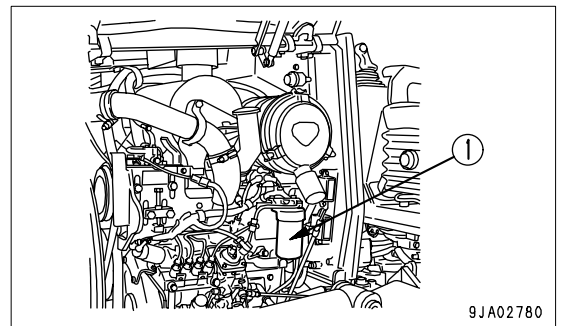


#### WARNING

- Engine is at high temperature immediately after the machine has been operated. Wait for engine 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. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.

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 completing the replacement of filter cartridge (1), bleed the air.
6. Bleed the air as follows.

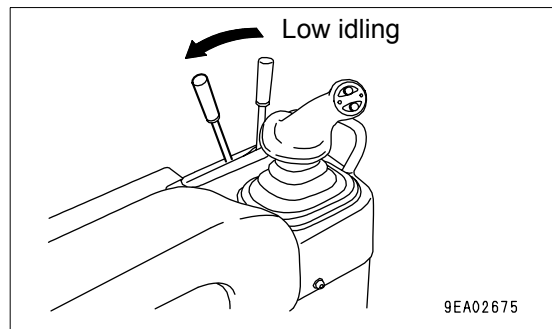
**METHOD OF USING AUTOMATIC AIR BLEED MECHANISM**

(If equipped)

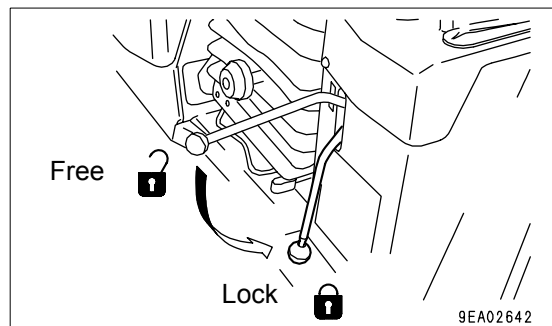
**⚠ WARNING****The engine will start, so check carefully that the area around the engine is safe before cranking it.**

It is possible to bleed the air from the fuel circuit simply by rotating the starting motor with the starting switch. Bleed the air as follows;

1. After replacing the filter cartridge, the engine is started, so follow the procedure in "OPERATION AND CHECK BEFORE STARTING ENGINE (3-75)".
2. Set the fuel control lever to the midrange speed position.



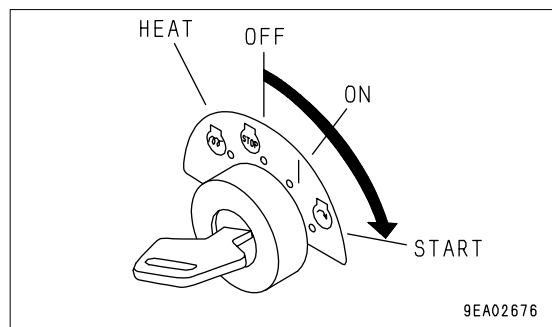
3. Set the parking lever of the steering, directional and gear shift lever to the LOCK position.



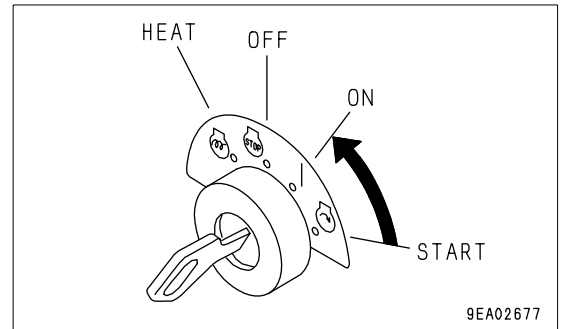
4. Turn the key in the starting switch to START and hold it there for 20 seconds.

When this is done, the starting motor will be actuated for approx. 2 seconds and then will stop, but the electric air bleed pump continues to be actuated and bleeds the air.

Keep the starting switch key at the START position for 20 seconds, regardless of whether the engine turns or not.



5. Return the key in the starting switch to the ON position and wait for approx. 30 seconds.



6. Turn the key in the starting switch to START and hold it there for 20 seconds.

When this is done, the starting motor will be actuated for approx. 2 seconds and then will stop, but the engine will turn. Even when the engine turns, keep the starting switch at the START position.

Keeping the starting switch at the START position will actuate the electric pump and the air can be bled.

**NOTICE**

**Even when the engine turns, keep the starting switch at the START position for approx. 20 seconds. The air will be bled while it is being held at the START position.**

**If the starting switch is returned to the ON position immediately the engine starts, the air bleeding operation will not be completed.**

7. Return the starting switch to the ON position.

When this is done, if the engine does not continue to turn and stops, repeat the operation in the Step 6.

**NOTICE**

**When the engine has run out of fuel also, fill the fuel tank, then use the same method and operate the starting switch for 20 seconds each two or three times to bleed the air.**

**The air bleeding time can be shortened if the fuel tank is full.**

8. After replacing the filter cartridge, start the engine and check that there is no leakage of oil from the filter seal surface. If there is any oil leakage, check the tightening condition of the filter cartridge. If there is still leakage, follow the procedure in Steps 1 and 2 of "REPLACE FUEL FILTER CARTRIDGE (4-45)" to remove the filter cartridge and check the packing surface for damage or foreign material caught in the surface.

