Operation & Maintenance Manual

UEAM002401

PC160LC-7KA

HYDRAULIC EXCAVATOR

SERIAL NUMBER **PC160LC-7KA - K40001 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 personel who will come into contact with the machine.

FOR US MARKET ONLY

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 hazard when performing operation and maintenance.

⚠ WARNING

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

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

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

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

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

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

CALIFORNIA

Proposition 65 Warning

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

CALIFORNIA

Proposition 65 Warning

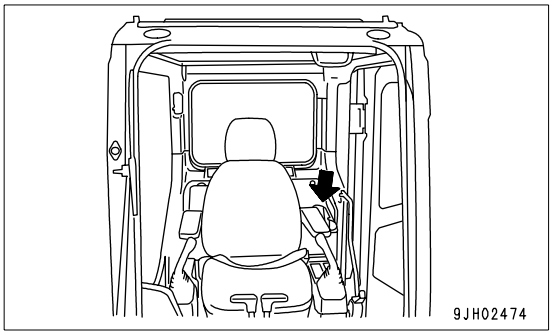
Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Wash hands after handling.

⚠ WARNING

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

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



SAFETY INFORMATION

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

Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.
In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This word is used also to alert against unsafe practices that may cause property damage.

Example of safety message using signal word

⚠ WARNING

**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

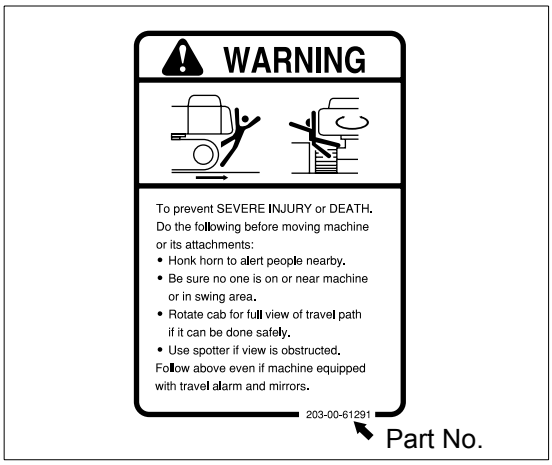
In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

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

● **Safety labels**

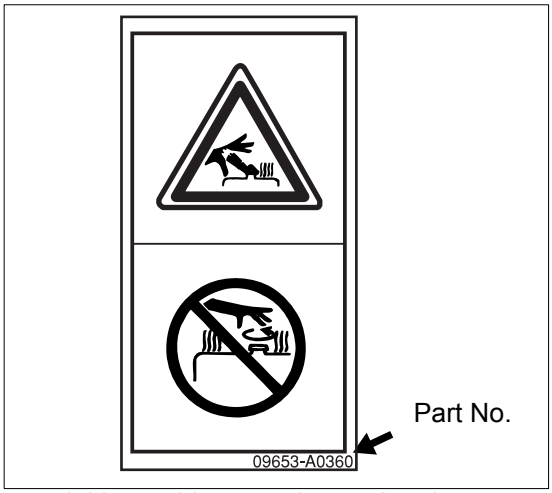
Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.
This machine uses “Safety labels using words“ and “Safety labels using pictograms“ to indicate safety procedures.

Example of safety label using words



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.



Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions.
If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to take the necessary steps to ensure safety.
In no event should you engage in prohibited uses or actions described in this manual.

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

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

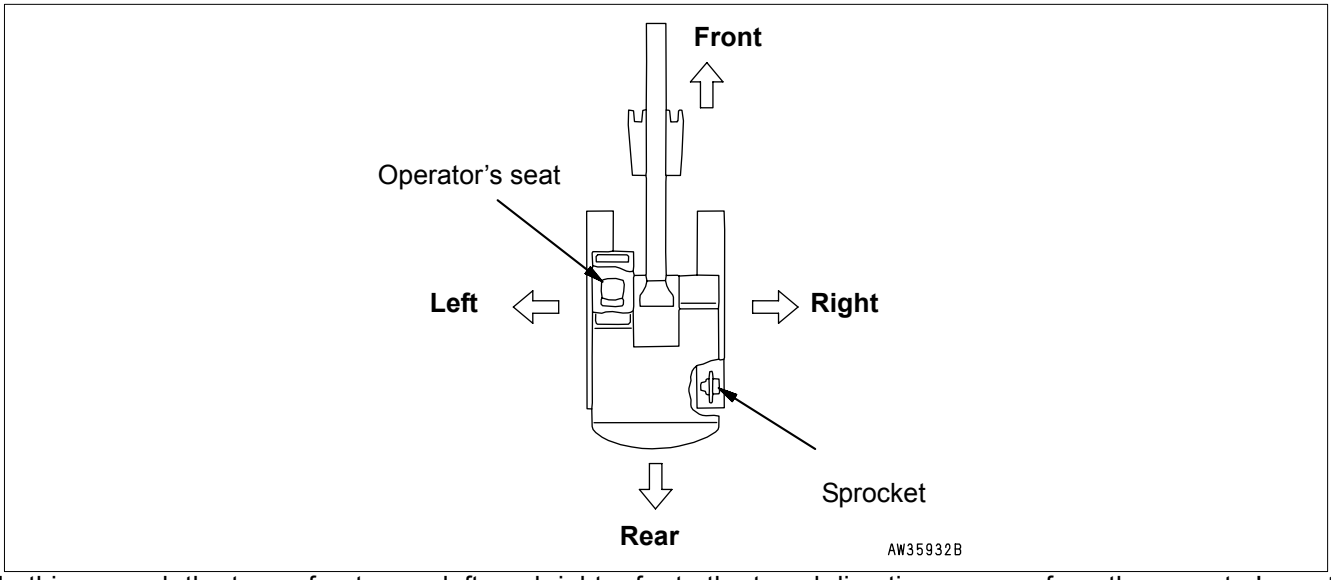
INTRODUCTION

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

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

See the section “RECOMMENDED APPLICATIONS (3-104)“ for further details.

DIRECTIONS OF MACHINE



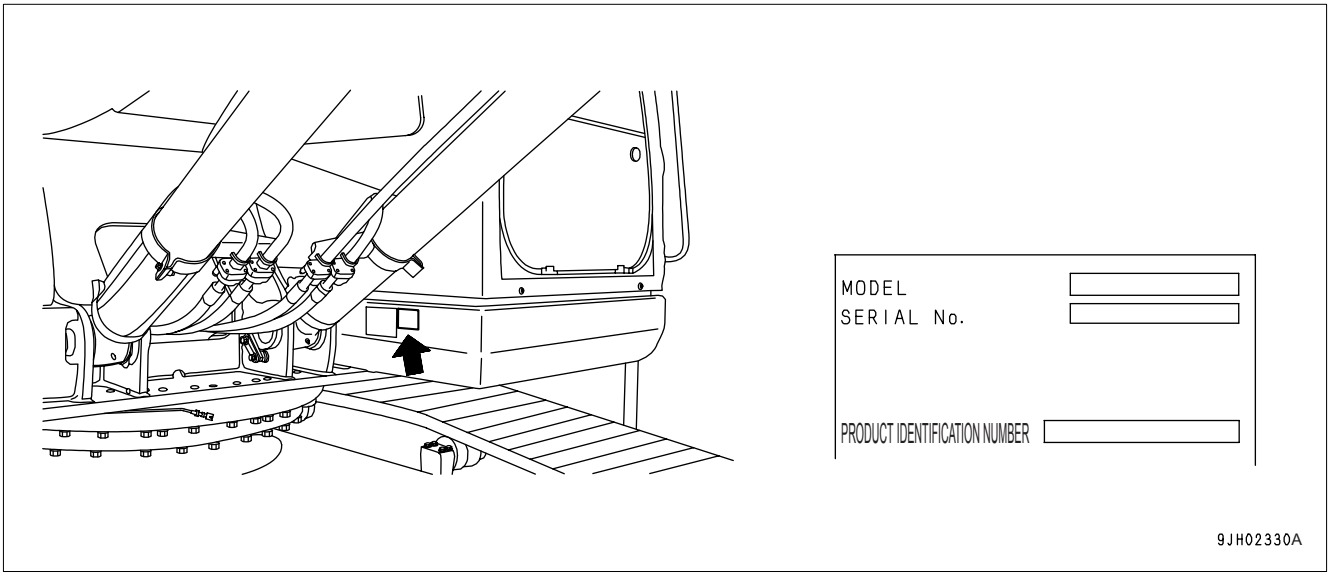
In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

PRODUCT INFORMATION

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

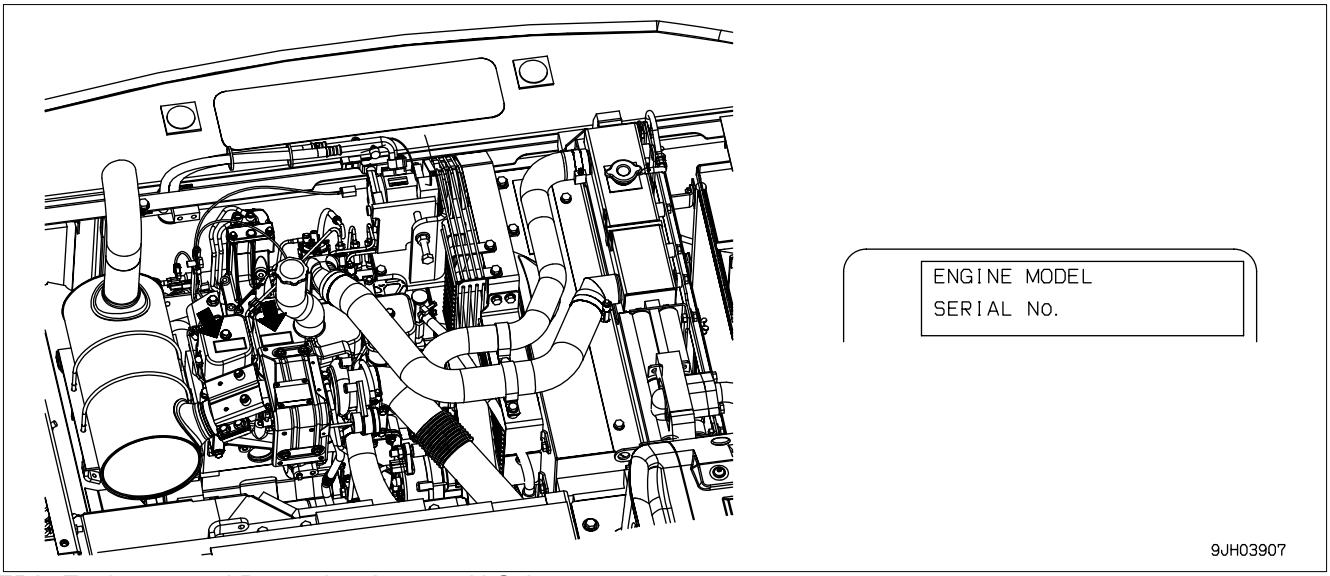
MACHINE SERIAL NUMBER PLATE AND ITS LOCATION

On the bottom right of the operator's cab



ENGINE SERIAL NUMBER PLATE AND ITS LOCATION

On top of the No. 3 (or No. 4) cylinder head cover.
(The EPA supplementary plate is on top of the No. 1 cylinder head cover.)



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

SERVICE METER LOCATION

On top of the machine monitor

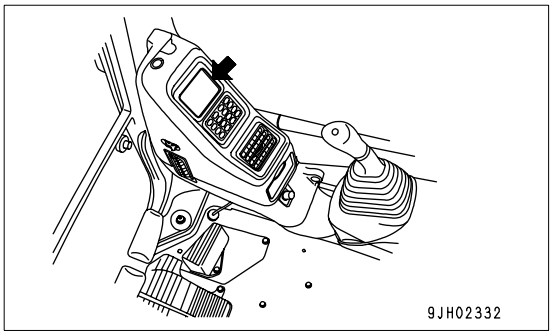
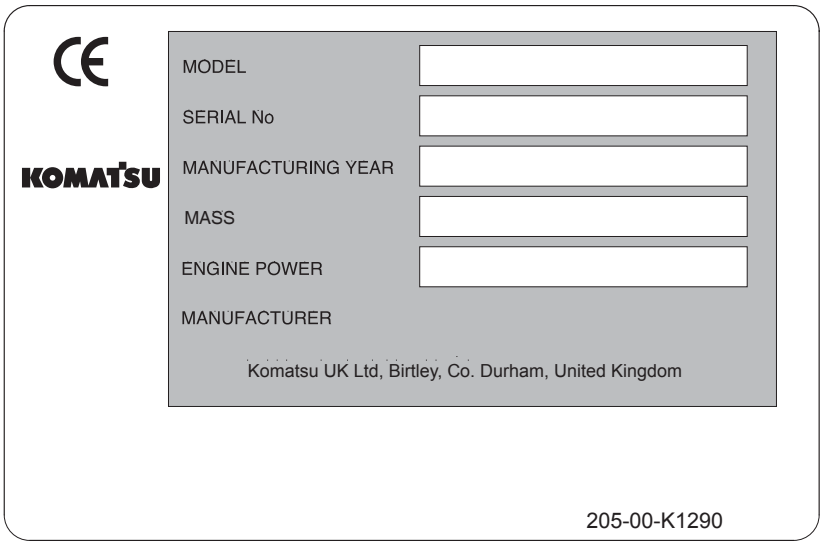


TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

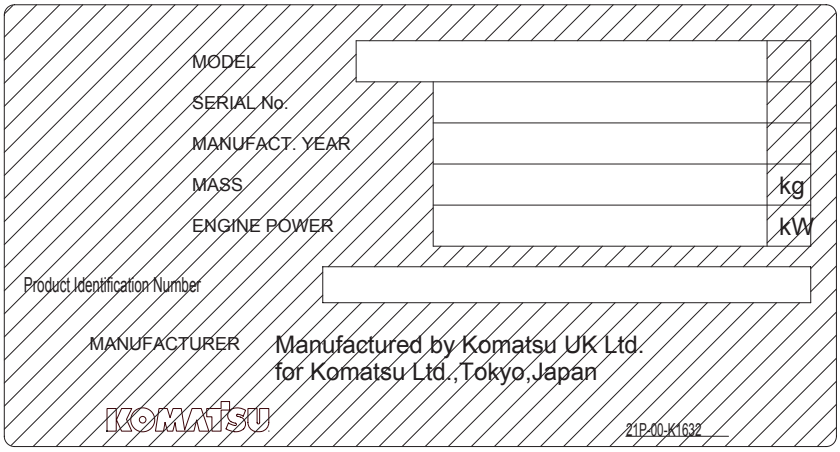
Machine serial No.	
Engine serial No.	
Product Identification Number	
Manufacturers name:	KOMATSU UK Ltd.
Address:	Durham Road Birtley Chester-Le street County Durham DH32QX United Kingdom
Distributor Address	
Phone	

MACHINE SERIAL PLATE

Valid until 31 December 2003



Valid as of 1 January 2004



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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.

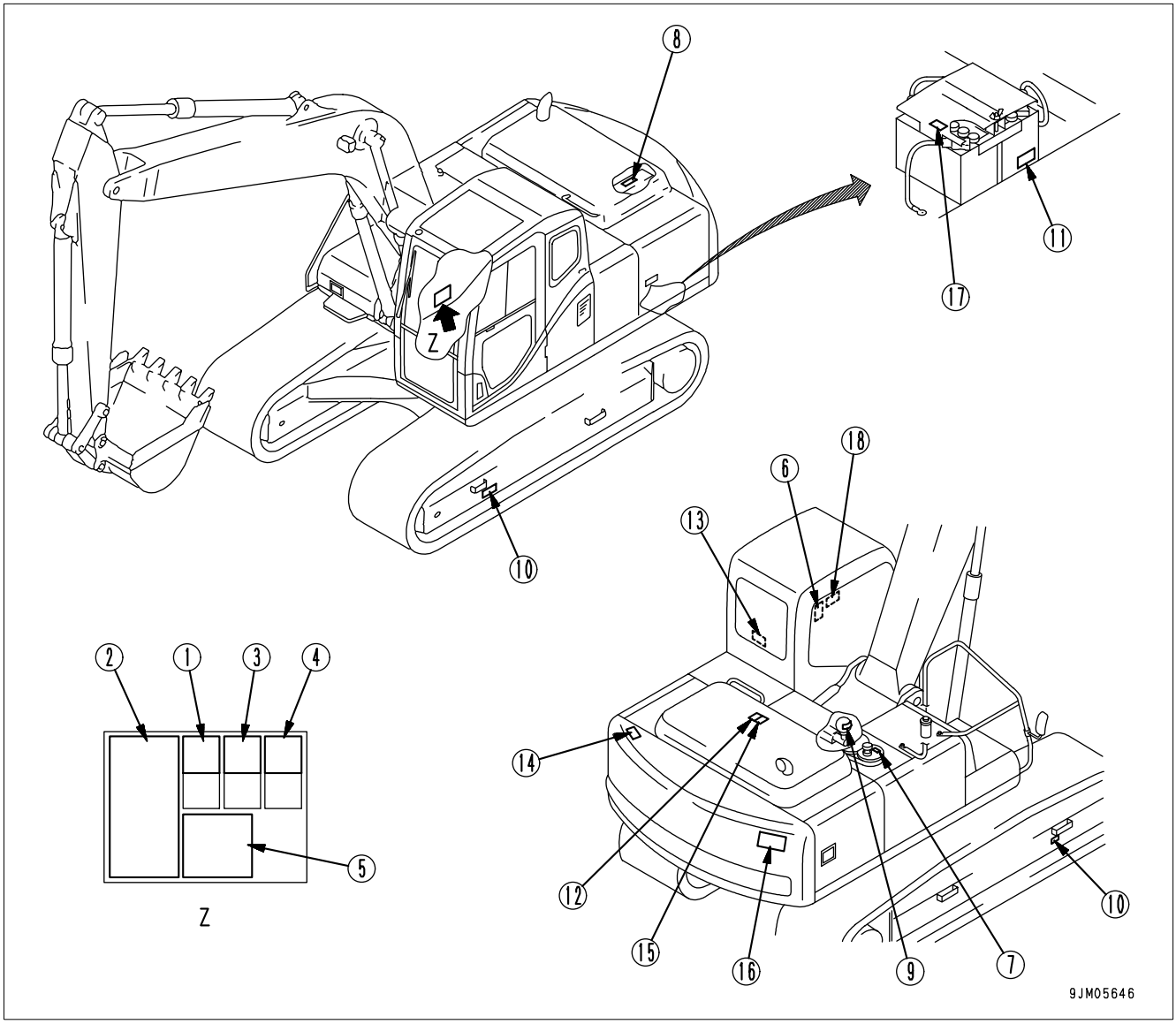
SAFETY INFORMATION

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.

LOCATION OF SAFETY LABELS

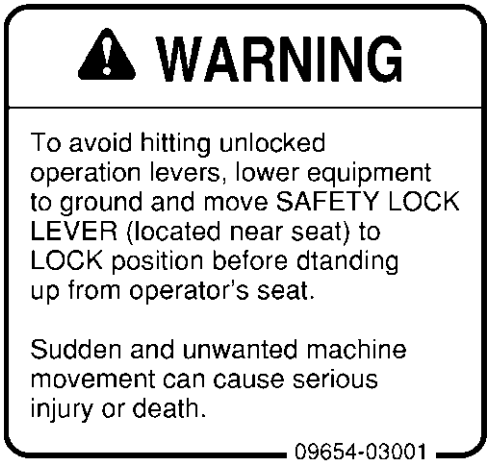


SAFETY LABELS

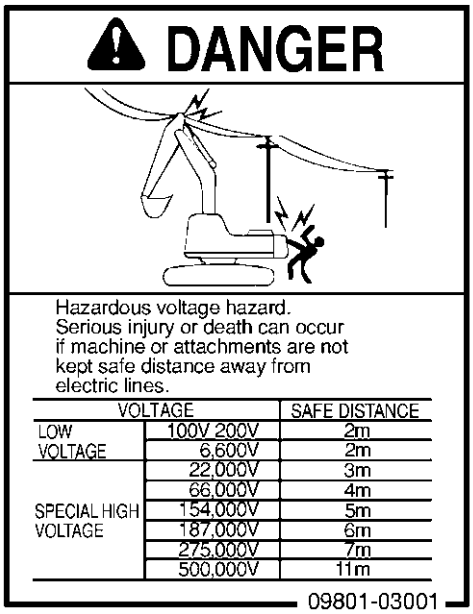
(1) Precautions for operation, inspection and maintenance (09651-03001)

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

(3) Warning for leaving operator's seat (09654-03001)



(4) Warnings for high voltage (09801-03001)



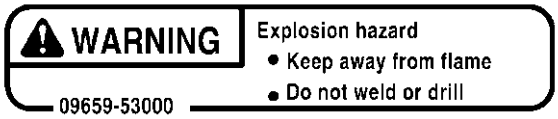
(5) Warnings when opening front window (09839-03000)

(6) Warnings when stowing front window (09803-03000)

(7) Precautions for high-temperature oil (09653-03001)

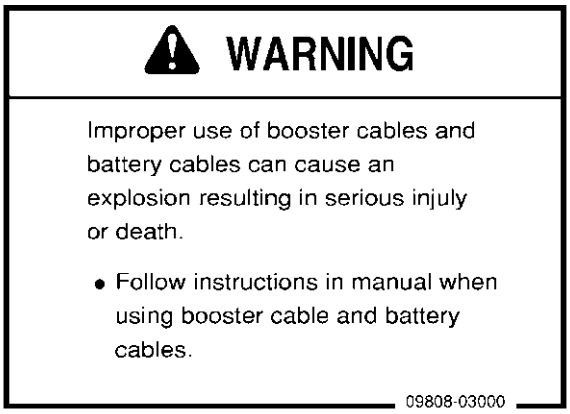
(8) Precautions for high-temperature coolant (09668-03001)

(9) Precautions when handling accumulator (09659-53000)



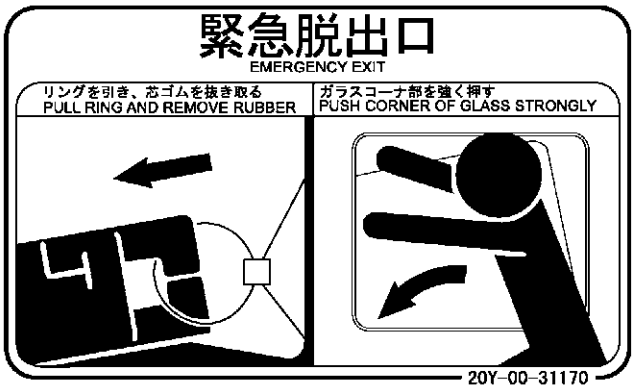
(10) Precautions when adjusting track tension (09657-03003)

(11) Precautions when handling cable (09808-03000)



(12) Stop rotation when performing testing and adjusting (09667-03001)

(13) Explanation of methods for emergency escape (20Y-00-31170)

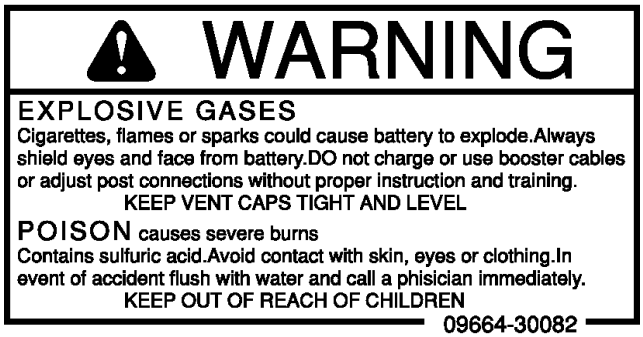


(14) Roll-over precautions (09805-23000)

(15) Roll-over precautions (09805-13000)

(16) Prohibited to enter within swing range (09133-23000)

(17)Precautions for broken or becomes dislodged to the window (09664-30082)



SAFETY INFORMATION

SAFETY RULES

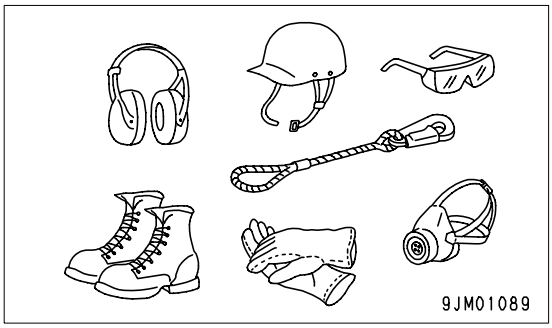
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine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

IF ABNORMALITIES ARE FOUND

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

WORKING WEAR AND PERSONAL PROTECTIVE ITEMS

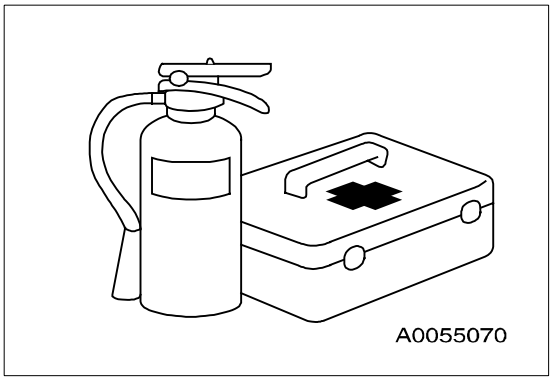
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get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



FIRE EXTINGUISHER AND FIRST AID KIT

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

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

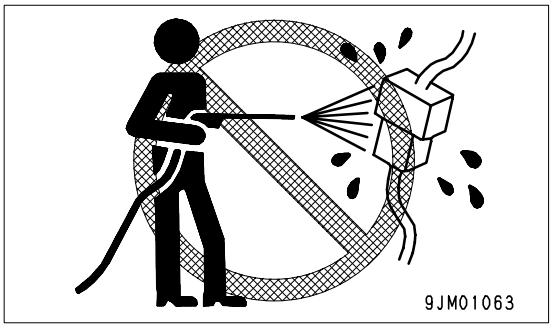


SAFETY EQUIPMENT

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

KEEP MACHINE CLEAN

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

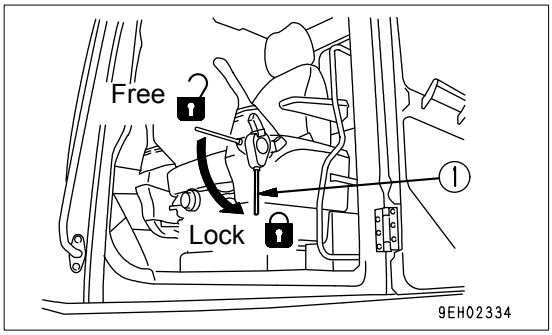


KEEP OPERATOR'S COMPARTMENT CLEAN

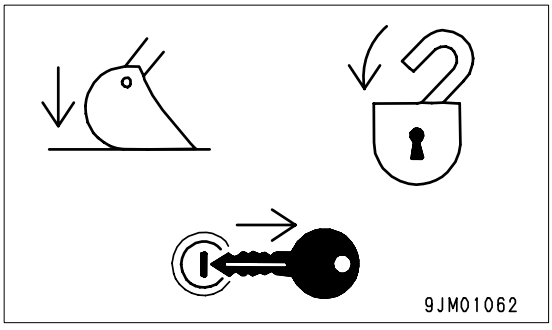
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do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

LEAVING OPERATOR'S SEAT WITH LOCK

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



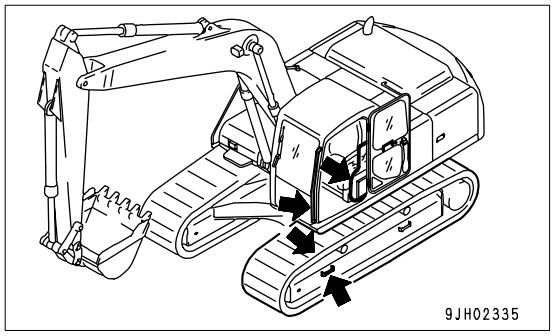
- When leaving the machine, always lower the work equipment completely to the ground, set safety lock lever (1) securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.

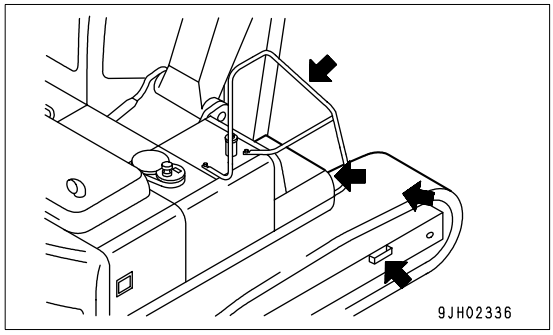


HANDRAILS AND STEPS

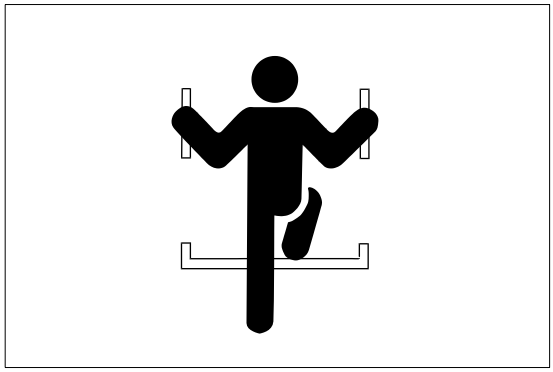
To prevent personal injury caused by slipping or falling off the machine, always do as follows.

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





- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Do not grip the control levers when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.



- Do not get on or off the machine while holding tools in your hand.

MOUNTING AND DISMOUNTING

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

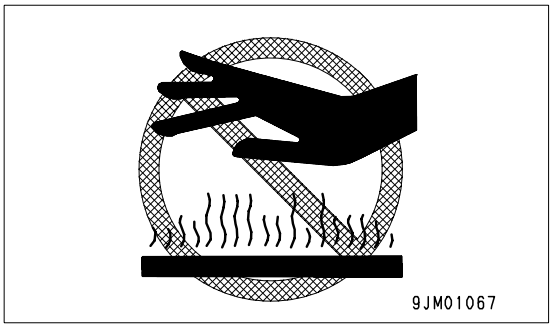
NO PERSONS ON ATTACHMENTS

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

BURN PREVENTION

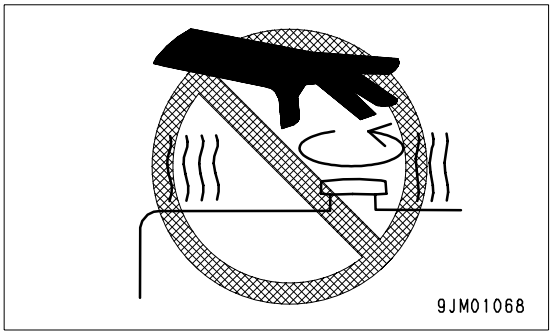
Hot coolant

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



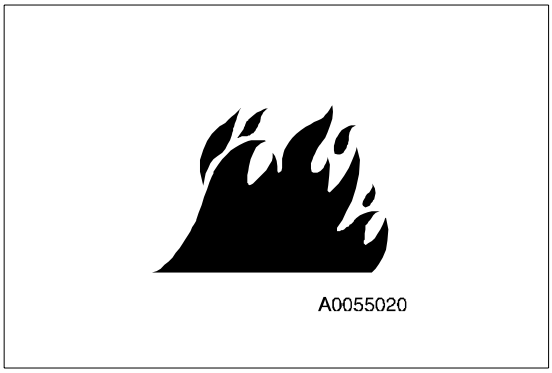
Hot oil

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



FIRE PREVENTION AND EXPLOSION PREVENTION

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



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

- **Fire coming from electric wiring**
  Short circuits in the electrical system can cause fire.
  - Always keep electric wiring connections clean and securely tightened.
  - Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.

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

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

ACTION IF FIRE OCCURS

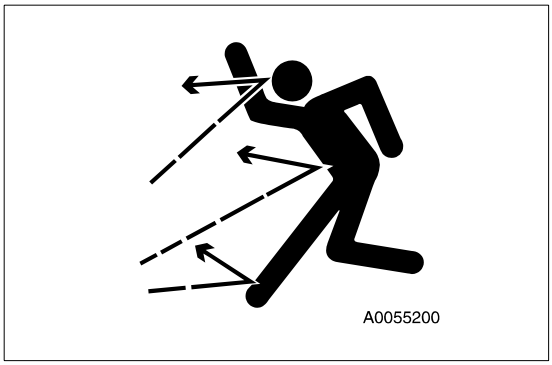
If a fire occurs, escape from the machine as follows.
- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.

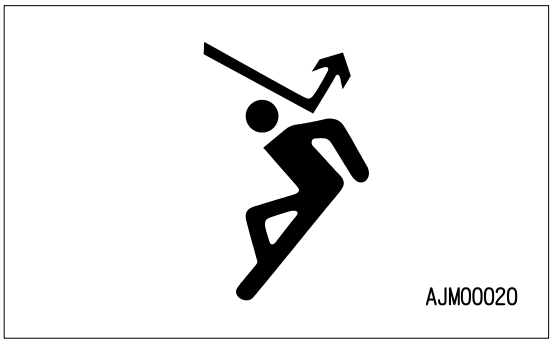
WINDSHIELD WASHER FLUID

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

FALLING OBJECTS, FLYING OBJECTS AND INTRUDING OBJECTS PREVENTION

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





ATTACHMENT INSTALLATION

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

ATTACHMENT COMBINATIONS

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

CAB WINDOW GLASSES

- If the cab glass on the work equipment side is broken, there is a hazard that the work equipment may contact the operator's body directly. Stop operation immediately and replace the glass.
- The ceiling window is made of organic glass (poly carbonate), and as such it is apt to break easily when receiving damage on the surface, thereby deteriorating its protective characteristic. If there is a crack or damage caused by a fallen rock, or when any sign of them is noticed, replace it with a new window.

UNAUTHORIZED MODIFICATIONS

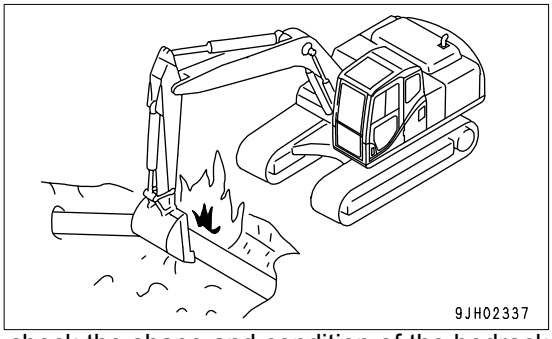
Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

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

SAFETY AT JOBSITE

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

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take 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.

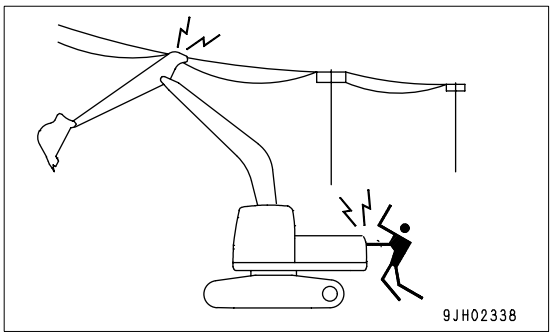
WORKING ON LOOSE GROUND

- 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.

DISTANCE TO HIGH VOLTAGE CABLES

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

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.



- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.

Voltage of Cables	Safety Distance
100 V - 200 V	Over 2 m (6.5ft)
6,600 V	Over 2 m (6.5ft)
22,000 V	Over 3 m (9.8ft)
66,000 V	Over 4 m (13.1ft)
154,000 V	Over 5 m (16.4ft)
187,000 V	Over 6 m (19.7ft)
275,000 V	Over 7 m (23ft)
500,000 V	Over 11 m (36ft)

- 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.

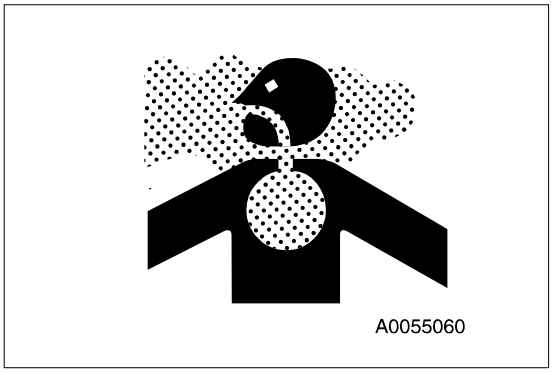
ENSURE GOOD VISIBILITY

- 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 AREA

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.



SIGNALMAN'S SIGNAL AND SIGNS

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

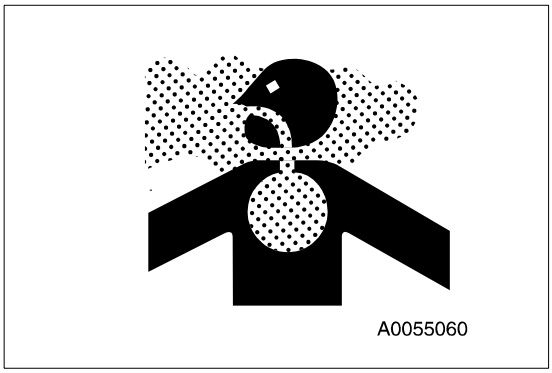
EMERGENCY EXIT FROM OPERATOR'S CAB

If for some reason, the cab door does not open, use the rear window as an emergency escape. For details, see Section “EMERGENCY EXIT FROM OPERATOR'S CAB (3-39)“ in this manual.

ASBESTOS DUST HAZARD PREVENTION

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

- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position. All workers should use an approved respirator.



- Do not allow other persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

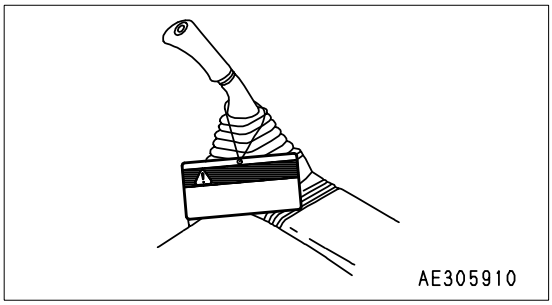
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.

SAFETY MACHINE OPERATION

STARTING ENGINE

If there is a warning tag hanging from the work equipment control lever, do not start the engine or touch the levers (1).

DANGER - Do NOT operate
When this tag is not being used, keep it in the storage compartment.



CHECKS BEFORE STARTING ENGINE

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

- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the front lamps and working lamps, and check that they light up correctly.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Before starting the engine, make sure that the safety lock lever is in the LOCK position.
- Adjust the mirrors so that the rear of the machine can be seen clearly from the operator's seat.
  When adjusting, see “Rear view Mirrors (3-72)“.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

SAFETY RULES FOR STARTING ENGINE

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

STARTING ENGINE IN COLD WEATHER

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

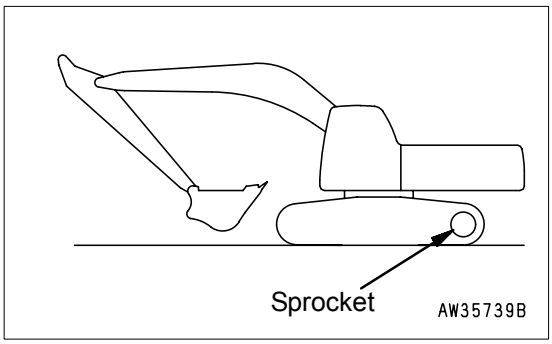
CHECKS BEFORE OPERATION

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

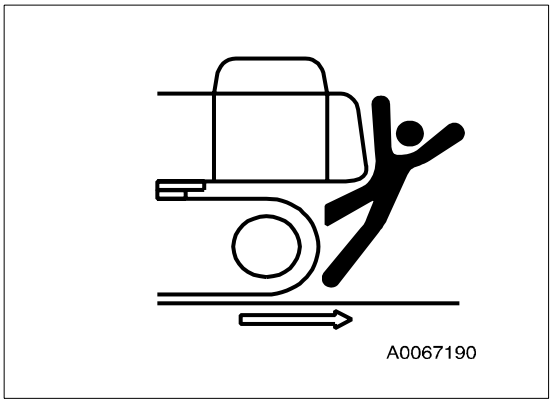
SAFETY RULES FOR CHANGING MACHINE DIRECTIONS

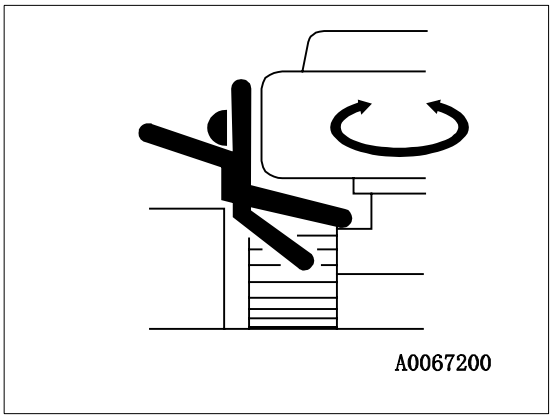
- Before traveling, position the upper structure so that the sprocket is at the rear of the operator's cab. If the sprocket is at the front of the operator's cab, the machine makes a movement reverse to the control lever movement (for example, forward becomes reverse, and left becomes right). Be careful to avoid such a reverse movement of the machine.
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.



- Do not allow anyone apart from the operator to ride on the machine.
- Check that the travel alarm (if equipped) works properly.
- Always lock the door and windows of the operator's compartment in position (open or closed).
  On jobsites where there is a hazard of flying objects or of objects entering the operator's compartment, check that the door and windows are securely closed.
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.

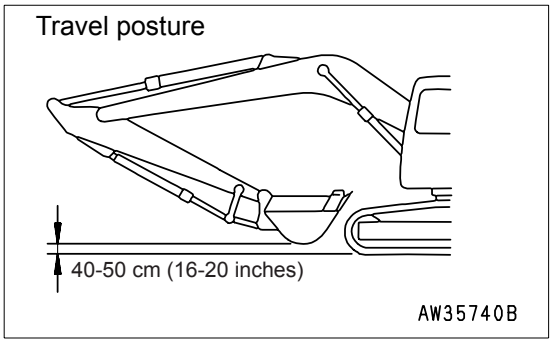
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.



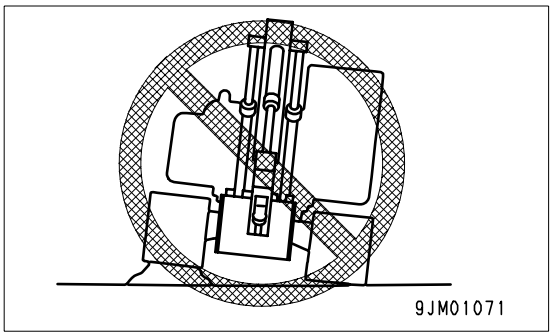


SAFETY RULES FOR TRAVELING

- When using the machine, to prevent the machine from overturning due to overloading and to avoid damage to the work equipment, do not exceed the maximum permitted load or performance of the machine.
- When traveling on flat ground, keep the work equipment 40 to 50 cm (16-20 inches) high above the ground.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
- When traveling on rough ground or steep slopes, if the machine is equipped with auto-deceleration, always turn the auto-deceleration switch OFF (cancel).



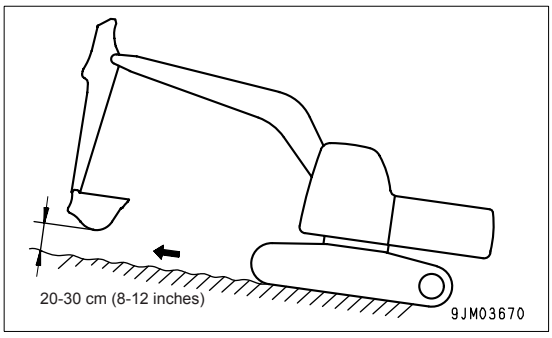
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.

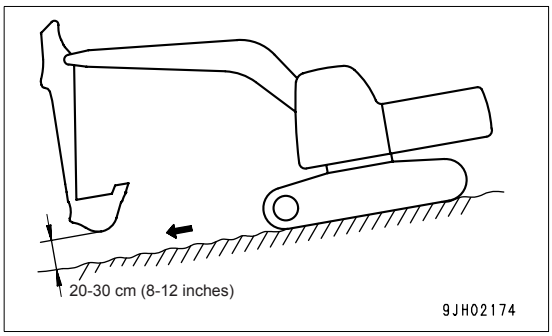


TRAVELING ON SLOPES

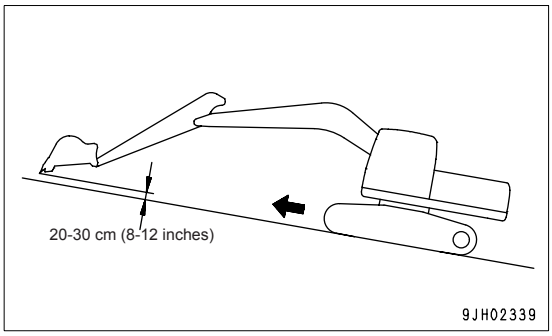
To prevent the machine from tipping over or slipping to the side, always do as follows.

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

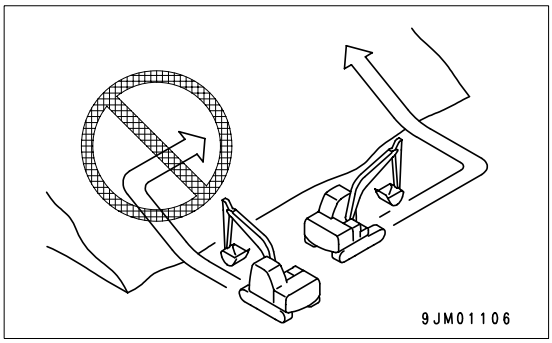




- When traveling up a steep slope, extend the work equipment to the front to improve the balance, keep the work equipment approximately 20 to 30 cm (8-12 inches) above the ground, and travel at low speed.
- When traveling downhill, lower the engine speed, keep the travel lever close to the neutral position,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

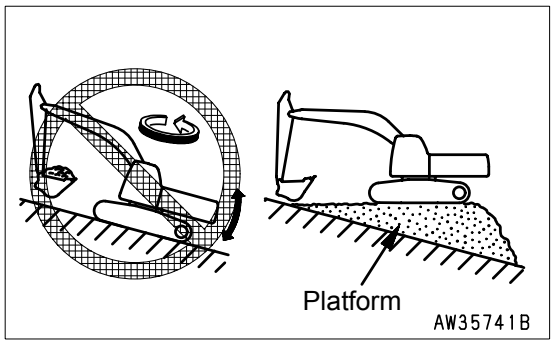


- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- Travel on grass, fallen leaves, or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



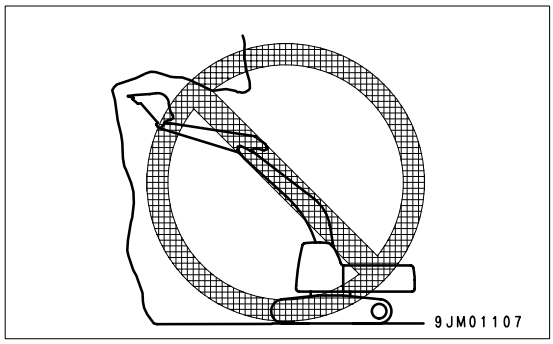
OPERATIONS ON SLOPES

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

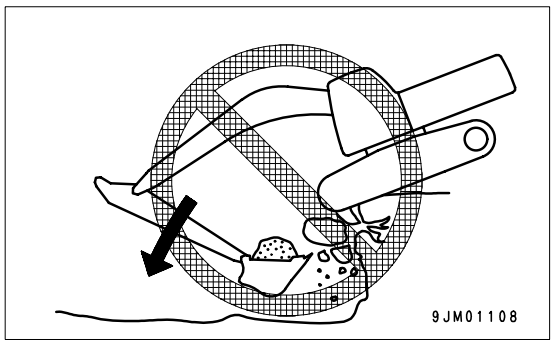


PROHIBITED OPERATIONS

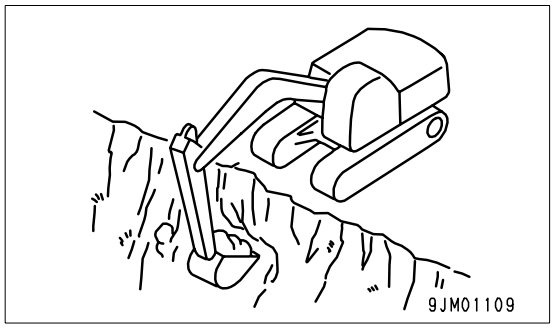
- Never dig the work face under an overhang. There is a hazard that rocks may fall or that the overhang may collapse and fall on top of the machine.



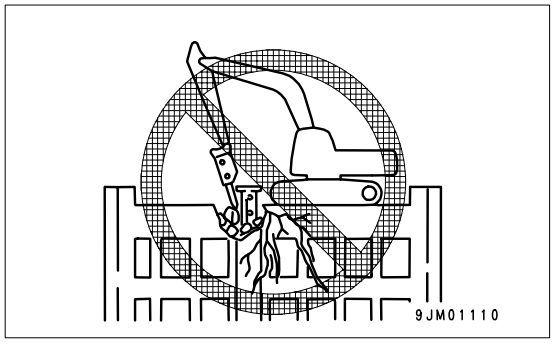
- Do not excavate too deeply under the front of the machine. The ground under the machine may collapse and cause the machine to fall.



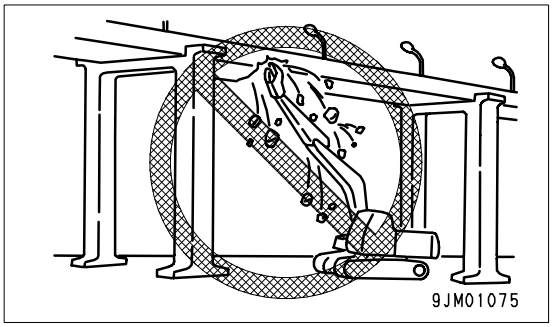
- To make it easier to escape if there is any problem, set the tracks at right angles to the road shoulder or cliff with the sprocket at the rear when carrying out operations.



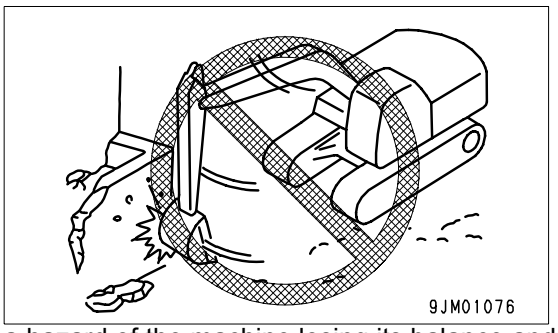
- Do not carry out demolition work under the machine. There is a hazard that the machine may become unstable and tip over.
- When working on or from the top of buildings or other structures, check the strength and the structure before starting operations. There is a hazard of the building collapsing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



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



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



- When using a breaker or other heavy work equipment, there is a hazard of the machine losing its balance and tipping over. When operating on flat ground as well as on slopes.
  - Do not suddenly lower, swing, or stop the work equipment.
  - Do not suddenly extend or retract the boom cylinder. There is a hazard that impact will cause the machine to tip over.

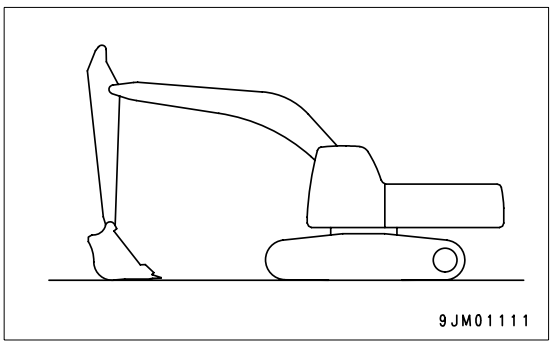
- Do not pass the bucket over the head of other workers or over the operator's seat of dump trucks or other hauling equipment. The load may spill or the bucket may hit the dump truck and cause serious injury or property damage.

OPERATIONS ON SNOW

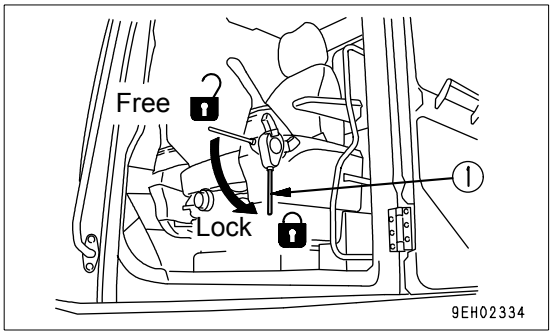
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes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

PARKING MACHINE

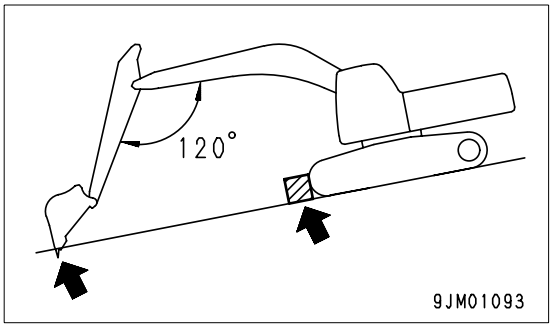
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



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



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



TRANSPORTATION

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

SHIPPING THE MACHINE

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

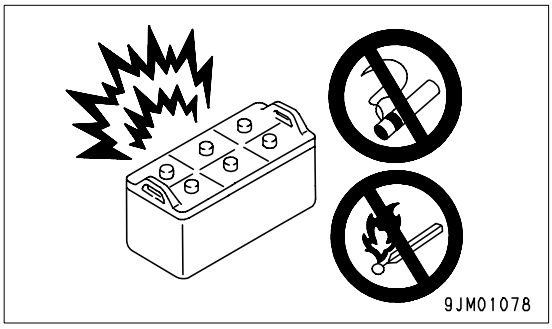
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the procedure when transporting the machine, see TRANSPORTATION (3-110).

BATTERY

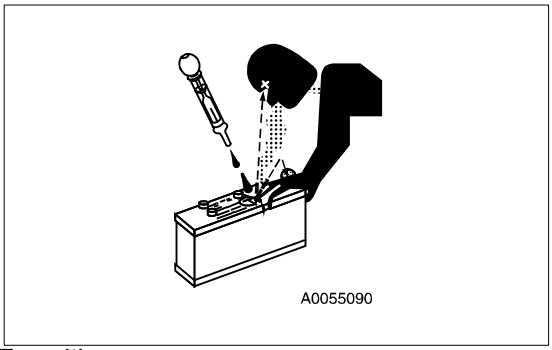
BATTERY HAZARD PREVENTION

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.



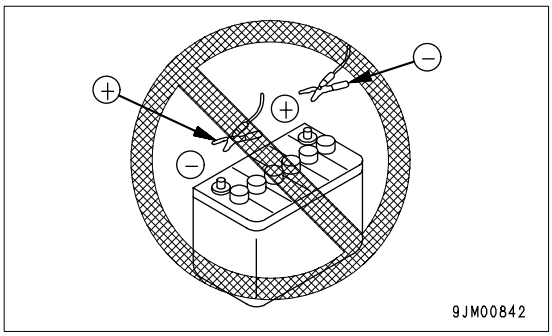
- Before working with batteries, turn the starting switch to the OFF position.

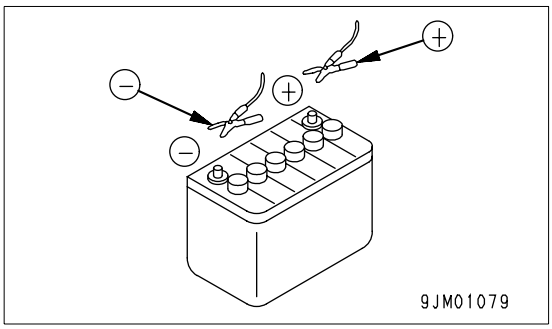
As there is a hazard that sparks will be generated, always do as follows.

- 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 ENGINE WITH BOOSTER CABLES

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





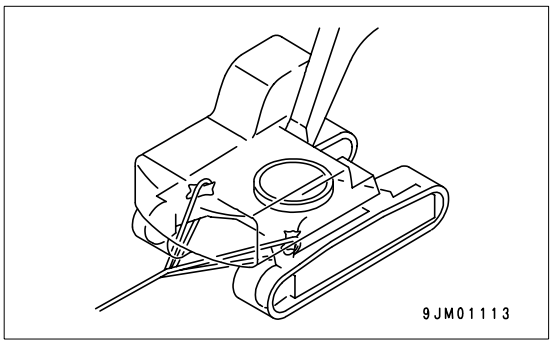
- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see “Starting Engine With Booster Cables (3-125)“ in the OPERATION section.

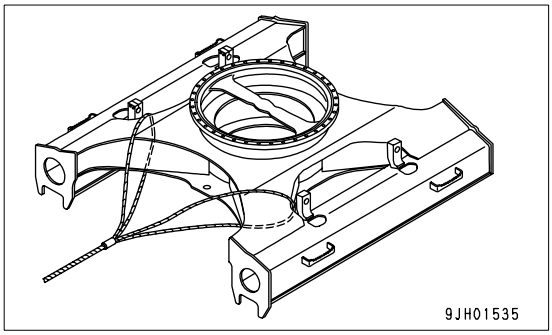
TOWING

SAFETY RULES FOR TOWING

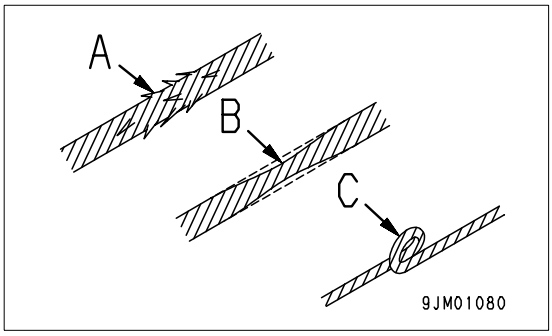
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.
For towing, see “TOWING THE MACHINE (3-123)“.

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





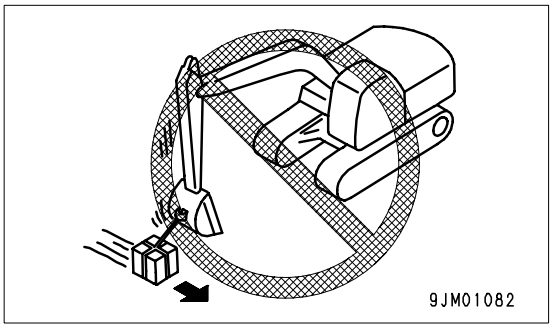
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.

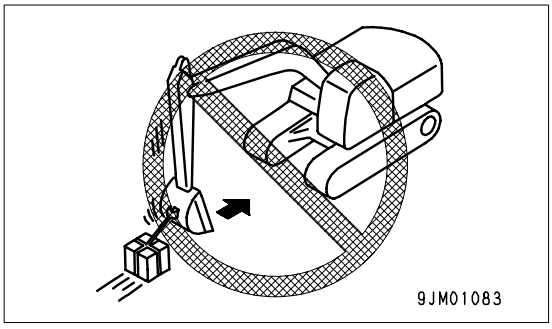


LIFTING OBJECTS WITH BUCKET

SAFETY RULES FOR LIFTING OBJECTS

- Do not carry out lifting work on slopes, soft ground, or other places where the machine is not stable.
- Use wire rope that conforms to the specified standard.
- Always observe the specified lifting load strictly.
- It is dangerous if the load hits any worker or structure. Always check carefully that the surrounding area is safe before swinging or turning the machine.
- Do not start, swing, or stop the machine suddenly. There is a hazard that the lifted load will swing.
- Do not pull the load to the side or in towards the machine.
- Do not leave the operator's seat when there is a raised load.





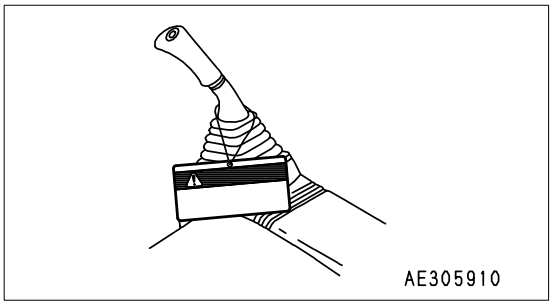
SAFETY MAINTENANCE INFORMATION

WARNING TAG

- Always attach the “DO NOT OPERATE“ warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine.
  Attach additional warning tags around the machine if necessary.
  Warning tag Part No. 09963-03000

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

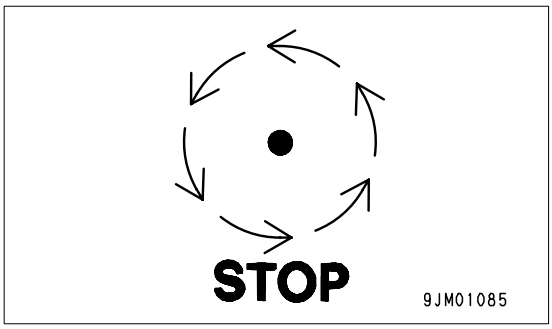
- Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean and tidy to enable you to carry out operations safely.
  If the work place is not kept clean and tidy, there is the danger that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

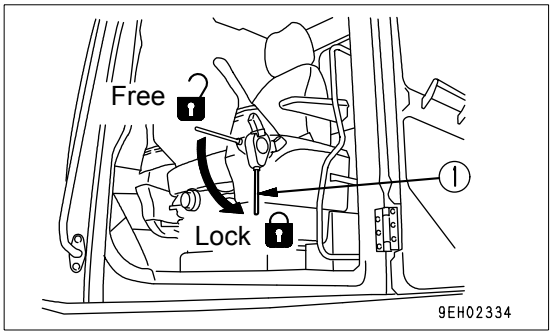
APPOINT LEADER WHEN WORKING WITH OTHERS

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

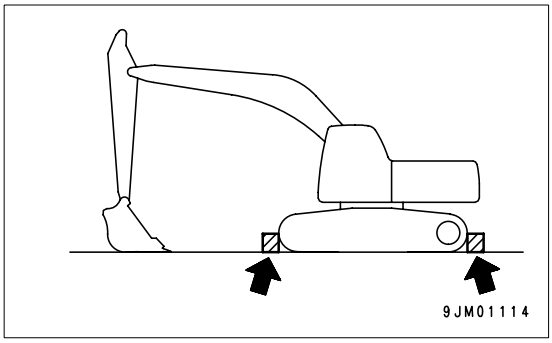
STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

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





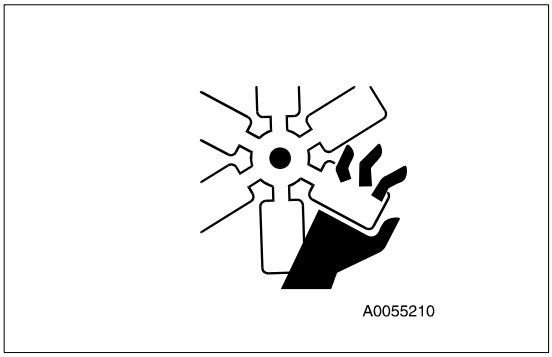
- Put blocks under the track to prevent the machine from moving.



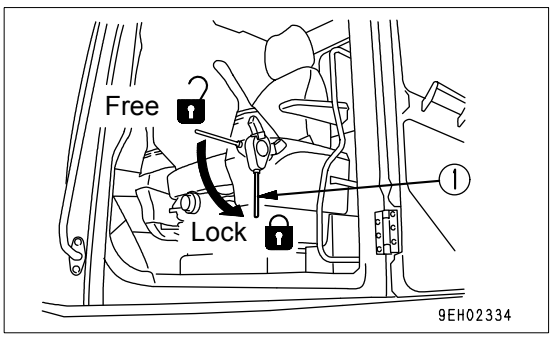
TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

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

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.



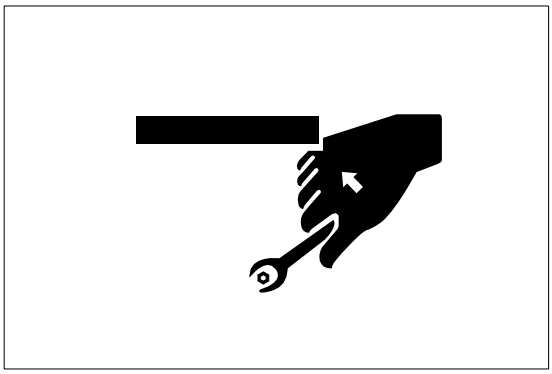
- Set safety lock lever (1) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Do not touch any control levers. If any control lever must be operated, give a signal to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

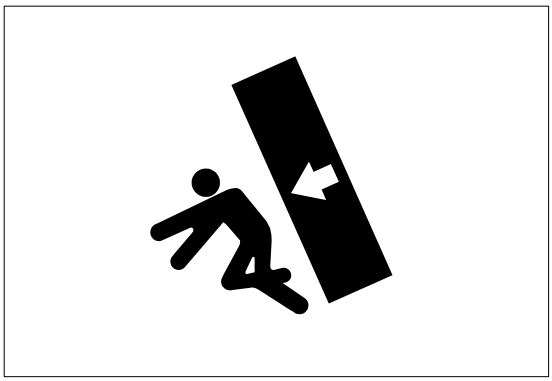
- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your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

PERSONNEL

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

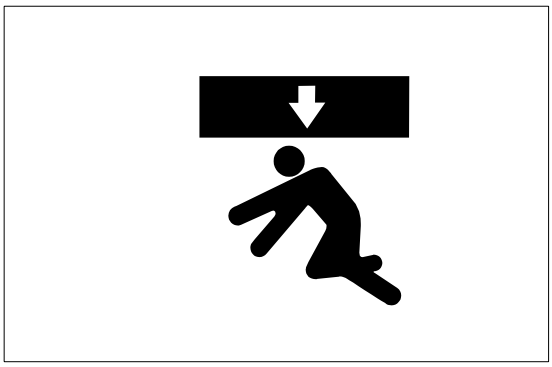
ATTACHMENTS

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



WORK UNDER THE MACHINE

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are 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.



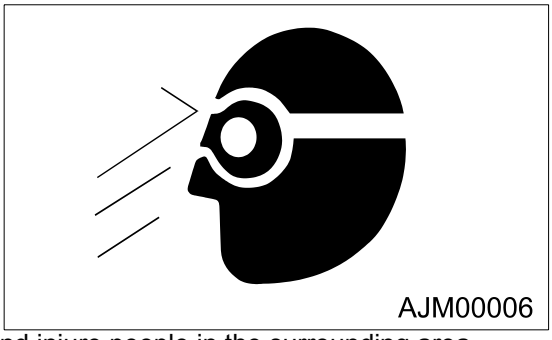
NOISE

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

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.

WELDING WORKS

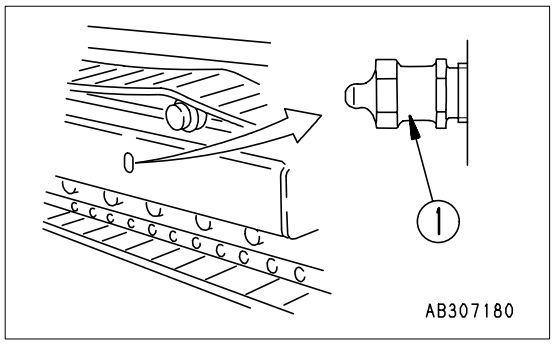
Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

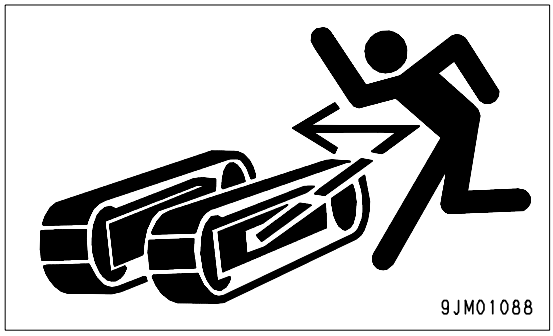
REMOVING BATTERY TERMINALS

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

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

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





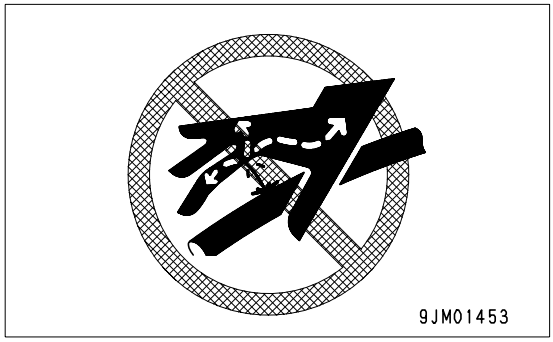
DO NOT DISASSEMBLE RECOIL SPRINGS

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.

SAFETY RULES FOR HIGH-PRESSURE OIL

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

- For details of the method of releasing the pressure, see “METHOD FOR RELEASING INTERNAL PRESSURE IN HYDRAULIC CIRCUIT (4-38)“. If the circuit is still under pressure, do not carry out any inspection or replacement operation.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.
  When carry out inspection, wear safety glasses and leather gloves.
- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.



SAFETY HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury. 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.

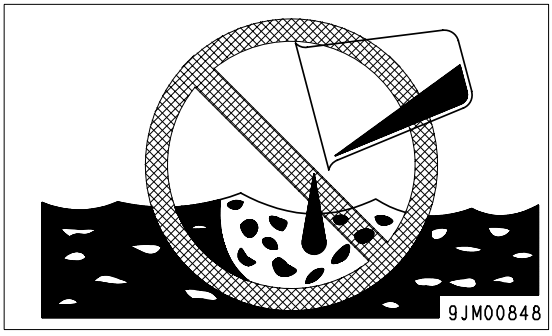
Replace the hose if any of the following problems are found.

- 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 MATERIALS

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

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



AIR CONDITIONER MAINTENANCE

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

- For using the machine safely for an extended period of time, replace safety-critical parts like hoses and seat belts periodically.

Replacement of safety-critical parts: See “SAFETY CRITICAL PARTS (4-14)“.

- 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.

