TEN00969-CA

Operation & Maintenance Manual

HYDRAULIC
EXCAVATOR

PC88MR-11

SERIAL NUMBERS C40001 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 near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

NOTICE

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

KOMATSU

Foreword

⚠ WARNING

Komatsu recommends that any service parts used for maintenance, repair or replacement of emission control systems be genuine new Komatsu or Komatsu approved parts or Komatsu approved rebuilt parts or assemblies or others parts of equivalent quality, and that the engine be serviced by an authorized Komatsu distributor. Failure to follow these recommendations could result in ineffective service, damage to the product, or safety risks (including serious personal injury or death).

In the United States, the owner may choose to have maintenance, replacement or repair of the emissions-related parts performed by a facility other than an authorized Komatsu distributor.

⚠ WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engines in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www. P65warnings.ca.gov/diesel

⚠ WARNING: This product can expose you to chemicals including lead, which is known in the State of California to cause cancer and birth defects or other reproductive harm.

For more information go to www. P65warnings.ca.gov.

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Foreword

This manual explains the operation, and the inspection and maintenance procedures necessary for the safe use of the machine. Most accidents occur by the failure to obey basic safety rules for the operation and maintenance of machines. Obey the precautions in the Operation and Maintenance Manual at all times.

Make sure that you know the work conditions in advance to prevent accidents caused by dangerous conditions.

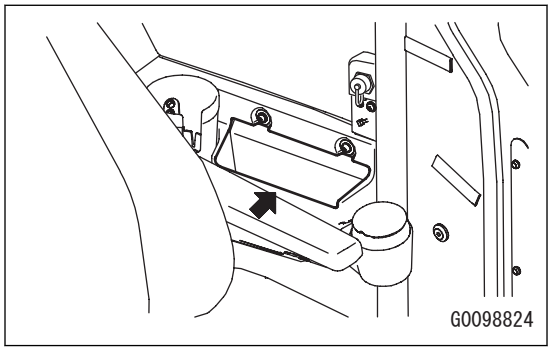
Komatsu cannot predict each circumstance that might involve a possible danger when the machine is used. The precautions and warning indications in the Operation and Maintenance Manual and on the machine cannot include all possible safety precautions.

Do operation, inspection, and maintenance of the machine on the user's responsibility if a situation is not included in the Operation and Maintenance Manual. Take the necessary precautions for safety. Make sure you avoid operations and procedures that are not allowed in the Operation and Maintenance Manual.

Read and understand all precautions and warnings in the Operation and Maintenance Manual and on the machine before operation, inspection, and maintenance. Obey all the contents. Failure to comply can cause serious personal injury or death.

If you operate the machine incorrectly, or do checks and maintenance incorrectly, it is dangerous. It can result in serious personal injury or death.

Keep the Operation and Maintenance Manual in the location shown on the illustration for all personnel to read.



If you are transferring the machine, make sure that the Operation and Maintenance Manual comes with the machine.

Komatsu supplies machines that conforms with all applicable rules and standards of the country to which it is supplied. If the machine is used in a country other than that of the shipping destination, there is possibility that it does not meet the safety device requirements and standards of that country. When you are not sure if your machine conforms to the standard and regulations in your country or region, consult your Komatsu distributor.

Explanations, values and illustrations in the Operation and Maintenance Manual are prepared with the latest information available on the date of publication. For up-to-date information about your machine or information contained in the Operation and Maintenance Manual, consult your Komatsu distributor.

Unit uses the International System of Units (SI). For reference, gravitational units are given in { }.

The numbers in illustrations refer to the numbers in ( ) in the text. For example, 1 is shown as (1).

When you consult your Komatsu distributor for questions or repair, tell them the information in "Machine Information (1-9)".

If the Operation and Maintenance Manual is lost or damaged, consult your Komatsu distributor.

Some of Komatsu machines have the software based on the Open Source Software (OSS).

By the license of the OSS, Komatsu publishes the license information of the software to be used in the website that follows.

https://www.komatsu.jp/en/ProductInfo/opensoft/

Some Komatsu machines have radio equipment certified by the type approval in each country.

Related information is available on the website below.

https://www.komatsu.jp/en/ProductInfo/radio-compliance

Safety Information

Make sure to obey the precaution and warning indications in the Operation and Maintenance Manual and on the machine to avoid personal injury in operation, inspection, or maintenance, and for the safety of the personnel around the machine.

In the Operation and Maintenance Manual or on the machine, the safety alert symbols are used to identify important messages.

Safety alert symbols show the risk of accidents that can cause serious injury or death. Obey the instruction of the safety alert symbol.

The signal words that follow are used to identify important safety messages in the Operation and Maintenance Manual or on the machine.

⚠ DANGER	Shows a very dangerous situation which, if not avoided, will result in serious injury or death.
⚠ WARNING	Shows a possibly dangerous situation which, if not avoided, can result in serious injury or death.
⚠ CAUTION	Shows a possibly dangerous situation which, if not avoided, can result in injury, or damage to the machine or the surrounding area.

The signal words that follow are used to tell you there is a possible danger that can cause damage to the machine.

NOTICE	Failure to follow the precautions results in damage to the machine or a personal injury or death.
REMARK	Shows useful information.

Introduction

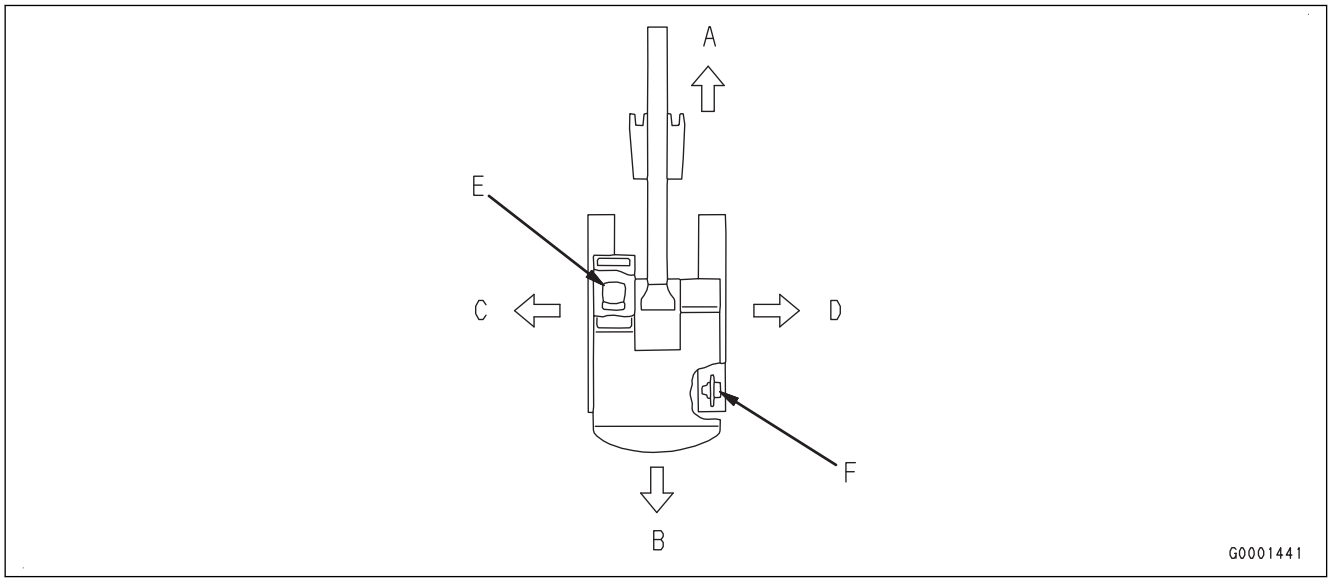
Main Application of the Machine

This machine is used mainly for the works that follow.

- Digging work
- Ditch work
- Loading work
- Leveling work
- Demolition work

For details of work procedure, see OPERATION, “Recommended Applications (3-177)”.

Directions of Machine



(A) Front
(B) Rear
(C) Left
(D) Right
(E) Operator's seat
(F) Sprocket

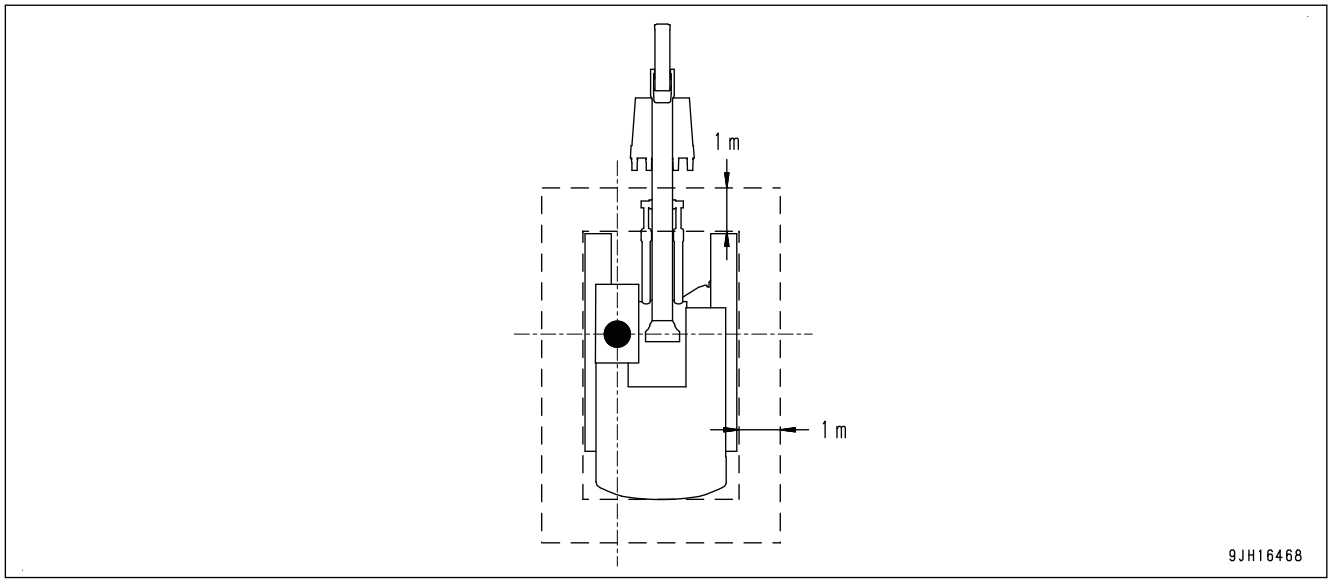
In the Operation and Maintenance Manual, the directions of the machine (front, rear, right, left) are based on the direction when operator in operator's seat views the direction of forward travel while the sprocket is at the rear.

Visibility from Operator Seat

The visibility of this machine required by visibility standards (ISO 5006) is shown as follows.

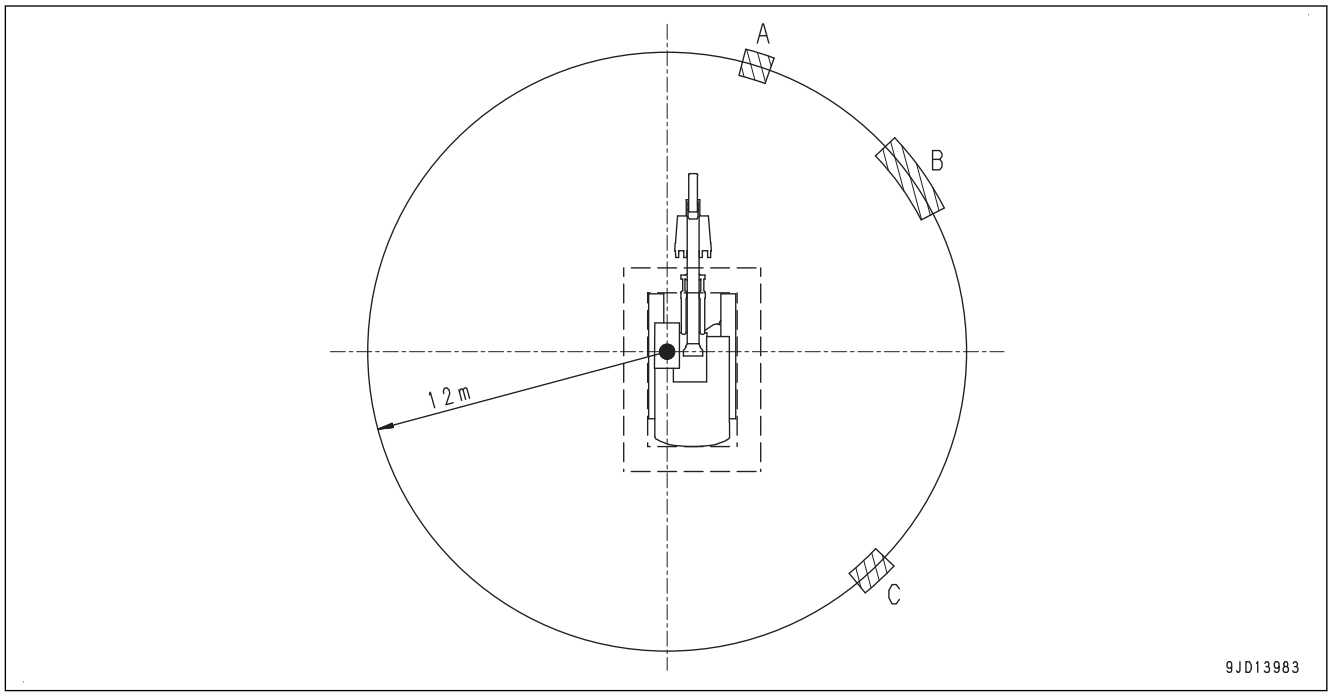
Proximity Visibility

The figure below shows a visibility at a spot 1m {3ft 3in} away from outside of this machine and 1.5m {4ft 11in} above the ground.



Circumference Visibility of 12m {39ft 4in}

The circumference visibility at a radius of 12m {39ft 4in} of this machine is as shown in the figure. The shaded area (A),(B), and (C) in the figure is blocked even when visibility aid devices such as mirrors are installed to the machine and adjusted adequately. Fully understand that there is an area where you cannot see during operation and operate the machine.



Protective Structures

This machine has a structure to protect the operator (ROPS) which conforms to ISO12117-2: 2008.

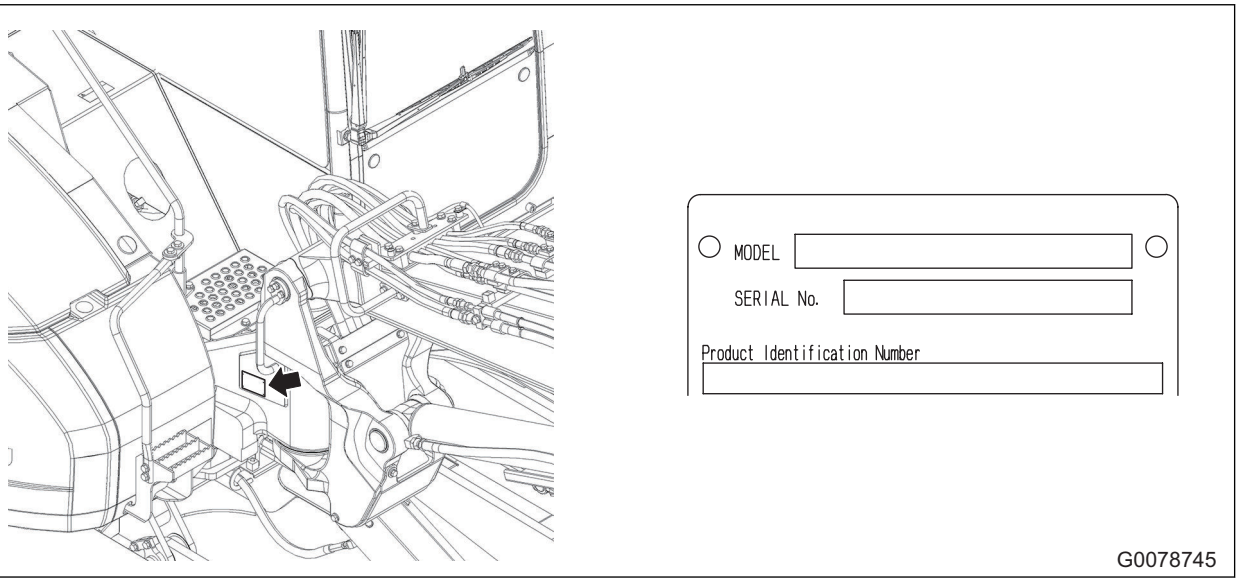
Machine Information

When you consult your Komatsu distributor for repair or replacement of parts, tell them the items that follow.

Location of Product Identification Number (PIN) and Machine Serial No. Plate

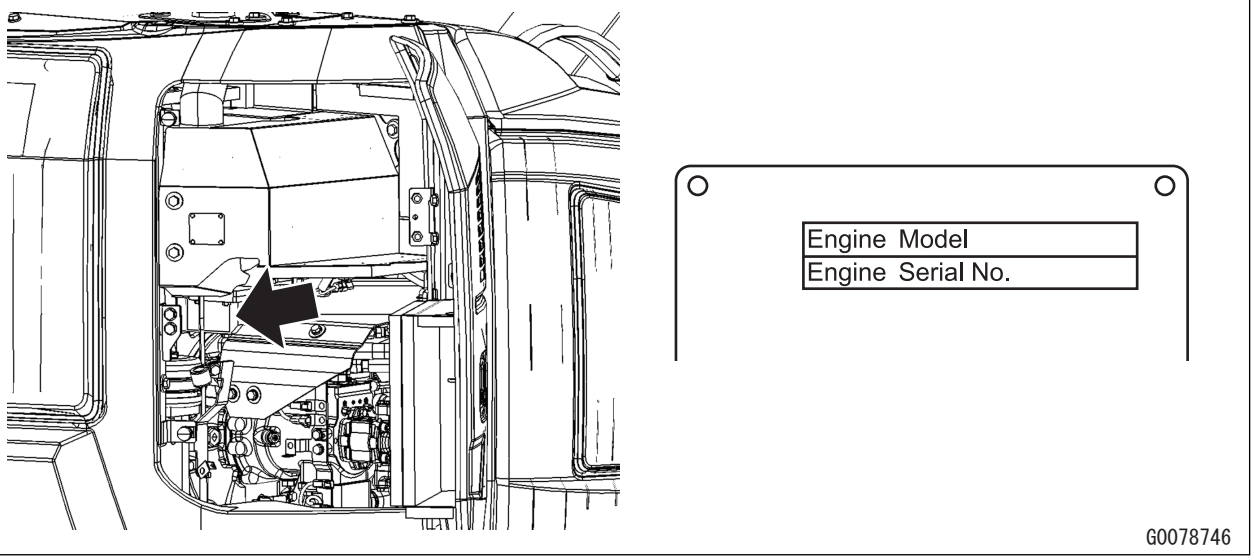
The nameplate is located at the position on the figure.

The design of the nameplate can be different by the district.



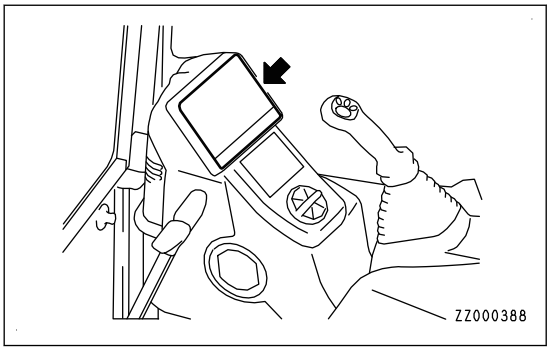
Location of Engine Number Plate

The nameplate is located at the position on the figure.



Service Meter Location

The service meter is shown on the machine monitor.