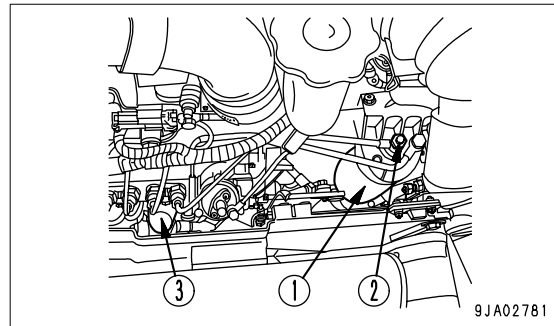
If there is any damage or foreign material caught in the packing surface, replace the packing with a new part. For details, see "REPLACE FUEL FILTER CARTRIDGE (4-45)", Steps 3 to 6.

**METHOD OF MANUAL AIR BLEEDING**

1. After replacing filter cartridge (1), loosen air bleed plug (2).
2. Loosen the knob of feed pump (3), pump it up and down several tens of times until no more bubbles come out with the fuel from the air bleed plug.
3. Tighten air bleeding plug (2).

A genuine Komatsu filter cartridge is recommended for use.

After finishing the replacement of the filter cartridge, start the engine and check that there is no oil leakage from the filter seal surface.



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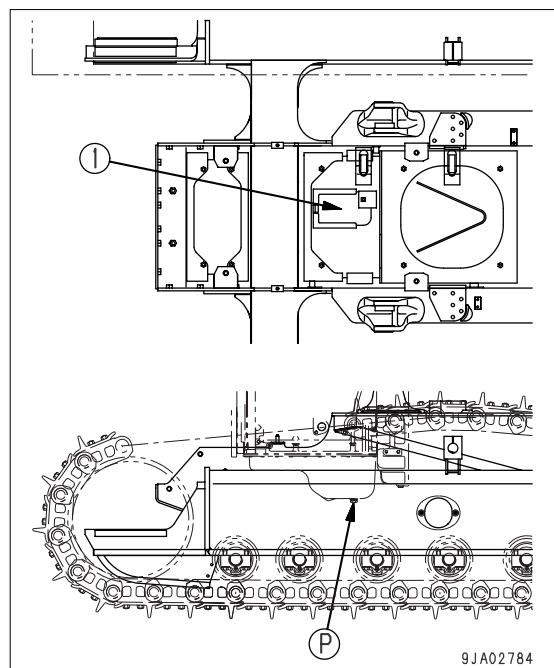
**REMARK**

When the engine has run out of fuel, fill the fuel tank, then use the same method and operate the feed pump to bleed the air.

**CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE**
 **WARNING**

Engine parts and oil are at high temperature immediately after the engine is stopped, and will cause serious burns. Wait for the temperature to cool down before starting the operation.

- Refill capacity: 12.5 liters
  - Prepare a socket wrench and filter wrench.
1. Remove inspection cover (1) at the bottom at the center of the machine.
  2. Put a container to catch the drained oil under the drain plug, then loosen drain valve (P) slowly to drain the oil. Be careful not to get the oil on yourself.
  3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
  4. Tighten drain valve (P).



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5. Open the engine side cover at the right side of the machine, then remove bottom cover (2).
6. Using a filter wrench, turn filter cartridge (3) counterclockwise to remove it.

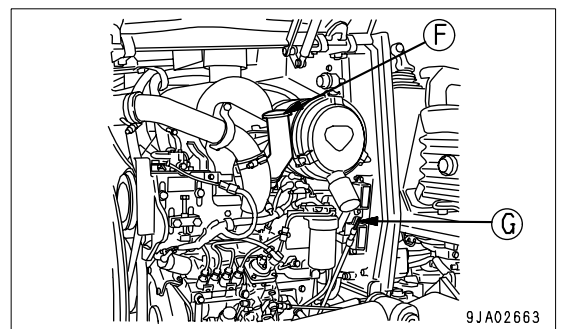
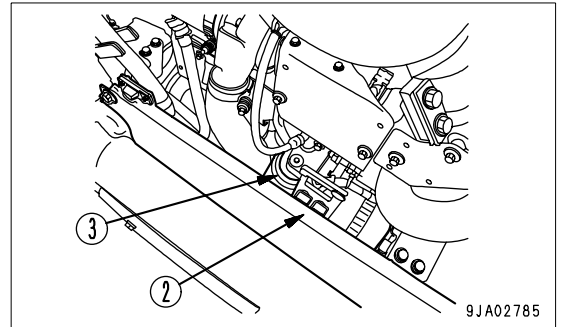
To prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.

7. Clean the filter holder, fill the new filter cartridge with clean engine oil, coat the thread and packing surface of the new filter cartridge with clean engine oil (or coat it thinly with grease), then install it to the filter holder.

8. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.

9. After replacing the filter cartridge, add oil through oil filler (F) until the oil level is between the H and L marks on the dipstick (G).

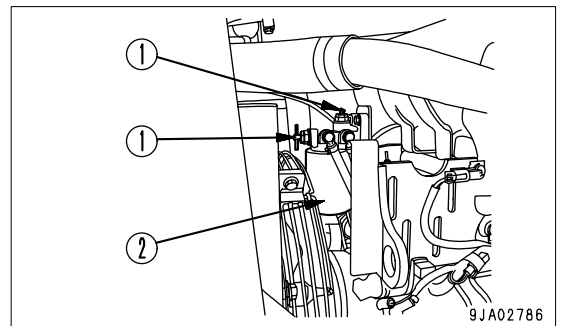
10. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (3-66)".



**REPLACE CORROSION RESISTOR CARTRIDGE**

(If equipped)

1. Open the engine side cover on the left side of the chassis.
2. Screw in 2 valves (1) at the top of the corrosion resistor.
3. Using a filter wrench, turn cartridge (2) to the left to remove it.
4. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.



5. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.

6. Open valves (1) (2 places).

Use Komatsu genuine cartridge.

**CLEAN, CHECK RADIATOR FINS AND OIL COOLER 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.

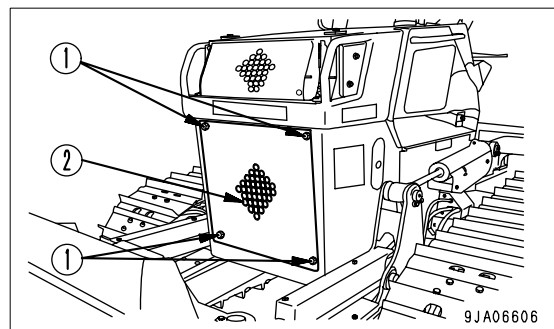
**NOTICE**

When using compressed air for cleaning, blow it keeping some distance to avoid damaging the fins. Damage on the fins can cause water leakage and overheating. In a dusty job site, check the fins every day, regardless of the maintenance interval.

**CLEAN, CHECK RADIATOR FINS**

If the radiator fins are clogged or dirty, clean and inspect them.

1. Remove bolts (1) (4 bolts), then remove cover (2).
2. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.

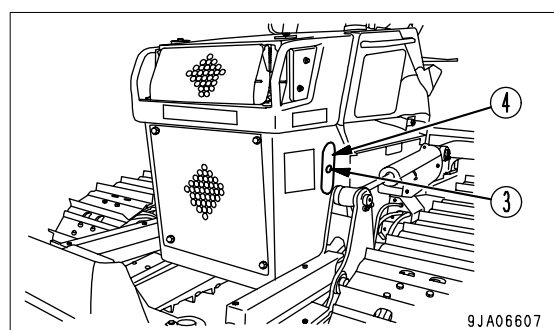
**REMARK**

Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

3. Install cover (2), and tighten bolts (1).

**CLEAN, CHECK OIL COOLER FINS**

1. Remove cap (3) and then remove cover (4) (provided both on the left and right) by loosening the mounting bolts.
2. Check the oil cooler fins through the opening of cover (4). Clean the fins if they are clogged or dirt is found sticking to them.
3. Blow off the dirt, dust or tree leaves clogging or sticking to the fins with compressed air. Pressurized steam or water may be used instead of compressed air.

**REMARK**

Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

4. Fix cover (4) with the mounting bolts.
5. Install cap (3).

## EVERY 1000 HOURS SERVICE

Maintenance for every 50, 250 and 500 hours should be carried out at the same time.

### CHANGE OIL IN FINAL DRIVE CASE

#### **WARNING**

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool 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 handle.
  - Refill capacity: each 3.5 liters
1. Set the TOP mark at the top, with the UP mark and plug (P) perpendicular to the ground surface.
  2. Set a container under plug (P) to catch the oil.
  3. Remove plugs (P) and (F) with the handle and drain the oil.

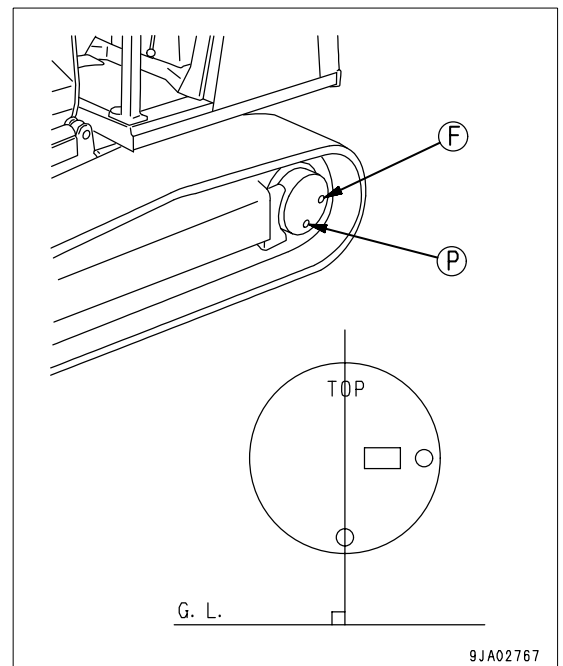
#### REMARK

Check the O-rings in the plugs for damage. If necessary, replace with new ones.

4. Tighten plug (P).
5. Add oil through the hole of plug (F).
6. When oil begins to overflow from the plug (F) hole, install plug (F).

Tightening torque of plugs (P) and (F):

$68.6 \pm 9.8 \text{ N}\cdot\text{m}$  ( $7 \pm 1 \text{ kgf}\cdot\text{m}$ )



### CHECK FAN BELT TENSION, ADJUST

Since inspection and replacement of the fan belt require special tools, contact your Komatsu distributor.

#### REMARK

The machine is equipped with an auto tensioner, so there is no need to adjust the tension.

### CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

## CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the rotor play checked.

## CHECK FOR LOOSE ROPS MOUNT BOLTS

(If equipped)

Check that the bolts are not loose and that there is no damage.

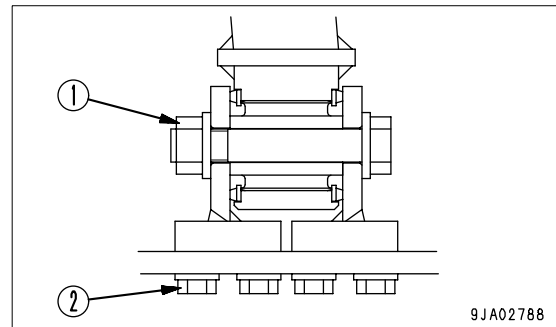
If any bolt is loose, tighten it to the following torque.