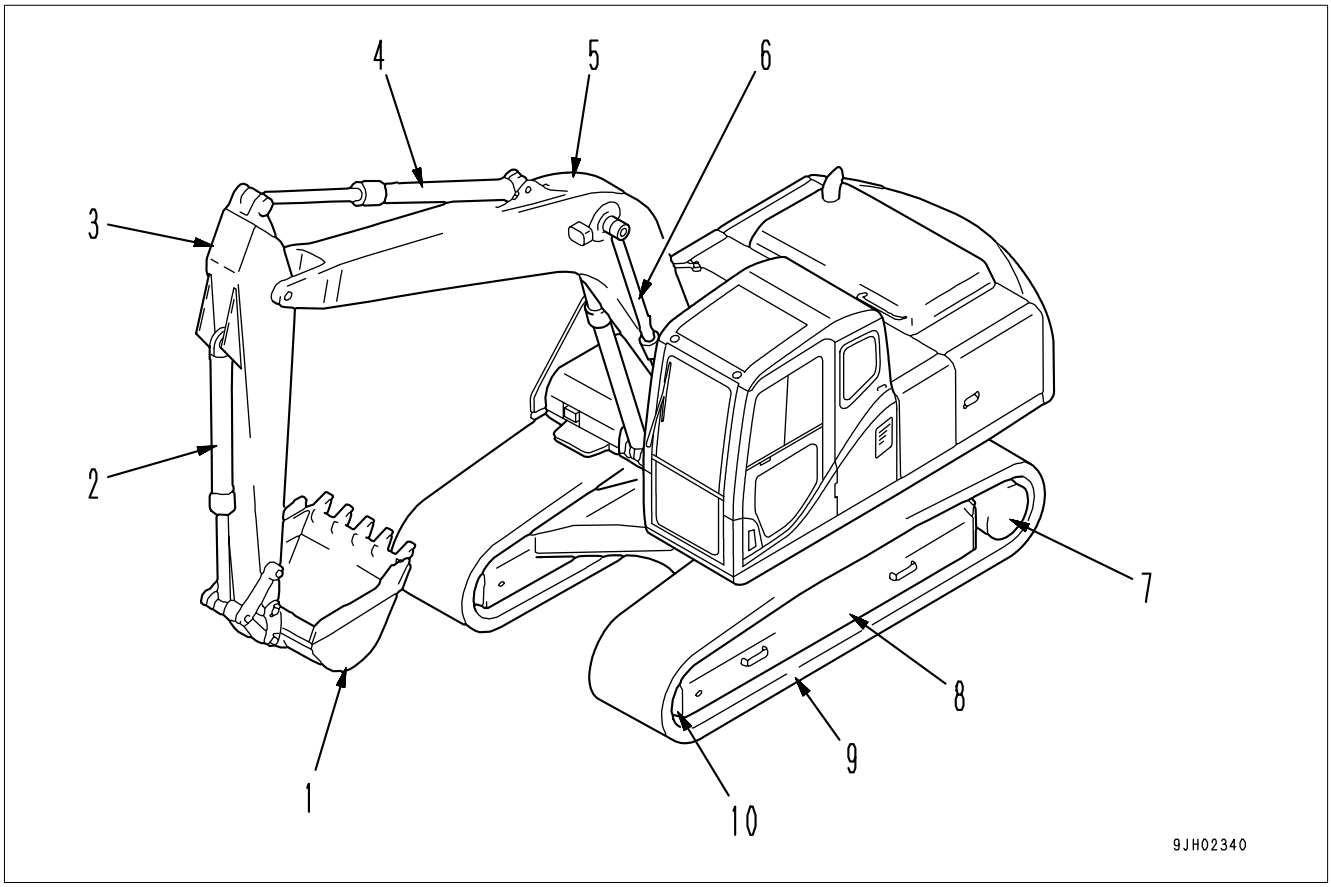
OPERATION

⚠ WARNING

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

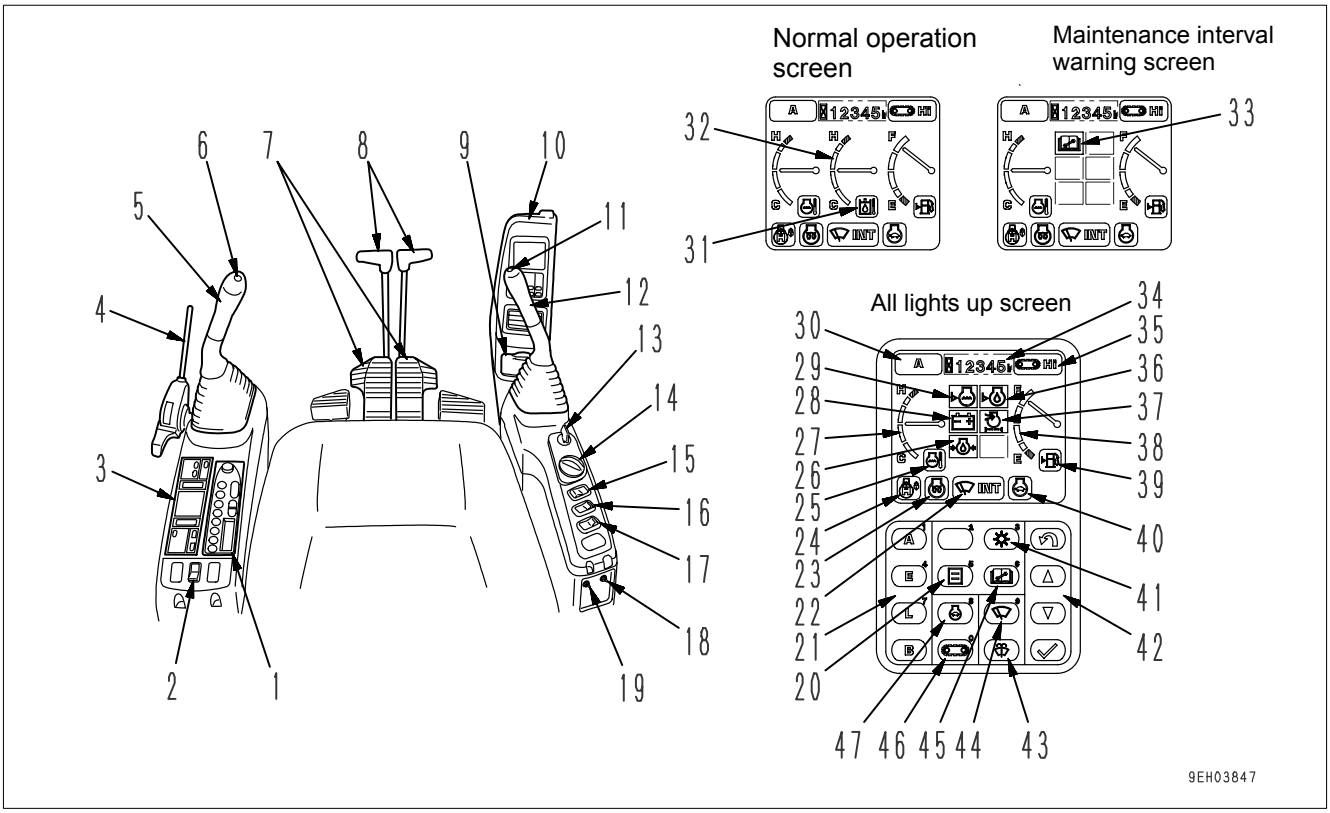
MACHINE VIEW ILLUSTRATIONS

OVERALL MACHINE VIEW



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

CONTROLS AND GAUGES

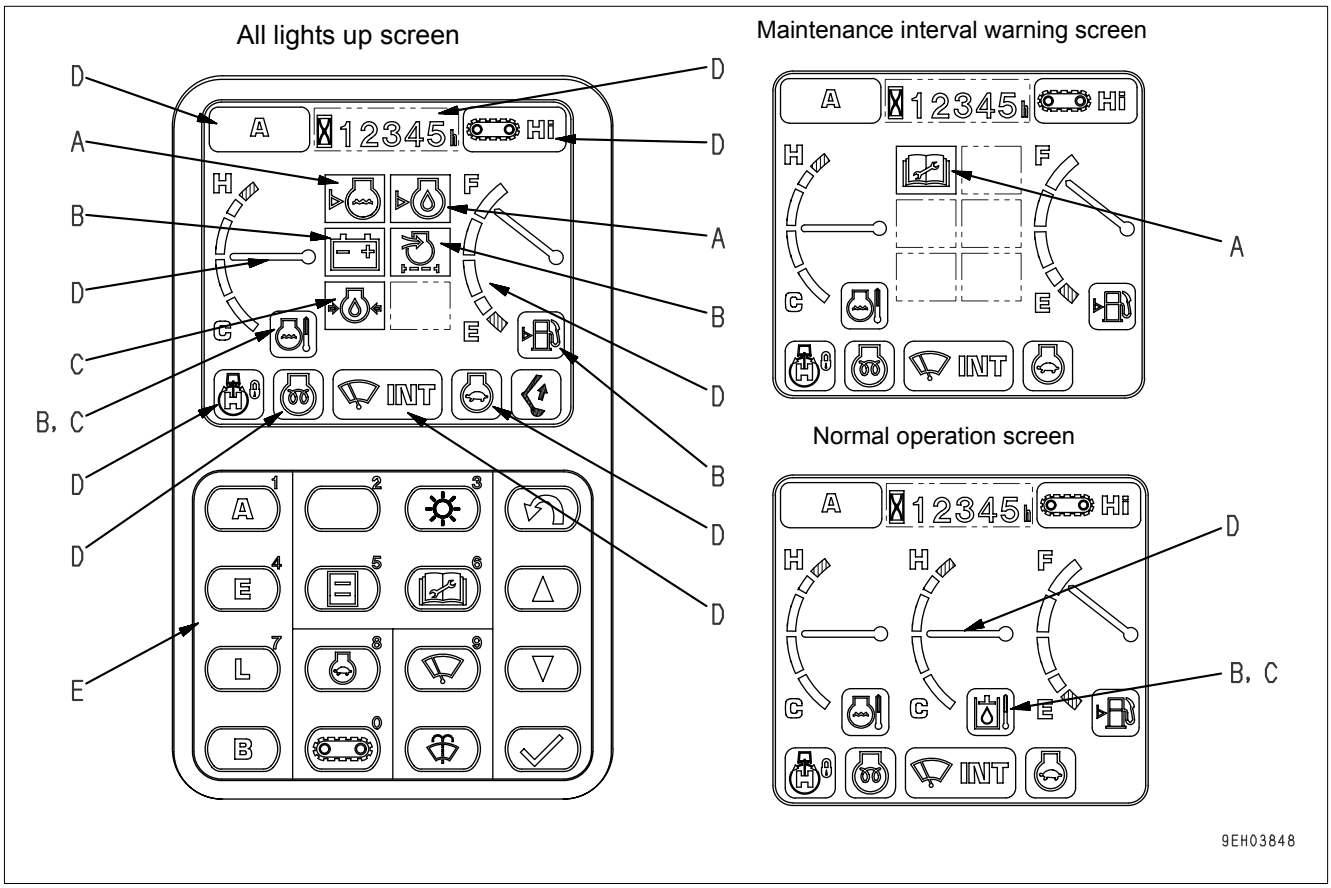


(1) Car radio
(2) Revolving warning lamp (if equipped)
(3) Airconditioner control panel
(4) Safety lock levers
(5) Left work equipment control lever
(6) Knob switch
(7) Travel pedal
(8) Travel levers
(9) Cigarette lighter
(10) Machine monitor
(11) Horn switch
(12) Right work equipment control lever
(13) Starting switch
(14) Fuel control dial
(15) Lamp switch
(16) Alarm buzzer stop switch
(17) Swing lock switch
(18) Swing brake cancel switch
(19) Emergency pump drive switch
(20) Select switch
(21) Working mode selector switch
(22) Wiper monitor
(23) Engine pre-heating monitor
(24) Swing lock monitor
(25) Engine coolant temperature monitor
(26) Engine oil pressure monitor
(27) Engine coolant temperature gauge
(28) Charge monitor
(29) Radiator water level monitor
(30) Working mode monitor
(31) Hydraulic oil temperature monitor
(32) Hydraulic oil temperature gauge
(33) Maintenance monitor
(34) Service meter
(35) Travel speed monitor
(36) Engine oil level monitor
(37) Air cleaner clogging monitor
(38) Fuel gauge
(39) Fuel level monitor
(40) Auto-deceleration monitor
(41) Display control switch
(42) Input control switch
(43) Window washer switch
(44) Wiper switch
(45) Maintenance switch
(46) Travel speed selector switch
(47) Auto-deceleration switch

DETAILED CONTROLS AND GAUGES

The following is an explanation of the devices needed for operating the machine.
To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

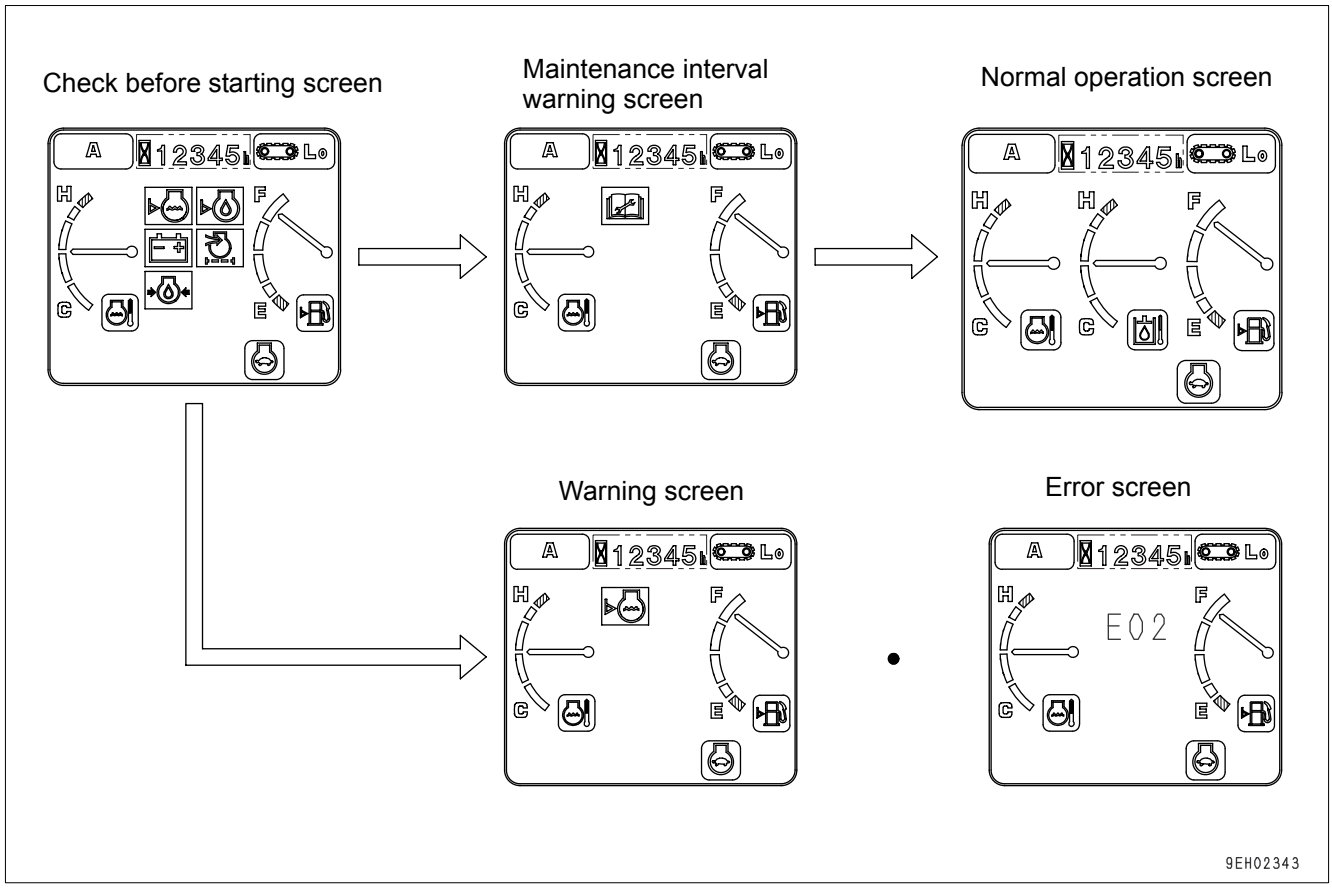
MONITORING SYSTEM



A: Basic check Items	D: Meter Display Portion, Pilot Display Portion
B: Caution Items	E: Monitor Switches
C: Emergency Stop Items	

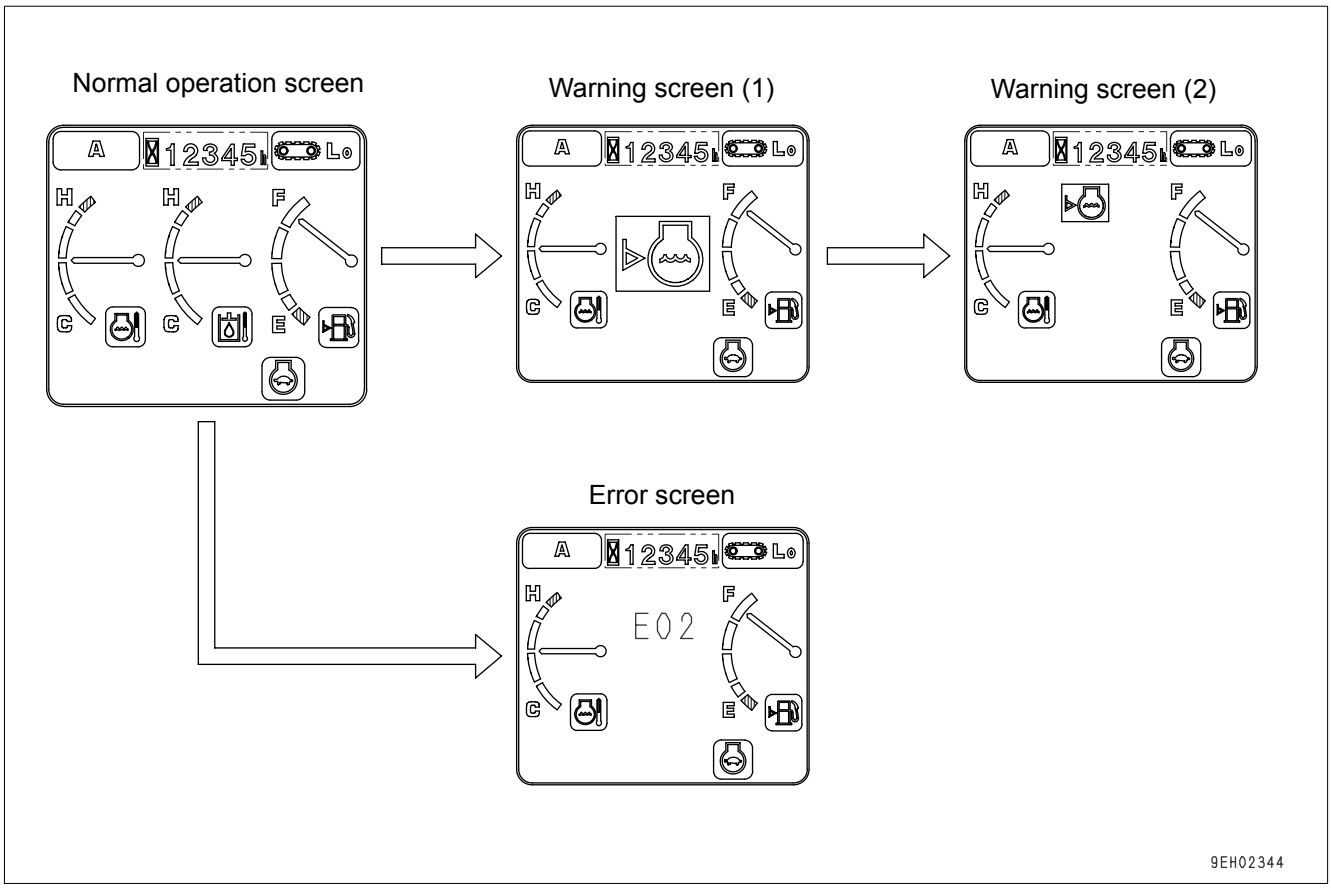
Basic Operation Of Machine Monitor

If There Is Abnormality When Starting engine



- If there is any abnormality when starting the engine, the check before starting screen changes to the maintenance interval warning screen, warning screen, or error screen.
- After displaying the check before starting screen for 2 seconds, the screen changes to the maintenance interval warning screen.
- After displaying the maintenance interval warning screen for 30 seconds, the screen returns to the normal screen.
- After displaying the check before starting screen for 2 seconds, the screen changes to the warning screen or error screen.

If Any Abnormality Occurs During Operation



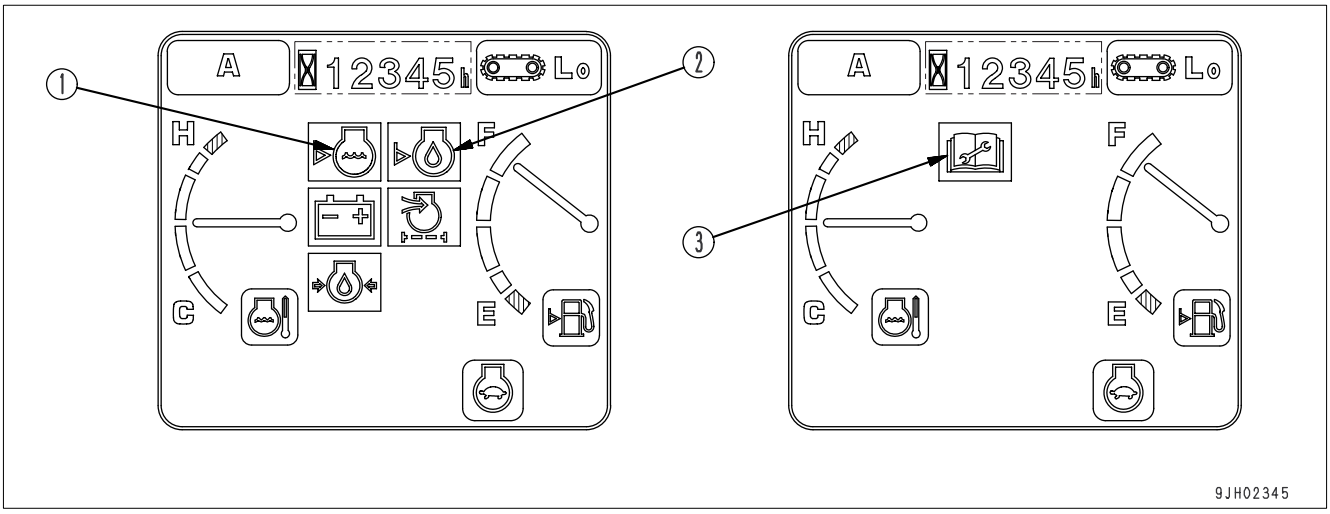
- If any abnormality occurs during operation, the normal operation screen changes to warning screen (1) or the error screen.
- After displaying warning screen (1) for 2 seconds, the screen automatically changes to warning screen (2).

Basic Check Monitors

⚠ CAUTION

These monitors do not ensure that the machine is in good condition. When carrying out checks before starting (daily checks), do not simply rely on the monitors. Always get off the machine and check each item directly.

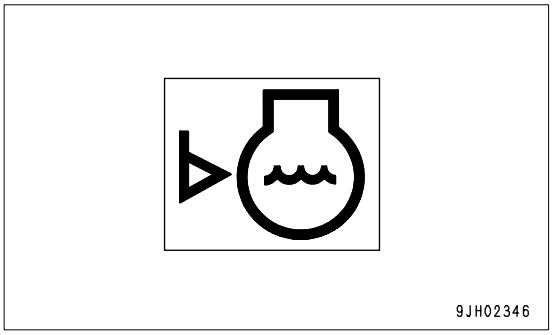
This displays the basic items among the check before starting items that must be checked before starting the engine. If there is any abnormality, the monitor for the location of the abnormality will light up.



(1) Radiator coolant level monitor	(3) Maintenance interval monitor
(2) Engine oil level monitor	

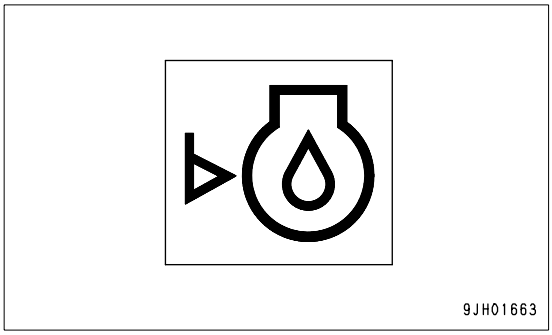
Radiator Coolant Level Monitor

This monitor (1) warns the operator that there has been a drop in the radiator water level.
If the radiator water level is low, the lamp lights up red, so check the water level in the radiator and the sub tank, and add water.



Engine Oil Level Monitor

This monitor (2) warns the operator that there has been a drop in the oil level in the engine oil pan.
If the oil level in the engine oil pan is low, the lamp lights up red, so check the oil level in the engine oil pan, and add oil.

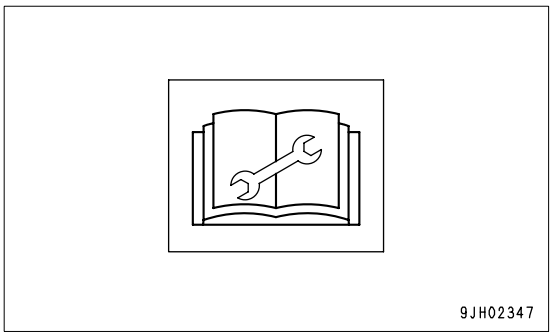


Maintenance interval Monitor

This monitor (3) lights up to warning the operator that the set time has passed since the maintenance was last carried out. This monitor screen goes out after 30 seconds and returns to the normal operation screen.

- For details of the method of checking the maintenance interval, see “Maintenance Switch (3-21)“.

If it is desired to change the setting of the maintenance interval, please consult your Komatsu distributor.

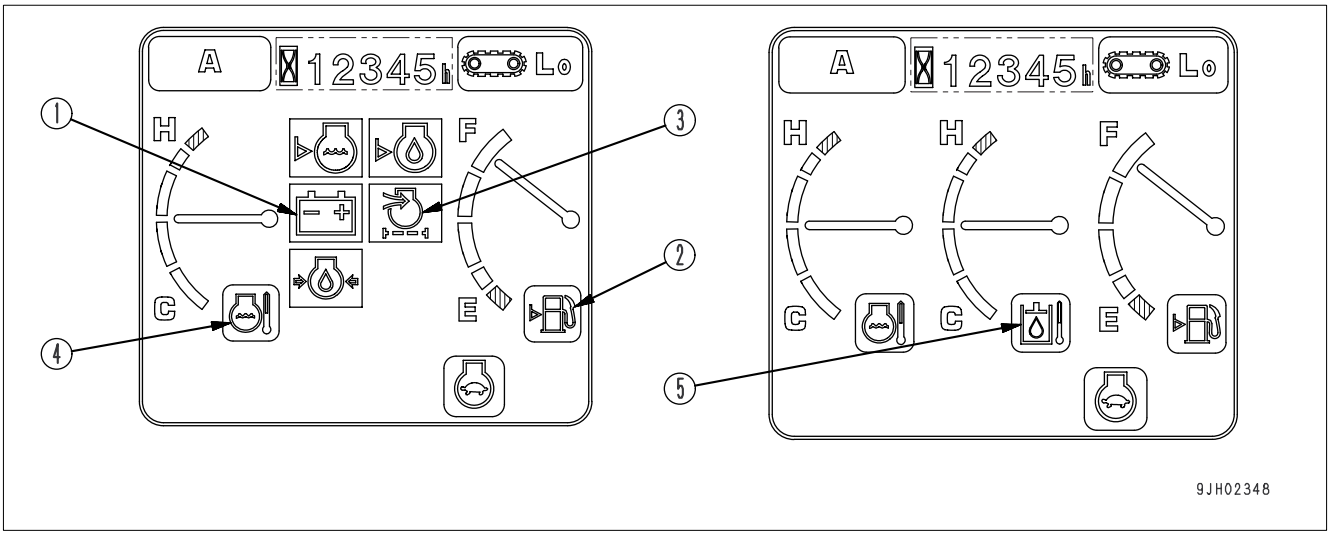


Caution Monitors

⚠ CAUTION

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

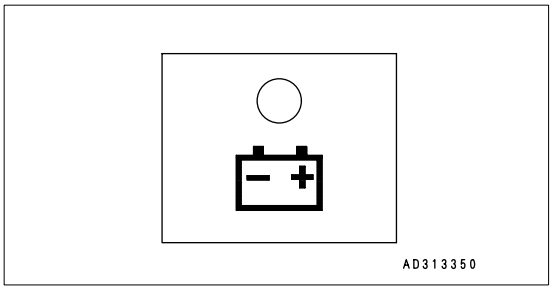
These are items that should be observed while the engine is running. If any abnormality occurs, the screen displays the item that needs immediate action.
If there is an abnormality, the monitor for the abnormal location lights up red.



(1) Charge level monitor	(4) Engine water temperature monitor
(2) Fuel level monitor	(5) Hydraulic oil temperature monitor
(3) Air cleaner clogging monitor	

Charge Level Monitor

This monitor (1) warns the operator that there is an abnormality in the charging system when the engine is running.
If the battery is not being charged properly while the engine is running, it lights up red.
If it lights up red, check for looseness of the V-belt. If any abnormality is found, take the necessary action. For details, see “OTHER TROUBLE (3-127)“

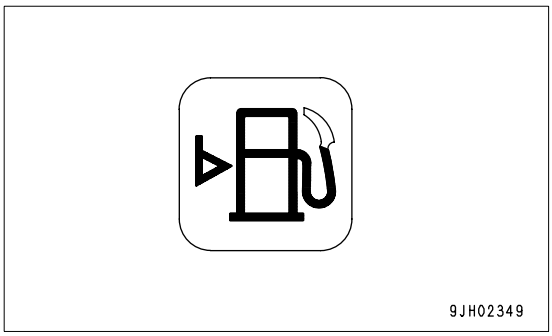


REMARK

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

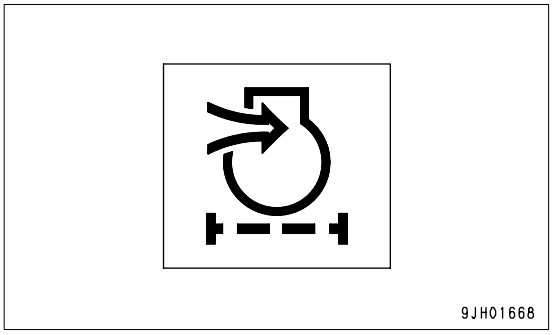
Fuel Level Monitor

This monitor (2) lights up to warn that the operator that the level in the fuel tank is low.
If the remaining amount of fuel goes down to 41 liters (106 US gallons), the light changes from green to red, so add fuel as soon as possible.
If the indicator enters the red range, do not carry out operations on steep slopes. There is danger that the engine will stall.



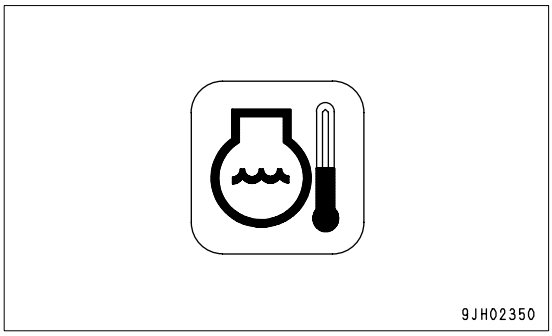
Air Cleaner Clogging Monitor

This monitor (3) warns the operator that the air cleaner is clogged.
If it lights up red, stop the engine and inspect and clean the air cleaner.



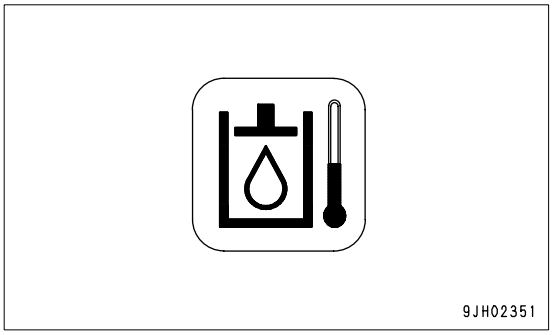
Engine Water Temperature Monitor

If this monitor (4) lights up white in low temperatures, carry out the warming-up operation. For details, see “Warming-Up Operation (3-81)“.
Continue the warming-up operation until monitor (4) changes to green.



Hydraulic Oil Temperature Monitor

If this monitor (5) lights up white in low temperatures, carry out the warming-up operation. For details, see “Warming-Up Operation (3-81)“.
Continue the warming-up operation until monitor (5) changes to green.

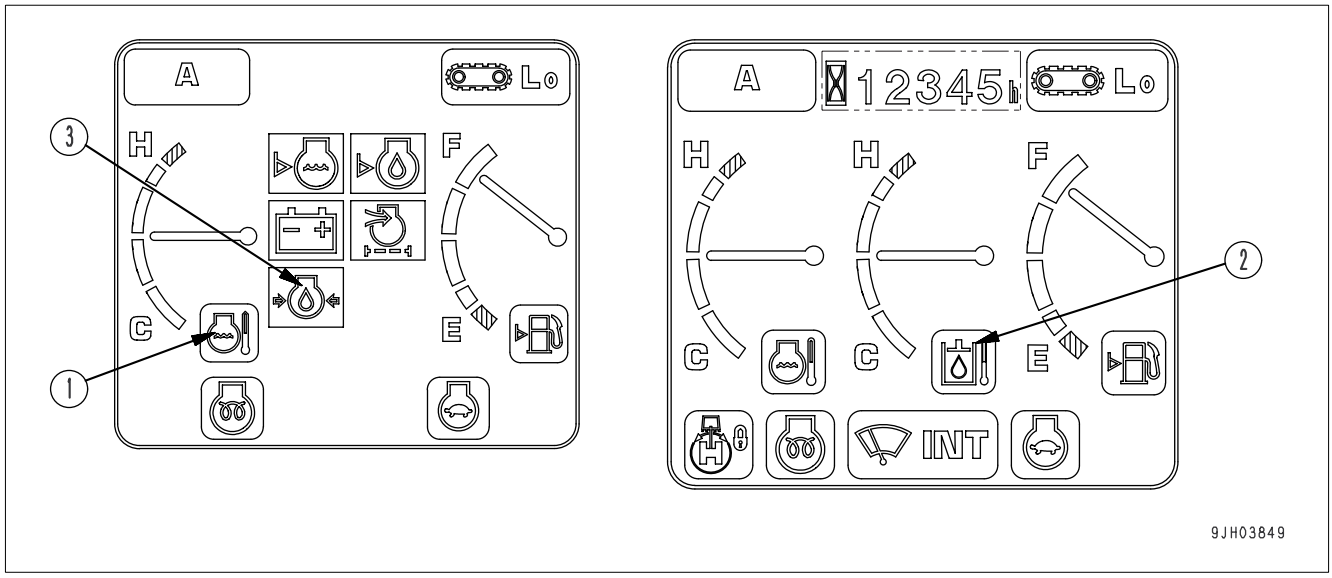


Emergency Monitors

⚠ CAUTION

If the monitor lights up red, stop the engine immediately or run it at low idling, then check the applicable location and carry out the necessary action.

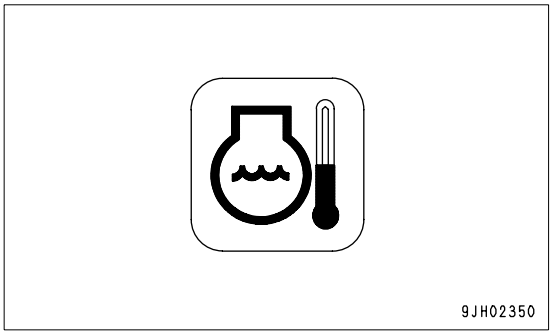
These are items that should be observed while the engine is running. If there is an abnormality, the monitor for the abnormal location lights up red and the buzzer sounds, so carry out action immediately.



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

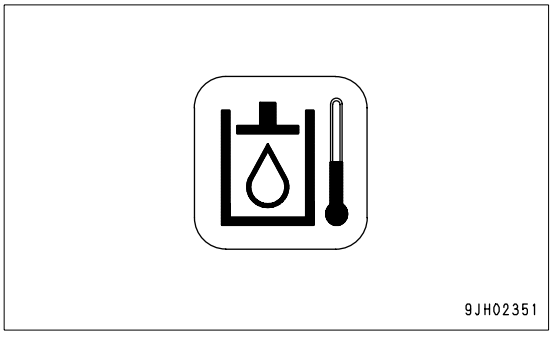
Engine Water Temperature Monitor

This monitor (1) warns the operator that the engine water temperature has risen.
If the engine water temperature becomes abnormally high, the monitor lights up red, the overheat prevention system is automatically actuated, and the engine speed goes down.
Stop operations and run the engine at low idling until monitor (1) changes to green.



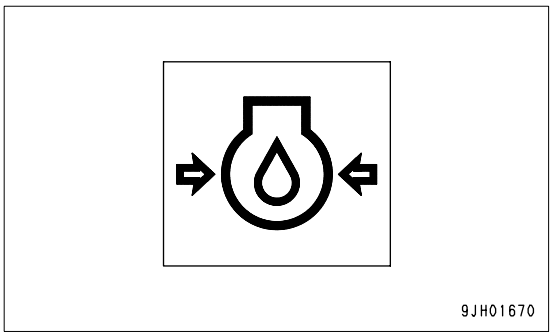
Hydraulic Oil Temperature Monitor

This monitor (2) warns the operator that the hydraulic oil temperature has risen. If it lights up red during operations, run the engine at low idling or stop the engine and wait until the oil temperature goes down and the monitor changes to green.



Engine Oil Pressure Monitor

This monitor (3) lights up red if the engine lubrication oil pressure goes below the normal level. If it lights up red, stop the engine, and check the lubrication system and the level of oil in the oil pan.

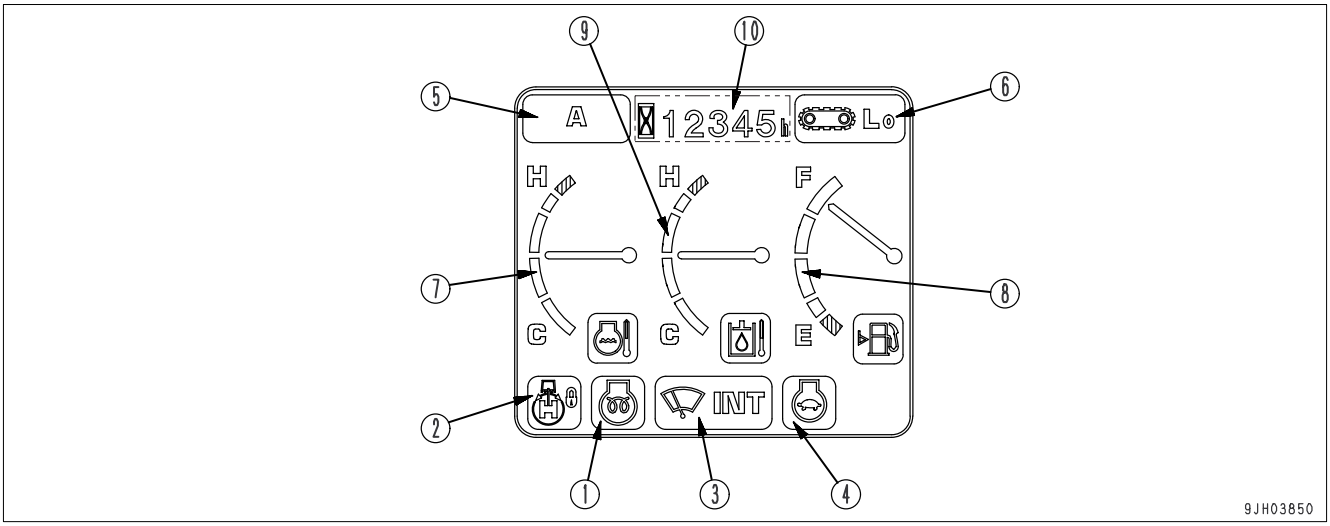


REMARK
While the starting switch is ON, the lamp remains lit and goes off once the engine is started. When the engine starts, the buzzer may sound for a short time, however, this does not indicate a fault.

REMARK
The color when the monitor lights up for the basic check items, caution items, and emergency stop items is as follows.

Type of monitor	Color when monitor lights up		
	When normal	When abnormal	At low temperature
Radiator coolant level monitor	OFF	Red	-
Engine oil level monitor	OFF	Red	-
Maintenance interval monitor	OFF	Red	-
Charge monitor	OFF	Red	-
Fuel level monitor	Green	Red	-
Air cleaner clogging monitor	OFF	Red	-
Engine water temperature monitor	Green	Red	White
Hydraulic oil temperature monitor	Green	Red	White
Engine oil pressure monitor	OFF	Red	-

Meter Display Portion



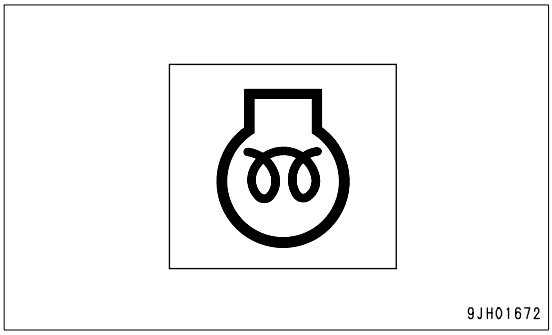
(1) Engine Pre-heating Monitor	(6) Travel speed monitor
(2) Swing Lock Monitor	(7) Engine water temperature gauge
(3) Wiper monitor	(8) Fuel Gauge
(4) Auto-deceleration monitor	(9) Hydraulic oil temperature gauge
(5) Working mode monitor	(10) Service Meter

Pilot Display

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

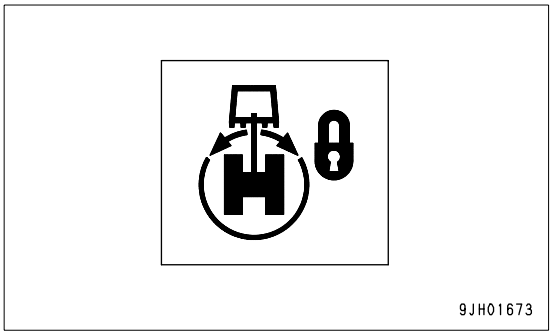
Engine Pre-heating Monitor

This monitor (1) displays the preheating completion time when using preheating to start the engine at temperatures below 0°C.
It lights up when the starting switch is turned to the HEAT position, and flashes after a short time to indicate that the preheating has been completed. (The flashing stops after approx. 10 seconds.)



Swing Lock Monitor

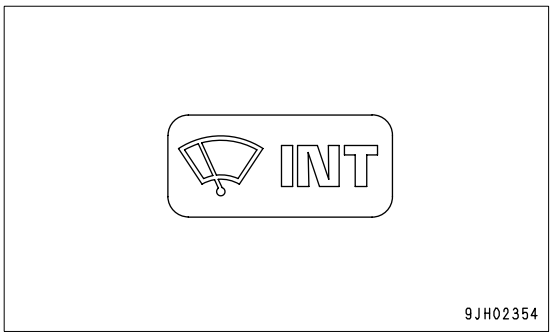
This monitor (2) informs the operator that the swing lock is being actuated.
Actuated: Lights up
When the swing lock switch is turned ON (ACTUATED), the monitor lamp lights up.
This monitor flashes when the swing holding brake release switch is turned on.



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

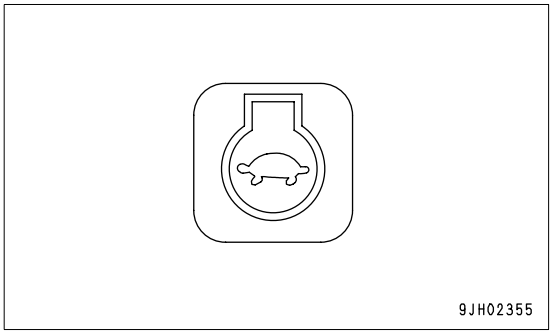
Wiper Monitor

This monitor (3) indicates the operating status of the wiper.
The monitor display when the wiper switch is operated is as follows.
When ON lights up: Wiper moves continuously
When INT lights up: Wiper moves intermittently
OFF: Wiper stops



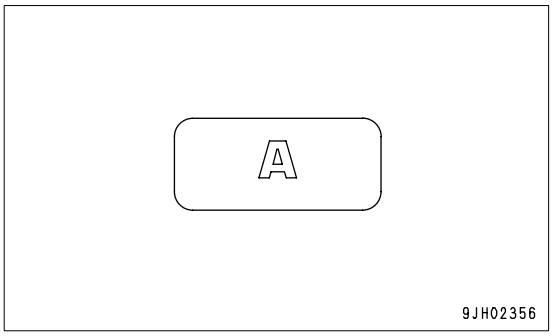
Auto-deceleration Monitor

This monitor (4) shows if the auto-deceleration function is being actuated.
The monitor display when the auto-deceleration switch is operated is as follows.
Auto-deceleration monitor ON: Auto-deceleration actuated
Auto-deceleration monitor OFF: Auto-deceleration canceled



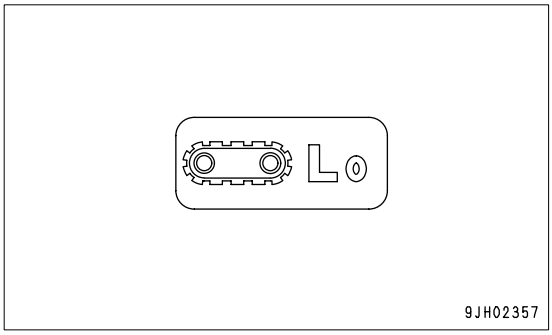
Working Mode Monitor

This monitor (5) displays the set working mode.
The monitor display when the working mode switch is operated is as follows.
A: A mode (for heavy-load operations)
E: E mode (for operations with emphasis on fuel economy)
L: L mode (for fine-control operations)
B: B mode (for breaker operations)



Travel Speed Monitor

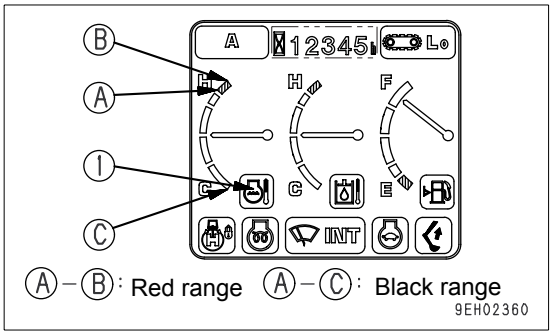
This monitor (6) displays the set mode for the travel speed.
The monitor display when the travel speed selector switch is operated is as follows.
Lo: Low speed
Hi: High speed



Gauges and Meter

Engine Water Temperature Gauge

This meter (7) indicates the engine cooling water temperature.
During normal operations, the indicator should be in the black range. If the indicator enters the red range during operations, the overheat prevention system is actuated.
The overheat prevention system acts as follows.
Red range position (A): Engine water temperature monitor (1) lights up red
Red range position (B): Engine speed is reduced to low idling, engine water temperature monitor lamp (C) lights up red, and the alarm buzzer sounds at same time.
The overheat prevention system remains actuated until the indicator returns to the black range.
When the engine is started, if the indicator is at position (C), engine water temperature monitor (1) lights up white.
In this case, carry out the warming-up operation. For details, see “Warming-Up Operation (3-81)“.

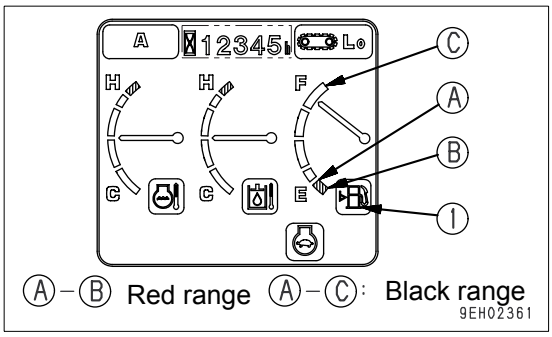


Fuel Gauge

This meter (9) displays the level of the fuel in the fuel tank. During operations, the indicator should be in the black range.
If the indicator enters red range (A) during operations, there is less than 60 liters of fuel remaining in the tank, so check and add fuel.

REMARK
When the indicator reaches red range (B), there is less than 41 liters of fuel remaining.
When the fuel level goes below 41 liters (10.6 US gallons), fuel level monitor (1) lights up red.

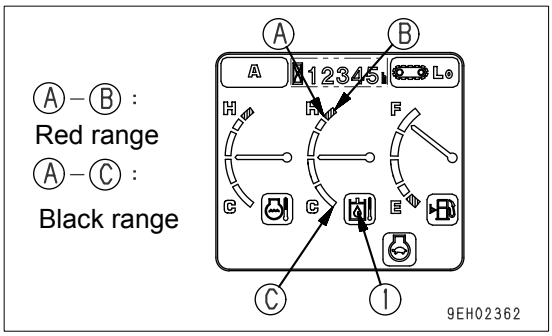
The correct fuel level may not be displayed for a short time when the starting switch is turned ON, but this is not an abnormality.



Hydraulic Oil Temperature Gauge

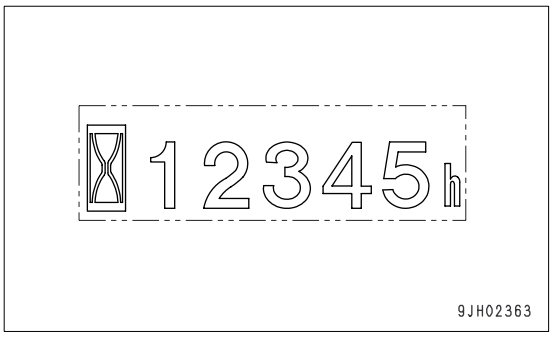
This meter (9) displays the hydraulic oil temperature.
During operations, the indicator should be in the black range.
If the indicator enters red range (A) during operations, the hydraulic oil temperature as gone above 102°C (216°F).
Stop the engine or run it at low idling and wait for the hydraulic oil temperature to go down.

REMARK
When the indicator is in the red range (A) to (B), the hydraulic
oil temperature is as follows.
Red range position (A): More than 102°C (216°F)
Red range position (B): More than 105°C (221°F)
When the indicator is in the red range (A) to (B), hydraulic oil temperature monitor (1) lights up red.
If the indicator is at position (C) when the engine is started, the hydraulic oil temperature is more than 25°C (77°F), and hydraulic oil temperature monitor (1) lights up white. In this case, carry out the warming-up operation. For details, see “Warming-Up Operation (3-81)“.

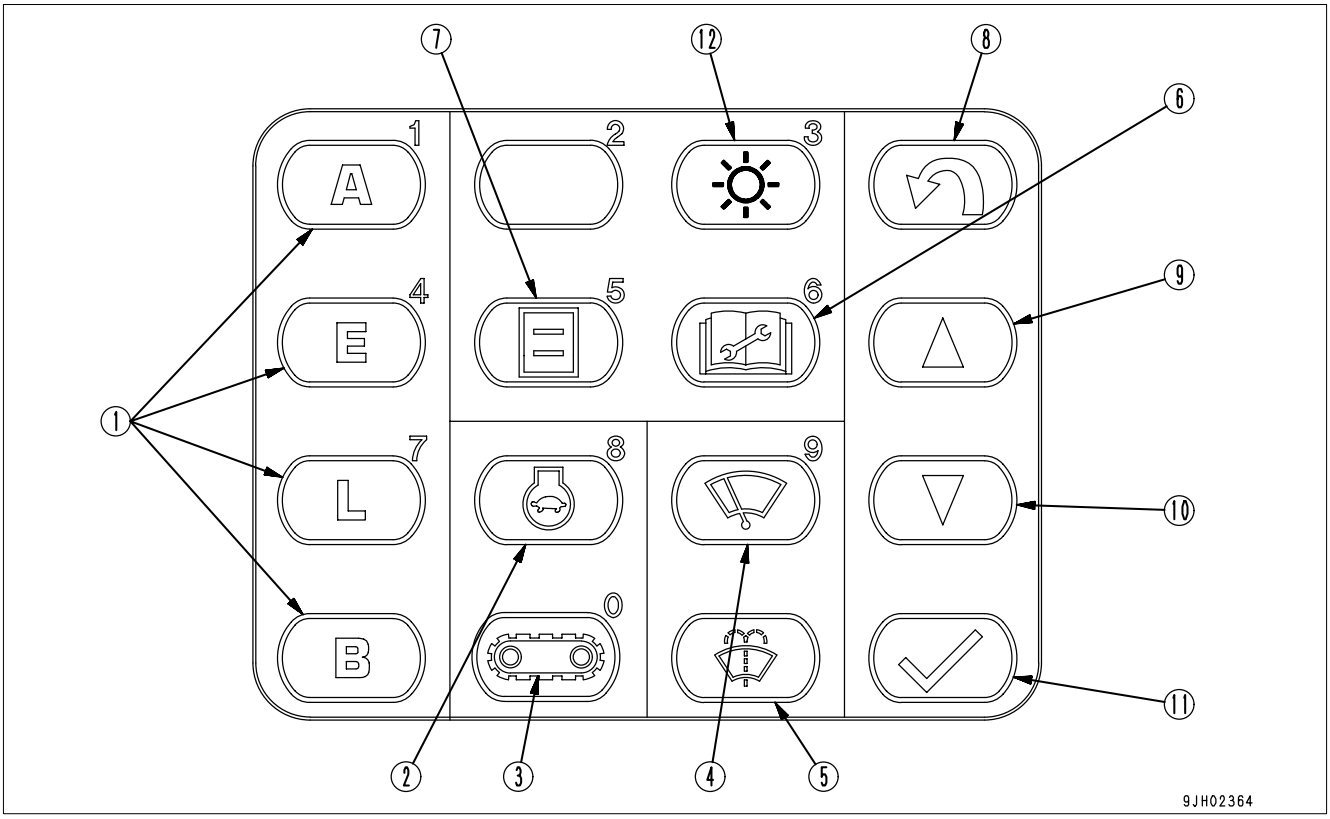


Service Meter

This monitor (10) displays the total time that the machine has been operated.
Use the time display to set the maintenance interval. When the starting switch is ON, the service meter advances even if the machine is not moving.
The service meter advances by 1 for every hour of operation, regardless of the engine speed.



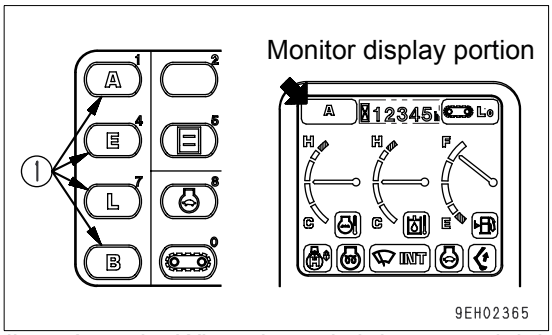
Monitor Switches Portion



(1) Working mode selector switch (basic switch)	(7) Select switch
(2) Auto-deceleration switch (selection switch)	(8) Back switch
(3) Travel speed switch	(9) Up switch
(4) Wiper switch	(10) Down switch
(5) Window washer switch	(11) Input confirmation switch
(6) Maintenance switch	(12) Adjusting Brightness And Contrast

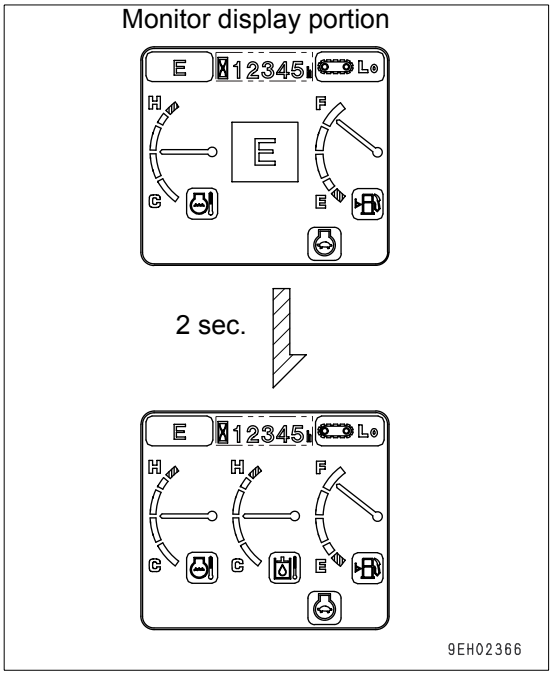
Working Mode Selector Switch (Basic Switch)

This switch (1) is used to set the power and movement of the work equipment.
Operations can be carried out more easily by selecting the mode to match the type of operation.
A mode: For heavy-load operations
E mode: For operations with emphasis on fuel economy
L mode: For fine-control operations
B mode: For breaker operations



- When the engine is started, the working mode is set automatically to A mode. When the switch is pressed, it is possible to select the other modes. The monitor display on the monitor display portion changes for each mode.
- If it is desired to have the working mode set to start automatically in E, L, or B mode (default options setting), please ask your Komatsu distributor to change the setting.

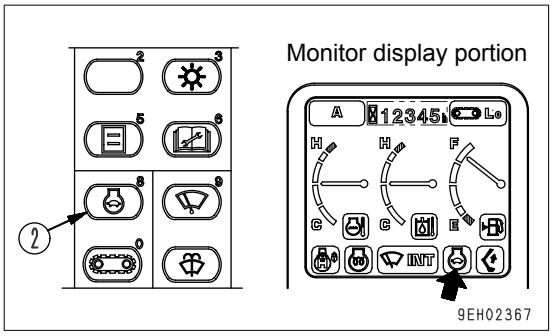
REMARK
When the mode selector switch is pressed, the mode is displayed in the center of the monitor display, and the screen returns to the normal screen after 2 seconds. (The diagram on the left is an example of the display for the E mode.)



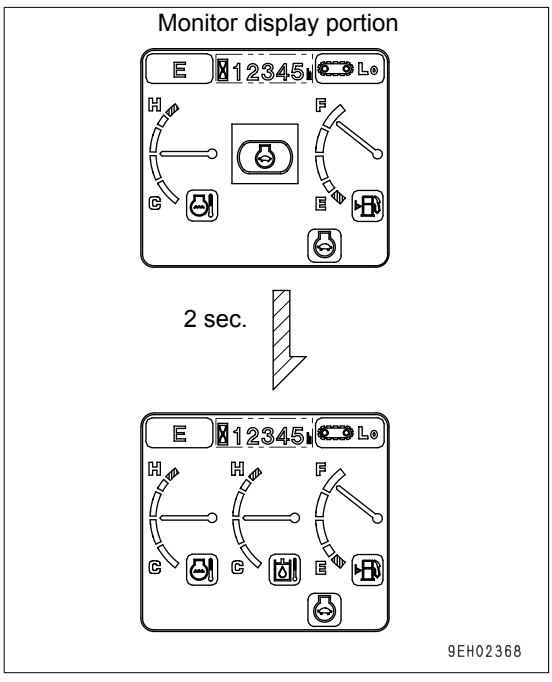
NOTICE
When using the breaker, do not use A mode. There is danger that the breaker may be damaged.

Auto-deceleration Switch (Selection Switch)

When this auto-deceleration switch button (2) is depressed, the auto-deceleration is actuated, if the control levers are in the neutral position, and the engine speed is automatically lowered to reduce fuel consumption.
Monitor display ON: Auto-deceleration actuated
Monitor display OFF: Auto-deceleration canceled
Each time that the switch is pressed, the auto-deceleration switches between actuated and canceled.



REMARK
When the auto-deceleration switch is pressed and the auto-deceleration is actuated, the mode is displayed in the center of the monitor display, and the screen returns to the normal screen after 2 seconds.

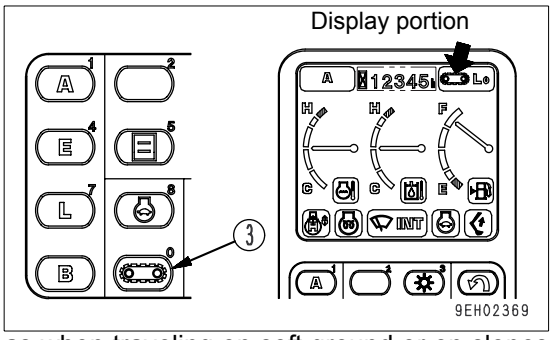


Travel Speed Selector Switch

⚠ WARNING

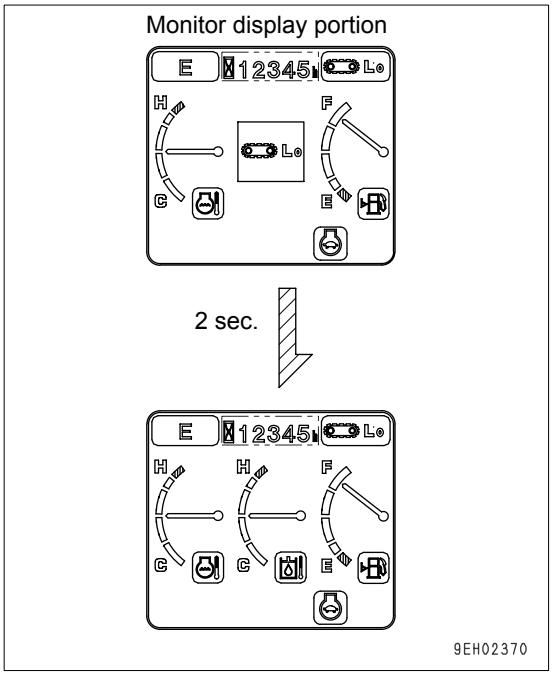
- **When loading on or unloading from a trailer, always travel at low speed (with the travel speed selector switch put at the Lo position). Never operate the travel speed selector switch during the loading or unloading operation.**
- **If the travel speed is switched between Hi and Lo when the machine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

This switch (3) is used to set the travel speed to 3 stages.
Lo lights up: Low-speed travel
Hi lights up: Hi-speed travel
When the engine is started, the speed is automatically set to Lo.
Each time that the switch is pressed, the display changes Lo → Hi → Lo in turn.



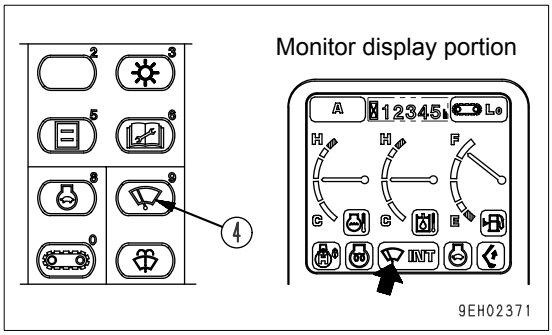
When traveling in high speed (Hi), if travel power is needed, such as when traveling on soft ground or on slopes, the speed automatically switches to low speed (Lo), so there is no need to operate the switch. The monitor display stays at Hi.

REMARK
Each time that the travel speed selector switch is operated, the mode is displayed in the center of the monitor display, and the screen returns to the normal screen after 2 seconds.

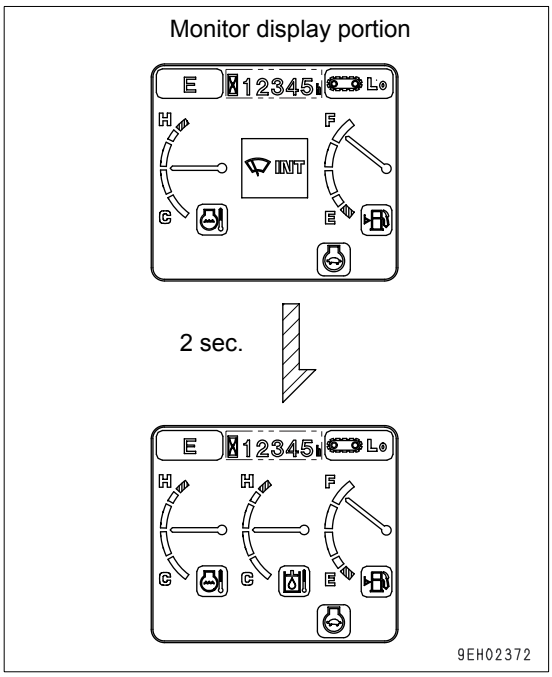


Wiper Switch

This switch (4) operates the wiper for the front glass.
Each time the switch is pressed, it changes ON → INT → stop (OFF).
Monitor display INT lighted up: Wiper moves intermittently
Monitor display ON lighted up: Wiper moves continuously
Monitor display OFF: Wiper stops



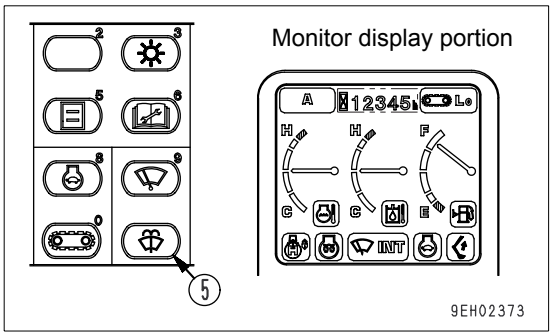
REMARK
Each time that the wiper switch is operated, the mode is displayed in the center of the monitor display. The screen returns to the normal screen after 2 seconds.



Window Washer Switch

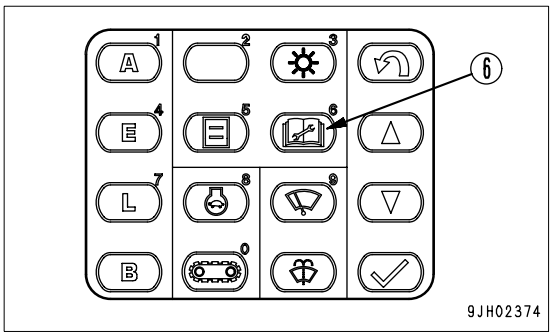
This switch (5) is kept continuously pressed, window washer fluid is sprayed out on the front glass. When the switch is released, the spray stops.

- If switch (4) is kept pressed when the wiper is stopped, the window washer fluid will spray out, and at the same time, the wiper will be actuated continuously. When switch (4) is released, the wiper will continue to operate continuously for 2 cycles, and will then stop.
- If the wiper is moving intermittently and switch (4) is kept pressed continuously, the window washer fluid will spray out, and at the same time, the wiper will be actuated continuously. When switch (4) is released, the wiper will continue to operate continuously for 2 cycles, and will then return to intermittent operation.

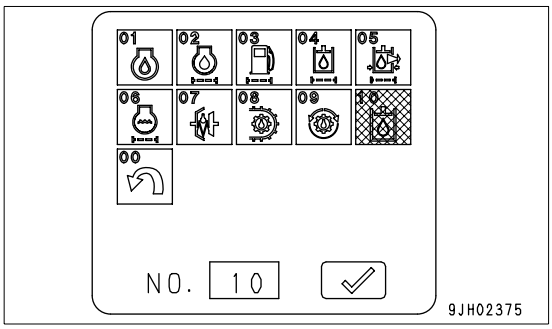


Maintenance Switch

- This switch (6) is used to check the time remaining to maintenance.

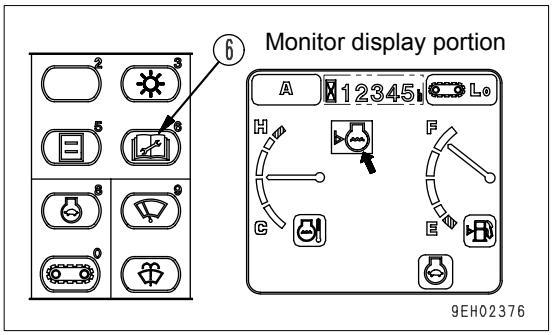


- When this switch (6) is pressed, the screen on the monitor display changes to the maintenance screen shown in the diagram on the right.
  The time remaining to maintenance is indicated by the color of each monitor display. After confirming the maintenance time, carry out the maintenance.
  White display: More than 30 hours remaining to maintenance
  Yellow display: Less than 30 hours remaining to maintenance
  Red display: Maintenance time has already passed



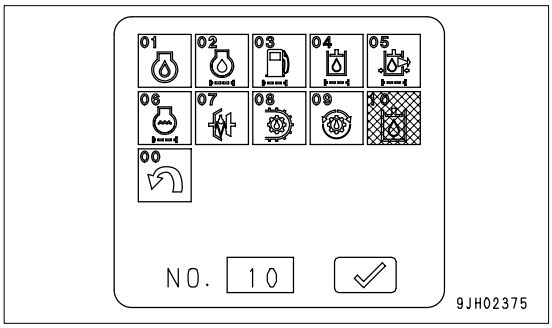
NOTICE

1. **If the monitor display changes to the maintenance warning screen when the engine is started or when the machine is being operated, stop operations immediately. When this happens, the monitor corresponding to the maintenance warning screen will light up red.**
2. **Press switch (6) to display the maintenance screen and check that there is no abnormality in any other monitor.**
3. **If another monitor is lighted up red on the maintenance screen, carry out maintenance for that item also.**



- The maintenance display items are as follows.

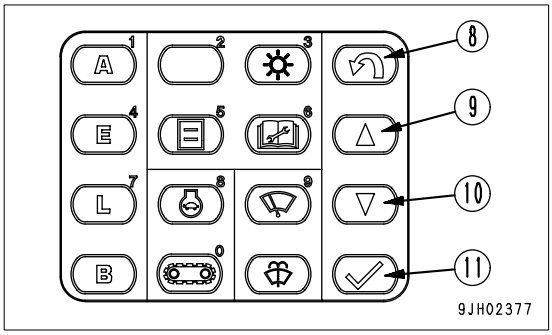
Monitor No.	Maintenance item	Default set screen (H)
01	Change engine oil	500
02	Change engine oil	500
03	Replace engine oil filter	500
04	Replace hydraulic oil filter	1000
05	Replace hydraulic tank breather	500
06	Replace corrosion resistor (option for overseas)	1000
07	Check damper case oil level, add oil	1000
08	Change final drive case oil	2000
09	Change swing machinery case oil	1000
10	Change hydraulic oil	5000



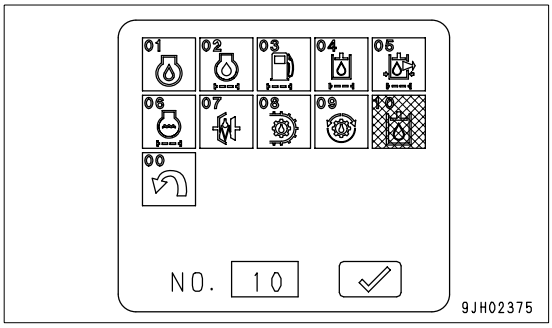
If it is desired to change the setting for the maintenance interval, please contact your Komatsu distributor.

- The method of checking the time remaining to maintenance is as follows.

1. Look at the maintenance screen, press up switch (9) or down switch (10) on the monitor switch portion, and select the item.
   (The color of the monitor for the selected item is inverted to black.)

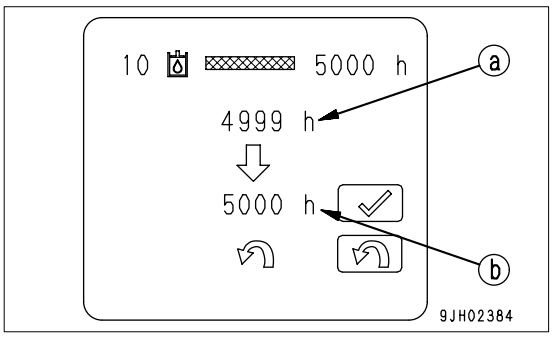


2. After selecting the monitor item, press input confirmation switch (11). The display screen will switch to the time remaining to maintenance.
   (Press back switch (8) to return to the previous screen.)

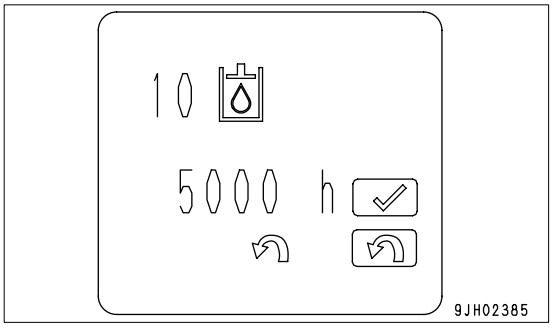


3. Check the time remaining to maintenance.
   (a): Time remaining to maintenance
   (b): Default setting for maintenance interval

   When only checking the time remaining to maintenance, press back switch (8) twice.
   The screen will return to the normal operation monitor screen.
   When canceling the time remaining to maintenance and returning to the default time setting, press input confirmation switch (11). The screen will switch to the default setting screen.

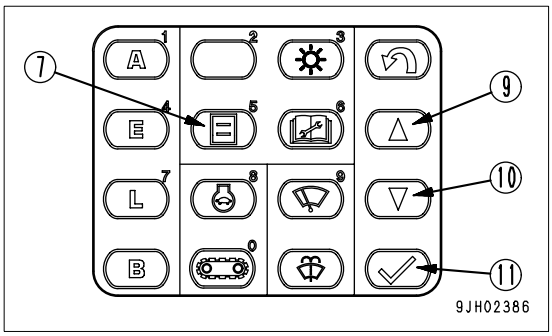


4. After checking the time on the default setting screen, press input confirmation switch (11).
   The screen will return to the maintenance screen.
   (Press back switch (8) to return to the previous screen.)



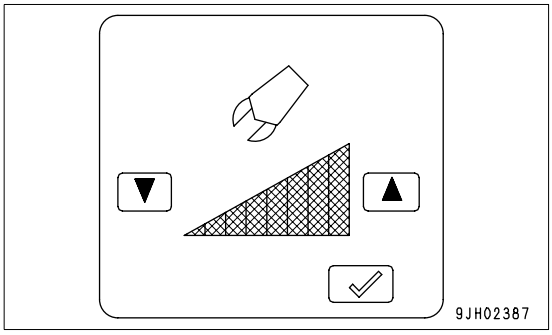
Select Switch

This switch (7) is used to select the flow setting in each of working modes A, E, and B.



- When working mode is A or E

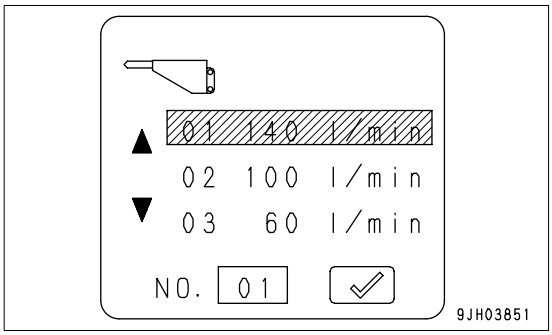
(1) Press select switch (7) and the normal screen on the monitor display changes to the flow setting screen shown in the diagram on the right.
(2) Press up switch (9) or down switch (10) to adjust to the desired flow.
Each segment on the scale is approx. 30 liters/min (7.9 US gallons/min).
(3) After completing the flow setting, press input confirmation switch (11).
The monitor display will return to the normal screen.



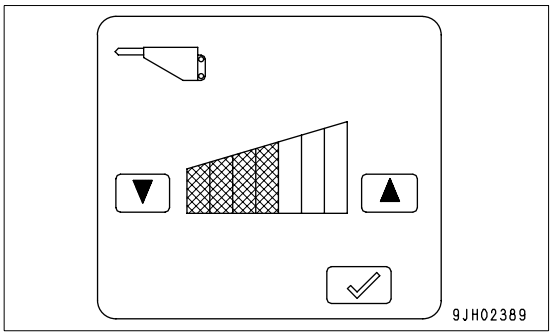
REMARK
The flow can be adjusted only when it is possible to install an attachment. (if equipped)

- When working mode is B mode

(1) Press select switch (7) and the normal screen on the monitor display changes to the flow setting screen shown in the diagram on the right.
(2) Press up switch (9) or down switch (10) to adjust to the desired flow.
(3) After completing the flow setting, press input confirmation switch (11).

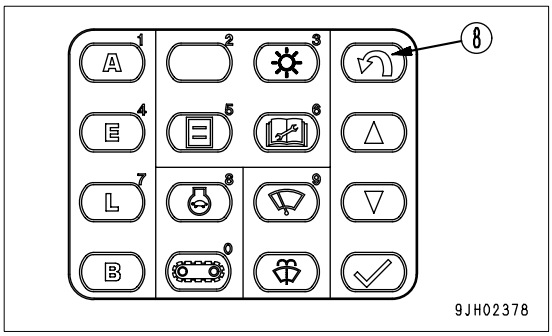


(4) With the operation in Step (3), the flow setting screen changes to the fine flow adjustment screen shown in the diagram on the right.
(5) Press up switch (9) or down switch (10) to adjust to the desired flow.
Each segment on the scale is approx. 10 liters/min (2.6 US gallons/min).
(6) After completing the flow setting, press input confirmation switch (11).
The monitor display will return to the normal screen.



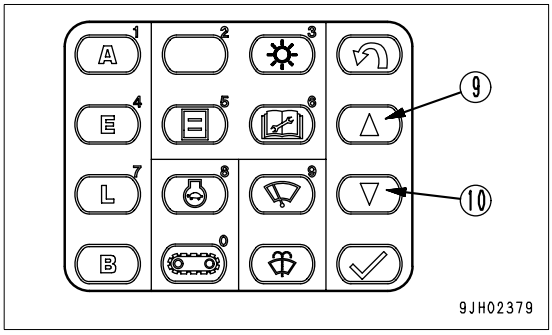
Back Switch

Press this switch (8) when in the maintenance mode, brightness/contrast adjustment mode, or select mode. The screen will return to the previous screen on the monitor display.



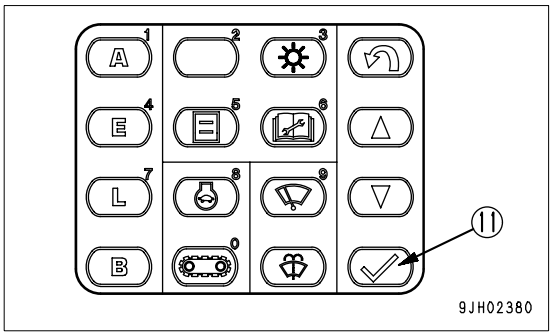
Up Switch, Down Switch

Press up switch (9) or down switch (10) when in the maintenance mode, brightness/contrast adjustment mode, or select mode to move the cursor on the monitor display (colors of selected monitor are inverted) up, down, left, or right.



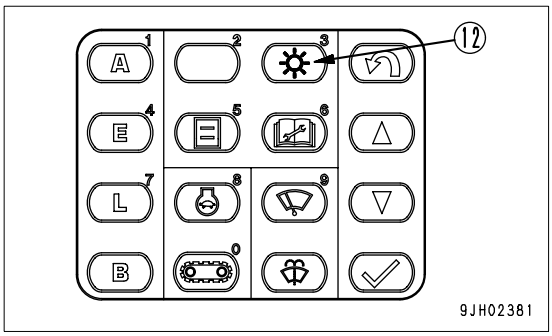
Input Confirmation Switch

Press this switch (11) to confirm the selected mode when in the maintenance mode, brightness/contrast adjustment mode, or select mode.



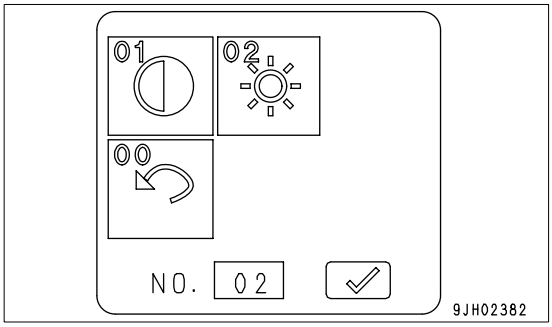
Adjusting Brightness And Contrast

Press this switch (12) to adjust the brightness and contrast of the monitor display screen.



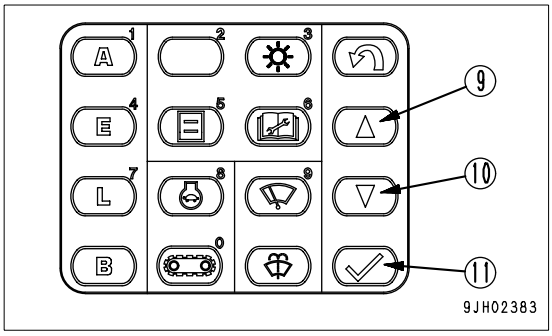
Adjusting brightness and contrast

1. When monitor adjustment switch (12) is pressed, the monitor display screen changes to the brightness/contrast screen shown in the diagram on the right.

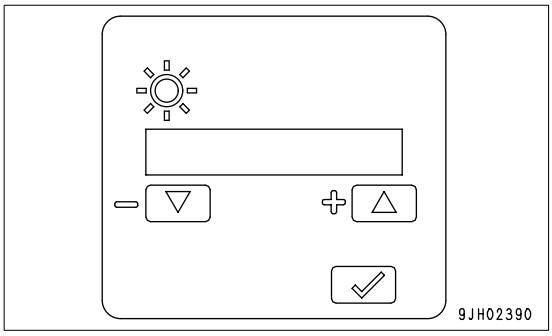


- Adjusting brightness

2. Use the brightness/contrast screen and press up switch (9) or down switch (10) to select the brightness monitor. (The selected monitor is inverted to black.)

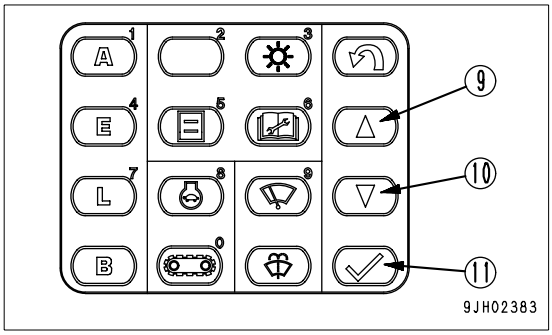


3. When the screen changes to the brightness adjustment screen, press up switch (9) or down switch (10) to adjust the brightness.
4. After completing adjustment of the brightness, press input confirmation switch (11).