Your Machine Serial Numbers and Distributor

Machine serial No.	
Engine serial No.	
Product identification number (PIN)	
Distributor name	
Address	
Phone	
Service personnel	

Abbreviation List

- This list of abbreviations includes the abbreviations for functions, devices, and parts which are used in the operation and maintenance manual.
- Commonly used abbreviations are not included.
- Special abbreviations which are not shown frequently are included in the text as additional information.

List of Abbreviations Used in the Text

Abbreviation	Actual word spelled out	Explanation
API	American Petroleum Institute	API is the abbreviation for American Petroleum Institute.
BOC	Bolt-On Cutting edge	BOC is a cutting edge that is attached with bolts to the bucket.
CAN	Controller Area Network	CAN is one of networks that communicate between the machine monitor and controllers.
DEF	Diesel Exhaust Fluid	DEF is a urea solution that is used for the SCR system.
EGR	Exhaust Gas Recirculation	EGR is a function that recirculates part of exhaust gas to the intake side to control NOx emissions.
FOPS	Falling Object Protective Structure	FOPS is a structure that protects operators from falling objects.
GNSS	Global Navigation Satellite System	GNSS is a general term for satellite positioning systems.
GPS	Global Positioning System	GPS is one of satellite positioning systems.
IMU	Inertial Measurement Unit	IMU is a device that senses the angles (or angular velocity) and acceleration of the three axes.
KCCV	KOMATSU Closed Crankcase Ventilation	KCCV is a function that isolates oil from blowby gas in the engine and returns the blowby gas to the intake side.
KDOC	KOMATSU Diesel Oxidation Catalyst	KDOC is a device that purifies exhaust gas.
KDPF	KOMATSU Diesel Particulate Filter	KDPF is a device that is composed of the KCSF and KDOC, and catches soot (Particulate Matter, PM) in exhaust gas.
KOWA	Komatsu Oil and Wear Analysis	KOWA is a preventive maintenance service that collects and analyzes oil in the machine at the specified interval so that wear of the machine and other problems can be found at short time.
OPG	Operator Protective Guards	OPG is a structure that protects operators from falling objects.
PPC	Proportional Pressure Control	PPC is a function that controls the pressure of the hydraulic circuit in proportion to the degree of the lever operation.
PTO	Power Take Off	PTO is a mechanism that takes out the engine power.
ROPS	Roll-Over Protective Structure	ROPS is a structure that protects operators from falling objects or in the event of a machine roll-over.
SCR	Selective Catalytic Reduction	SCR is a device that purifies nitrogen oxides (NOx) in exhaust gas from the engine.
SOC	State Of Charge	SOC is the abbreviation for State Of Charge that is the charge rate to battery capacity shown on the liquid crystal panel of the battery charger.
TOPS	Tip-Over Protectuive Structure	TOPS is a protection structure that protects operators in the event of a machine tip-over.

Safety

⚠ WARNING

Fully understand the safety precautions which are shown in the Operation and Maintenance Manual and on the machine. Obey the precautions when you operate the machine and when you do the inspection and maintenance.

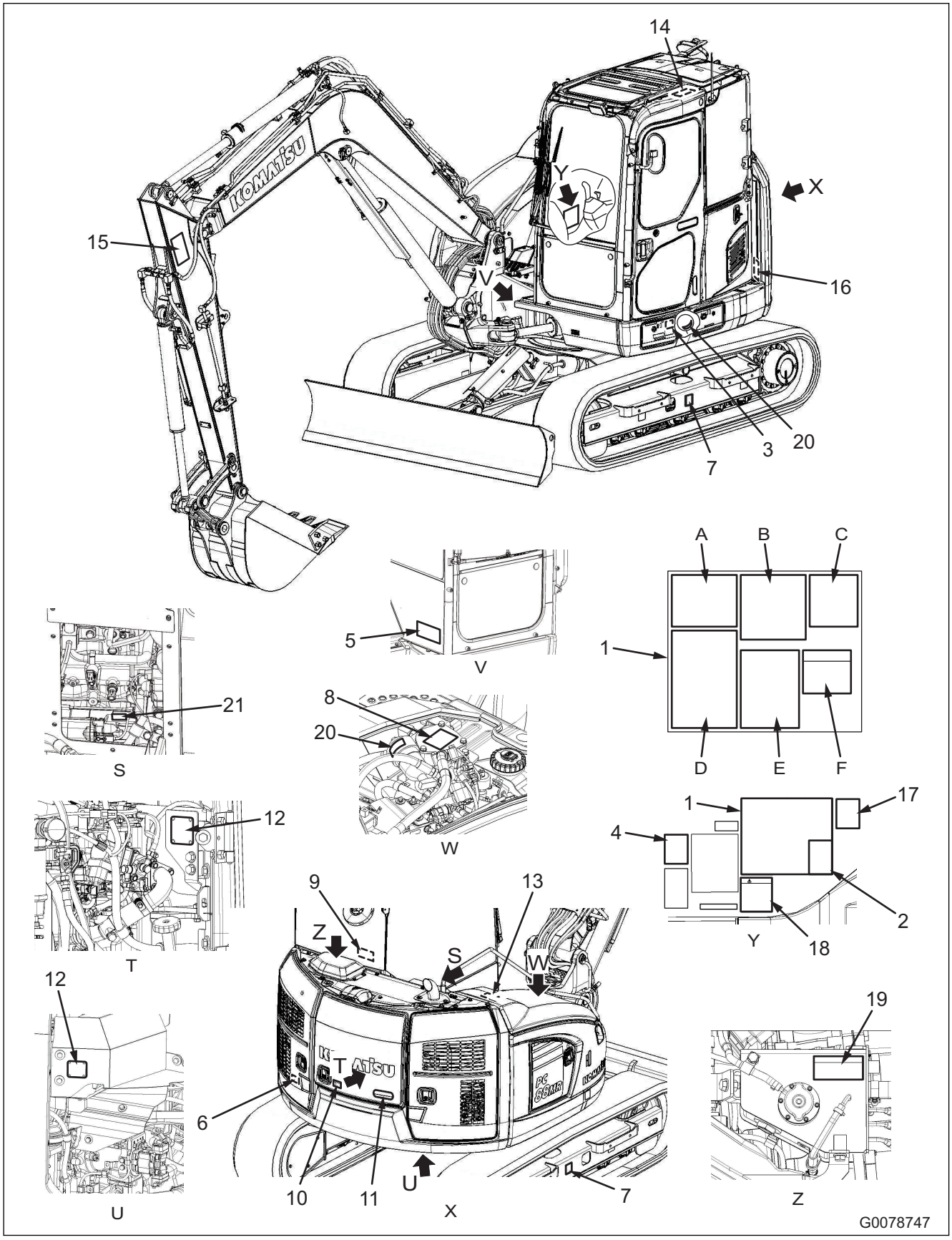
Safety Labels

Make sure you fully understand the content and how to avoid the danger shown on the safety labels. Remember where these safety labels are located.

Handle the safety labels used on this machine as follows.

- Always keep the safety labels clean to be read correctly. When you clean the safety labels, do not use the organic solvents or gasoline. These can cause the labels to peel off.
- If the safety label is damaged, or it cannot be found or read, replace it with a new one. For the part numbers for the safety labels, see Operation and Maintenance Manual or the actual label, and make an order to your Komatsu distributor.
- The warning and safety signs are not the only signs on the machine. Read and obey those signs also.

Location of Safety Labels



Contents of Safety Labels

1. Caution when leaving operator's seat, caution for operation, inspection and maintenance, caution when opening or closing front window, caution before operating, do not go close to high-voltage cables, caution for control pattern
   Safety labels that follow are integrated sticker. Make a request with 22P-00-21470 for replacement

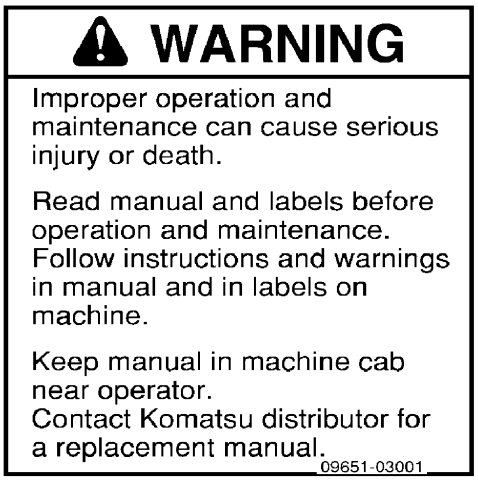
   (A) Caution when leaving operator's seat

   Part number: 09654-03001



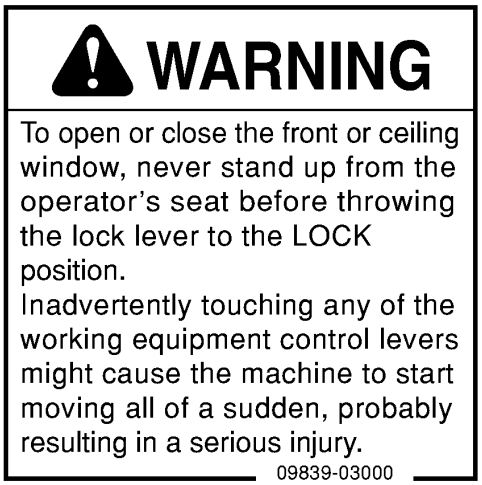
   (B) Caution for operation, inspection and maintenance

   Part number: 09651-03001



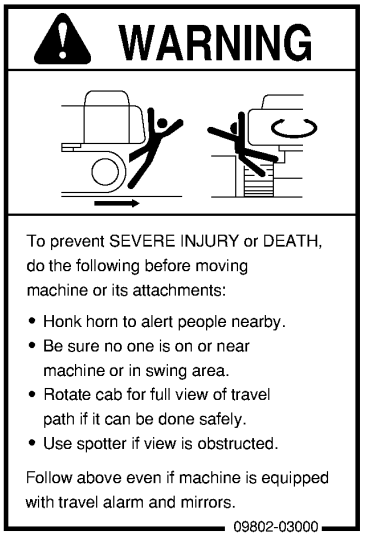
   (C) Caution when opening or closing front window

   Part number: 09839-03000



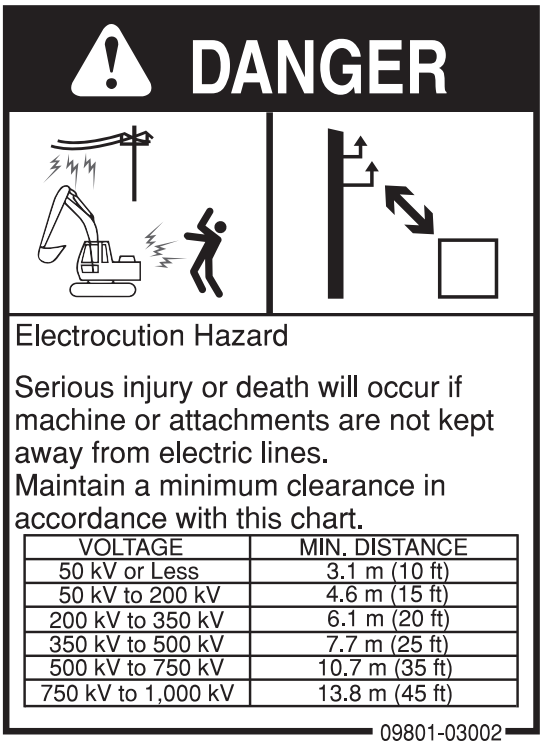
(D) Caution before operating

Part number: 09802-03000



(E) Caution for electric cables

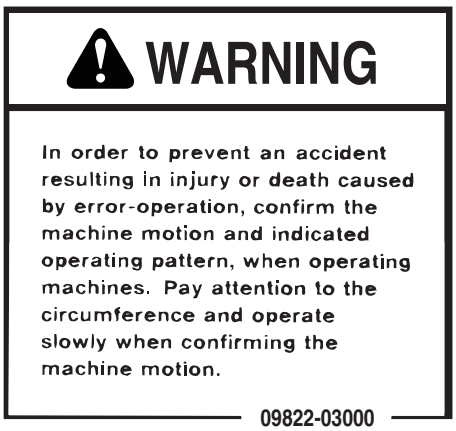
Part number: 09801-03002



(F) Caution for control pattern

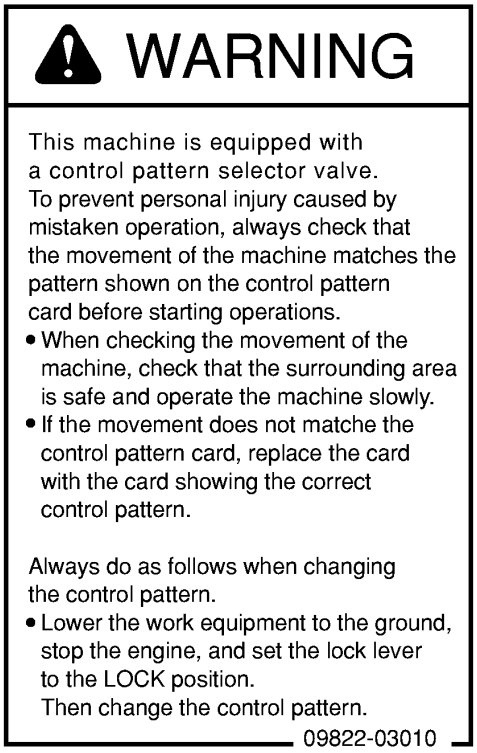
Standard machine

Part number: 09822-03000



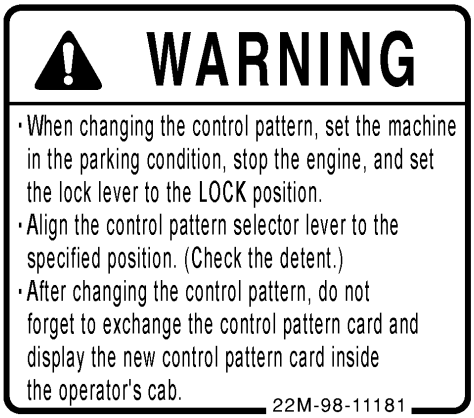
2. Caution for control pattern

   Machine with control pattern change-over valve
   Part number: 09822-03010



3. Caution when changing control pattern

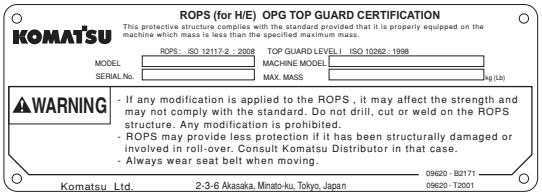
   Machine with control pattern change-over valve
   Part number: 22M-98-11181



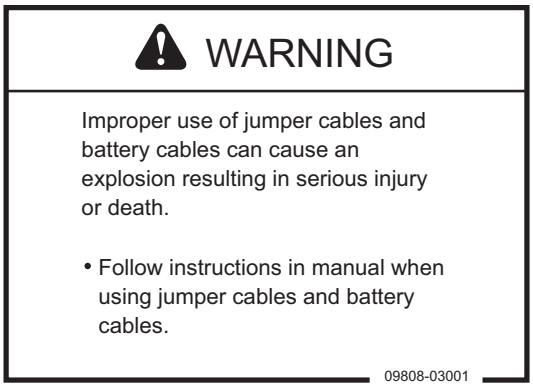
4. Caution when swinging and traveling in reverse
   Part number: 09833-03000



5. Caution for handling ROPS
   Part number: 09620-T2001, 09620-B2171



6. Caution for handling cable
   Part number: 09808-03001



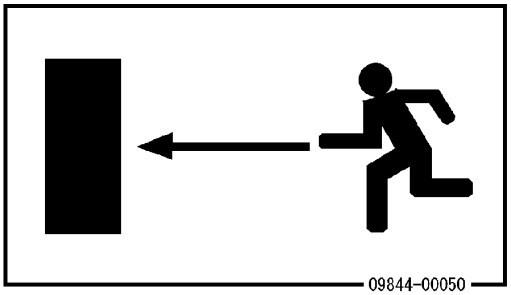
7. Caution for adjusting track tension
   Part number: 09657-03003



8. Caution for high-temperature oil
   Part number: 09653-03001



9. Emergency escape
   Part number: 09844-00050



10. Caution for rotating parts when you check and maintenance
    Part number: 09667-03001



11. Prohibition of entering into swing range
    Part number: 22N-98-51210



12. Caution against high temperature
    Part number: 09817-B0753
    - Sign indicates a burn hazard from touching heated parts, such as engine, motor, or muffler during or right after operation.
    - Never touch when hot.



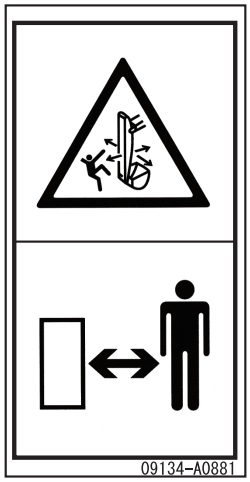
13. Prohibition of getting on or off cover
    Part number: 22P-00-11310



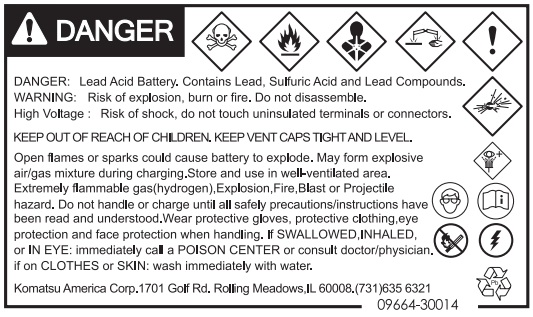
14. Caution when stowing front window
    Part number: 09803-03000



15. Caution for nearing machine
    Part number: 09134-A0881
    - Sign indicates a hazard of being hit by the working device of the machine.
    - Keep away from machine during operation.



16. Caution for handling battery
    Part number: 09664-30014



17. Caution for blast site
    Part number: 09845-13000



18. Caution for using seatbelt
    Part number: 09848-03000



19. Caution for high-temperature coolant
    Part number: 14X-98-78380



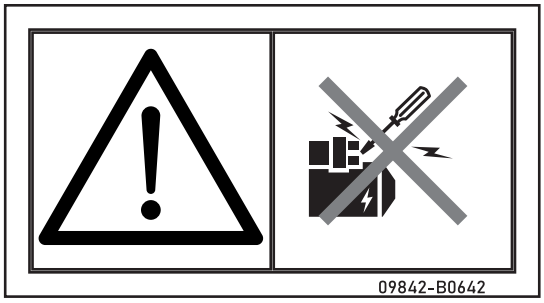
20. Caution for handling accumulator
    Part number: 09659-53000



21. Prohibition of start by short-circuiting

    Part number: 09842-B0642

    - Start the engine only while sitting on 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 personal injury or fire.



General Precautions Common to Operation and Maintenance

Incorrect operation, inspection and maintenance can cause serious personal injury or death. Read the description of the safety signs in this manual and on the machine before you do operation and maintenance, and obey the precautions.

Precautions Before Starting Operation

For Safety Operation

- Only the trained and authorized persons can operate this machine.
- When an authorized person do operation, inspection, and maintenance of the machine, make sure to follow all safety precautions and procedures described in this manual.
- Do not operate the machine if the operator is unwell, or under the influence of a medicine (which causes drowsiness), or alcohol, or has a mental issue.
- When the work is to be done with multiple workers or when a signalman is provided, make sure to share the details of the work and work under the prescribed signs.

Understand the Machine

Before you operate the machine, read this manual fully. If there is a content that you do not understand in this manual, consult the safety personnel.