If there is any damage, replace the bolt with a genuine Komatsu part.

Tightening torque

Bolt (1): 785 to 98 N·m (80 to 100 kgf·m)

Bolt (2): 230 to 289 N·m (23.5 to 29.5 kgf·m)





## EVERY 2000 HOURS SERVICE

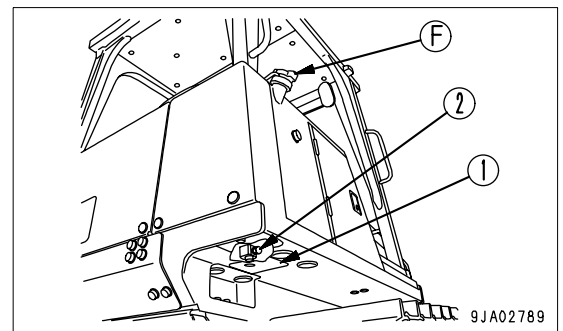
Maintenance for every 50, 250, 500 and 1000 hours service should be carried out at the same time.

### CHANGE OIL IN HYDRAULIC TANK, REPLACE OIL FILTER CARTRIDGE AND CLEAN SUCTION STRAINER

#### WARNING

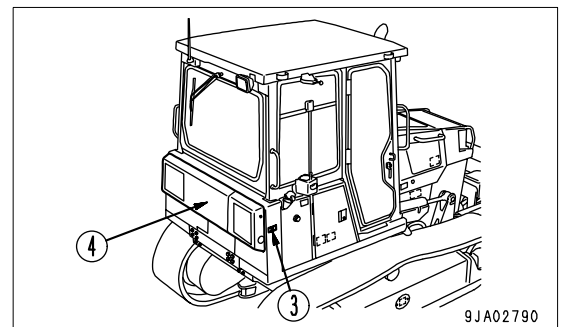
- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Refill capacity: 44 liters
1. Lower the blade to the ground securely, stop the engine and slowly turn the cap of oil filler (F) to release the internal pressure. Then, remove the cap.
  2. Remove the cover (1) at the bottom of the hydraulic tank.
  3. Place a container to receive drained oil on the track under the drain hole.
  4. Loosen drain valve (2) at lower side of hydraulic tank to drain the oil, then tighten valve (2) again.



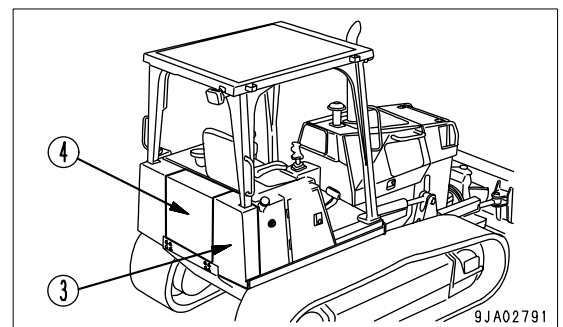
When loosening drain valve (2), be careful not to get the oil on you.

5. For the cab specification machine, cancel lock (3) of the inspection cover at the right side at the rear of the machine, remove the bolts, then remove rear cover (4).

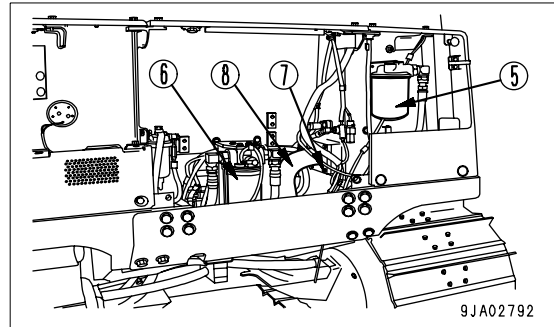


Remove the washer tank.

6. For machines other than the cab specification machines, remove the bolts, then remove the cover at the right side at the rear of the machine and center cover (4) at the rear.

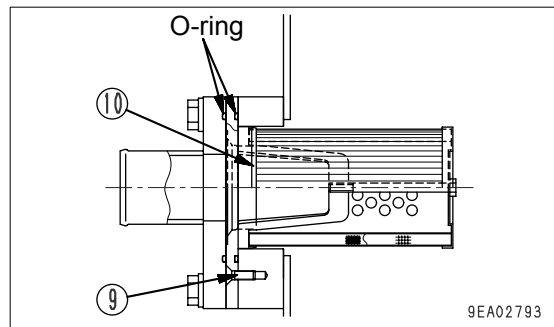


7. Using the filter wrench, turn filter cartridges (5) and (6) to the left and remove them.
8. Remove 4 bolts (7), then lift up the flange portion of piping (8).

**REMARK**

Lift up the flange to take out the strainer. Turn the flange by utilizing the slack of the rubber hose connected to the pipe.

9. Remove 2 screws (9), then take out strainer (10).
10. Remove any dirt stuck to strainer (10), then wash it in clean diesel oil or flushing oil.
11. Assemble strainer (10), tighten screws (9), then assemble piping (8) with bolts (7).
12. Clean the filter holder, fill the new filter cartridge with oil, then coat the seal and thread of the filter cartridge with oil (or coat thinly with grease) and install.



13. After the packing surface of the cartridge touches the sealing surface of the filter holder, tighten the cartridge further by about 2/3 turns.

Use Komatsu genuine cartridge.

14. Refill the specified quantity of oil through oil filler (F).
15. After adding oil, check that the oil is at the correct level.

For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (3-68)".

16. Install the cover at the rear of the machine.
17. After replacing hydraulic oil and cleaning or replacing filter element and strainer, bleed air from the circuit.