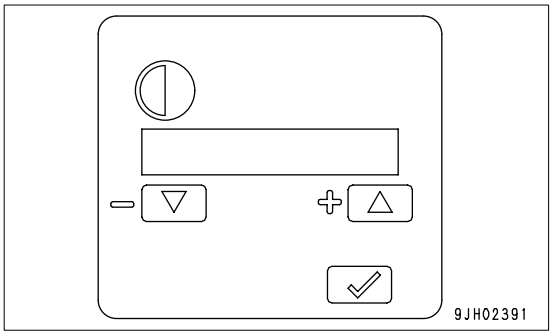
● Adjusting contrast

2.U se the brightness/contrast screen and press up switch (9) or down switch (10) to select the contrast monitor. (The selected monitor is inverted to black.)

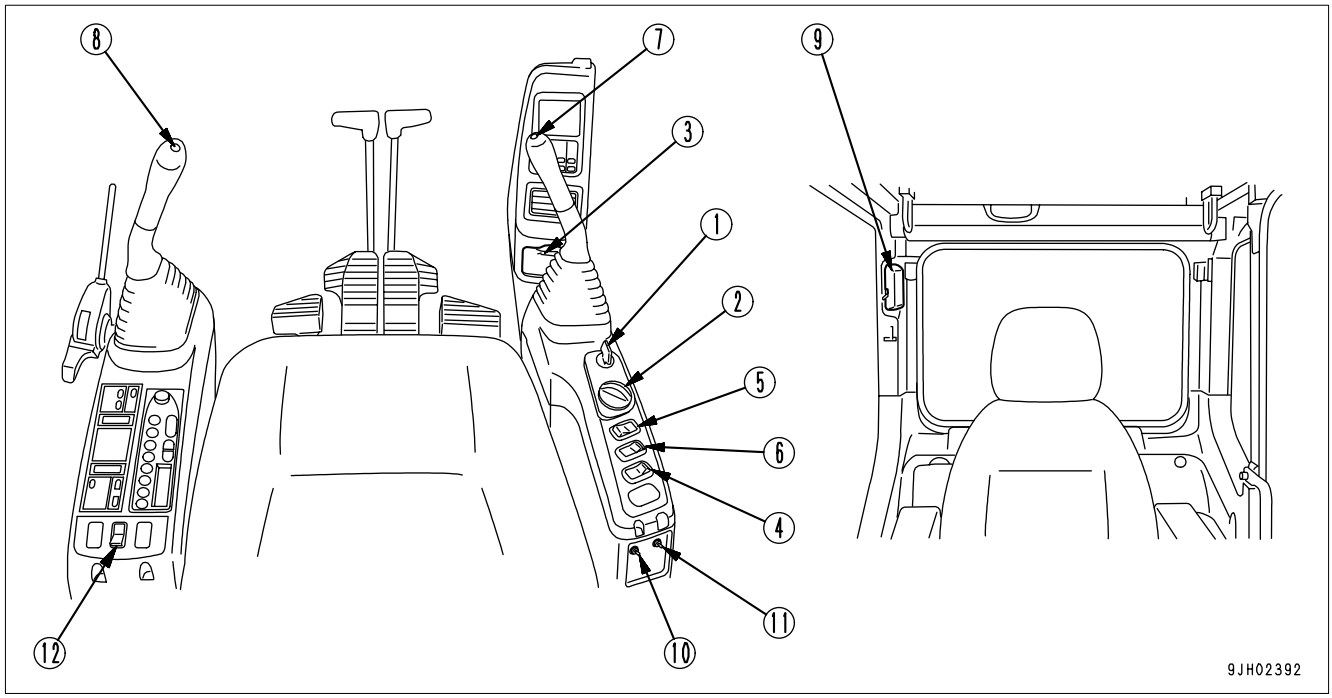


3. When the screen changes to the contrast adjustment screen, press up switch (9) or down switch (10) to adjust the contrast.

4. After completing adjustment of the contrast, press input confirmation switch (11).



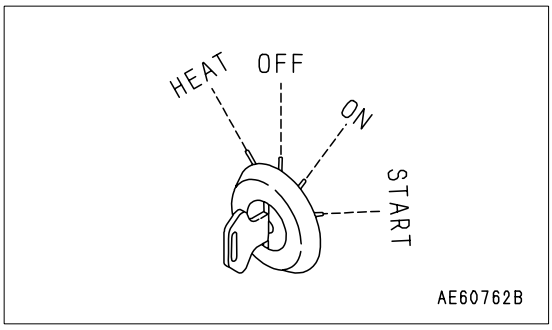
SWITCHES



(1) Starting Switch	(7) Horn Switch
(2) Fuel Control Dial	(8) Knob switch
(3) Cigarette lighter	(9) Room Lamp Switch
(4) Swing Lock Switch	(10) Emergency pump drive Switch
(5) Lamp Switch	(11) Swing Brake Cancel Switch
(6) Alarm buzzer stop switch	(12) Rotating Lamp Switch (if Equipped)

Starting Switch

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



OFF position

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

ON position

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

START position

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

HEAT position

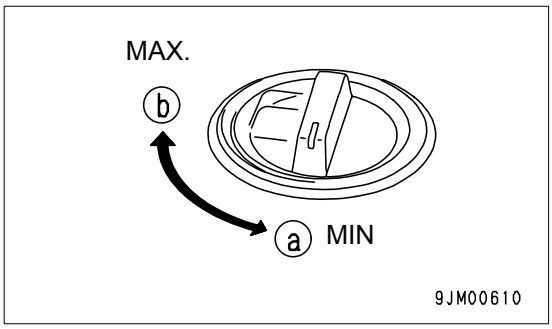
When starting the engine in cold temperatures, set the key to this position. When the key is set to the HEAT position, the preheating monitor lights up. Keep the key at this position until the preheating monitor flashes.

When the preheating monitor flashes, release the key immediately.

When the key is released, it will return automatically to the OFF position, so turn it immediately to the START position to start the engine.

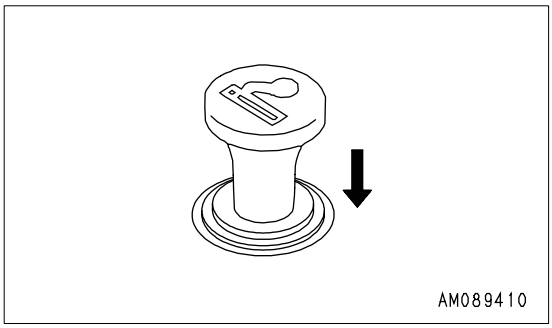
Fuel Control Dial

This dial(2) adjusts the engine speed and output.
(a) Low idling (MIN):T turned fully to the left
(b) Full speed (MAX): Turned fully to the right



Cigarette Lighter

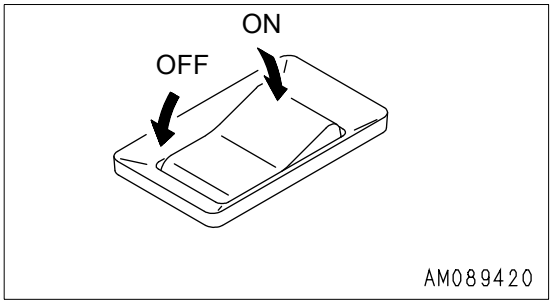
This switch (3) is used to light cigarettes. To use, push the lighter in. After a few seconds it will spring back.
Pull out the lighter and light your cigarette.
By removing the cigarette lighter, the socket is available as a power source for the yellow flashing lamp. Max. current is 3.5 A (85 W).



Swing Lock Switch

⚠ WARNING

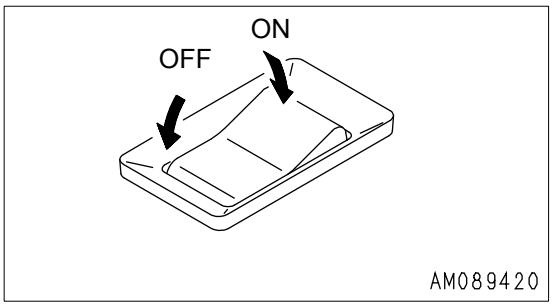
- **When not using the swing operation, e.g. in traveling, put the swing lock switch to the OFF position.**
- **On slopes, even when the swing lock switch is at the ON position, the weight of the work equipment may cause the upper structure to swing if the swing control lever is operated in the downhill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



This switch (4) is used to lock the upper structure so that it cannot swing.
ON position (actuated): The swing lock is always applied, and the upper structure will not swing even if the swing is operated. In this condition, the swing lock lamp lights up.
OFF position (canceled): The swing lock is applied only when all work equipment control levers are at neutral; when any work equipment control lever is operated, it is canceled.
The swing lock is actuated approx. 4 seconds after all work equipment control levers are placed at neutral.

Lamp Switch

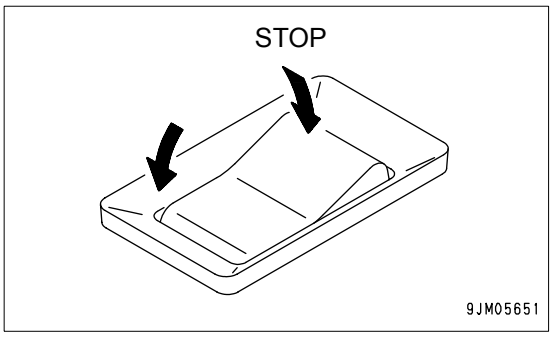
This switch (5) is used to light up the front lamps, working lamp, additional lamp at the top front of the cab, rear lamp, and monitor lighting.



Alarm Buzzer Stop Switch

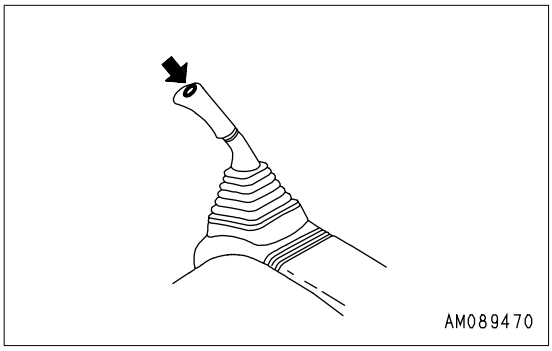
This switch (6) is used (when the engine is running) to stop the alarm buzzer when it has sounded to warn of an abnormality in a warning item.

REMARK
This switch is an automatic reset type. If the STOP position is pressed, the alarm buzzer stops and the switch automatically returns to its original position.



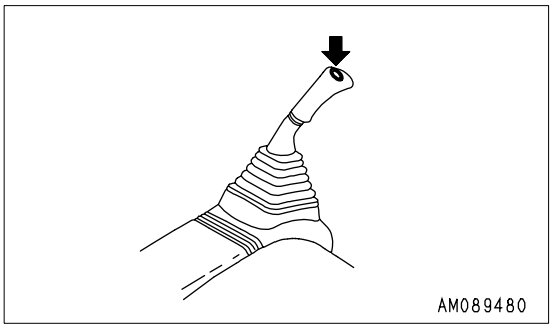
Horn Switch

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



Knob Switch

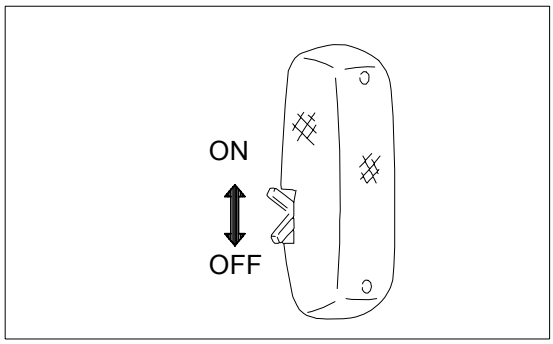
Knob switch (8) on the left work equipment control lever is used to actuate the power max and slowdown functions.
Press once (single click) and keep the switch pressed. The one-touch power max. Function is actuated for a maximum of 8.5 seconds at A and E mode.



Room Lamp Switch

NOTICE
It is possible to turn on the room lamp even when the starting switch is at the OFF position, so be careful not to forget to turn it off.

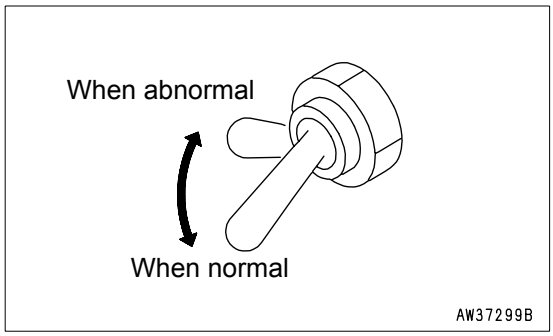
This switch (9) is used to light up the room lamp.
ON position: Lights up
OFF position: Goes out
It will also light up even when the engine is not running.



Pump Drive Emergency Switch

NOTICE
The emergency pump driving switch is provided to make it possible to carry out work for a short time when there is a failure in pump control system. It is necessary to repair the abnormal location as soon as possible.

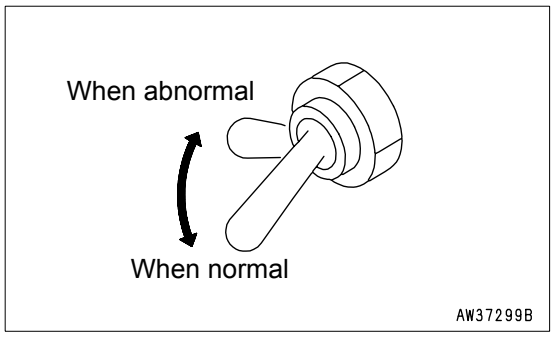
This switch (10) is used to make it possible to carry out operations temporarily if any abnormality should occur in the pump control system (when the display shows E02).
When normal: Move switch down
When abnormal: Move switch up If the display shows E02, move the switch up to make it possible to carry out work.



Swing Holding Brake Release Switch

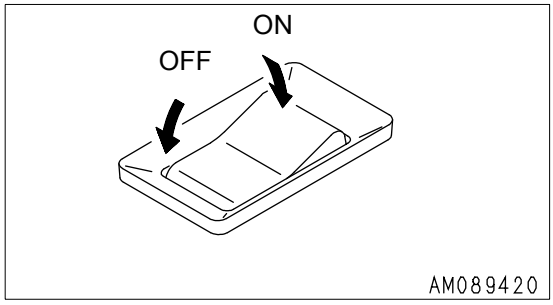
NOTICE
This switch makes it possible to carry out swing operations for a short time even when there is an abnormality in the swing brake system. Do not use this switch except in emergencies. Repair the abnormality as soon as possible.

This switch (11) is used to make it possible to carry out operations temporarily if any abnormality should occur in the swing brake system (when the display shows E03).
When normal: Move switch down
When abnormal: Move switch up
If the display shows E03, move the switch up to make it possible to carry out work.

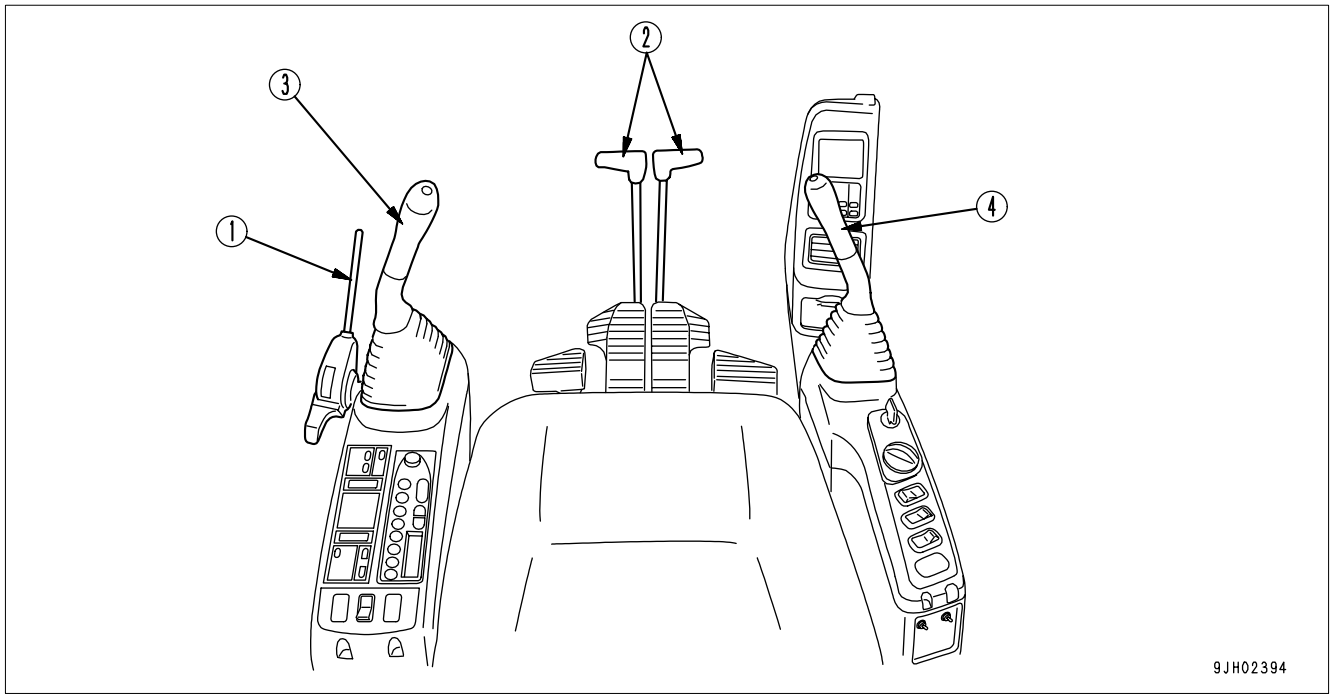


Rotating Lamp Switch (If Equipped)

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



CONTROL LEVERS AND PEDALS

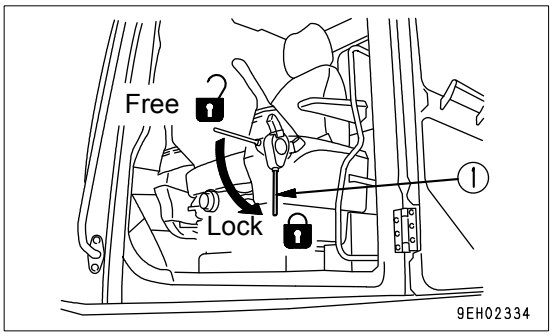


(1) Safety lock lever	(3) Left work equipment control lever (with auto-deceleration device)
(2) Travel levers (Machines with pedal)	(4) Right work equipment control lever (with auto-deceleration device)

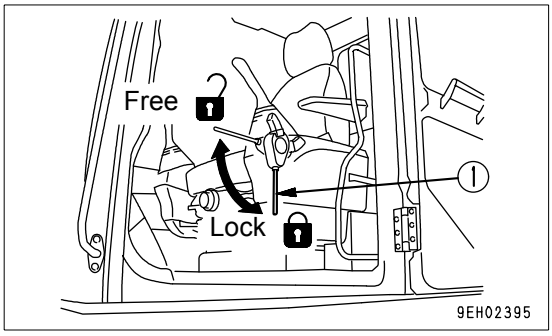
Safety Lock Lever

⚠ WARNING

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



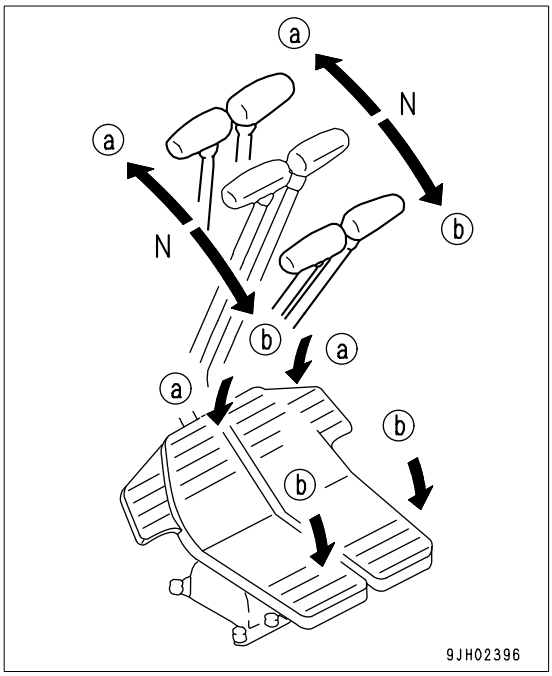
This lever (1) is a device to lock the work equipment, swing, travel, and attachment (if equipped) control levers.
Push the lever down to apply the lock.
This lock lever is a hydraulic lock, so even if it is in the lock position, the work equipment control lever and travel lever will move, but the work equipment, travel motor, and swing motor will not work.



Travel Levers (with Pedals)

⚠ WARNING

- **Do not rest your foot on the pedal during operations. If the pedal is depressed by mistake, the machine may suddenly move and cause a serious accident. Be extremely careful when operating the pedal for travel or steering operations. When you are not using the pedal, do not rest your foot on it.**
- **If the track frame is facing the rear, the direction of travel operations will be reversed when the travel lever is operated. (The machine will travel forward when operated in reverse, and in reverse when operated forward; the left and right directions will also be reversed.)**
- **When operating the travel levers, check if the track frame is facing the front or the rear. (If the sprocket is at the rear, the track frame is facing the front.)**



Lever (2) is used to change the direction of travel between forward and reverse. ( ) shows the pedal operation.
(a) FORWARD: The lever is pushed forward
(The pedal is angled forward)
(b) REVERSE: The lever is pulled back
(The pedal is angled back)
N (Neutral): The machine stops

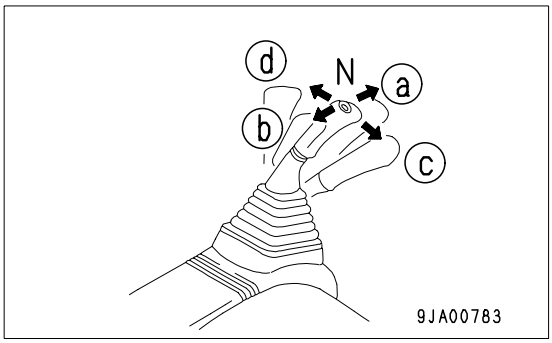
REMARK
Machines equipped with travel alarm (If equipped)
If the lever is shifted to the advance or reverse position from the neutral position, the alarm sounds to warn that the machine is starting to advance.

Work Equipment Control Lever (With Auto-deceleration Device)

⚠ WARNING

If any lever is operated when in the deceleration range, the engine speed will suddenly increase, so be careful when operating the levers.

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

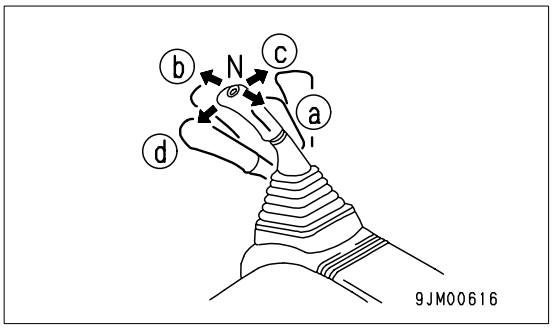


Arm operation
(a) Arm OUT
(b) Arm IN

Swing operation
(c) Swing to right
(d) Swing to left

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

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



Boom operation
(a) RAISE
(b) LOWER

Bucket operation
(c) DUMP
(d) CURL

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

REMARK
The engine speed for all control levers (travel, work equipment, attachment) is changed as follows by the auto-deceleration mechanism.

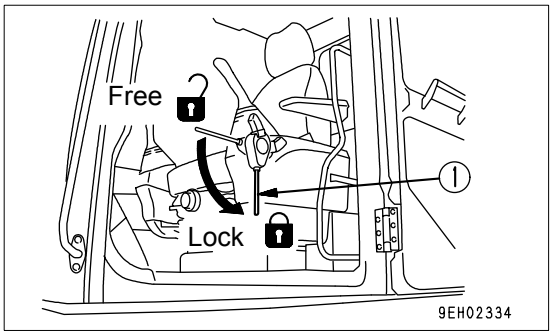
- **When the travel lever and work equipment control levers are at the neutral position, even if the fuel control dial is above midrange speed, the engine speed will go down to a midrange speed. If one of these levers is operated, the engine speed will rise to the speed set by the fuel control dial.**

- **If all the control levers are at the neutral position, the engine speed goes down approx. 100 rpm, then after approx. 4 seconds, the engine speed goes down to the deceleration speed (approx. 1400 rpm).**

SUN ROOF

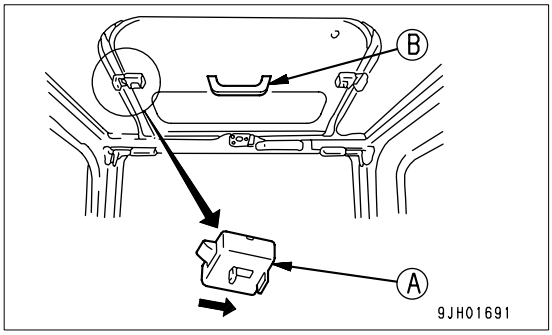
⚠ WARNING

When leaving the operator's seat, set the safety lock lever securely to the LOCK position.
If the safety lock lever is at the FREE position and the control lever is touched by mistake, this may lead to a serious accident.



Opening

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



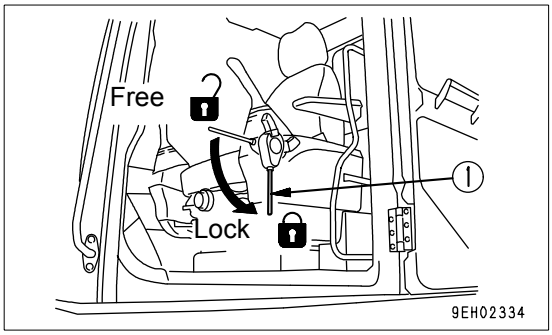
Closing

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

WINDSHIELD

⚠ WARNING

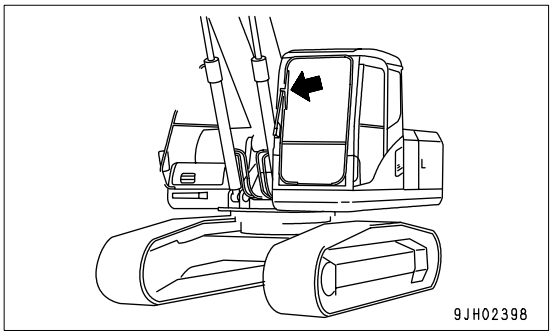
- **When opening or closing the front window, bottom window, or door, always set the safety lock lever to the LOCK position.**
- **If the control levers are not locked and they are touched by accident, this may lead to a serious accident.**
- **When opening or closing the window at the front of the cab,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



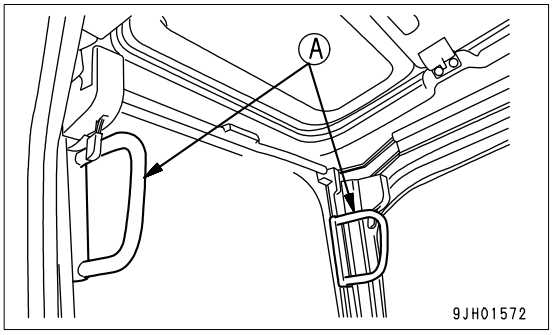
It is possible to stow (pull up) the front window in the roof of the operator's compartment.

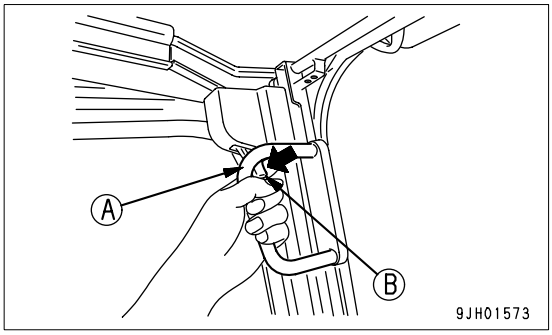
Opening

1. Stop the machine on level ground, lower the work equipment completely to the ground, then stop the engine.
2. Set the safety lock lever securely to the LOCK position.
3. Check that the wiper blade is stowed in the right stay.

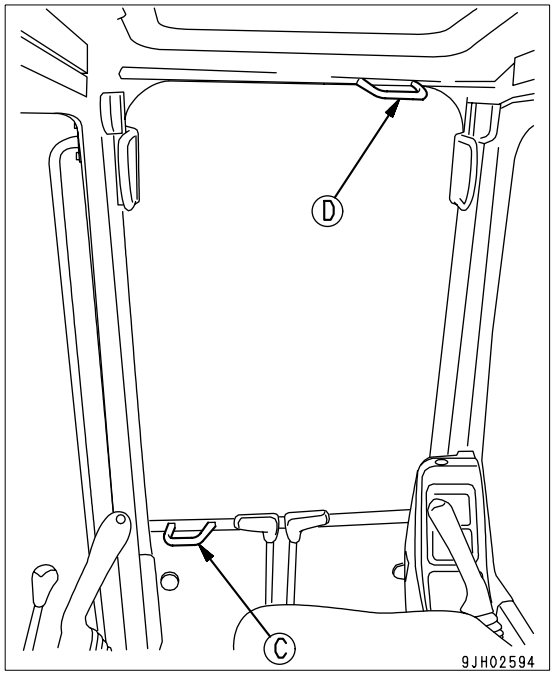


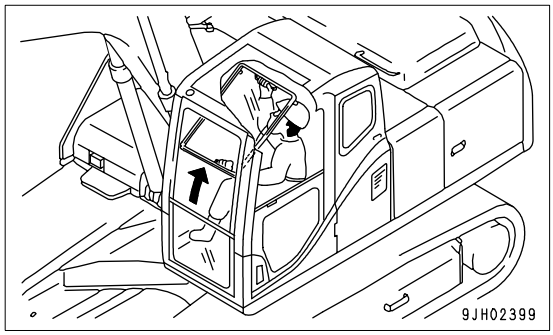
4. Grip handles (A) at the top right and left of the front window, and pull lock lever (B) toward yourself to release the lock at the top of the front window. The top of the front window will come out.

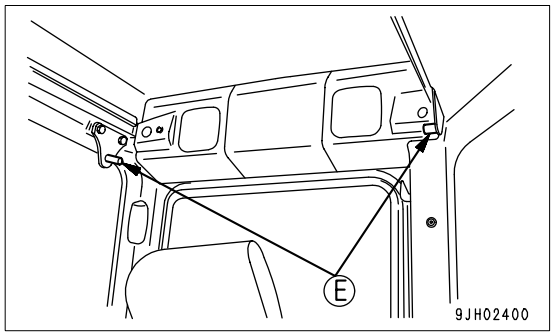




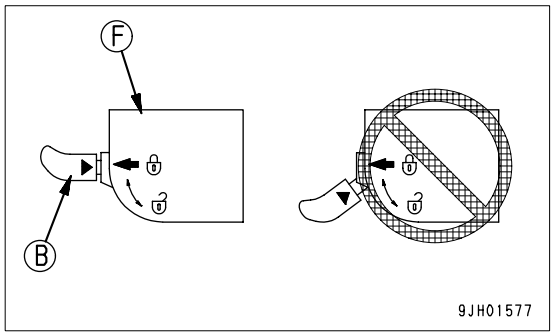
5. Hold lower knob (C) with your left hand from inside the operator's cab, and with your right hand, grip top knob (D), pull it up, and push it against lock catch (E) at the rear of the cab securely to lock the window.







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

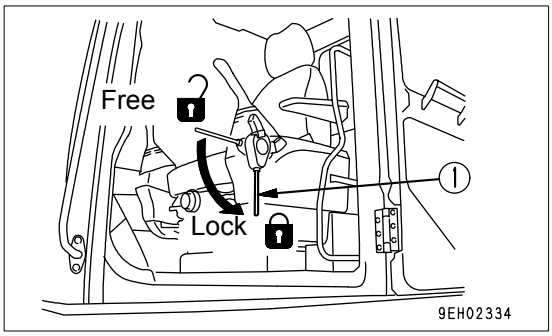


Closing

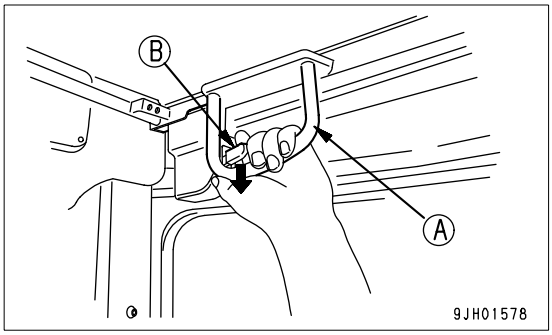
⚠ WARNING

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

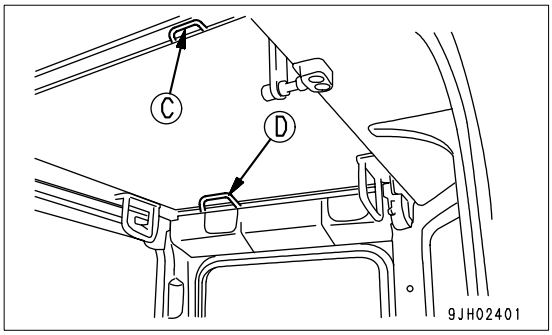
1. Stop the machine on level ground, lower the work equipment completely to the ground, then stop the engine.
2. Set the safety lock lever to the LOCK position without fail.

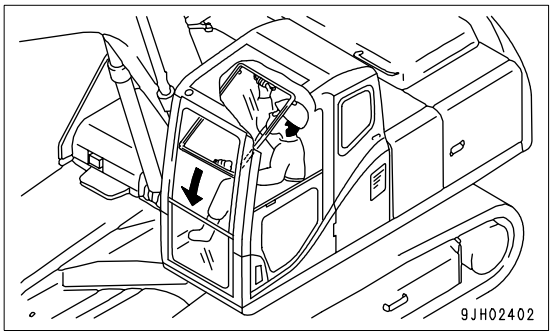


3. Grip left and right handles (A), and pull down lock lever (B) to release the lock.

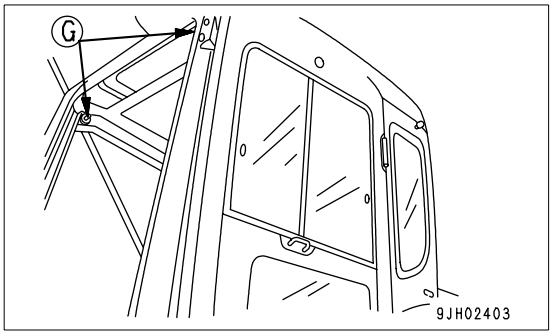


4. Grip handle (C) at the bottom of the front window with your left hand and handle (D) at the top with your right hand, push to the front, then lower slowly.

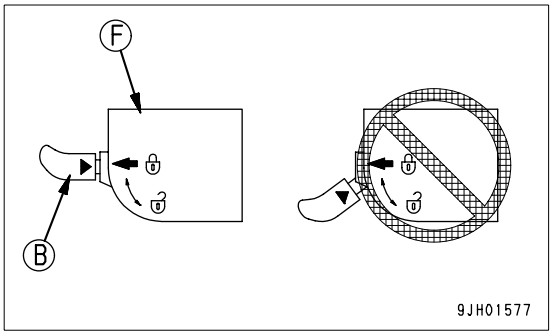




5. When the bottom of the window reaches the top of the bottom window, push the top of the window to the front to push it against left and right lock catches (G) and engage the lock.

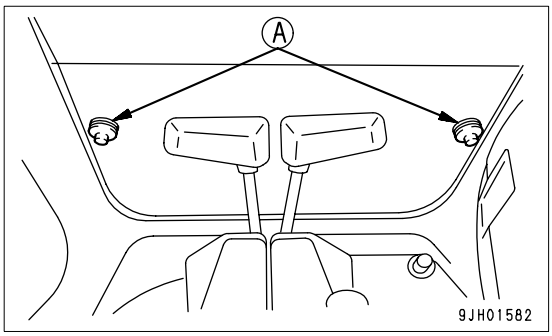


6. Check that lock lever (B) is securely at the LOCK position.
   - The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lock lever (B). Check visually.
   - If the arrow on lock case (F) does not match the position of the arrow on lock lever (B), the lock is not engaged.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

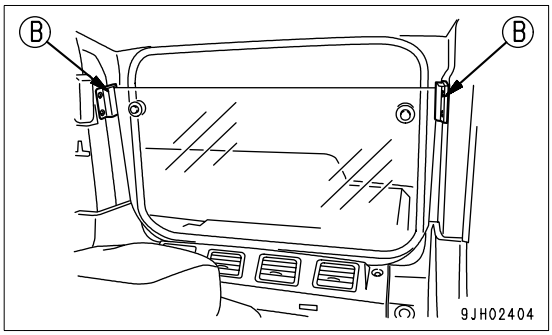


Removing Lower Windshield

1. Open the front window, then hold grip (A), pull up, and remove the bottom window.



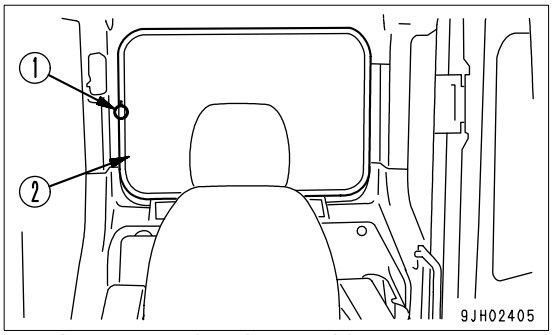
2. After removing the bottom window, store it at the rear of the operator's cab and lock it securely with left and right locks (B).
   - When removing, always hold the glass with one hand and release the lock with the other hand.



EMERGENCY EXIT FROM OPERATOR'S CAB

- If for some reason, the cab door does not open, remove the rear window and use it as an emergency escape.
- Remove the rear window as follows.

1. Pull ring (1) and completely remove seal (2) from the rubber core.

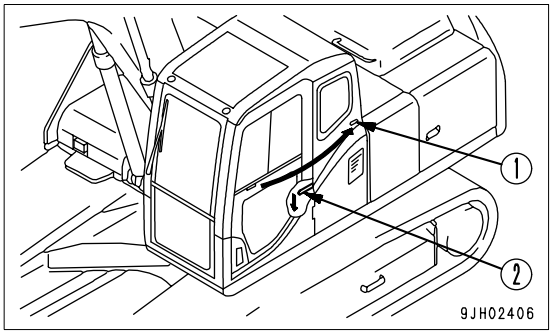


2. When the corner of the front window glass is pushed strongly, it can be removed to the outside.
   - Do not remove the rear window except when using it as an emergency exit.

DOOR LOCK

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

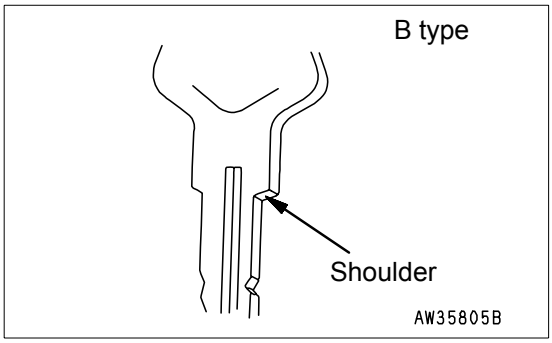
1. Push the door against catch (1) to fix it in position.
2. When closing the door, push down the lever (2) on the left of the operator's seat to release the catch.
3. When fixing the door in position, fix it firmly to the catch.



CAP WITH LOCK

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

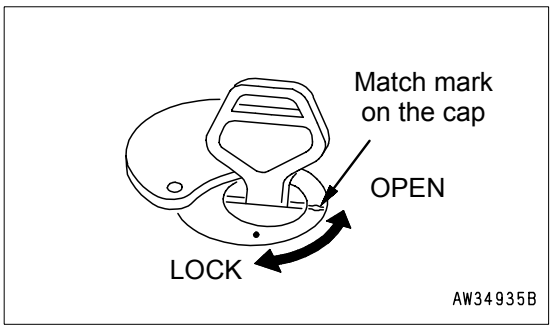
Insert the key as far as it will go to the shoulder. If the key is turned before it is inserted all the way, it may break.



Opening and Closing Caps with Lock

Opening the Cap

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



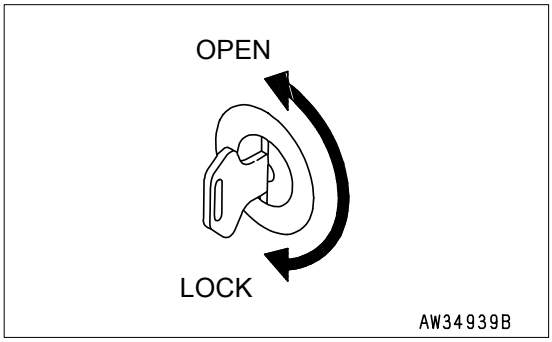
Locking the Cap

1. Turn the cap until tight, then insert the key into the key slot.
2. Turn the starting switch key clockwise, then remove the key.

Opening and Closing Cover with Lock

Opening 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.

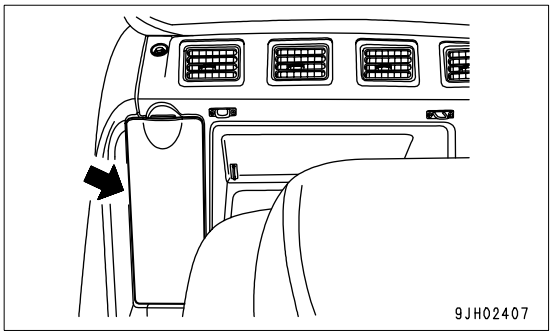


Locking the Cover

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

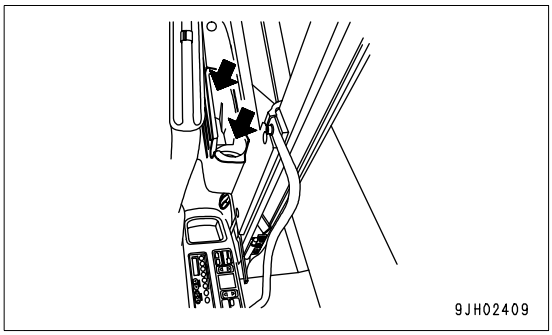
HOT AND COOL BOX

This is on the right side at the rear of the operator's seat. It is interconnected with the air conditioner: it stays warm when the heating is used, and stays cool when the cooling is used.



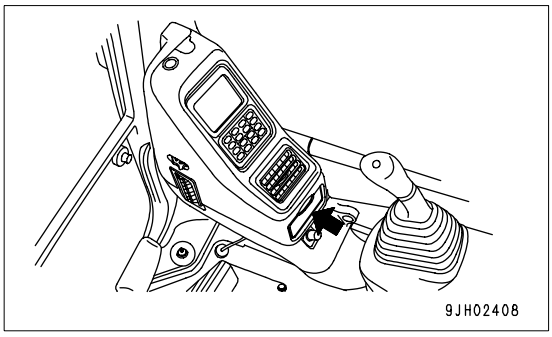
MAGAZINE BOX

(with cup holder)
This is on the left side of the operator's seat.
Keep the Operation and Maintenance Manual in this box so that it can be taken out and read whenever necessary.



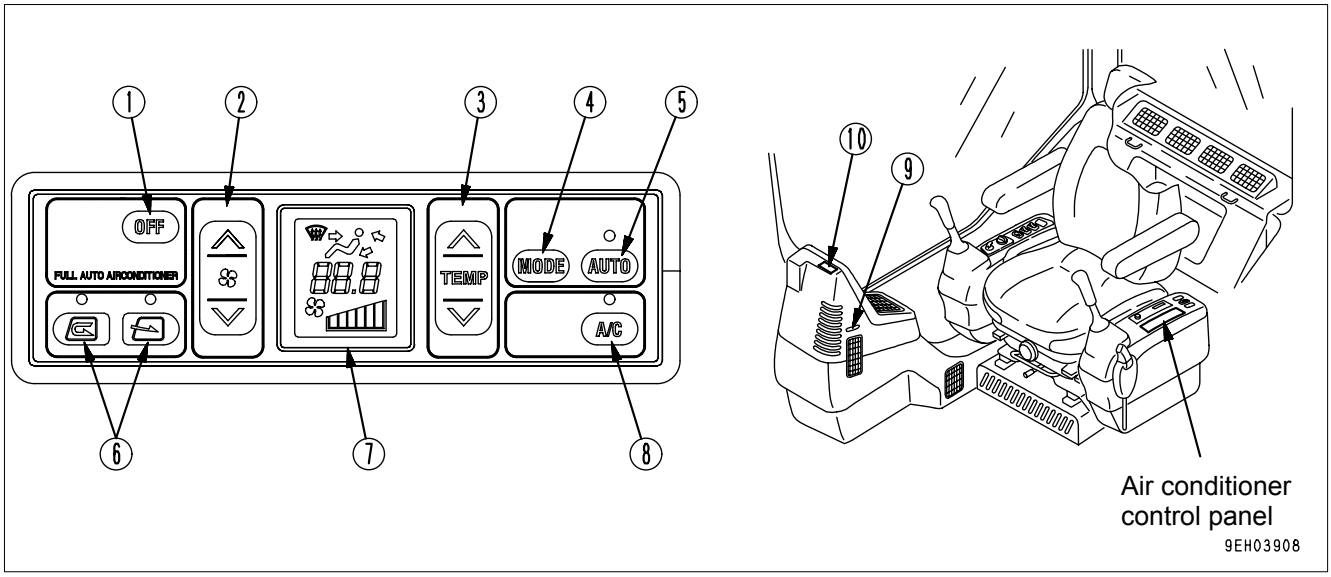
ASHTRAY

This is under the machine monitor at the front right of the operator's compartment.
Always make sure that you extinguish your cigarette, then put it in the ashtray and close the lid.



AIR CONDITIONER CONTROLS

Air Conditioner Control Panel

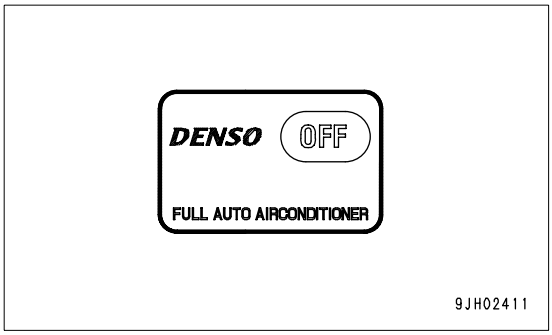


(1) OFF switch	(6) FRESH/RECIRC selector switch
(2) Fan switch	(7) Display monitor
(3) Temperature control switch	(8) Air conditioner switch
(4) Vent selector switch	(9) Defroster selector lever
(5) Auto switch	(10) Sunlight sensor

OFF Switch

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

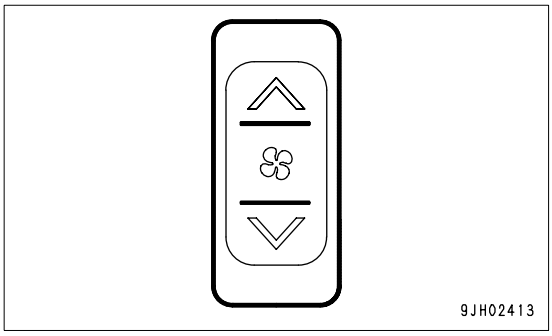
- When OFF switch (1) is pressed, the set temperature and air flow display on display monitor (7) and the lamps above auto switch (5) and air conditioner switch (8) go out, and operation stops.



Fan Switch

This switch (2) is used to adjust the air flow.
The air flow can be adjusted to six levels.

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

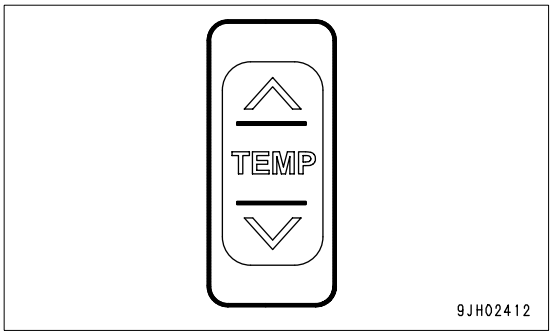


Monitor display and air flow	
Liquid crystal display	Air flow
	Air flow "low"
	Air flow "medium 1"
	Air flow "medium 2"
	Air flow "medium 3"
	Air flow "medium 4"
	Air flow "high"

Temperature Control Switch

This switch (3) is used to control the temperature inside the cab. The temperature can be set between 18°C and 32°C (64°F and 90°F).

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



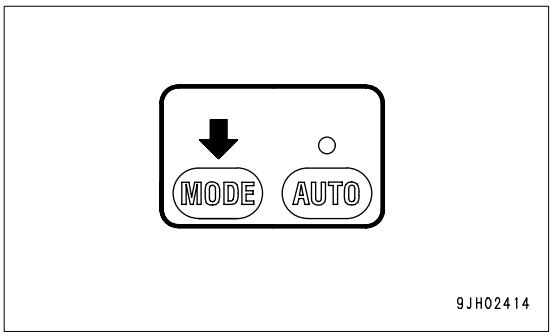
Monitor display and the function

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

Vent Selector Switch

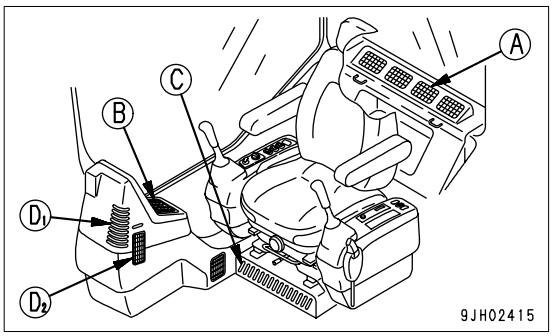
This switch (4) is used to select the vents.

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



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

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



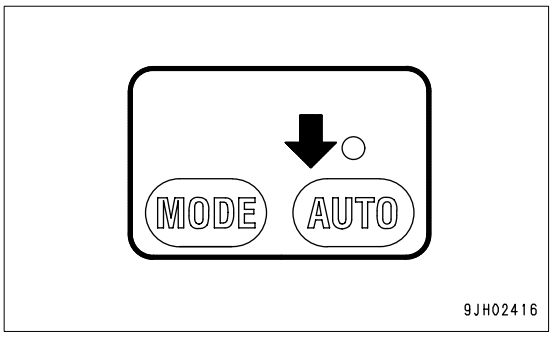
Liquid crystal display	Vent mode	Vent				Remarks
		(A)	(B)	(C)	(D)	
	Front and rear vents (including defroster vent)	O	O		(O)	-
	Front, rear and foot vents (including defroster vent)	O	O	O	(O)	-
	Foot vent			O		-
	Front, foot vents (including defroster vent)		O	O	(O)	Cannot be selected for automatic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

Note 1: Air blows out from vents marked O
Note 2: The defroster vents can be opened or closed manually with the vent lever.

Auto Switch

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

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

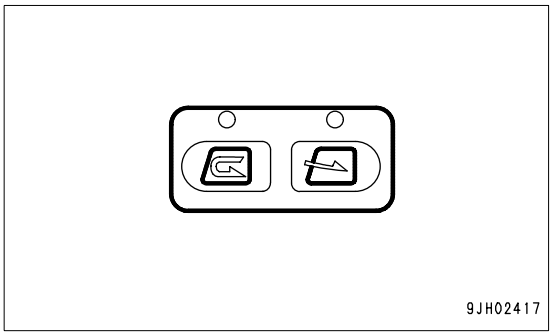


RECIRC	The outside air is shut off and only the air inside the cab is circulated. Use this position to carry out rapid cooling of the cab or when the outside air is dirty.
FRESH	Outside air is taken into the cab. Use this position to take in fresh air or when carrying out demisting.

FRESH/RECIRC Selector Switch

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

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

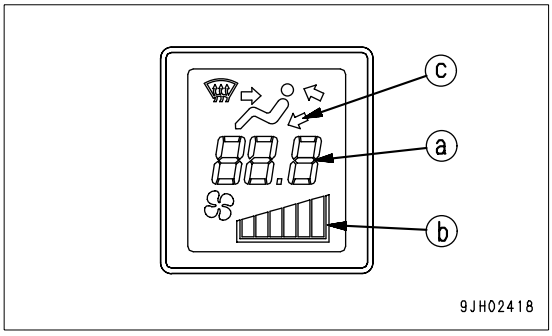


RECIRC	The outside air is shut off and only the air inside the cab is circulated. Use this position to carry out rapid cooling of the cab or when the outside air is dirty.
FRESH	Outside air is taken into the cab. Use this position to take in fresh air or when carrying out demisting.

Display Monitor

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

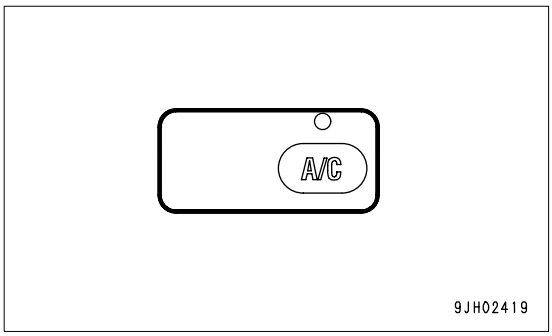
- When OFF switch (1) is pressed, the display of temperature setting (a) and air flow (b) goes out, and operation stops.



Air Conditioner Switch

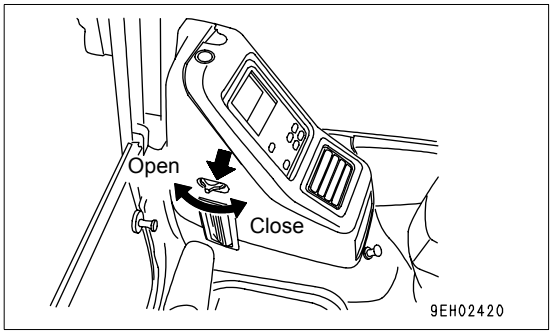
This switch (8) is used to turn the air conditioner (cooling, dehumidifying, heating) ON or OFF.

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



Defroster Selector Lever

This switch (9) is used in cold or rainy weather to remove the mist that forms on the front glass.
Selector lever forward: To defroster (open)
Selector lever back: Closed
The defroster can be used when the vent selector switch is set to face or face and foot.

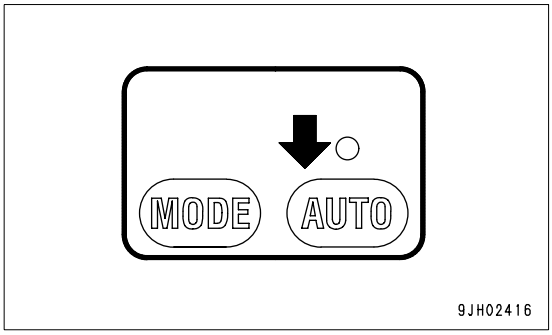


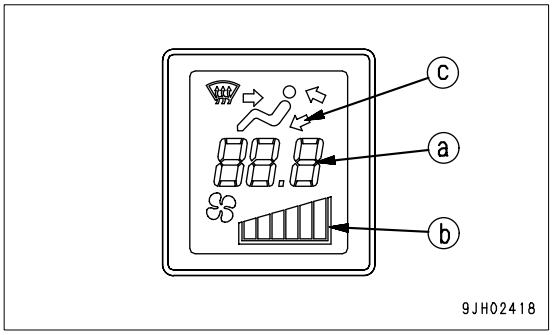
Method Of Operation

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

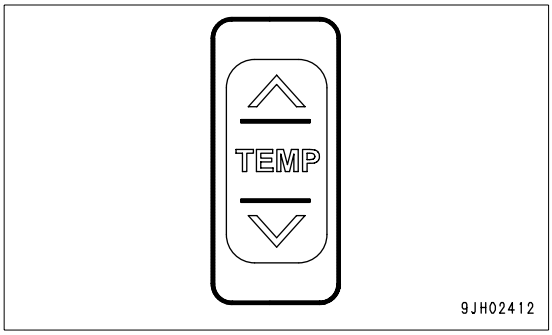
Automatic Operation

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



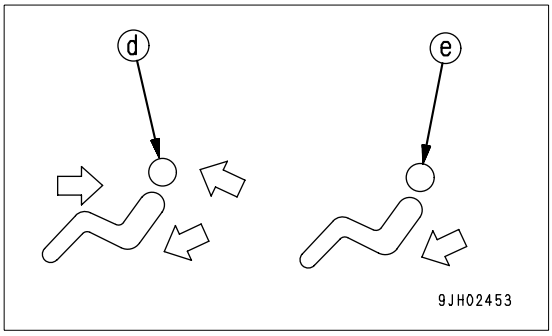


2. Use temperature set switch (3) to set to the desired temperature. The air flow, combination of vents, and selection of fresh or recirculated air is automatically selected according to the set temperature, and the air conditioner is operated automatically to provide the set temperature.



REMARK

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

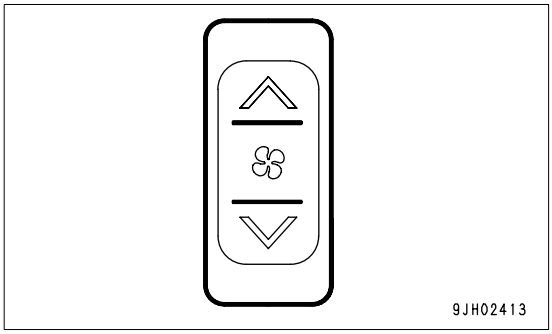


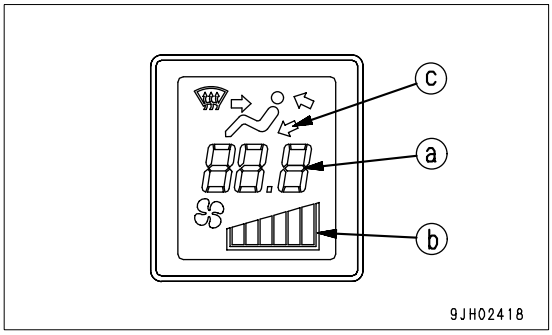
Stopping Automatic Operation

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

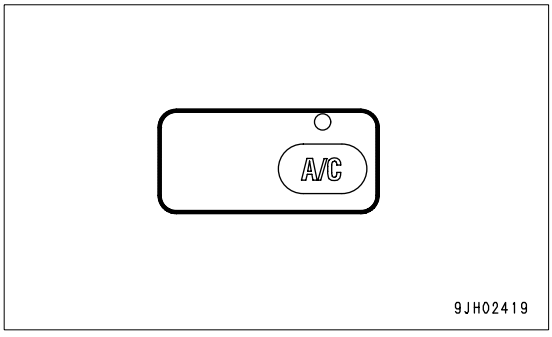
Manual Operation

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

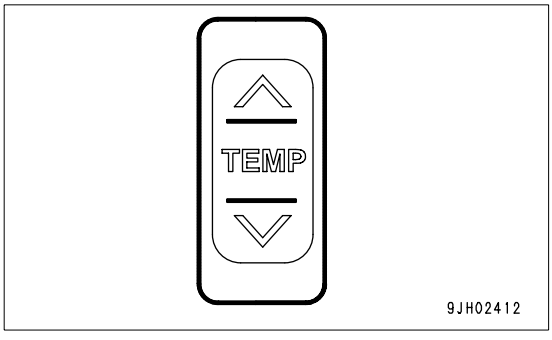




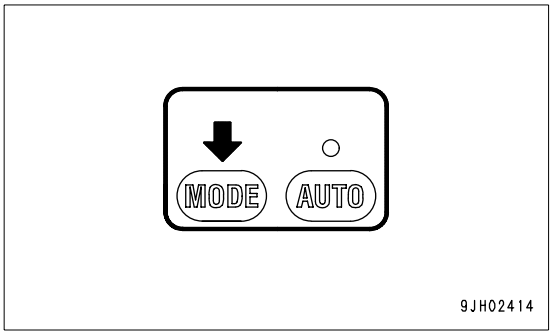
2. Turn air conditioner switch (8) ON. Check that the lamp at the top of the air conditioner switch lights up.

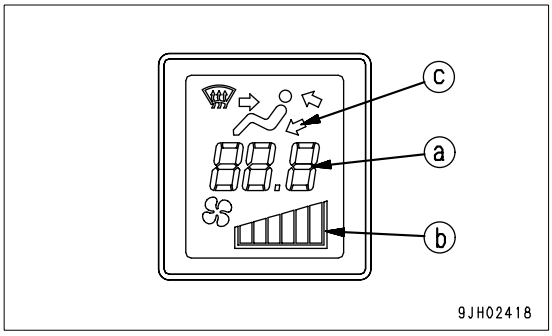


3. Press the temperature setting switch and adjust the temperature inside the cab.

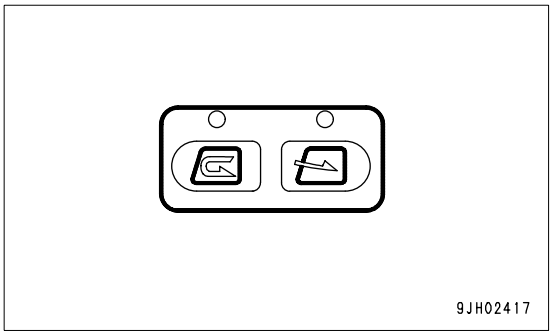


4. Press vent selector switch (4) and select the desired vents. When this is done, the display for vent (c) of the display monitor changes according to the selection.



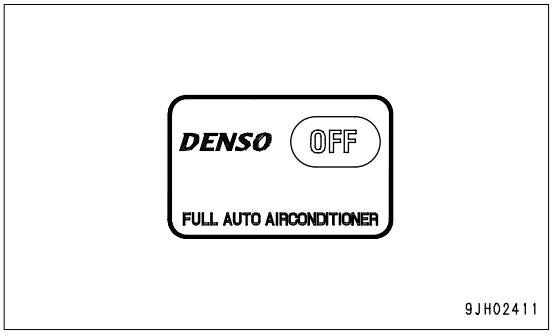


5. Press RECIRC/FRESH selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).



Stopping Manual Operation

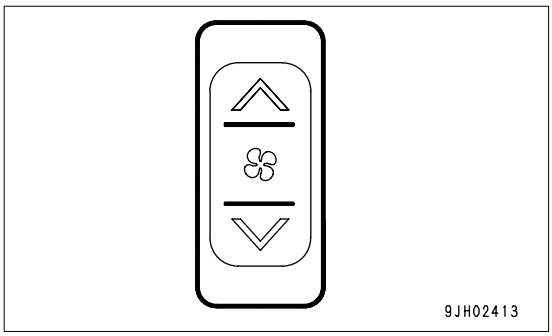
Press OFF switch (1). The displays for temperature setting (a) and air flow (b) on the display monitor, and the lamps above auto switch (5) and air conditioner switch (8) go out, and the operation stops.

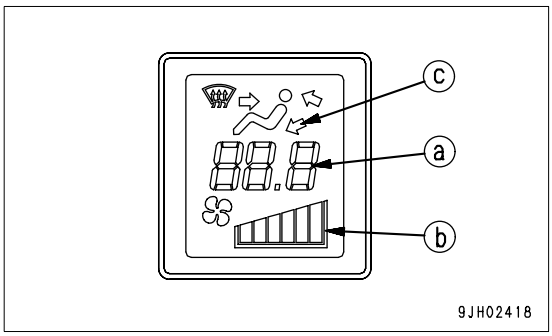


Operation with cold air to face and warm air to feet

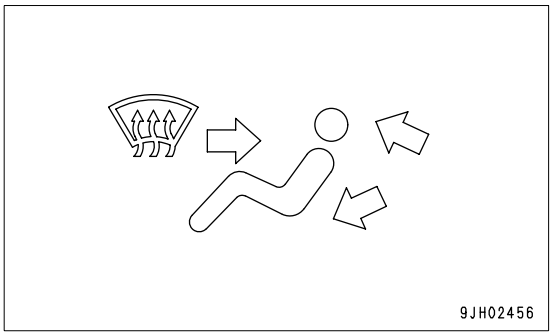
To operate with cold air blowing to the face and warm air blowing to the feet, set as follows.

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

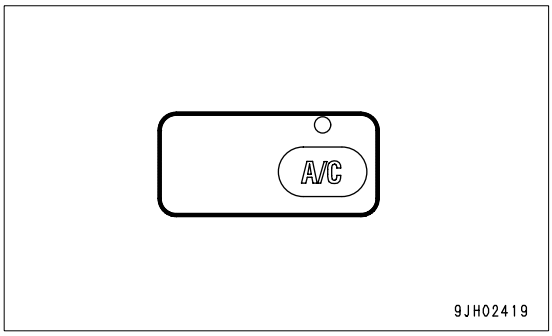




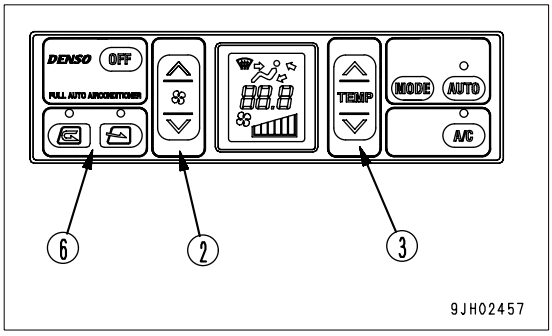
2. Press vent selector switch (4) and set the vent display on the display monitor to the display shown in the diagram on the right.



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

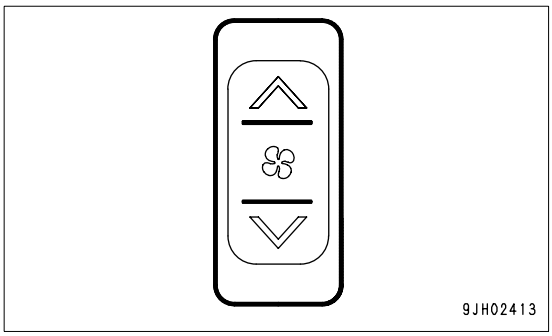


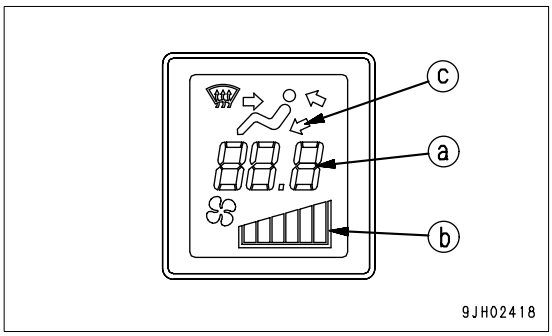
4. Adjust fan switch (2), temperature setting switch (3) and FRESH/RECIRC selector switch (8) to the desired positions.



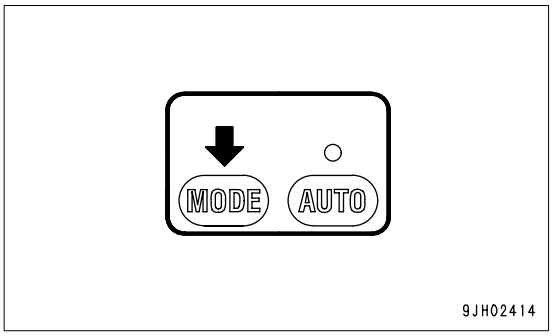
Defroster Operation

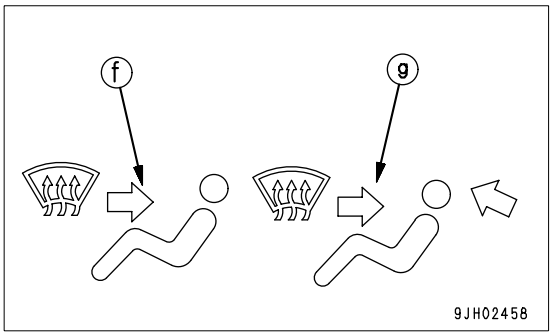
1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on the display monitor.



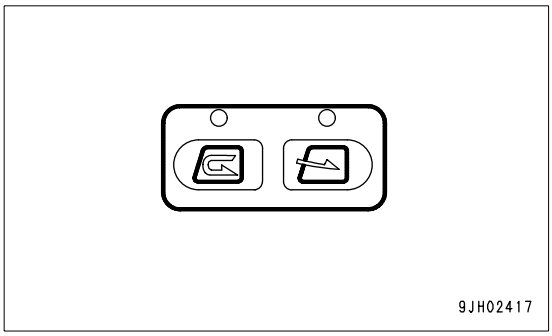


2. Press vent selector switch (4) and set the vent display on the display monitor to the display shown in (f) or (g) in the diagram on the right.

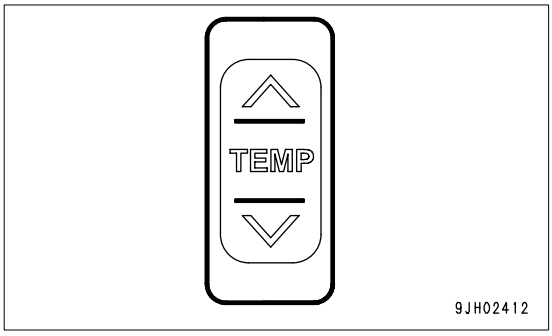




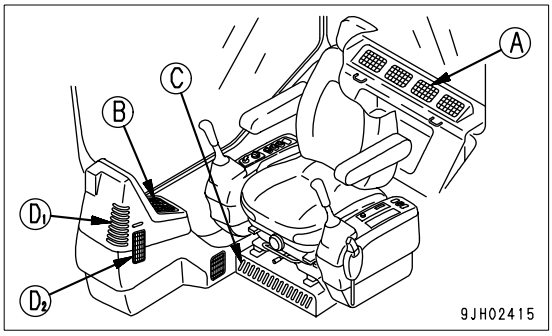
3. Press FRESH/RECIRC selector switch (6) and set it to take in fresh air.



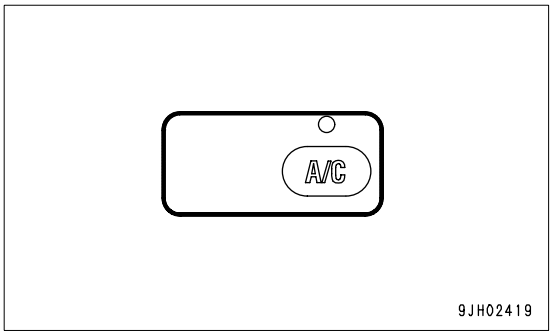
4. Press temperature setting switch (3) and set the set temperature display on the display monitor to the maximum heating temperature of 32°.



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



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



Use Air Conditioner With Care

NOTICE

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

Ventilation

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so open the window and turn the lever to FRESH for a while to remove the smoke while continuing the cooling.

When running the air conditioner for a long time, turn the lever to the FRESH position once an hour to carry out ventilation and cooling.

Temperature Control

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

Air Conditioner Maintenance

When carrying out inspection of a machine equipped with an air conditioner, see the “CHECK AND ADJUST AIR CONDITIONER (4-32)“ and carry out inspection according to the table.

Other Functions

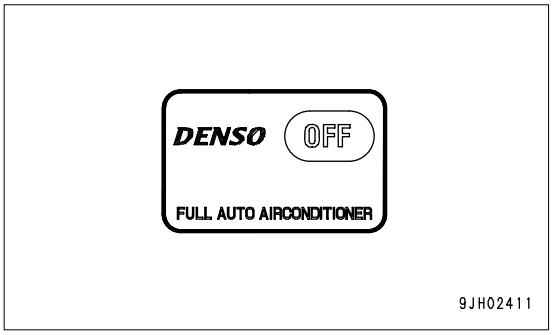
Self-diagnostic Function

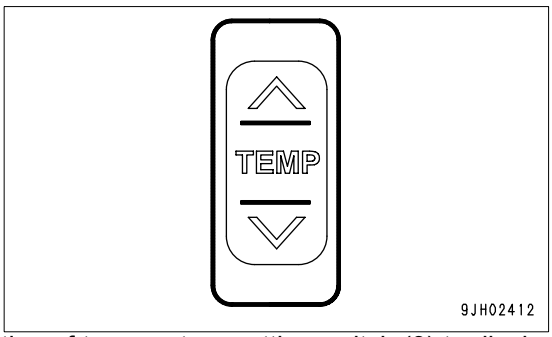
It is possible to carry out troubleshooting of the various sensors and equipment used on the air conditioner.

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

   <Monitor display and failure mode>

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



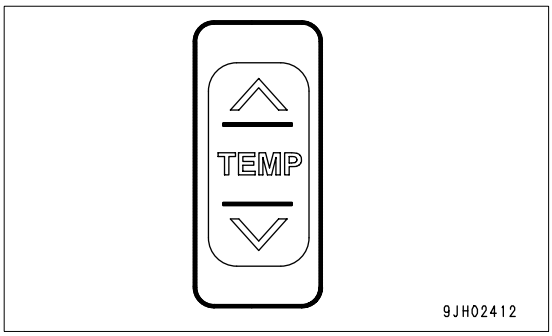


- When more than one failure is detected, press the "ˆ" or "Ÿ" portion of temperature setting switch (3) to display the failures in turn.
- After completing the troubleshooting, press OFF switch (1) again to return to the normal display.

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

Function To Switch Set Temperature Display Between Fahrenheit And Celsius

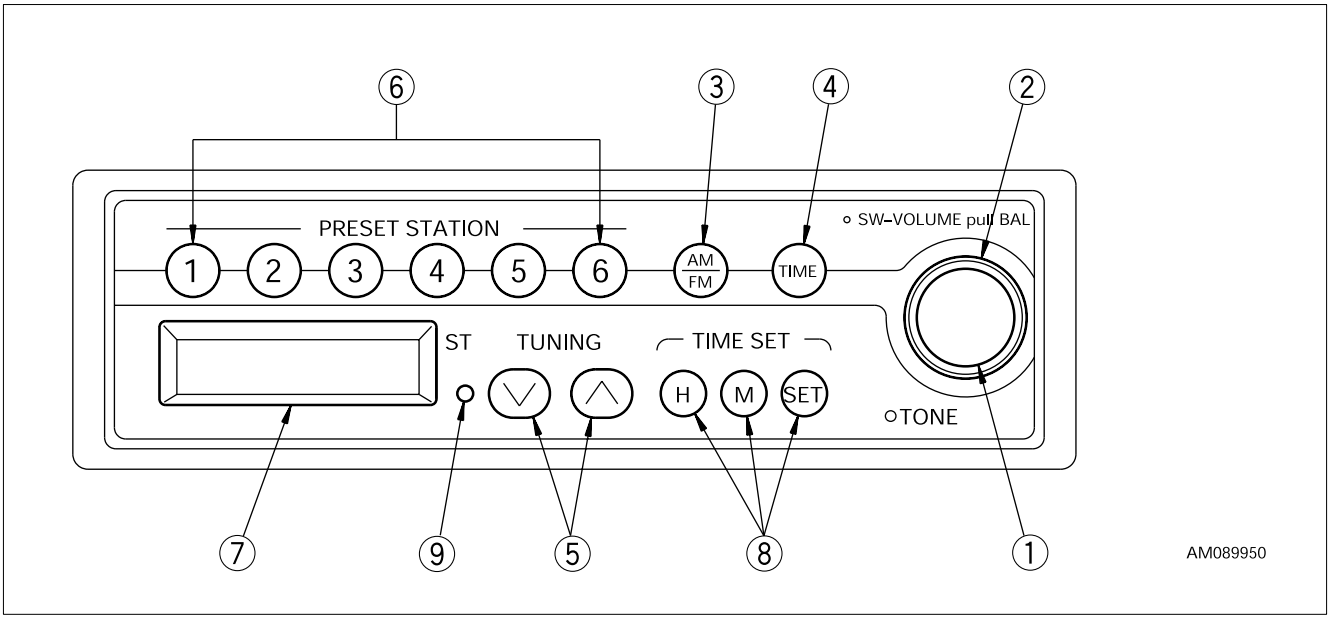
It is possible to switch the set temperature display between °F and °C.
If the “⁄“ and “Ÿ“ portions of temperature setting switch (3) are pressed at the same time for more than 5 seconds while the fan is running, the temperature display will switch between °F and °C.
(Note that the unit is not displayed.)



s	Liquid crystal display range
°C	18° to 32°
°F	64 to 90

RADIO

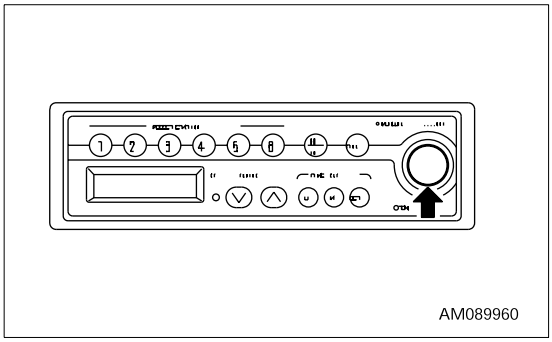
Control Panel



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

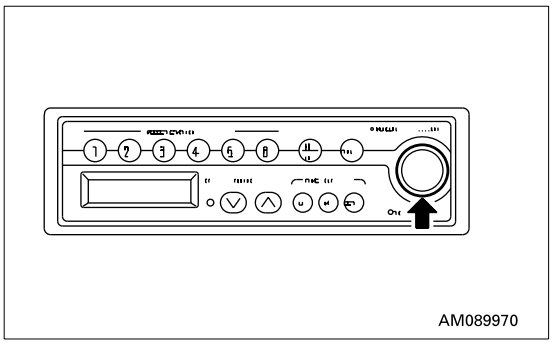
Power Switch/Volume Control (SW-VOLUME) and Balance (Pull BAL) Knob

Press this knob (1) to turn the power for the radio on. The frequency is displayed on display (7). Press again to turn the power off.
Turn the knob to adjust the volume as follows.
Turn CLOCKWISE to INCREASE volume
Turn COUNTERCLOCKWISE to REDUCE volume
If the knob is pulled until it locks, it can be turned to the left or right to adjust the balance of the left and right speakers.
Turn CLOCKWISE to increase volume from RIGHT speaker
Turn COUNTERCLOCKWISE to increase volume from LEFT speaker
After adjusting the left and right balance, press lightly to return the knob to its original position. (If it is left pulled out, the overall volume cannot be adjusted.)