Preparations for Safe Operation

Precautions for Safety-related Equipment

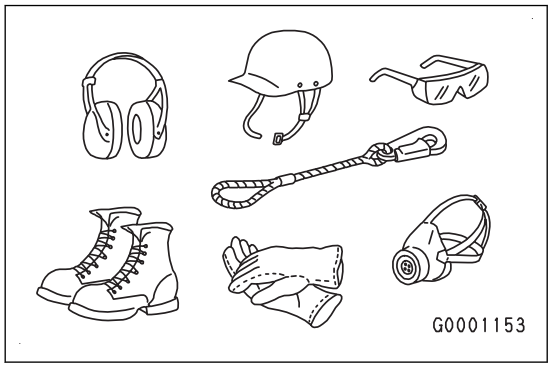
- Make sure that all protective guards, covers, cameras and mirrors are correctly installed. If it is damaged, repair it.
- Fully understand how to use the safety devices.
- Do not remove safety devices, and manage them always to get the correct function.

Inspect Machine

Check the machine before you start the machine operation. If a problem is found, do not operate the machine until repairs of the problem is completed.

Wear Well-Fitting Clothes and Protective Equipment

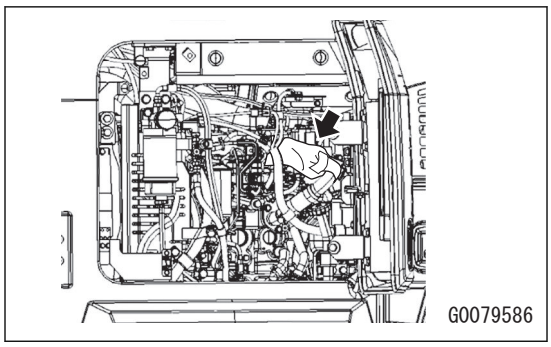
- Do not wear loose clothes and accessories. It can be hooked by the control lever and protrusion part, and there is a danger that the machine moves unexpectedly.
- Be sure to wear a hard hat and safety shoes. Wear the protective equipment like protective eyeglasses, masks, gloves, ear plugs, and personal fall-arrest equipment by the content of work.
- There is a danger that long hair sticks out of your helmet and get caught in the machine. Tie it up not to get caught.
- Check the function of each protective equipment before use.

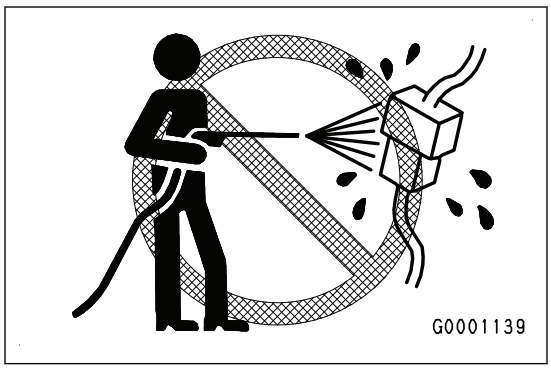


Keep Machine Clean

- If sand, soil, oil or grease is attached to the machine, your foot slips when you get on or off the machine and when you do inspection or maintenance of the machine. Wipe off sand, soil, oil, or grease attached to the machine always to keep the machine clean.
- If water directly gets on the engine, the engine can have failure. When you clean the machine with water or steam, be careful not to spray water directly onto the engine.

Cover the EGR valve not to spray water onto it when you wash the machine.





- If water gets in the electrical system, electric devices can have a malfunction and it can cause a failure of machine. There is a danger that causes serious personal injury or death if the machine moves unexpectedly by a malfunction. When you clean the machine with water or steam, be careful not to spray water directly onto the electric devices.
- There is a danger that splashed high pressurized water damages the camera. Be careful that high pressurized water is not splashed on it directly. When you clean the camera, wipe off dirt with soft cloth.
- If you stand on an unbalanced footing or you are in an unbalanced posture when you clean the camera, you can fall and be injured. Put a stepladder or step on the level and firm ground, and adjust the camera in a stable balance.

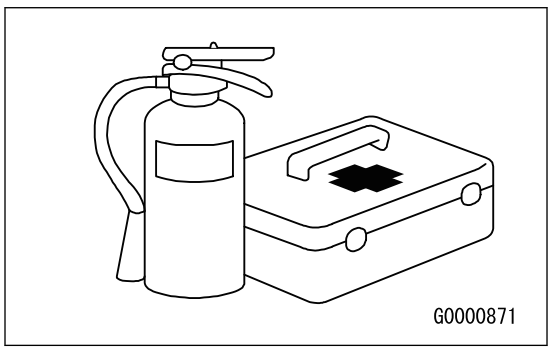
Precautions for Inside Operator's Compartment

- Before you go in the operator's compartment, remove the mud or oil or grease from your shoes.
  If you operate pedals with mud or oil or grease attached to your shoes, your foot slips and that can cause an accident.
- Do not let the parts and tools remain in the operator's compartment. If the parts and tools enter the operation devices, it prevents the operation and the machine moves unexpectedly, and there is a danger that causes serious personal injury or death.
- Do not install a suction cup on the window glasses. Suction cup can work as a lens, and it can cause fire.
- Do not use a mobile phone when you drive the machine or you operate the machine. This can lead to mistakes in operation, and cause serious personal injury or death.
- Do not get the dangerous objects such as flammable or explosive materials into the operator's compartment.

Supply Fire Extinguisher and First Aid Kit

To prevent serious personal injuries or death or fires, obey the items that follow.

- To prepare for the possibility of fires, check the location of the fire extinguisher and get full knowledge of its use.
- Regularly do inspection and maintenance of the fire extinguisher.
- Decide where to store the first aid kit. Check it regularly and add items if necessary.



Report Immediately If a Problem is Found

If you notice abnormality (sound, vibration, smell, instrument malfunction, smoke, oil leakage, and warning device or error display on the monitor) in the machine while you do operation, inspection, or maintenance of the machine, immediately report the responsible person, and take appropriate measures. Do not operate the machine until the problem is corrected.

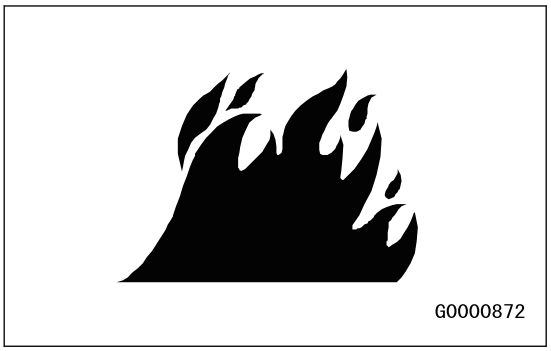
Actions if Fire Occurs

- Turn the starting switch to the OFF position to stop the engine.
- Use the handrails and steps to escape from the machine.
- Do not jump down from the machine. There is a danger that causes serious personal injury by fall.
- The combustion gas during a fire contains harmful materials which have a bad influence on your body. Do not breathe or inhale the combustion gas.
- In the unburned remaining left after a fire is extinguished, harmful compounds generated by the fire remains in some cases, and direct contact with skin has a bad effect to the human body.
  Wear rubber gloves always when you handle unburned remaining.
  Chloroprene rubber (neoprene rubber) or polyvinyl chloride (when the temperature is sufficiently low) is recommended for the material of the gloves.
  If you use the cotton gloves, wear the rubber gloves below them.

Precautions to Prevent Fire

Fire Caused by Fuel, Oil, Coolant, or Window Washer Fluid

Do not let an open flame be near flammable substances such as fuel, oil, coolant, or window washer fluid. There is a danger that they catch fire. Obey the items that follow.


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- Do not smoke or use flame near fuel or other flammable substances.
- Shut down the engine before you add fuel.
- While fuel or oil is added to the machine, stay near the machine.
- Tighten all the fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After you add fuel or oil, wipe up the spilled fuel or oil.
- Put the greasy rags and other flammable materials into a safe container and store it.
- When you wash the parts with oil, use a non-flammable oil. Do not use the diesel fuel or gasoline. There is danger that they catch fire.
- Do not weld or use a cutting torch to cut the pipes or tubes that contain flammable liquids.
- Keep the oil and fuel in the well-ventilated and the specified area and keep unauthorized persons away from there.
- Before you do the machine grinding or welding work, move the flammable materials to a safe area.

Fire Caused by Accumulated Flammable Objects

- Remove dry leaves, chips, pieces of paper, coal dust, or other flammable materials accumulated or stuck around the engine exhaust manifold, exhaust pipe, or battery, or on the inside of the undercovers.
- To prevent fires caused by sparks or burned particles from other fires, remove flammable materials such as dry leaves, chips, coal dust, or other flammable materials accumulated or stuck around the cooling system (radiator, oil cooler) or inside of the undercover.

Fire Caused by Electric Wiring

Short circuits in the electrical system can cause fire. Obey the items that follow.

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

Fire from Pipings

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

If they are loose, they can vibrate during operation and rub against other parts. This could lead to damage to the hoses and the high-pressure oil could spurt out. It can cause a fire and personal injury.

Explosion Caused by Light

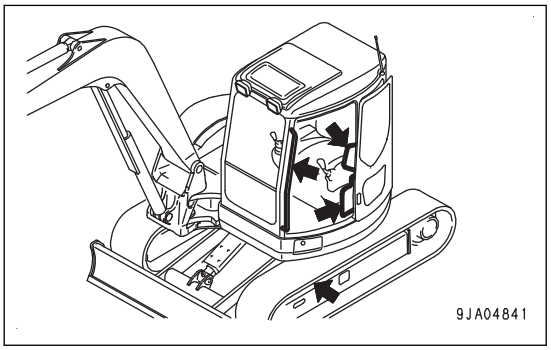
When you check the level of fuel, oil, battery electrolyte, or coolant, use the lighting which does not cause an explosion by vapor.

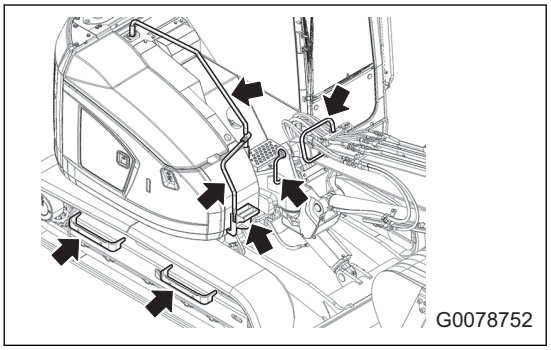
Precautions When You Get on or Off Machine

Use Handrails and Steps When You Get on or Off Machine

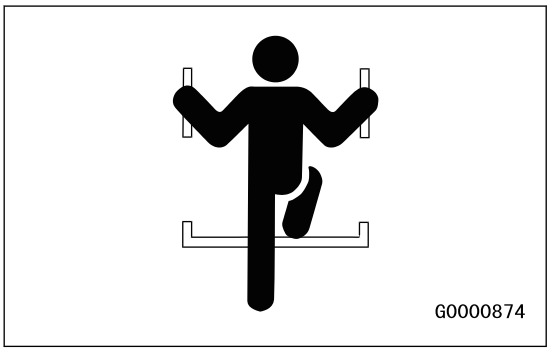
To prevent personal injury caused by slipping or falling off the machine, obey the items that follow.

- Use the handrails and steps marked by arrows in the figure when you get on or off the machine.





- Always face to the machine, and keep 3 points or more contact by your hands and feet (two feet and one hand, or two hands and one foot) with the handrails and the steps, to support yourself.
- Before you get on and off the machine, check the handrails and steps if there is no oil, grease, or mud on them. If it is found, wipe it off immediately not to slip. If there is a loose bolt on the handrail and step, tighten it.
  If the handrails and steps are damaged or deformed, they need to be repaired immediately. Consult your Komatsu distributor.



- Do not hold the control levers or lock levers when you get on or off the machine. When you get on or off the machine, be careful that your body or clothes do not touch the levers.
- Do not climb on the engine hood or covers where there are no non-slip pads.
- Do not get on or off the machine with tools in your hand.

No Jumping On or Off Machine

There is a danger that causes serious personal injury or death if you get on or off the moving machine. Obey the items that follow.

- Do not jump onto the machine or jump down from it. Do not get on the machine or get off from it while it is moving.
- Even if the machine starts moving while nobody is on board, avoid jumping onto the machine to stop it.

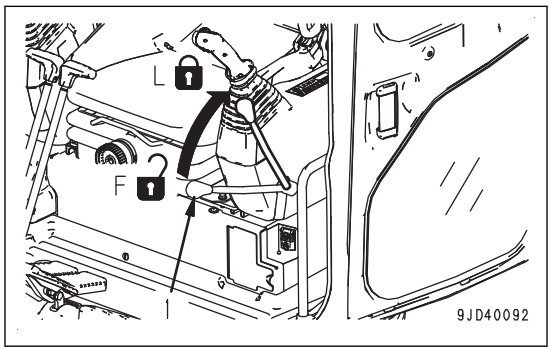
No People on Work Equipment or Attachments

Do not let a person stand on the work equipment or attachment. There is a danger of serious personal injury or death caused by such as falling down.

Precautions When You Stand Up from Operator Seat

Before you stand up from the operator's seat, such as when you open or close the front window or ceiling window, or when you remove or install the lower window, or when you adjust the position of the seat, always lower the work equipment to the ground, hold the red part on the top of the lock lever (1) to set it to the LOCK position (L), and stop the engine.

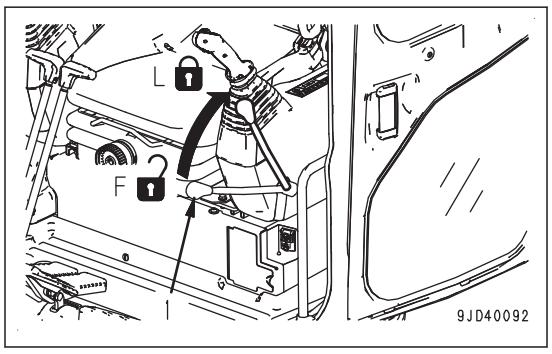
If you touch the control levers by mistake, there is a possibility that the machine suddenly moves and it could cause serious personal injury or death.

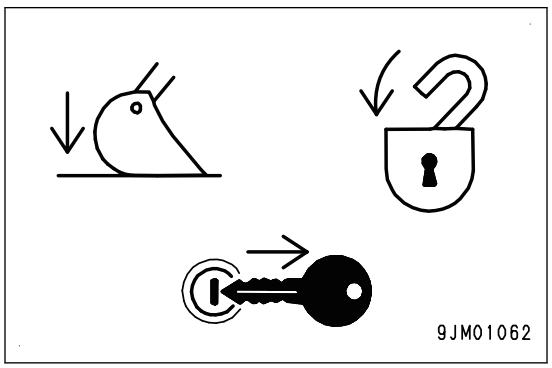


Precautions When You Move Away from Operator Seat

If the correct procedures are not done when you park the machine, the machine suddenly moves off by itself, and this can lead to serious personal injury or death. Obey the items that follow.

- When you go away from the machine, be sure to make the direction of undercarriage and upper structure the same, and lower the work equipment to the ground. Hold the red part on the top of the lock lever (1), securely operate it to the LOCK position (L), and stop the engine. Apply all the locks and be sure to take the key with you and keep it in the specified location.
- If the operator's seat and console are positioned at the front, your body or clothes will easily touch the levers. Move them rearward to keep a sufficient space, and then get off the machine.
- Apply all the locks and be sure to take the key with you and keep it in the specified location.





Emergency Exit from Operator Cab

- If you cannot open the door of the cab, use the hammer for emergency to break the window glass, and escape.
- When you escape, remove all the pieces of glass from the window frame. Be careful not to cut yourself on the glass. Not to slip on the broken pieces of glass, be careful of your footing.

Precautions for Machine and Jobsite

Do Not Get Caught

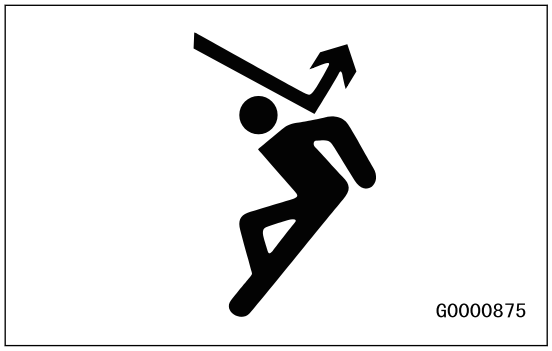
The clearance in the area around the work equipment changes by the movement of the link. There is a danger that causes serious personal injury or death if you get caught in it.

Do not allow anyone to come near all the rotating or telescopic parts.

Precautions Related to Protective Structures

The operator's cab is provided with a structure to protect the operator (e.g. ROPS, OPG). This structure absorbs the impact energy and protects the operator.

ROPS function cannot be guaranteed when the guaranteed load (listed on the nameplate) of ROPS is exceeded. Do not modify the machine or install attachments that increase the weight which exceeds the guaranteed load.

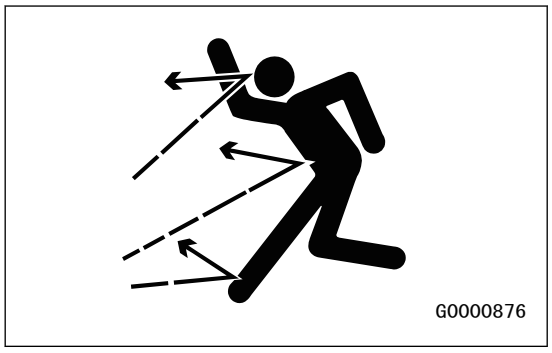


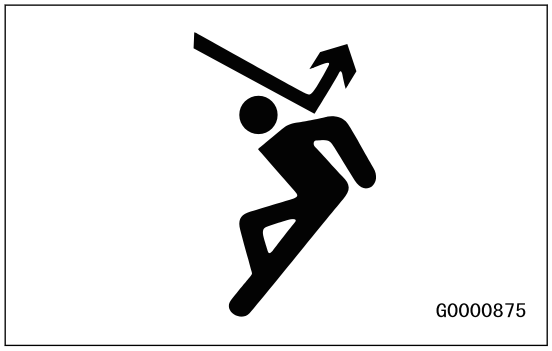
If the function of the structure to protect the operator is prevented, the operator is not protected and may be injured. Obey the items that follow.

- If the protective structure is fitted, do not operate the machine without the protective structure.
- If the protective structure is welded, or holes are drilled in it, or it is modified, its strength could be lowered. Do not do the modification.
- If the protective structures for operators are deformed by falling objects or due to tipping over of machine, the strength is reduced and the original performance cannot be maintained. In such case, be sure to consult your Komatsu distributor.
- Even if the protective structure is installed, it cannot be effective unless the seat belt is fastened correctly. Be sure to use the seat belt during the operation.

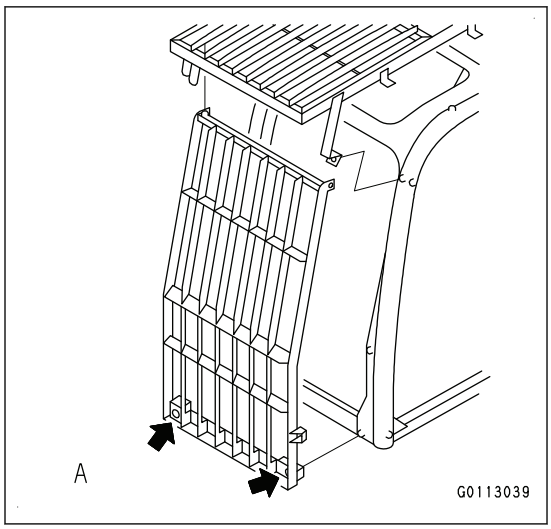
Protection Against Objects Which Fall, Fly, or Enter

On a jobsite where there is danger of falling objects, scattering fragments, or other objects that could intrude into operator's cab, installation of additional guarding to protect the operator that is appropriate for the working conditions is recommended.