For details of the method of bleeding the air from the hydraulic circuit, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (4-34)".

**CLEAN, CHECK TURBOCHARGER**

Contact your Komatsu distributor for cleaning and inspection.

**CHECK VIBRATION DAMPER**

Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

**CHECK ALTERNATOR, STARTING MOTOR**

The brushes may be worn or the bearing may have run out of grease, contact your Komatsu distributor for inspection and repairs.

If the engine is started frequently, have this inspection carried out every 1000 hours.

**CHECK ENGINE VALVE CLEARANCE, ADJUST**

Contact your Komatsu distributor for cleaning and inspection.

**EVERY 4000 HOURS SERVICE**

Maintenance for every 50, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

**CHECK WATER PUMP**

Check that there is no play in the pulley, leakage of oil or water, or clogging of the drain hole. If any abnormality is found, please contact your Komatsu distributor for repairs or replacement.

# **SPECIFICATIONS**

## SPECIFICATIONS

With power angle power tilt dozer and ROPS cab

Item		Unit	D31EX-21	D31PX-21
Machine weight		kg	7,130	7,650
Name of engine		-	Komatsu SAA4D102E-2 diesel engine	
Engine horsepower		kW (HP)/rpm	56 (75)/2,000	
A	Overall length	mm	4,015	3,995
B	Overall height	(Not including antenna)	mm	2,700
		(To tip of exhaust pipe)	mm	2,645
C	Overall width	mm	2,435	3,200 *2,875
	Travel speed (Quick shift mode)	Forward 1st/2nd/3rd	km/h	3.4/5.6/8.5
		Bckward 1st/2nd/3rd	km/h	4.1/6.5/8.5
	Travel speed (Variable shift mode)	Forward	km/h	0.8 - 8.5
		Backward	km/h	0.8 - 8.5

\* Machines equipped with narrow blade

With power angle power tilt dozer and ROPS cab

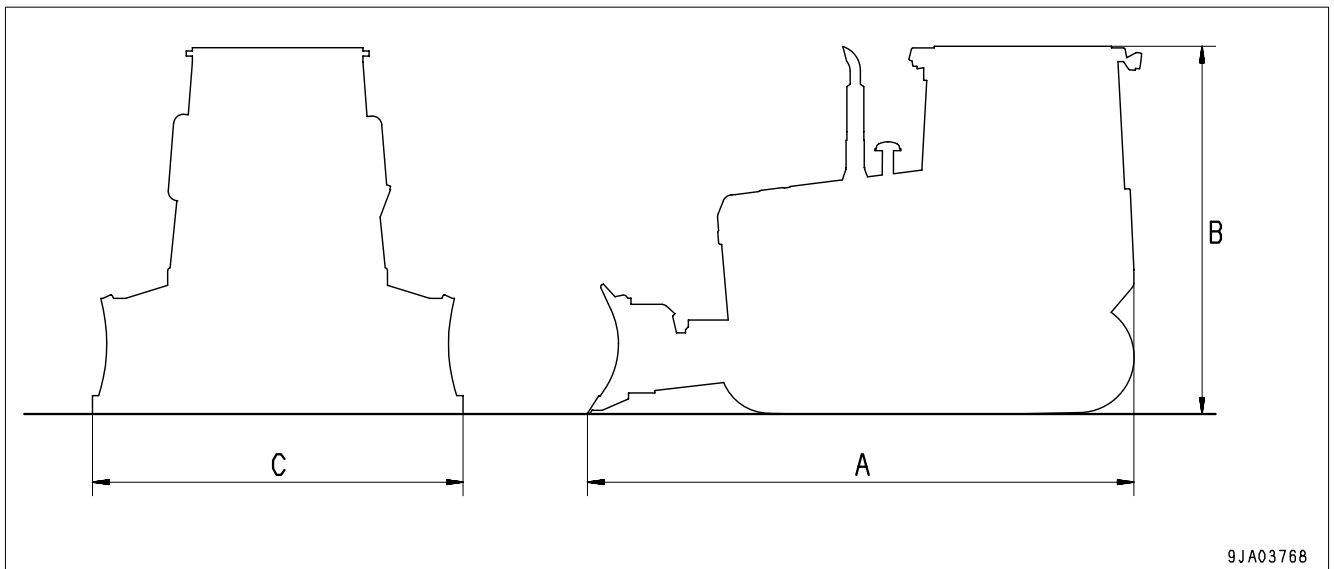
Item		Unit	D37EX-21	D37PX-21
Machine weight		kg	7,410	7,770
Name of engine		-	Komatsu SAA4D102E-2 diesel engine	
Engine horsepower		kW (HP)/rpm	63 (85)/2,000	
A	Overall length	mm	4,015	3,995
B	Overall height	(Not including antenna)	mm	2,700
		(To tip of exhaust pipe)	mm	2,645
C	Overall width	mm	2,720	3,250 *2,875
	Travel speed (Quick shift mode)	Forward 1st/2nd/3rd	km/h	3.4/5.6/8.5
		Bckward 1st/2nd/3rd	km/h	4.1/6.5/8.5
	Travel speed (Variable shift mode)	Forward	km/h	0.8-8.5
		Backward	km/h	0.8-8.5

\* Machines equipped with narrow blade

With power angle power tiltdozer and ROPS cab

Item		Unit	D39EX-21	D39PX-21
Machine weight		kg	8,820	9,200
Name of engine		-	Komatsu SAA4D102E-2 diesel engine	
Engine horsepower		kW (HP)/rpm	71 (95)/2,000	
A	Overall length	mm	4,200	4,200
B	Overall height	(Not including antenna)	2,770	2,770
		(To tip of exhaust pipe)	2,720	2,720
C	Overall width	mm	2,740	3,330 *2,980
	Travel speed (Quick shift mode)	Forward 1st/2nd/3rd	km/h	3.4/5.6/8.5
		Bckward 1st/2nd/3rd	km/h	4.1/6.5/8.5
	Travel speed (Variable shift mode)	Forward	km/h	0.8-8.5
		Backward	km/h	0.8-8.5

\* Machines equipped with narrow blade



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# ATTACHMENTS, 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

Read the instruction manual for the attachment carefully, and do not use the machine before you understand the operation method completely.