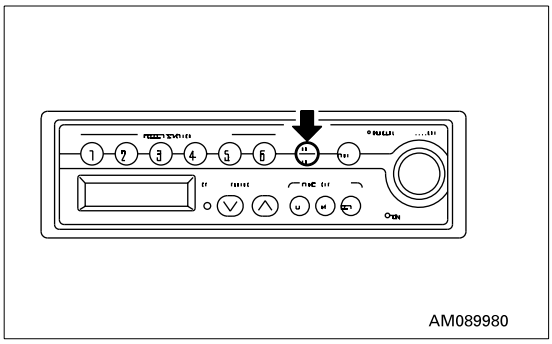
Tone Control Knob (TONE)

Turn the knob (2) to adjust the tone as follows.
Turn CLOCKWISE to emphasize the high sounds.
Turn COUNTERCLOCKWISE to suppress the high sounds.


AM089970

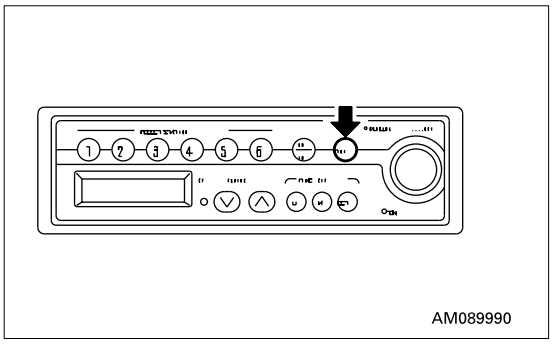
FM/AM Selection Button (AM/FM)

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


AM089980

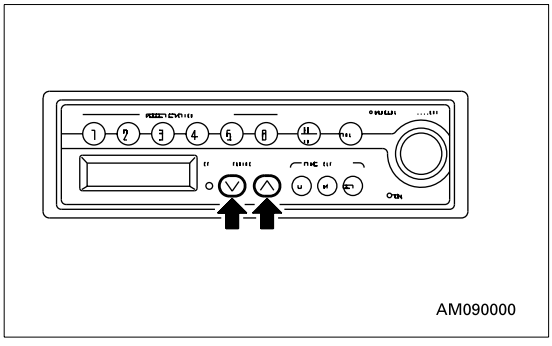
Display Selection Button (TIME)

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


AM089990

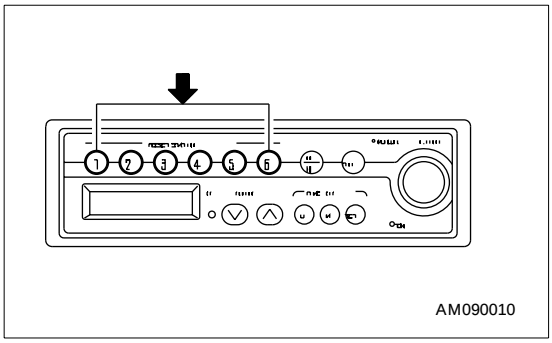
Tuning Button (TUNING) Manual Tuning (MANUAL)

Use this buttons (5) to change the frequency.
For further details, see “Controls Of Radio (3-58)“


AM090000

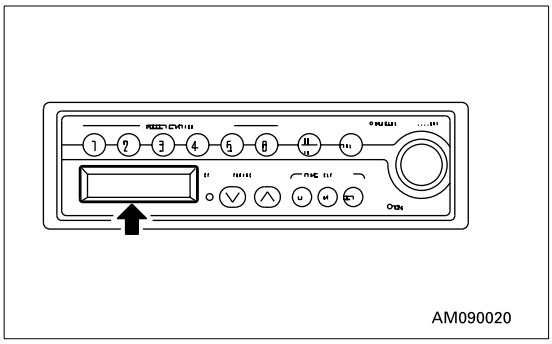
Preset Station Buttons (1, 2, 3, 4, 5, 6)

If these buttons (6) are set to the frequency of the desired broadcasting station, the station can be selected at a touch.
For details of the method of presetting, see “Preset Station Buttons (3-58)“.


AM090010

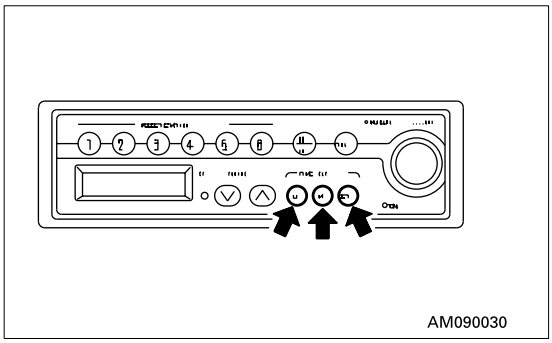
Display

In this display (7), receiving band, frequency, preset No. and time are shown.


AM090020

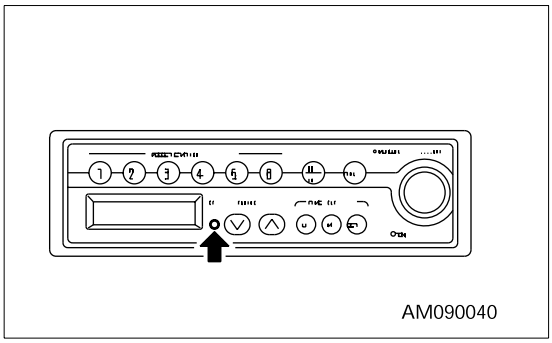
Time Reset Button

This button (8) is used to correct the time.
H: Hour
M: Minute
SET: Sets to start of hour (00 minutes)


AM090030

Stereo Indicator (ST)

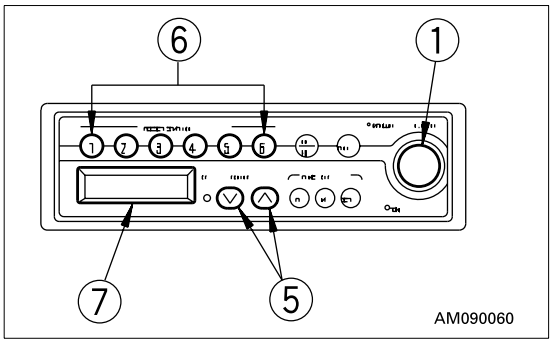
This lamp (9) lights up when a stereo broadcasting is picked up when receiving an FM broadcasting station.


AM090040

Controls Of Radio

Preset Station Buttons

1. Press power switch (1) and display the frequency on display (7).
2. Turn the tuning button (5) (manual, auto) to adjust to the desired frequency.
3. Select a preset button to use for recording the frequency setting, and keep that button pressed for at least 1.5 seconds. The sound will disappear, but when the setting is recorded, the sound will appear and the preset number will appear on display (7) to show that the station has been preset.
   After completion of presetting, press preset button (6), and release it within approx. 1.5 seconds. The setting will change to the frequency of the broadcasting station recorded for that button. One AM station and one FM station can be recorded for each preset button.



Manual Tuning

Press tuning button (5) and set to the desired frequency.
Each time the button is pressed, the frequency will move up or down in steps of 9 kHz (AM) or 0.1 MHz (FM).
∨ button: Move to a lower frequency station
∧ button: Move to a higher frequency station

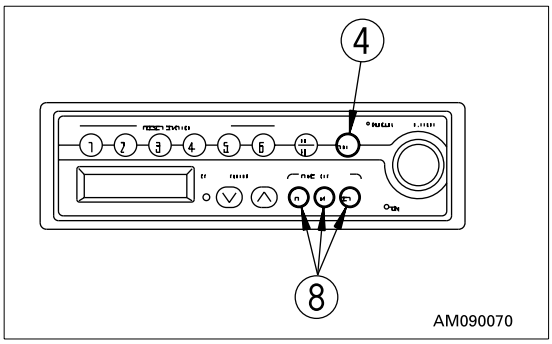
- If the frequency reaches the top or bottom limit, it will automatically change as follows: top limit Æ bottom limit, or bottom limit Æ top limit

Automatic Tuning

Keep tuning button (5) pressed for at least 0.5 seconds. When a broadcasting station is picked up, it will automatically stop. To search for the next station, press tuning button (5) again for at least 0.5 seconds.
∨ button: Move to a lower frequency station
∧ button: Move to a higher frequency station

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

Setting Correct Time



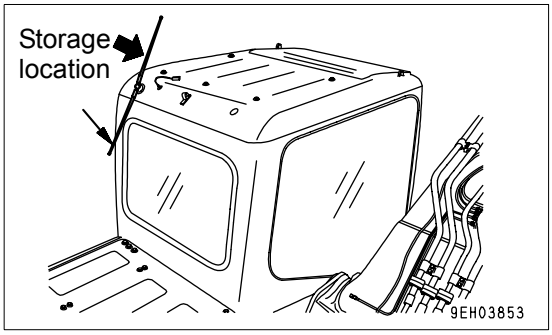
1. Press display selector button (4) to display the time.
   After 5 seconds, the display will return to the frequency display and the time cannot be corrected. If this happens, press display selector button (4) again.
2. Press time adjustment button (8) and adjust the hour and minute.
   H button: Adjusts hour (advances one hour each time it is pressed)
   M button: Adjusts minute (advances one minute each time it is pressed)
   If the H or M button are kept pressed, the time will advance continuously until the button is released.
   SET button: Every time SET button is depressed, hour and minute are reset in the following manner.
   If the minute display is between 0 and 05, the minute reading will return to 00.
   If the minute display is between 55 and 59, the minute display will return to 00 and the hour will advance by
   If the minute display is between 06 and 54, no resetting can be made.
   Example 10:05 → 10:00
   10:59 → 11:00
   10:26 → 10:26

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

Antenna

NOTICE

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



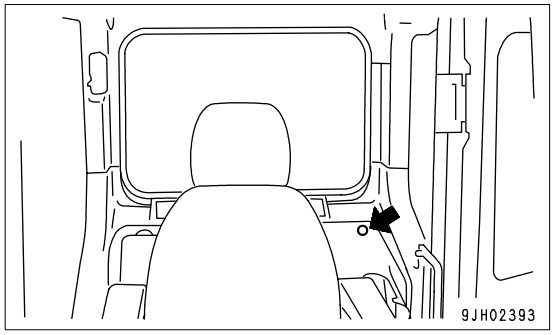
Use Radio With Care

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

AUXILIARY ELECTRIC POWER

12 V power source

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

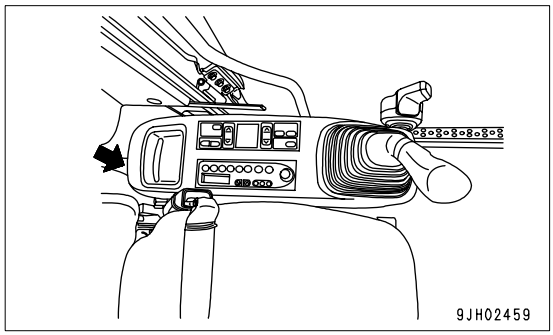


FUSE

NOTICE

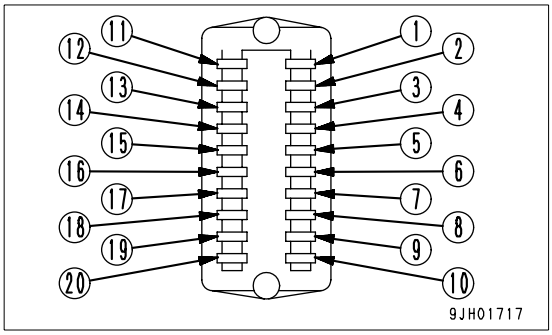
Before replacing a fuse, be sure to turn off the starting switch.

The fuses protect the electrical equipment and wiring from burning out.
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.
Replace the fuse with another of the same capacity.



Fuse Capacities and Circuit Names

No.	Fuse capacity	Name of circuit
(1)	10A	Controller
(2)	20A	Electromagnetic valve
(3)	10A	PPC hydraulic lock solenoid
(4)	10A	Window washer, cigarette lighter
(5)	10A	Horn
(6)	10A	Spare
(7)	10A	Rotating lamp (arm crane solenoid)
(8)	10A	Light relay
(9)	10A	Radio, speaker, left knob switch
(10)	10A	Spare
(11)	20A	Air conditioner unit
(12)	20A	Monitor, wiper monitor
(13)	20A	Light, light relay drive
(14)	10A	10 A Optional power source (1)
(15)	10A	Optional power source (2), travel alarm, 12V power port
(16)	10A	Radio backup
(17)	20A	Monitor (normal power source)
(18)	10A	Starting switch
(19)	10A	Room lamp
(20)	10A	Spare

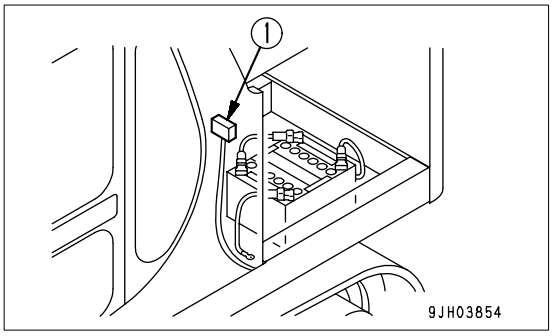


FUSIBLELINK

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

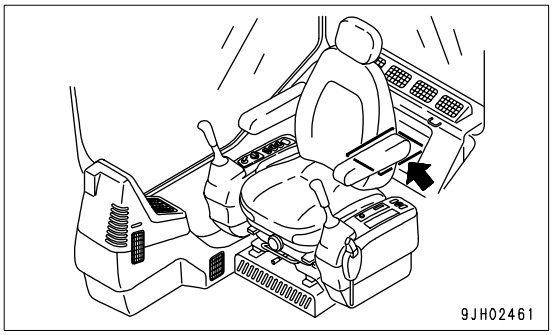
REMARK

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



CONTROLLERS

controller installed.

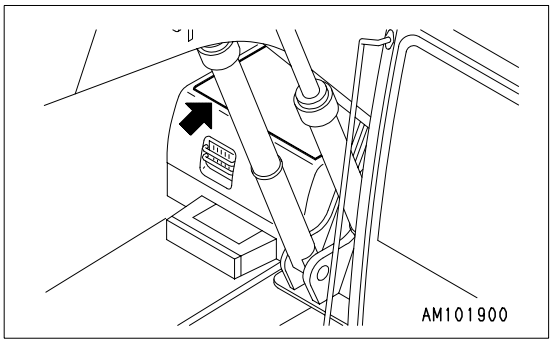


NOTICE

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

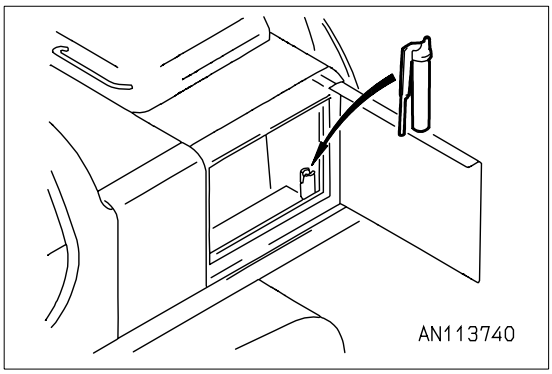
TOOL BOX

This is used for keeping the tools.



GREASE GUN HOLDER

This is inside the battery room door on the left side of the machine.
When not using the grease gun, fit it in this holder.



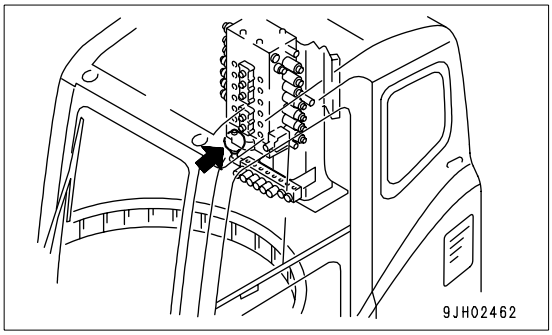
ACCUMULATOR

⚠ WARNING

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

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

This machine is equipped with an accumulator in the control circuit. The accumulator is a device to store oil pressure for the control circuit, and when it is installed, the control circuit can be actuated for a short time even after the engine is stopped. Due to this device, the work equipment lowers under its own weight, if the control lever is moved in the lowering direction.
The accumulator is installed to the position shown in the diagram on the right.



Releasing Hydraulic Pressure With Accumulator

1. Place the work equipment on the ground. Close the crusher attachment jaws, etc.
2. Stop the engine.
3. Turn the starting switch to the ON position.
4. Move the safety lock lever to the free position. Move the work equipment control lever and the attachment control pedal to full stroke back and forth, right and left so as to release the pressure in the control circuit.
5. Move the safety lock lever to the lock position. Lock the control lever and attachment control pedal.

MACHINE OPERATIONS AND CONTROLS

BEFORE STARTING ENGINE

Walk-Around Checks

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

⚠ WARNING

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

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, hoses
   Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hose. 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 water from the cooling system. If any abnormality is found, repair it.

4. Check for oil leakage from hydraulic equipment, hydraulic tank, hoses, joints
   Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.

5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.
   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 abnormality in gauges, monitor.
   Check that there is no abnormality in the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

8. Clean, check rear view mirror
   Check that there is no damage to the rear view mirror. If it is damaged, replace it with a new mirror. Clean the surface of the mirror and adjust the angle so that the area at the rear can be seen from the operator's seat.

9. 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.

10. Check bucket with hook (if equipped) for damage.
    Check that there is no damage to the hook, guide, or hook mount. If any abnormality is found, please contact your Komatsu distributor for repair.

Checks Before Starting

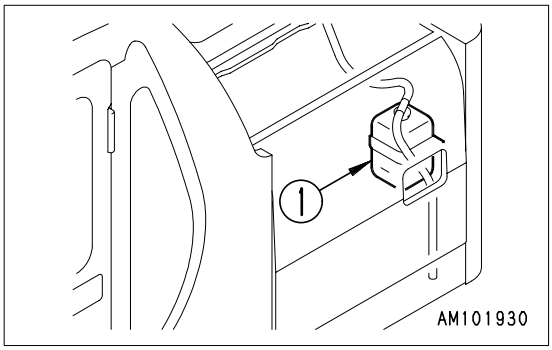
Always carry out the items of the checks in this section before starting the engine each day.

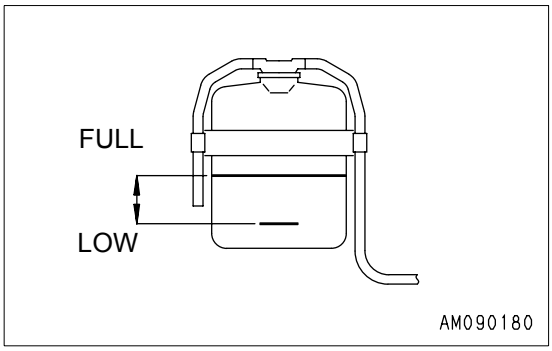
Check Coolant Level, Add Water

⚠ WARNING

- **Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.**
- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to 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 door at the rear left of the machine, and check if the cooling water in sub-tank (1) (shown in the diagram on the right) is between the FULL and LOW marks. If the water level is low, add water to the FULL level through the filler port of sub-tank (1).
2. After adding water, tighten the cap securely.
3. If the sub tank is empty, there is probably leakage of water. After inspecting, repair any abnormality immediately. If there is no abnormality, check the water level in the radiator. If the water level is low, add water to the radiator, then fill the reserve tank (1).



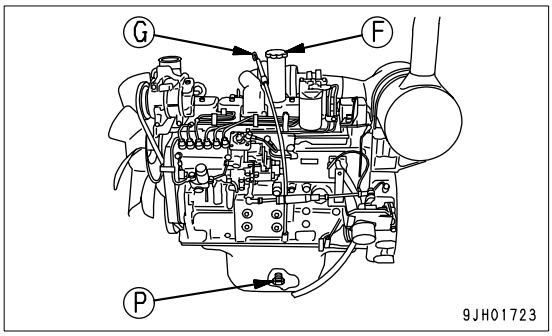


Check Oil Level In Engine Oil Pan, Add Oil

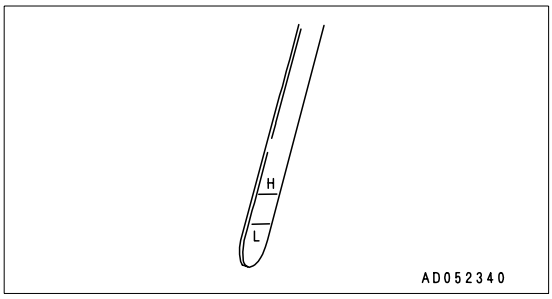
⚠ WARNING

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

1. Open the engine hood on the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Insert dipstick (G) fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick (G).
   If the oil level is below the L mark, add engine oil through oil filler (F).



5. If the oil is above the H line, open drain valve (P) at the bottom of the engine oil pan, drain the excess engine oil, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine hood.



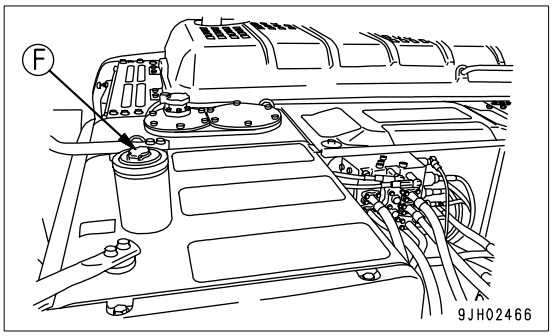
REMARK
When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
If the machine is at an angle, make it horizontal before checking.

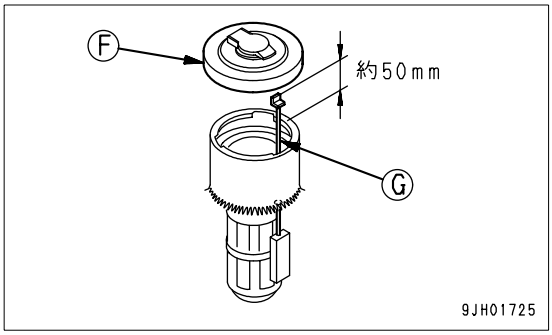
Check Fuel Level, Add Fuel

⚠ WARNING

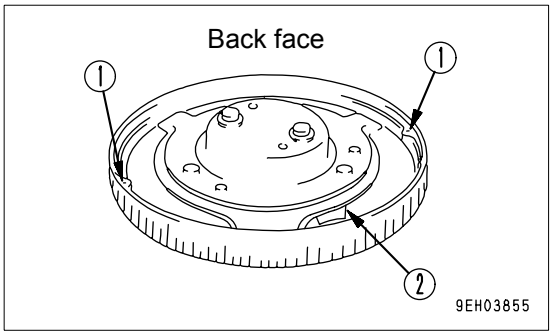
When adding fuel, never let the fuel overflow. This may cause a fire. If any fuel is spilled, wipe it up completely. Never bring flames near fuel because it is highly flammable and dangerous.

1. Open fuel filler cap (F) of the fuel tank.
2. If fuel filler cap (F) is opened, float gauge (G) rises to the fuel level. Check that the fuel tank is full. Check the fuel level visually and with float gauge (G).
3. If the fuel tank is not full, supply fuel through the fuel filler until float gauge (G) rises to the maximum position.
   - Fuel tank capacity: 280 liters (73 US gallons)
   - Position of tip of float gauge (G) when tank is full: Approx. 50 mm (2 inches) from top surface of fuel tank
4. After adding fuel, push float gauge (G) straight down with fuel filler cap (F). Be careful not to get float gauge (G) caught in the tab of fuel filler cap (F), and tighten fuel filler cap (F) securely.



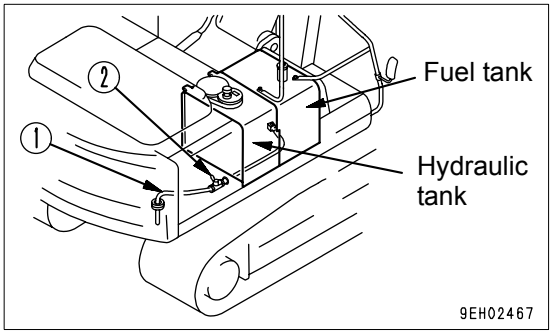


REMARK
If breather hole (1) in the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.



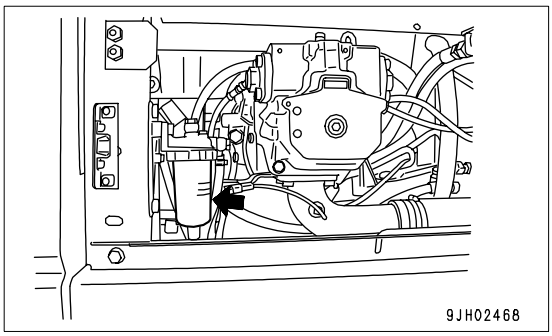
Drain Water And Sediment From Fuel Tank

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

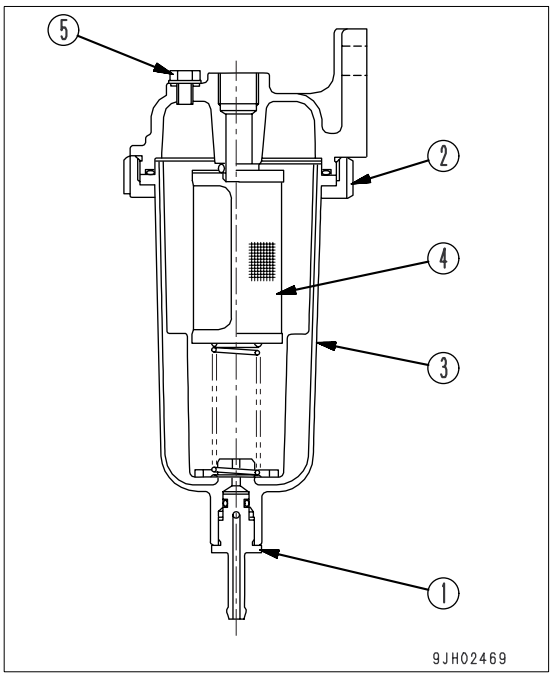


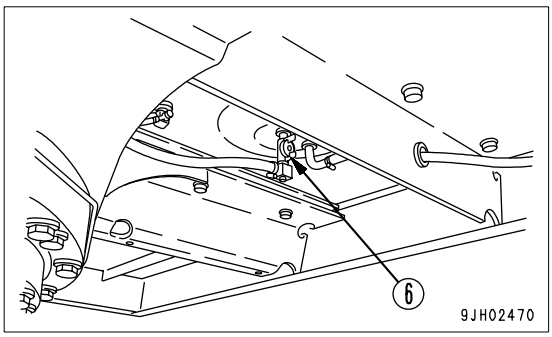
Check For Water and Sediment In Water Separator, Drain Water

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



4. Prepare a container to catch the drained fuel and set it under the water separator.
5. Close fuel valve (6) at the bottom of the fuel tank.
6. Remove air bleed plug (5) at the top of the water separator.
7. Loosen drain valve (1) at the bottom of the water separator, and drain the water and sediment into the container.
8. Loosen ring nut (2), then remove filter case (3).
9. Remove element (4) from the separator base.
10. Wash element (4) and filter case (3) in clean diesel oil.
11. Check element (4) and replace it if it is damaged.
12. When installing element (4), perform Steps 5 and 9 in the opposite order.
    Tightening torque of ring nut (2):
    40 ± 3 N·m (4.1 ± 0.3 kgf·m)
13. Loosen air bleed plug (5) then Fill filter case (3) with fuel. When the fuel comes out from air bleed plug (5), tighten air bleed plug (5).



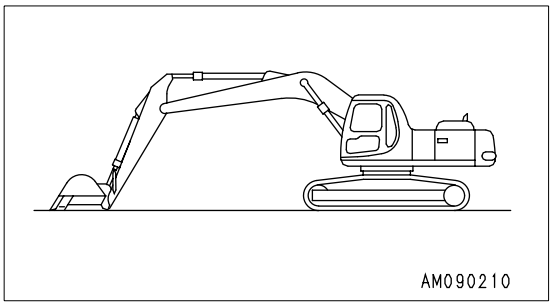


Check Oil Level In Hydraulic Tank, Add Oil

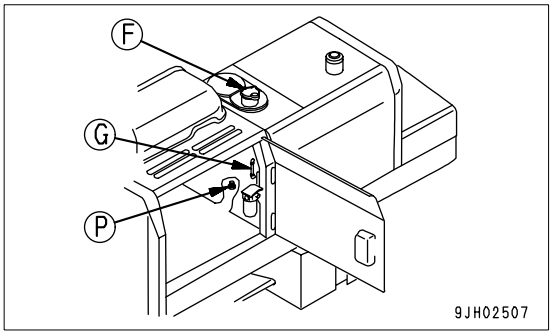
⚠ WARNING

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

1. If the work equipment is not in the condition shown in the diagram on the right, start the engine, run the engine at low speed, retract the arm and bucket cylinder rods fully, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.
2. Within 15 seconds after stopping the engine, move each control lever (for work equipment and travel) to the full stroke in all directions to release the internal pressure.

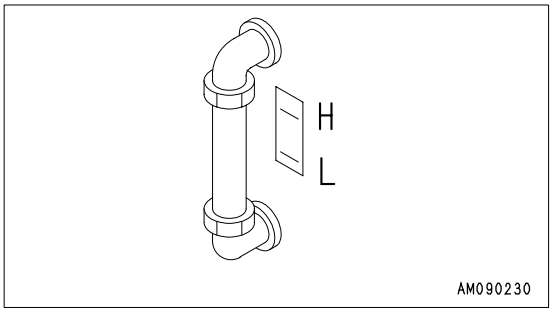


3. Check sight gauge (G) from the right window installed to the operator's compartment. The oil level should be between the H and L lines.



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

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



REMARK
The oil level will vary depending upon the oil temperature. Accordingly, use the following as a guide:
- **Before starting operation: Between H and L levels**
- **(Oil temperature 10 to 30°C (50 to 86°F))**
- **Normal operation: around H level**
- **(Oil temperature 50 to 80°C (122 to 176°F))**

Check Electric Wirings

⚠ WARNING

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

Check that there is no damage to the fuses; that fuses of the specified capacity are used; that there is no disconnection or trace of short-circuiting on the electric wiring and no damage to the covering. Check also that there is no loosened terminal. If any, tighten it again.
Moreover, pay particular attention to the electric wiring when checking the battery, engine starting motor and alternator.
Be sure to check that there is no inflammable material accumulated around the battery. If present, remove it without fail.

Check Function Of Horn

1. Turn the starting switch to the ON position.
2. Confirm that the horn sounds immediately when the horn button is pressed.
   If the horn does not sound, please contact your Komatsu distributor for repair.

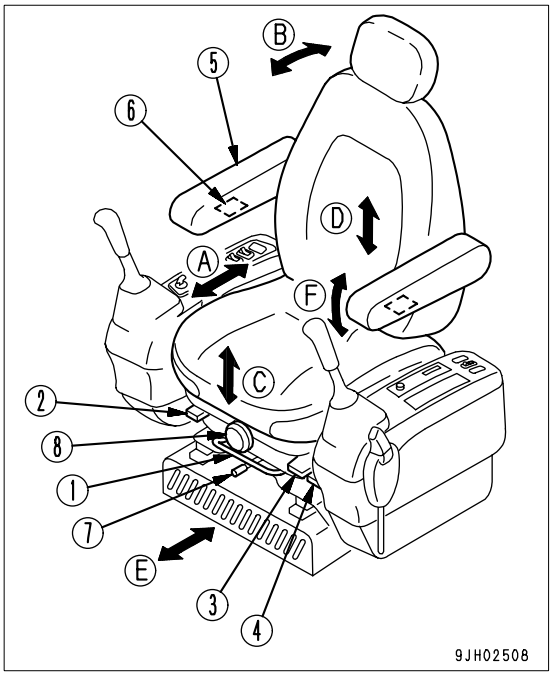
Adjustment

⚠ WARNING

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

Seat Adjustment

(A) Fore-and-aft adjustment
Pull lever (1) up, set the seat to the desired position, then release the lever.
Fore-and-aft adjustment: 160 mm (16 stages)



(B) Adjusting reclining

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

Pull up lever (2) and set the seat back to a position which is comfortable for operation, then release the lever.
Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.

(C) Adjusting seat tilt

- Forward tilt

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

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

- Rear tilt

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

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

Amount of tilt: Up 13°, down 13°

- Adjusting seat height

It is possible to move the seat up or down by combining adjustments forward tilt and rear tilt.
After setting the forward tilt or rear tilt to the desired height, operate the opposite part to set the seat horizontal then secure in position.
Height adjustment: 60 mm
(D) Adjusting armrest angle
Armrest (5) can be made to spring up by hand approx. 90°.
In addition, by turning the bottom (6) of the armrest by hand it is possible to make fine vertical adjustments of the armrest angle.
Armrest adjustment angle: 25°.

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

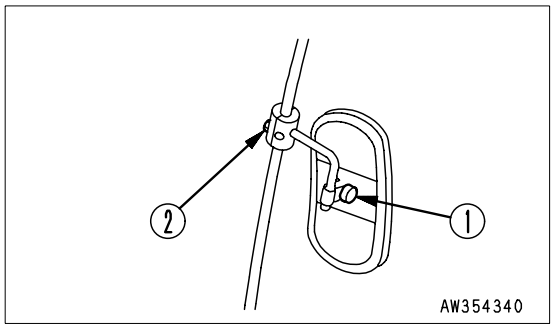
(E) Overall fore-and-aft adjustment of seat
Move lever (7) to right, set to the desired position, then release the lever. In this case, the operator's seat, left and right control levers, and safety lock lever all slide together.
Fore-and-aft adjustment:180 mm (9 stages)
(F) Adjusting suspension (if equipped)
Turn knob (8) to the right to make the suspension harder, or to the left to make the suspension softer. Adjust the reading of the dial to match the operator's weight and select the optimum suspension.

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

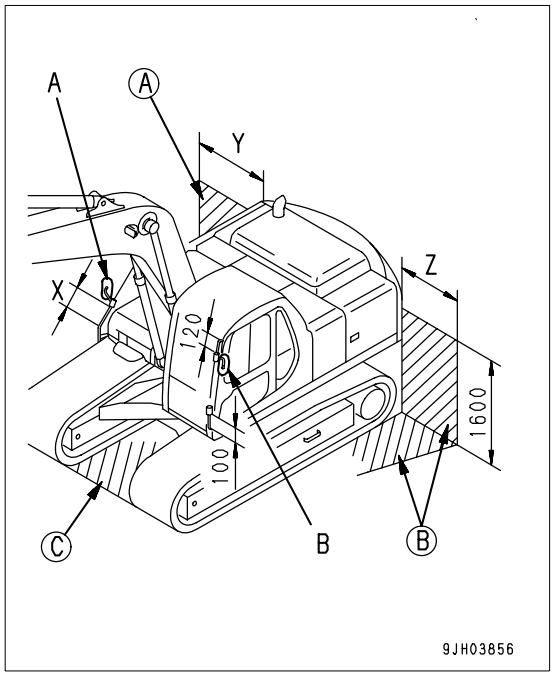
Rear view Mirrors

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

- Adjust the mirror mount so that it is possible to see people (or objects with a height of 1 m or a diameter of 30 cm) at the rear left and right of the machine
- Install the mirror to the dimensions listed in the table below. Recognition areas are also shown in the table for reference.



Mounting position X: 100 mm
Range of view Y (right side): 1500 mm
Range of view Z. (left side): 1830 mm
Mirror A: Must be able to see hatched area (A)
Mirror B: Must be able to see hatched area (B)



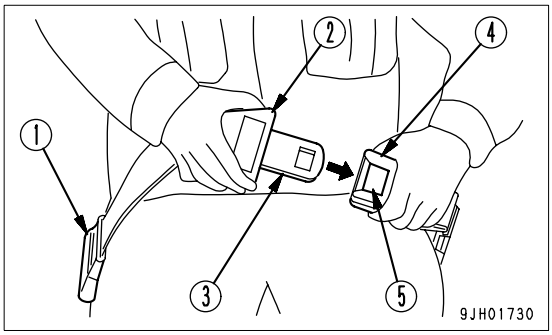
Seat Belt

⚠ WARNING

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

Fastening and Removing

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



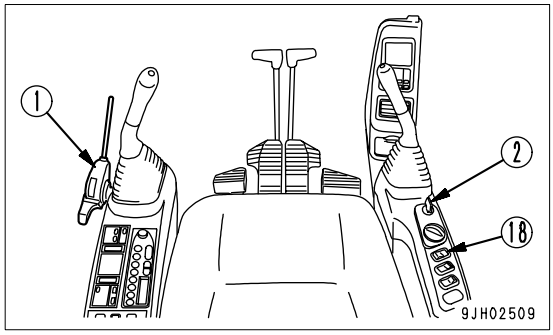
Hold grip (2) and pull the belt out from wind-in device (1), check that the belt is not twisted, then insert tongue (3) into buckle (4) securely.
When doing this, pull the belt lightly to check that it is properly locked.

Press button (5) in buckle (4), and remove tongue (3) from buckle (4).
The belt is automatically wound in, so hold grip (2) and return the belt slowly to wind-in device (1).

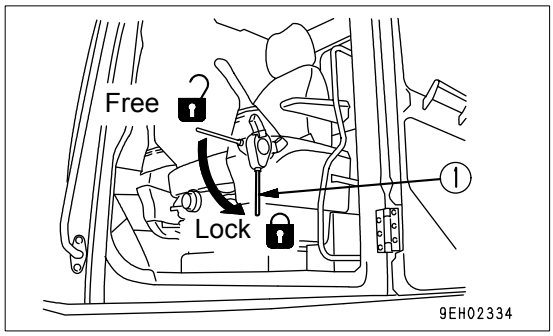
Operations Before Starting Engine

⚠ WARNING

- **When starting the engine, check that the safety lock lever is securely at the LOCK position.**
- **If the control levers are not locked and they are touched by accident when starting the engine, the work equipment may move unexpectedly, and this may lead to a serious accident.**

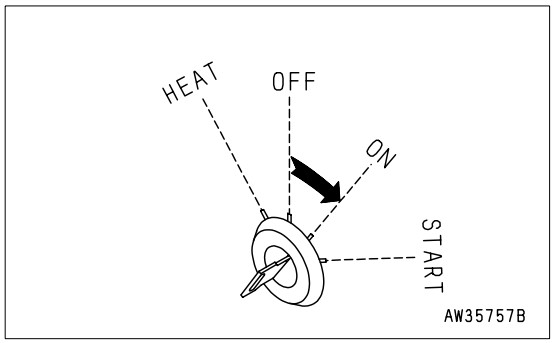


1. Check that safety lock lever (1) is at the LOCK position.

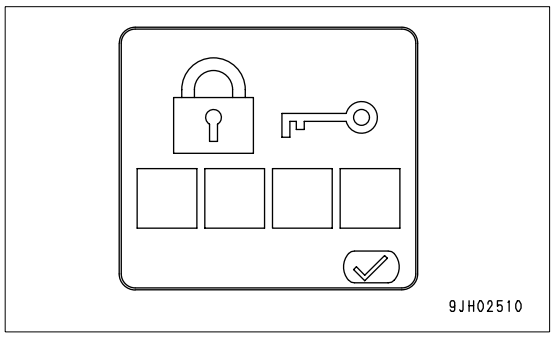


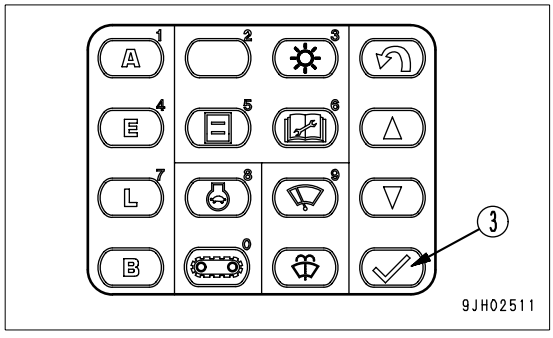
2. Check the position of each levers.
   Set the control lever to the neutral position.

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



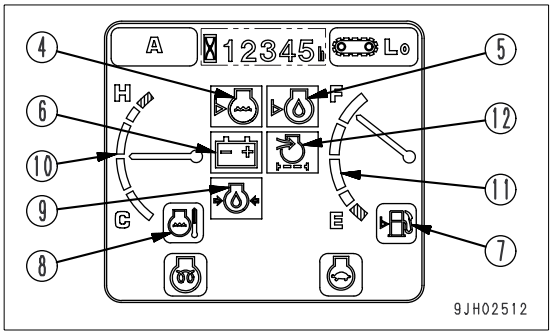
- If a password has been set, the input display screen is shown on the monitor screen.
  After inputting the password, press input confirmation switch (3).



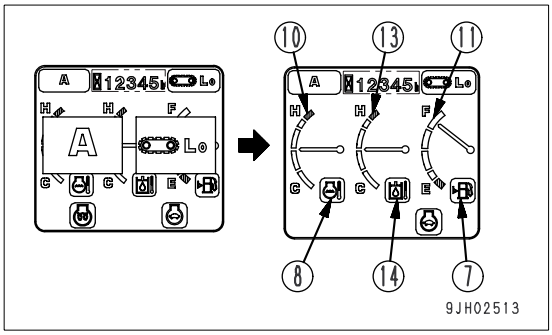


1) The buzzer sounds for approx. 1 second, and the following monitors and meters light up for approx. 3 seconds.
   - Radiator water level monitor (4)
   - Engine oil level monitor (5)
   - Charge monitor (6)
   - Fuel level monitor (7)
   - Engine water temperature monitor (8)
   - Engine oil pressure monitor (9)
   - Engine water temperature gauge (10)
   - Fuel gauge (11)
   - Air cleaner clogging monitor (12)

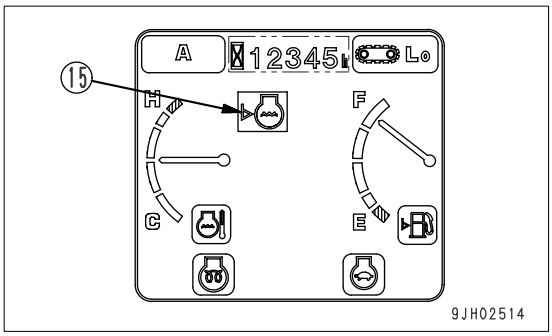
   If the monitors do not light up or the buzzer does not sound, there is probably a failure in the monitor, so contact your Komatsu distributor for repairs.



2) After approx. 3 seconds, the screen switches to the working mode/travel speed display monitor. Then it switches to the normal screen.
   - Fuel level monitor (7)
   - Engine water temperature monitor (8)
   - Engine water temperature gauge (10)
   - Fuel gauge (11)
   - Hydraulic oil temperature gauge (13)
   - Hydraulic oil temperature monitor (14)

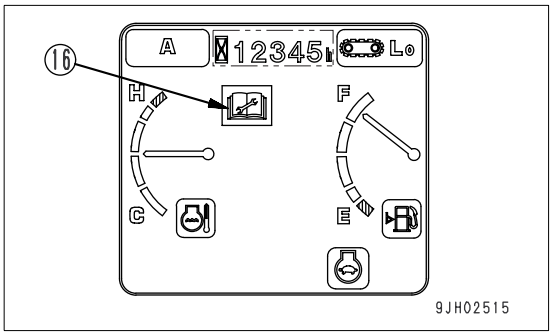


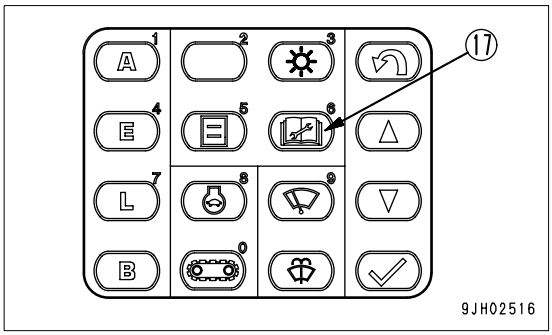
3) If the hydraulic oil temperature gauge goes out and caution lamp (15) stays lighted up red, carry out inspection immediately for the item which is lighted up red.



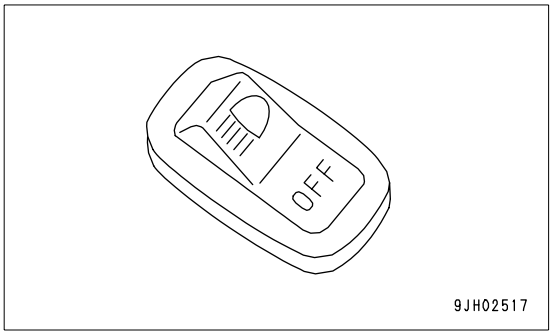
4) If there are any items where the maintenance time has passed, maintenance interval monitor (16) lights up for 30 seconds. Press maintenance switch (17), check the item, then carry out maintenance immediately.

   For details of the method of checking the maintenance interval, see “Maintenance Switch (3-21)“ in the Explanation of components.





5) Press lamp switch (18) and check that the front lamp lights up.
If it does not light up, there is probably a blown bulb or disconnection, so contact your Komatsu distributor for repairs.

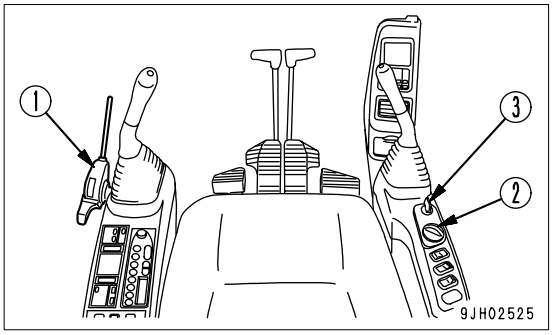


STARTING ENGINE

Normal Starting

⚠ WARNING

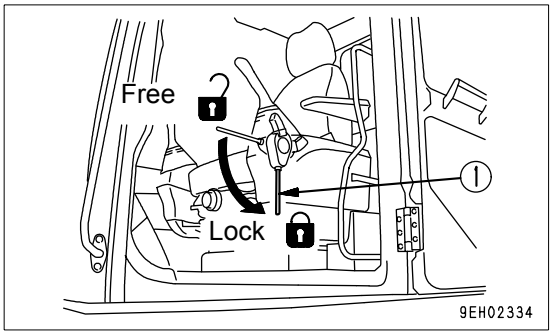
- **Start the engine only after sitting down in the operator's seat.**
- **Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.**
- **Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.**
- **Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.**



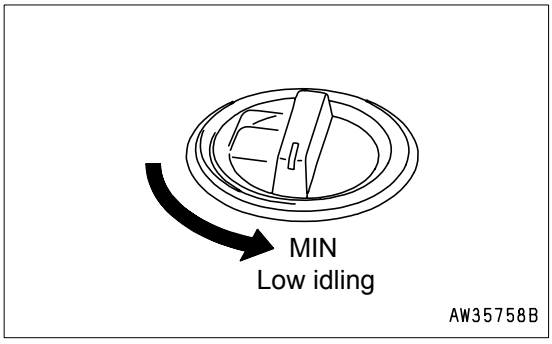
NOTICE

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

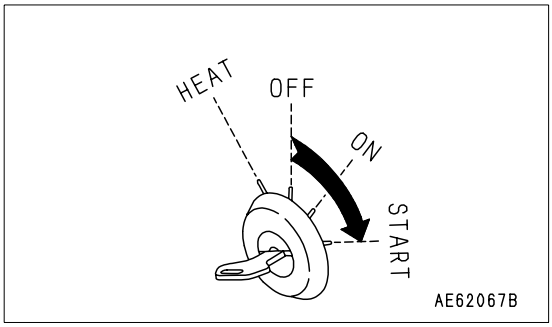
1. Check the safety lock lever (1) is at the LOCK position. If the safety lock lever is in the FREE position, the engine does not start.



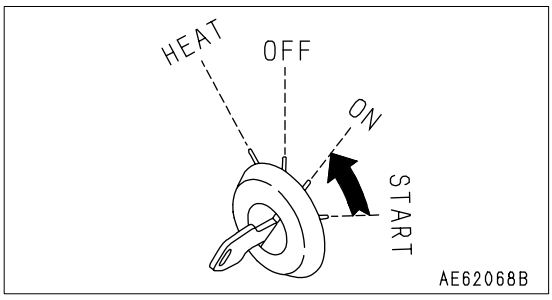
2. Set fuel control dial (2) at the low idling (MIN) position.
   If it is at the high idling (MAX) position, always change it to the low idling (MIN) position.



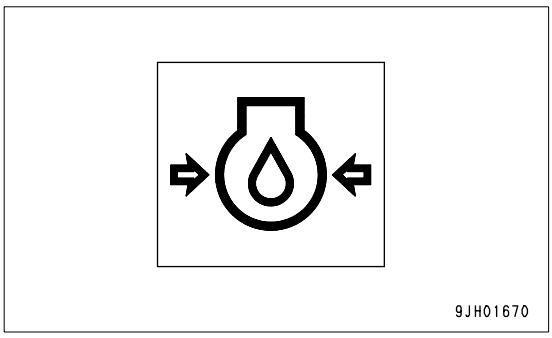
3. Turn the key in starting switch (3) to the START position. The engine will start.



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



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



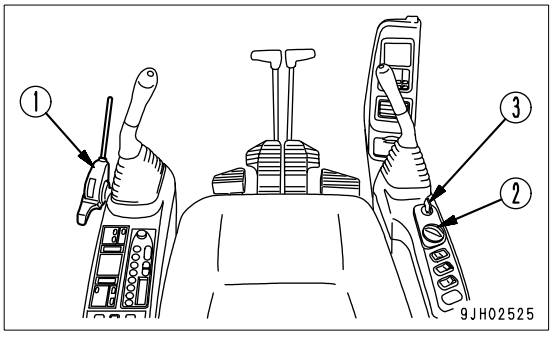
NOTICE
If the engine oil pressure monitor does not go out even after 4 to 5 seconds have passed, stop the engine immediately. Check the oil level, check for leakage of oil, and take the necessary action.

Starting Engine In Cold Weather

⚠ WARNING

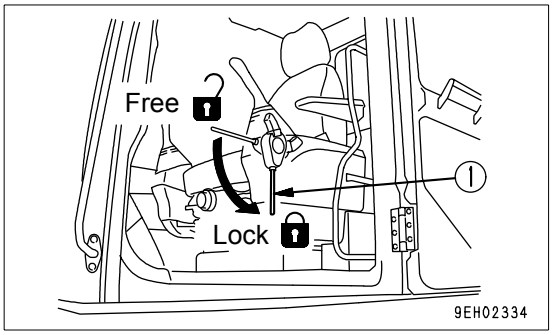
- **Start the engine only after sitting down in the operator's seat.**
- **Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.**
- **Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.**
- **Never sue 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.**

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

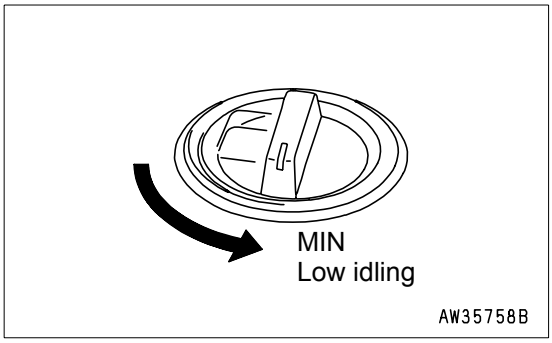


When starting in low temperatures, do as follows.

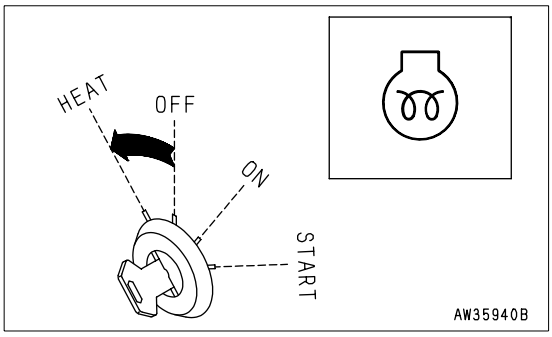
1. Check the safety lock lever (1) is at the LOCK position. If the safety lock lever is in the FREE position, the engine does not start.



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

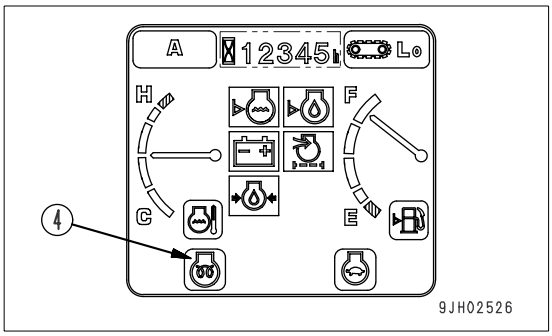


3. Hold the key in starting switch (3) at the HEAT position, and check that preheating monitor (4) lights up.
   After about 30 seconds, preheating monitor lamp (4) will flash to indicate that preheating is finished.

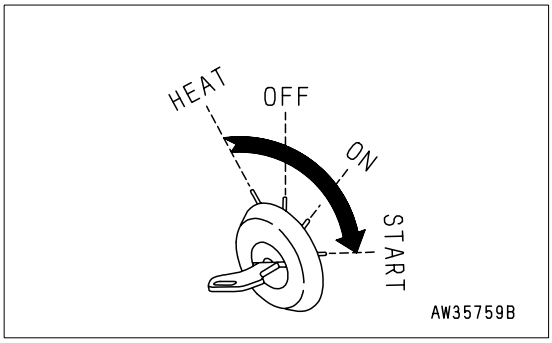


REMARK

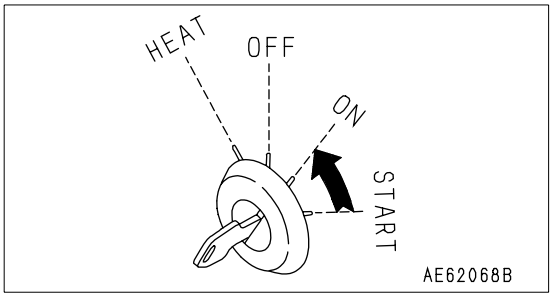
- **The monitors and gauges will light up also when the key is turned to the HEAT position, but this is not an abnormality.**
- **If the temperature is low, the monitor screen may become dark or it may take time for the display to appear, but this is not an abnormality.**



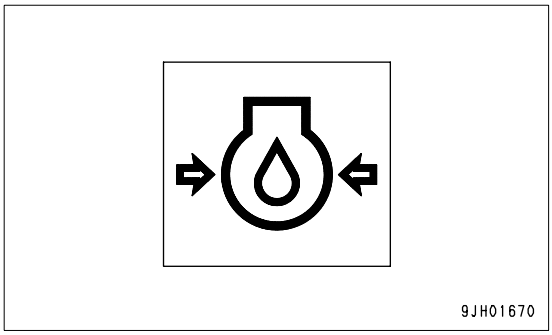
4. When preheating monitor (4) goes out, turn the key in starting switch (3) to the START position to start the engine.



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



6. After starting the engine, do not touch the work equipment control lever or travel pedal while the engine oil pressure monitor lamp is lighted up.



AFTER STARTING ENGINE

⚠ WARNING

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

Breaking-In The New Machine

⚠ CAUTION

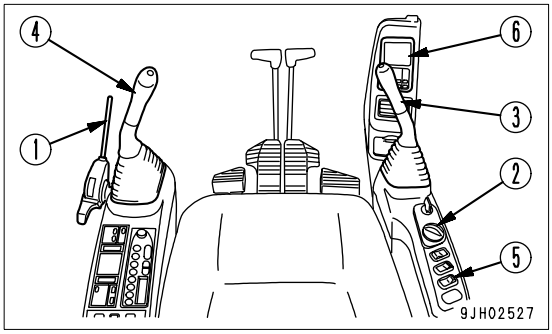
Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.
Be sure to breaking-in the machine for the initial 100 hours (as indicated by the service meter).
During breaking-in operations, follow the precautions described in this manual.

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

Warming-Up Operation

NOTICE

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

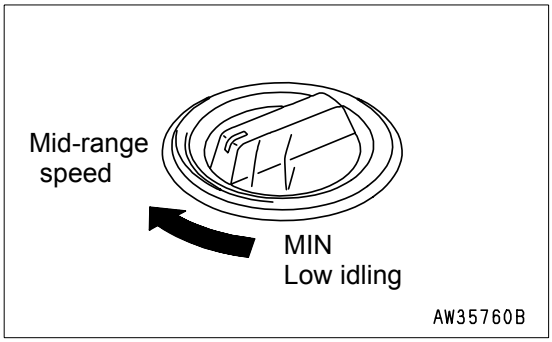


REMARK

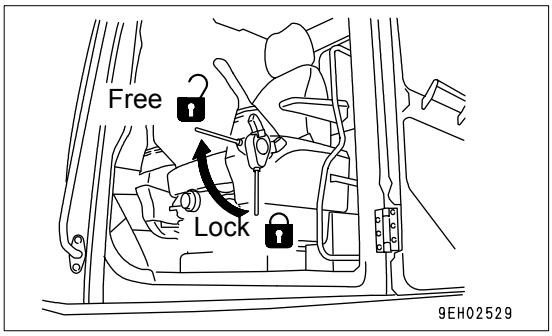
- **If the engine water temperature is above 30°C (86°F), to protect the turbocharger, the engine speed does not rise for 2 seconds after starting, even if the fuel control dial is turned.**
- **If the hydraulic oil temperature is low, the hydraulic oil temperature monitor display will be white.**

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

1. Set fuel control dial (2) to a point midway between low idling (MIN) and full throttle (MAX), and run the engine at a mid-range speed under no load until the engine water temperature monitor enters the green display.

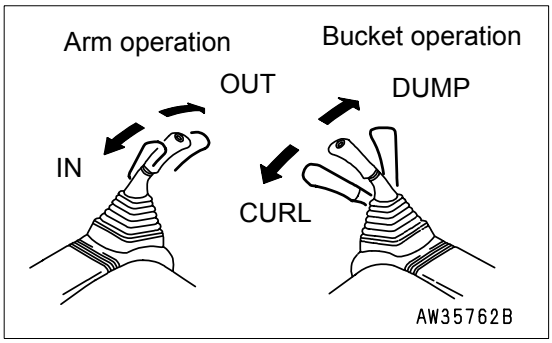


2. Set safety lock lever (1) to the FREE position and raise the bucket from the ground.



3. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of the stroke.

4. Operate the bucket for 30 seconds and the arm for 30 seconds in turn fully for 5 minutes.

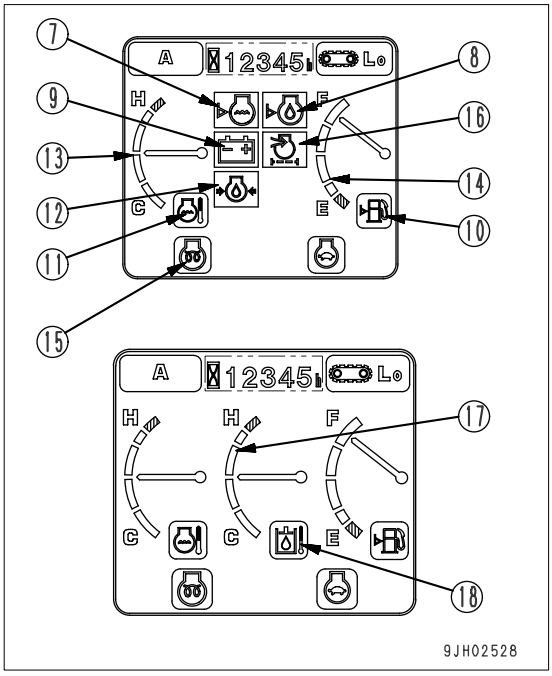


REMARK
If swing lock switch (5) is operated to the ON position, it is possible to raise the oil temperature faster.

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

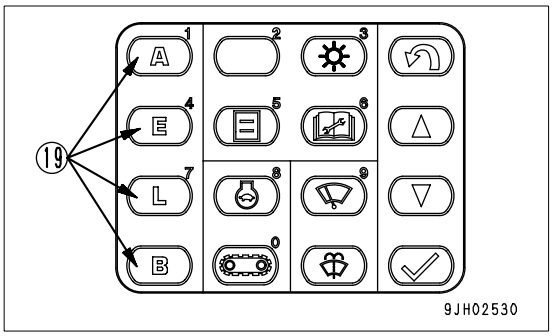
5. After carrying out the warming-up operation, check that all the gauges on machine monitor (6) and the caution lamps are in the following conditions.
   - Radiator water level monitor (7): OFF
   - Engine oil level monitor (8): OFF
   - Charge monitor (9): OFF
   - Fuel level monitor (10): Green display
   - Engine water temperature monitor (11): Green display
   - Engine oil pressure monitor (12): OFF
   - Engine water temperature gauge (13): Indicator in black range
   - Fuel gauge (14): Indicator in black range
   - Preheating monitor (15): OFF
   - Air cleaner clogging monitor (16): OFF
   - Hydraulic oil temperature gauge (17): Indicator in black range
   - Hydraulic oil temperature monitor (18): Green display

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



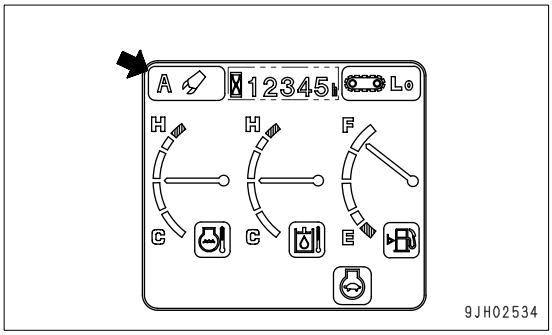
7. If air cleaner clogging monitor (16) is lighted up, clean or replace the element immediately.
   For details of the method of cleaning the element, see “CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (4-19)“.

8. Use working mode switch (19) on machine monitor (6) to select the working mode to be used.

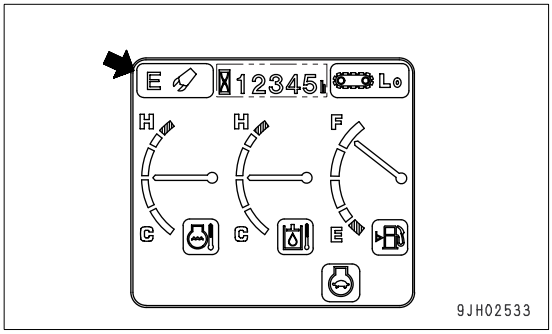


Working mode monitor display

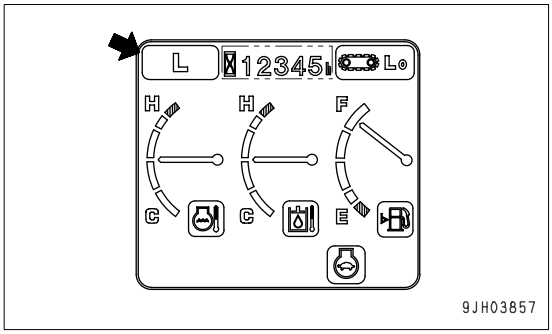
1) A mode
   For heavy-load operations



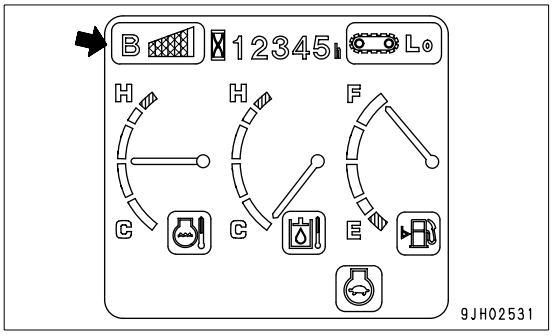
2) E mode
   For operations with emphasis on fuel economy



3) L mode
   For fine-control operations



4) B mode
For breaker operations



In Cold Weather Areas

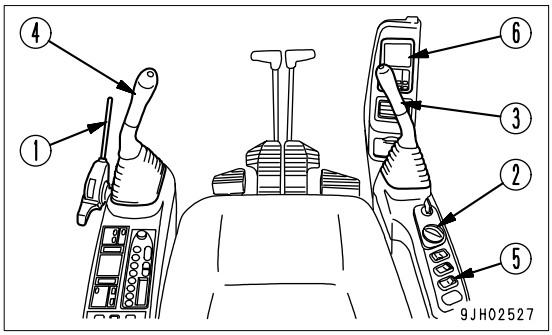
(AUTOMATIC WARMING-UP OPERATION)
When starting the engine in cold areas, carry out the automatic warming-up operation after starting the engine.

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

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

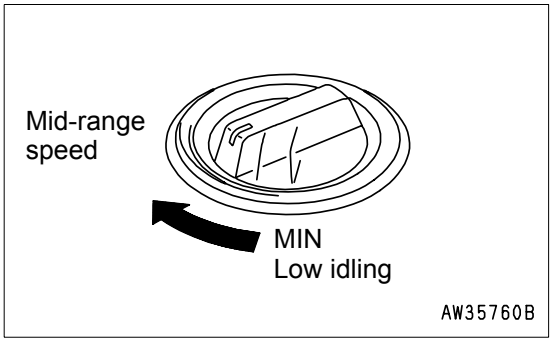
NOTICE

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

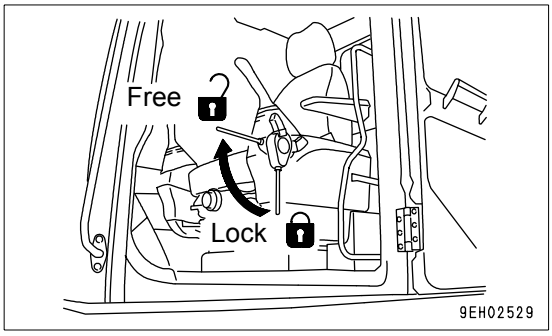


REMARK
If the hydraulic oil temperature is low, the hydraulic oil temperature monitor display will be white.

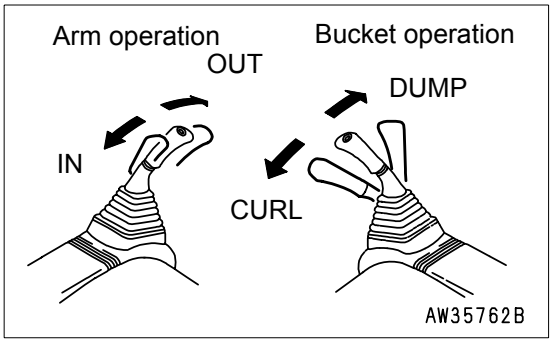
1. Turn fuel control dial (2) to the medium speed position.



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



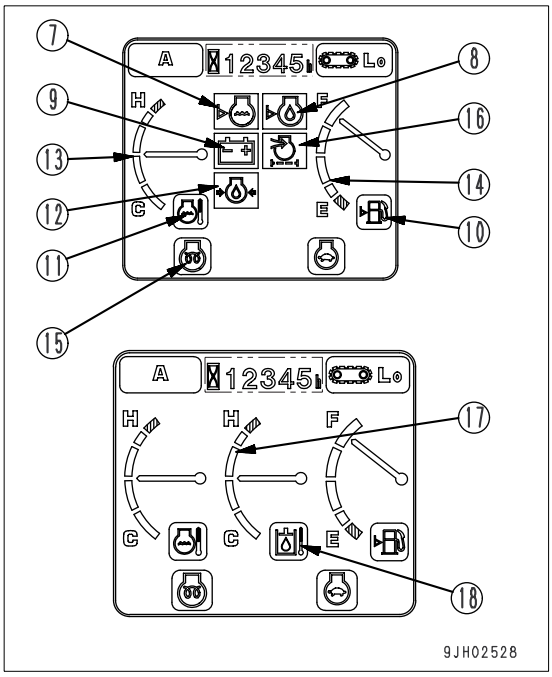
3. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of the stroke.
4. Operate the bucket for 30 seconds and the arm for 30 seconds in turn fully for 5 minutes.



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

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

5. After carrying out the warming-up operation, check that each gauge and monitor lamp is in the following condition.
   - Radiator water level monitor (7): OFF
   - Engine oil level monitor (8): OFF
   - Charge monitor (9): OFF
   - Fuel level monitor (10): Green display
   - Engine water temperature monitor (11): Green display
   - Engine oil pressure monitor (12): OFF
   - Engine water temperature gauge (13): Indicator in black range
   - Fuel gauge (14): Indicator in black range
   - Preheating monitor (15): OFF
   - Air cleaner clogging monitor (16): OFF
   - Hydraulic oil temperature gauge (17): Indicator in black range
   - Hydraulic oil temperature monitor (18): Green display

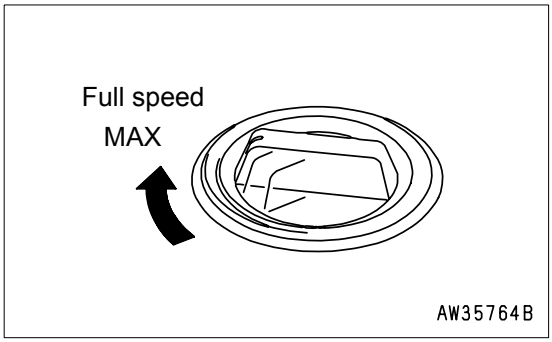


6. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, contact your Komatsu distributor.

7. If air cleaner clogging monitor (16) is lighted up, clean or replace the element immediately.
   For details of the method of cleaning the element, see “CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (4-19)“.

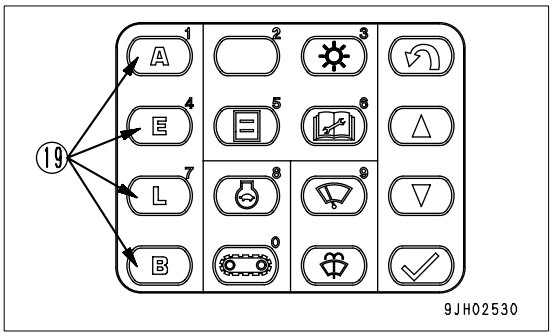
8. Turn fuel control dial (2) to the full speed (MAX) position and carry out the operation is Step 4. for 3 to 5 minutes.
9. Repeat the following operation 3 - 5 times and operate slowly.

   Boom operation RAISE ←→ LOWER
   Arm operation IN ←→ OUT
   Bucket operation CURL ←→ DUMP
   Swing operation LEFT ←→ RIGHT
   Travel (Lo) operation FORWARD ←→ REVERSE



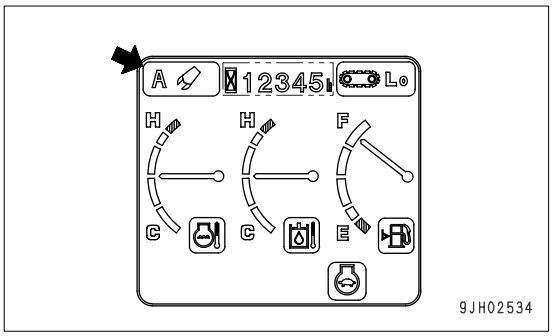
REMARK
If the above operation is not carried out, then may be a delay in response when starting or stopping the actuation of the travel, swing, or work equipment.

10. Use working mode switch (19) on machine monitor (6) to select the working mode to be used.

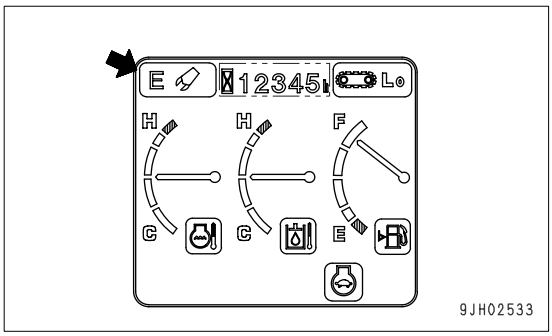


Working mode monitor display

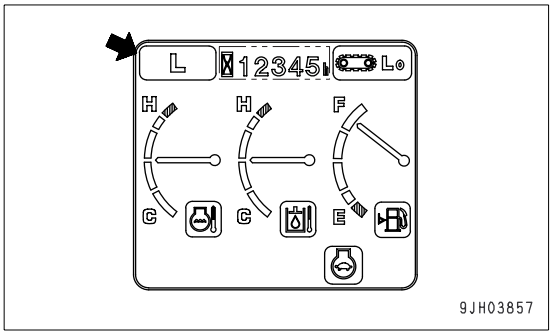
1) A mode
   For heavy-load operations



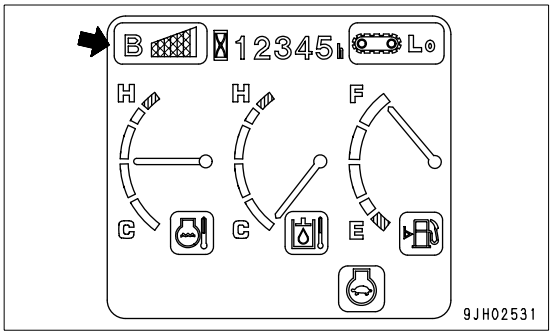
2) E mode
   For operations with emphasis on fuel economy



3) L mode
For fine-control operations

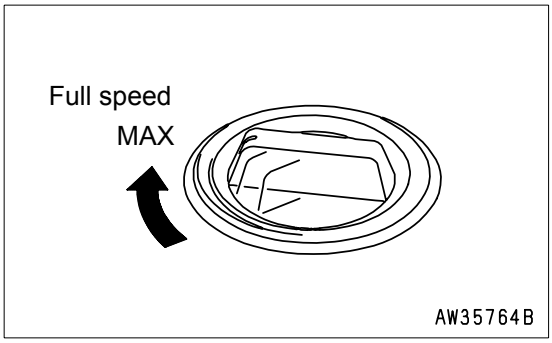


4) B mode
For breaker operations

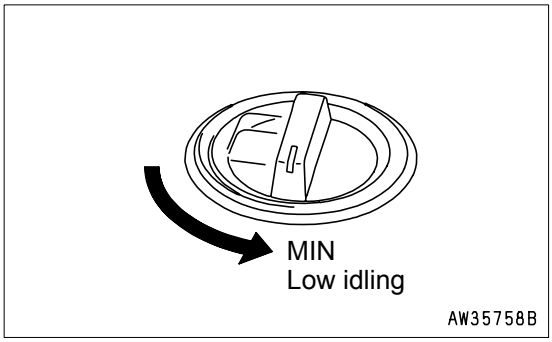


NOTICE
Canceling automatic warming-up operation
If it becomes necessary in an emergency to cancel the automatic warming-up operation or to lower the engine speed to low idling, do as follows.