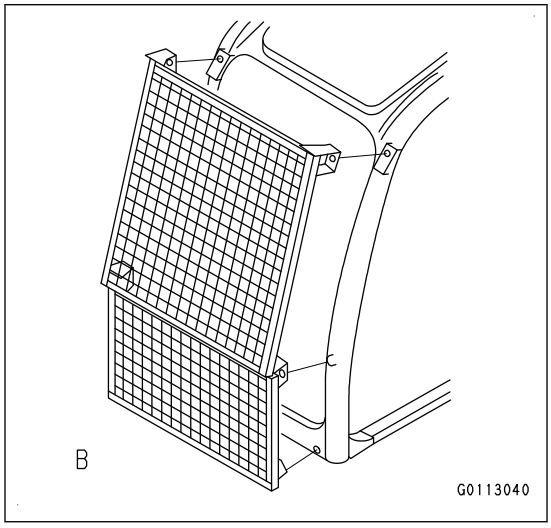




- When operating on jobsite, such as mines or quarries where there may be a hazard of falling rocks, installation of a falling object protective structure FOPS and a front guard (A) if recommended. Always keep all the windows and doors closed when operating. In addition, always check that there is no one except the operator in the surrounding area where there may be a danger of falling objects or scattering fragments.



- When using attachments that may create flying debris or scatter fragments, installation of a front window guard is recommended (B). The use of safety glasses by the operator is also recommended. For machines equipped with cabs, always keep the windows and door closed during operation. For machines equipped with open canopies, installation of a mesh front guard and polycarbonate protective sheet is recommended. In addition, always check that there is no one in the surrounding area where there could be a danger of falling objects or scattering fragments.
- Do not weld or drill holes in the machine cab protective structure when installing protective guards. Only use approved, existing mounting surfaces or bosses provided for guarding installation.



If any glass or polycarbonate protective sheets on the machine are broken or doors do not close properly, replace or repair them immediately.

Do not operate the machine without the necessary guards.

Above precautions are developed for the standard jobsite. Depending on actual jobsite conditions, installation of additional guards may be necessary.

Contact your local distributor for information on safety guards and / or recommendations to reduce the danger of getting hit by objects that could strike the operator’s cabin.

Unauthorized Modification

- Komatsu will not be responsible for personal injuries, machine failures, physical loss or damage, or influence on the environment because of modifications made without authorization from Komatsu.
- Consult your Komatsu distributor in advance because modification can cause a safety issue.

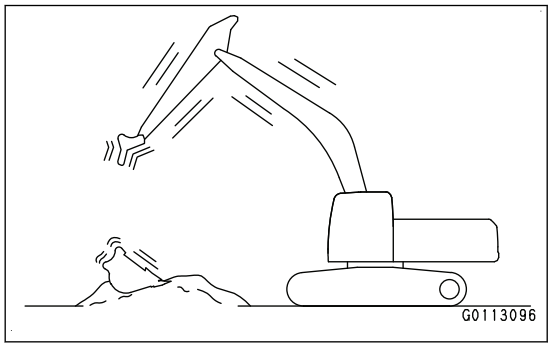
Precautions Related to Attachments and Options

When installing optional parts or attachments, always check local regulations governing their use, contact your local Komatsu distributor before installing if you have any questions. Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu. Any personal injuries, product failures, physical loss or damage, or influence on the environment resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.

- When installing optional parts or attachments, contact your Komatsu distributor for advice if you have any questions.

- The machine weight should not exceed ROPS certification rating as long as the optional attachments written in the attachment combination table of this manual are installed. When installing optional parts or attachments which are not written in this manual, the machine weight must not exceed the ROPS certification rating. Always contact your Komatsu distributor before installing.
- Installing certain attachment combinations may cause interference and possible damage to the operator's cab or other parts of the machine during operation and could cause serious personal injury or death. Before using unfamiliar attachments, always check for potential cab interference while operating the machine. Always ensure the operator's safety when working with unfamiliar work equipment.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

Quick Coupler Attachment



- Inspect all quick couplers to determine if they are subject to unexpected release hazards. Determine whether a manually installed locking pin and installation procedures have been provided by the manufacturer.
- Follow the manufacturer recommendations for maintenance and inspection of the quick coupler to prevent a malfunction of the quick coupler that could result in an unintended release of the attachment.
- Follow the manufacturer's installation procedures and recommendations on testing quick coupler attachments.
- Train and require all personnel to use and follow manufactures installation, use, safety and maintenance procedures when using a quick coupler attachment.

Large Attachments and Combinations

When using attachments that are larger than the standard excavating bucket, always be aware of the possibility that these attachments may come in contact with the operators cab when the work equipment is retracted for travel purposes or positioned close to the machine cab.

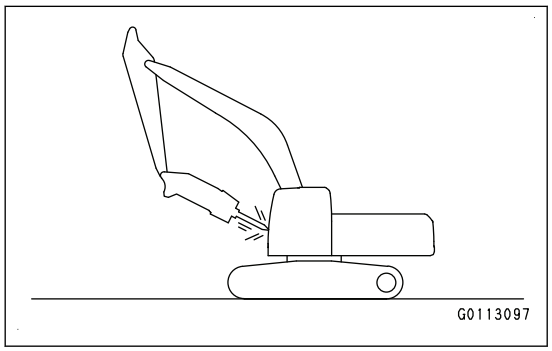
If you will be using a hydraulic breaker attachment, never dry fire or activate these attachments especially if they are oriented in the direction of the cab; the possibility of the tool bit ejecting from the breaker may damage the machine or injure the operator.

Depending on the type or combination of attachment, there is a danger that the work equipment may hit the cab or other parts of the machine.

Before using unfamiliar work equipment, review the manufacturer's work equipment safety and operation manuals and check for any potential operator cab interference and operate with caution.

Never operate attachment or bucket near cab of machine.

Always be aware when operating on slopes or traveling, that attachments may change the center of gravity on the machine and increase the possibility of a rollover situation.



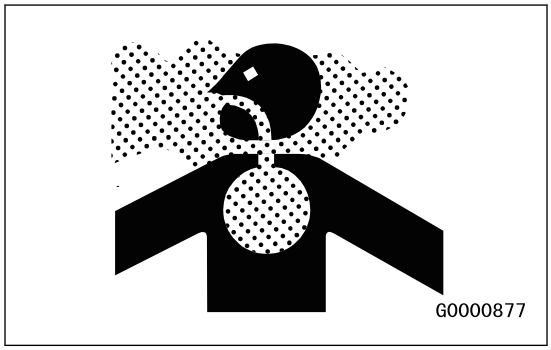
Precautions for Cab Glass

- If the cab glass is broken, stop the work and repair it immediately.
- If the cab glass on the work equipment side is broken, there is a danger that the operator can be directly hit or caught in the work equipment. Immediately stop the work and replace the glass.

- The ceiling window is made of resin, so if it gets scratched, the visibility will be deteriorated and the risk to get cracked will increase. Replace the damaged ceiling windows with new ones as soon as possible. If you do not repair the scratch, there is a danger that causes injury when the soil and sand fall onto the ceiling window and break the ceiling window.

Precautions When You Operate Engine Inside Building

Exhaust gas from engine contains ingredients that can cause injury in your health or cause death. Start the engine and operate the machine in a well-ventilated area. If it is unavoidable to operate the engine or the machine indoors or in a poor-ventilated area, make sure to exhaust the engine exhaust gas and take in sufficient clean air.



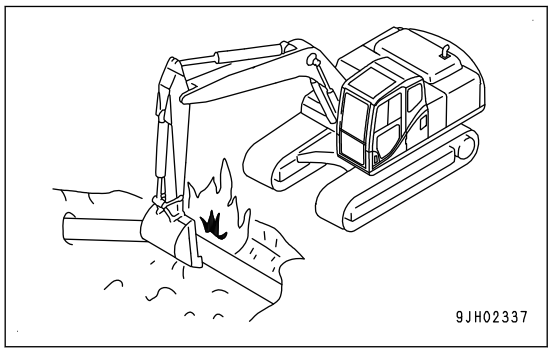
Precautions for Operation

Precautions for Jobsite

Examine Jobsite Conditions

In the jobsite, there are many dangers that could cause serious personal injury or death. Before you start the work, check the items that follow to make sure that there is no danger on the jobsite.

- When you do the work near thatched roofs, dead leaves, dead grass, etc., be careful because they easily can cause a fire.
- Find out the terrain and ground condition at the jobsite, and decide the safe way of work. Do not do the work on the jobsite where there is a danger of landslides or falling rocks.
- If there seemed to be buried objects such as water pipes, gas pipes, high-voltage pipes, consult the management company, check the location, and make sure not to destroy these buried objects.
- Take measures to keep the unauthorized persons away from the jobsite.
- Especially when you do the work on a road, allocate a signalman or install the fences around the jobsite to protect the pedestrian and vehicles.
- When you drive the machine or do the work in shallow water or soft ground, inspect the depth of water, the speed of water flow, the ground and topographical conditions in advance to avoid areas where the travel can be impeded.



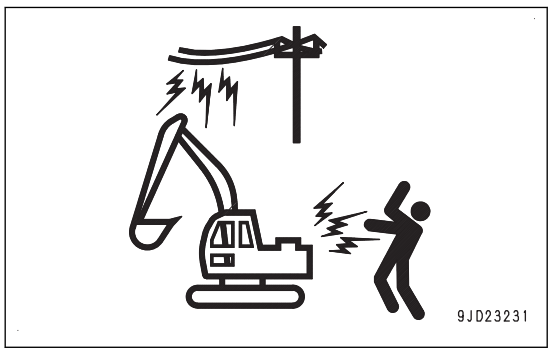
Precautions When You Work on Loose Ground

- Do not travel or work on the cliffs, road shoulders or near deep trenches. There is a danger that the ground is loose. There is a danger that the ground collapses because of weight and vibration of the machine and the machine tips over or fall. In particular after rain, earthquake, or blasting, be careful because the ground collapses easily.
- There is a danger that the ground collapses on the embankment or near the excavated trench because of weight and vibration of the machine. Before you start work, take measures to keep the ground safe and to prevent the machine not to tip over or fall.

Do Not Go Close to High-Voltage Cables

Do not move the machine or do the work near electric cables. There is a danger of serious personal injury or death by an electric shock. In the jobsite where the machine can come into contact with the electric cables, obey the items that follow.

- Tell the electric power company that the construction work will be done near the electric cables and consult the necessary measures.
- If the electric cable is a high-voltage cable, be aware that you can get an electric shock when you just go closer to it. Make sure to keep the safe distance shown in the Table when you do the work. Consult the electric power company about the voltage.



VOLTAGE	MIN. DISTANCE
50kV or Less	3.1m {10ft} or more
50kV to 200kV	4.6m {15ft} or more
200kV to 350kV	6.1m {20ft} or more
350kV to 500kV	7.7m {25ft} or more

VOLTAGE	MIN. DISTANCE
500kV to 750kV	10.7m {35ft} or more
750kV to 1000kV	13.8m {45ft} or more

- In case of emergency, wear rubber-soled shoes and rubber gloves, and lay a rubber sheet on the operator's seat, and make sure that your body parts not protected by rubber etc. do not touch the machine body.
- Allocate a signalman to keep the machine away from the electric cables.
- To prevent electric shock, do not allow unauthorized person to approach the machine when you work near high voltage wires.
- If the machine came near or touched the electric cables, to protect the operator from electric shocks, keep the operator seated until the electricity is shut off. Keep other persons away from the machine.

Make Sure of Good Visibility

Although this machine has the equipment that assists your visibility such as a mirror or camera, there are some parts that cannot be seen from the operator's seat, so be very careful when you operate.

There is a danger that causes serious personal injury or death if you drive the machine or do operation in a place where visibility is bad, because you cannot check an obstacle around the machine or state of the work site. When you drive or operate the machine in the site where the visibility is bad, obey the items that follow.

- If the visibility is not sufficient, allocate a signalman as needed.
- The signalman who gives signals must be one person.
- In dark area, turn on the working lamp and headlamp installed to the machine, and add lighting facilities to make the site brighter if necessary.
- If the visibility is bad because of mist, snow, rain, or dust, stop the work.
- Clean the mirror which is installed to the machine when you do the check before starting, and adjust the range of view to secure the visibility.
- When you clean the camera, wipe off dirt with soft cloth. Make sure that the image is clear on the monitor. If you stand on an unbalanced footing or you are in an unbalanced posture when you clean the camera, you can fall and be injured. Put a stepladder or step on the level and firm ground, and adjust the camera in a stable balance.

Check Signs and Signalman's Signals

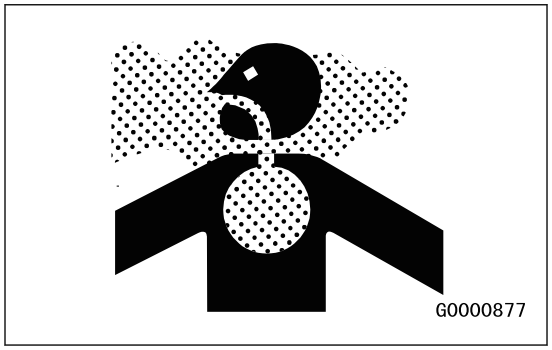
If signals and signs are not clear, there is a danger of serious personal injury or death caused by the machine that slips, tips over, and contacts with the obstacle or persons around the machine. Obey the items that follow.

- Provide the signs to let the operator recognize the soft road shoulder or ground. If the visibility is not sufficient, assign a signalman as needed. The operator must pay attention to the sign and follow the instructions of the signalman.
- The signalman who gives signals must be one person.
- All workers must understand the meaning of all signals and signs.

Be careful of Asbestos Dust

There is a danger of lung cancer if you breathe air which contains asbestos dust. There is a danger that you breathe the asbestos particles on the jobsites where demolition work is done or the industrial wastes are handled. Obey the items that follow.

- Sprinkle water over the ground not to let the asbestos scatter in the air.
- Do not use the compressed air.
- Workers must do the work on the windward if the machine is operated at the jobsite where there is a danger of asbestos dust.
- Workers must wear the dust masks.



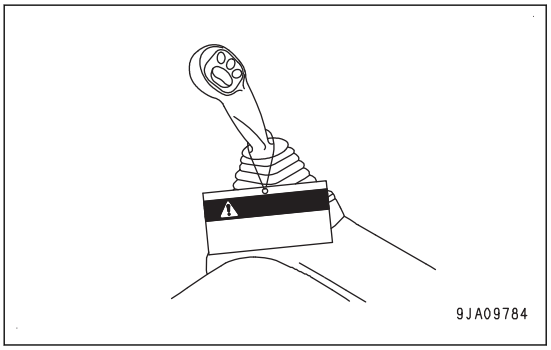
- Outsiders must be away during the work.
- Obey the rules related to the jobsite and environmental standard.

This machine does not use asbestos, but there is a danger that non-genuine parts contains asbestos in some cases. Use our genuine parts.

Start Engine

Use Warning Tags

If “DANGER! Do NOT operate!” warning tag is shown, the machine is under inspection and maintenance. There is a danger that causes serious personal injury or death if you get caught in rotation part or movable part of the machine when you ignore the warning tag and operate the machine. Do not start the engine. Do not touch levers.

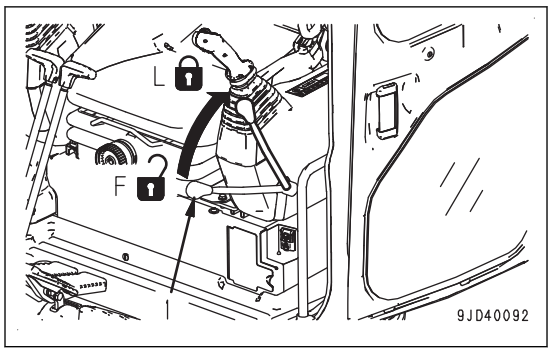




Checks and Adjustment Before You Start Engine

Before you start the engine, check the items that follow and make sure that there is no problem to operate the machine. If these checks are not done, a bad influence is given to machine operation. There is a danger that serious personal injury or death is caused.

- Remove all dirt from the surface of the window glass to keep a good view.
  When you clean the right window, use a tool such as a mop.
- Do the walk-around check securely by “Walk-Around Check (3-110)”.
- Remove all dirt from the surface of the lens of the headlamps and working lamps, and make sure that they light up correctly.
- Check the coolant level, fuel level, oil level in the engine oil pan, the clogging of the air cleaner, damage of the electric wiring, etc.
- Check the battery terminals for looseness or corrosion.
- Make sure that there is no mud or dirt accumulated around the movable parts of pedals, and that the pedals work correctly.
- Adjust the operator's seat to a position where it is easy to do the operations, and make sure that there is no damage or wear to the seat belt or mounting hardware.
- Make sure that the gauges work correctly, check the angle of the mirror, and make sure that the control levers are all at the NEUTRAL position.



- Before you start the engine, make sure that the lock lever (1) is in the LOCK position (L).
- Adjust the mirrors to the position that you can see the rear of the machine easily from the operator's seat.
  For the adjustment, see “How to Adjust Mirrors (3-125)”.
- Adjust the cameras to the angle that you can see the area around the machine easily from the operator's seat.
  For the adjustment, see “How to Adjust Rearview Camera Angle (3-128)”.
- Adjust the armrest to a position for easier operation, and then fix it securely. If you operate the machine in an unbalanced posture, mistake in operation can occur, and it can cause serious personal injury or death.
  For the adjustment, see “Adjust Operator Seat (3-122)”.
- Make sure that there is no person or obstacle above, below, or around the machine.

Precautions When You Start Engine

There is a possibility that the machine starts suddenly, and it can cause serious personal injury or death. Obey the items that follow.

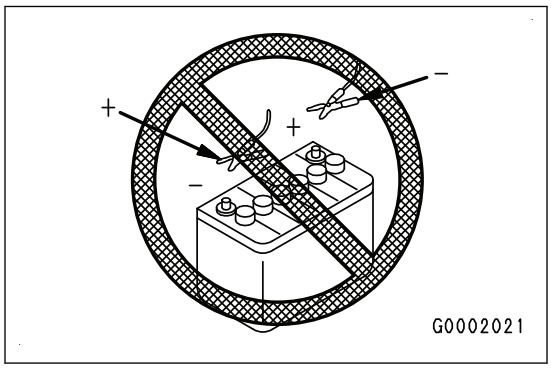
- When you start the engine, be sure to sit on the operator's seat.
- Before you start the engine, make a horn sound to give a warning.
- Do not allow anyone other than the operator to ride on the machine.
- Do not start the engine by short circuit of the engine starting circuit. Serious personal injury or death or fire can be caused.

In Cold Weather

- If the work equipment is operated without sufficient warming-up operation of the machine, there is a possibility that the response of the work equipment to the movement of the control lever and the control pedal becomes slow, and that the work equipment cannot respond to the operator's desires. So be sure to do the warm-up operation. Especially in cold weather, be sure to do the warm-up operation sufficiently.
- When battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a danger that the battery will catch fire and explode.
  Before you charge the battery or start with another power supply, thaw the battery electrolyte and make sure that there is no leak of battery electrolyte.

Start Engine with Jumper Cables

If a mistake is made in the method to connect the jumper cables, it can cause the battery explosion, so be sure to obey the items that follow.



- Be sure to wear the protective eyeglasses and rubber gloves when you start the engine with the jumper cables.
- When you connect a normal machine to a failed machine with the jumper cables, be sure to use the normal machine with the same battery voltage as the failed machine.
- When you start the engine with the jumper cables, do the startup operation with 2 workers (one worker sits on the operator's seat and the other handles the battery).
- When you use other machine for the start-up operation, be careful that the normal machine does not touch the failed machine.
- When you connect the jumper cables, turn the starting switches of the failed machine and the normal machine to the OFF position. If the failed machine has a battery disconnect switch, set it to the OFF position, and then set it to the ON position again after the cables are connected.
  For details of operation of the battery disconnect switch, see “Battery Disconnect Switch (3-106)”.
  It is dangerous that the machine possibly moves when the power is connected.