If you lose the instruction manual, be sure to order another copy from your Komatsu distributor.

To prevent serious personal injury caused by misoperation, place your foot on the pedal only when operating the pedal.

#### Precautions for removal and installation

When removing or installing an attachment, observe the following items and work safely.

Select a firm, level surface when installing or removing an attachment.

When working in cooperation with one or more other workers, decide signs and observe them when carrying out the operation.

When carrying a heavy part (25 kg or more), use a crane.

When removing a heavy part, always place a support in position before removing it.

When lifting a load with a crane, be particularly careful of the center of gravity.

It is dangerous to carry out operations when the load has been raised by a crane. Always lower the load onto a stand and check that it is safe.

When leaving an attachment removed or installing it, place it in a stable position to prevent it from falling over.

Never go under a load raised by a crane.

Always stand in a place which is safe even if the load should fall.

#### NOTICE

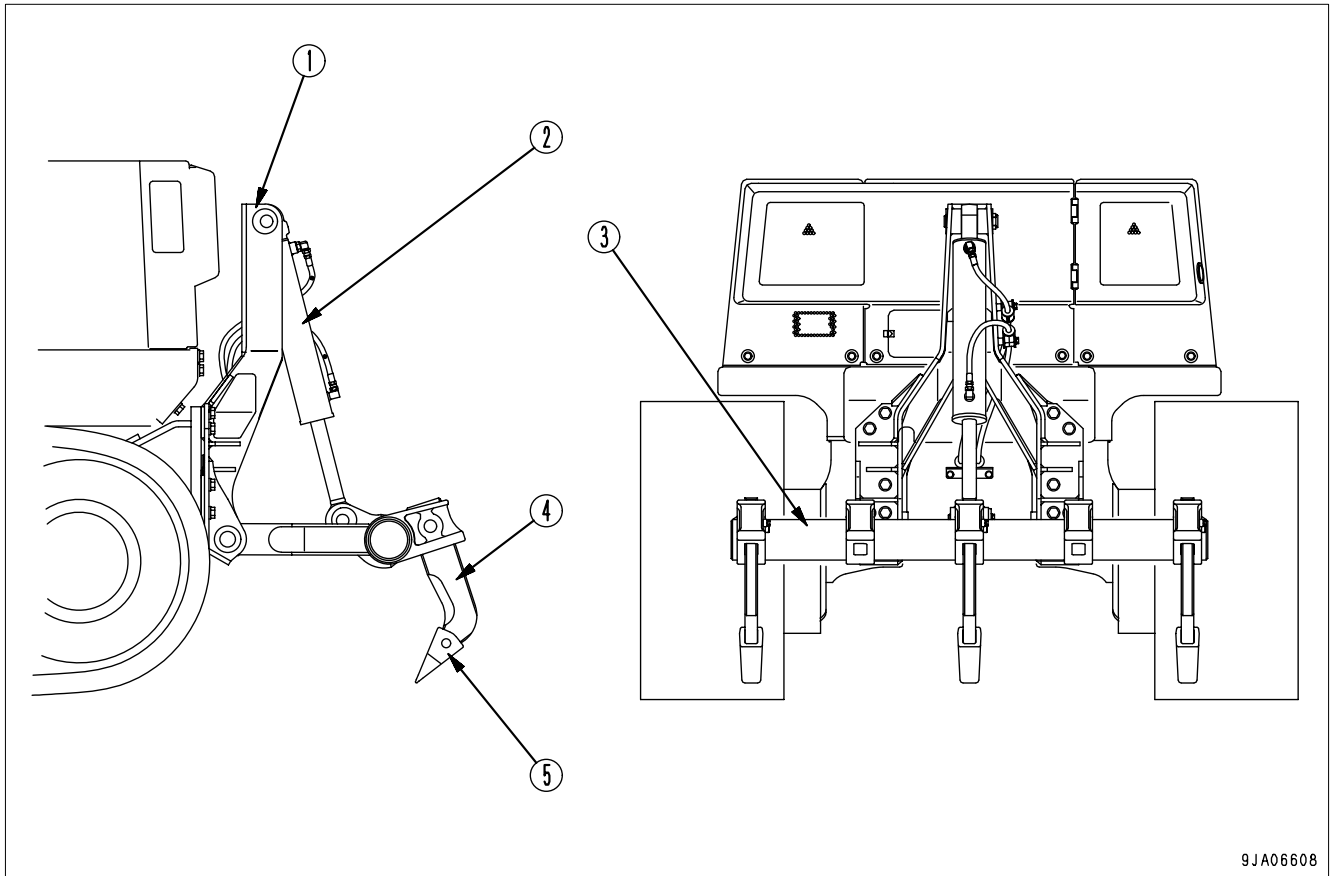
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

# HANDLING HYDRAULIC RIPPER

- This ripper is applicable for the D31EX and D37EX and D39EX.