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



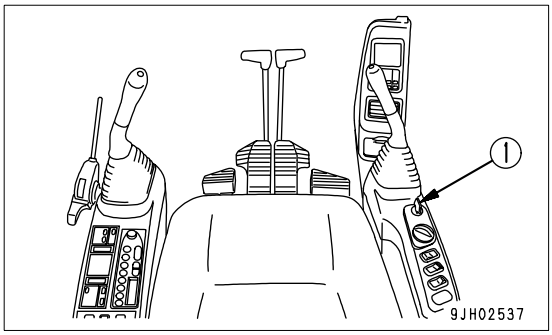
2] When fuel control dial (2) is returned to the low idling (MIN) position, the engine speed will drop.

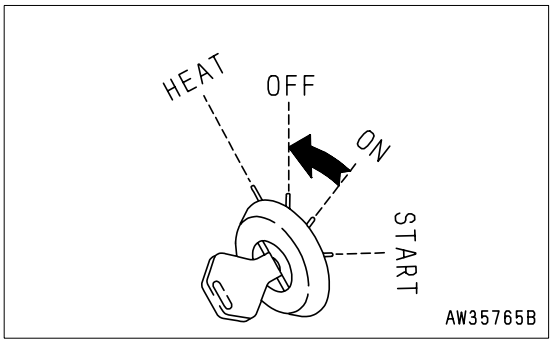


STOPPING THE ENGINE

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. Run the engine at low idling for about 5 minutes to cool down gradually.
2. Turn the key in starting switch (1) to the OFF position and stop the engine.
3. Remove the key from starting switch (1).





CHECK AFTER SHUT OFF ENGINE

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

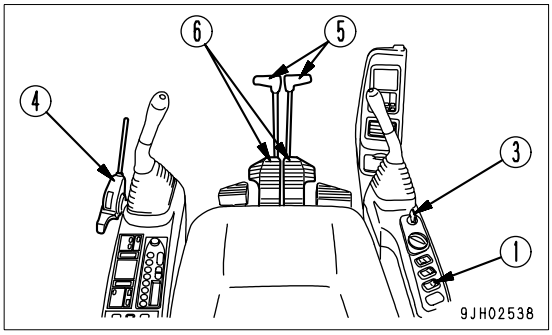
REMARK
After stopping the engine, if the starting switch is turned within approx. 10 seconds to the ON or START position to start the engine again, the monitor display is not reset, and the screen before the starting switch was turned OFF is displayed.

MACHINE OPERATION

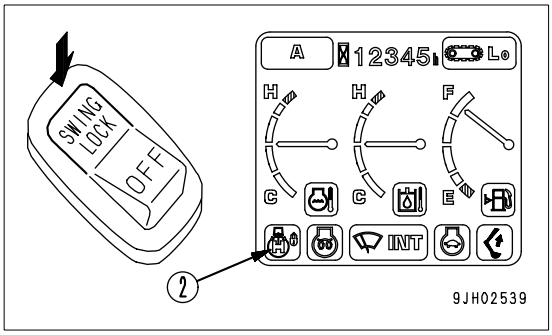
Preparations For Moving The Machine Off

⚠ WARNING

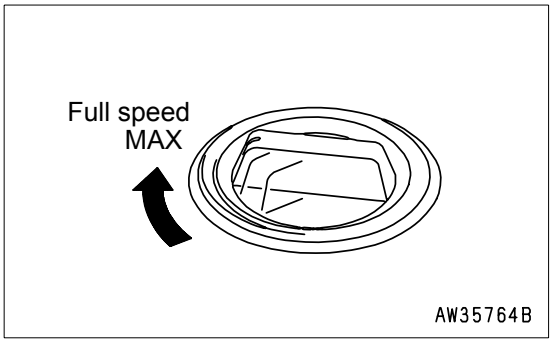
- **Before operating the steering levers, check the direction of the track frame.**
- **If the sprocket is at the front, the operation of the travel levers is reversed.**
- **When moving off, check that the area around the machine is safe, and sound the horn before moving.**
- **Do not allow anyone in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



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

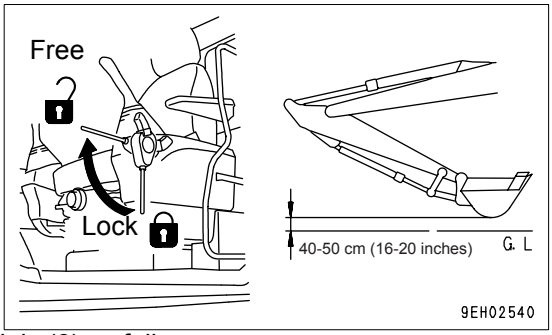


2. Turn fuel control dial (3) towards the full speed position to increase the engine speed.



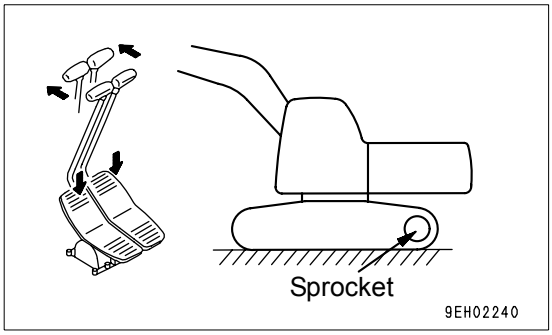
Moving Machine Forward

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

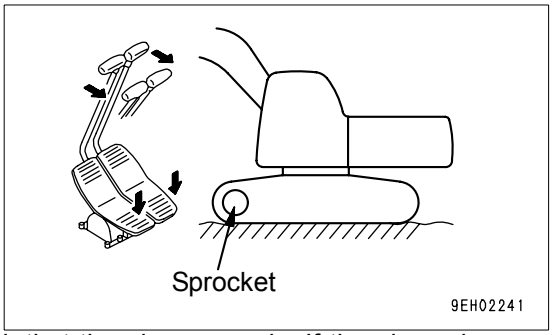


2. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.

- When the sprocket (A) is at the rear of the machine
  Push levers (5) forward slowly or depress the front part of pedals (6) slowly to move the machine off.



- When the sprocket (A) is at the front of the machine
  Pull levers (5) backward slowly or depress the rear part of pedals (6) slowly to move the machine off.

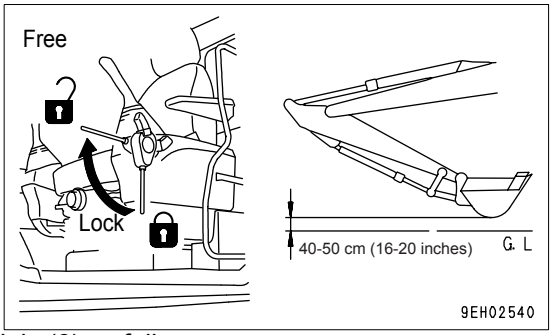


3. For machines equipped with a travel alarm (if equipped), check that the alarm sounds. If the alarm does not sound, please contact your Komatsu distributor for repair.

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

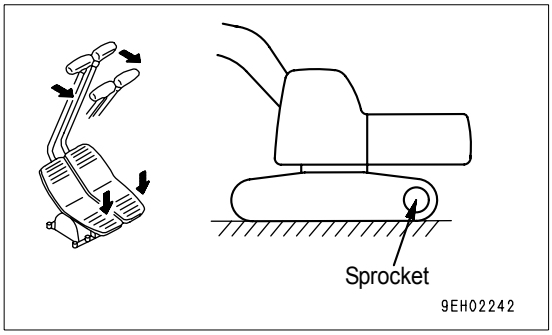
Moving Machine Backward

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

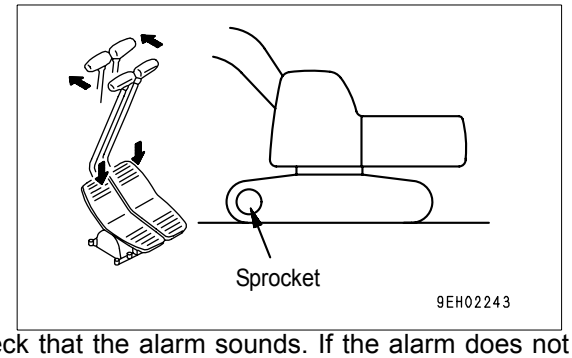


2. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.

- When the sprocket (A) is at the rear of the machine
  Pull levers (5) backward slowly or depress the rear part of pedals (6) to move the machine off.



- When the sprocket (A) is at the front of the machine
  Push levers (5) forward slowly or depress the front part of pedals (6) to move the machine off.



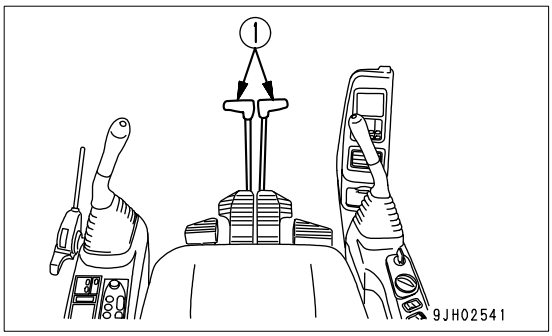
3. For machines equipped with a travel alarm (if equipped), check that the alarm sounds. If the alarm does not sound, please contact your Komatsu distributor for repair.

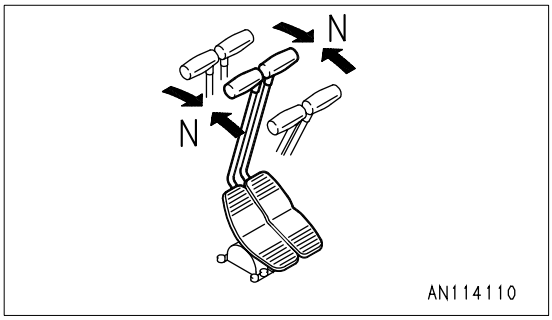
Stopping Machine

⚠ WARNING

Avoid stopping suddenly. Give yourself ample room when stopping.

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





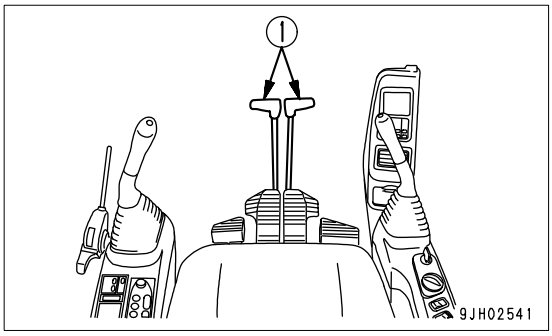
STEERING THE MACHINE

Steering

⚠ WARNING

Before operating the travel control levers, check the direction of the track frame (i.e. position of the sprocket) first. If the sprocket is at the front, the machine moves in the reverse direction to the operation of the travel lever.

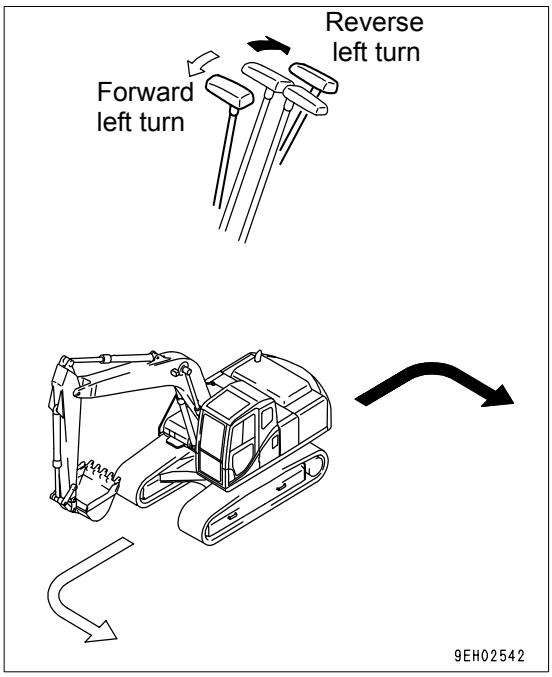
Use the travel levers to change direction.
Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.
Operate two travel levers (1) as follows.



Steering the Machine when Stopped

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

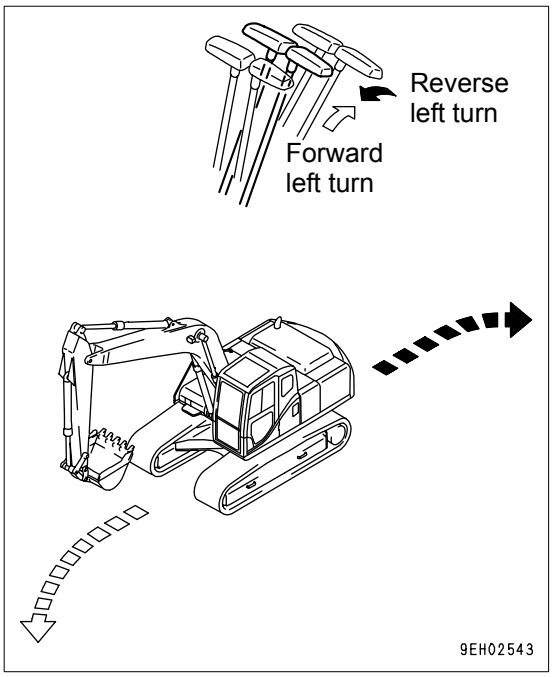
REMARK
When turning to the right, operate the left travel lever in the same way.



Changing Direction of the Machine

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

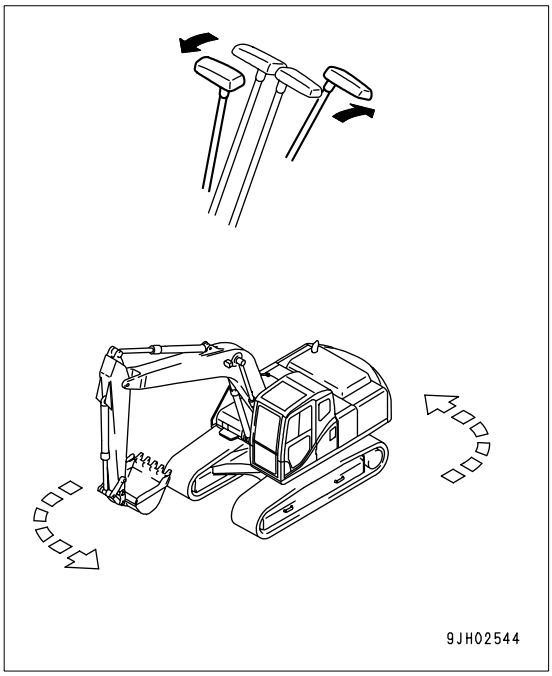
REMARK
When turning to the right, operate the right travel lever in the same way.



Counter-rotation Turn (Spin Turn)

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

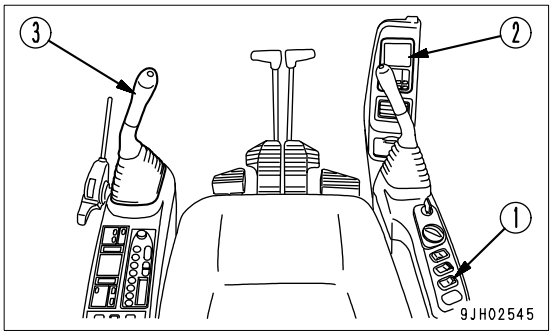
REMARK
When using counter-rotation to turn right, pull the right travel lever back and push the left travel lever forward.



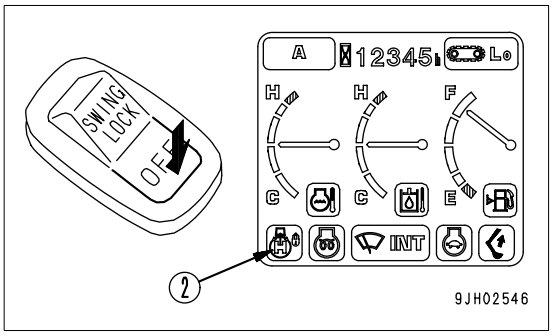
SWINGING

⚠ WARNING

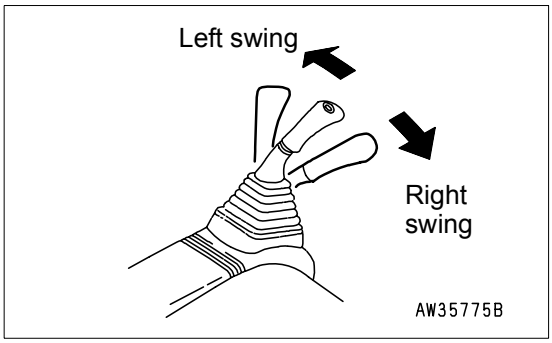
- **The tail of the machine extends outside the tracks. Before operating the swing, check that the area around the machine is safe.**



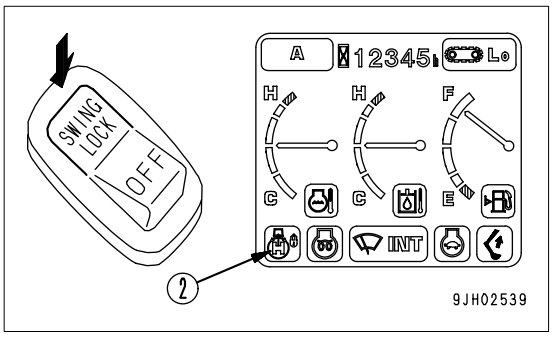
1. Before starting the swing operation, turn swing lock switch (1) OFF and check that swing lock monitor (2) has gone out.



2. Operate left work equipment control lever (3) to swing the upper structure.



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



WORK EQUIPMENT CONTROLS AND OPERATIONS

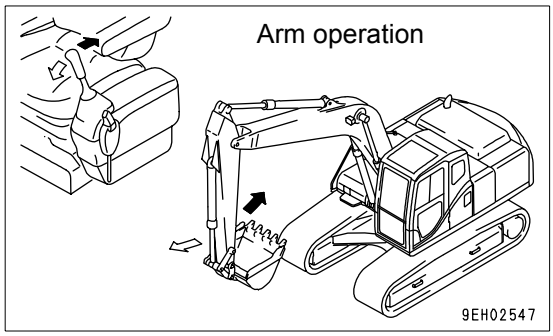
⚠ WARNING

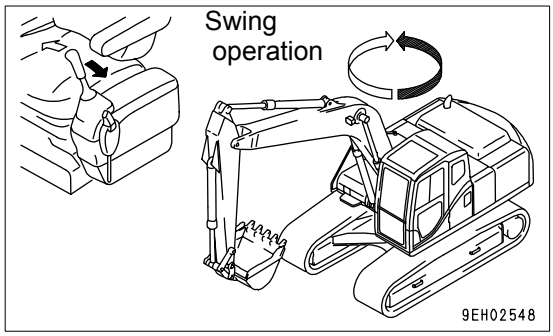
- **If the lever is operated when the auto-deceleration is being actuated, the engine speed will suddenly rise, so be careful when operating the lever.**
- **If the work equipment control lever is operated quickly, the work equipment will move quickly; if the lever is operated slowly, the work equipment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

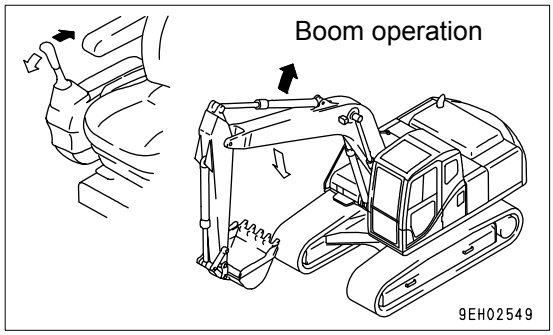
The work equipment is operated by the left and right work equipment control levers. The left work equipment control lever operates the arm and swing, and the right work equipment control lever operates the boom and bucket.
The movements of the lever and work equipment are as shown in the diagrams on the right. When the levers are released, they automatically return to the neutral position and the work equipment is held in place.

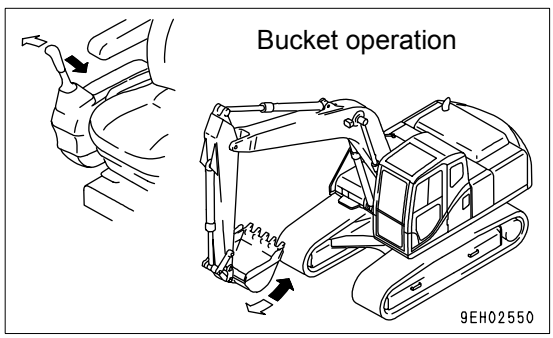
- If the work equipment control levers are returned to the neutral position when the machine is stopped, even if the fuel control dial is set to FULL, the auto-deceleration mechanism will act to reduce the engine speed to a mid-range speed.

REMARK
With this machine, an accumulator is installed in the operating circuit, so if less than 15 seconds has passed since the engine was stopped, when the starting switch is turned to the ON position even when the engine is stopped, it is possible to operate
the levers to lower the work equipment to the ground.
In addition, this operation can also be used to release the remaining pressure in the hydraulic cylinder circuit or to lower the boom after the machine has been loaded onto a trailer.





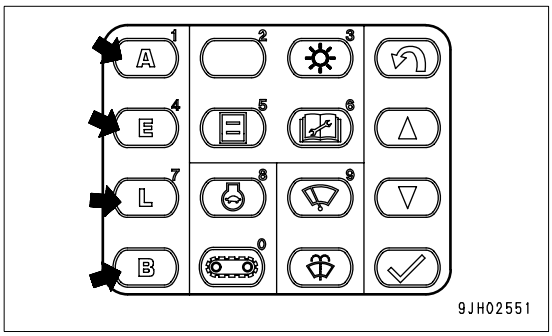




WORKING MODE

Working Mode

The mode selector switch can be used to switch the mode to match the operating conditions and purpose, thereby enabling work to be carried out efficiently.
Make effective use of each mode as follows.
When the starting switch is turned ON, the working mode is set to A mode.
Use the working mode switch to set the mode to the most efficient mode to match the type of work.



Working mode	Applicable operations
A mode	Normal digging, loading operations (Operations with emphasis on productivity)
E mode	Normal digging, loading operations
L mode	When positioning work equipment exactly (fine-control operations)
B mode	Breaker operations

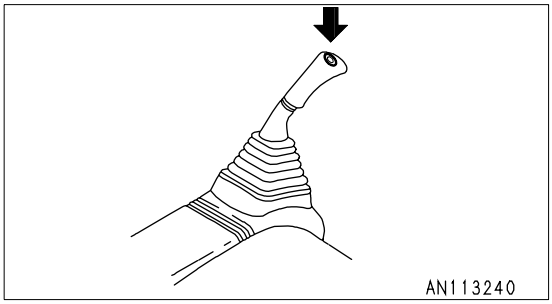
NOTICE
If breaker operations are carried out in the A mode, the hydraulic equipment may be damaged.

One-Touch Power Max. Switch

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

- Press the left knob switch and keep it pressed. The power is increased as long as the switch is being pressed. However, the increased power is automatically canceled after 8.5 seconds.

- This function is not actuated when the working mode is set to L mode or B mode.



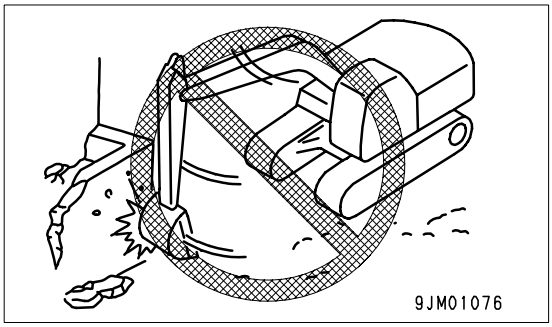
PROHIBITED OPERATIONS

⚠ WARNING

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

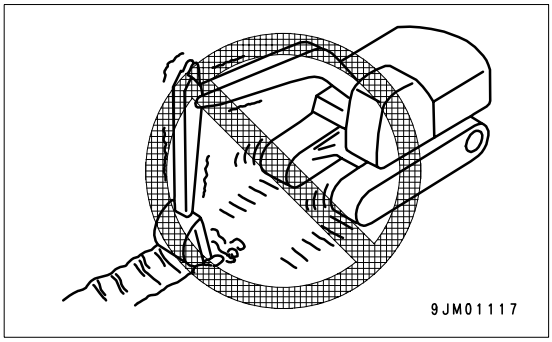
Operations Using Swing Force

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



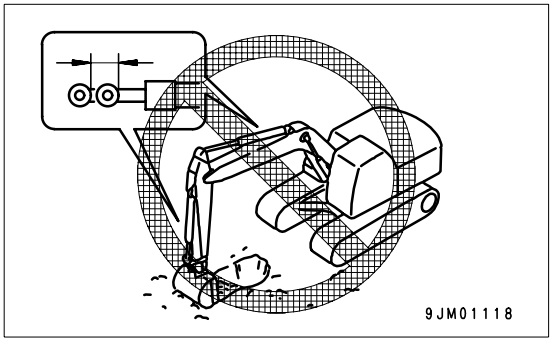
Operations Using Travel Force

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



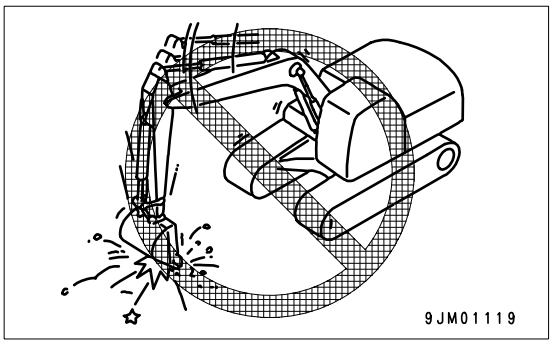
Prohibition of Operations Using Hydraulic Cylinders to Stroke Ends

If the work equipment is used with the cylinder rod operated to its stroke end, and given impact by some external force, the hydraulic cylinders will be damaged, causing personal injury. Avoid operations with the hydraulic cylinder fully retracted or fully extended.



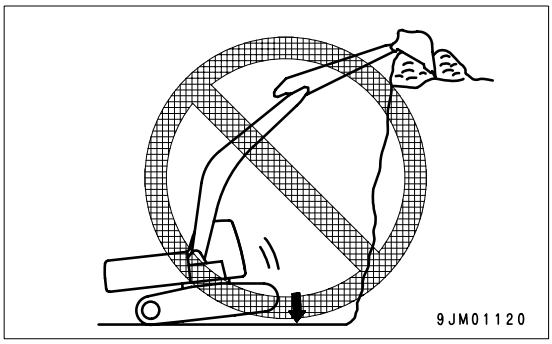
Operations Using Bucket Dropping Force

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



Operations Using Machine Dropping Force

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

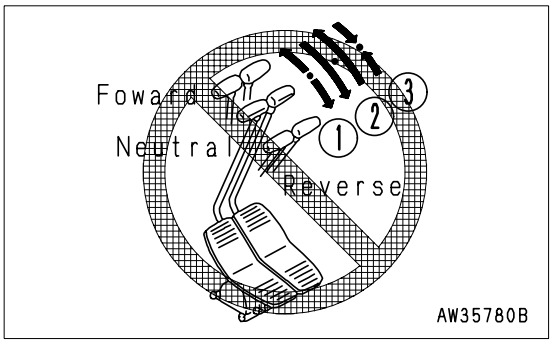


Digging Hard Rocky Ground

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

Sudden Lever Shifting High Speed Travel

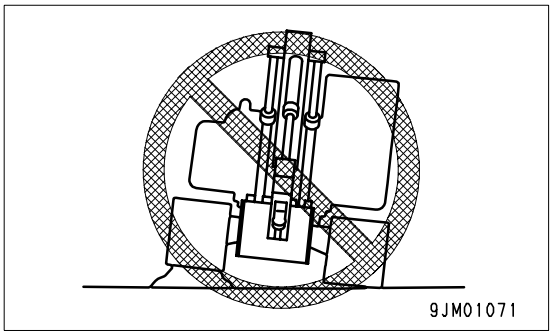
(1) Never carry out sudden lever shifting as this may cause sudden starting.
(2) Avoid sudden lever shifting from forward to reverse (or from reverse to forward).
(3) Avoid sudden lever shifting change such as sudden stopping from near top speed (lever release operation).



GENERAL OPERATION INFORMATION

Traveling

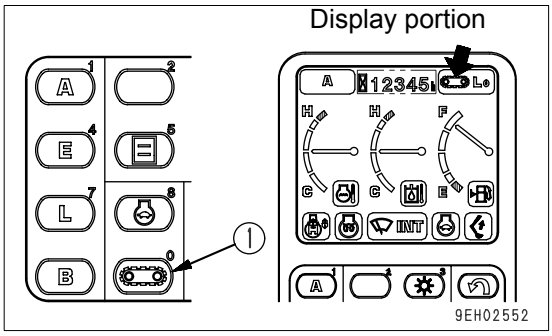
Traveling over boulders, tree stumps, or other obstacles will cause a big shock to the chassis (and in particular to the tracks), and this will cause damage to the machine. For this reason, always remove any obstacles or travel around them, or take other steps to avoid traveling over such obstacles as far as possible.
If there is no way to avoid traveling over an obstacle, reduce the travel speed, keep the work equipment close to the ground, and try to travel so that the center of the track passes over the obstacle.



High Speed Travel

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

- To switch the travel speed, press travel speed selector switch (1). The travel speed is displayed as Lo, or Hi on the monitor display.

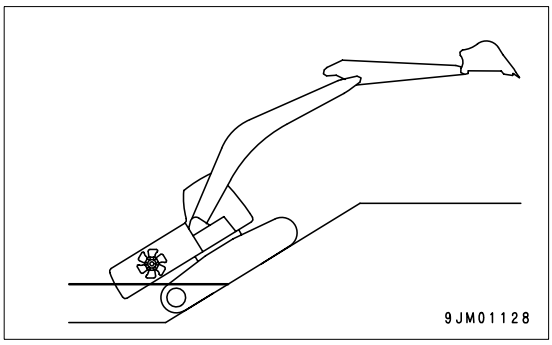


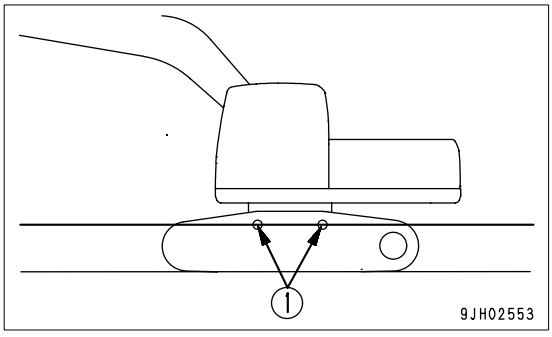
Permissible Water Depth

⚠ CAUTION

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

Do not drive the machine in water deepen than of the center of carrier roller (1).
Supply grease to the parts which have been under water for a long time until the used grease is projected out of the bearings (around the bucket pin, in particular).

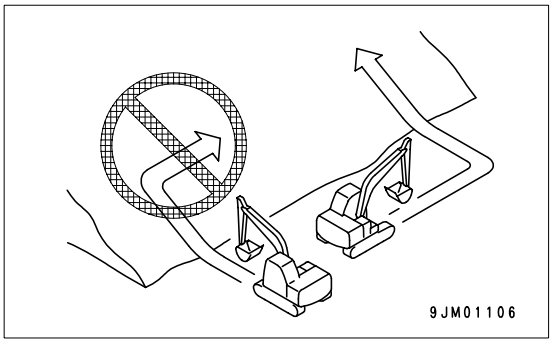


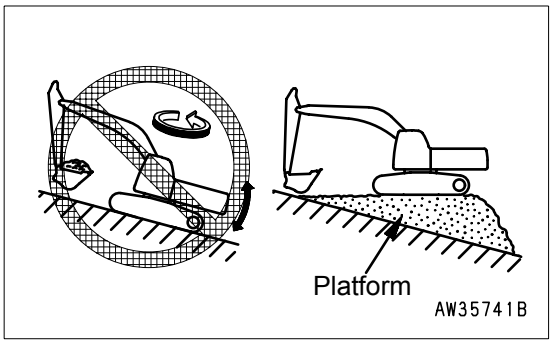


TRAVELING ON SLOPES

⚠ WARNING

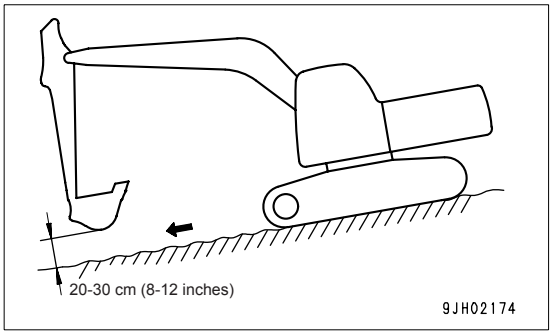
- **Turning or operating the work equipment when working on slopes may cause the machine to lose it balance and turn over, so avoid such operations.**
  It is particularly dangerous to swing downhill when the bucket is loaded.
- **If such operations have to be carried out, pile soil to make a platform on the slope so that the machine can be kept horizontal when operating.**
- **Do not travel up or down steep slopes. There is danger that the machine may turn over.**
- **When traveling, raise the bucket approx. 20 to 30 cm (8 to 12 inches) from the ground.**
- **Do not travel downhill in reverse.**
- **Never turn on slopes or travel across slopes.**
- **Always go down to a flat place to perform these operations. It may be longer, but it will ensure safety.**
- **Always operate or travel in such a way that it is possible to stop safely at any time if the machine slips or becomes unstable.**
- **When traveling uphill, if the shoes slip or it is impossible to travel uphill using only the force of the tracks, do not use the pulling force of the arm to help the machine travel uphill. There is danger that the machine may turn over.**



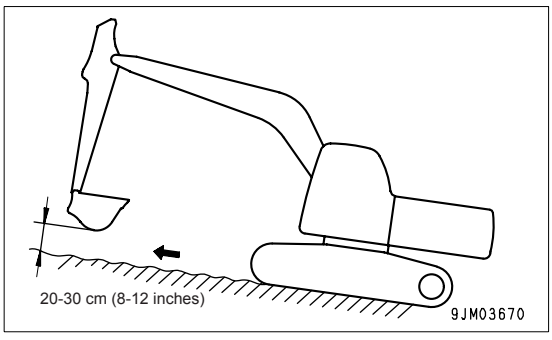


1. When traveling down steep hills, use the travel lever and fuel control dial to keep the travel speed low. When traveling down a steep hill of more than 15°, set the work equipment to the posture shown in the diagram on the right, and lower the engine speed.

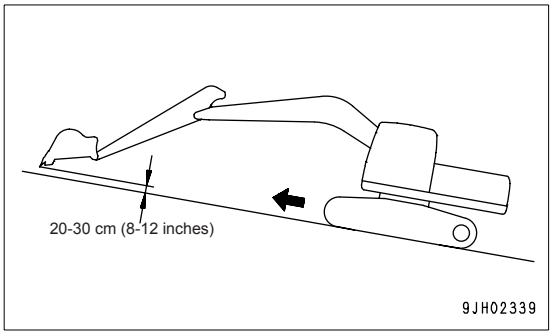
REMARK
Travel down fills with the sprocket side down.
If the machine travels down with the sprocket side up, the track tends to become loose, and that can cause skipping pitches.



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



- When traveling up a steep slope, extend the work equipment to the front to improve the balance, keep the work equipment approximately 20 to 30 cm (8 to 12 inches) above the ground, and travel at low speed.



Traveling Downhill

Put the travel lever in the neutral position. This will cause the brake to be automatically applied.

Engine Stopped on Slope

If the engine stops when traveling uphill, move the travel levers to the neutral position, lower the bucket to the ground, stop the machine, then start the engine again.

Cab Doors on Slope

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

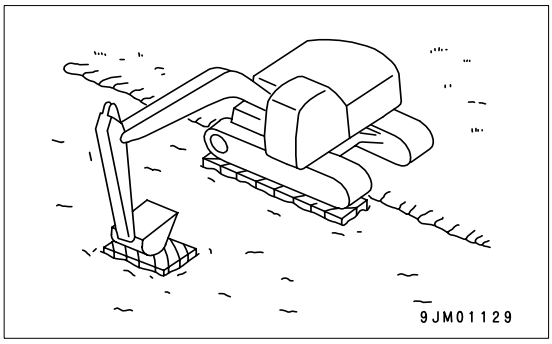
ESCAPE FROM MUD

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

Stuck One Side Of Track

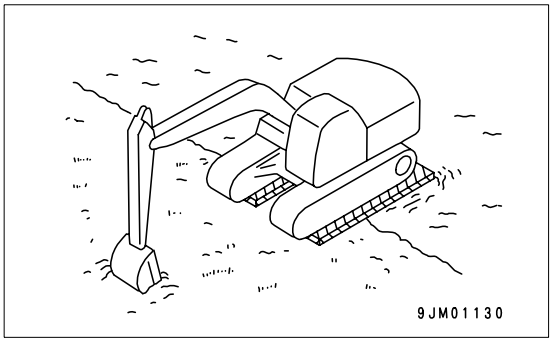
NOTICE
When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. The angle between the boom and arm should be 90° to 110°.
The same applies when using the bucket installed in the reverse direction.

When only one side is affixed in mud, use the bucket to raise the track, then lay boards or logs and drive the machine out.



Stuck Both Sides Of Tracks

When the tracks on both sides are stuck in mud and they slip, making it impossible for the machine to move, lay boards or logs as explained above, and dig the bucket into the ground in front. Then pull in the arm as in normal digging operations and put the travel levers in the FORWARD position to pull the machine out.

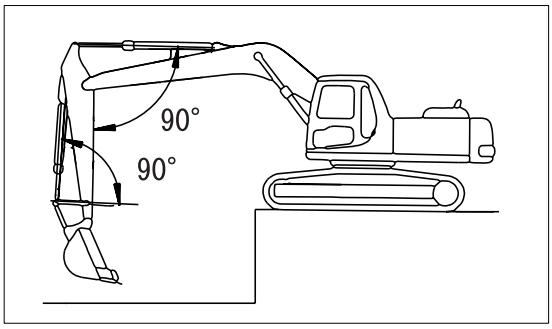


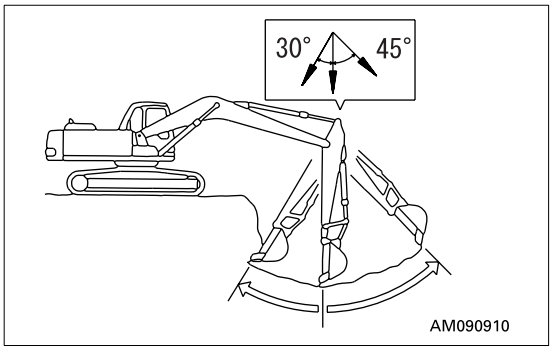
RECOMMENDED APPLICATIONS

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

Backhoe Work

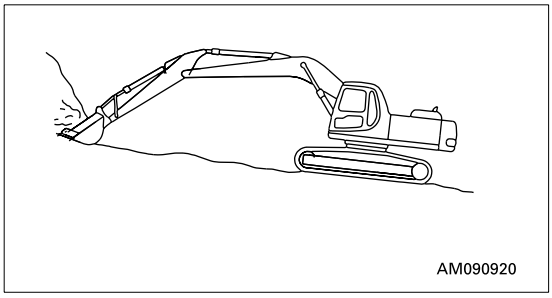
A backhoe is suitable for excavating areas that are lower than the machine.
When the condition of the machine is as shown in the diagram on the right (angle between [bucket cylinder and link] and [arm cylinder and arm] is 90°), the maximum excavation force is obtained from the pushing force of each cylinder.
When excavating, use this angle effectively to optimize your working efficiency.
The range for excavating with the arm is from a 45° angle away from the machine to a 30° angle towards the machine.
There may be some differences depending on the excavation depth, but try to stay within the above range rather than operating the cylinder to the end of its stroke.





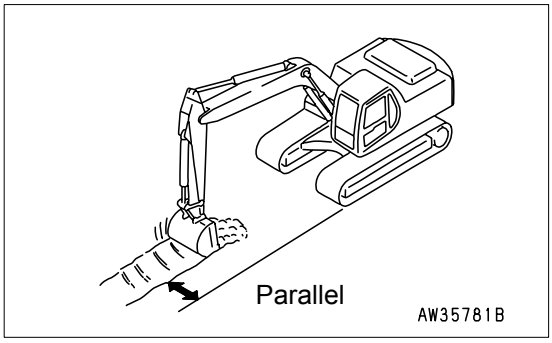
Shovel Work

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



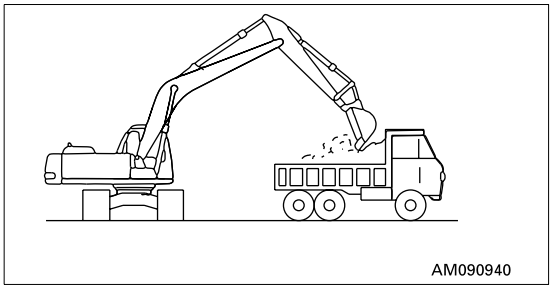
Ditching Work

Ditching work can be performed efficiently by attaching a bucket which matches the digging operation and then setting the tracks parallel to the line of the ditch to be excavated.
To excavate a wide ditch, first dig both sides and then finally remove the center portion.



Loading Work

In places where the swing angle is small, work efficiency can be enhanced by locating the dump truck in a place easily visible to the operator.
Loading is easier and capacity greater if you begin from the front of the dump truck body than if loading is done from the side.



BUCKET REPLACEMENT AND INVERSION

⚠ WARNING

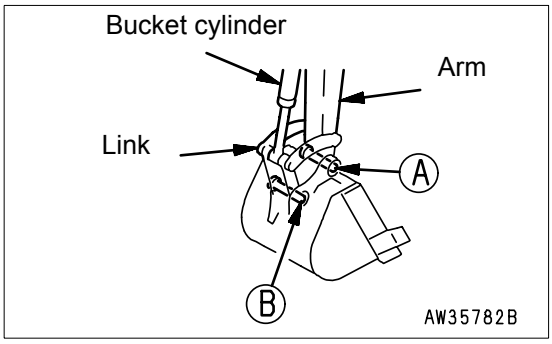
- **When pins are knocked in with a hammer, pieces of metal may fly and cause serious injury.**
- **When carrying out this operation, always wear goggles, hard hat, gloves, and other protective equipment.**
- **When the bucket is removed, place it in a stable condition.**
- **If pins are hit with a strong force, there is a hazard that the pin may fly out and injure people in the surrounding area. Make sure that there is no one in the surrounding area before starting the operation.**
- **When removing the pins, do not stand behind the bucket. In addition, be extremely careful not to put your foot under the bucket while standing at the side for the work.**
- **When removing or inserting pins, be extremely careful not to get your fingers caught.**
- **Never insert your fingers into the pin holes when aligning the holes.**

Stop the machine on a firm and flat surface and do the work. When performing joint work, appoint a conductor and follow that person's instructions and signals.

Replacement

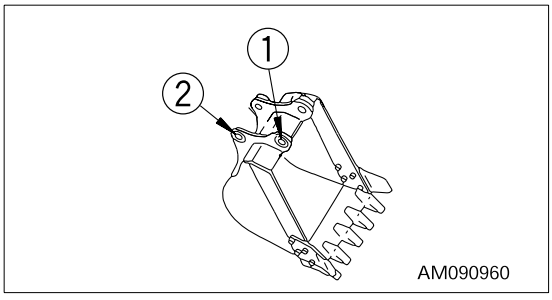
1. Place the bucket in contact with a flat surface.

REMARK
When removing the pins, place the bucket so that it is in light contact with the ground.
If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.



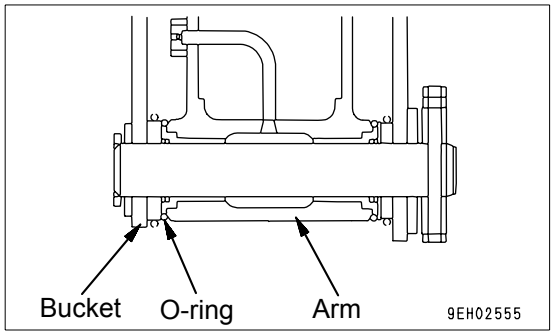
NOTICE
After removing the pins, make sure that mud or sand does not get on them. Dust seals are fitted at both ends of the bushings, so be careful not to damage them.

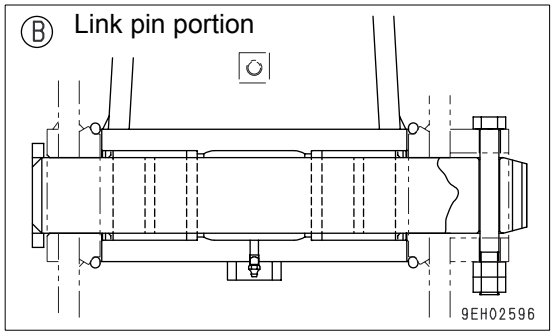
2. Remove the double nut of the stopper bolt for arm pin (A) and link pin (B), remove the bolt, pull out arm pin (A) and link pin (B), and then remove the bucket.
3. Align the arm with holes (1) of the replacement bucket and the link with holes (2), then insert grease-coated pins (A) and (B) into hole (1) and hole (2) respectively.



REMARK
When installing the bucket: For arm pin portion (A), fit an O-ring at the position on the bucket shown in the diagram on the right. After inserting the pin, fit it into the proper groove. For link pin portion (B), install the bucket with the O-ring fitted in the proper groove.

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

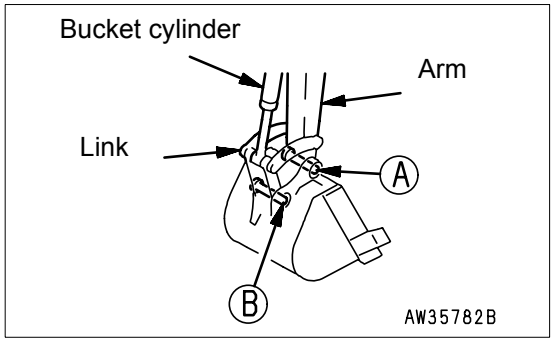




Inversion

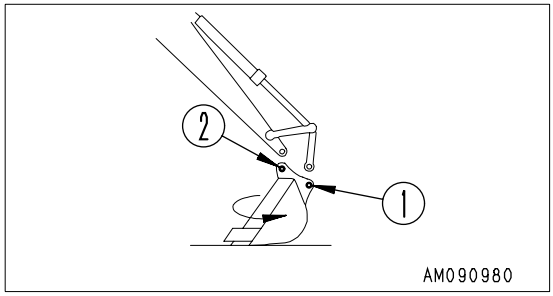
1. Place the bucket in contact with a flat surface.

REMARK
When removing the pins, place the bucket so that it is in light contact with the ground.
If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

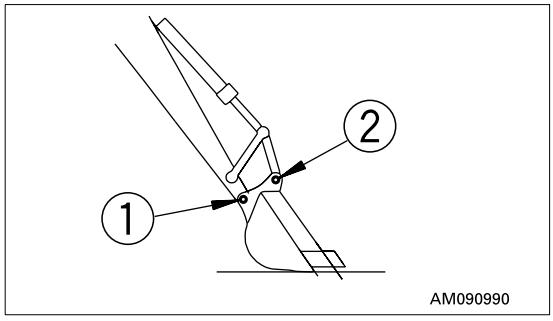


NOTICE
After removing the pins, make sure that mud or sand does not get on them. Dust seals are fitted at both ends of the bushings, so be careful not to damage them.

2. Remove the double nut of the stopper bolt for arm pin (A) and link pin (B), remove the bolt, pull out arm pin (A) and link pin (B), and then remove the bucket.

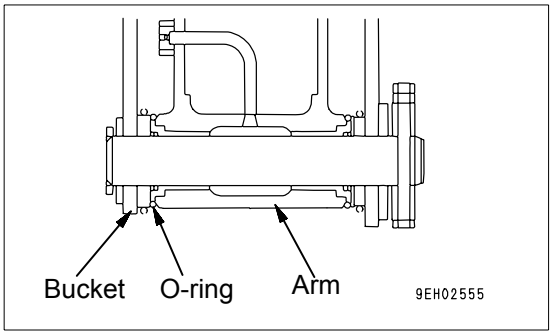


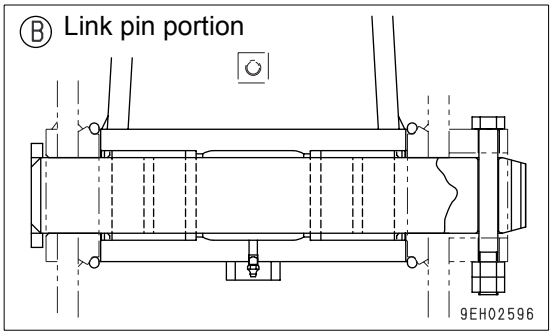
3. Turn the removed bucket. After turning the bucket, align the arm with link mounting hole (1), then align the link with arm mounting hole (2) and install.
4. Align the arm with holes (1) of the replacement bucket and the link with holes (2), then insert grease-coated pins (A) and (B) into hole (1) and hole (2) respectively.



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

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

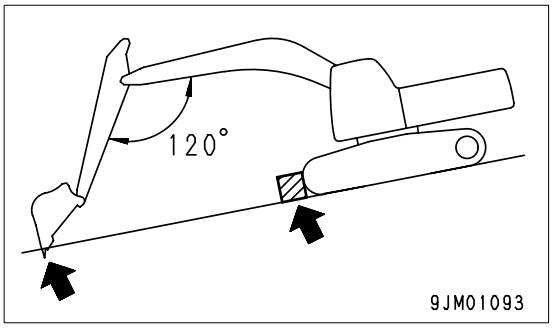




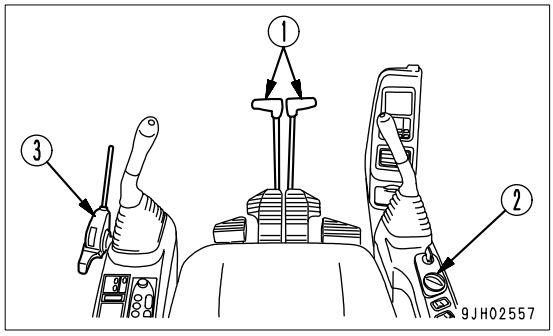
PARKING MACHINE

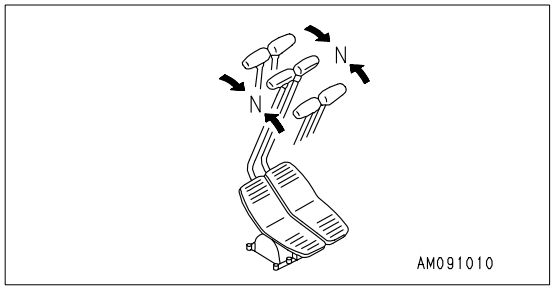
⚠ WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, insert blocks underneath the track shoes. As an additional safety measure, thrust the bucket into the ground.**
- **If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever securely to LOCK position.**

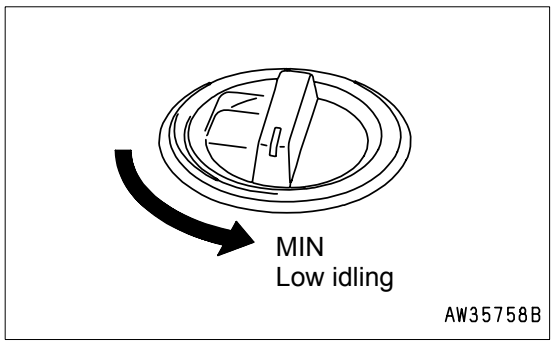


1. Put left and right travel levers (1) in the neutral position. The machine stops.

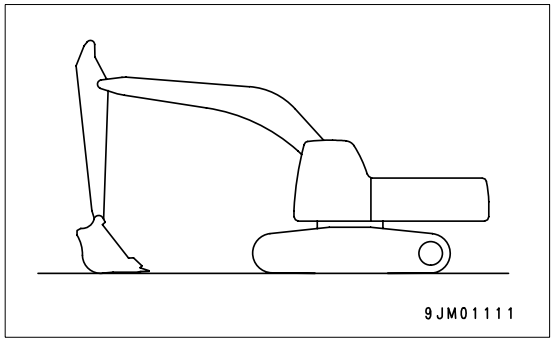




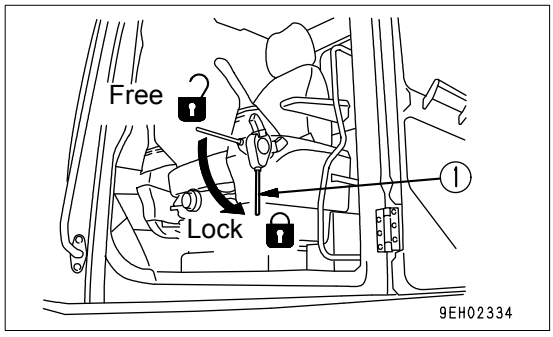
2. Turn fuel control dial (2) to lower the engine speed to low idling.



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

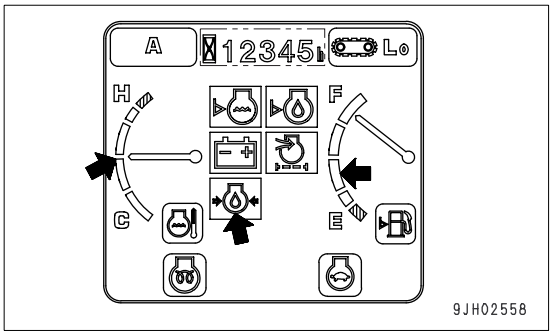


4. Set safety lock lever (3) in the LOCK position.



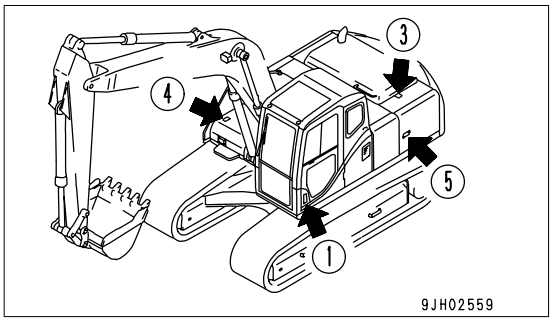
MACHINE INSPECTION AFTER DAILY WORK

Check the engine water temperature, engine oil pressure, and fuel level on the machine monitor.

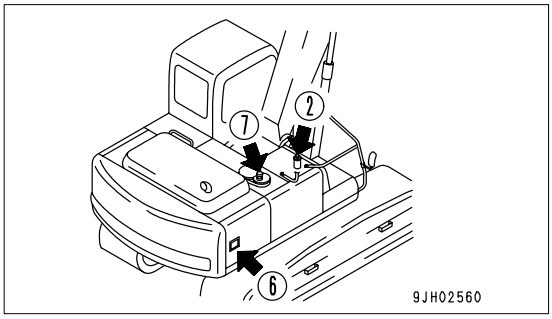


LOCKING

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



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



TRANSPORTATION

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

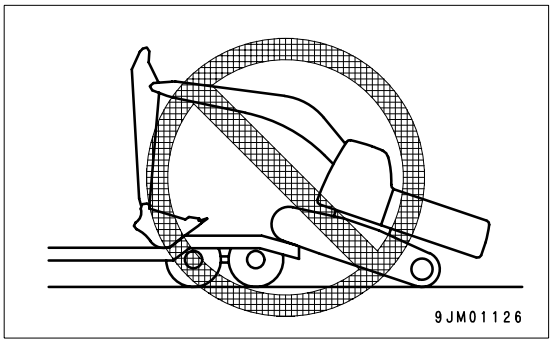
TRANSPORTATION PROCEDURE

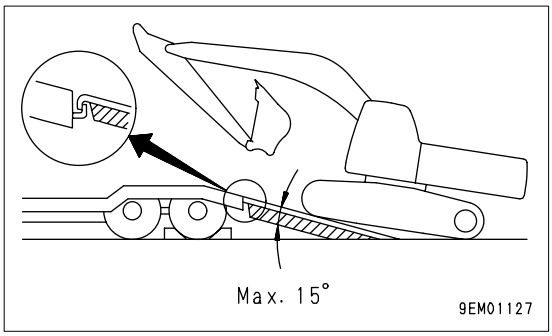
As a basic rule, transport the machine by trailer.
Select the trailer to match the weight and dimensions given in “SPECIFICATIONS (5-2)“.
Note that the value for the weight and transportation dimensions given in SPECIFICATIONS may differ according to the type of shoe or type of arm or other attachments.

LOADING AND UNLOADING WITH TRAILER

⚠ WARNING

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

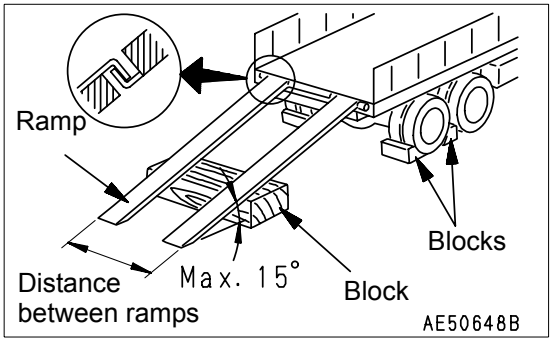




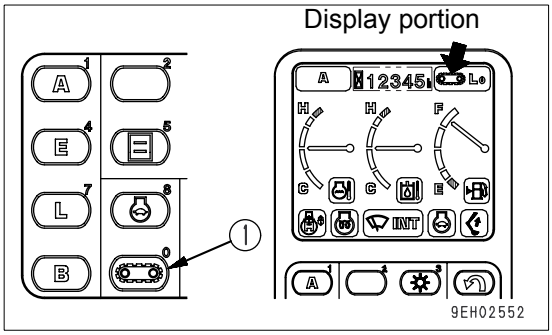
When loading or unloading, always use ramps or a platform and carry out the operation as follows.

Loading

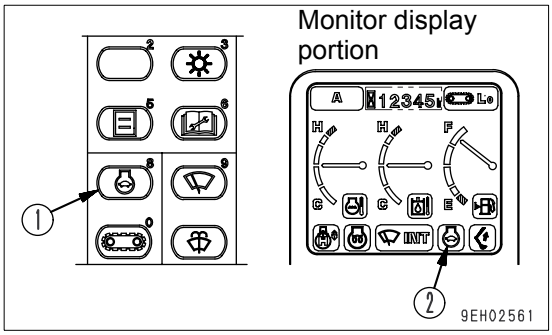
1. Perform loading and unloading on firm, level ground only.
   Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put detents under the tires to ensure that the trailer does not move.
   Then fix the ramps in line with the center of the trailer and the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



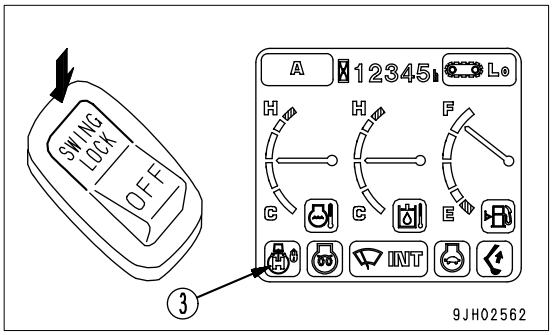
3. Set the travel speed selector switch to the LOW position.
   - To switch the travel speed, press travel speed selector switch (1). The travel speed is displayed as Lo, or Hi on the monitor display.



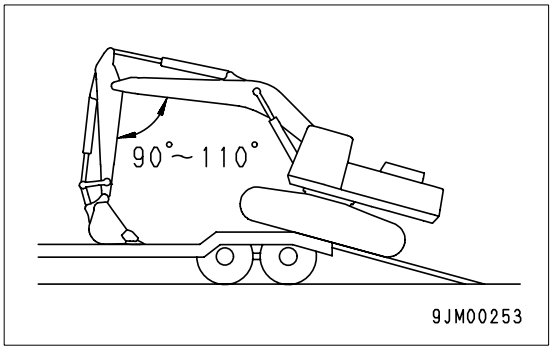
4. Turn auto-deceleration switch (1) OFF and operate the fuel control dial to set the engine speed to low idling.
   - Each time auto-deceleration switch (1) is pressed, it switches OFF → ON → OFF in turn.
   - When auto-deceleration switch (1) is turned OFF, display monitor (2) goes out.

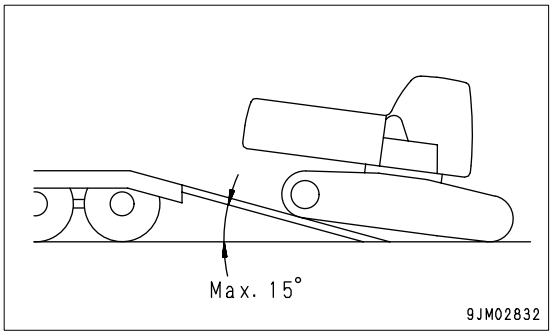


5. Turn the swing lock switch ON to apply the swing lock.
   - When the swing lock switch is turned ON, display monitor (3) lights up.

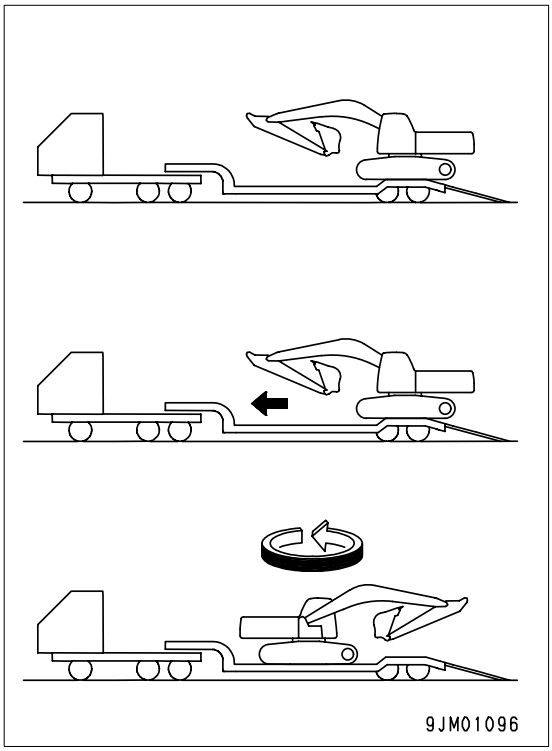


6. If the machine is equipped with work equipment, set the work equipment at the front, and travel forward to load it; if it has no work equipment, travel in reverse to load it.
   Follow instructions and signals of a conductor particularly when traveling in reverse.

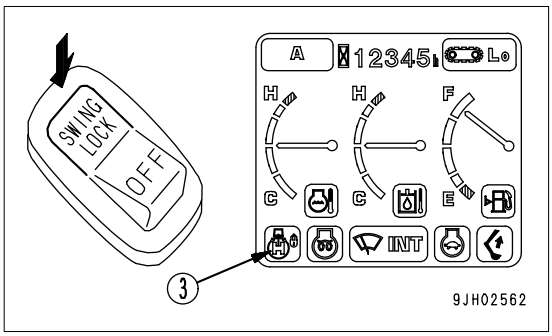




7. Before moving onto the ramps, make sure that the machine is positioned in a straight line with the ramps and that the center line of the machine matches that of the trailer.
   Align the direction of travel with the ramps and travel slowly. Lower the work equipment as far as possible without causing interference.
   When on the ramps, operate only the travel lever. Do not operate any other lever.
8. When the machine travels over the rear wheels of the trailer, it becomes unstable, so drive slowly and carefully. (Never operate the steering.)
9. At the moment the machine passes the rear wheels, it tilts forward, so be careful not to let the work equipment hit the trailer body. Drive the machine forward to the specified position, then stop the machine.
10. Turn the swing lock switch OFF to release the swing lock, then swing the upper structure slowly 180°.
11. Stop the machine at the specified position on the trailer.



12. Turn the swing lock switch ON to lock the swing lock.
    - When the swing lock switch is turned ON, display monitor (3) lights up.



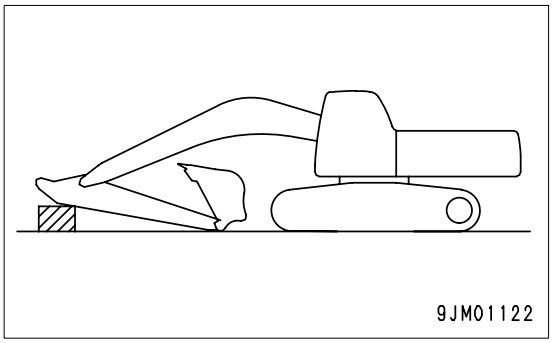
Securing Machine

NOTICE

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

Load the machine on to a trailer as follows.

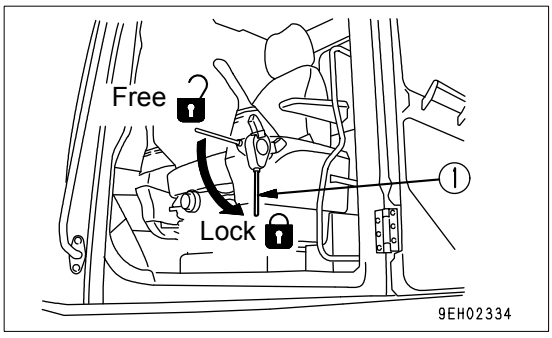
1. Extend the bucket and arm cylinders fully, then lower the boom slowly.



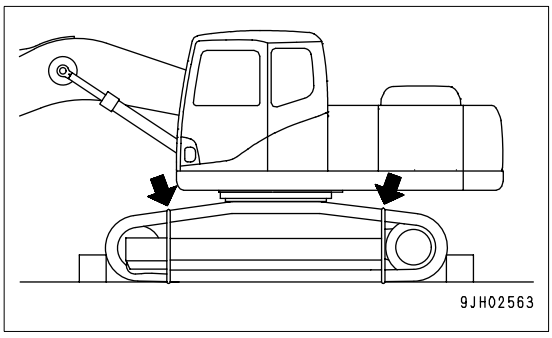
2. Stop the engine, then remove the key from the starting switch.

3. Lock each control lever with the safety lock lever securely.

4. After removing the outer element, cover with a clean cloth or tape to prevent dirt or dust from sticking to the inner element.

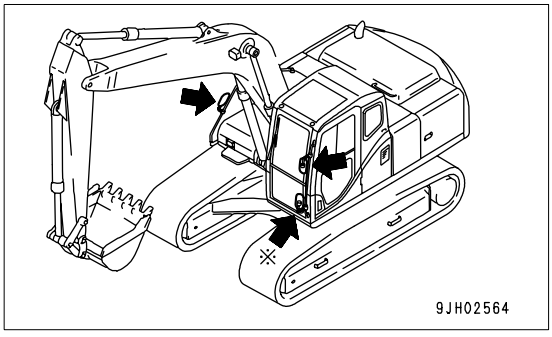


5. Put blocks under both ends of the tracks to prevent the machine from moving during transportation, and tie the machine down securely with chains or wire rope of suitable strength.
   Be particularly careful to fix the machine in position securely so that it does not slip to the side.



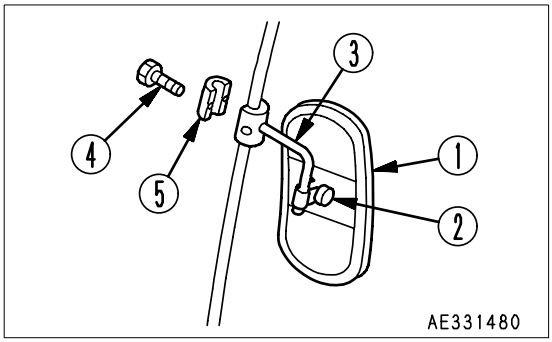
Rear view Mirrors

There are mirrors in the positions shown in the diagram on the right. (if required)
If they are damaged, or when removing and installing them for transportation, do as follows.



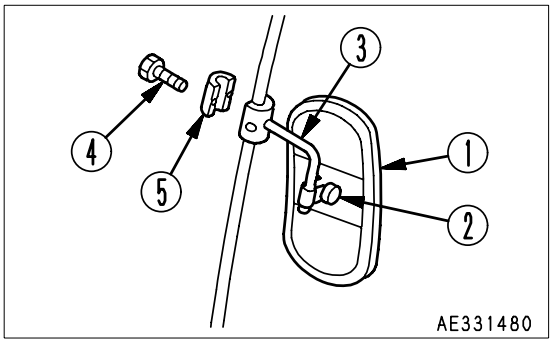
Removal

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



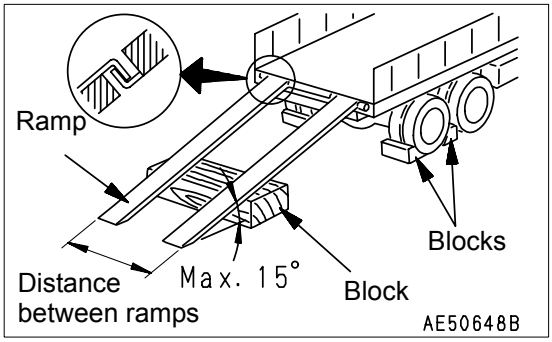
Installation

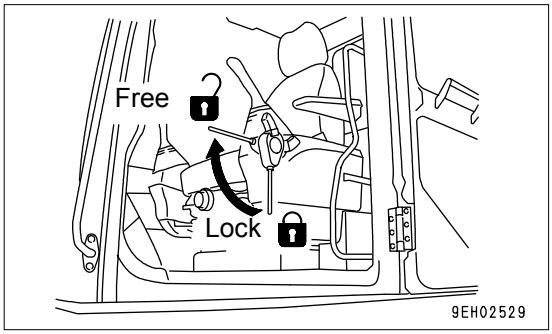
1. Install support (3) and clamp (5) to the handrail, then tighten with bolt (4).
2. Install mirror (1) to support (3),then tighten locknut (2).



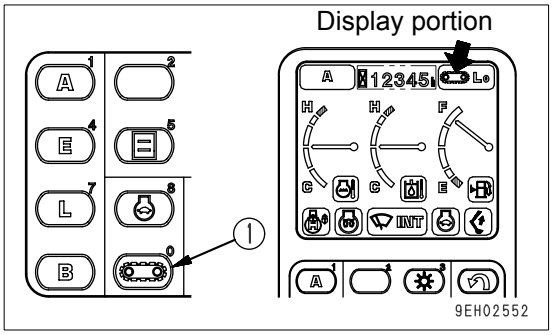
Unloading

1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put detents under the tires to ensure that the trailer does not move.
   Then fix the ramps in line with the center of the trailer and the machine.
   Be sure that the two sides are on the same level.
   Make the slope of the ramps a maximum of 15°.
   Set the distance between the ramps to match the center of the tracks.
   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.
   Warm the engine up fully.
5. Set the safety lock lever to the FREE position.

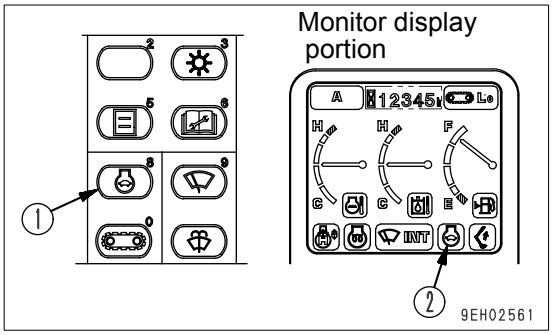




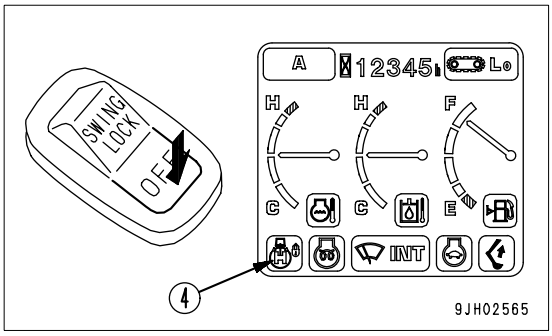
6. Set the travel speed selector switch to the LOW position.
   - To switch the travel speed, press travel speed selector switch (1). The travel speed is displayed as Lo, or Hi on the monitor display.



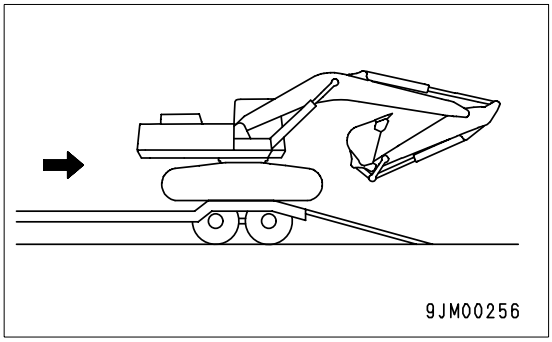
7. Turn auto-deceleration switch (1) OFF and operate the fuel control dial to set the engine speed to low idling.
   - Each time auto-deceleration switch (1) is pressed, it switches OFF → ON → OFF in turn.
   - When auto-deceleration switch (1) is turned OFF, display monitor (2) goes out.



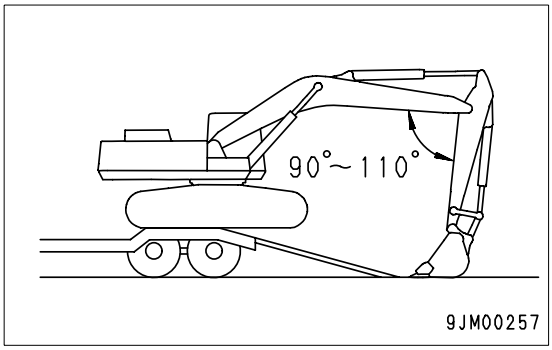
8. Turn the swing lock switch OFF to release the swing lock.
   - When the swing lock switch is turned OFF, display monitor (4) goes off.



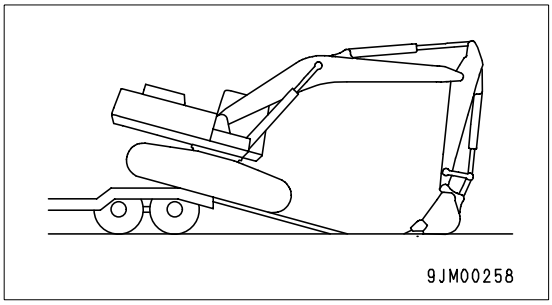
9. Raise the work equipment, pull in the arm under the boom, then move the machine slowly.
10. When the machine is horizontal on top of the rear wheels of the trailer, stop the machine.



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



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



LIFTING MACHINE

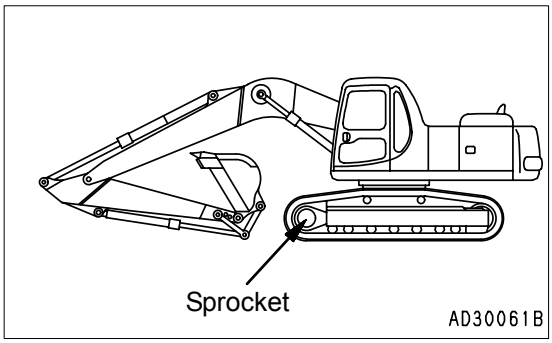
⚠ WARNING

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

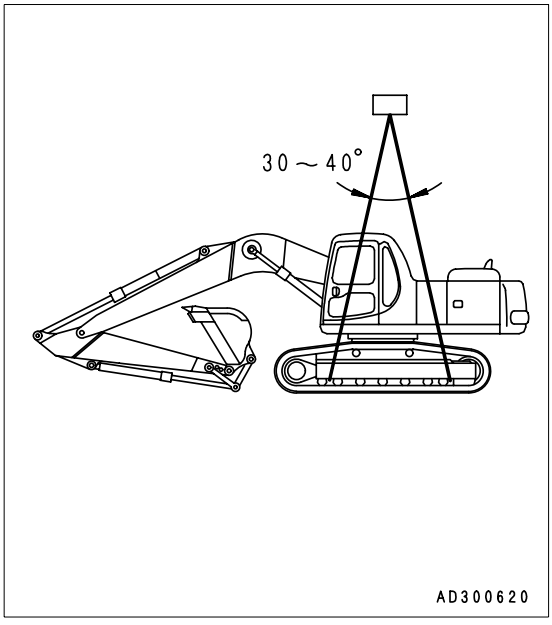
NOTICE
The lifting procedure applies to machines with standard specifications.
The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

For details of the weight, see “SPECIFICATIONS (5-2)“.
When lifting the machine, carry out the operation on flat ground as follows.