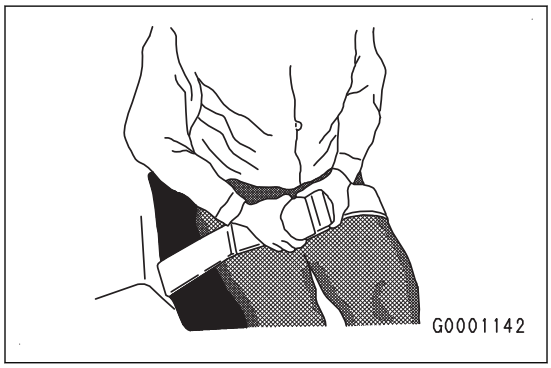
- Be sure to connect the positive (+) terminal first when you connect the jumper cables. Disconnect the negative (-) terminal (ground side) first when you disconnect them.
- Do not let the clips touch other clips or the machine when you disconnect the jumper cables.
- For the procedure to start the machine by the jumper cables, see OPERATION, “Start Engine with Jumper Cables (3-243)”.

Precautions for Operation

Checks Before Operation

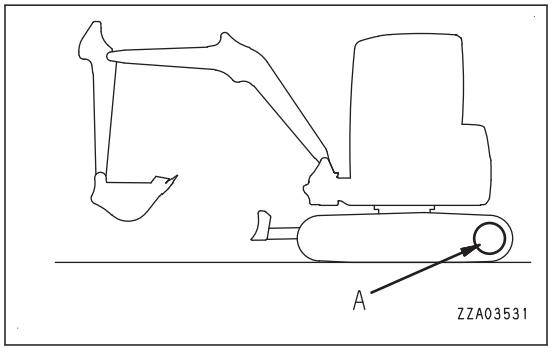
If the check before starting is not done, the machine performance will not be fully used, and there is a danger that causes serious personal injury or death.

Do the inspection in a large area where has no obstacle, and be very careful around the machine. Keep persons away from near the machine.



- Be sure to fasten the seat belt. There is a danger that operator is thrown out from the operator's seat and gets personal injury when brake is applied suddenly.
- Check that the movement of the machine agrees with the display on the control pattern card. If it does not match, immediately replace the control pattern card with a correct one.
- Check that the machine, work equipment, travel, and swing are operated correctly.
- Check that sound, vibration, heat, smell is normal, and there is no abnormality in instrument, oil leakage, fuel leakage.
- Repair the failed part always when an abnormality is found.

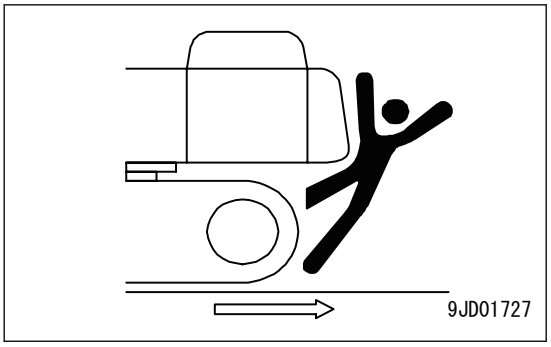
Precautions When Machine Travels Forward and Reverse, or Swings

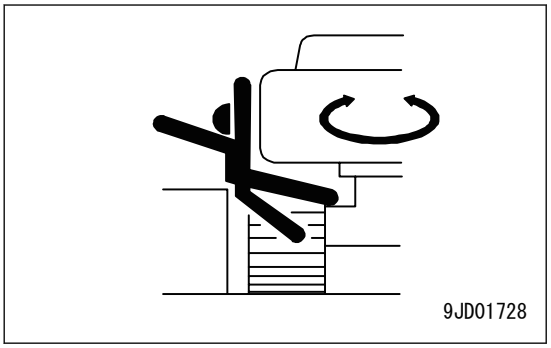


- Make the sprocket (A) be on the rear side before the machine travels. If the sprocket (A) is on the front side, the actual travel direction becomes opposite to travel lever operation. It is very dangerous and can cause serious personal injury or death because the machine will travel in the incorrect direction unexpectedly.
- All the windows and doors at the cab must be fixed securely whether they are opened or closed.
  In the jobsite where there is a danger of objects that fly on or go in the operator's cab, close all the windows and doors.
- Do not allow anyone other than the operator to ride on the machine.

- If persons are in the area around the machine while it travels or swings, there is danger that they will be hit or caught by the machine, and this can lead to serious personal injury or death. Before you drive the machine or do the swing operation, obey the items below.
  - When you operate the machine, be sure to sit on the operator's seat.
  - Before you move the machine, check again that there is no person or obstacle around the machine.
  - Before you operate the machine, make a horn sound to give a warning to persons around the machine.
  - Make sure that the travel alarm operates normally.
  - If there is an area in the rear of the machine which cannot be seen, allocate a signalman. Drive or swing the machine carefully and slowly not to have the accidental contact.

Obey the above precautions even for the machines with mirrors and cameras.

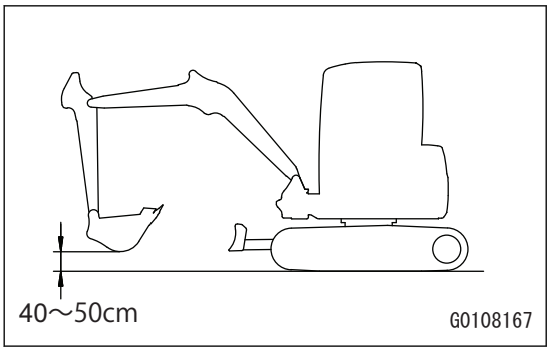


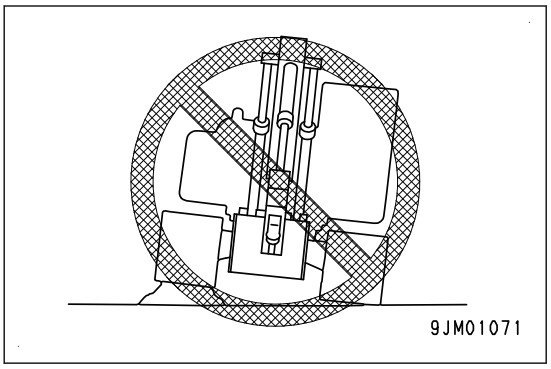


Precautions When You Travel

There is a danger of serious personal injury or death caused by that the machine falls over while it travels, or a person gets in contact with the machine. Obey the items that follow.

- To prevent accident, keep a sufficient distance from persons, constructions, and other machines while you operate the machine.
- When the machine travels on a level ground, keep the work equipment at 40 to 50cm {15.7 to 19.7in} above the ground. If that height is not kept between the work equipment and the ground, there is a danger that the work equipment touches the ground and the machine falls over.
- If you have bad visibility on the right side, raise the boom to make sure that you have good visibility.
- When you drive the machine on rough terrain or on steep slopes, make sure to turn the auto decelerator switch off (release). If it is in the ON (operation) state, the engine speed can increase and the speed can suddenly increase.
- Do not ride over the obstacles. If the machine needs to ride over an obstacle, keep the work equipment near the ground and drive the machine at low speed. The machine falls over easily in the lateral direction. Do not drive it over obstacles which make the machine tilt largely in the lateral direction.
- When the machine travels on rough ground, drive the machine at low speed not to let the machine fall over, and avoid sudden direction change. If the work equipment touches the ground, the machine could lose the balance, and there is a danger that the machine and the structure around it are damaged.





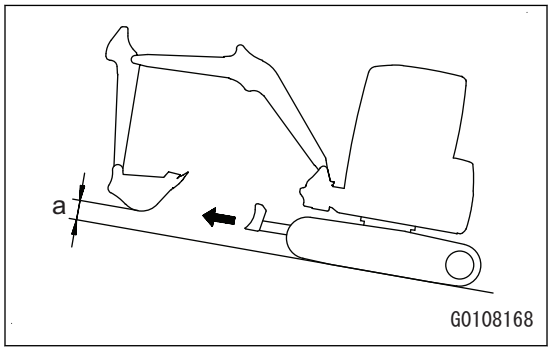
- When you use this machine, to prevent the machine tipping over by overload, and accident by damage of the work equipment, do not use the machine to the level that exceeds the allowable performance such as the maximum allowable load specified by structural reason.
- Before the machine goes over the bridges or the constructions, check that they are sufficiently strong to support the weight of the machine.

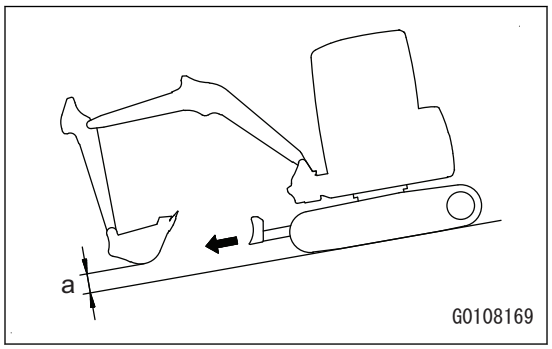
- When you operate the machine in such areas where height is limited as in tunnels or buildings or below bridges or below electric wires, operate it slowly and be very careful not to let the machine and work equipment touch anything.
- For the machine with blade, raise the blade before the travel when you do not do the leveling work.

Precautions When You Travel on Slopes

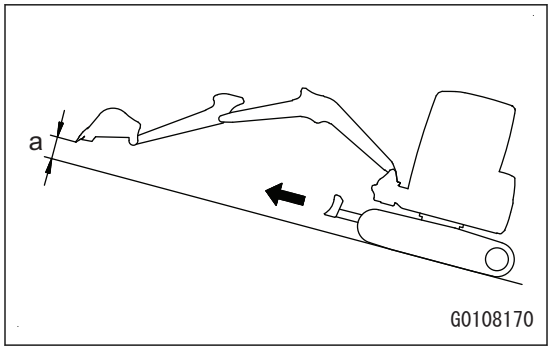
To prevent unexpected falling over and sideways slip, obey the items that follow.

- Hold the work equipment at the height (a) of 20 to 30cm {7.9 to 11.8in} above the ground to be able to lower the work equipment to the ground and stop the machine immediately in case of an emergency.
- When the machine goes the uphill, let the work equipment point to the uphill side, and when it goes the downhill, let it point to the downhill side. Make sure the condition of the ground below the undercarriage is safe, and move the machine carefully.

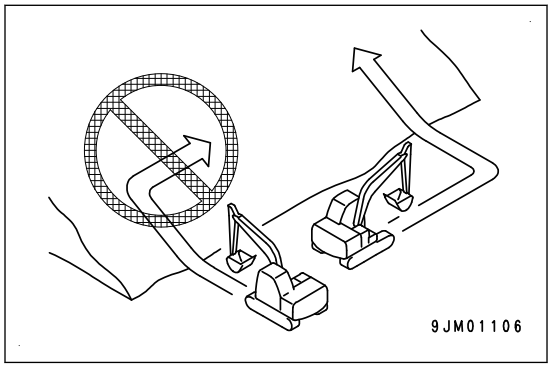




- When the machine travels up on a steep slope, extend the work equipment forward to improve the balance, keep it at the height (a) of 20 to 30cm {7.9 to 11.8in} above the ground, and travel at low speed.



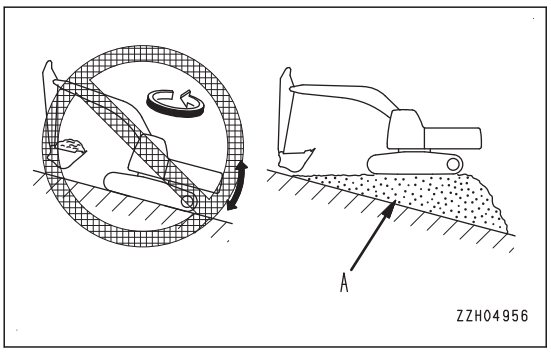
- When you drive the machine on downhill, lower the engine speed, move the travel lever to near the NEUTRAL position, and drive it with low speed.
- Move the machine straight to the slope. Do not move the machine diagonally across the slope, or travel in a horizontal direction. It is very dangerous.
- On a slope, do not steer the machine or do not go across the slope. If you need to change the direction, move the machine to the level ground and find other path.



- Do not travel on the slope covered with the iron plates. Even a slight slope is slippery and it is very dangerous.
- Set the travel speed as low as possible on the grasses and fallen leaves. Even a small-angle slope is slippery and dangerous.
- If the engine stops, move all control levers to the NEUTRAL position immediately, set the lock lever to the LOCK position, and start the engine.

Precautions When You Operate Machine on Slopes

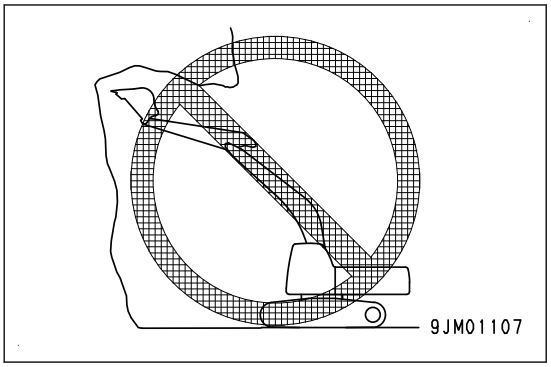
- If you do swing operation or the work equipment operation on a slope, there is a danger of a serious personal injury or death when the machine loses its balance and tips over. Keep a stable area for operations, and do the work very carefully.
- Do not swing toward the root side when the bucket is loaded with soil because there is a danger that the machine tips over.
- If you cannot avoid the work on a slope, make embankment (A), etc. before you start the work, to create a level and solid scaffold for the machine not to tip over.
- Do not do the work at the slope covered with the steel plates. Even a slight slope is slippery and it is very dangerous.



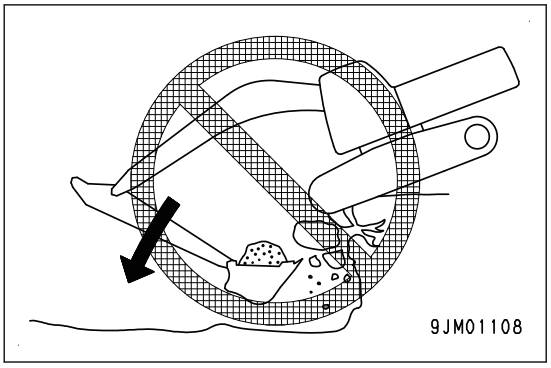
Prohibited Operations

There is a danger of serious personal injury or death if the machine tips over or fall, or the ground at the jobsite breaks or object of demolition work collapses. Obey the items that follow.

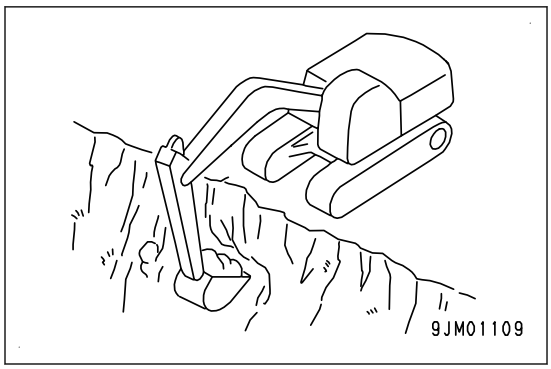
- If the work is done at the bottom of a cliff, there is a danger of landslide or falling rocks. Do not excavate at the bottom of a cliff.



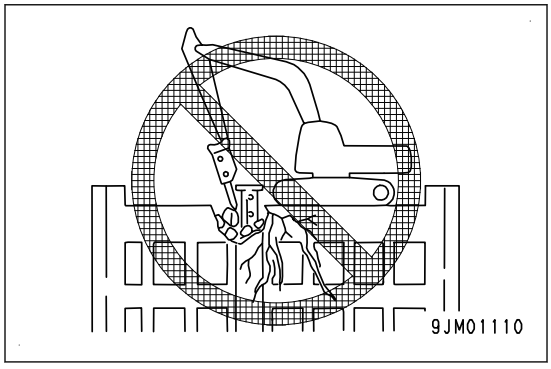
- Do not excavate too deeply below the front of the machine. The ground below the machine can break and cause the machine to fall.



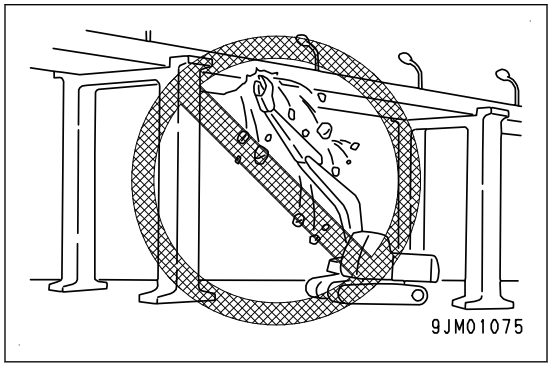
- When you operate the machine near the cliff or road shoulder, do the work with the tracks at a right angle to the cliffs and shoulders and the sprocket at the back for quick evacuation in case of emergency.



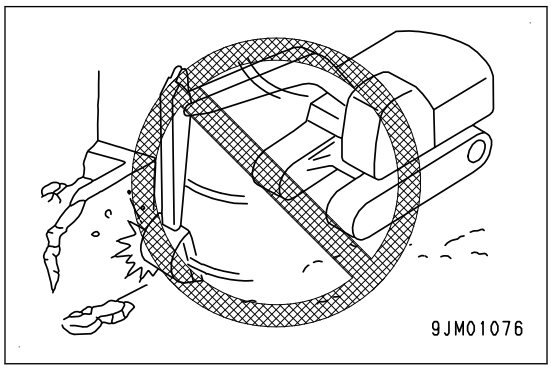
- Do not do demolition of the ground below the machine because there is a danger that the ground becomes unbalanced and the machine falls.



- Do not do demolition overhead when you do demolition work. Serious injury or death can be caused since the broken pieces can fall or the building can break.



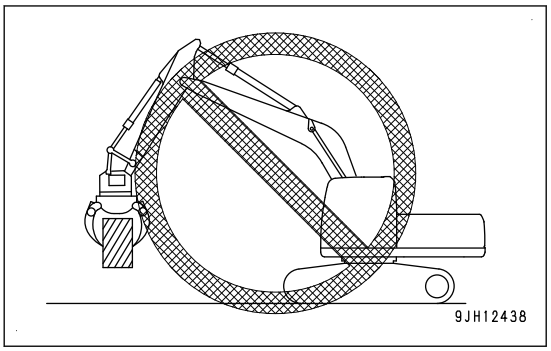
- Do not crush the object with the work equipment because there is a danger that causes serious personal injury or death by scattered crushed material, damaged work equipment, or falling of the machine by reaction of the hit.



- Do not let the bucket go over above the operator's head or operator's seat of the transportation machine such as a dump truck. There is a possibility that soil drops and bucket hits the machine. These can cause the serious injury or death in some cases.
- When the work is done on top of the structure such as a building or from above, check the strength and the structure before you start the operations. Serious injury or death can be caused by the broken building or structure.
- In general, the machine is more likely to tip over when the work equipment is in the lateral direction than it is in the longitudinal direction against the forward and reverse direction of tracks.
  Be very careful when the machine swings sideways from the longitudinal position while a load is applied to the work equipment. There is a danger that the machine falls over.

- There is a danger that the machine becomes unbalanced and tips over when heavy attachment (such as demolition crusher) is used. Obey the items that follow not only on a slope but also on a level ground.
  - Do not swing suddenly. Do not lower the work equipment suddenly. Do not stop the work equipment suddenly.
  - Do not suddenly extend or retract the boom cylinder. The shocks can cause the machine to fall over.
- Do not do the work such as pinching with the tip when do the work with fork or grapple.