## GENERAL VIEW



- (1) Support
- (2) Hydraulic cylinder
- (3) Beam

- (4) Shank
- (5) Point

## EXPLANATION OF COMPONENTS

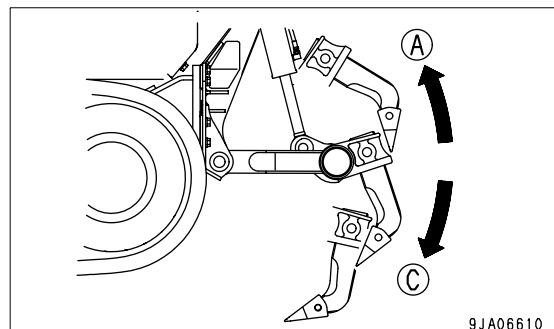
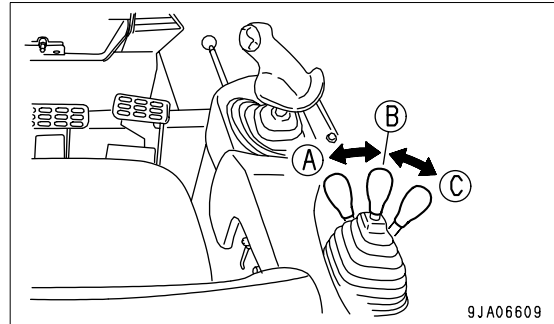
### RIPPER CONTROL LEVER

#### **WARNING**

When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the safety lock lever to the LOCK position.

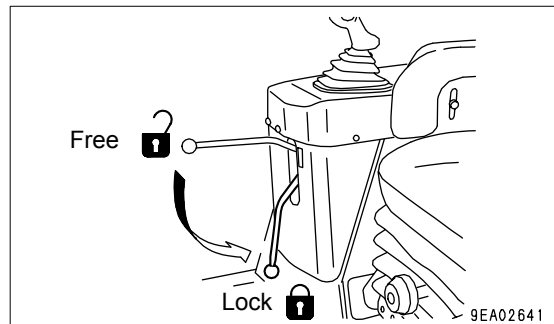
This lever is used to operate the ripper.

- (A) RAISE
- (B) HOLD: Ripper is stopped and held in the same position.
- (C) LOWER



#### REMARK

The ripper operation is locked by the safety lock lever. For details of the operation of the safety lock lever, see "SAFETY LOCK LEVER (3-39)".



## OPERATION

### CHECK BEFORE STARTING ENGINE, ADJUST

#### WALK-AROUND CHECK

1. Check for wear of the point at the tip of the shank, check the mounting condition, and check for damage to the rivets. If any abnormality is found, replace or repair.

### PRECAUTIONS WHEN OPERATING

- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position.

Do not dig the shank in deep when starting digging operations.

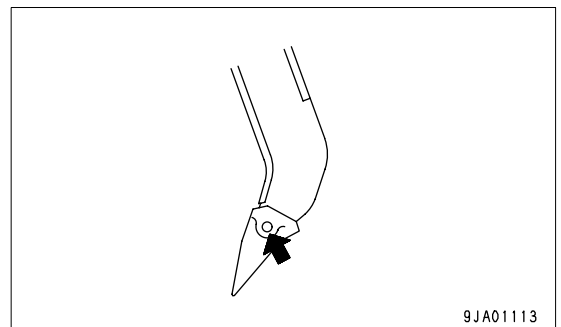
- During ripping operations, never turn the machine suddenly or travel in reverse. When turning the machine suddenly or traveling in reverse, raise the shank from the ground surface.
- When carrying out digging operations with only one shank, always use the center shank. Remove both side shanks.
- When starting to travel up a steep slope or when reaching the bottom of the slope, the point may touch the ground. On hard ground, there is danger of the point breaking if it touches the ground, so raise the shank to the maximum height.

### ADJUSTING POSTURE OF WORK EQUIPMENT

#### REPLACEMENT OF POINT

A point is installed to protect the shank. If the point is worn, replace it as follows.

1. Put a pin remover in contact with the pin marked by the arrow and tap with a hammer to remove.
2. Replace the point.
3. Insert the pin half way, then knock it in fully with a hammer.



## TROUBLESHOOTING

### OTHER TROUBLE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Slow ripper raising and function, lack of ripping force.	<ul style="list-style-type: none"> <li>•Improper hydraulic oil</li> <li>•Defective pump</li> <li>•Defective adjustment of relief valve</li> <li>•Defective control valve, safety valve                             <ul style="list-style-type: none"> <li>•Defective valve spool</li> </ul> </li> <li>•Defective piston ring, packing, valve</li> <li>•Clogging inside piping</li> </ul>	<ul style="list-style-type: none"> <li>•Add oil to specified level, see CHECK BEFORE STARTING</li> <li>(•Check, repair)</li> <li>(•Check, adjust)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> </ul>
Cylinder lacks holding power	<ul style="list-style-type: none"> <li>•Leakage of oil from piping, hose</li> <li>•Defective piston ring, packing</li> <li>•Defective piston valve</li> <li>•Defective valve spool</li> <li>•Defective safety valve, suction valve</li> </ul>	<ul style="list-style-type: none"> <li>•Tighten</li> <li>(•Replace)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> <li>(•Check, repair)</li> </ul>
Oil pressure does not rise	<ul style="list-style-type: none"> <li>•Clogging inside piping</li> <li>•Defective adjustment of relief valve</li> </ul>	<ul style="list-style-type: none"> <li>(•Repair)</li> <li>(•Check, adjust)</li> </ul>