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



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



COLD WEATHER OPERATION

COLD WEATHER OPERATION INFORMATION

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

Fuel And Lubricants

- Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see “LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS (4-8)“.

Cooling System Coolant

⚠ WARNING

- **Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large amount 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 propane-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 of the antifreeze mixture when changing the coolant, see “CLEAN INSIDE OF COOLING SYSTEM (4-23)“.
Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, anti foam 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 cooling water must be changed twice a year (spring and fall), so use permanent antifreeze as far as 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 large amount of water, and consult a doctor.**
- **Battery electrolyte dissolves paint. If it gets on to the bodywork, wash it off immediately with water.**
- **If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.**
- **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.

Temperature °C(°F) / Charging Rate(%)	20 (68)	0 (32)	-10 (14)	-20 (-4)
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

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

AFTER DAILY WORK COMPLETION

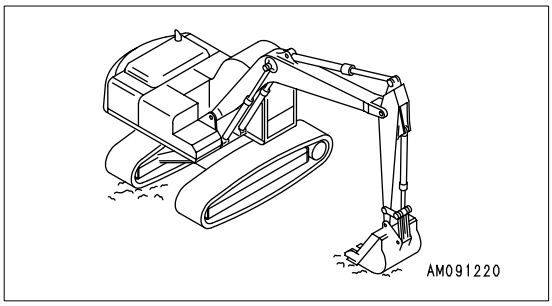
⚠ WARNING

- **Performing idle-running of the tracks is dangerous, so stay well away from the tracks.**

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 and the machine can start next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- After operation in water or mud, remove water from undercarriage as described below to extend undercarriage service life.

1. Swing 90° with engine at low idling and bring the work equipment to the side of the track.
2. Jack up the machine until the track is raised slightly from the ground. Rotate the track under no load. Repeat this procedure on both the left and right sides.



AFTER COLD WEATHER SEASON

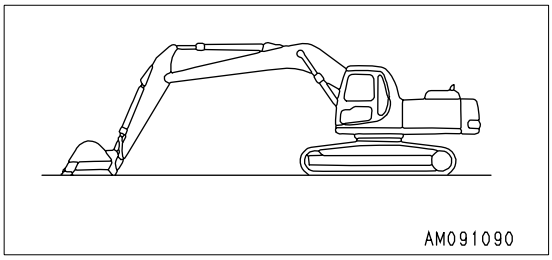
When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see “LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS (4-8)“.
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh soft water.

LONG TERM STORAGE

BEFORE STORAGE

NOTICE
To protect the hydraulic cylinder piston rod while in storage, keep the work equipment in the posture shown at right.
(This prevents rust from developing on the piston rod)



When putting the machine in storage for a long time, do as follows.
- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Lock each control lever and pedal with the safety lock lever and pedal lock.
- Set the stop valve to the “lock“ position on machines ready for attachments. Install the blind plugs to the elbows.
- Set the selector valve on the machines which can install attachments to the “Where no attachment is mounted“position.

DURING STORAGE

⚠ WARNING

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

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

AFTER STORAGE

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

When using the machine after long-term storage, do as follows before using it.
- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places.
- When a machine is stored for a long period, moisture in the air will get into the oil. Check the oil before and after starting the engine. If there is water in the oil, change the oil.

STARTING MACHINE AFTER LONG-TERM STORAGE

When starting the engine after long-term storage, cancel the automatic warming-up operation as follows.
1. Turn the starting switch key to the ON position.
2. Turn the fuel control dial from the low idling (MIN) position to the full (MAX) position, hold it there for 3 seconds, then return it to the low idling (MIN) position and start the engine.

TROUBLES AND ACTIONS

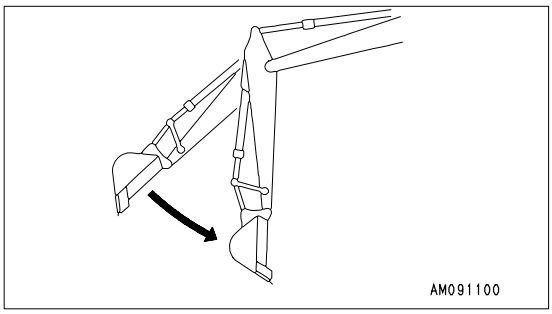
RUNNING OUT OF FUEL

When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before stating.
For details of bleeding the air, see “REPLACE FUEL FILTER CARTRIDGE (4-47)“.

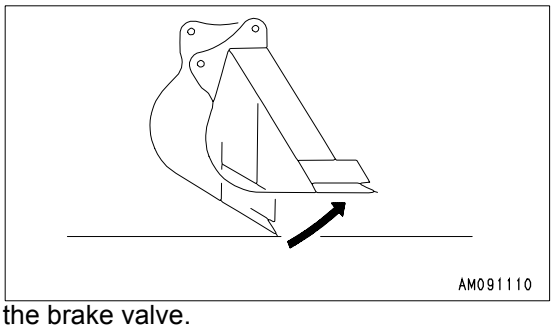
PHENOMENA THAT ARE NOT FAILURES

Note that the following phenomena are not failures:

- When the arm control lever is operated to the IN position and the work equipment is lowered under no load from a high position, the arm speed will drop momentarily when the arm is more or less at the vertical position.



- When the bucket control lever is operated to the CURL position and the work equipment is lowered under no load from a high position, the bucket speed will drop momentarily when the bucket teeth are more or less at the horizontal position.
- The bucket or arm will fluctuate by itself during heavy- duty digging operations.



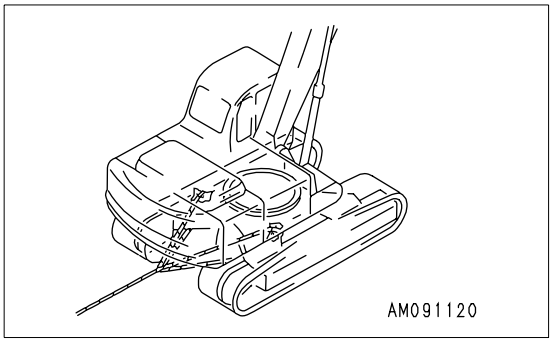
- When starting or stopping the swing, noise will be emitted from the brake valve.
- When going down a steep slope at low speed, a noise will be emitted from the travel motor brake valve.

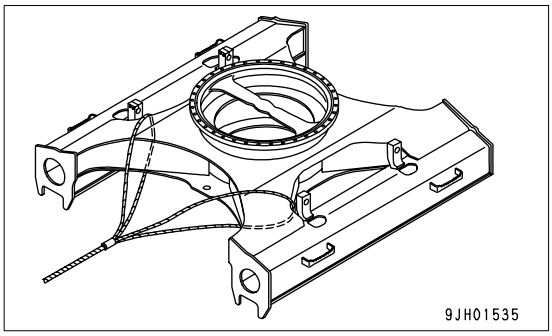
TOWING THE MACHINE

⚠ WARNING

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

If the machine sinks in mud and cannot get out under its own power, or if the drawbar pull of the excavator is being used to tow a heavy object, use a wire rope as shown in the diagram on the right.
Place pieces of wood between wire ropes and body to prevent damage to ropes and body.
At this time, never use the hole for light-weight towing.

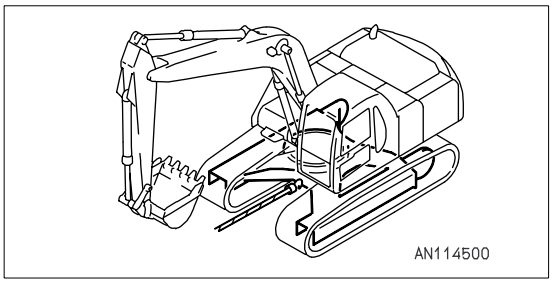




LIGHTWEIGHT TOWING HOLE

⚠ WARNING

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



There is a hole in the track frame to fit the shackle when towing light objects.
Permissible towing load: Max. 49,000N (5,000 kgf)

SEVERE JOB CONDITION

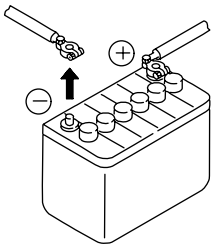
- When carrying out digging operations in water, if the work equipment mounting pin goes into the water, carry out greasing every time the operation is carried out.
- For heavy-duty operations and deep digging, carry out greasing of the work equipment mounting pins every time before operation.
  After greasing, operate the boom, arm and bucket several times, then grease again.

DISCHARGED BATTERY

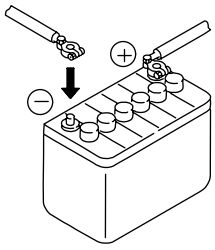
⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.**
- **The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large 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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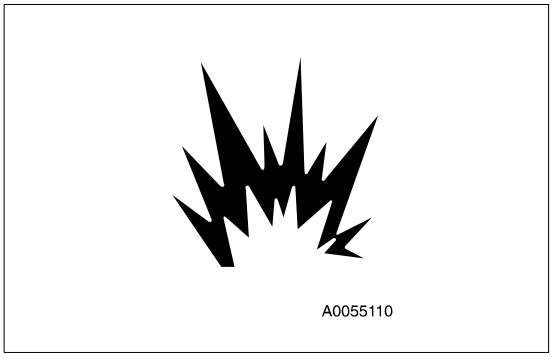
Battery Removal And Installation

- Before removing the battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is a hazard of sparks being generated.
- When installing the battery, connect the ground cable last.
- When replacing the battery, secure it with battery fitting.
  Tightening torque: Tightening battery terminal: 9.8 to 14.7 N·m (1 to 1.5 kgf·m)

Battery Charges

When charging the battery, if the battery is not handled correctly, there is a hazard that the battery may explode. Always follow the instructions of “DISCHARGED BATTERY (3-124)“ and the instruction manual accompanying the charger, and do as follows.



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

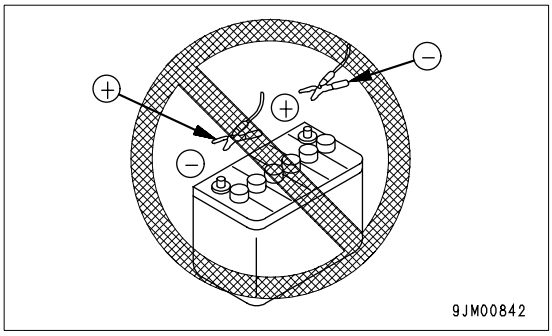
Starting Engine With Booster Cables

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

Connecting and Disconnecting Booster Cables

⚠ WARNING

- **When connecting the cables, never contact the positive (+) and negative (-) terminals.**
- **When starting the engine with a booster cable, always wear safety glasses.**
- **Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.**
- **Be careful not to make a mistake when connecting a booster cable. In the last connection (to the upper structure frame), a spark will be caused, so connect the cable to a spot as far away from the battery as possible. (Avoid the work equipment, however, because it is not a good conductor)**
- **When removing the booster cable, exercise good care so that the booster cable clips may not contact each other, or they contact the chassis.**



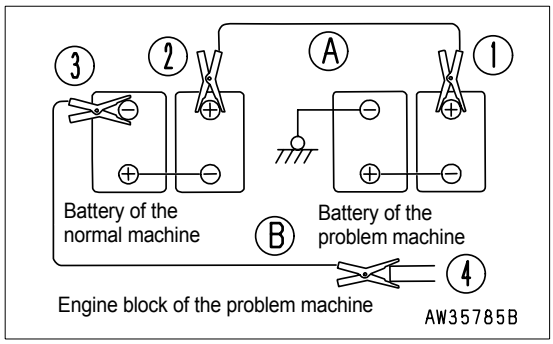
NOTICE

- **The starting system for this machine uses 12 V. For the normal machine, also use a 12 V battery.**
- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**
- **Check that the safety lock levers and parking brake levers of both machine are in the LOCK position.**
- **Check that each lever is in the NEUTRAL position.**

Booster Cable Connection

Keep the starting switch of the normal machine and problem machine are both at the OFF position.
Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
3. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
4. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
5. Connect the other clip of booster cable (B) to the revolving frame of the problem machine.



Starting the Engine

⚠ CAUTION

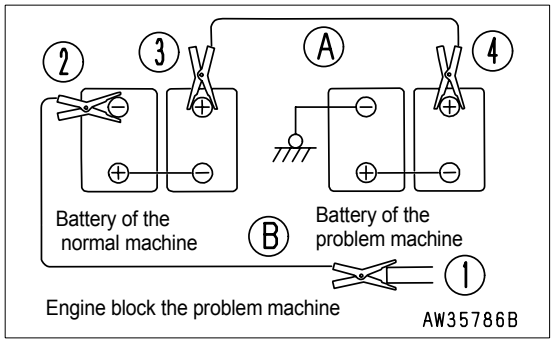
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are at the HOLD or neutral position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine.
   If the engine doesn't start at first, try again after 2 minutes or so.

Booster Cable Disconnection

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

1. Remove one clip of booster cable (B) from the revolving frame of the problem machine.
2. Remove the other clip of booster cable (B) from the negative (-) terminal of the normal machine.
3. Remove one clip of booster cable (A) from the positive (+) terminal of the normal machine.
4. Remove the other clip of booster cable (A) from the positive (+) terminal of the problem machine.



OTHER TROUBLE

Electrical System

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	•Defective wiring, deterioration of battery •Loose fan belt	(•Check, repair loose terminals, disconnections, replace battery) Check fan belt tension, replace)
Lamp flickers while engine is running		•Check fan belt tension, replace
Charge level monitor does not go out even when engine is running	•Defective alternator •Defective wiring	(•Replace) (•Check, repair)
Abnormal noise is generated from alternator	•Defective alternator	(•Replace)
Starting motor does not turn when starting switch is turned to ON	•Defective wiring •Defective starting motor •Insufficient battery charge	(•Check, repair) (•Replace) •Charge
Pinion of starting motor keeps going and out	•Insufficient battery charge •Defective safety relay	•Charge (•Replace)
Starting motor turns engine sluggishly	•Insufficient battery charge •Defective starting motor	•Charge (•Replace)
Starting motor disengages before engine starts	•Defective wiring, defective ring gear pinion •Insufficient battery charge	(•Check, repair) •Charge
Pre-heating monitor does not light	•Defective wiring •Defective heater relay •Defective monitor	(•Check, repair) (•Replace) (•Replace)
Oil pressure monitor does not light up when engine is stopped (starting switch at ON position)	•Defective monitor •Defective caution lamp switch	(•Replace) (•Replace)
Outside of electrical heater is not warm when touched by hand	•Defective wiring •Disconnection in electric heater •Defective operation of heater relay switch	(•Check, repair) (•Replace) (•Replace)

Chassis

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Speed of travel, swing, boom, arm, bucket is slow	•Lack of hydraulic oil	•Add oil to specified level, see CHECK BEFORE STARTING
Pump generates abnormal noise (sucking in air)	•Clogged element in hydraulic tank strainer, lack of oil	•Clean, see EVERY 2000 HOURS SERVICE
Excessive rise in hydraulic oil temperature	•Loose fan belt •Dirty oil cooler •Lack of hydraulic oil	•Check fan belt tension, replace •Clean, see EVERY 500 HOURS SERVICE •Add oil to specified level, see CHECK BEFORE STARTING
Track comes off	•Track too loose	•Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket		
Bucket rises slowly, does not rise	•Lack of hydraulic oil	•Add oil to specified level, CHECK BEFORE STARTING
Does not swing	•Swing lock switch still applied	•Turn swing lock switch OFF

Engine

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure monitor lights up	•Engine oil pan oil level is low (sucking in air) •Clogged oil filter cartridge •Defective tightening of oil pipe, pipe joint, oil leakage from damaged point •Defective engine oil pressure sensor •Defective monitor	•Add oil to specified level, see CHECK BEFORE STARTING •Replace cartridge, see EVERY 500 HOURS SERVICE (•Check, repair) (•Replace sensor) (•Replace monitor)
Steam spurts out from top of radiator (pressure valve) Radiator water level monitor lights up	•Cooling water level low, leakage of water •Loose fan belt •Dirt or scale accumulated in cooling system •Clogged radiator fins or damaged fins •Defective thermostat •Loose radiator filler cap (high-altitude operations) •Defective water level sensor •Defective monitor	•Check, add water, repair, see CHECK BEFORE STARTING •Check fan belt tension, adjust, replace •Change coolant, flush inside of cooling system, see WHEN REQUIRED •Clean or repair, see EVERY 500 HOURS SERVICE (•Replace thermostat) •Tighten cap or replace packing (•Replace sensor) (•Replace monitor)
Engine does not start when starting motor is turned	•Lack of fuel •Air in fuel system •Defective fuel injection pump or defective nozzle •Starting motor cranks engine sluggishly •Preheating monitor does not light up •Defective compression •Defective valve clearance	•Add fuel, see CHECK BEFORE STARTING •Repair place where air is sucked in, see EVERY 500 HOURS SERVICE (•Replace pump or nozzle) •See ELECTRICAL SYSTEM •See ELECTRICAL SYSTEM (•Adjust valve clearance)
Exhaust gas is white or blue	•Too much oil in oil pan •Improper fuel	•Set oil to specified level, see CHECK BEFORE STARTING •Change to specified fuel
Exhaust gas occasionally turns black	•Clogged air cleaner element •Defective nozzle •Defective compression •Defective turbocharger	•Clean or replace, see WHEN REQUIRED (•Replace nozzle) (•See defective compression above) •Clean or replace turbocharger

Problem	Main causes	Remedy
Combustion noise occasionally make breathing sound	•Defective nozzle	(•Replace nozzle)
Abnormal noise generated (combustion or mechanical)	•Low-grade fuel being used •Overheating •Damage inside muffler •Excessive valve clearance	•Change to specified fuel •Refer to “Radiator water level monitor lights up“ as above •Replace muffler (•Adjust valve clearance)

Electronic Control System

If an error code appears on the machine monitor display (normally displays TIME), follow the countermeasure table as shown below in the self-diagnosis.

Machine Monitoring System

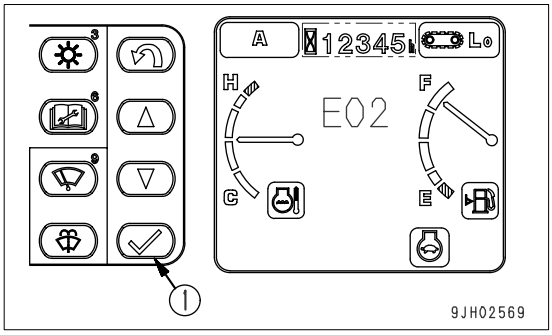
Monitor display	Error mode	Countermeasure
E02	PC-EPC valve system error	If the pump override switch is set to the ON position, operation can be carried out. However, immediately have the TVC valve system inspected by your Komatsu distributor. (*)
E03	Swing brake system error	Turn the swing prolix switch ON to cancel the brake. When applying the swing brake, operate the swing lock switch manually. Depending on the cause of the failure, it may be impossible to release the brake. In any case, have the system inspected immediately by your Komatsu distributor. (*)
E05	Governor system error	Governor will not execute the control function. Manually operate the governor-lever. To fix the governor lever at the full stroke position, use the retaining bolt holes on bracket. In this case, immediately have the governor system inspected by your Komatsu distributor.
In the case where the monitor will not display error codes and work equipment operation and swing operation can not be carried out.		Have the machine inspected immediately by your Komatsu distributor.

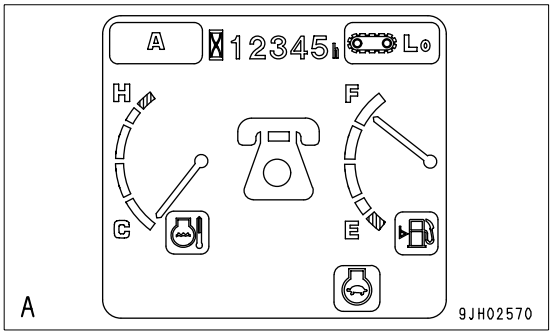
(*) For details of the method of handling the emergency pump drive switch and swing holding brake cancel switch, see SWITCHES (3-27).

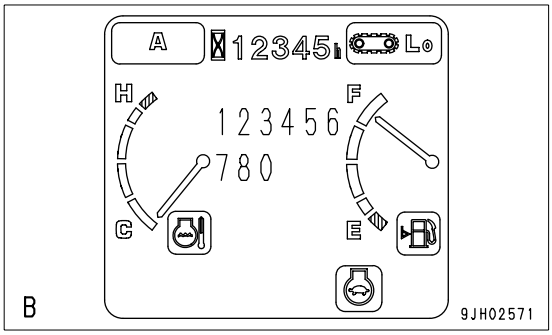
Point Of Contact To Telephone When Error Occurs

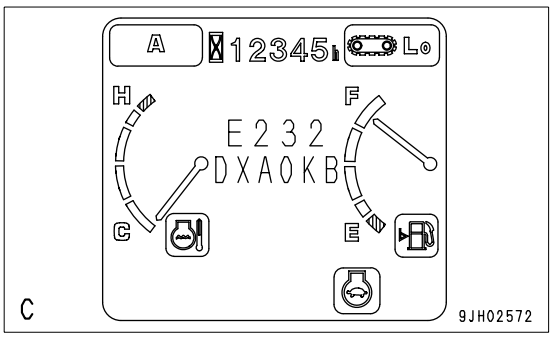
If an error screen is displayed on the monitor, the screen changes as follows each time input confirmation switch (1) is pressed.
Error screen → screen A → screen B → screen C → error screen
Check the point of contact telephone number on screen B.

REMARK
If the point of contact telephone number has not been registered, screen B is not displayed.
If it is necessary to register the point of contact telephone number, ask your Komatsu distributor to register it.









MAINTENANCE

⚠ WARNING

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

MAINTENANCE INFORMATION

Do not carry out any inspection and maintenance operation that is not found in this manual.

Service Meter Reading

Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

Komatsu Genuine Replacement Parts

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

Komatsu Genuine Lubricants

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

Windshield Washer Fluid

Use automobile window washer fluid, and be careful not to let any dirt get into it.

Fresh and Clean Lubricants

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

Check Drained Oil and Used Filter

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

Fuel Strainer

If your machine is equipped with a fuel strainer, do not remove it while fueling.

Welding Instructions

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1m from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- If a seal or bearing happen to come between the welding part and grounding point, change 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 will cause damage and malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

Dusty Jobsite

When working at dusty worksites, do as follows:

- Inspect the air cleaner clogging monitor frequently to see if the air cleaner is clogged.
  Clean the air cleaner element at a shorter interval than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

Avoid Mixing Lubricants

If a different type of oil has to be added, drain the old oil and replace all the oil with the new type of oil. Never mix different kinds of oil.

Locking the Inspection Covers

If inspection or maintenance has to be carried out with the inspection cover open, lock it securely in position with the lock bar. If inspection or maintenance is carried out with the inspection cover not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

Hydraulic System - Air Bleeding

When hydraulic equipment has been repaired or replaced, or the hydraulic piping has been removed and installed again, the air must be bled from the circuit. For details, see “BLEEDING AIR FROM HYDRAULIC SYSTEM (4-36)“.

Hydraulic Hose Installation

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.
  When doing this, be careful not to forget to assemble the O-rings and gaskets.
- When installing the hoses, do not twist them or bend them into loops with a small radius.
  This will cause damage to the hose and markedly reduce its service life.

Checks After Inspection and Maintenance Works

If you forget carrying out the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do as follows.

- Checks after operation (with engine stopped)
  - Have any inspection and maintenance points been not forgotten?
  - Have all inspection and maintenance items been carried out correctly?
  - Have any tools or parts been not 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 leakage of water or oil? Have all the bolts been tightened?
- Checks when operating engine
  - For details of the checks when operating the engine, see “TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (2-31)“ and pay careful attention to safety.
  - Are the inspection and maintenance items working properly?
  - Is there any leakage of fuel or oil when the engine speed is raised?

LUBRICANTS, COOLANT AND FILTERS

HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

Oil

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and is deteriorates with use.
  Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual.
  Even if the oil is not dirty, always change the oil after the specified interval.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
  The majority of problems with machine are caused by the entry of such impurities.
  Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.
  Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters 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.
- At the time of shipping from the factory, SAE1OWCD is used for hydraulic type of oil. When HO46-hydraulic oil is going to be used, change specified amount of oil (whole amount). The hydraulic oil that is not recommended by Komatsu can cause clogging of oil filter, so do not use it. The portion of the oil that remains in the piping or cylinders will not be a problem even though it will be mixed into new oil.

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 change for the fuel that is suitable for the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

Cooling System Coolant

- River water contains large 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 anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped. This anti-freeze is effective in preventing corrosion of the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions, 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 used when overhauling, so they do not need grease.
  If any part becomes stiff or generates noise after being used for a long time, grease it.
- Always wipe off all of the old grease that is pushed out when greasing.
  Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

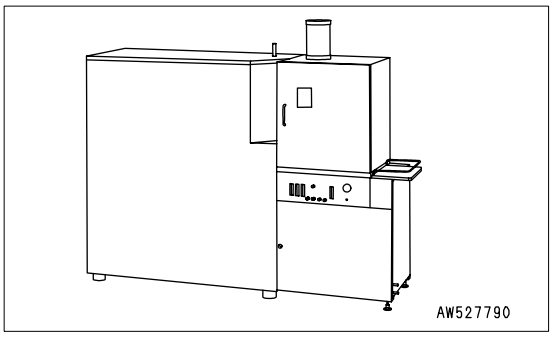
Carrying out KOWA (Komatsu Oil Wear Analysis)

KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.
Periodic use of KOWA makes the following possible:

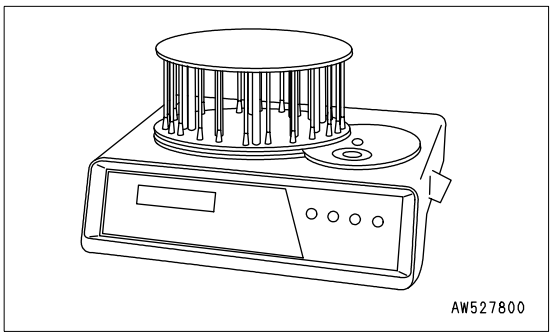
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

KOWA analysis items

- Analysis of metal wear particles
  This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.



- Measurement of particle quantity
  This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.



Oil sampling

- Sampling interval
  250 hours: Engine
  500 hours: Other components

- Precautions when sampling
  - Make sure that the oil is well mixed before sampling.
  - Carry out sampling regularly at fixed intervals.
  - Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

Oil And Fuel Storage

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drum can is at the side. (To prevent moisture from being sucked in)
  If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

Filters

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
  Replace all filters periodically. For details, see the Operation and Maintenance Manual.
  However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are affixed to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

ELECTRIC SYSTEM MAINTENANCE

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause electrical leakage and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is check of fan belt tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External 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 an operator's cab cooler or any other electrical equipment, connect it to an independent power source connector. The cables to supply power to the optional equipment must never be connected to the fuse, starting switch, or battery relay.

WEAR PARTS

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 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	Q'ty	Replacement frequency
Engine oil filter	6733-51-5141	Cartridge	1	Every 500 hours service
Hydraulic oil filter	20Y-60-31121 (07000-15160)	Element (O-ring)	1 (1)	Every 1000 hours service
Fuel filter	6732-71-6111	Cartridge	1	Every 500 hours service
Hydraulic tank breather	20Y-60-21470	Element	1	Every 500 hours service
Air cleaner	600-185-2500	Element assembly	1	-
Additional filter for breaker (if equipped)	20Y-970-1820 (07000-12115)	Element (O-ring)	1 (1)	-
Electric heater	6732-11-4811	Gasket	2	-
Bucket	205-70-74272 (205-70-74281) (205-70-74291)	Vertical pin type Tooth (Pin) (Lock)	5 (5) (5)	-

LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS

PROPER SELECTION

Reservoir	Kind of fluid	AMBIENT TEMPERATURE		Type	CAPACITY	
		Min °C (°F)	Max °C (°F)		Specified	Refill
Engine oil pan	Engine oil	0 (32) -20 (-4) -15 (5) -20 (-4)	40 (104) 10 (50) 50 (122) 40 (104)	SAE 30 SAE 10W SAE 15W-40 SAE 10W-30	14.3 liter (3.8 US gallons)	14 liter (3.7 US gallons)
P.T.O. case		0 (32) -30 (-22)	40 (104) 10 (50)	SAE 30 SAE10W		
Swing machinery case		-30 (-22)	40 (104)	SAE 30	4.5 liter (1.2 US gallons)	4.5 liter (1.2 US gallons)
Final drive case (each)					4.5 liter (1.2 US gallons)	4.5 liter (1.2 US gallons)
Hydraulic system		-30 (-22) -20 (-4)	40 (104) 40 (104)	SAE 10W SAE 10W-30	190 liter (50.2 US gallons)	121 liter (32 US gallons)
		-15 (5)	40 (104)	SAE 15W-40		
Fuel tank	Diesel fuel	-10 (14) -30 (-22)	50 (122) -10 (14)	ASTM D975 No. 2 ASTM D975 No. 1 (for winter use)	280 liter (74 US gallons)	
Cooling sytem	Water	Add antifreeze			18.6 liter (4.9 US gallons)	
Grease fitting	Grease	-30 (-22)	40 (104)	NLGI No. 2		

ReservoirsCapacity		Engine oil pan	Swing machinery case	Final drive case (each)	Damper case	Hydraulic system	Fuel tank	Cooling system
Specified	Liters	14.3	4.5	4.5	0.75	190	280	18.6
	US gallons	3.8	1.2	1.2	0.2	50.2	74	4.9
Refill	Liters	14	4.5	4.5	–	121	–	–
	US gallons	3.7	1.2	1.2	–	32	–	–

REMARK

- **When fuel sulphur content is less than 0.5%, change oil in the oil pan according to every 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 (32°F), be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though the atmospheric temperature goes up to 10°C (50°F) 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 hydrauric 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 Insitute

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

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 pius	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifeeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 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	PEN-NZOIL	*Supreme 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 anti-freeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 star-tex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total Transmission TM	Multis EP2	Antigal/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	-	Antifreeze

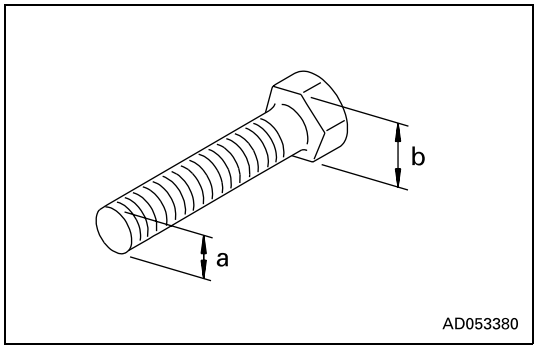
TIGHTENING TORQUE SPECIFICATIONS

TIGHTENING TORQUE LIST

⚠ CAUTION

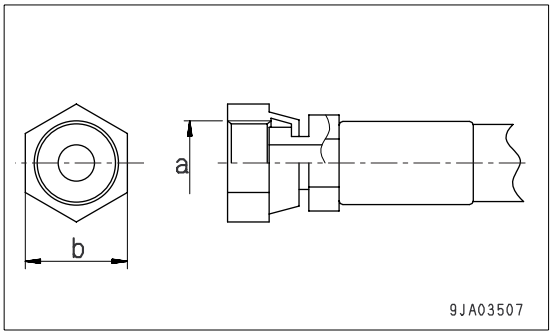
If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.
Always pay careful attention when tightening parts.

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below.
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.



Thread diameter a(mm/ inches)	Width across flat b(mm/ inches)	Tightening torque			
		Target value		Service limit	
		N•m/lbf-ft	kgf•m/lbf-ft	N•m/lbf-ft	kgf•m/lbf-ft
6/0.25	10/0.4	13.2/9.7	1.35/9.7	11.8-14.7/8.7-10.8	1.2-1.5/8.7-10.8
8/0.3	13/0.5	31/22.9	3.2/22.9	27-34/19.9-25	2.8-3.5/19.9-25
10/0.4	17/0.7	66/48.7	6.7/48.7	59-74/43.5-54.6	6.0-7.5/43.5-54.6
12/0.5	19/0.7	11/8.1	11.5/8.1	98-123/72.3-90.7	10.0-12.5/72.3-90.7
14/0.6	22/0.9	177/130.5	18/130.5	157-196/115.8-144.6	16.0-20.0/115.8-144.6
16/0.6	24/0.9	279/205.8	28.5/205.8	245-309/180.7-227.9	25.0-31.5/180.7-227.9
18/0.7	27/1.1	382/281.7	39/281.7	343-425/253-313.5	35.0-43.5/253-313.5
20/0.8	30/1.2	549/404.9	56/404.9	490-608/361.4-448.4	50.0-62.0/361.4-448.4
22/0.9	32/1.25	745/549.5	76/549.5	662-829/488.3-611.4	67.5-84.5/488.3-611.4
24/0.9	36/1.4	927/683.7	94.5/683.7	824-1030/607.8-759.7	84.0-105.0/607.8-759.7
27/1.1	41/1.6	1320/973.6	135/973.6	1180-1470/870.3-1084.2	120.0-150.0/870.3-1084.2
30/1.2	46/1.8	1720/1268.6	175/1268.6	1520-1910/1121.1-1408.7	155.0-195.0/1121.1-1408.7
33/1.3	50/2.0	2210/1630	225/1630	1960-2450/1445.6-1807	200.0-250.0/1445.6-1807
36/1.4	55/2.2	2750/2028.3	280/2028.3	2450-3040/1807-2242.2	250.0-310.0/1807-2242.2
39/1.5	60/2.4	3280/2419.2	335/2419.2	2890-3630/2131.6-2677.3	295.0-370.0/2131.6-2677.3

- The torques marked I indicate the tightening torques for the hoses at the top of the swivel joint.
- The torques marked * indicate the hightening torques for the hoses at the top of the swivel joint.



Thread diameter a(mm/ inches)	Width across flat b(mm)	Tightening torque			
		Target value		Service limit	
		N•m/lbf-ft	kgf•m/lbf-ft	N•m/lbf-ft	kgf•m/lbf-ft
14/0.6	19/0.75	29.4/21.7	3.0/21.7	27.5-39.2/20.3-28.9	2.8-4.0/20.3-28.9
18/0.7	24/0.9	78.5/57.9	8.0/57.9	58.8-98.1/43.4-72.4	6.0-10.0/43.4-72.4
22/0.9	27/1.1	117.7/86.8	12.0/86.8	88.3-137.3/65.1-101.3	9.0-14.0/65.1-101.3
24/0.9	32/1.25	147.1/108.5	15.0/108.5	117.7-176.5/86.8-130.2	12.0-18.0/86.8-130.2
30/1.2	36/1.4	215.7/159.1	22.0/159.1	176.5-245.2/130.2-180.9	18.0-25.0/130.2-180.9
33/1.3	41/1.6	255.0/188.1	26.0/188.1	215.7-284.4/159.1-209.8	22.0-29.0/159.1-209.8

SAFETY CRITICAL PARTS

For using the machine safely for an extended period of time, you are requested to periodically replace the safety - critical and fire prevention- related parts listed in the table of important parts on the following page.
Material quality of these parts can change as time passes and they are likely to wear our 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 irrespective of their conditions after a certain period of usage. This is important to ensure that these parts maintain their full performance at all the time.
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 parts has not yet arrived.
If any of the hose clamps show deterioration like deformation or crack, replace such a defective clamp with a new one together with a defective hose.
Also carry out the following checks with hydraulic hoses which need not be replaced periodically. Tighten a loosened clamp again or replace a defective hose, as such abnormality requires.
When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.
Ask your Komatsu distributor to replace the critical parts.
Check the hydraulic hoses and the fuel hose, too, when carrying out the following periodic inspections.

Interval	Check items
Check before starting	Oil leakage from the connections or the clamps of fuel and hydraulic hose
Monthly inspection	Oil leakage from the connections or the clamps of fuel and hydraulic hose. Damage (crack, wear and tear) of fuel and hydraulic hose.
Yearly inspection	Oil leakage from the connections or the clamps of fuel and hydraulic hose. Interference, deformation, deterioration and damage (crack, wear and tear) of fuel and hydraulic hose.

SAFETY CRITICAL PARTS LIST

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (Fuel tank - Water separator)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (Water separator - Fuel pump)	1	
3	Fuel return hose (Fuel injection pump - Fuel tank)	1	
4	Spill hose (Engine output connector - Fuel tank)	1	
5	Pump outlet hose (Pump - Control valve)	2	
6	Work equipment hose (Boom cylinder inlet)	4	
7	Work equipment hose (Bucket cylinder line - Boom foot section)	2	
8	Work equipment hose (Bucket cylinder inlet)	2	
9	Work equipment hose (Arm cylinder line - Boom foot section)	2	
10	Work equipment hose (Arm cylinder inlet)	2	
11	Additional attachment line hose (Boom foot section)	2	
12	Additional attachment line hose (Boom top section)	2	
13	Swing line hose (Swing motor inlet)	2	
14	Main suction hose	1	
15	Heater hose	2	
16	Travel line hose (Control valve - Swivel joint)	4	
17	Travel line hose (Swivel joint - Travel motor)	4	
18	Seat belt	1	Every 3 years

MAINTENANCE SCHEDULE

If the machine is equipped with a hydraulic breaker, the maintenance schedule for some parts will be different. For details, see “MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (4-17)“ to confirm the correct maintenance schedule when carrying out maintenance.

MAINTENANCE SCHEDULE CHART

INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

INITIAL 1000 HOURS MAINTENANCE (ONLY AFTER THE FIRST 1000 HOURS)

WHEN REQUIRED

CHECKS BEFORE STARTING

EVERY 250 HOURS MAINTENANCE

EVERY 500 HOURS MAINTENANCE

EVERY 1000 HOURS MAINTENANCE

EVERY 2000 HOURS MAINTENANCE

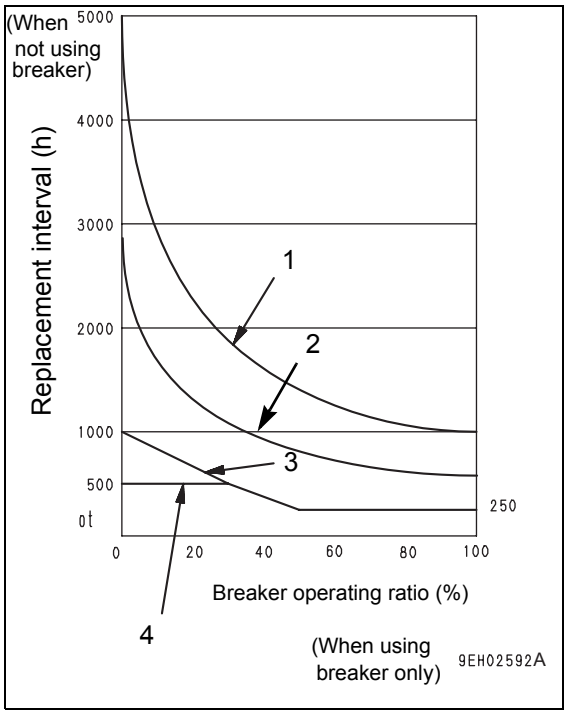
MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER

For machine equipped with a hydraulic breaker, the hydraulic oil deteriorates faster than for normal bucket digging operations, so set the maintenance intervals as follows.

Hydraulic Oil Filter Element - Replace

- On new machines, replace the element after the first 100 to 150 hours, then carry out further replacement of the element according to the table on the right.

1. Replacement interval for hydraulic oil
2. Replacement interval for bio-oil
3. Hydraulic filter element
4. Additional filter element



Hydraulic Oil - Change

- Change the oil according to the table on the right.

USE OF BIO-DEGRADEABLE OIL

Special care must be taken when using bio-degradable oil in the hydraulic system of the hydraulic excavator.
When the machine is supplied from the factory with bio-degradable oil, the following change intervals should be used. The oil supplied from the factory is classed as BO46-G3. (If the machine has been filled with any other type of bio-degradable oil, then contact your Komatsu distributor for advice on change intervals).

Filter changes

1) The first filter change should be made 50 hours after first use.
2) The second, and subsequent changes should be made at the standard changing intervals.
3) If an abnormality is found in the characteristics of the oil, change the filter immediately.

Oil changes

1) Change the bio-degradable oil every 2500 hours.
2) If an abnormality is found in the characteristics of the oil, change the oil immediately

.MAINTENANCE PROCEDURE

INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

Carry out the following maintenance only after the first 250 hours of operation on new machines.

- Replace Fuel Filter Cartridge

For details of the method of replacing or maintaining, see the section on EVERY 500 HOURS SERVICE.

INITIAL 1000 HOURS MAINTENANCE (ONLY AFTER THE FIRST 1000 HOURS)

Carry out the following maintenance only after the first 1000 hours of operation on new machines.

- CHECK ENGINE VALVE CLEARANCE, ADJUST
  Special tools are needed for inspection and maintenance, so contact your Komatsu distributor.

WHEN REQUIRED

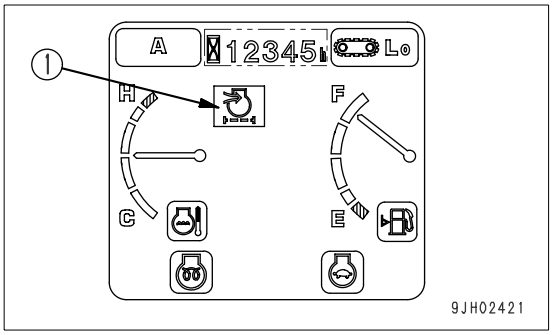
CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

⚠ WARNING

- **When using compressed air, there is danger of dirt flying and causing personal injury.**
- **Always wear protective glasses, dust mask, or other protective equipment.**
- **When removing the outer element from the air cleaner body, it is dangerous to pull it out by force. When working at high places or where the foothold is poor, be careful not to fall because of the reaction when pulling out the outer element.**

Checking

If air cleaner clogging monitor (1) of the monitor panel flashes, clean the air cleaner element.



Replacing

- Replacing element, O-ring
  If one year has passed since installing the element or if air cleaner clogging monitor (1) on the monitor panel flashes immediately after the element is cleaned, replace the outer element, inner element, and O-ring.
- Replacing evacuator valve
  Replace it if it is damaged or the rubber is markedly deformed.

NOTICE

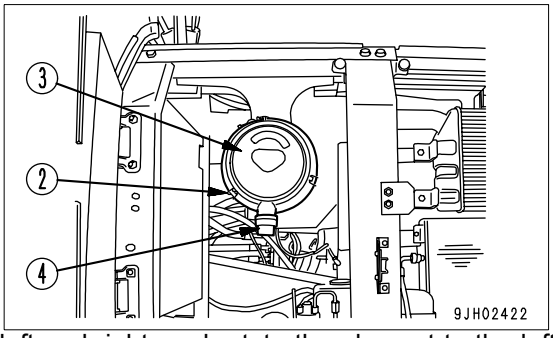
Do not clean the air cleaner element until the air cleaner clogging monitor on the monitor panel flashes. If the element is cleaned frequently before the clogging monitor flashes, the air cleaner will not be able to display its performance fully, and the cleaning efficiency will also go down.
In addition, during the cleaning operation, more dirt stuck to the element will fall inside the inner element.

Cleaning or replacing outer element

1. Open the rear door at the left side of the machine, remove 4 hooks (2), then remove cover (3).

NOTICE

Before and after cleaning the element, do not leave or keep it in direct sunlight.

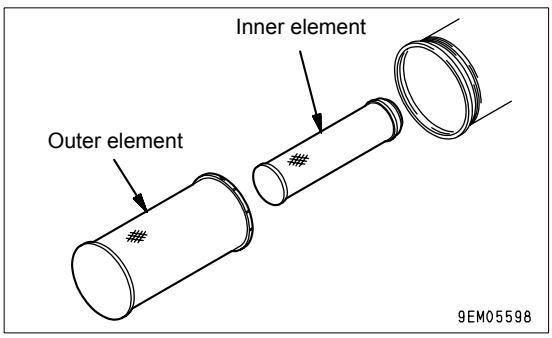


2. Hold the outer element, rock it lightly up and down and to the left and right, and rotate the element to the left and right to pull it out.

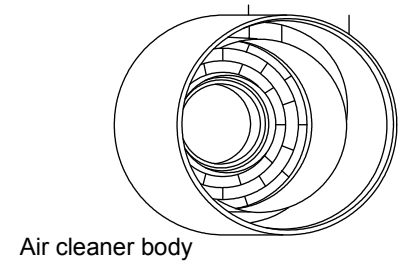
NOTICE

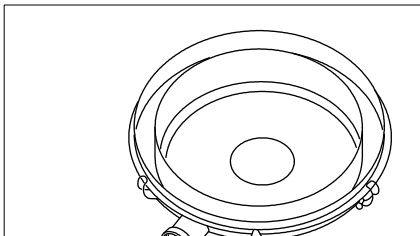
- **Never remove the inner element. It will allow dirt to enter and cause failure of the engine.**
- **Do not use a screwdriver or other tool.**

3. Hold the outer element, rock it lightly up and down and to the left and right, and rotate the element to the left and right to pull it out.

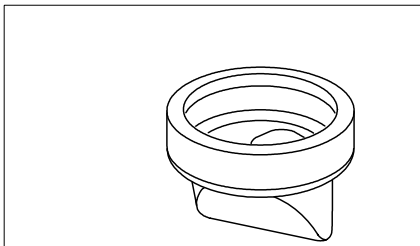


4. Wipe off or brush off the dirt stuck to cover (3) and the inside of the air cleaner body.

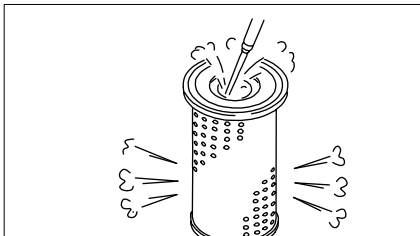

Air cleaner body
9EH01889


Cover ③
9EH01890

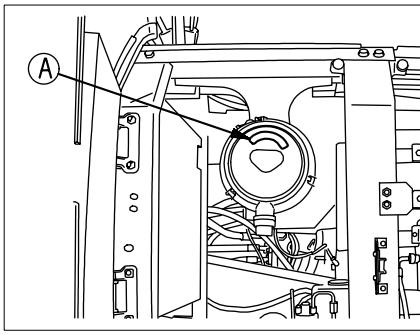
5. Remove any dirt or dust that is accumulated to evacuator valve (4) installed to cover (3).


Evacuator valve
9EH01891

6. Direct dry compressed air (less than 0.69MPa (7kgf/cm²) to the outer element (4) from inside along its folds, then direct it from outside along its folds and again from inside.
   1) Remove one seal from the element whenever the element has been cleaned.
   2) Replace the outer element which has been cleaned 5 times repeatedly or used throughout a year. Replace the inner element at the same time.


AD053020

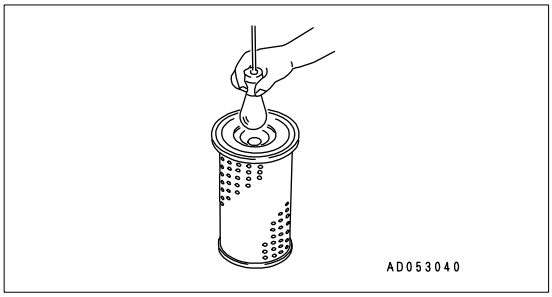
   3) Replace both inner and outer elements when the monitor lamp (1) flashed soon after installing the cleaned outer element even though it has not been cleaned 5 times.
   4) When replacing the element, stick on seal (A) packed in the same box as the element. Stick the seal in the position shown in the diagram on the right.



9JH02423

7. Remove the cloth or tape cover installed in Step 3.

8. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.



NOTICE
- **When cleaning the element, do not hit or beat it against anything.**
- **Do not use an element whose folds or gasket or seal are damaged.**

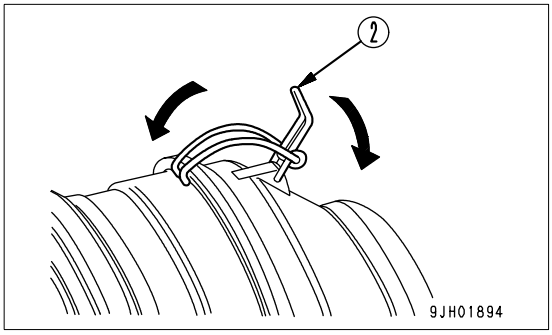
Install Air Cleaner Element

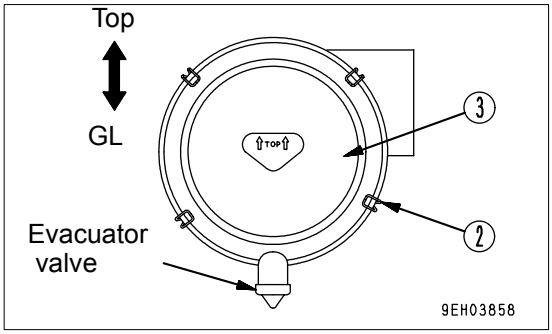
NOTICE
- **Do not use any damaged gasket or seal or element with damaged pleats.**
- **Cleaning the element or O-ring after one year has passed and using them again will cause problems. Always replace them with new parts.**
- **The seal portion on imitation parts lacks precision, and allows the entry of dust, which leads to damage of the engine. Do not use such imitation parts.**
- **Do not run the engine with the inner element removed. It will cause damage to the engine.**

1. Check that there is no dirt or oil stuck to the seal portion of the new element or cleaned element. Wipe off any dirt or oil.
2. When the outer element has been removed, check that the inner element has not come out of position and is not at an angle. If is is at an angle, insert your hand and push it in straight.
3. Push the outer element in straight with your hand when installing it to the air cleaner body.
   If the element is held and rocked lightly up and down and to the left and right while pushing it in, the element can be inserted easily.

NOTICE
When inserting the element, if the rubber at the tip is swollen or the outer element is not pushed in straight, and cover (3) is assembled by force to hook (2), there is danger that the hook and air cleaner body may be damaged, so be careful when assembling.

4. Install cover (3) as follows.
   1) Align cover (3) with the element.
   2) Hook the tip of hook (2) to the protruding part of the air cleaner body and lock it in position.
   3) When locking hooks (2) in position, apply the hooks in turn on opposite sides (top, bottom, left, right) in the same way as when tightening bolts.
   4) Always install cover (3) so that the evacuator is facing the ground.
   5) When cover (3) is installed, check that the clearance between the air cleaner body and cover (3) is not too large. If it is too large, install again.





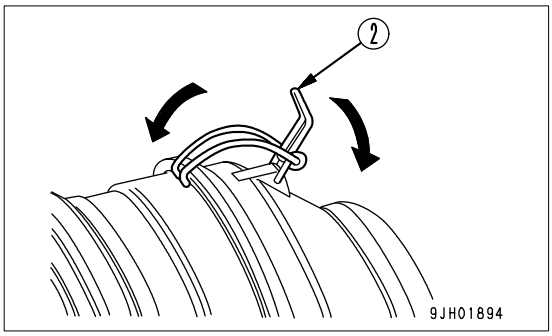
Replacing inner element

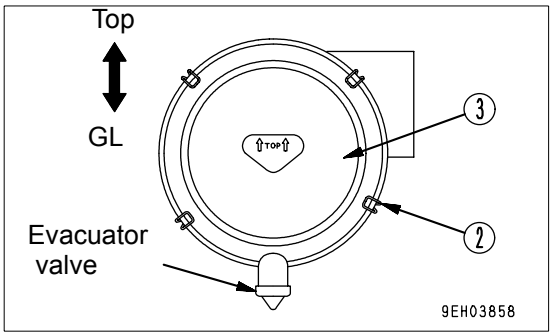
1. First remove the outer element, and then remove the inner element.
2. Cover the air connector side (outlet side) with a clean cloth or tape.
3. Clean the air cleaner body interior, then remove the cover from the air intake port in Step 2.
4. Install a new inner element to the connector, then tighten the nut.

NOTICE

The inner element must not be used again even after its cleaning. When replacing the outer element, replace the outer element at the same time.

5. Set the outer element in position, then lock cover (3) with hooks (2).





CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.**
- **Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.**
- **For details of starting the engine, see"BEFORE STARTING ENGINE (3-64)" and "STARTING ENGINE (3-77)" in the OPERATION section.**
- **There is danger of touching the fan if the undercover is left removed.**
- **Never enter behind the machine when the engine is running.**

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replacing corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours, whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant
Non permanent type antifreeze containing ethylene glycol (winter, one season type)	Every 6 months (spring, autume) (Drain antifreeze in spring, add antifreeze in autumn)	
When no using antifreeze	Every 6 months or every 1000 hours, whichever come first	

Stop the machine on level ground when cleaning or changing the coolant.
Use a permanent type of antifreeze.
If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.
Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.
The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.
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
PC160

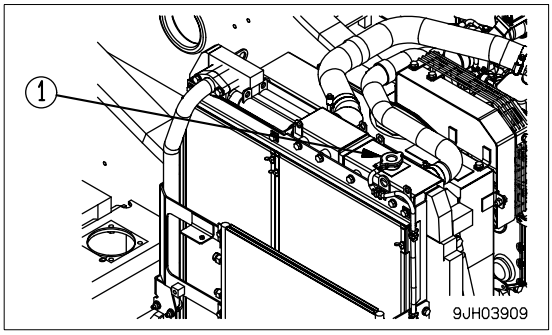
Min. atmospheric temperature	°C (°F)	-10 (14)	-15 (5)	-20 (-4)	-25 (-13)	-30 (-22)
Amount of antifreeze	liter	5.6	6.7	7.6	8.6	9.3
	US gallons	1.5	1.8	2.0	2.3	2.5
Amount of water	liter	13.0	11.9	11.0	10.0	7.2
	US gallons	3.4	3.1	2.9	2.6	1.9

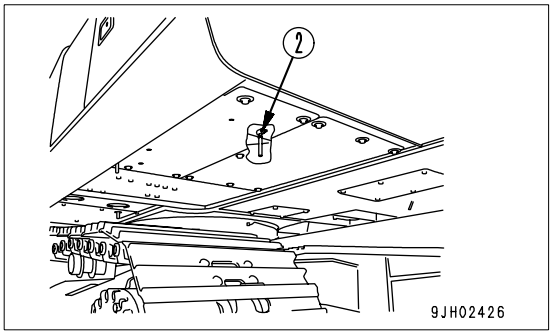
⚠ WARNING

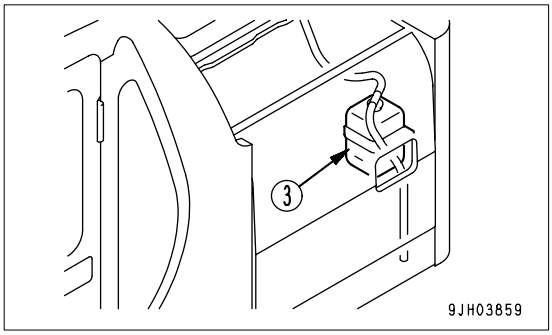
Antifreeze is flammable, so keep it away from flame.
Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at once.

Use city water for the cooling water.
If river water, well water or other such water supply must be used, contact your Komatsu distributor.
We recommend use of an antifreeze density gauge to control the mixing proportions.
Prepare a container to catch drained coolant: Min 20 liters (5.3 US gallons) capacity.

1. Turn radiator cap (1) slowly and remove it.
2. Remove the undercover, then set the container under drain valve (2) to catch the coolant mixture.
   Open drain valve (2) at the bottom of the radiator and drain the coolant.
3. After draining the coolant, close drain valve (2), and fill with city water. When the radiator is full, start the engine and run at low idling to raise the temperature to at least 90°C (194°F), then continue to run for approx. 10 minutes.
4. Stop the engine, open drain valve (2), and drain the water.
5. After draining the water, clean the radiator with detergent.
   For the cleaning method, follow the instruction of detergent.
6. Close drain valve (2).
7. Install the undercover.
8. Add water through the water filler up to the filler port.
9. Run the engine idle at a low speed for 5 minutes, then at a high speed for 5 minutes to bleed air mixed in the cooling water. (At this time, keep the water filler cap removed.)
10. After draining off the cooling water of reserve tank (3) , clean the inside of the reserve tank and refill the water between FULL and LOW level.
11. Stop the engine and tighten the cap. Check the coolant level, and add water if the level is low.

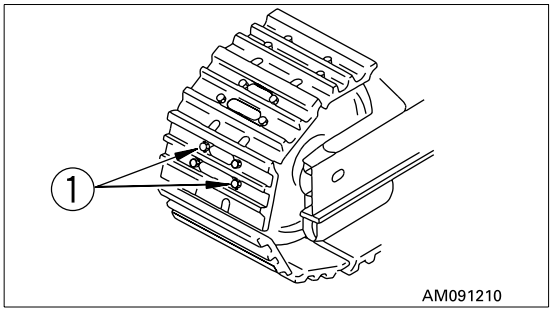






CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.



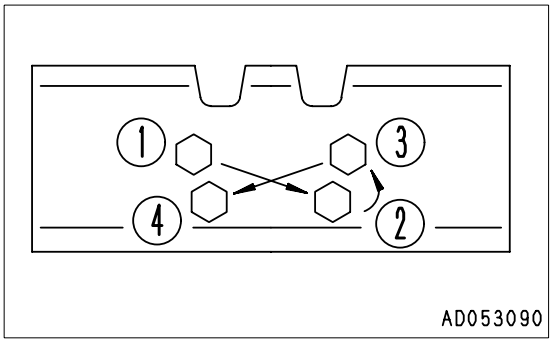
Tightening

Track shoe

1. First tighten to a tightening torque of 490 ± 49 N·m (361.4 ± 36.1 lbf-ft) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further 120° ± 10°.

Order for tightening

Tighten the bolts in the order shown in the diagram on the right. After tightening, check that the nut and shoe are in close contact with the link mating surface.



CHECK AND ADJUST TRACK TENSION

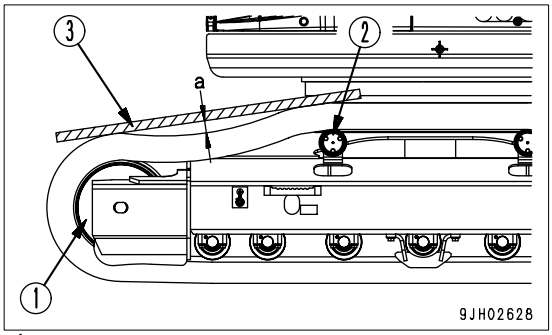
⚠ WARNING

For details of starting the engine and operating the work equipment, see "BEFORE STARTING ENGINE (3-64)", "STARTING ENGINE (3-77)", "AFTER STARTING ENGINE (3-81)", and "WORK EQUIPMENT CONTROLS AND OPERATIONS (3-96)" in the OPERATION section.

Wear on pins and bushings of the undercarriage will vary with working conditions and a type of soil, so inspect the track tension every now and then in order to maintain the standard tension.
For carrying out inspection and adjustment of track shoes, park the machine on the flat and solid ground.

Checking

1. Run the engine at low idling, then travel the machine forward for a distance equal to the track length on ground and stop the machine slowly.
2. Put on the track shoe straight wooden bar (3) which stretches from idler (1) to upper carrier roller (2).
3. Measure the maximum deflection between the bottom surface of the wooden bar and the top surface of the track shoe.
   Deflection a should be 10 to 30 mm (0.4 to 1.2 inches).

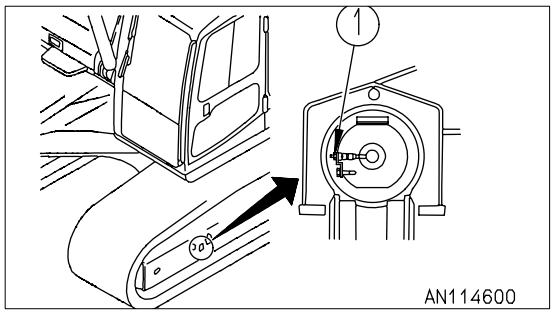


If the track tension is not at the standard value, adjust it in the following manner.

Adjustment

⚠ WARNING

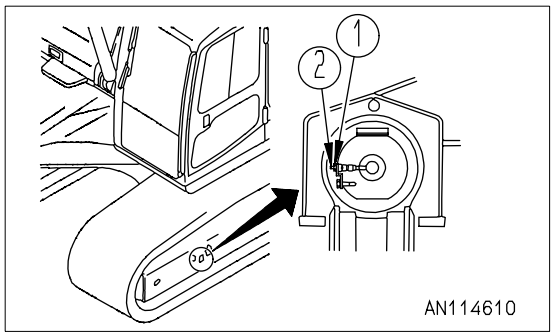
Grease inside the adjusting mechanism is under high pressure. Grease coming from plug (1) under pressure can penetrate the body, causing injury or death. For this reason, do not loosen plug (1) more than one turn.
Do not loosen any part other than plug (1). Furthermore, do not bring your face in front of the plug (1).
If the track tension is not relieved by this procedure, please contact your Komatsu distributor for repairs.



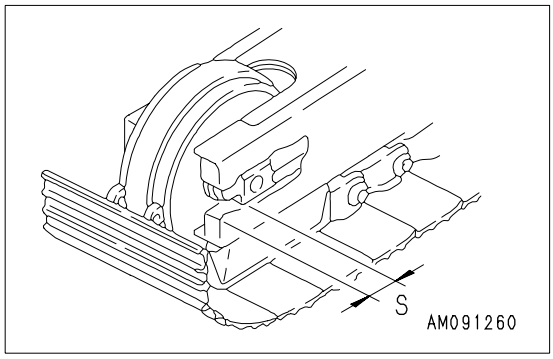
Increasing Track Tension

Prepare a grease gun.

1. Pump in grease through grease fitting (2) with a grease gun.
2. To check that the correct tension has been achieved, run the engine at low idling, move the machine slowly forwards 7 - 8 metres (23 - 26.2 foot), then stop the machine.
3. Check the track tension again, and if the tension is not correct, adjust it again.



4. Continue to pump in grease until dimension S becomes zero (0). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor for repairs.

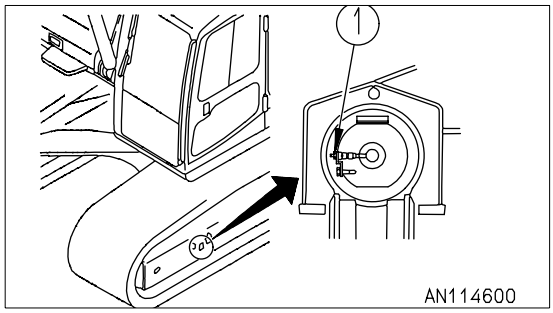


Loosening Track Tension

⚠ WARNING

It is extremely dangerous to release the grease by any method except the procedure given below.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor for repairs.

1. Loosen plug (1) gradually to release the grease.
2. 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, run the engine at low idling, move the machine slowly forwards 7 - 8 m (23 - 26.2 foot), then stop the machine.
6. Check the track tension again, and if the tension is not correct, adjust it again.



CHECK ELECTRICAL INTAKE AIR HEATER

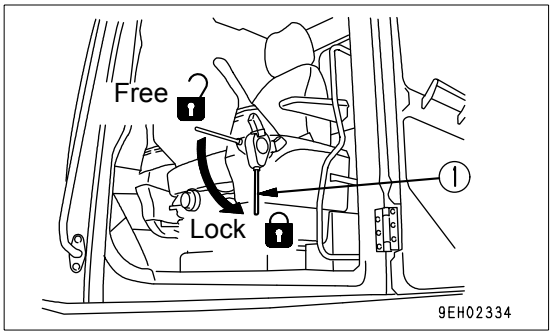
Before the start of the cold season (once a year), contact your Komatsu distributor to have the electrical intake air heater checked for dirt or disconnections.

REPLACE BUCKET TEETH (VERTICAL PIN TYPE)

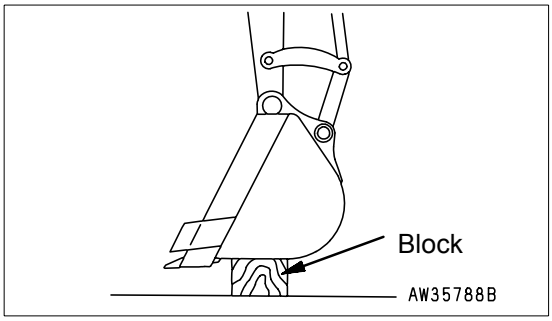
Replace the bucket teeth before the adapter starts to wear.

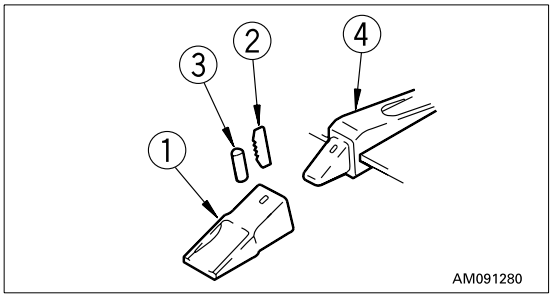
⚠ WARNING

- **It is dangerous if the work equipment moves by mistake when the teeth are being replaced.**
- **Set the work equipment in a stable condition, then stop the engine and set the safety lock lever securely to the LOCK position.**
- **The pins can be knocked out only with strong force, so there is a hazard that the pin may fly out. Check that there is no one in the surrounding area.**
- **There is a hazard that fragments will fly during the replacement work, so always wear protective equipment like safety glasses and gloves.**

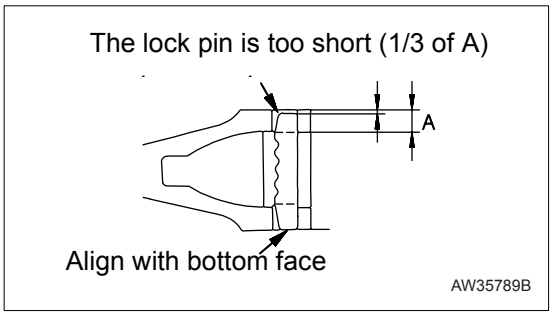


1. Place a block under the bucket bottom to make it possible to knock the pin of tooth (1) out with a hammer, and set so that the bottom of the bucket is horizontal.
2. Use a hammer and drift to knock out lock pin (2). (If the drift is set against rubber pin lock (3) when it is hit, the rubber pin lock may break. Set it against the back of the pin.)
3. After removing lock pin (2) and rubber pin lock (3), check them.
   If lock pins and rubber pin locks with the following defects are used, the teeth may come off the bucket. Replace them with new ones.

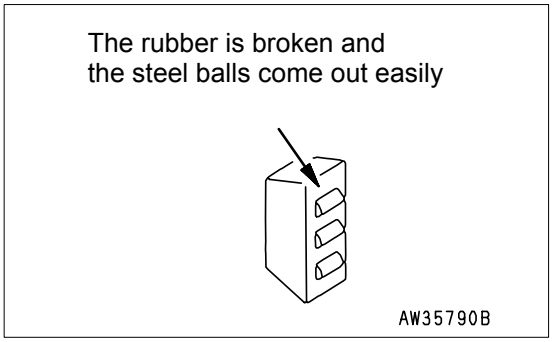




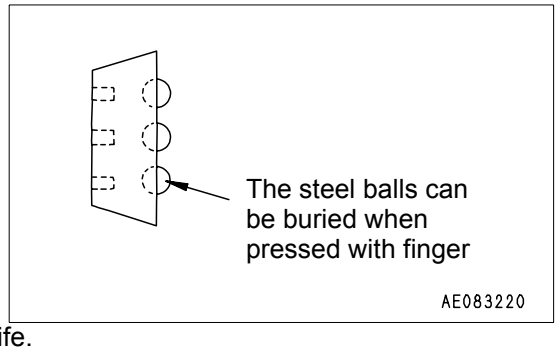
- The lock pin is too short.



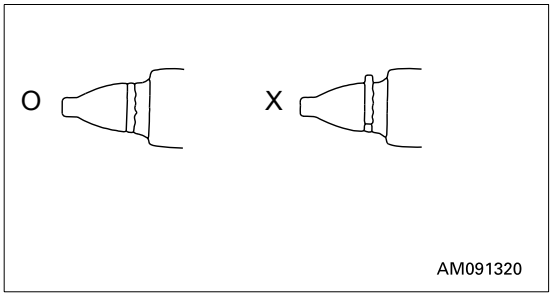
- The rubber of the rubber pin lock is torn, and the steel balls may come out.



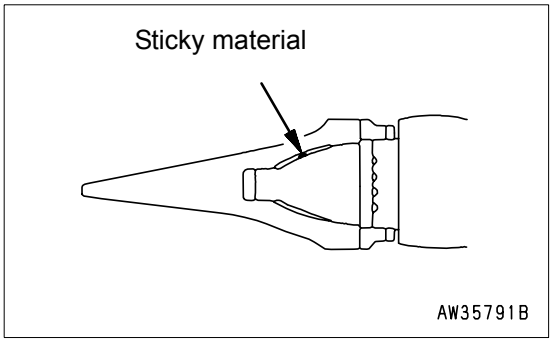
- The steel balls are buried when they are pressed by hand.



4. Clean the surface of adapter (4) and remove the soil with a knife.
5. Use your hand or a hammer to push rubber pin lock (3) into the hole of the adapter.
   When doing this, be careful that the rubber pin lock does not fly out from the adapter surface.
6. Clean the inside of teeth (1), then install it to adapter (4). If there is mud affixed to it or if there are protrusions, the teeth will not enter the adapter properly, and there will not be proper contact at the mating portion.

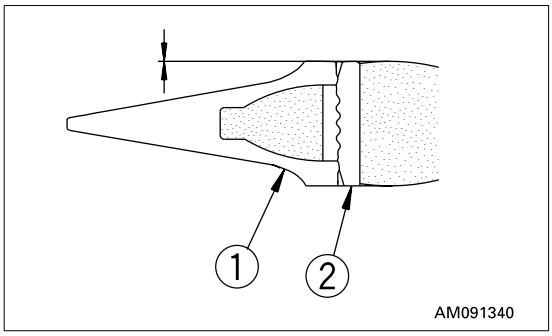


7. Fit teeth (1) to adapter (4), and confirm that when the pointer is pressed strongly, the rear face of the hole for the pin of the teeth is at the same level as the rear face of the hole for the pin of the adapter.
   If the rear face of the hole for the pin of teeth (1) is protruding to the front from the rear face of the pin hole for adapter (4), do not try to knock the pin in.
   There is something preventing teeth (1) from entering adapter (4) fully, so remove the obstruction. When teeth (1) enters adapter (4) fully, knock in lock pin (2).

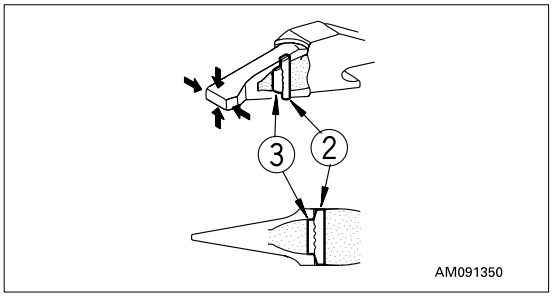


8. Insert lock pin (2) in the hole of the teeth and hit it until its top is the same level as the surface of teeth (1).
9. After replacing a bucket tooth, always check the following.

1) After the lock pin has been knocked in completely, check that it is secured by the point and surface.
2) Lightly hit lock pin (2) in the reverse direction from which it was hit in.
3) Lightly hit the tip of the point from above and below, and hit its sides from right and left.
4) Confirm that rubber pin lock (3) and lock pin (2) are set as shown in the figure.



The life of the teeth can be lengthened and the frequency of its replacement can be reduced by turning it upside down so that it will wear evenly.
Replace the rubber pin lock and locking pin at the same time as replacing the teeth. This makes it possible to prevent the teeth from falling out.

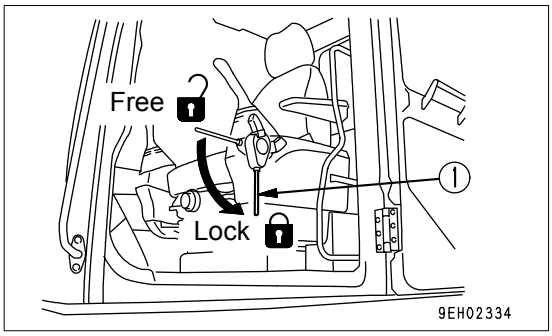


REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE)

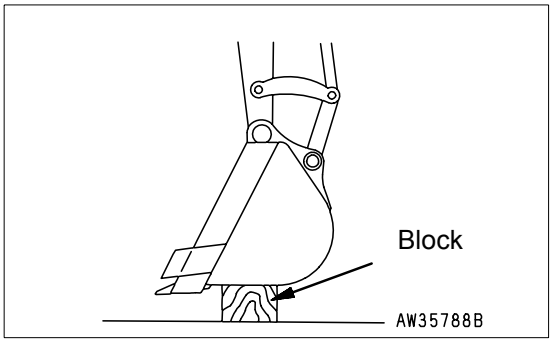
Replace the teeth before the wear reaches the adapter.

⚠ WARNING

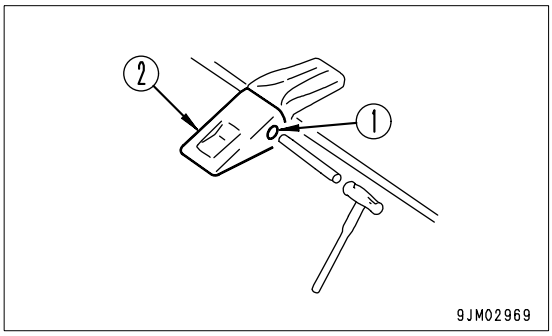
- **It is dangerous if the work equipment is mistakenly moved when the teeth are being replaced.**
- **Set the work equipment in a stable condition, stop the engine, then set the lever securely to the LOCK position.**
- **If the pin is hit out with strong force, there is danger that the pin may fly out. Check that there is no one in the surrounding area.**
- **There is danger of pieces flying during the replacement operation, so always wear protective clothing, such as safety glasses and gloves.**



1. Place a block under the bucket bottom so that the pin (1) of tooth (2) can be knocked out with a hammer. Set so that the bottom face of the bucket is horizontal.



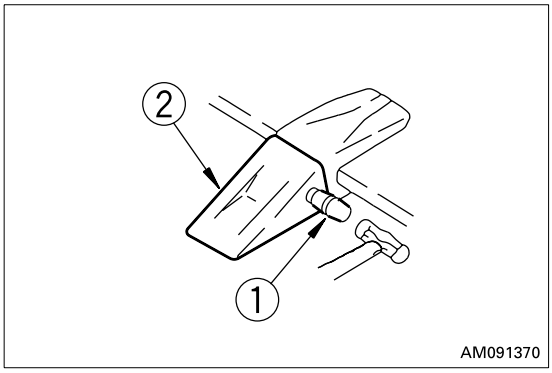
2. Place a bar on the head of pin (1), hit the bar with a hammer to knock out the pin, then remove tooth (2).



REMARK

- **If it cannot be removed by this method, for safety reasons, always contact your Komatsu distributor to have the replacement carried out.**

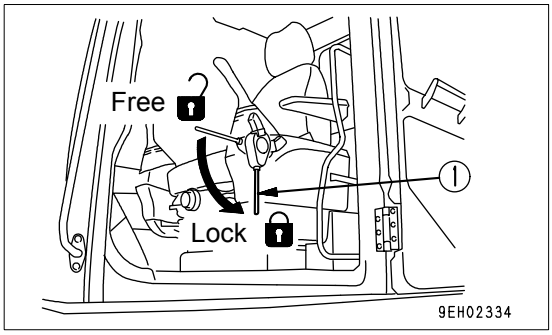
3. Clean the mounting face. Fit a new tooth (2) in the adapter, push in pin (1) partially by hand, then lock it with a hammer to install the tooth to the bucket.