  Object is easy to slip and fall, and there is a danger that it damages the machine or causes serious personal injury or death.



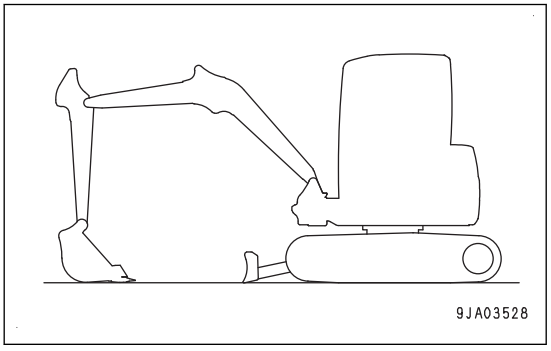
Precautions When You Operate on Snow or Frozen Surfaces

- Snow-covered or frozen surfaces are slippery, so be careful when you drive or operate the machine, and avoid sudden lever operations. Machine can slip even on a slight slope. Be especially careful when you do the work on slopes.
- Frozen road becomes soft when the temperature increases. Be careful because there is a possibility that the machine can fall over or you cannot escape from the machine.
- It is dangerous that the machine goes into deep snow. The machine can fall over or become buried in the snow. Be careful not to go off the road or to get trapped in a drift of snow.
- In the snow removal work, the road shoulder and objects along the road are buried in the snow and cannot be seen. Be careful because there is a risk of a fall or a collision.

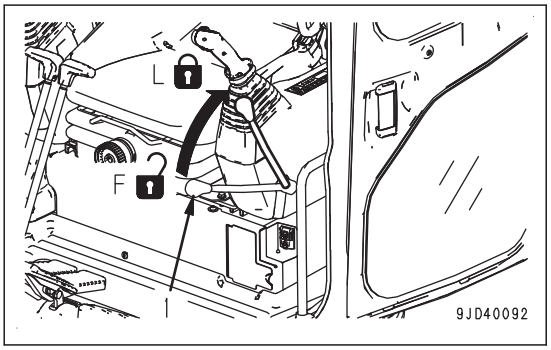
Precautions When You Park Machine

Unexpected movement of the parked machine can cause serious personal injury or death. Obey the items that follow.

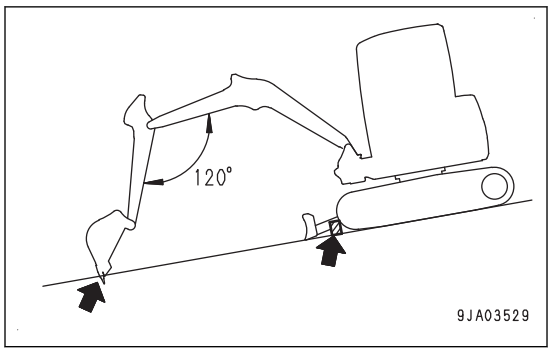
- Park the machine on a firm and level ground.
- Select an area where there is no risk of landslides, falling rocks, or flooding.
- Lower the work equipment to the ground.



- When you go away from the machine, be sure to make the direction of undercarriage and upper structure the same, and lower the work equipment to the ground. Hold the red part on the top of the lock lever (1), securely operate it to the LOCK position (L), and stop the engine.
- If the operator's seat and console are positioned at the front, your body or clothes will easily touch the levers. Move them rearward to keep a sufficient space, and then get off the machine.
- Be sure to close the operator's cab door, and apply all the locks. Remove the key not to let an unauthorized person move the machine, and keep it in the specified area.



- If you need to park the machine on a slope, obey the items that follow.
  - Make the work equipment on the downhill side and dig it into the ground.
  - Block the tracks not to move.



Precautions for Transportation

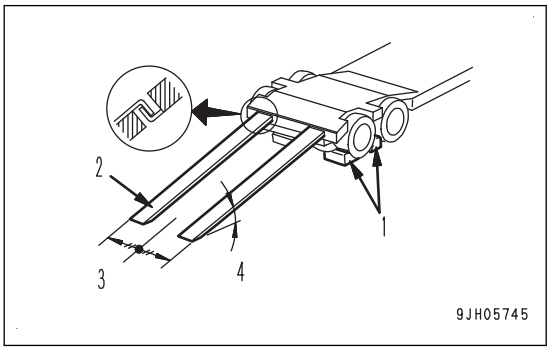
When you transport the machine, there is a risk of serious personal injury or death because of accident during the transportation. Obey the items that follow.

- The machine weight, transportation height, and overall length are different by the work equipment and option that is installed to the machine. Check it carefully.
- Before you determine the transportation route, check that the bridges or the constructions the machine goes over can bear the weight of the transporting vehicle and the machine.
- The disassembly of this machine can be necessary for the transportation by each related law and regulation. When you transport the machine, consult your Komatsu distributor.

Precautions When You Load and Unload

If you handle the machine incorrectly when you load or unload the machine, it is dangerous that the machine can turn over or fall. It requires special attention. Obey the items that follow.

- Load or unload the machine on a firm and level ground only. Avoid road edge or area near the cliff.
- Do not use the work equipment to load or unload the machine. There is danger that the machine can turn over or fall.
- Be sure to use the ramps that have sufficient length, width, and strength. Set the ramps not to be moved or dropped.
  (1) Chock
  (2) Ramp
  (3) Center of ramp
  (4) Angle of ramp: Max. 15°



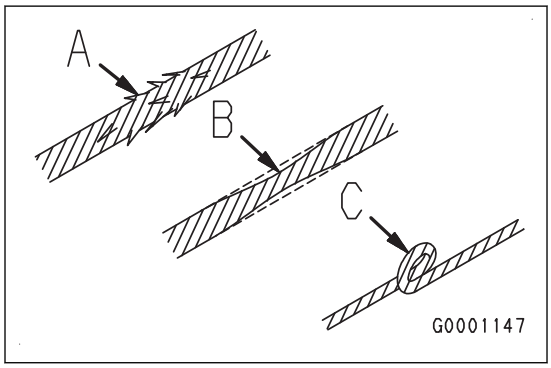
- To prevent the machine slip, be sure the surfaces of ground, ramps, and loading platform are free of grease, oil, ice, and water, etc. If any, remove them. Remove mud off from the undercarriage of the machine. Especially on a rainy day, be very careful as they are slippery.
- Be sure to turn off (cancel) the auto-deceleration switch. If you operate the machine while the auto-deceleration switch is turned on (activated), there is danger that the engine speed suddenly increases, the machine suddenly moves off, or the machine travel speed becomes faster.
- Set the engine speed to low idle, and drive the machine slowly.
- When the machine is on the ramps, do not operate the lever other than travel levers (travel forward and reverse).
- Do not correct your steering on the ramps. If necessary, drive off the ramps onto the ground, correct the direction, and then go onto the ramps again.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the loading platform, and there is a danger that the machine loses its balance. Drive the machine slowly over this point.
- When you load or unload the machine on an embankment or platform, make sure that it has sufficient width, strength, and grade.
- When you swing the upper structure on the loading platform, lower the work equipment, retract it, and do the operation slowly since the footing is not stable.
- Be sure to fold the mirrors and stow the radio antenna.
  For the machines with cab, be sure to lock the door after the machine is loaded. The door can be open during transportation.
- When it is necessary to remove the handrails and steps, be careful not to lose the removed handrails and steps.
  Install the removed handrails and steps securely.

Precautions for Towing

Precautions for Towing and Being Towed

In the towing and being towed operation, a mistake in the selection of the wire rope or towing bar or towing procedure can cause personal injury or death.

- Make sure that the towing wire rope and towing bar have the strength at least 1.5 times the working weight of the machine to be towed.
- Do not use a wire rope which has breaks in the strands (A), the reduced diameter (B), or the kinks (C). There is a danger that the rope can break during the towing operation.
- Wear the leather gloves always when you handle the wire ropes.
- Do not do the towing operation on a slope.
- During the towing operation, do not stand between the towing machine and the towed machine.

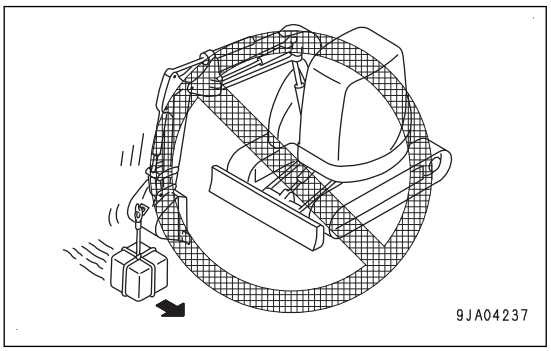


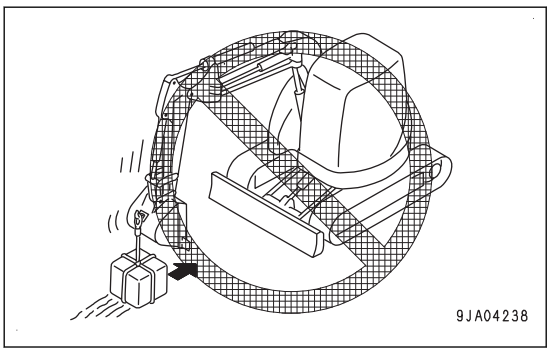
Lifting Operation by Bucket with Hook

Precautions for Lifting Operations

There is danger that a lifted load falls down or the machine falls over. It can cause serious personal injury or death. Obey the items that follow.

- Do not do the lifting work on slopes, soft ground, or other areas where the machine is not stable.
- Use wire rope that agrees with the specified standard.
- Make the signals to be used and give a signalman in the location.
- Do not let a worker go in the area where there is danger of contact with a lifted load or the danger from a falling load.
- It is dangerous if a lifted load hits the person or structure. When you do the swing operation or the work equipment operation, make sure that the area around the machine is safe.
- Do not start, swing, or stop the machine suddenly. The lifted load possibly swings, and it is dangerous.
- Do not use the work equipment or swing to pull the load. There is danger that the hook can be damaged and the load can come off. The reaction at this time can cause personal injury.
- Do not go away from the operator's seat while the load is lifted.





Precautions for Maintenance

Precautions Before You Start Inspection and Maintenance

Show Warning Tag During Inspection and Maintenance

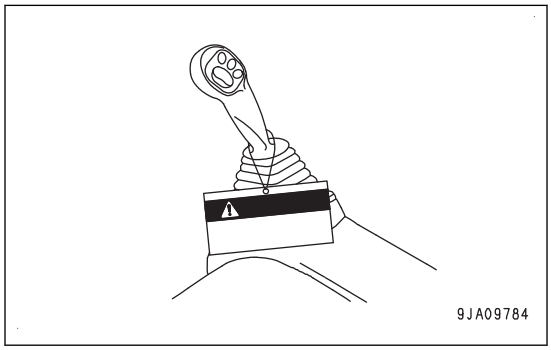
During the inspection and maintenance, “DANGER! Do NOT operate!” warning tag must be shown.

If “DANGER! Do NOT operate!” warning tag is shown, the machine is under inspection and maintenance. There is a danger that causes serious personal injury or death if you get caught in rotation part or movable part of the machine when you ignore the warning tag and operate the machine. Do not start the engine. Do not touch levers.

Show the warning tags around the machine where it is necessary.

Warning tag part number 09963-03001

Store this warning tag in the tool box when it is not used. If there is no tool box, store it in the pocket for Operation and Maintenance Manual.





Keep Work Place Clean

- Put away tools, and hammers which can be obstacle for work, wipe off slippery objects such as grease and oil, and clean and organize the work place for workers to work safely. If the workplace is not organized, there is a danger of personal injury if you tip over or slip with cluttered tool.
- Use water only to clean ceiling windows that use organic glass (polycarbonate), not organic solvents. The use of organic solvents such as benzene, toluene and methanol causes chemical reactions such as dissolution or decomposition, which deteriorates the polycarbonate.

Select Suitable Place for Inspection and Maintenance

- Stop the machine on a firm and level ground.
- Select an area where there is no risk of landslides, falling rocks, or flooding.

Only Authorized Personnel

When you do maintenance, there is a danger that serious personal injury or death occurs if unauthorized persons touch the machine. Do not let unauthorized persons come close other than necessary workers. Allocate a personnel as needed.

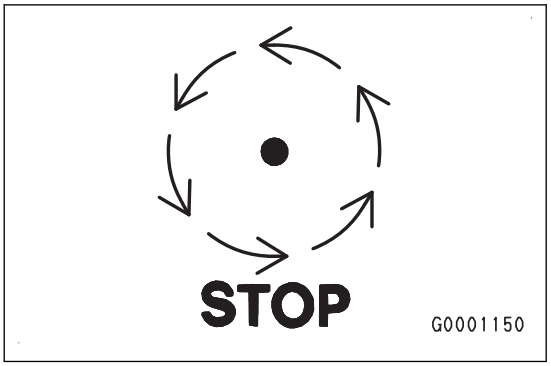
Assign Leader When You Work with Others

When you repair the machine or remove or install a work equipment, assign a person who will direct the work and follow its instructions to prevent personal injury because of being caught.

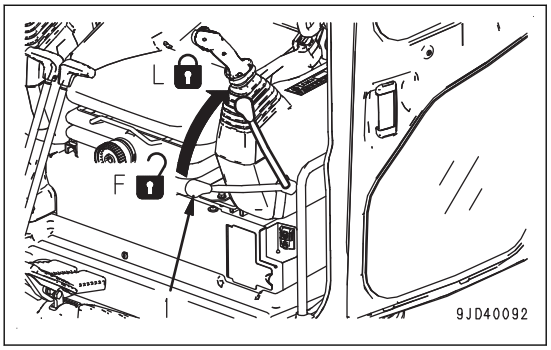
Stop Engine Before You Inspect or Do Maintenance

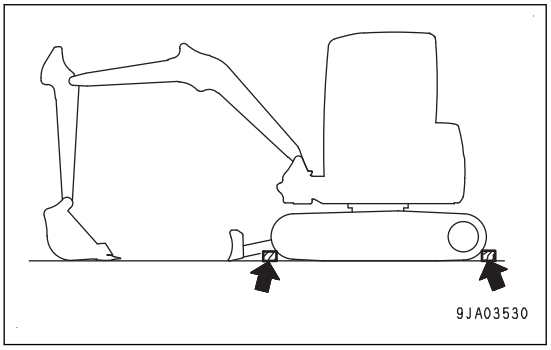
If you are caught or pinched between the work equipment during operation, or exposed to high-temperature or high-pressure liquids, it is dangerous and can cause serious personal injury or death. Obey the items that follow.

- Be sure to lower the work equipment to the ground and stop the engine before inspection and maintenance.



- Turn the starting switch to the ON position. Operate the work equipment control lever back and forth, right and left 2 to 3 times fully to release the remaining pressure in the hydraulic circuit. Hold the red part on the top of the lock lever (1) to operate it to the LOCK position (L), and turn the starting switch to the OFF position.
- Make sure that the battery relay is turned off and the main power is not supplied. (Turn the starting switch to the OFF position, wait for approximately 1 minute, and push the horn switch. If the horn does not operate, the power is not supplied.)
- Chock the tracks to prevent movement.

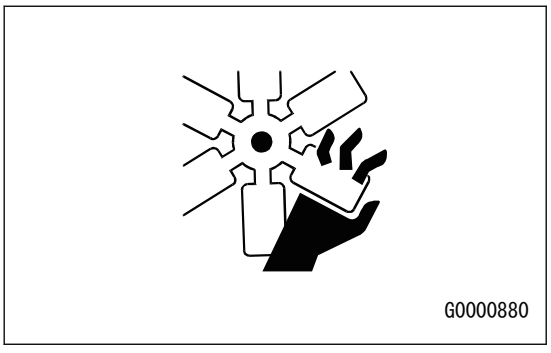




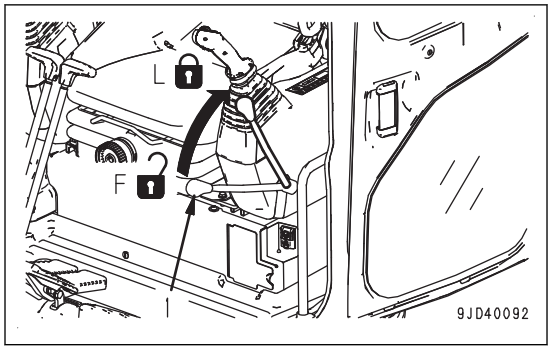
Precautions for Maintenance When Engine is in Operation

To prevent an accident, do not do the maintenance while the engine is in operation. If maintenance is necessary while the engine is in operation, do the work with 2 or more workers, and obey the items that follow.

- One worker must sit on the operator's seat and be ready to stop the engine always. All workers must keep contact with the other workers.
- Rotating parts such as the fans or belts are dangerous that they can easily catch your body part or a thing. When you work, be careful not to let them come near the rotating parts.
- Do not drop or insert tools or other objects into the fan, belt, or other rotating parts. They possibly touch the rotating parts and fly. It is dangerous.

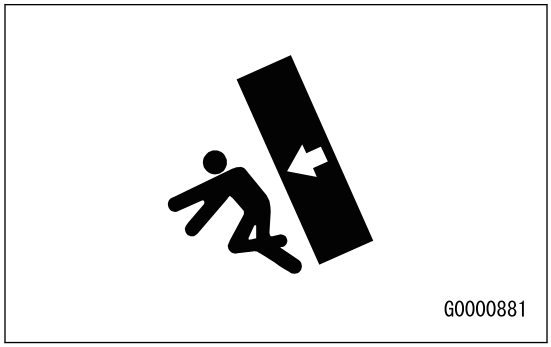


- Release the remaining pressure in the hydraulic circuit, and hold the red part on the top of the lock lever (1) to operate it to the LOCK position (L). For the procedure to release the remaining pressure, see “How to Release Internal Pressure in Hydraulic Circuit (4-88)”.
- Do not touch the control levers (and pedals). When it is necessary to operate the control levers (and pedals), always give a signal to your fellow workers to evacuate them to a safe area.



Precautions When You Install, Remove, or Store Attachments

- For removal or installation of the attachments, allocate a leader.
- When you store attachments that can fall over, store them in a stable condition to let them not fall over. Also, keep the unauthorized persons away from the storage area.



Precautions When You Work at High Places

When you work in high places, prepare a workbench with stairs, etc. to make the work area available. Then, start the work.

There is a danger of serious personal injury or death caused by fall or such.

Precautions When You Work Under Machine or Work Equipment

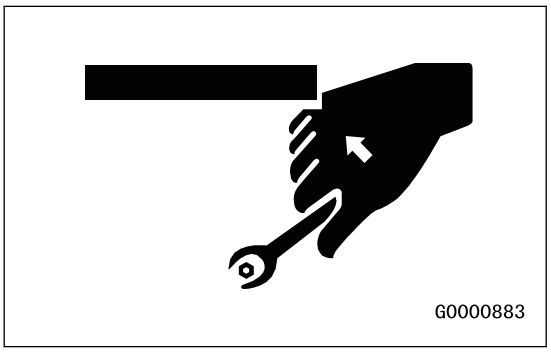
If the machine or work equipment falls down, it can lead to serious personal injury or death. Obey the items that follow.

- Use the hoists or hydraulic jacks which are in good condition and sufficiently strong to handle the weight of the component. Do not use the hydraulic jacks at the parts where the machine is damaged or bent or twisted. If the strand of wire rope is frayed, or the wire rope is twisted, or the diameter of wire rope is decreased, do not use it. Do not use a hook which is bent or damaged.
- It is extremely dangerous to work below the machine if the track shoes are lifted off the ground and the machine is supported only with the work equipment. If one of the control levers is touched by accident, or if the hydraulic piping is damaged, the work equipment or the machine will suddenly fall. Do not go below the work equipment or machine.
- If it is necessary to raise the work equipment or the machine and then go below it to do the inspection or maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
  If they are not supported, there is a possibility that the machine or work equipment falls down, and it leads to serious personal injury or death.
- Do not use concrete blocks for supports. There is a possibility that the concrete blocks break even with a light load.