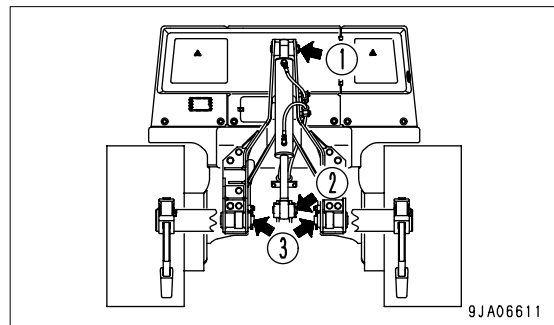
## MAINTENANCE

### EVERY 250 HOURS SERVICE

#### LUBRICATING

1. Lower the ripper 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.

- (1) Ripper cylinder foot pin (1 point)
- (2) Ripper cylinder rod end pin (1 point)
- (3) Link pin (2 points)



## DELUXE SEAT

### WARNING

When adjusting the position of the operator's seat, always set the safety lock lever to the LOCK position to prevent any accidental contact with the control levers.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

#### (A) Fore-and-aft adjustment

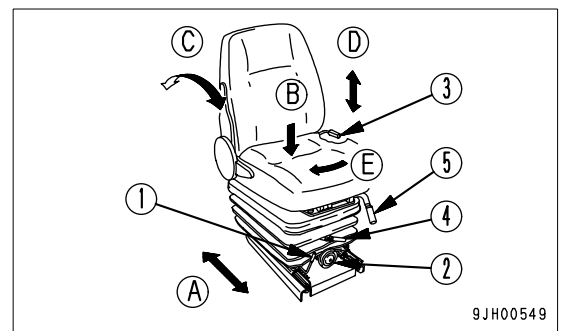
Pull lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (8 stages)

#### (B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted within a range of 50 to 120 kg



#### REMARK

If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight. When operating on uneven surfaces, adjust the seat to a harder setting.

#### (C) Adjust reclining angle

Pull up lever (3) 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.

#### REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

(D) Height adjustment of seat

- Turn lever (4) to adjust the height of the seat.
- If the lever is turned clockwise, the seat is heightened. If the former is turn counterclockwise, the latter is lowered.

If you apply your weight to the seat, the lever becomes heavy. Accordingly, do not apply your weight.

After adjusting the height, release the lever to lock the seat.

(Height adjustment distance: Stepless, 50 mm)

(E) Adjusting direction of seat

Pull up lever (5) to unlock the seat, and the seat can be turned by hand to the position of 15° on the right.

After changing the direction of the seat, return the lever securely to lock the seat.

- Change the direction of the seat to the right for the ease of operation of the ripper.



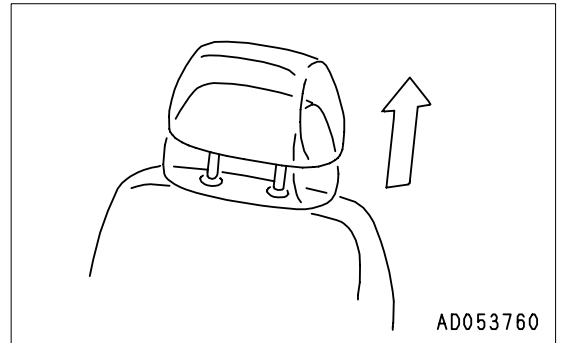
## HEADREST

### Removal of headrest

Pull up the headrest.

**REMARK**

The headrest cannot be fixed to halfway.



AD053760

## EQUIPPING FIRE EXTINGUISHER AND FIRST-AID KIT

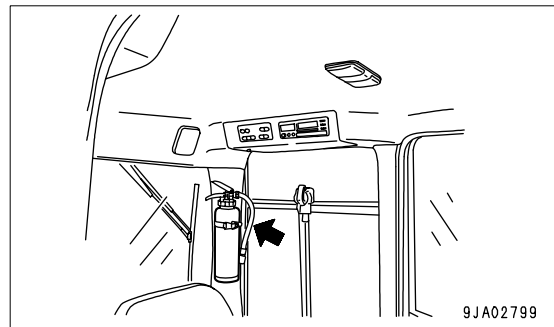
Equipping the fire extinguisher and the first-aid kit at the illustrated position needs brackets (if equipped).

The fire extinguisher and the first-aid kit can be installed to the positions shown in the following illustration.

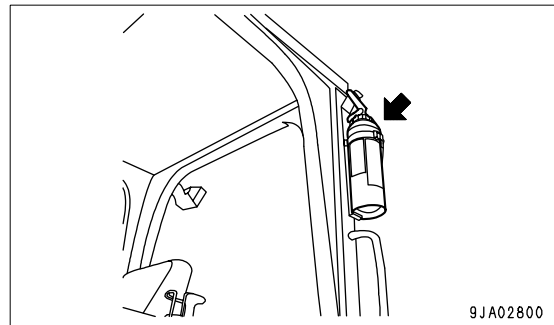
Equipping the fire extinguisher and the first-aid kit at the illustrated position needs brackets (option). For the brackets, please contact your Komatsu distributor.

When installing a fire extinguisher, install it in the position shown in the diagram.

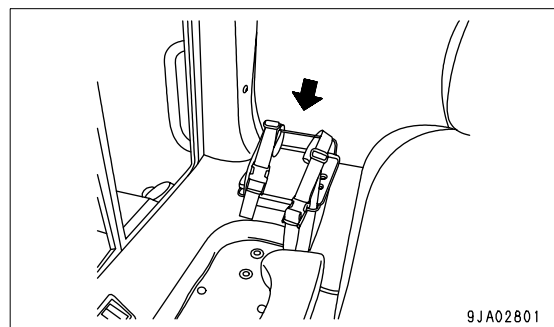
- Machine equipped with cab



- Machine equipped with canopy



When installing a first aid box, install it in the position shown in the diagram.



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# COLOPHON

D31EX,PX-21 , D37EX,PX-21 , D39EX,PX-21 GALEO BULLDOZER

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