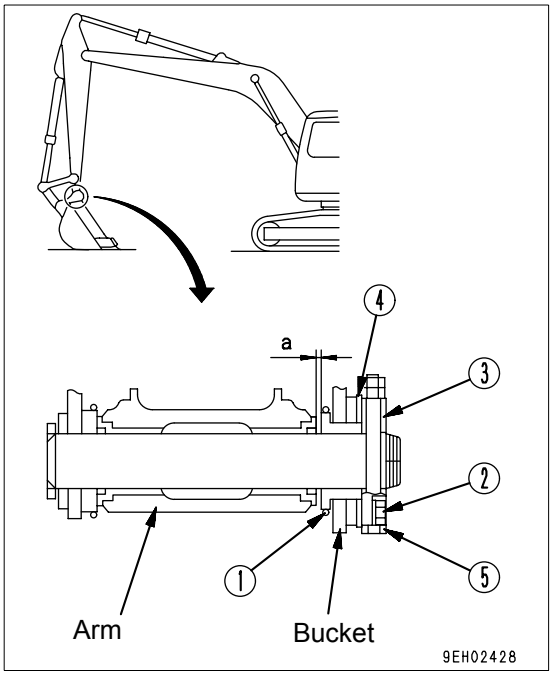


ADJUST BUCKET CLEARANCE

⚠ WARNING

It is dangerous if the work equipment moves by mistake while the bucket clearance is being adjusted.
Set the work equipment on the ground in a stable condition, then stop the engine and lock the safety lock lever without fail.



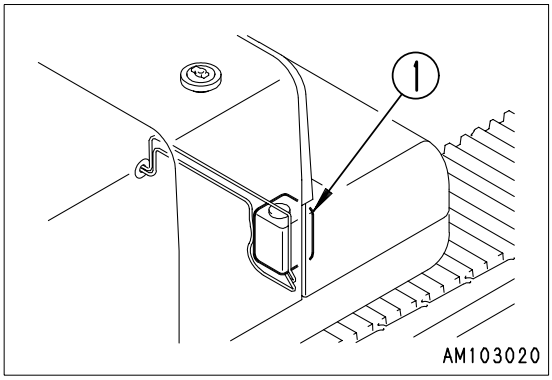


1. Set the work equipment to the position shown in the diagram on the right, then stop the engine and set the lock lever to the LOCK position.
2. Shift O-ring (1) of the linkage and measure the amount of play “a“.
   Measurement is easier of you move the bucket to one side or the other so all the play can be measured in one place. (In the diagram this is on the left-hand side)
   Use a gap (clearance) gauge for easy and accurate measurement.
3. Loosen 4 plate mounting bolts (2), and loosen plate (3).
   The shim is a split type, so the operation can be carried out without removing the bolts.
4. Remove shim (4) corresponding to the amount of play “a“ measured above.

   [Example]
   In the case of play of 3 mm (0.12 inches), remove two 1.0 mm (0.04 inches) shims and one 0.5 mm (0.02 inches) shim. Play becomes 0.5 mm (0.02 inches). For shim (4), two types of 1.0 mm (0.04 inches) and 0.5 mm (0.02 inches) are used.
   When play “a“ is smaller than one shim, do not carry out any maintenance.
5. Tighten the four bolts (2).
   If the bolts (2) are too stiff to tighten, pull out pin stopper bolt (5) for easier tightening.

CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

If there is air in the window washer fluid, check the level of the fluid in window washer tank (1). Add automobile window washer fluid if necessary.



When adding fluid, be careful not to let any dust get in.

Mixture ratio of pure washer fluid and water

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 (14°F)
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C (-4°F)
Winter in extremely cold area	Pure washer fluid	-30°C (-22°F)

There are two types depending on the freezing temperature:
-10°C (general use) and -30°C (-22°F) (cold area use), so select according to the area and season.

CHECK AND ADJUST AIR CONDITIONER

Check level of refrigerant (gas)

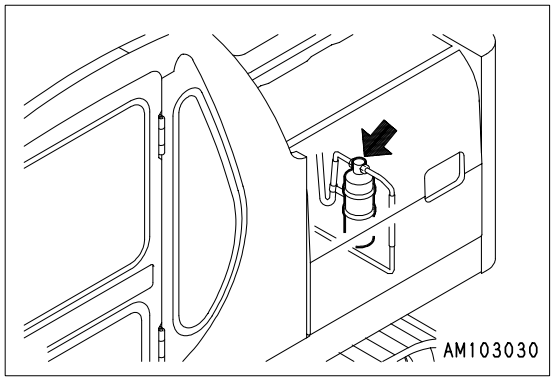
⚠ WARNING

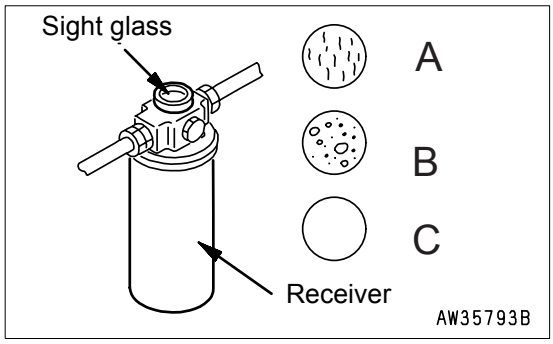
If the refrigerant used in the cooler gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.
Do not bring any flame close to any point where the refrigerant gas is leaking.

If there is a lack of refrigerant (gas), the cooling performance will be poor. When operating the cooler at high speed with the engine at full throttle, use the receiver sight glass (inspection window) to check the condition of the refrigerant gas (Freon R134a) flowing in the refrigerant circuit.

- 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.





Inspection During Off Season

Even during the off-season, operate the air conditioner for 3 - 5 minutes once a month to maintain the oil film at all parts of the compressor.

Inspection and Maintenance Items

Check, maintenance items	Content of check, maintenance	Guideline for maintenance interval
Refrigerant (gas)	Charge amount	Twice a year (spring, autumn)
Condenser	Clogged fins	Every 500 hours
Compressor	Operating condition	Every 4000 hours
V-belt	Damage, tension	Every 250 hours
Blower motor, fan	Operating condition (does it When required make abnormal noise?)	When required
Control mechanism	Operating condition (does it function normally?)	When required
Piping mounts	Mounting condition, looseness at tightening or connecting portions, leakage of gas, damage	When required

WASH WASHABLE FLOOR

⚠ WARNING

- **When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.**
- **If the control levers are touched by mistake, the work equipment or machine may suddenly move, and this may lead to a serious accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.**
- **When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.**
- **If the control levers are touched by mistake, the work equipment or machine may suddenly move, and this may lead to a serious accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.**

NOTICE

- **When carrying out this operation, be careful not to get water on the monitor and connectors inside the operator's cab.**
- **Never spray water above the pedestal of the operator's seat (2).**
- **If any water splashes on the surrounding equipment, be sure to wipe it off.**

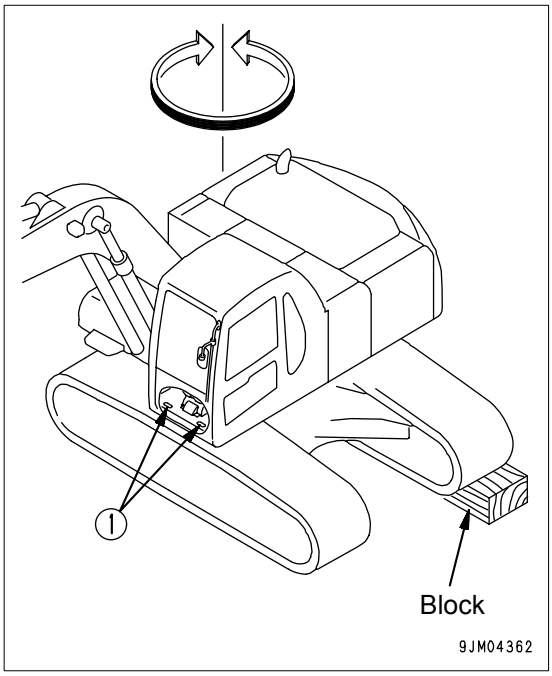
With the washable floor, it is possible to flush out the dirt on the cab floor directly with water.

Washing Washable Floor Mat

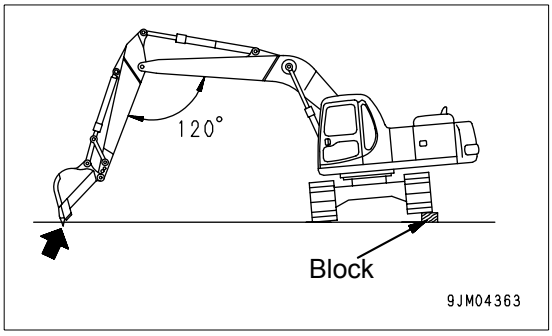
1. Stop the machine on horizontal ground, lower the bucket to the ground, and then stop the engine.
2. When washing the floor mat, use a brush to remove the dust, or direct the water onto the mat and wash it with a brush.

Method of washing

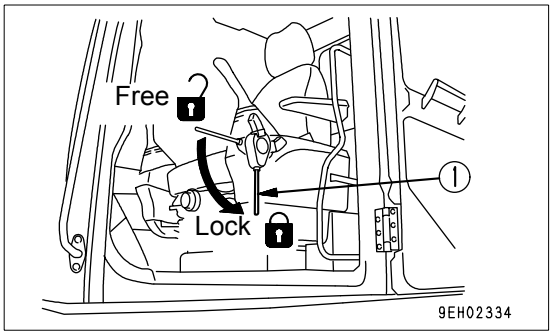
1. Set the machine at an angle.
   For details, see “Method of Setting Machine At Angle (4-35)“
2. Swing the upper structure slowly so that water drain holes (3) in the cab floor are at a low position.



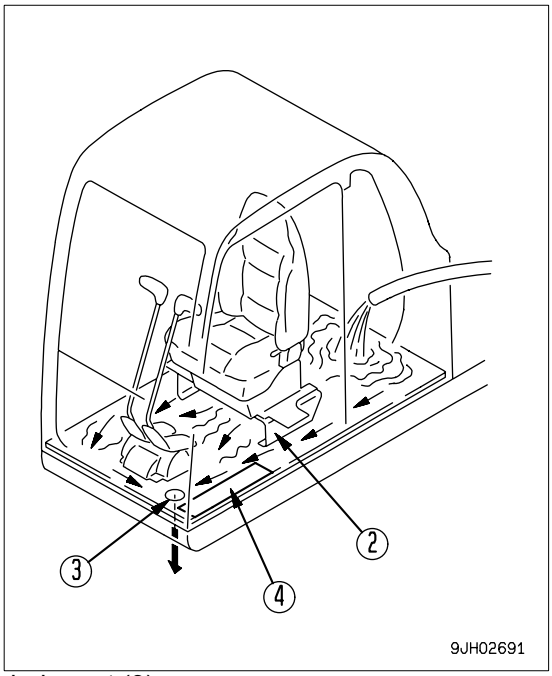
3. Lower the work equipment to the ground and set the machine in a stable condition.



4. Set the safety lock lever to the LOCK position, then stop the engine.



5. Remove the floor mat holder plate (4).
6. Remove the floor mat.
7. Remove the cap from water drain port (3).
8. Flush out the dirt on the floor directly with water through water drain port (3).



9. After completing the washing operation, install the cap in water drain port (3).
10. Fit the floor mat, then secure it with floor mat holder plate (4).

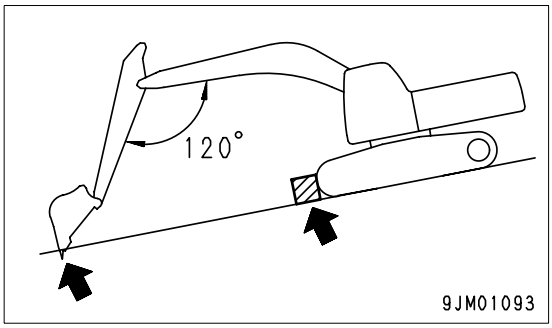
Method of Setting Machine At Angle

Method Using Slope

⚠ WARNING

Select a solid and smooth slope.
Always put blocks under the track to prevent the machine from moving, and dig the work equipment into the ground.

1. Stop the machine so that the work equipment is on the downhill side.
2. Put blocks under the track and dig the work equipment into the ground.

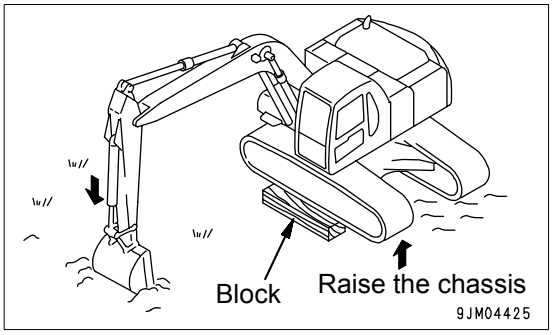


Method Using Block

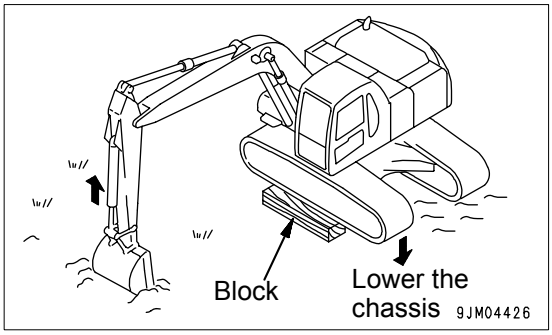
⚠ WARNING

Select a firm flat place.
Put strong blocks under the undercarriage to stabilize the machine and be extremely careful when carrying out the operation.

1. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.
2. Insert a block securely between the ground surface and the raised track and make sure that the machine is stable.



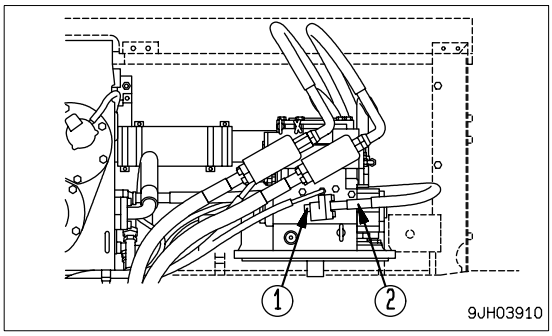
3. Raise the boom slowly and lower the machine.
   When doing this, check that the machine is always stable.



BLEEDING AIR FROM HYDRAULIC SYSTEM

For details, see “STARTING ENGINE (3-77)“. If it is necessary to refer to the items for starting the engine, moving the machine off, steering, or stopping, see the OPERATION section.

1. Bleeding air from pump
   1) Loosen air bleed plug (1) and check that oil oozes out from the air bleeder.
   2) If the oil does not ooze out, remove the drain hose from the hydraulic pump case and fill the pump case completely with hydraulic oil through drain port (2).
      Hold the removed hose firmly, keeping the mouthpiece higher than the oil level in the hydraulic tank so that oil will not spill out of the hose.
   3) After completing the air bleed operation, tighten air bleed plug (1) and install the drain hose.

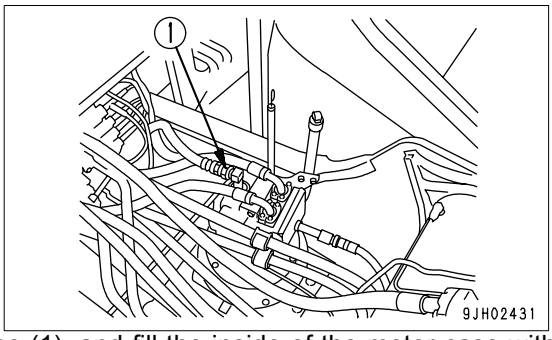


NOTICE
If the drain hose is installed first, oil will spurt out from plug hole (1).
If the pump is operated without filling the pump case with hydraulic oil, abnormal heat will be generated and this may cause an unexpected damage to the pump.

2. Starting engine
   Start the engine, referring to “STARTING ENGINE (3-77)“.
   Run the engine at low idling for 10 minutes after starting, then start operations.
3. Bleeding air from cylinders
   1) 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 (3.9 inches) short of its stroke end)
   2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
   3) Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

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.

4. Bleeding air from swing motor
   1) Run the engine at low idling, loosen hose (1) at port S, and check that oil oozes out from port S hose (1).

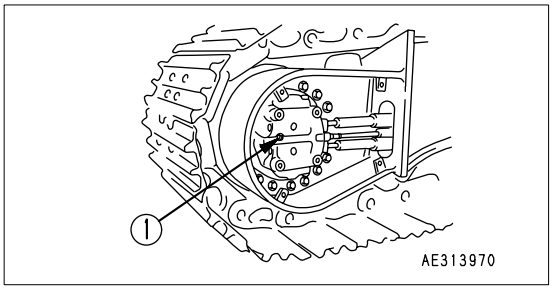


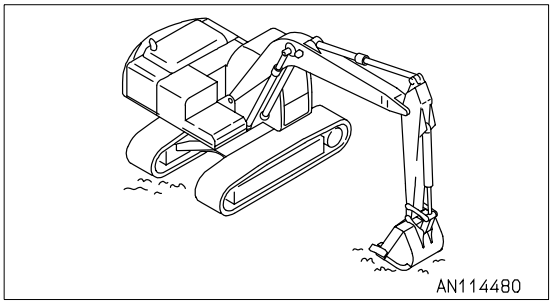
NOTICE
Do not operate the swing under any circumstances.

   2) If oil does not ooze out, stop the engine, remove port S hose (1), and fill the inside of the motor case with hydraulic oil.
   3) After completely bleeding the air, tighten port S hose (1).
   4) Run the engine at low idling and slowly swing at least two times uniformly to the left and right. This will automatically bleed the air.

NOTICE
- **If the air is not bled from the swing motor, the motor bearings may be damaged.**
- **When replacing the travel motor safety valve, please contact your Komatsu distributor to have it replaced and to have the air bled.**

5. Bleeding air from travel motor
   (Bleed the air only when the oil inside the travel motor case has been drained.)
   1) Run the engine at low idling, loosen air bleeder (1), and check that oil flows out.
   2) Run the engine at low idling and swing the work equipment 90° to bring it to the side of the track.
   3) Jack up the machine until the track is raised slightly from the ground.Rotate the track under no load for 2 minutes. Repeat this procedure on both the left and right sides, and rotate the track equally both forward and in reverse.





6. Bleeding air from attachment (when installed)
   If a breaker or other attachment has been installed, run the engine at low idling and operate the attachment pedal repeatedly (approx. 10 times) until the air has been bled from the attachment circuit.

NOTICE

- **If the method of bleeding the air from the attachment itself is specified by the manufacturer, bleed the air according to the specified procedure.**
- **After completing the air bleeding operation, stop the engine, and leave the machine for 5 minutes before starting operations. This will remove the air bubbles in the oil inside the hydraulic cylinders.**
- **Check that there is no leakage of oil and wipe off any oil that has been spilled.**
- **After completing the air bleeding operation, inspect the oil level, and if the oil level is low, add oil.**

METHOD FOR RELEASING INTERNAL PRESSURE IN HYDRAULIC CIRCUIT

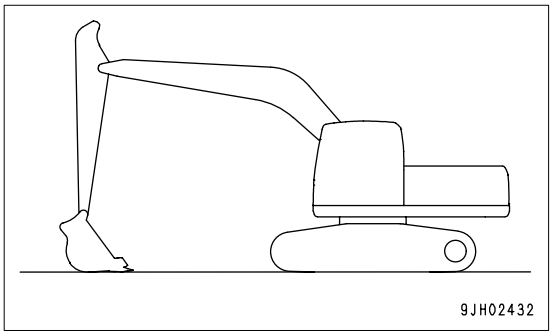
⚠ WARNING

- **The hydraulic circuit is always under pressure, so release the pressure inside the circuit before inspecting or replacing the piping or hoses.**
- **If the pressure is not released, high-pressure oil will spurt out and may cause serious personal injury.**

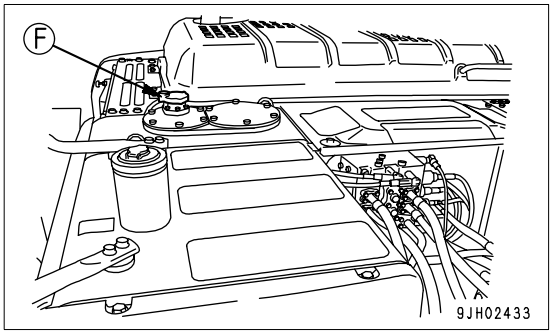
The parts and oil are at high temperature after the engine is stopped, and may cause serious burns.

- **Wait for the temperature to go down before starting the operation.**
- **When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the internal pressure before removing the cap.**

1. Stop the machine on firm level ground.



2. Within 15 seconds after stopping the engine, turn the starting switch to the ON position, and operate the control levers (work equipment, travel) fully in each direction to release the internal pressure.
3. 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 “Checks Before Starting (3-65)“ in the OPERATION section.

- Check Coolant Level, Add Water
- Check Oil Level In Engine Oil Pan, Add Oil
- Check fuel level, add fuel
- Drain Water and Sediment From Fuel Tank
- Check for Water and Sediment in Water Separator, Drain Water
- Check Oil Level In Hydraulic Tank, Add Oil
- Check Electric Wirings
- Check Function Of Horn

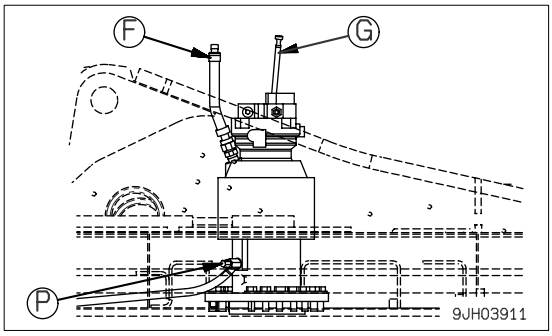
EVERY 250 HOURS MAINTENANCE

CHECK OIL LEVEL IN SWING MACHINERY CASE, ADD OIL

⚠ WARNING

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

1. Remove dipstick (G) and wipe the oil from the dipstick with a cloth.
2. Insert dipstick (G) fully in the guide.
3. When dipstick (G) is pulled out, if the oil level is between the H and L marks of the gauge, oil level is proper.
4. If the oil does not reach the L mark on dipstick (G), remove oil filler (F), and add engine oil.
5. If the oil level exceeds the H mark on the dipstick, loosen drain valve (P) to drain the excess oil.
6. After checking oil level or adding oil, insert the dipstick (G) into the hole and install oil filler (F) cap.



CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

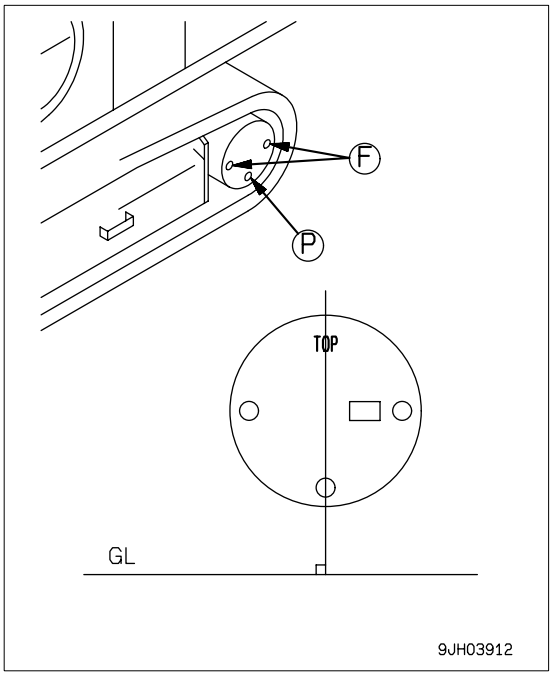
⚠ WARNING

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out.**
- **Loosen the plug slowly to release the pressure.**

- Prepare a handle.

1. Set the TOP mark at the top, with the UP mark and plug (P) perpendicular to the ground surface.
2. Remove plug (F) using the handle. When the oil level reaches a point 10 mm below the bottom of the plug hole, the correct amount of oil has been added.
3. If the oil level is too low, install plug (F), operate the travel levers, and drive forward or in reverse to rotate the sprocket one turn. Then repeat Step 2 to check again.
4. If the oil level is low, add engine oil through plug hole (F) until the oil overflows from plug hole (F).
5. After checking, install plug (F).
   The tightening torque for plugs (P) and (F) is 68.6 ± 9 N·m {50.6 ± 6.6 lbf·ft}.

REMARK
There are two plugs (F). Add oil through the one easier to fill oil and through which no internal gears are to be seen.



CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.

⚠ WARNING

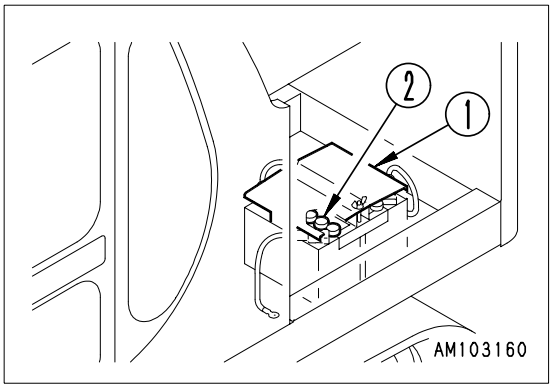
- **Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may also cause an explosion.**
- **The battery generates flammable gas and there is danger of explosion, so do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amount of water and consult a doctor.**
- **When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.**

NOTICE

When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

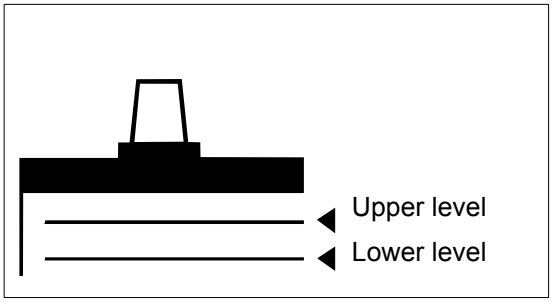
1. Open the battery room door on the left side of the machine, then remove cover (1).
2. Remove cap (2) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.
3. Clean the air hole in the battery cap (3), then tighten the cap securely.
   Wipe the top surface of the battery with a damp cloth to keep it clean.
   When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.



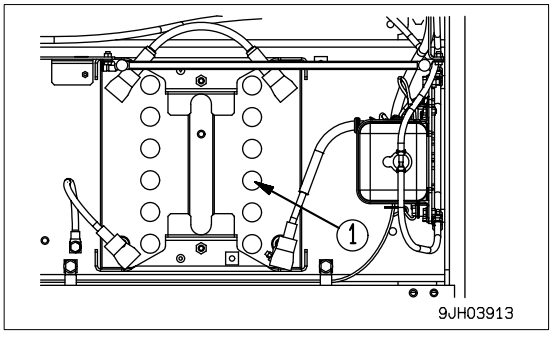
When checking electrolyte level from side of battery

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L) and LOWER LEVEL (L.L) lines.
   If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



2. 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.
3. After adding distilled water, tighten cap (1) securely.



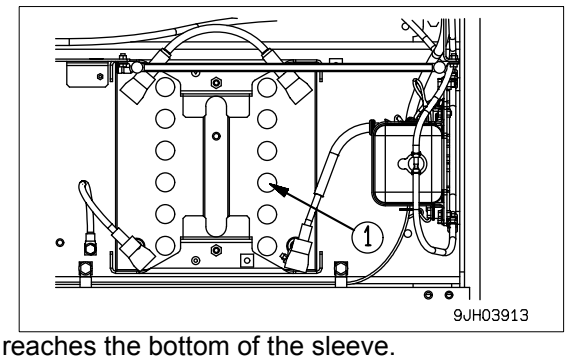
REMARK

If distilled water is added to above the U.L line, use a pipette to lower the level to the U.L line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

When it is impossible to check electrolyte level from side of battery

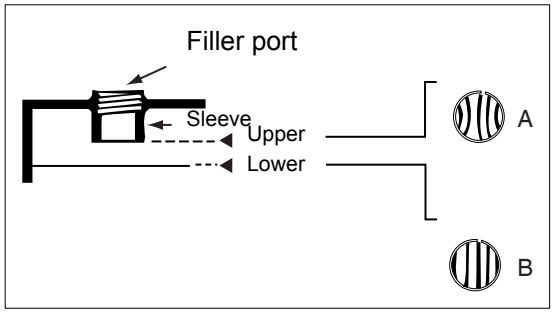
If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. 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	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.
B	Too low (level) The electrolyte level is not up to the bottom of the sleeve, so the plate appears to be normal.



2. After adding distilled water, tighten cap (1) securely.

REMARK

If distilled water is added to above the bottom of the sleeve, use a pipette 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.

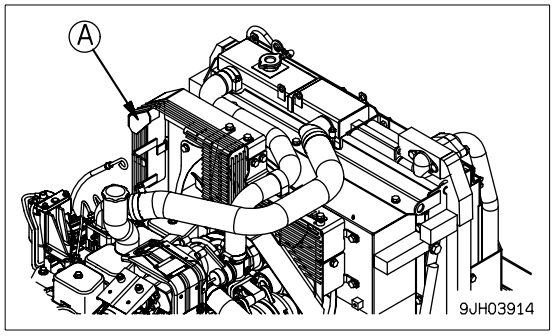
When it is possible to use indicator to check electrolyte level

If it is possible to use and indicator to check the electrolyte level, follow the instructions given.

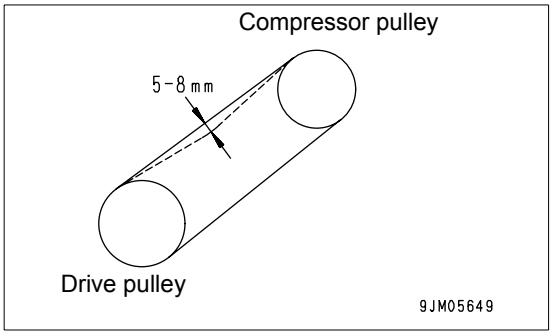
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST

Checking

1. Remove radiator fan guard (A).

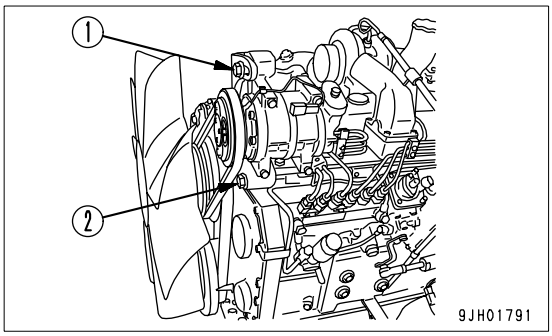


2. Press the belt at a point midway between the drive pulley and compressor pulley with a finger force of approx. 58.8 N (43.4 lbf) and check that the deflection is 5 - 8 mm (0.2 - 0.3 inches).

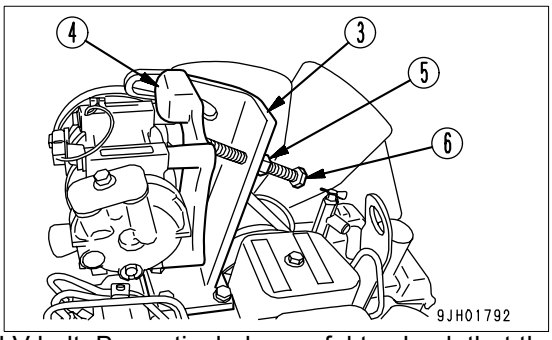


Adjustment

1. Loosen bolts (1) and (2).
   - Bracket (4) holds the compressor in place. When bolts (1) and (2) are loosened, bracket (4) moves with the securing position of bolt (2) as a fulcrum.



2. Loosen nut (5) attached to the fixed bracket (3) and then tighten bolt (6).
   - Tighten bolt (6) so that the deflection of the belt will be 5 - 8 mm (0.2 - 0.3 inches) (approx. 58.8N (43.4 lbf)).
3. Tighten bolts (1) and (2) to secure bracket (4).
4. Loosen bolt (6) to remove from bracket (4).
5. Tighten nut (5).



6. Check for damage to the pulleys, and wear of the V-groove and V-belt. Be particularly careful to check that the V-belt is not in contact with the bottom of the V-groove.
7. If the belt has elongated and there is no more allowance for adjustment, or if the belt is cut or cracked, replace the belt.
8. After replacing the V-belt, operate for one hour, then adjust again.

EVERY 500 HOURS MAINTENANCE

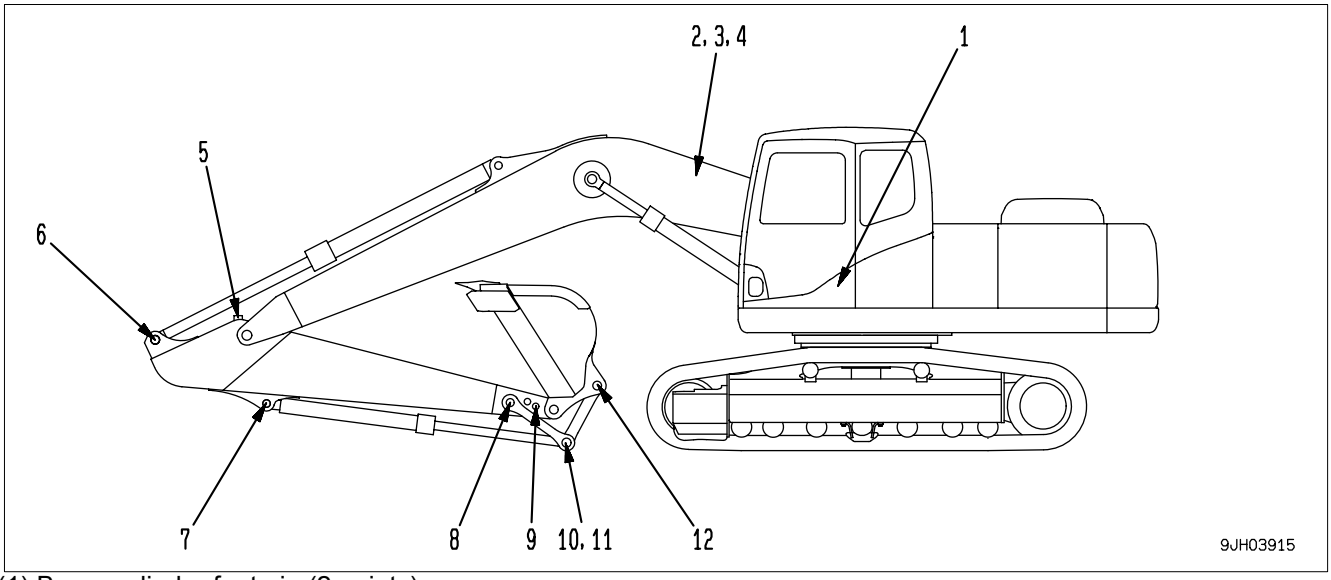
Maintenance for every 250 hours service should be carried out at the same time.

LUBRICATING

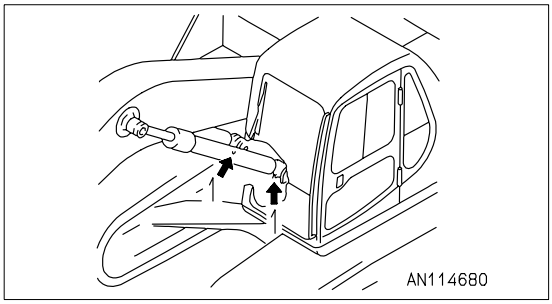
NOTICE

- **For the first 50 hours on a new machine, carry out greasing for greasing points 1 to 12 every ten hours. Carry out the greasing for these points also at 250 hours and 500 hours on a new machine. After this, carry out the greasing every 500 hours or every six months, whichever comes sooner.**
- **After carrying out digging work in water, always greasing the pins that were under water.**
- **When carrying out heavy-duty operations, such as hydraulic breaker operations, carry out the greasing every 100 hours.**

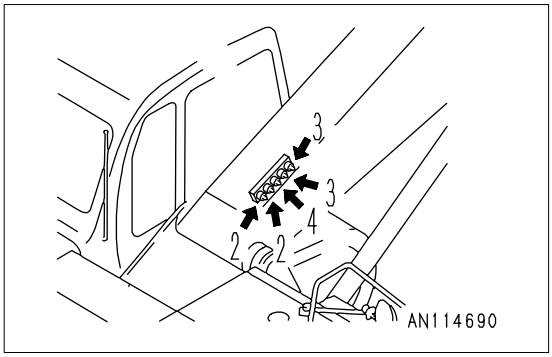
1. Set the work equipment in the greasing posture below, then lower the work equipment to the ground and stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.



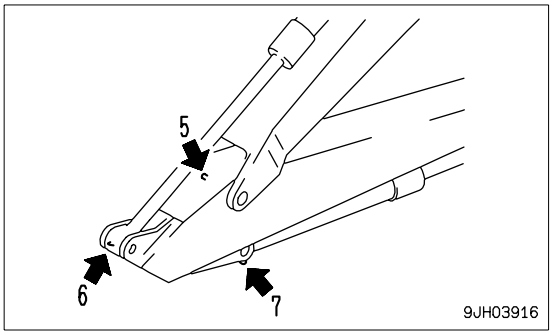
(1) Boom cylinder foot pin (2 points)



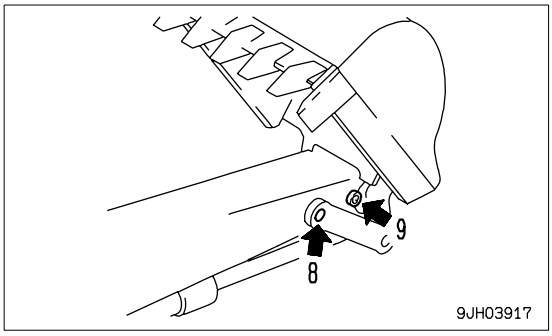
(2) Boom foot pin (2 points)
(3)Boom cylinder rod end pin (2 point)
(4) Arm cylinder foot pin (1 point)



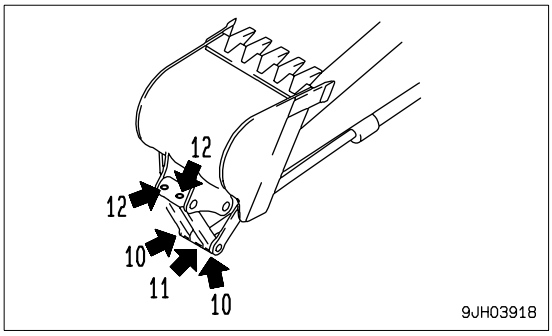
(5) Boom - Arm coupling pin (1 point)
(6) Arm cylinder rod end (1 point)
(7) Bucket cylinder foot pin (1 point)



(8) Arm-Link coupling pin (1 point)
(9) Arm-Bucket coupling pin (1 point)

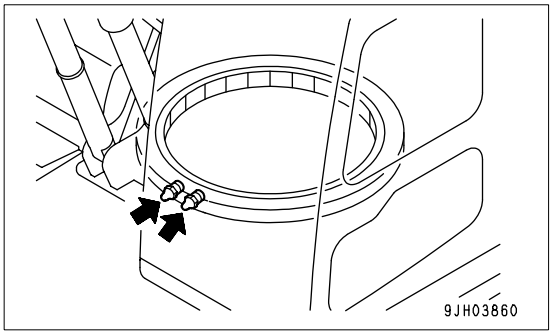


(10) Link coupling pin (2 points)
(11) Bucket cylinder rod end (1 point)
(12) Bucket-Link coupling pin (1 point)



LUBRICATE SWING CIRCLE

1. Lower the work equipment to the ground.
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.



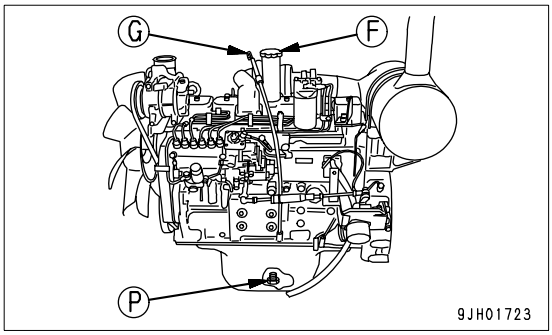
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

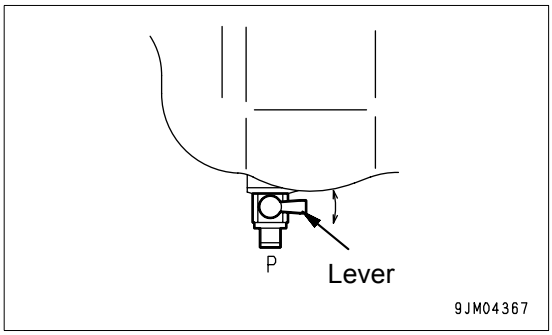
⚠ WARNING

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

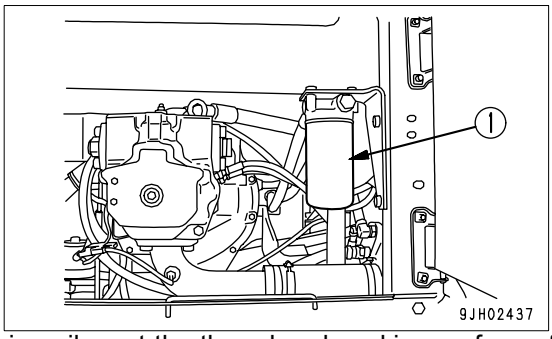
- Refill capacity of oil pan: 14 liters (3.7 US gallons)
- Filter wrench

1. Remove the inspection cover of the undercover directly under drain plug (P) under the machine, then place a container to catch the oil.
2. To prevent getting oil on yourself, lower the lever of drain valve (P) slowly, drain the oil, then raise the lever to close the valve.





3. Open the cover at the rear right, then use a filter wrench to turn filter cartridge (1) to the left to remove it.

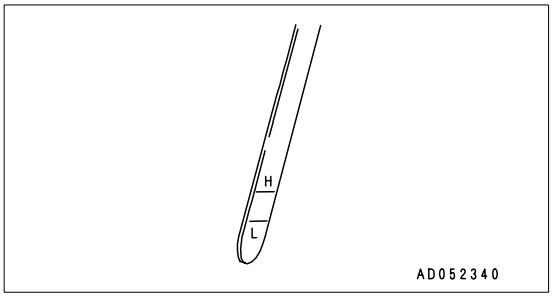


4. Clean the filter holder, fill the new filter cartridge with clean engine oil, coat the thread and packing surface of the new filter cartridge with clean engine oil (or coat it thinly with grease), then install it to the filter holder.

REMARK
Confirm that no remnants of old packing still adhere to the filter holder as this may result in oil leakage. Check that there is no old packing affixed to the filter holder. If there is any old packing affixed to the filter, it will cause leakage of oil.

5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it a further 3/4 to 1 turn.

6. After replacing the filter cartridge, open the engine hood and add engine oil through oil filler (F) to between the H and L marks on dipstick (G).
7. Run the engine at idling for a short time, then stop the engine, and check 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)“.
8. Install the undercover.



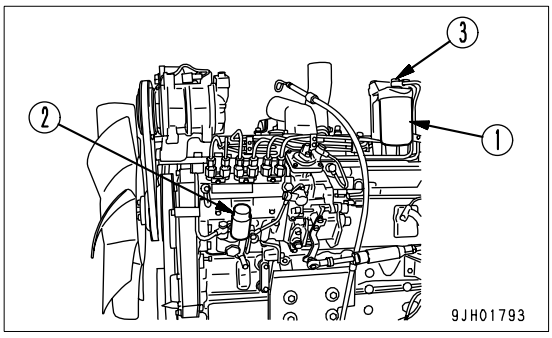
REPLACE FUEL FILTER CARTRIDGE

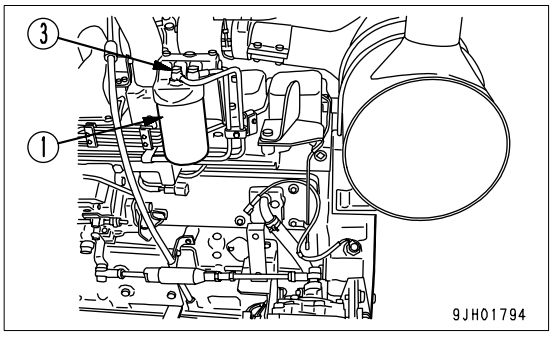
⚠ WARNING

- **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, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 1/2 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 replacing the fuel filter cartridge, bleed the air from the system.
   Bleed the air as follows.
6. Fill the fuel tank with fuel (to the position where the float is at the highest position).
7. After replacing filter cartridge (1), loosen air bleed plug (3).
8. Loosen the knob of feed pump (2), pump it up and down, and continue to make the fuel overflow until no more bubbles come out from air bleed plug (3). Then tighten the knob of feed pump.





9. Tighten air bleed pug (3).
   Always use a genuine Komatsu filter cartridge.
   After replacing the filter cartridge, start the engine and check for any leakage of oil from the filter seal surface.

REMARK

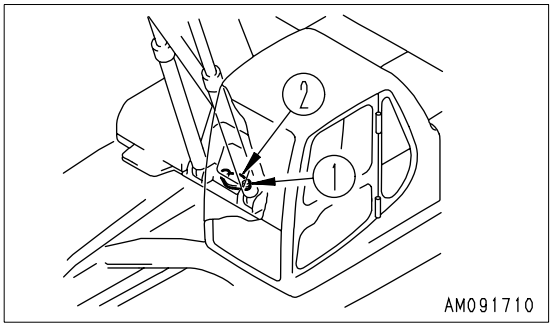
Use the feed pump to bleed air from the fuel system, when the machine has run out of fuel, too.

CHECK SWING PINION GREASE LEVEL, ADD GREASE

- Prepare a scale.

1. Remove bolts (1) (2 bolts) on the top of the revolving frame and remove cover (2).
2. Insert a scale into the grease and check that the height of the grease in the portion where the pinion passes is at least 28 mm. Add more grease if necessary.
3. Check if the grease is milky white. If it is milky white, it is necessary to change the grease. Please contact your Komatsu distributor.

   The total amount of grease: 10.5 liters (2.8 US gallons)



4. Install cover (2) with bolts (1).

CLEAN AND INSPECT RADIATOR FINS, OIL COOLER FINS, CONDENSER FINS AND AFTER COOLER FINS

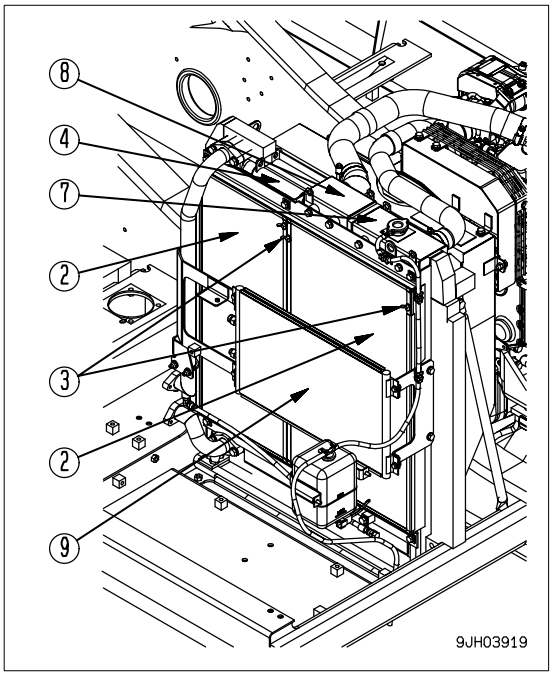
⚠ WARNING

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.

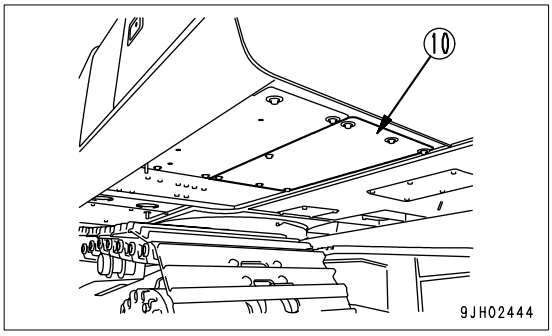
NOTICE

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.

1. Open engine hood (1).
2. Loosen screw (3) and pull up net (2).
3. Clean net (2). (it is to be installed again, as instructed in the step 8.)
4. Loosen the 3 cover bolts at the top on the engine side, then slide the cover.
5. Inspect the front and rear of oil cooler fins (4), radiator fins (7), after-cooler fins (8) and condenser fins (9) for dirt, dust, dry leaves, etc. Blow them away with compressed air, if any. Steam or water may be used instead of compressed air.
   6. Check the rubber hose. Replace with a new one, if the hose is found to have cracks or to be hardened by aging. Further, check the hose cramps for looseness.
6. Check the rubber hose. Replace with a new one, if the hose is found to have cracks or to be hardened by aging. Further, check the hose cramps for looseness.



7. Remove cover (10) of the under cover and dispose of the dirt, dust, dry leaves, etc. fallen on it.
8. Push in cleaned net (2) back to the original place and secure it with screw (3).



CLEAN INTERNAL AND EXTERNAL AIR FILTERS OF AIR CONDITIONER

⚠ WARNING

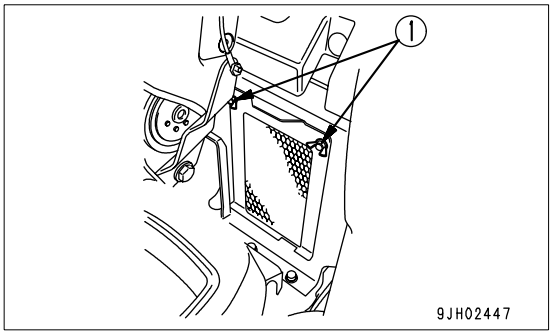
If compressed air is used, there is danger that dirt may fly and cause personal injury.
Always wear safety glasses, dust mask, and other protective equipment.

NOTICE
As a guideline, the filters should be cleaned every 500 hours, but on dusty jobsites, clean the filters more frequently.

REMARK
If the filter becomes clogged, the air flow will be reduced, and there will be an abnormal noise from the air conditioner unit.

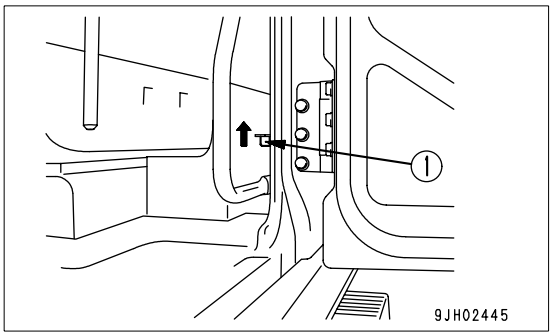
Cleaning reticulated air filter

1. Remove wing bolts (1) from the inspection window at the bottom rear left on the inside of the operator's cab, then take out the recirculated air filter.
2. Clean the filter with compressed air. If there is oil on the filter, or if the filter is extremely dirty, wash it in a neutral agent. After rinsing it in water, dry it thoroughly before using it again.
   If the clogging of the filter cannot be removed by blowing with air or washing in water, replace the filter with a new part.

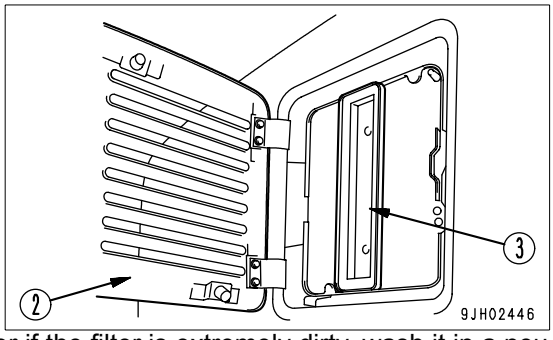


Cleaning fresh air filter

1. Pull up the lock release lever under the door release lever to release the lock.



2. Open cover (2) at the bottom left of the operator's cab by hand, pull out filter case (3) from the inside, then remove the filter.



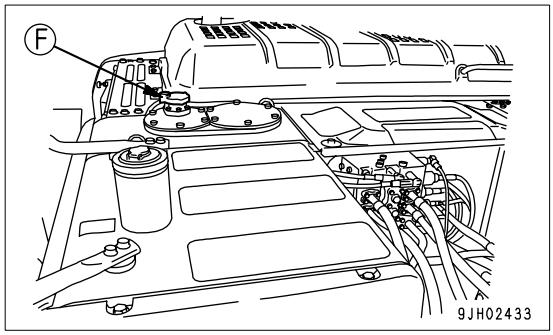
3. Clean the filter with compressed air. If there is oil on the filter, or if the filter is extremely dirty, wash it in a neutral agent. After rinsing it in water, dry it thoroughly before using it again.
   If the clogging of the filter cannot be removed by blowing with air or washing in water, replace the filter with a new part.
4. After cleaning, insert the filter in filter case (3) again, open the cover at the bottom left of the operator's cab by hand, return the filter case to its original position, then close the cover. When doing this, check that the lock is applied.

REPLACE BREATHER ELEMENT IN HYDRAULIC TANK

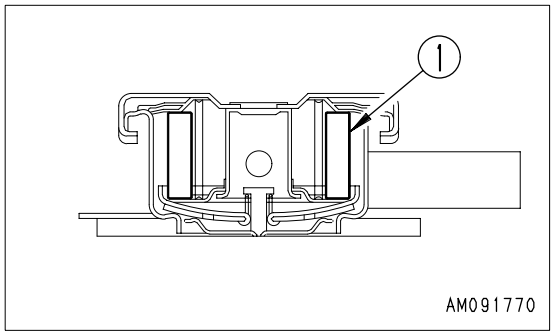
⚠ WARNING

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. Remove the cap of oil filler (F) at the top of the hydraulic tank.



2. Replace element (1) inside the cap.



EVERY 1000 HOURS MAINTENANCE

Maintenance for every 250 and 500 hours service should be carried out at the same time.

REPLACE HYDRAULIC OIL FILTER ELEMENT

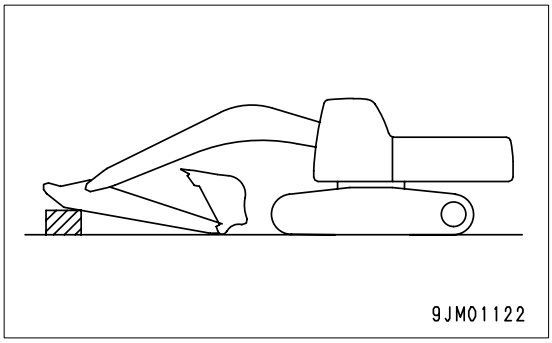
⚠ WARNING

- **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.**

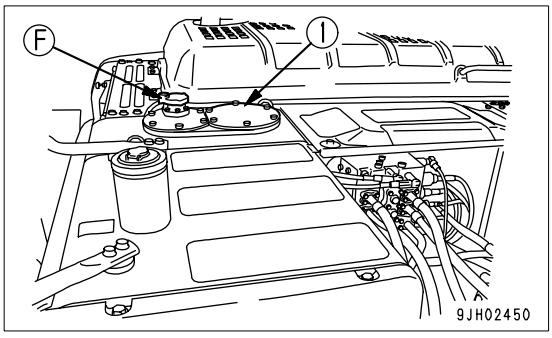
NOTICE

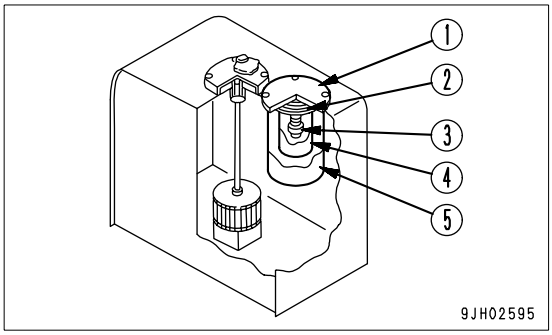
If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (4-17)" when carrying out maintenance.

1. Set the work equipment on the hard and flat ground in the maintenance posture as shown in the figure, then lower it to the ground and stop the engine.



2. Remove the cap from oil filler (F), and release the internal pressure.
3. Loosen 6 bolts, then remove cover (1). When doing this, the cover may fly out under the force of spring (2), so hold the cover down when removing the bolts.
4. After removing spring (2), valve (3) and strainer (4), take out element (5).
   - Inspect the bottom of the filter case for dirt, and remove it, if any. Take good care then not to let fall the dirt into the hydraulic tank.
5. Clean the removed parts in diesel oil.
6. Install the new element in the place where old element (5) was installed.
7. Set valve (3), strainer (4) and spring (2) on top of the element.
8. Set cover (1) in position, push it down by hand, and install the cover with the mouning bolts.
9. Screw in the oil filler cap and install the cover.
10. To bleed the air, start the engine according to "STARTING ENGINE (3-77)" and run the engine at low idling for 10 minutes.
11. Stop the engine.





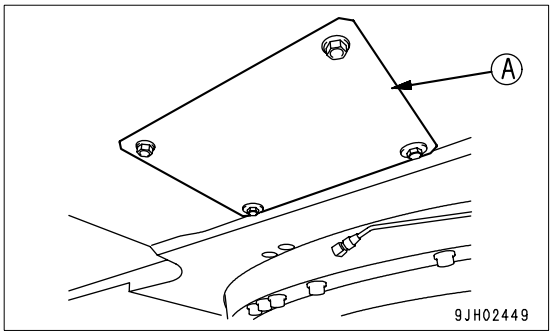
CHANGE OIL IN SWING MACHINERY CASE

⚠ WARNING

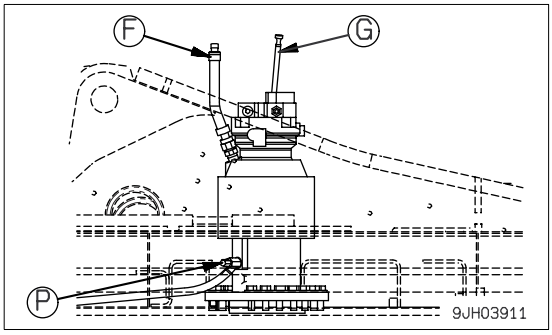
The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

- Refill capacity: 6.6 liters (1.7 US gallons)

1. Remove cover (A) of the inspection hole.



2. Set a container under drain valve (P) under the machine body to catch the oil.
3. Loosen drain valve (P) under the body, drain the oil, then tighten the drain valve again.
4. Remove the cap of oil filler (F), then add the specified amount of engine oil through oil filler (F).
5. Pull out dipstick (G) and wipe off oil on the dipstick with cloth.
6. Insert dipstick (G) fully in the oil filler pipe, then take it out again.
7. The oil level should be between H and L marks on the dipstick (G). If the oil does not reach the L mark, add engine oil through oil filler port (F).



8. If the oil is above the H mark, drain the excess engine oil from drain valve (P), and check the oil level again.

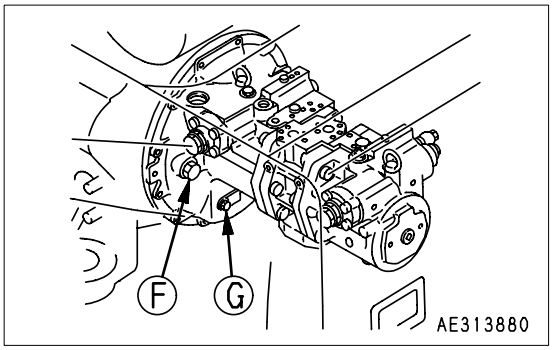
CHECK OIL LEVEL IN DAMPER CASE, ADD OIL

⚠ WARNING

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

NOTICE
Park the machine on flat ground and stop the engine. After waiting for more than 30 minutes after stopping the engine, check the oil level.

1. Open the cover on the right side of the machine.
2. Remove plug (G) and check the oil level. if the oil level is near the bottom of the plug hole, the oil amount is at a proper level. If found short, remove plug (F) and replenish oil through plug (F) filler port up to the bottom of plug (G) hole.



NOTICE
If excess oil is supplied, drain it to the specified amount to avoid overheating.

3. Install plugs (G) and (F).
4. Close the door.

CHECK FAN BELT TENSION AND REPLACE FAN BELT

Special tools are required for inspection and replacement of the fan belt. Contact your Komatsu distributors for inspection and replacement.

REMARK
An installed auto fan belt tension adjuster, “Auto Tensional Fan Belt“, dispenses with the belt deflection adjustment.

EVERY 2000 HOURS MAINTENANCE

Maintenance for every 250, 500 and 1000 hours service should be carried out at the same time.

CHANGE OIL IN FINAL DRIVE CASE

⚠ WARNING

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out.**
- **Loosen the plug slowly to release the pressure.**

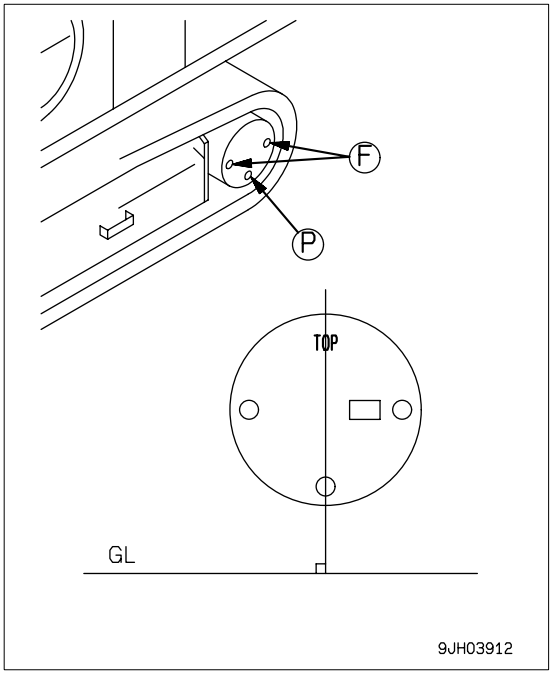
- Refill capacity (each): 4.5 liters (1.2 US gallons)
- Prepare a handle.

1. Set the TOP mark at the top, with the TOP 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 engine 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 ± 9.8 N·m(50.6 ± 7.2 lbf·ft)

REMARK
There are two plugs (F). Add oil through the one easier to fill oil and through which no internal gears are to be seen.

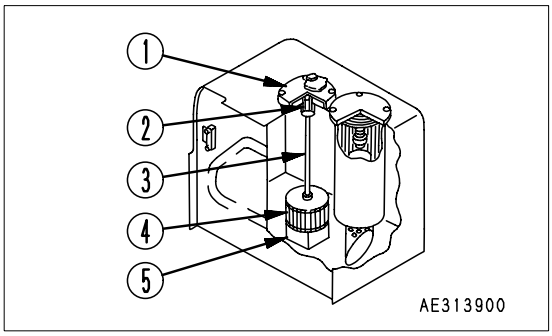


CLEAN HYDRAULIC TANK STRAINER

⚠ WARNING

- **The parts and oil are at high temperature after the engine is stopped, and may cause 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.**

1. Loosen 6 bolts, then remove cover (1). When doing this, the cover may fly out under the force of spring (2), so push the cover down when removing the bolts.
2. Hold the top of rod (3) and pull up to remove spring (2) and strainer (4).
3. Remove any dirt stuck to strainer (4), then wash it in clean diesel oil or flushing oil. If strainer (4) is damaged, replace it with a new part.
4. When installing, insert strainer (4) into protruding part (5) of the tank, and assemble.
5. Assemble so that the protruding part at the bottom of cover (1) holds spring (2), then tighten with the bolt.



CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.
If the engine is started frequently, have this inspection carried out every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

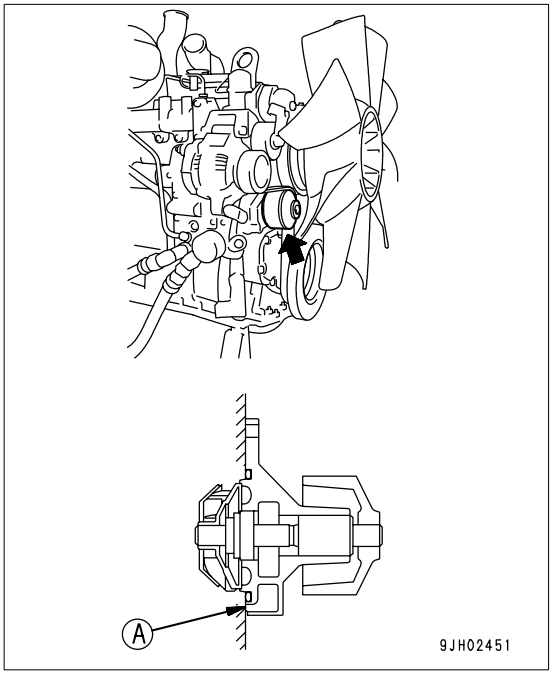
Special tools are needed for inspection and maintenance, please contact your Komatsu distributor.

EVERY 4000 HOURS MAINTENANCE

Maintenance for every 250, 500, 1000 and 2000 hours service should be carried out at the same time.

CHECK WATER PUMP

Since the pulley may have play, oil may leak, water may leak and the drain hole (A) may be clogged, contact your Komatsu distributor for inspection, overhaul or replacement.



EVERY 5000 HOURS MAINTENANCE

Maintenance for every 250, 500 and 1000 hours service should be carried out at the same time.

CHANGE OIL IN HYDRAULIC TANK

⚠ WARNING

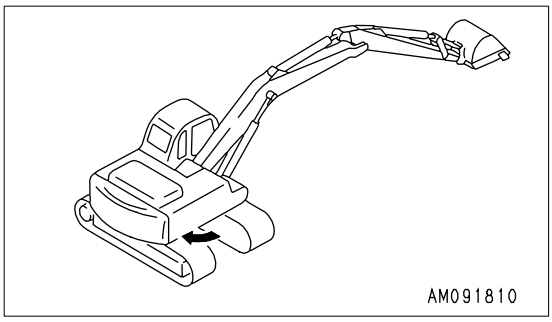
- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

NOTICE

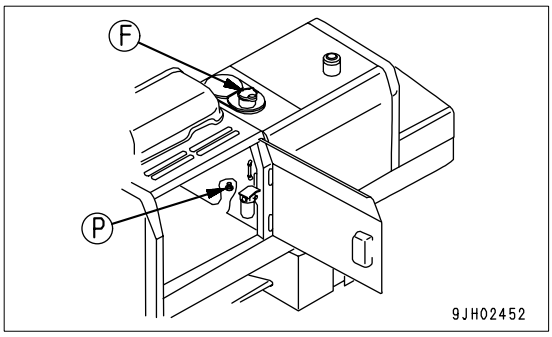
If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (4-17)" when carrying out maintenance.

- Refill, capacity: 121 liters (32 US gallons)
- Prepare a handle (for the socket wrench).

1. Swing so that the drain plug at the bottom of the hydraulic tank is in the middle between the left and right tracks.
2. Retract the arm and bucket cylinders, then lower the boom and put the teeth in contact with the ground.
3. Set the safety lock lever to the LOCK position and stop the engine.



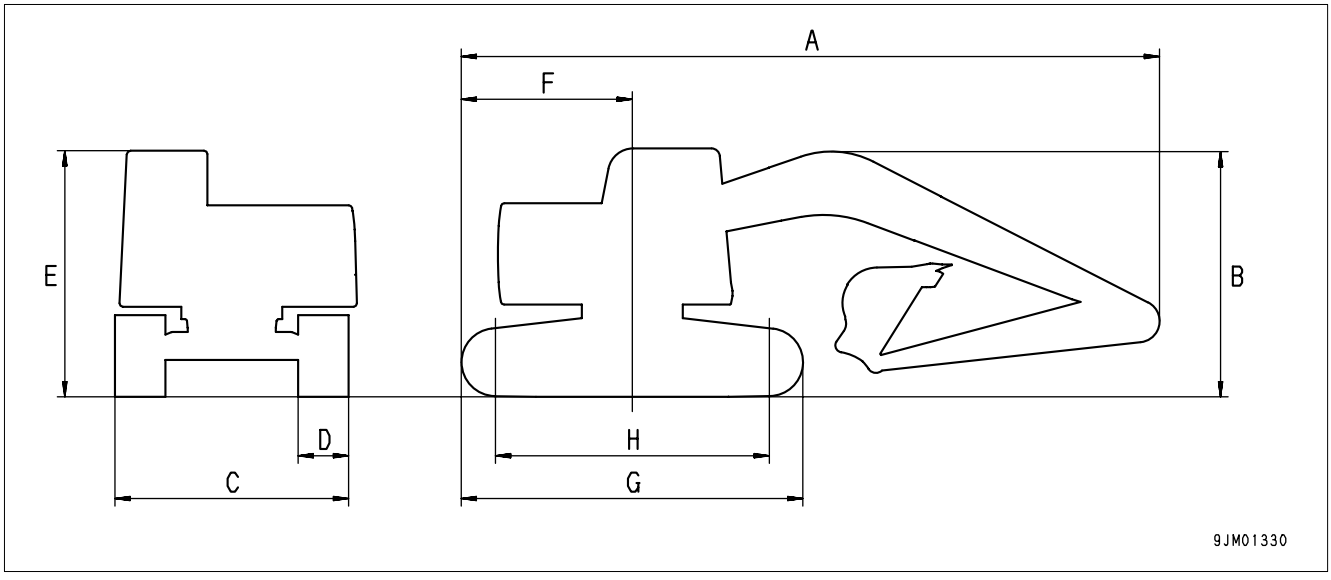
4. Remove the cap of oil filler port (F) at the top of the hydraulic tank.
5. Set a container direct under the drain plug located on the machine's underside to catch oil that is drained. Remove drain plug (P) and drain the oil. Check an O-ring installed to Plug (P), and if it has a scratch or damage, replace it with new one. After draining the oil, tighten drain plug (P).
   - The specified tightening torque is 68.6 ± 9.81 N·m (50.6 ± 7.2 lbf·ft)
   - Take care not to get oil on yourself when you remove drain plug (P).
6. Add the specified amount of new and clean engine oil (for hydraulic system) through oil filler port (F). Check that the oil level is between H and L on the sight gauge.
   For details of oil level check, see "Check Oil Level In Hydraulic Tank, Add Oil (3-69)".



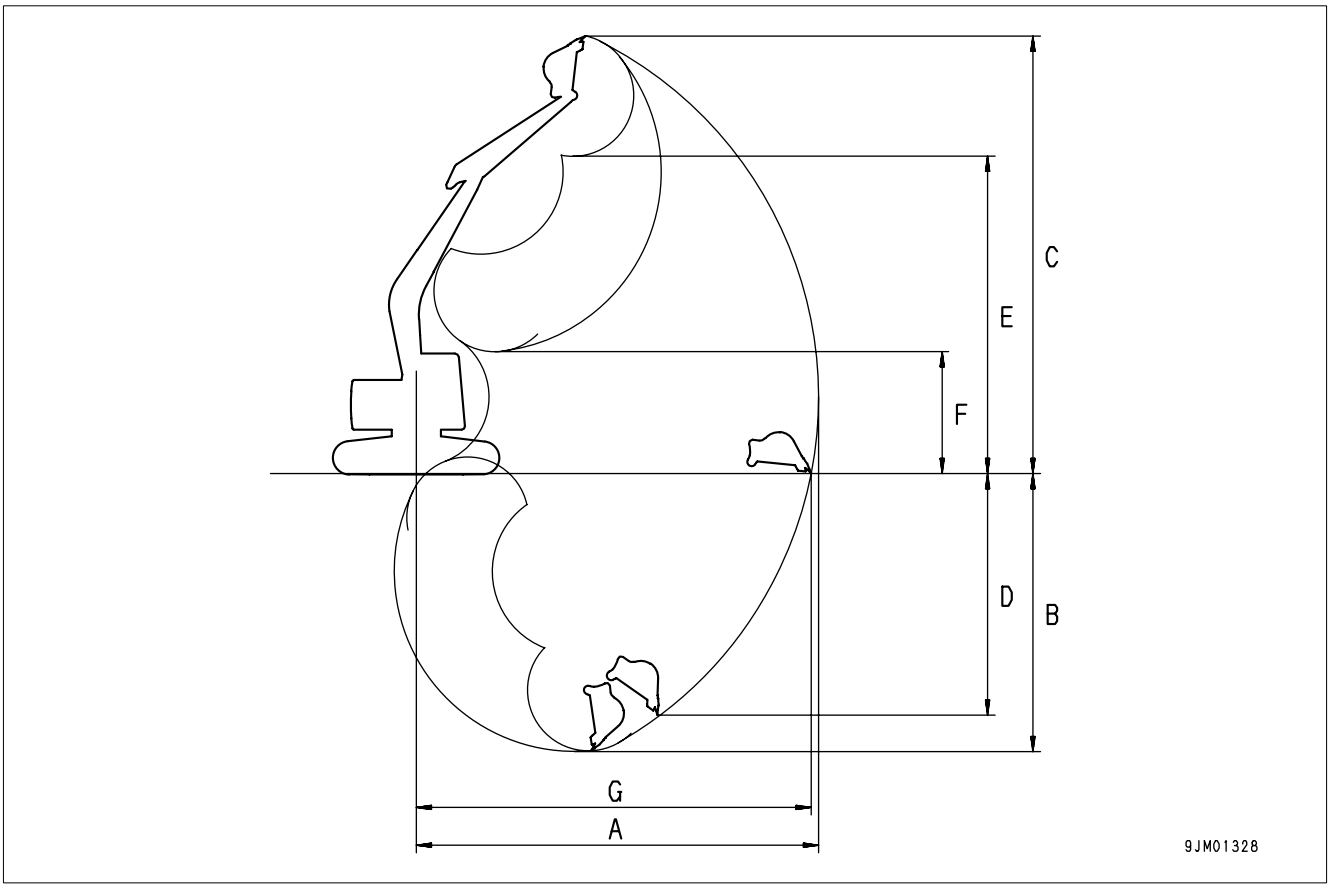
SPECIFICATIONS

SPECIFICATIONS

	Item	Unit	PC160LC-7
	Operating weight	kg (lb)	16,400 (36,155.8)
	Bucket capacity	m^3 (ft^3)	0.65 (23)
	Name of engine	-	KOMATSU SAA4D102E diesel engine
	Engine horsepower	kW{HP}/rpm	82.40 {111}/2,200
A	Overall length	mm (ft)	8,565 (28.1)
B	Overall height	mm (ft)	3,027 (9.9)
C	Overall width	mm (ft)	2,490 (8.2)
D	Track width	mm (ft)	500 (1.6)
E	Height of cab	mm (ft)	2,970 (9.7)
F	Radius of upper structure	mm (ft)	2,436 (8.0)
G	Length of track	mm (ft)	3,965 (13.0)
H	Tumbler center distance	mm (ft)	3,170 (10.4)
	Min. ground clearance	mm (ft)	440 (1.44)
	Travel speed (Low/High)	km/h (mph)	3.4/5.5 (2.1/3.4)
	Swing speed	rpm	12.0



	Working ranges mm (ft)	PC160LC-7
A	Max. digging reach	8,960 (29.4)
B	Max. digging depth	5,960 (20.0)
C	Max. digging height	9,180 (30.1)
D	Max. vertical wall depth	5,690 (19.0)
E	Max. dumping height	6,370 (21.0)
F	Min. dumping height	2,400 (8.0)
G	Max. reach at ground level	8,800 (29.0)



SPECIFICATIONS

ATTACHMENTS AND OPTIONS

⚠ WARNING

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

ATTACHMENTS AND OPTIONS - GENERAL INFORMATION

SAFETY FIRST

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.
When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.
If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.

⚠ WARNING

General precautions

- **Attachments are powerful tools. To prevent serious injury or damage, use the attachment correctly.**

Read the instruction manual for the attachment thoroughly, and do not use this attachment unless you are sure that you have understood the guides completely.