Use Proper Tools

Handle the proper tools correctly. There is a danger that causes serious personal injury or death if you use a damaged or deformed tool or use a tool in purpose other than that it is intended.



Precautions for Check and Maintenance

Turn Battery Disconnect Switch to OFF Position

In the cases that follow, after you turn the starting switch to the OFF position, check that the system operating lamp is not lit. Then turn the battery disconnect switch to the OFF position and remove the switch key.

There is a danger that causes serious personal injury or death by electric shock if you do inspection and handling of the battery when you do not turn the battery disconnect switch to the OFF position.

- When you store the machine for a long time (more than a month)
- When you repair the electrical system
- When you do the electric welding
- When you handle the battery
- When you replace the fuse or such

Precautions for Welding

Welding can be done only by qualified personnel and it can be done in a place there are correct facilities. Unqualified personnel must not do welding because there is a danger of gas generation, fire, electric shock, etc. in welding.

Handle Battery

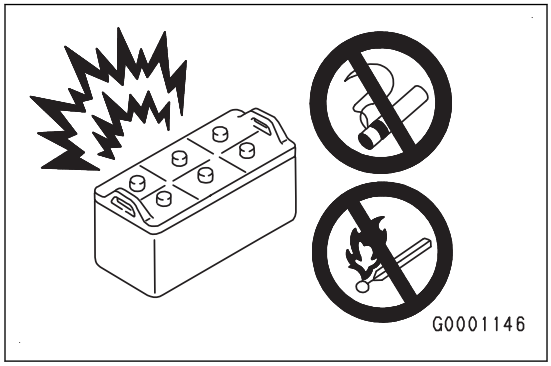
To check and handle the battery, turn the starting switch to the OFF position, make sure that the system operating lamp is not lit. Set the battery disconnect switch to the OFF position, and remove the switch key.

Danger of Battery Exploding

The battery releases flammable hydrogen gas.

If you do not handle the battery correctly, it can cause personal injury, explosion, or fire. Be sure to obey the items that follow:

- Do not use a direct air blow or dry cloth to clean the battery. Use a wet cloth to prevent fire or explosion from static electricity.
- Do not let open flame near the battery.
- Do not smoke near the battery.



For the machine with liquid stopper type battery, obey the precautions that follow.

- If the electrolyte level is below the minimum level line, do not use or charge the battery. There is a danger of explosion.
  Examine the battery electrolyte level at the specified interval. Add purified water (such as a commercial battery fluid) to the maximum level line.
- If you use a battery charger for charging, obey the precautions that follow:

  Before charging:

  - Remove the battery from the machine and move it to a well-ventilated area.
  - Remove the battery cap to make it easier to diffuse hydrogen gas out of the battery.
  - Make sure that the battery electrolyte level is between the middle of the two electrolyte level lines and the maximum level line.

During charging:

Do not look into the battery electrolyte.

After charging:

Examine the battery electrolyte level again and tighten the battery cap fully.

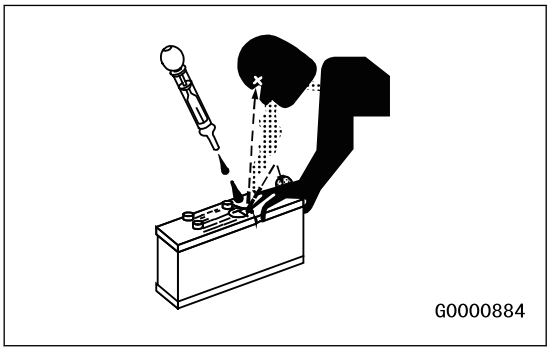
For the machine with Komatsu maintenance-free battery, obey the precautions that follow.

- See the display of the indicator, and obey the instruction. For how to read the indicator, see Maintenance, “How to Examine Komatsu Maintenance-Free Battery Indicator (4-27)”.
- If you use a battery charger for charging, remove the battery from the machine, move it to a well-ventilated area, and then charge the battery.

Risk Caused by Dilute Sulfate

Battery emits flammable hydrogen gas and it can explode. The battery electrolyte contains dilute sulfuric acid. If you handle it in not correct way, it can cause serious personal injury and death, explosion, or fire. Obey the items that follow.

- When you handle the battery, be sure to use the protective eyeglasses and rubber gloves.
- If the battery electrolyte got in contact with your eyes, immediately wash your eyes with water and consult a doctor.
- If you got the battery electrolyte on your clothes or skin, immediately flush it off fully with a lot of water.



Risk for Spark

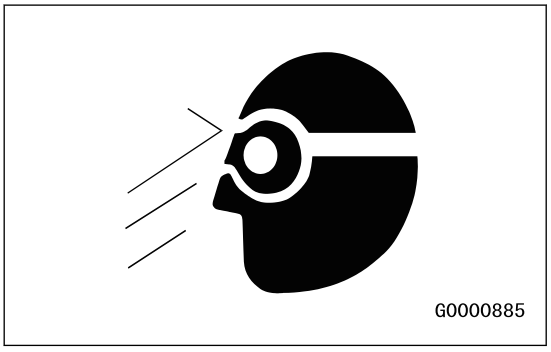
Sparks are made and can cause fire. Obey the items that follow.

- Do not allow metal object like a tool to contact between the terminals of the battery. Do not leave the tools.
- When you remove the battery terminals, after you turn the starting switch to the OFF position, check that the system operating lamp is not lit. Then turn the battery disconnect switch key to the OFF position and remove the key.
  Be sure to remove the ground side (negative (-) terminal side) of battery terminal first. Install the positive (+) terminal first, and install ground side last.
- Install the battery terminals securely.
- Install securely the battery to the specified position.

Precautions When You Use Hammer

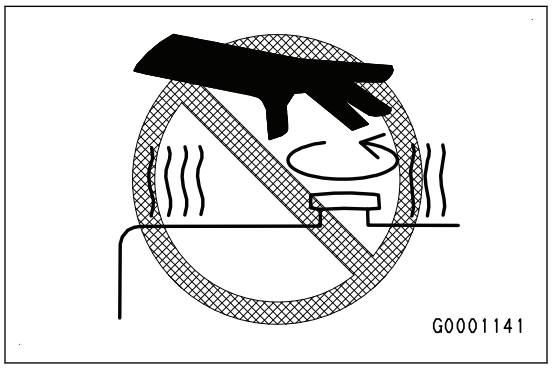
When you use a hammer, pins will jump out or metal particles will fly over. There is a danger that serious personal injury or death is caused. Obey the items that follow.

- When you hit pins and tooth with a hammer, there is a danger that persons nearby get injury by scattered pieces and others. Check that there is no person around the machine.
- When you hit hard metal parts such as pin, tooth, cutting edge, bearing and such with a hammer, there is a danger of serious personal injury or death caused by scattered objects. Wear the protective equipment such as protective eyeglasses and gloves.
- If the pins are hit with a strong force, they can fly out and cause injury to people around it. Keep persons away from around the machine.



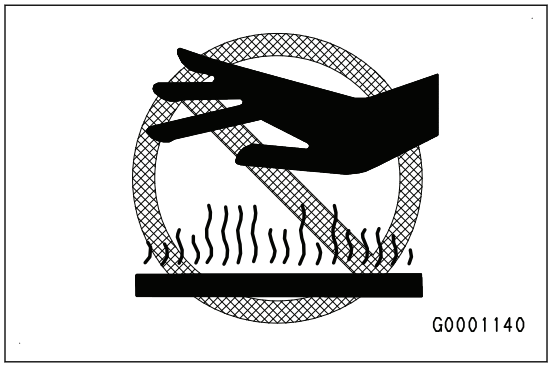
Precautions for High-Temperature Coolant

To prevent burn injury caused by hot water or steam spouting, when you inspect or drain the cooling water, make sure that the radiator cap is cool enough to be touched with bare hands, loosen the cap slowly to release pressure from the radiator, and then remove the cap.



Precaution for High-Temperature Oil

To prevent burn injury caused by spouting hot oil or touching the high temperature part, make sure that the cap and plug are cool enough to be touched with bare hands when you inspect or drain oil. Then, loosen the cap and plug slowly to release internal pressure, and remove the cap and plug.



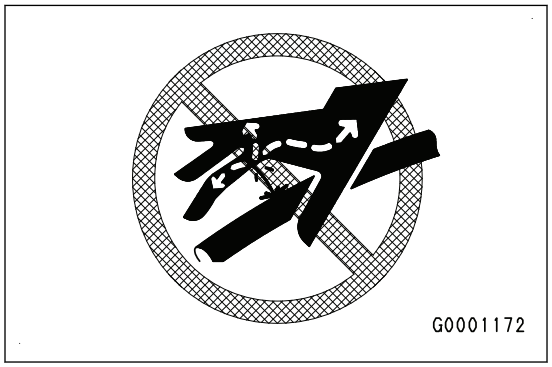
Precautions for High-Temperature Areas

To prevent burns caused by contact with hot parts, make sure it is cold enough to be touched with bare hands before you do inspection or service of the machine after you stop the engine.

Precautions for High-Pressure Oil

Internal pressure is constantly applied to the hydraulic system. Internal pressure is applied to the fuel pipes when engine is running and immediately after it is stopped. When you do inspection and replacement of pipes and hoses, if you do not make sure that the pressure of the circuit has been released, there is a danger that serious personal injury or death occurs. Obey the items that follow.

- Do not do inspection or replacement work when pressure is applied.
  Release pressure. See “How to Release Internal Pressure in Hydraulic Circuit (4-88)”.
- If there is oil leakage from the pipes or hoses, the pipes, hoses and around them are wet. Check the pipes for cracks, check the hoses for cracks and swelling.
  Wear the protective equipment such as protective eyeglasses and gloves at the time of measuring.
- If high-pressurized oil which is leaked through a small hole can pierce the skin or cause blindness if it hits the skin or eyes directly. If high-pressurized oil causes serious skin or eye injury, wash it off with clean water and get medical treatment as soon as possible.



Precautions for High-Pressure Fuel

While the engine is in operation, a high-pressure occurs in the engine fuel piping system. If disassembly is done before the pressure is released, there is a danger that causes serious personal injury or death. When you do

inspection and maintenance of fuel piping system, wait for 30 seconds or more after the engine is stopped to let the internal pressure go down.

Handle High-Pressure Hoses and Piping

There is a danger of serious personal injury or death by fire or malfunction if the oil or fuel leaks from the high-pressure hoses or pipes.

If you find looseness in the mounting parts of the hoses or the piping, or if oil or fuel leaks from the mounting parts, stop the work and retighten them to the specified torque.

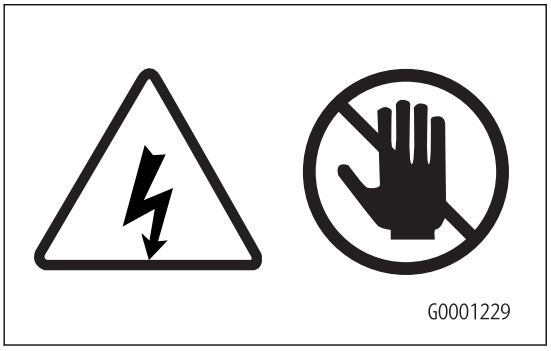
If you find damage or deformation in the hoses or piping, consult your Komatsu distributor.

Replace the hose if you find one of the conditions that follow.

- Hose damage, deformation of fitting
- Scratch of coating, cutting, exposure of reinforcing layer of wire
- A part of coating is expanded
- Movable part of hoses has signs of “distortion” and “crushing”.
- Foreign material is in the coating.

Precautions for High Voltage

When the engine is in operation or immediately after it is stopped, there is a danger of electric shock because voltage in the engine controller or engine injector is very high. Do not touch the inside of engine controller or the injector part of engine. If it is necessary to touch the inside of engine controller or the injector part of engine, consult your Komatsu distributor.



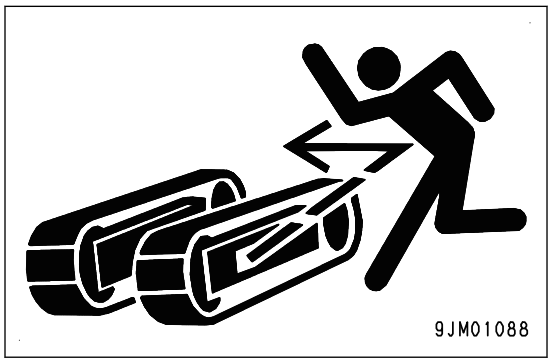
Precautions for Noise

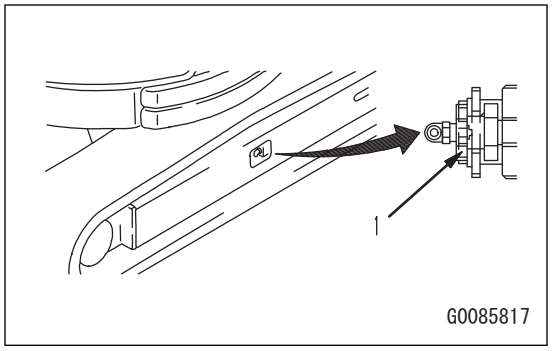
Wear the ear covers or ear plugs if you do the work exposed in noise for a long time such as adjustment work of engine.

Large ambient noise around you can cause auditory disturbance or hearing loss.

Precautions for High-Pressure Grease During Track Tension Adjustment

- Grease is pumped into the track tension adjustment system, and high pressure is applied on it. If the adjustment is not done with the specified procedure for maintenance, the grease drain plug (1) can fly out and cause serious injury or death.
- When you loosen the grease drain plug (1) to loosen the track tension, do not loosen it by 1 turn or more. Loosen the grease drain plug slowly.
- Keep your face, hands, feet, or other part of your body away from the grease drain plug (1).

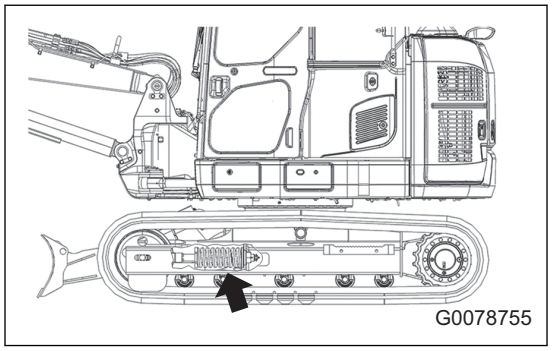




Do Not Disassemble Idler Cushion

Do not disassemble the idler cushion.

A powerful spring (recoil spring) is set in the idler cushion that acts to reduce the impact on the idler. If it is disassembled by mistake, the spring can shoot out and it can cause serious personal injury or death. If it is necessary to disassemble it, consult your Komatsu distributor.



Handle Accumulator and Gas Spring

Accumulator is installed to this machine. The work equipment goes down by its weight for a while after engine is stopped if the work equipment control lever is operated to LOWER direction.

After you stop the engine, set the lock lever to the LOCK position.

The accumulator and the gas spring are charged with high-pressure nitrogen gas, and if a mistake is made in the operation, it can cause an explosion and serious personal injury or death. Obey the items that follow.

- Do not disassemble.
- Do not let it come near an open flame, or do not dispose of it in fire.
- Do not do the drilling, welding or flame-cutting.
- Do not hit it or roll it or give shocks to it.
- When you dispose of it, the gas must be released. Consult your Komatsu distributor.



Precautions for Compressed Air

- If the compressed air is used for cleaning, dirt in the air could scatter and cause serious personal injury or death.
- When using the compressed air to clean the element or radiator, wear protective equipment such as protective eyeglasses, dust mask, and gloves.

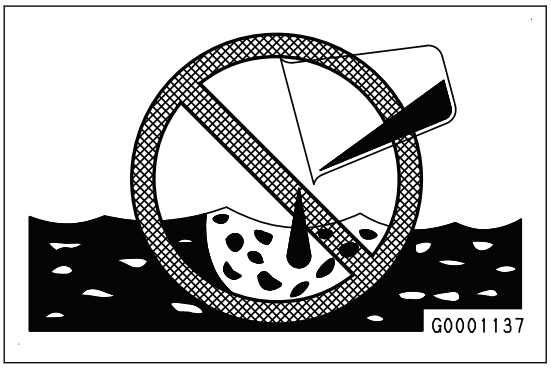
Maintenance of Air Conditioner

If the refrigerant of air conditioner gets into your eyes, you can lose your eyesight. Also, if it touches your skin, it can cause frostbite. Do not loosen the parts of the cooling circuit.

Precautions When You Discard Waste Materials

To prevent environmental pollution, be careful of the disposal of waste materials.

- Be sure to put the waste fluid into cans or tanks. Do not drain it directly onto the ground or pour it into the sewage system, rivers, seas, or lakes.
- When you dispose of the harmful objects such as oil, fuel, coolant, solvent, filters, and batteries, obey the applicable laws and regulations.



Some rubbers and plastics generate harmful gasses that have a bad effect to the human body when burned.

- Outsource to a contractor the disposal of rubber, plastics, and parts that contains them (hoses, cables, harnesses, etc.) in accordance to applicable laws and regulations.

If you have a question about waste disposal, consult Komatsu distributor.

Window Washer Fluid - Select

Use the ethyl alcohol washer fluid.

Do not use the methyl alcohol washer fluid because it can cause injury to your eyes.

Periodic Inspection of Defined Life Parts

- To use the machine safely for a long period, be sure to periodically inspect the defined life parts that have an especially close relation to safety, such as hoses and the seat belt. If an abnormality is found, replace it immediately.
- 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 can fail and cause serious personal injury or death. It is not easy to judge the remaining life of these components but inspect them as much as possible before work and at the regular maintenance.
- Replace or repair the defined life parts if a defect is found by the check.

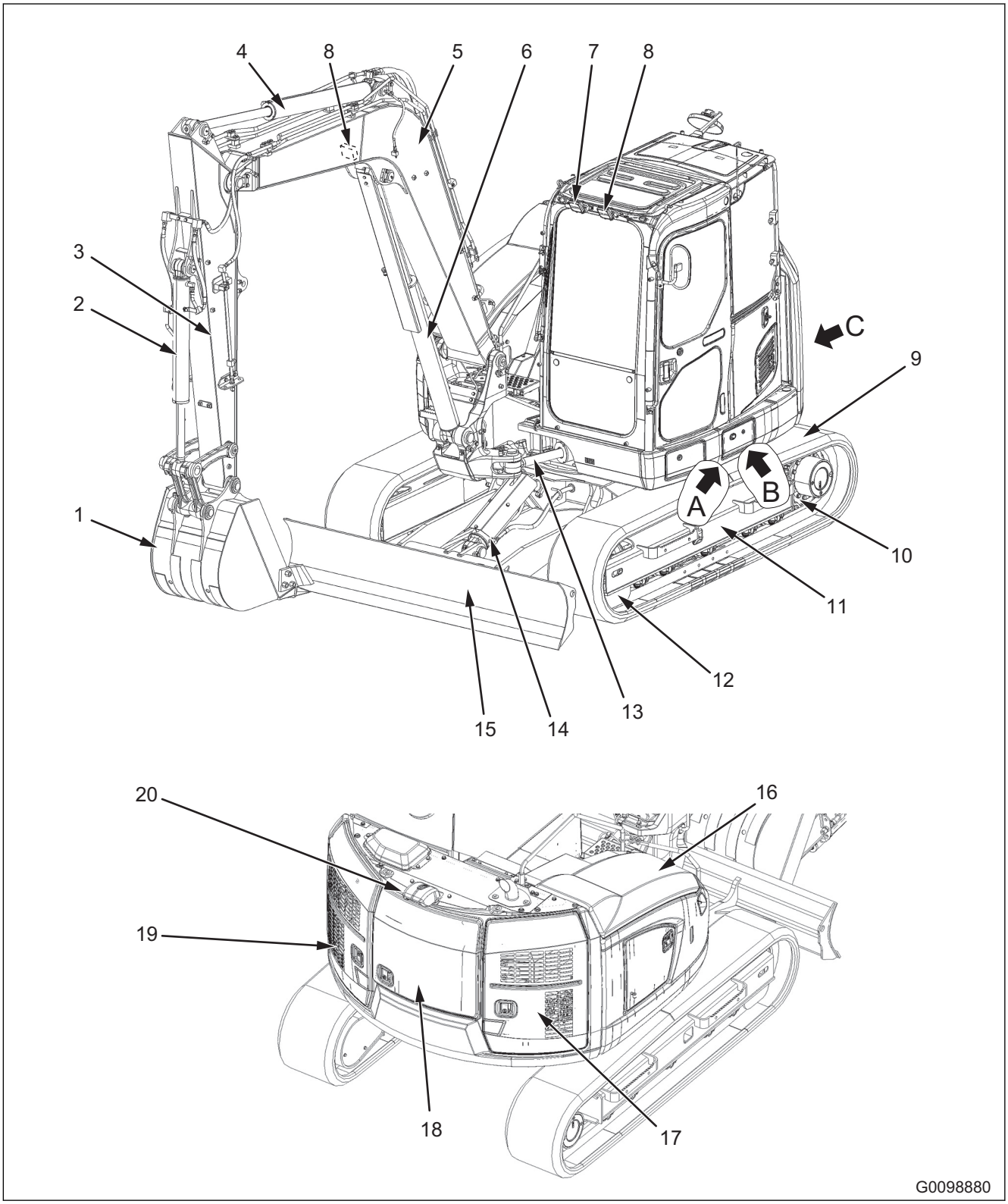
Operation

⚠ WARNING

Before you read the OPERATION, read and understand the SAFETY.