- **If you lose the instruction manual, always ask the manufacturer or attachment sales company for a new copy.**
- **Depending on the attachment, install the necessary front guard to the machine.**
- **Depending on the attachment, the impact noise may make it difficult for fellow workers to transmit instructions for the operation. Before starting operation, decide a leader and determine the signals to be used.**
- **Do not carry out swinging operations to the side with a heavy load on the attachment. This is particularly dangerous on slopes.**
- **Compared with a machine equipped with a bucket, a machine equipped with a breaker has a heavy load at the front of the work equipment and is unstable. To avoid the danger of tipping over, do not carry out operations with the attachment swung to the side.**
- **When an attachment is installed, the swing range and center of gravity of the machine are different, and the machine may move in an unexpected way. Be sure that you understand the condition of the machine properly.**
- **Before starting operations, set up a fence around the machine to prevent people from entering.**
- **Never operate the machine when there are people near the machine.**
- **To prevent serious accidents caused by misoperation, do not put your foot on the pedal except when operating the pedal.**

Precautions for removal and installation operations

- **When removing or installing the attachment always do as follows to ensure safety in the operation.**
- **Carry out the removal and installation operation on firm, level ground.**
- **When carrying out the operation with two or more workers, determine the signals and follow these during the operation.**
- **Always use a crane when you lift or carrying heavy objects (more than 25 kg (55.1 lb)).**
- **When removing heavy components, always support the component before removing it.**
- **When lifting with a crane, be particularly careful about the position of the center of gravity.**
- **It is dangerous to carry out operations with a load left raised by a crane. Always prepare a stand and ensure that the condition is safe.**
- **When leaving an attachment removed or when installing the attachment, make sure that it is in a stable condition and cannot fall over.**
- **Never go under a load raised by a crane.**
- **Stay in a safe place where there is no danger if the load should fall.**

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.
For details of removal and installation operations, contact your Komatsu distributor.

ATTACHMENT INSTALLATION

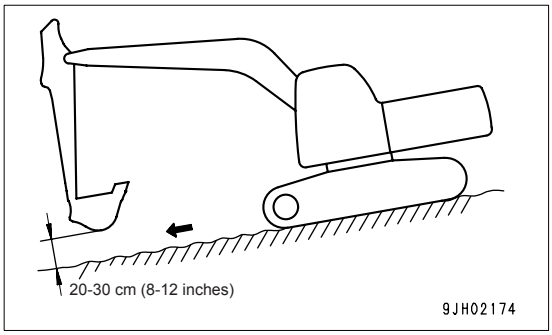
⚠ WARNING

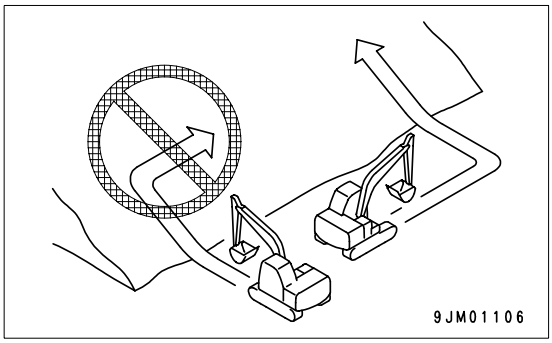
Long work equipment reduces the stability of the machine, so if the swing is operated on a slope, or when going down a steep hill, the machine may lose its balance and overturn.
The following operations are particularly dangerous, so never operate the machine in these ways.

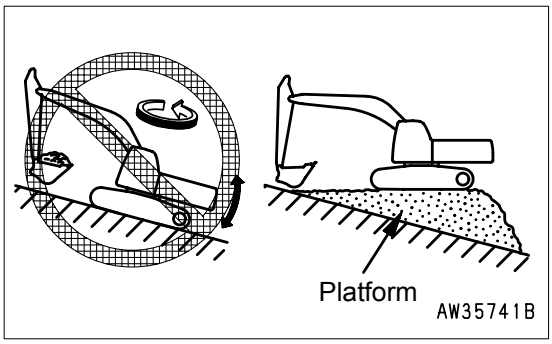
- **If heavy work equipment is installed, the overrun of the swing becomes greater (the distance from the point where the operator operates the control levers to stop the swing to the point where the upper structure stops completely), so there is danger of mistaking the distance and hitting something.**

Always operate so that there is an ample margin to the stopping point.

- **Furthermore, the hydraulic drift also becomes larger (when the work equipment is stopped in mid-air, it will gradually move down under its own weight).**
- **Always follow the correct procedure when installing the boom and arm.**
- **If the correct procedure is not followed, this may lead to serious damage or injury, so consult your Komatsu distributor before carrying out installation.**
- **If long work equipment is installed, the working range will suddenly become larger, so there is danger of mistaking the distance and hitting something.**
- **Always operate the work equipment so that there is ample space from any obstacles in the area.**







BUCKET WITH HOOK

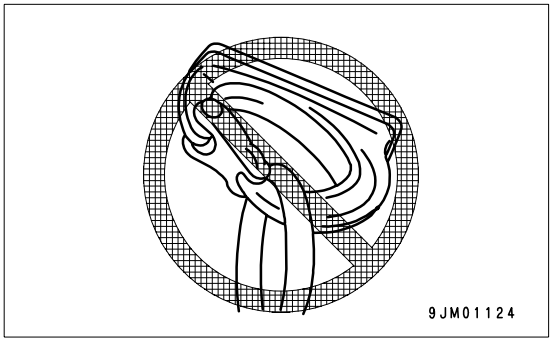
HOOK CONDITION

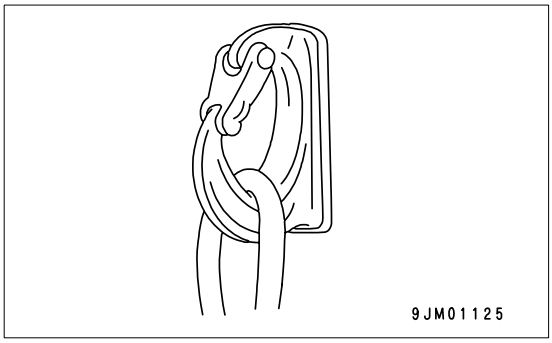
Check that there is no damage to the hook, stopper, or hook mount. If there is any abnormality, contact your Komatsu distributor.

PROHIBITED OPERATIONS

Operations with Care

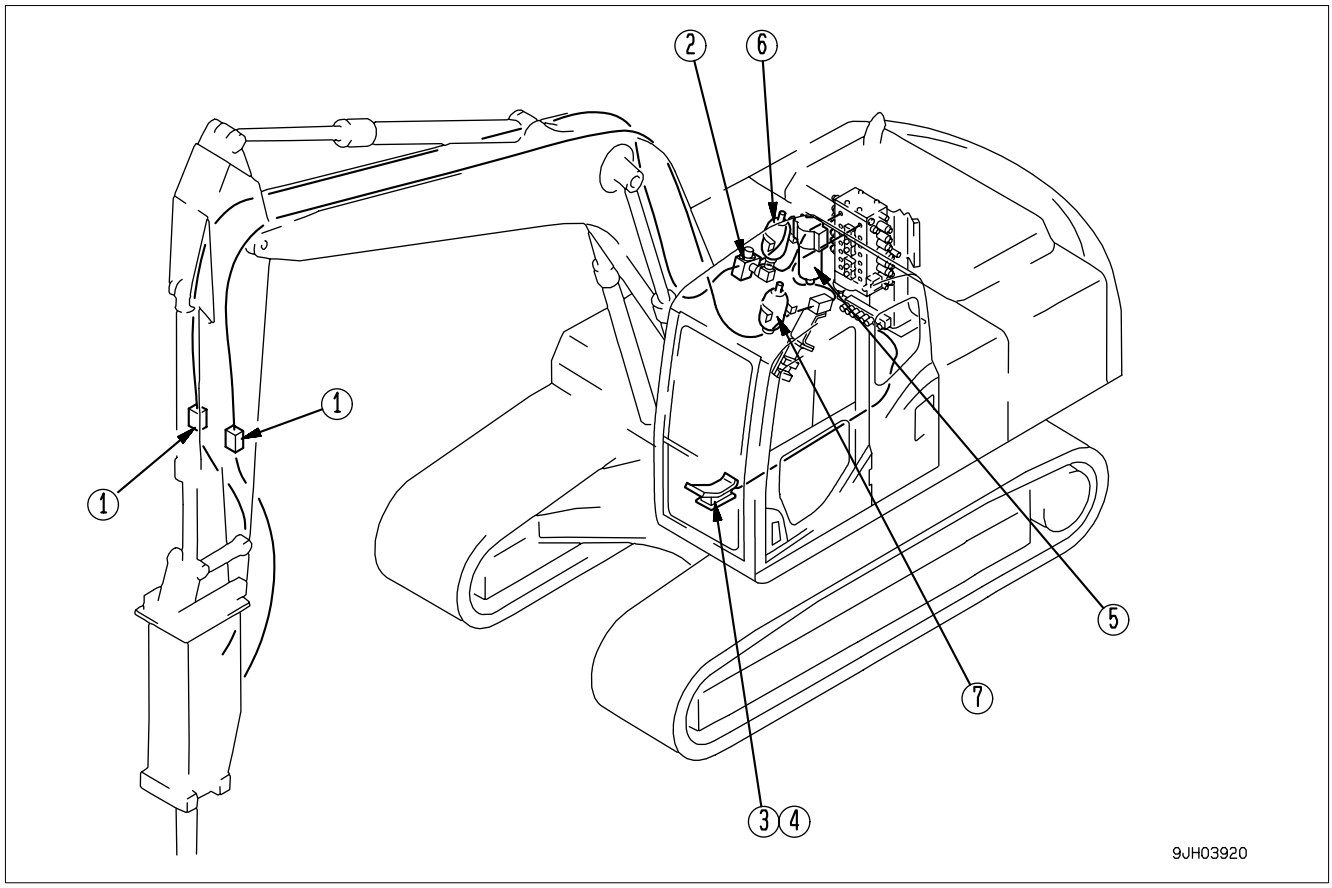
- During lifting operations, reduce the engine speed and carry out the operation in L mode.
- Depending on the operating posture, there is danger that the wire or ring may come off the hook. To prevent this, pay careful attention to the angle of the hook.
- Never travel the machine while lifting a load.
- If the bucket with hook is turned and used for operations, it will hit the arm during dumping operations, so be careful when using it.
- Loads suspended must not exceed the limit indicated in the “LIFTING CAPACITY TABLE“ stuck on the right-side lower portion of the operator's seat.
- If you are planning to newly install a hook, contact your Komatsu distributor.





MACHINE READY FOR ATTACHMENT (DELUXE HCU SYSTEM)

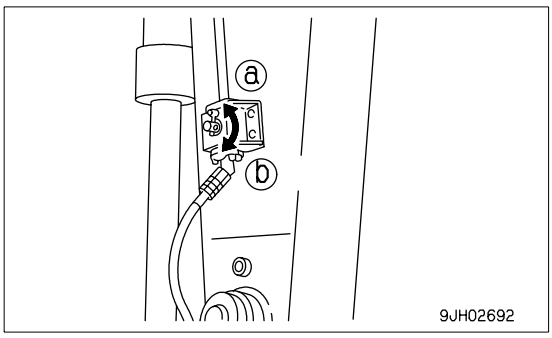
LOCATIONS



(1) Stop valve	(5) Additional filter for breaker
(2) Selector valve	(6) Accumulator(low-pressure)
(3) Attachment control pedal	(7) Accumulator(high-pressure) (if equipped)
(4) Lock pin	

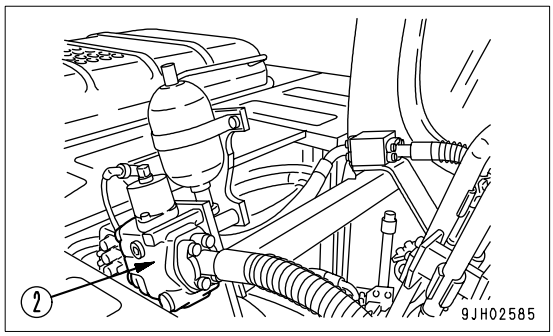
Stop Valve

This valve (1) stops the flow of the hydraulic oil.
(a) FREE: Hydraulic oil flows.
(b) LOCK: Hydraulic oil stops.
When removing or installing attachments, set this valve to the LOCK position.



Selector Valve

This valve (2) switches the flow of hydraulic oil.
It is automatically switched according to the selected working mode. It is necessary to switch the working mode to match the attachment that is installed. For details of switching the working mode, see “HYDRAULIC CIRCUIT (6-8)“.

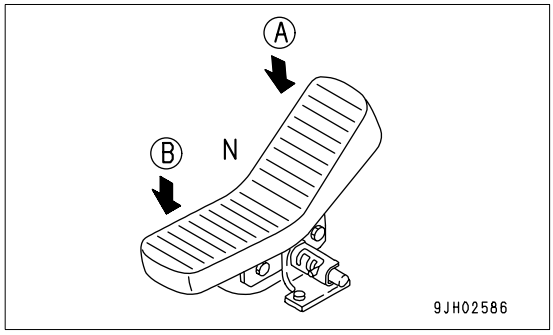


NOTICE
If a service circuit from the attachment maker has been added, the return circuit may not switch automatically.

Attachment Control Pedal

This pedal (3) is used to control the attachment.
When the front, center (neutral), and rear of the pedal are depressed, the movement of the attachment is as follows.

Hydraulic breaker
Front of pedal (A) : Actuated
Center of pedal N : Stopped
Rear of pedal (B) : Stopped



Regarding other attachments, hold a meeting with the attachment maker at the time of installation to confirm the operation of the pedal and attachment before using it.

REMARK
This pedal cover (3) differs in thickness at both ends. It can be stalled facing in either direction, so install it according to your own preference.

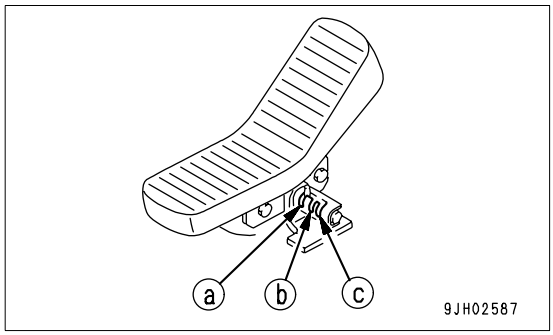
Lock Pin

This pin (4) locks the control pedal.
Position (a) : Locked
Position (b) : Only front of pedal can be operated to full position (rear is locked)
Position (c) : Both front and rear of pedal can be operated to full position

- When using a breaker, select B mode on the monitor and set the lock pin to position (b).

When not using the attachment, set the lock pin to position (a).

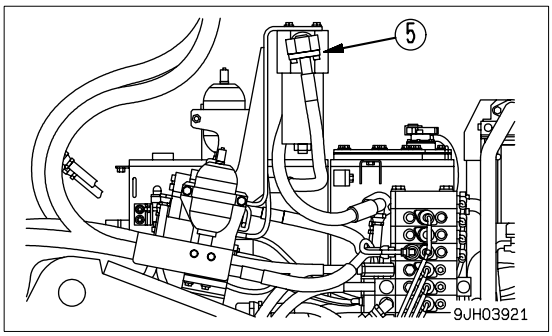
- When using a breaker, select A or E mode on the monitor and set the lock pin to position (c).



NOTICE
When using a breaker, if the lock pin is set to position (c) and the rear portion (B) of the pedal is depressed, it will cause defective operation or breakage of the breaker, so always set the lock pin to position (b) when using the breaker.

Breaker Circuit Additional Oil Filter

This filter (5) prevents deterioration of the hydraulic oil when using a breaker.
Oil only flows when B mode is selected on the monitor.



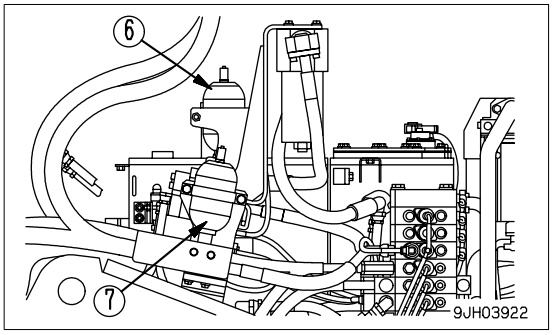
NOTICE
Always install an additional filter in the return circuit on machines equipped with a hydraulic breaker.

Accumulator

⚠ WARNING

The accumulator is charged with high-pressure nitrogen gas, so it is extremely dangerous if it is handled incorrectly. For details of handling, see "ACCUMULATOR (3-63)".

This accumulator (6), (7) is installed to reduce the peak pressure in the hydraulic circuit when a breaker is used. Normally, do not touch it.



NOTICE
The need to install an accumulator depends on the breaker manufacturer. When installing a breaker made by another manufacturer, please consult your Komatsu distributor.
Depending on the breaker manufacturer, it may be necessary to install the accumulator at the inlet or outlet port of the breaker.

HYDRAULIC CIRCUIT

NOTICE

- **When a breaker is installed, it is necessary to connect the return circuit directly to the return filter, so use only B mode. Do not use any other mode.**
- **The standard set pressure of the service valve safety valve depends on the mode selected when the machine is shipped from the factory.**

If B mode is selected: 20.6 MPa (2987.8 PSI)
If A or E mode is selected: 27.4 MPa (3974 PSI)

- **Adjustment may be needed depending on the attachment, so in such a case, please contact your Komatsu distributor.**

Switching Hydraulic Circuit

- Depending on the type of attachment, set the working mode on the monitor as follows.
- The set pressure of the service valve safety valve and the hydraulic circuit switch is according to the working mode selected.

Attachment	Working mode	Hydraulic circuit	Set pressure of service safety valve
Breaker or other attachment with one-way circuit	B mode	Return circuit automatically switched so that it does not pass through control valve	When shipped from factory : 20.6 MPa (2987.8 PSI)
Crusher or other attachment with two-way circuit	A mode or E mode	Return circuit automatically switched so that it passes through control valve	When shipped from factory : 27.4 MPa (3974 PSI)

Adjusting Oil Flow

Depending on the attachment, it is necessary to change the oil flow in the service circuit.
For details of setting the oil flow, see “ATTACHMENT OPERATIONS (6-18)“.

Switching Between Breaker and General Attachment

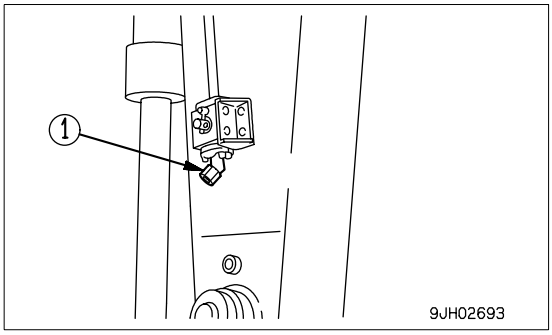
- When a possible attachment (if equipped) is installed and B mode is selected:
  1) The circuit becomes a circuit for breaker operation (1-way circuit).
  2) The hydraulic oil flowing in the breaker circuit flows to the additional filter for the breaker.
  3) The relief valve is set to a lower pressure.
  When shipped from factory: 20.6 MPa (2987.8 PSI)
  4) It is possible to adjust the maximum flow with the select mode.

- When a possible attachment (if equipped) is installed and A mode or E mode is selected:
  1) The circuit becomes a circuit for crusher operation (2-way circuit).
  2) The hydraulic oil flowing in the crusher circuit does not flow to the additional filter for the breaker.
  3) The relief valve is set to a higher pressure.
  When shipped from factory: 27.4 MPa (3974 PSI)
  4) It is possible to adjust the maximum flow with the select mode.

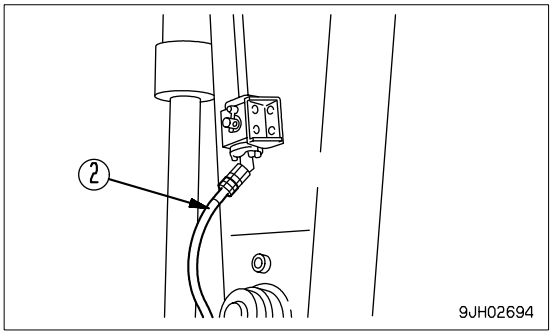
Hydraulic Circuit Connection

When connecting the attachment, connect the hydraulic circuit as follows.

1. Remove blind plug (1) at the end of the stop valve piping. (Two spots on the left and right)
   Be careful not to lose or damage any part that has been removed.

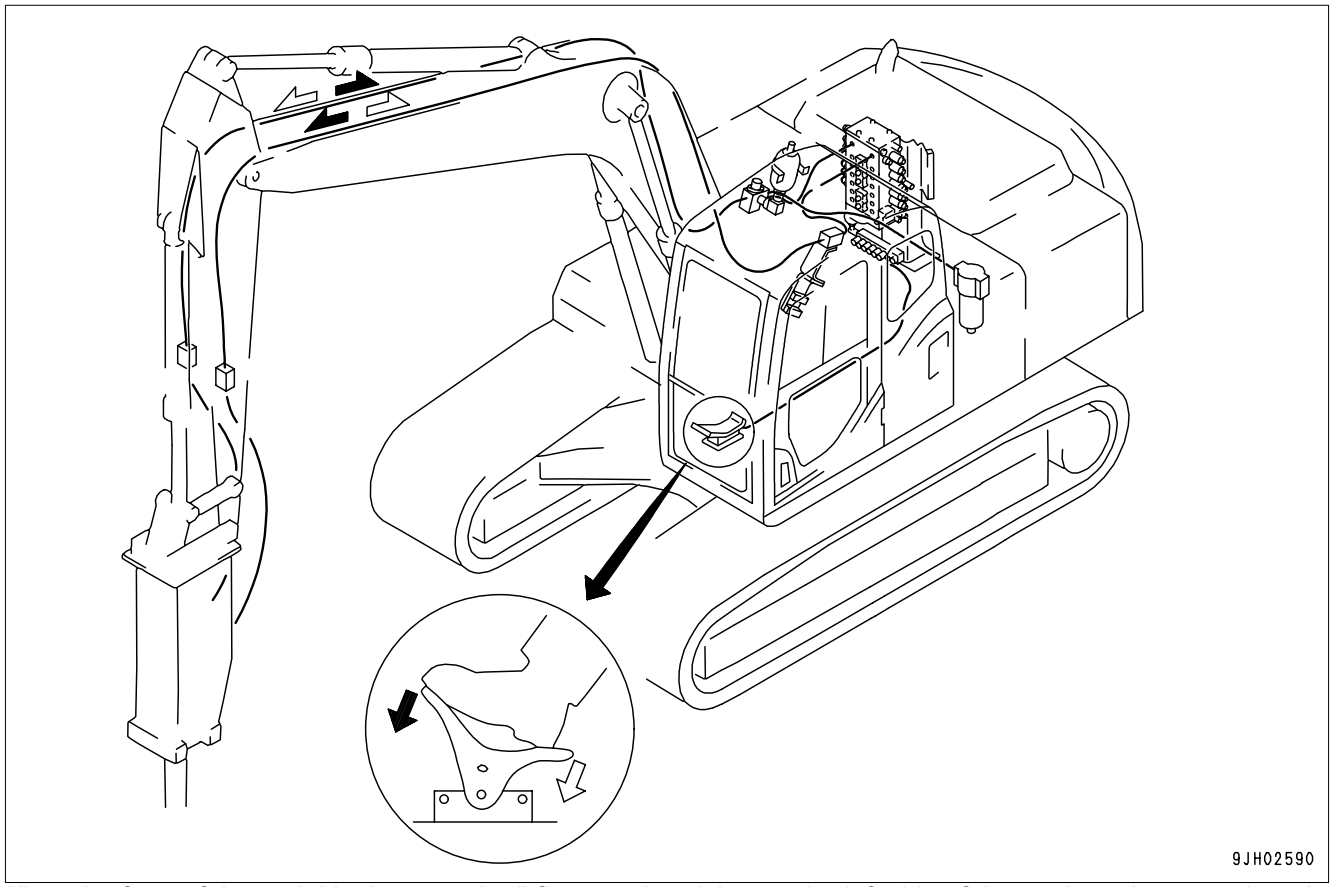


2. Connect attachment piping (2) provided by the attachment maker to the part from which the plug was removed Step 1. For the mouthpiece size and accumulator add-on, the action to take differs according to the attachment manufacturer, so please consult your Komatsu distributor.



Oil Flow Path

The direction of operation of the pedal and the path of the oil flow is as shown in the diagram below.

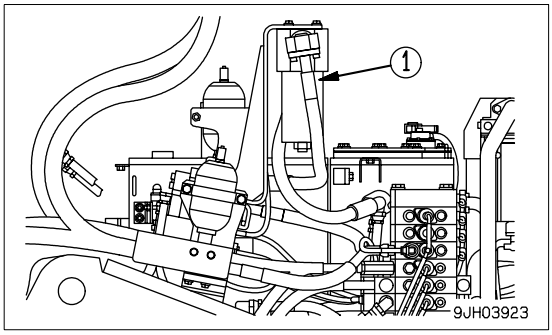


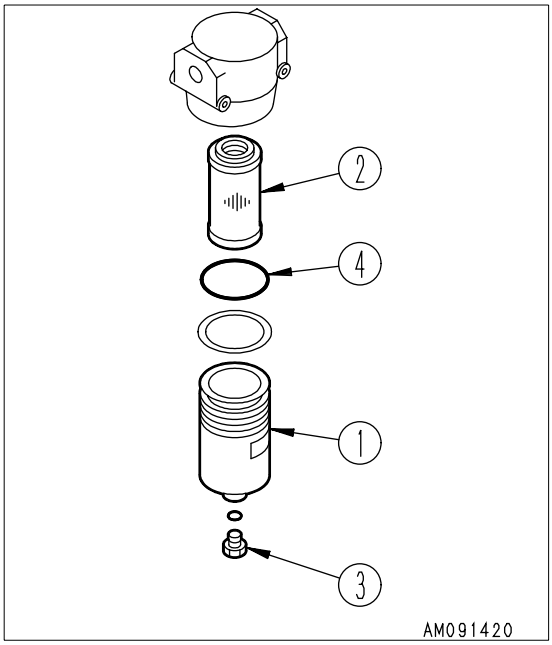
When the front of the pedal is depressed, oil flows to the piping on the left side of the work equipment; when the rear of the pedal is depressed, oil flows to the piping on the right side of the work equipment. (When a breaker is installed, only the front of the pedal can be used.)

Replace Additional Breaker Filter Element

⚠ WARNING

Immediately after operating the engine, all parts still retain high temperature. Never replace the filter in such condition.
Replace it only after each part has sufficiently cooled.





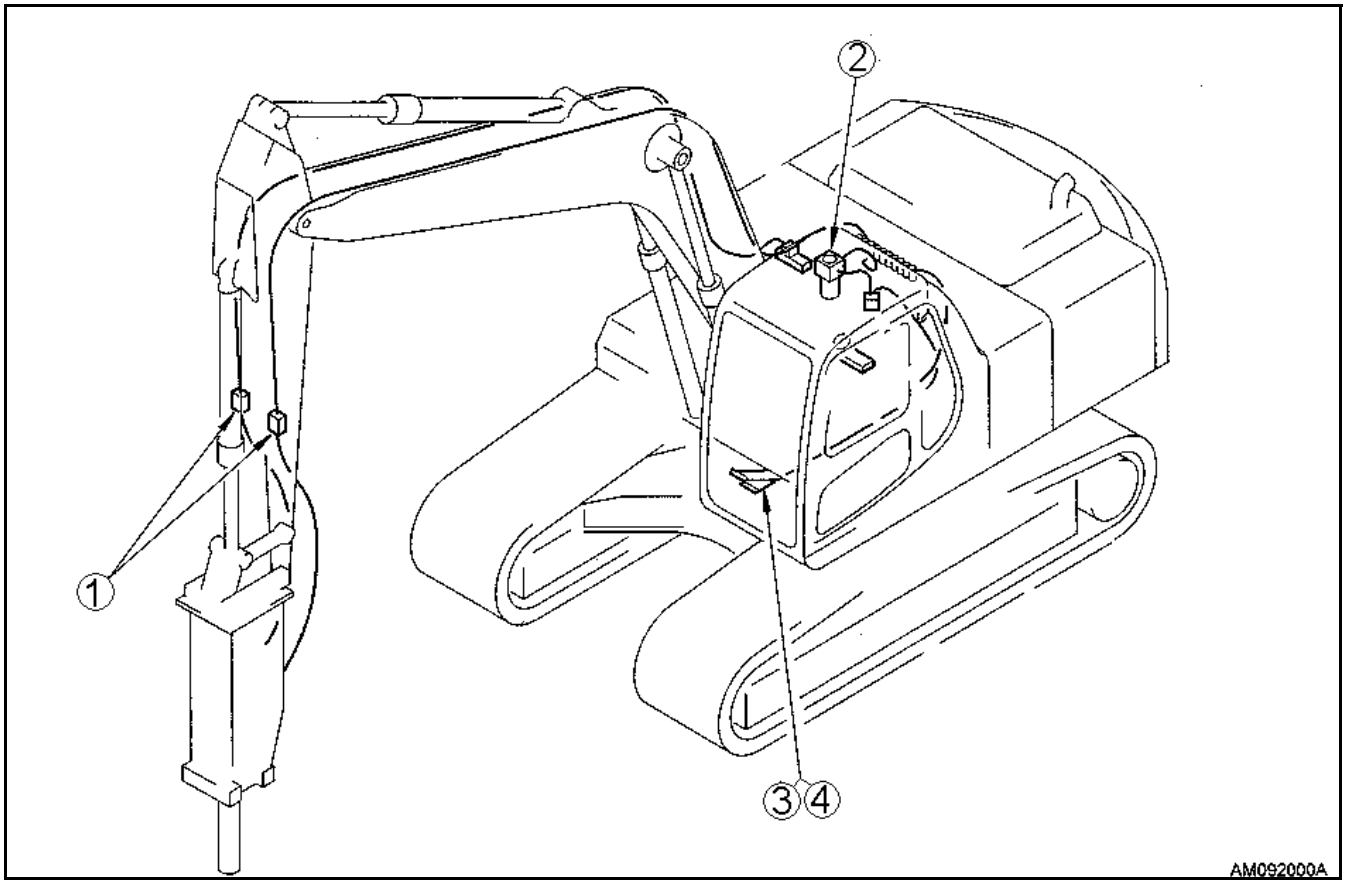
- Prepare a container to catch the oil.

1. Place a container under the filter element to catch the oil.
2. Remove plug (3) and drain the oil from filter case (1).
3. Turn filter case (1) counterclockwise to remove it. Remove element (2) from the case.
4. Clean the removed parts, then install new element (2) and O-ring (4).
5. When installing, bring the case into contact with the filter holder, then tighten a further 1/2 turns.

NOTICE
For details of the replacement interval for the element, "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (4-17)".

MACHINE READY FOR ATTACHMENTS (SIMPLE HCU SYSTEM)

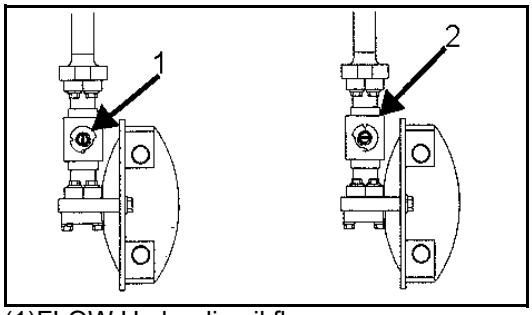
EXPLANATION OF COMPONENTS



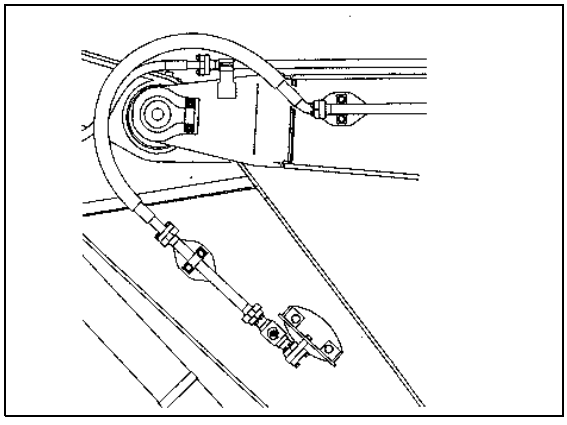
(1) Stop valve	(3) Attachment control pedal
(2) Selector valve	(4) Lock pin

(1) STOP VALVE

This valve stops the flow of the hydraulic oil.

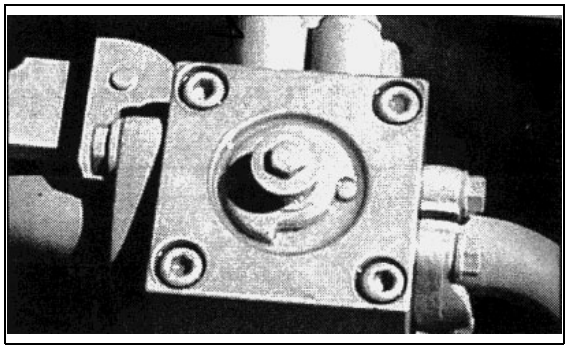


(1)FLOW:Hydraulic oil flows
(2)STOP:Hydraulic oil stops
Set this valve to the STOP position when removing or installing attachments.



(2) SELECTOR VALVE

This switches the flow of the hydraulic oil.
For details of the attachment to install and direction of right 3-way valve position, see "HYDRAULIC CIRCUIT (PAGE 6-12)".



(3) ATTACHMENT CONTROL PEDAL

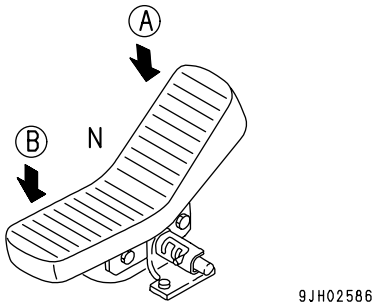
This pedal (3) is used to control the attachment.
When the front, center (neutral), and rear of the pedal are depressed, the movement of the attachment is as follows.

Hydraulic breaker

Front of pedal (A): Actuated
Center of pedal N: Stopped
Rear of pedal (B): Stopped
Regarding other attachments, hold a meeting with the attachment maker at the time of installation to confirm the operation of the pedal and attachment before using it.

REMARK

This pedal cover (3) differs in thickness at both ends. It can be installed facing in either direction, so install it according to your own preference.

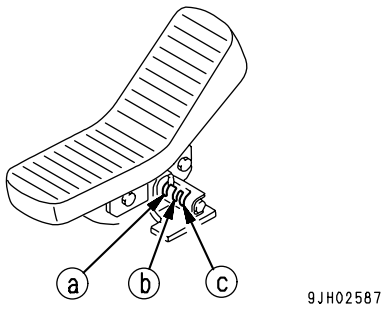


(4) LOCK PIN

This pin (4) locks the control pedal.
Position (a):Locked
Position (b):Only front of pedal can be operated to full position (rear is locked)
Position (c):Both front and rear of pedal can be operated to full position
When using a breaker, select B mode on the monitor and set the lock pin to position (b).
When not using the attachment, set the lock pin to position (a).
When using a breaker, select A or E mode on the monitor and set the lock pin to position (c).

NOTICE

When using a breaker, if the lock pin is set to position (c) and the rear portion (B) of the pedal is depressed, it will cause defective operation or breakage of the breaker. Set the lock pin to position (b) when using the breaker.



HYDRAULIC CIRCUIT

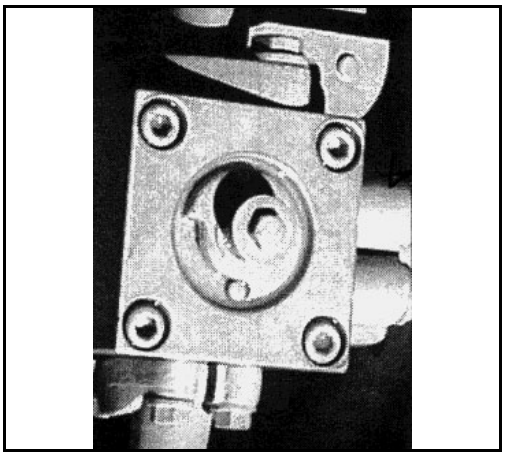
NOTICE

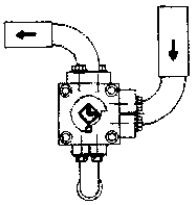
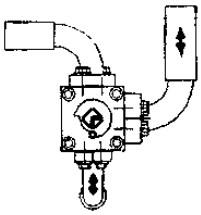
- **When a breaker is installed, use only B mode. Do not use any other mode.**
- **The standard set pressure of the service valve safety valve depends on selector valve position selected when the machine is shipped from the factory.**
  If selector valve is in the position for using breaker :

20.6 MPa (2987.8 PSI)
If selector valve is in position for general attachments such as crusher : 27.4 MPa (3974 PSI)
Adjustment may be needed depending on the attachment, so in such a case, please contact your Komatsu distributor.

SWITCHING HYDRAULIC CIRCUIT

Contact dealer to set left hand boom piping releif pressure.
When using the breaker and the general attachment (crusher etc.), turn the rotor of the 3-way valve to change over according to the following illustration.
(The marks indicating the port direction are stamped on the 3-way valve)



Attachment	Right 3-way valve (1)	Working mode	Hydraulic circuit	Set pressure of service safety valve
1-way flow (Breaker)	Front 	B mode	Return circuit switched so that it does not pass through control valve	When shipped from factory : 20.6 MPa (210 kgf / cm²)
2-way flow (Crusher)	Front 	A mode or E mode	Return circuit switched so that it passes through control valve	When shipped from factory : 27.4 MPa (280 kgf/ cm²)

NOTICE
Perform work only after the engine is stopped and the work equipment and machine body are in stable posture on the ground.

ADJUSTING OIL FLOW

Depending on the attachment, it is necessary to change the oil flow in the service circuit.
For details of setting the oil flow, see "ATTACHMENT OPERATIONS (PAGE 6-18)".

SWITCHING BETWEEN BREAKER AND GENERAL ATTACHMENT

- When a possible attachment (if equipped) is installed, the selector valve is set to the postition for using breaker and mode B is selected :

1. The circuit becomes a circuit for breaker operation (1-way circuit).
2. The relief valve is set to a lower pressure.
   When shipped from factory: 20.6 MPa (2987.8 PSI)
3. It is possible to adjust the maximum flow with the select mode.

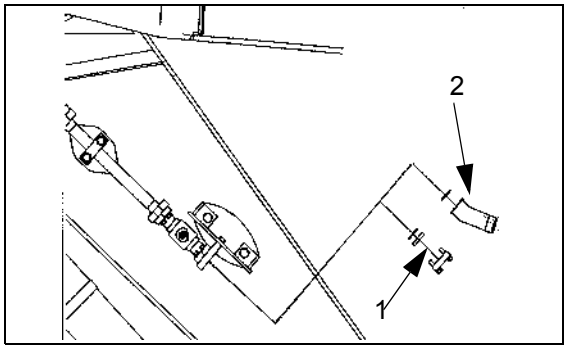
- When a possible attachment (if equipped) is installed, the selector valve is set to the postion for using general attachments and A mode or E mode is selected :

1. The circuit becomes a circuit for crusher operation (2-way circuit).
2. The relief valve is set to a higher pressure.
   When shipped from factory: 27.4 MPa (3974 PSI)
3. It is possible to adjust the maximum flow with the select mode.

HYDRAULIC CIRCUIT CONNECTION

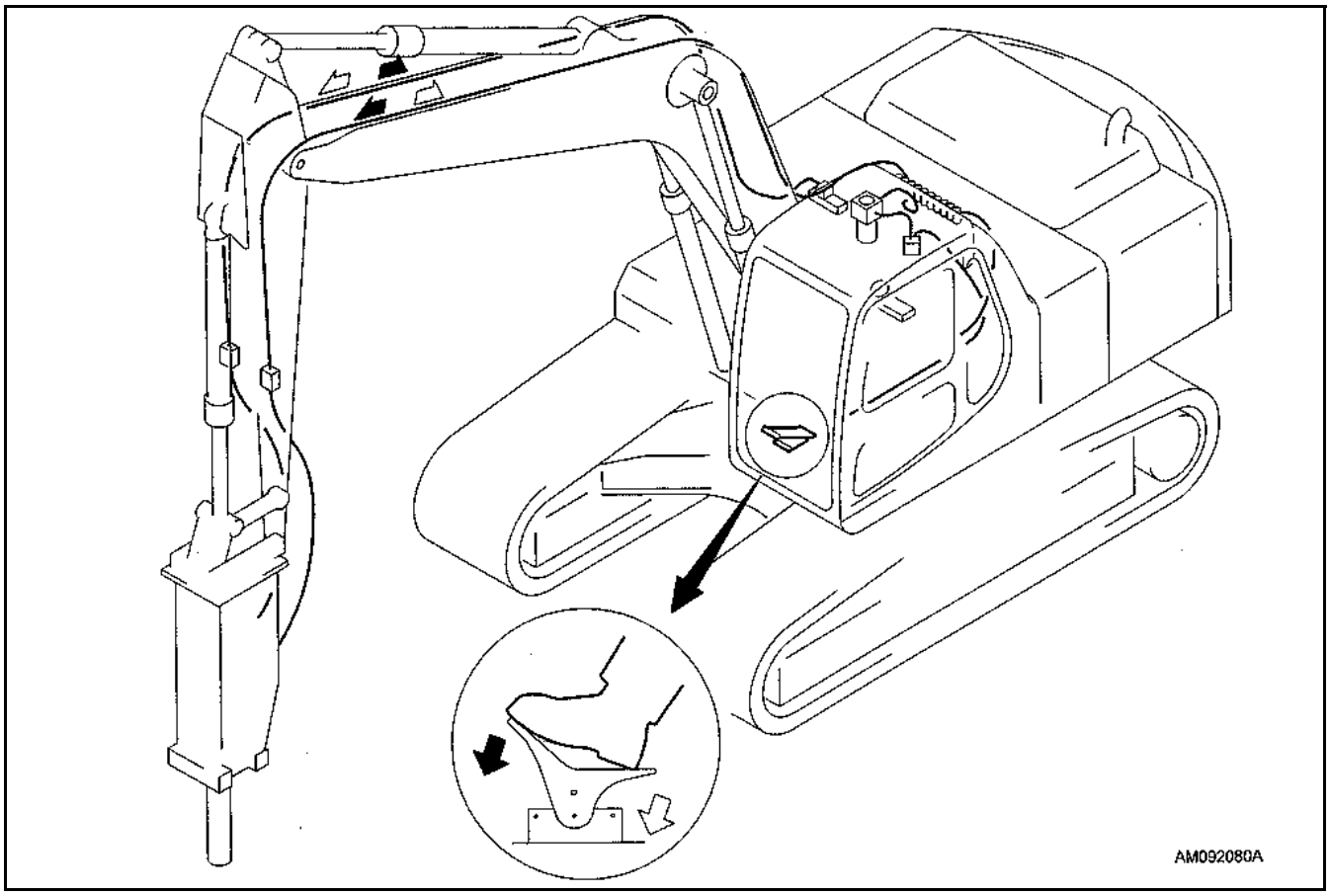
When connecting the attachment, connect the circuit as follows.

4. Remove blind plugs (1) at the end of the stop valve piping. (Two places on the left and right)
   Be careful not to lose or damage any part that has been removed.
5. Connect attachment tubes (2) supplied by the attachment manufacturer to the end from which the plug removed in Step 1.



PATH OF OIL

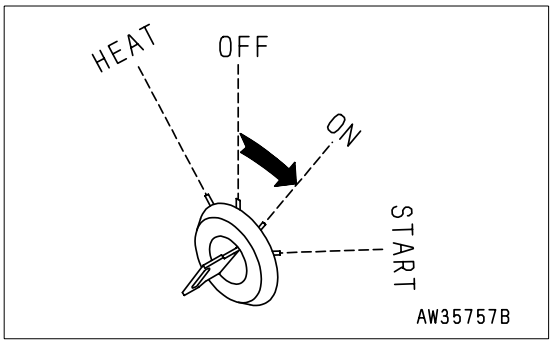
The direction of operation of the pedal and the path of the oil are as shown in the diagram below.

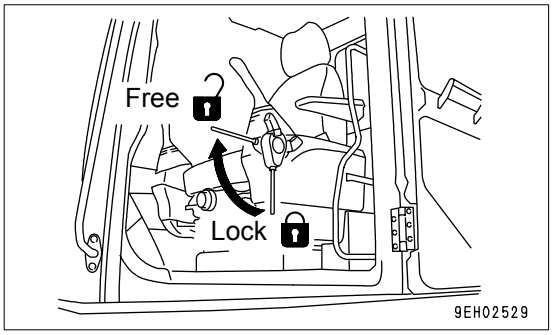


ATTACHMENT REMOVAL AND INSTALLATION

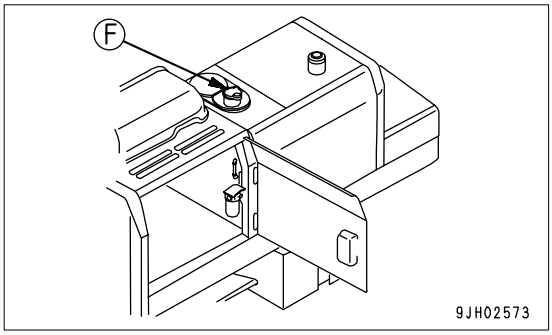
Attachment Removal

1. Lower the attachment to the ground and stop the engine.
2. Turn the starting switch to ON position and push down the safety lock lever to FREE position.
3. Operate each work equipment control lever and the attachment control pedal back and forth, left and right at full stroke 2 to 3 times to eliminate the internal pressure in the hydraulic circuit.

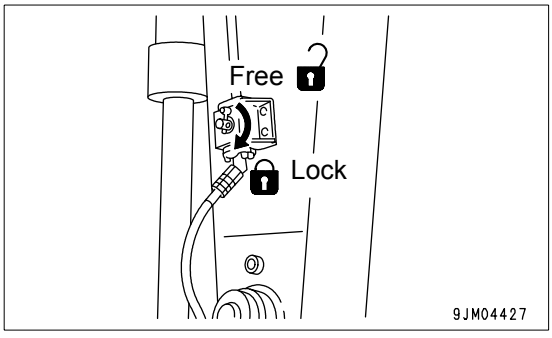




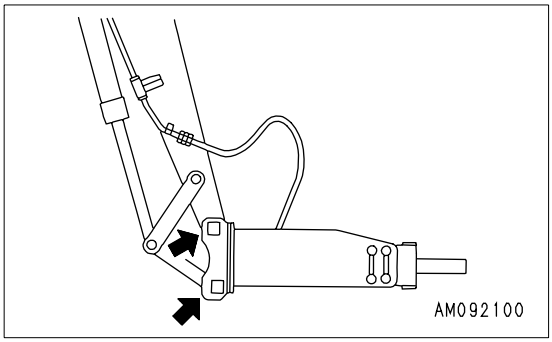
4. Loosen slowly oil filler cap (F) on top of the hydraulic tank to eliminate the internal pressure in the hydraulic circuit.



5. After checking that the oil temperature is low, turn the rotor of the stop valves installed to the inlet and outlet piping at the side of the arm to the OFF position.
6. Remove the hoses on the attachment side. Install the plugs to the two outlets.
   The plugs are used to prevent the attachment from incorrect operation caused by mixing in of foreign matter. After the plugs are correctly installed, store the attachment.

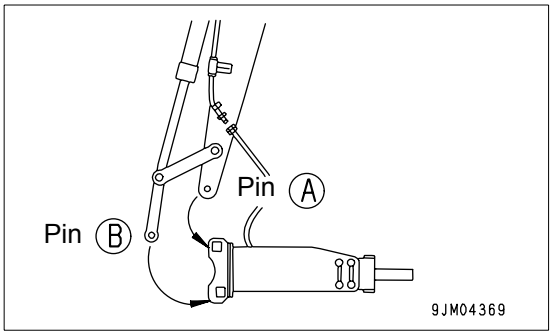


7. Pull out the mounting pins (2 places), remove the attachment, then install the bucket.
   For details of the procedure for installing the bucket, see “BUCKET REPLACEMENT AND INVERSION (3-105)“.
8. After installing the bucket, check the oil level in the hydraulic tank.

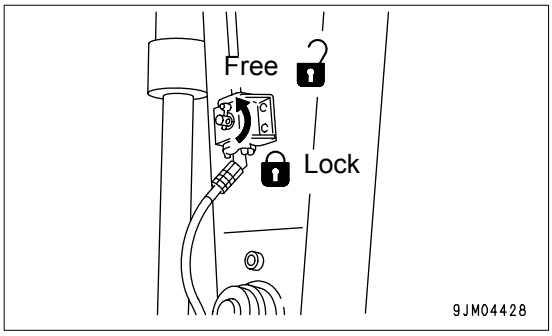


Attachment Installation

1. Remove the bucket.
   For bucket dismounting procedure, see “BUCKET REPLACEMENT AND INVERSION (3-105)“.
2. Place the attachment in a horizontal position, then install to the arm with pin (A) and then pin (B).



3. After confirming low oil temperature, remove the plug from the outlet and inlet port respectively.
   Take care that no dust, mud etc. adheres to the hose mousepiece portions.
   If O-ring is damaged, replace it with a new one.
4. Connect the hose at the attachment side.
   When doing this, check the direction of flow of the oil and be careful not to make any mistake.
5. Turn the rotor of the stop valves installed to the inlet and outlet piping at the side of the arm to the FREE position.
6. After installing the attachment, check the oil level in the hydraulic tank.



ATTACHMENT OPERATIONS

⚠ WARNING

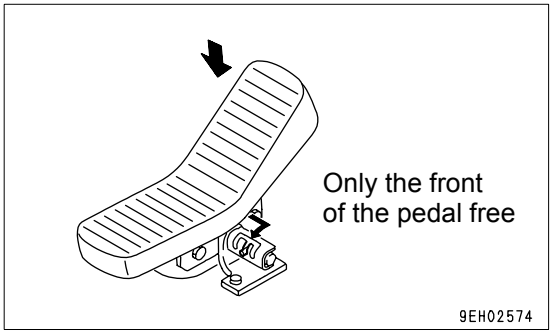
- **Do not rest the foot on the pedal and depress it, when the auto deceleration switch is in ON position. The engine speed rises all of sudden and the attachment will move suddenly and cause serious damage or injury.**
- **Do not put your foot on the pedal except when operating the pedal. If rest your foot on the pedal during operations, and it is depressed by accident, the attachment may move suddenly and cause serious damage or injury.**

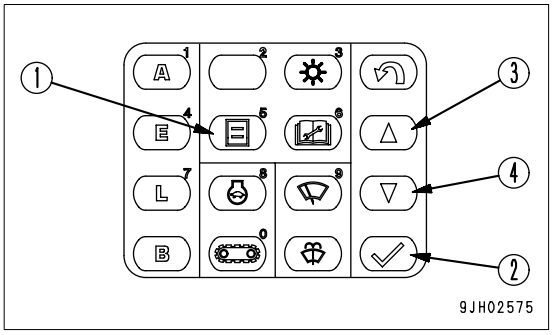
Operate the attachment as follows.

When Using Breaker

When the B mode control switch is ON and the lock pin position makes only the front of the pedal free, if the front of the pedal is depressed, the breaker is actuated.

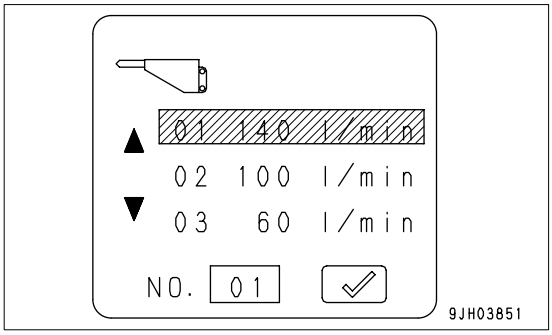
1. Set the working mode to B mode.
2. When select switch (1) on the monitor is pressed, the screen changes to screen (A). Select a suitable oil flow for the breaker from among 140 liters/min (37 US gallons), 100 liters/min (26.4 US gallons), and 60 liters/min (15.9 US gallons), then press input confirmation switch (2).
3. The monitor screen changes to screen (B), so if it is necessary to make fine adjustment, press up switch (3) or down switch (4) to move the bar graph showing the oil flow up or down, then press input confirmation switch (2).
   - It is possible to change the oil flow in segments of approx. 10 liters/min.
   - If fine adjustment is not necessary, simply press-input confirmation switch (2).
   - The default setting is 140 lifters/min (37 US gallons).
   - Even if the starting switch is turned OFF, the set oil flow when the engine is next started will be the value set by the above procedure.



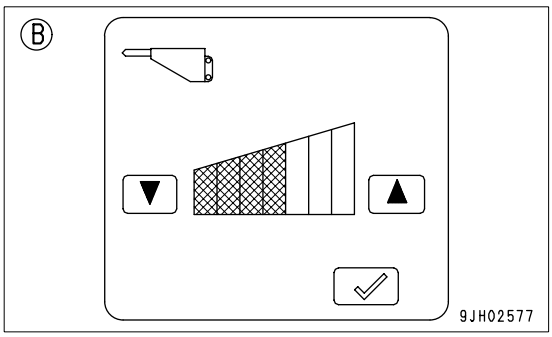


Precautions when using

- Check that the stop valve is at the FREE position.
- Check that the working mode is B mode.
  For details of the path of the oil, see “HYDRAULIC CIRCUIT (6-8)“.
- When considering whether it is necessary to install an accumulator for the attachment circuit, contact the attachment manufacturer and then decide.
- For other precautions when handling the breaker, follow the instruction manual from the breaker manufacturer and use the breaker correctly.



The deterioration of the hydraulic oil when using the breaker is much faster than for normal operations, so reduce the maintenance interval for the hydraulic oil and element.
For details, see “MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (4-17)“.

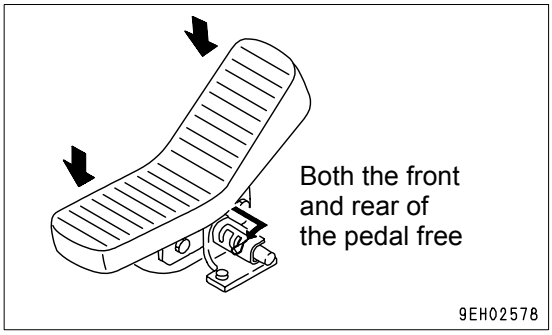


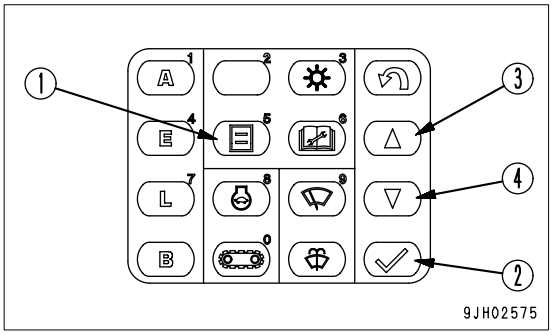
When Using General Attachment Such As Crusher

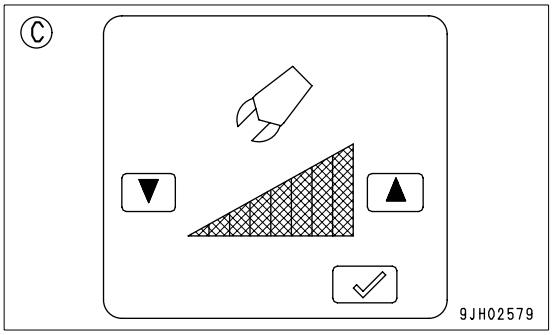
When the A mode or E mode control switch is ON and the lock pin position makes both the front and the rear of the pedal free, if the front or rear of the pedal is depressed, the attachment is actuated.

1. Set the working mode to A mode or E mode.
2. When select switch (1) on the monitor is pressed, the screen changes to screen (C), so press up switch (3) or down switch (4) to move the bar graph showing the oil flow up or down, then press input confirmation switch (2).
   - The default setting is the full flow (approx. 320 liters/ min (84.5 US gallons/min.)).
   - Even if the starting switch is turned OFF, the set oil flow when the engine is next started will be the value set by the above procedure.

   Precautions when using
   - Check that the stop valve is at the FREE position.
   - Check that the working mode is A mode or E mode. For details of the path of the oil, see “HYDRAULIC CIRCUIT (6-8)“.
   - For other precautions when handling the attachment, follow the instruction manual from the attachment manufacturer and use the attachment correctly.







LONG TERM STORAGE

If the equipment is not to be used for a long time, do as follows.

- Set the stop valve in the LOCK condition.
- Install the plug and O-rings to the valves.
- Set the lock pin at the LOCK position.

If there is no breaker or general attachment installed, operating the pedal may cause overheating and other problems.

SPECIFICATIONS

Hydraulic specifications

- Max. merging oil flow 160x2 liters / min

ATTACHMENT GUIDE

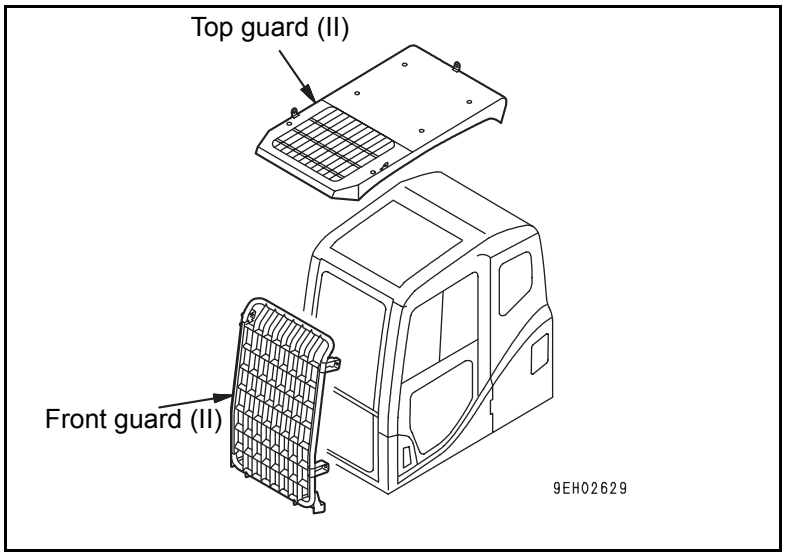
⚠ WARNING

- **Please read the instruction manual for the attachment and the sections of this manual related to attachments and options.**
- **When installing any attachment or option, there may be problems with safety, so please contact your Komatsu distributor before installing.**
- **Installing attachments or options without consulting your Komatsu distributor may not only cause problems with safety, but may also have an adverse effect on the operation of the machine and the life of the equipment.**
- **Any injuries, accidents, or damage resulting from the use of unauthorized attachments or options will not be the responsibility of Komatsu.**

OTHER ATTACHMENTS

Name			Conforming regulations, standards	Use	weigh kg (lb)
Protective guards	OPG	Top guard	ISO 10262 (Operator Protective Guards) Fulfills 2nd standard as strength category Level II (heavy-duty protective guard)	Level II: Protection from heavy falling objects	53 (116.8)
		Front guard		Level II: Protection from heavy flying objects	Level II: 52 (114.6)

Types of protective guard			Content of work			
			Breaker operations	Demolition, cutting operations	Quarries, mines, or other places where there is danger of falling rocks	
					Light load	Heavy load
Head guard				○		
OPG	Top guard	Level II				○
	Front guard	Level II				○



ATTACHMENT COMBINATIONS

⚠ WARNING

Depending on the type or combination of work equipment, there is danger that the work equipment may hit the cab or machine body.
When using unfamiliar work equipment for the first time, check before starting if there is any danger of interference, and operate with caution.

This table lists the combination of attachments which can be installed to the long arm (standard), short arm and extension arm.
○: Can be used
△: Can be used only for light duty work
×: Cannot be used

NOTICE
- **When the extension arm is equipped, if the bucket is drawn to the machine body, the arm interferes with the body. Operate the extension arm carefully.**
- **When the boom is fully lowered during oblique digging, the boom interferes with the undercarriage.**
- **Operate the boom carefully.**

Categories of use
For general digging: Digging or loading sand, gravel, clay etc.
For light duty digging: Digging or loading dry, uncaked earth and sand, mud etc.
For loading work: Loading dry, loose earth and sand
- For digging or loading hard soil or soft rock, it is recommended that the strengthened bucket with high durability and high wear resistance be employed.

*:Equipped with side cutter

Name of bucket		Capacity m^3 (ft^3) SAE	Outside width mm (inches)	Use	Long arm 2.9m (9.6ft)	Standard arm 2.6m (8.6ft)	Short arm 2.25m (7.5ft)
Standard bucket	*Narrow bucket	0.38 (13.4)	610 (24)	Narrow digging	○	○	○
	*Narrow bucket	0.57 (20.1)	762 (30)	Narrow digging	○	○	○
	*Standard bucket	0.67 (23.7)	914 (36)	General digging	○	○	○
	*Light duty bucket	0.86 (30.4)	1,067 (42)	Loading	△	○	○
HD bucket	*Narrow bucket	0.38 (13.4)	610 (24)	Narrow digging	○	○	○
	*Narrow bucket	0.57 (20.1	762 (30)	Narrow digging	○	○	○
	*Standard bucket	0.67 (23.7)	914 (36)	General digging	×	○	△
	*Light duty bucket	0.86 30.4	1,067 (42)	Loading	×	△	△

TRACK SHOES SELECTION

Select the most suitable track shoe to match the operating conditions.

Selection

Confirm the category from the list of uses in Table 1, then use Table 2 to select the shoe.

- Categories B and C are wide shoes, so there are limitations on their use. When using these shoes, check the pre-cautions, then investigate and study fully the conditions of use to confirm that these shoes are suitable.
- When selecting the shoe width, select the narrowest shoe possible that will give the required flotation and ground pressure. If a wider shoe than necessary is used, the load on the track will increase, and this will cause the shoes to bend, links to crack, pins to break, shoe bolts to come loose, and various other problems.

Category	Use	Precautions when using
A	Rocky ground, riverbeds, normal soil	•On rough ground with large obstacles such as boulders or fallen trees, travel at low speed.
B	Normal soil, soft ground	•These shoes cannot be used on rough ground where there are large obstacles such as boulders or fallen trees. •Travel at Hi speed only on flat ground, and if it is impossible to avoid going over obstacles, shift down and travel at half speed in Lo.

	PC160LC-7	
	Specifications	Category
Standard	500 mm (20 inches) Triple	A
Option	600 mm (23.6 inches) Triple	A
Option	700 mm (28 inches) Triple	B

BUCKET TEETH SELECTION

Depending on the working conditions, there is danger that an adapter and teeth may break, so select from the vertical pin and horizontal pin teeth to give teeth that are suitable for the purpose.
While the standard teeth of both vertical and horizontal pin types may be used widely, the following kinds of teeth are recommended depending on the working conditions.

Teeth Selection

Vertical Pin Type Tooth

General digging: Digging and loading normal soil, such as sand, gravel, clay, etc.
Light-duty digging: digging and loading dry and loose sandy soil, or muddy soil.
Loading: loading of dry and loose earth.

Horizontal Pin Type Tooth

Heavy-duty digging: digging hard soil, soil with rocks involving hammering work, scraping and the like.

- The heavy-duty bucket is of a horizontal pin type and as such, use it for heavy duty-digging.

Long-life Tooth

- Jobsites where long wear life is demanded, such as when loading hard rocks.
- Jobsites where no penetration is needed, such as when working with crushed rocks after blasting or ripping.
- Jobsites where heavy-duty operations are carried out, such as hitting or pulling up rocks with the tips of the teeth.

Self-sharpening Tooth

- Jobsites demanding penetration such as digging and loading sandy or clayey soil.

Selection Guide For Horizontal Or Vertical Pin Type Tooth

<table>
<tr><td colspan="3" rowspan="2"></td><td colspan="4">Applicable Work Site</td></tr>
<tr><td>Rock</td><td>Crushed stone</td><td>Clayey soil, Decompressed weathered granite</td><td>Sand</td></tr>
<tr><td rowspan="4">Work Contents</td><td rowspan="4">→Heavy
Light←</td><td>Digging with hammering work</td><td colspan="2">Horizontal pin type teeth</td><td colspan="2">Vertical pin type teeth</td></tr>
<tr><td>Scraping down</td><td colspan="2">Horizontal pin type teeth</td><td colspan="2">Vertical pin type teeth</td></tr>
<tr><td>General excavation</td><td colspan="4">Vertical pin type teeth</td></tr>
<tr><td>Loading</td><td colspan="4">Vertical pin type teeth</td></tr>
</table>

RECOMMENDED ATTACHMENT OPERATIONS

Below described are instructions which must be followed without fail when doing the work using a hydraulic excavator equipped with an attachment.

NOTICE

Select the optimum model of attachment for a hydraulic excavator on which it is to be mounted.

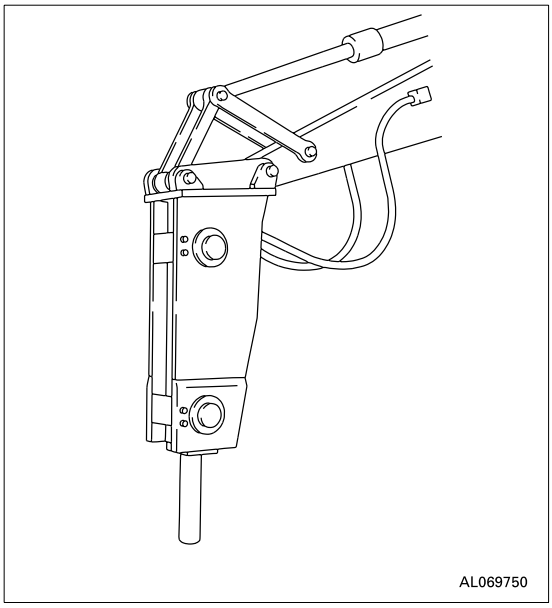
- **Depending on machine models of hydraulic excavator, the kind of attachments or the model of specific attachments that can be mounted will vary. Hence, consult your Komatsu distributor for the selection of optimum attachments.**

HYDRAULIC BREAKER

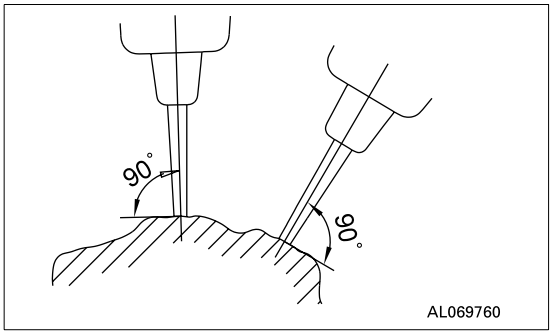
Main Applications

- Crushed rock
- Demolition work
- Road construction

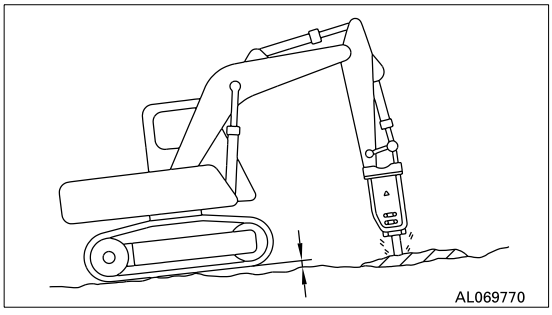
This attachment can be used for a wide range of applications including demolition of buildings, breaking up road surfaces or slag, tunnel work, rock crushing and breaking operations in quarries.



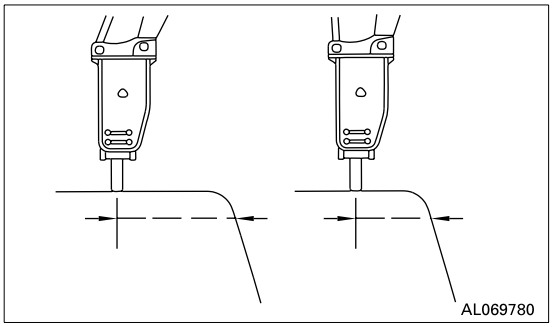
Keep the chisel pushed perpendicularly against the impact surface when carrying out breaking operations.



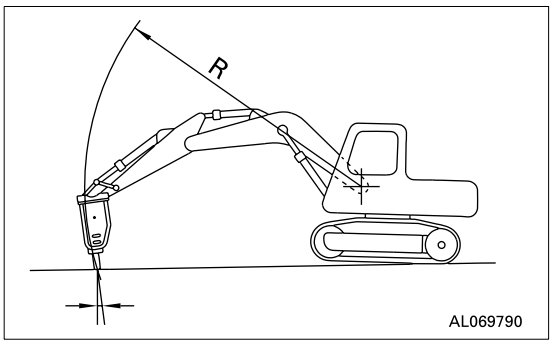
When applying impact, push the chisel against the impact surface and operate so that the chassis rises approx. 5 cm off the ground. Do not let the machine come further off the ground than this amount.



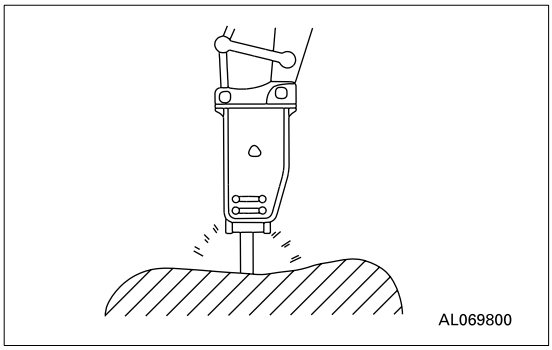
When applying continuous impact to the same impact surface, if the chisel does not penetrate or break the surface within 1 minute, change the point of impact and carry out breaking operations closer to the edge.



The direction of penetration of the chisel and the direction of the breaker body will gradually move out of line with each other, so always adjust the bucket cylinder to keep them aligned.



Always keep the chisel pressed against the impact surface properly to prevent using the impact force when there is no resistance.

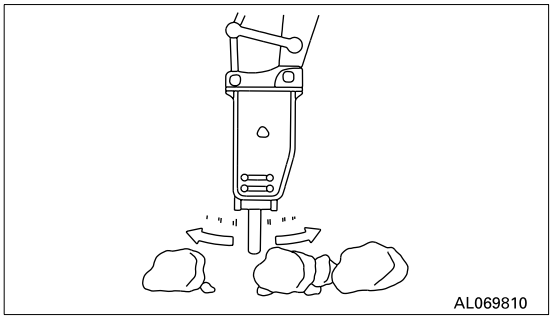


Prohibited Works

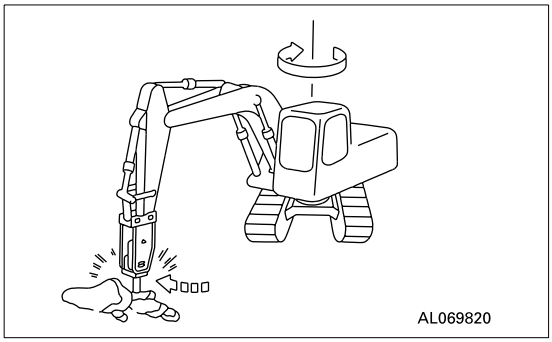
To ensure that the machine has a long life, and to ensure that operations are carried out in safety, do not operate the machine in any of the following ways.

- Do not operate all cylinders to the end of their strokes. Always leave approx. 5 cm to spare.

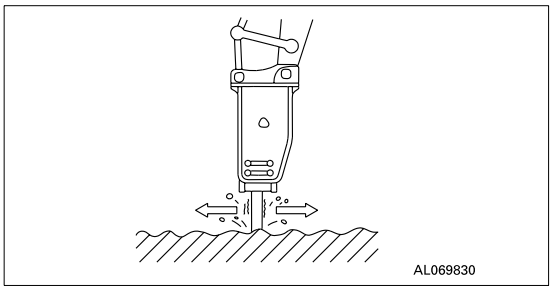
Using the mount to gather in pieces of rock



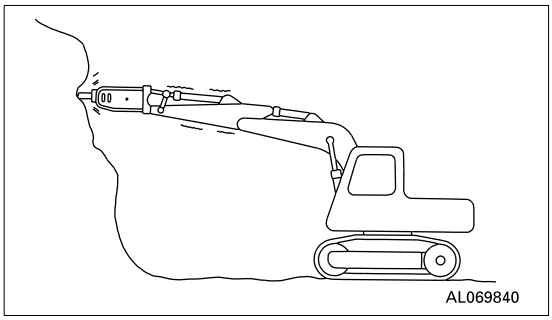
Operations using the swing force



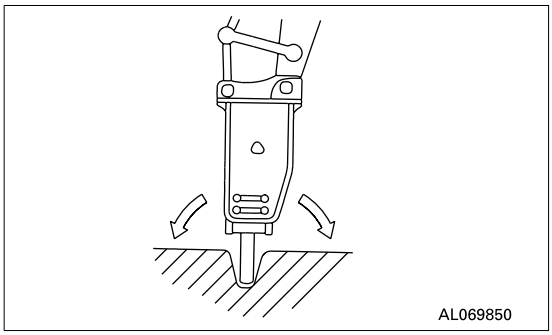
Moving the chisel while carrying out impacting operations



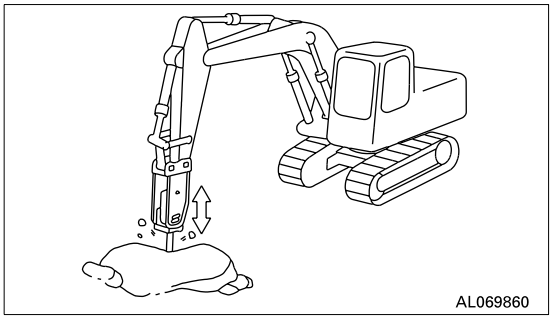
Holding the chisel horizontal or pointed up when carrying out impacting operations



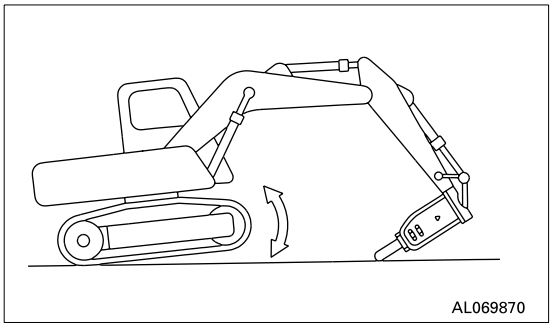
Twisting the chisel when it has penetrated the rock



Pecking operations

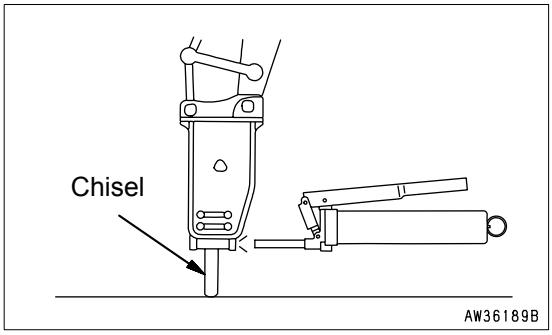


Extending the bucket cylinder fully and thrusting to raise the machine off the ground



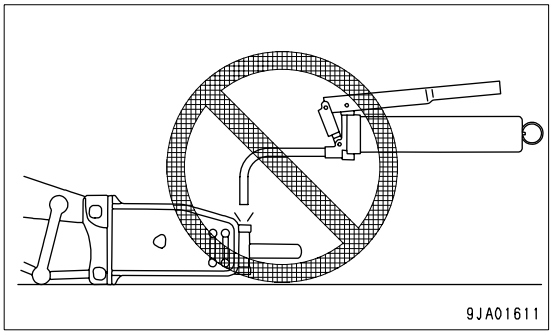
Greasing

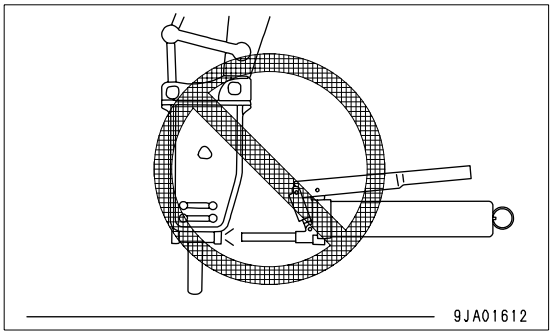
Supply grease in the correct position.



NOTICE

If the breaker is greased in an improper posture, it is filled with more grease than necessary. As a result, soil and sand will enter the hydraulic circuit and can damage the hydraulic components, while the breaker is in use. Therefore, be sure to grease the breaker, holding it in the right posture.





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