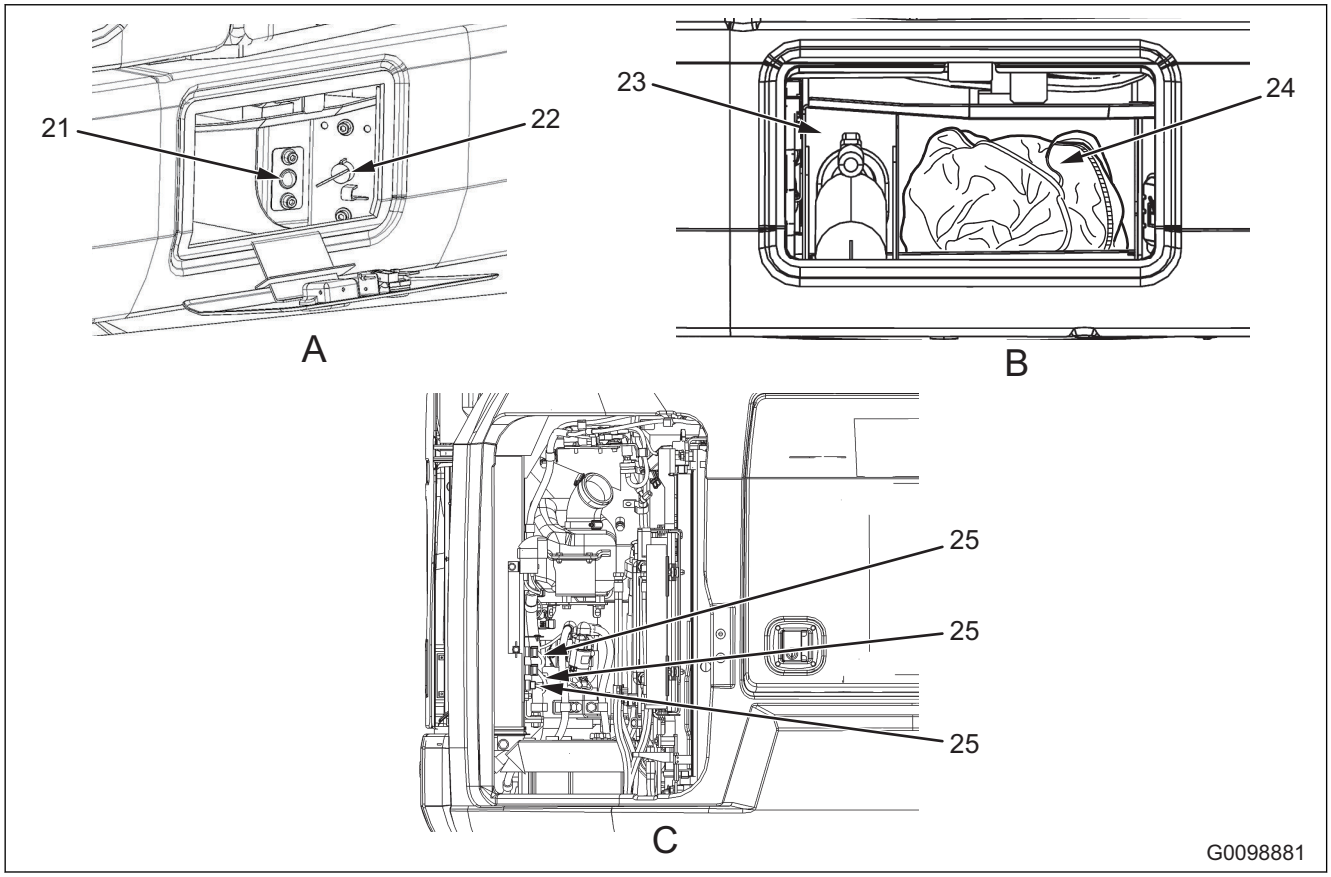
General View

Names of Machine Equipment



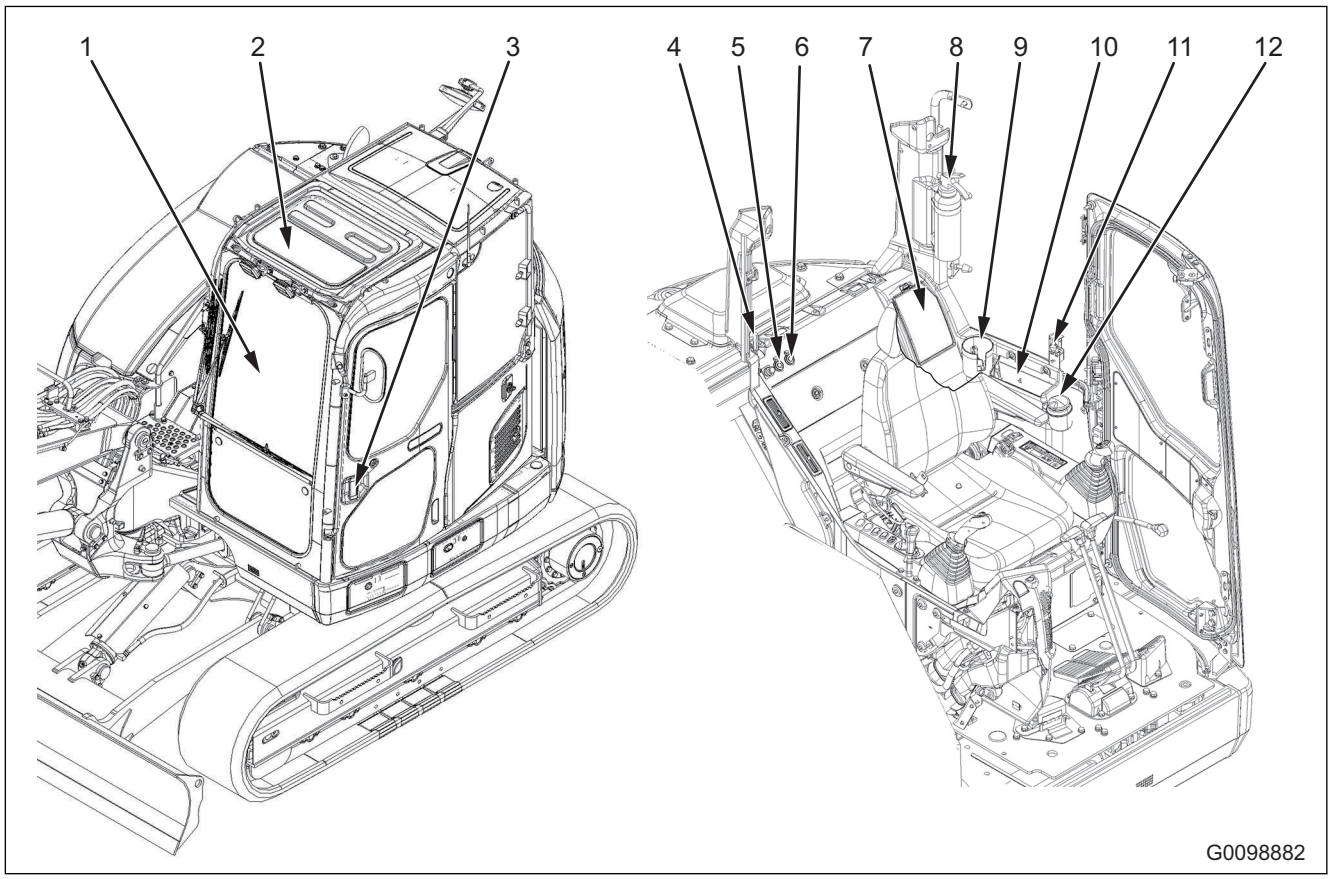
(1) Bucket
(2) Bucket cylinder
(3) Arm
(4) Arm cylinder
(5) Boom
(6) Boom cylinder

(7) Additional lamp (option)
(8) Working lamp
(9) Track
(10) Sprocket
(11) Track frame
(12) Idler
(13) Boom swing cylinder
(14) Blade cylinder (blade specification)
(15) Blade (blade specification)
(16) Dirt cover
(17) Rear right cover
(18) Rear cover
(19) Rear left cover
(20) Rearview camera



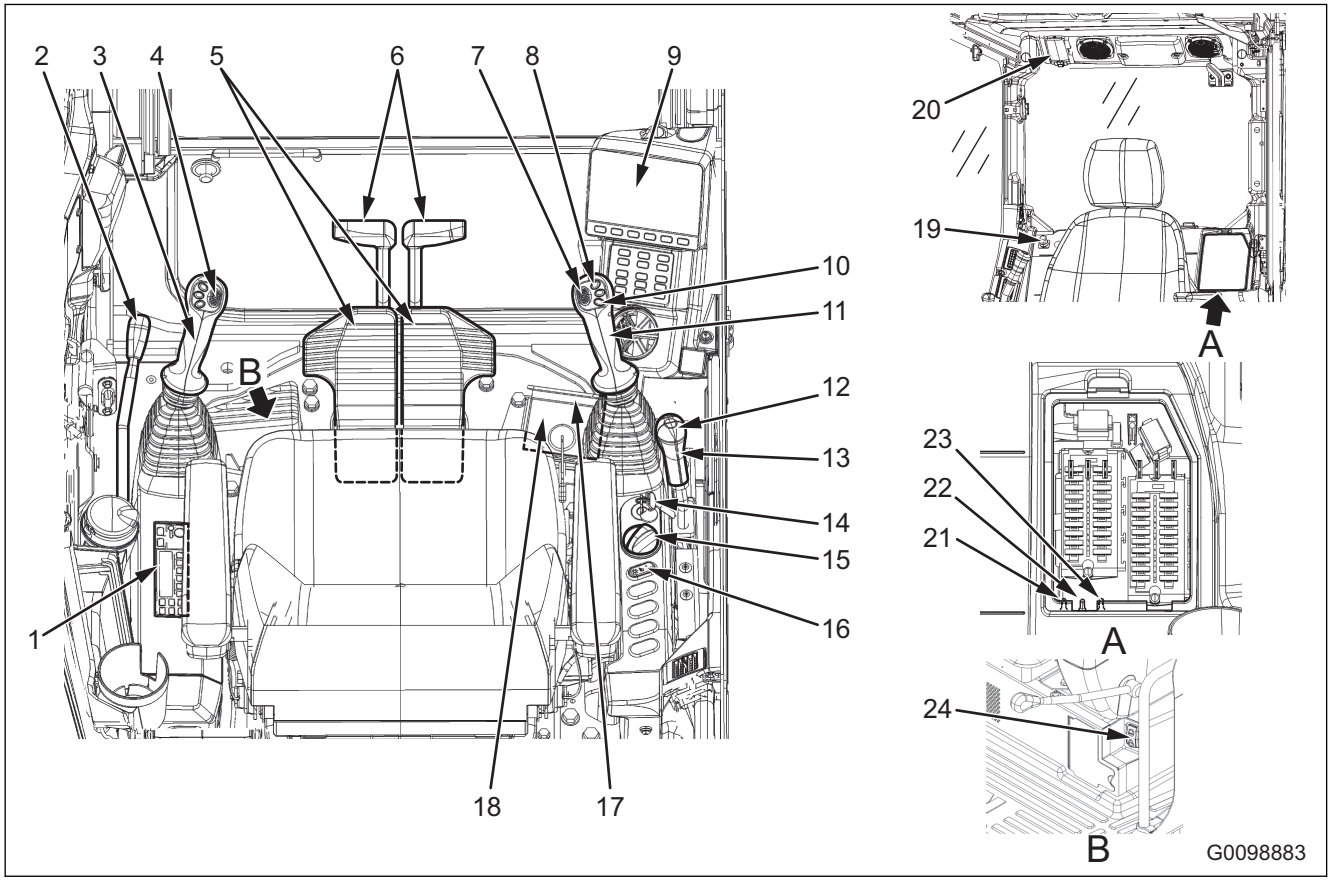
(21) System operating lamp
(22) Battery disconnect switch
(23) Grease pump holder
(24) Toolbox
(25) Fusible link

Names of CAB Devices



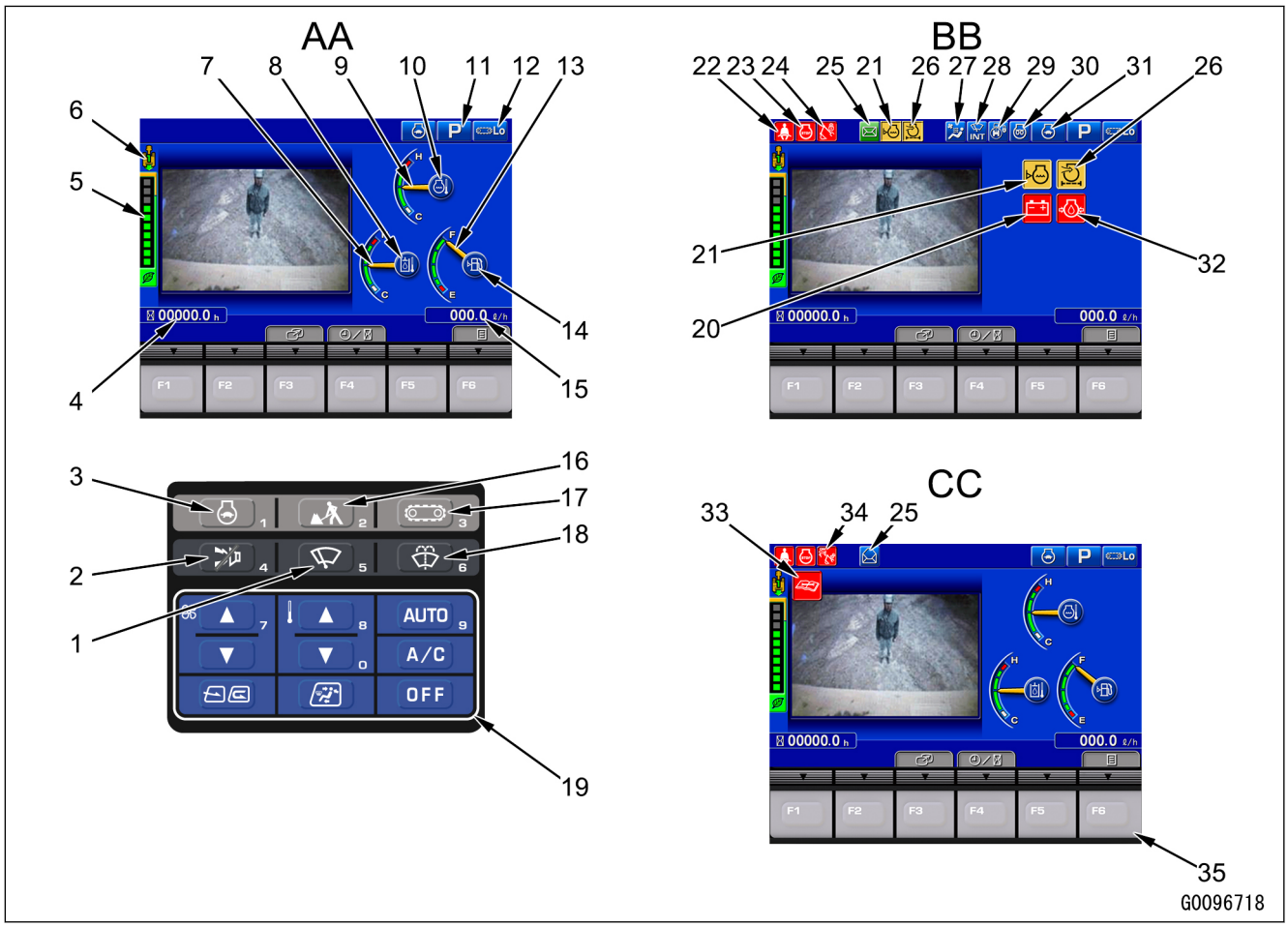
(1) Front window
(2) Ceiling window
(3) Door handle
(4) Emergency escape hammer
(5) 12V power supply 1
(6) 12V power supply 2
(7) Fuse
(8) Fire extinguisher (option)
(9) Cup holder
(10) Magazine box
(11) USB connector
(12) Ashtray

Control Levers and Pedals



(1) Radio
(2) Lock lever
(3) L.H. work equipment control lever
(4) 2nd-line attachment proportional switch
(5) Travel pedal
(6) Travel lever
(7) 1st-line attachment proportional switch
(8) Breaker operation switch
(9) Machine monitor
(10) Horn switch
(11) R.H. work equipment control lever
(12) Travel speed selector switch
(13) Blade control lever
(14) Starting switch
(15) Fuel control dial
(16) Lamp switch
(17) Swing lock cover
(18) Boom swing control pedal
(19) Cigarette lighter
(20) Room lamp switch
(21) Pump secondary drive switch
(22) Swing parking brake cancel switch
(23) Lock lever automatic lock cancel switch
(24) Engine shutdown secondary switch

Names of Machine Monitor Equipment



AA: Standard screen, BB: Check before starting screen, CC: Maintenance time warning screen

(1) Wiper switch
(2) Buzzer cancel switch
(3) Auto-deceleration switch
(4) Service meter/clock
(5) ECO gauge
(6) Camera selection display
(7) Hydraulic oil temperature gauge
(8) Hydraulic oil temperature caution lamp
(9) Engine coolant temperature gauge
(10) Engine coolant temperature caution lamp
(11) Working mode display
(12) Travel speed display
(13) Fuel gauge
(14) Fuel level caution lamp
(15) Fuel consumption gauge
(16) Working mode selector switch
(17) Travel speed selector switch
(18) Window washer switch
(19) Air conditioner control switch
(20) Charge level caution lamp
(21) Radiator coolant level caution lamp
(22) Seatbelt caution lamp
(23) Engine stop pilot lamp
(24) Work equipment lock pilot lamp
(25) Message display
(26) Air cleaner clogging caution lamp
(27) Air conditioner pilot lamp
(28) Wiper pilot lamp
(29) Swing lock pilot lamp
(30) Preheating pilot lamp
(31) Auto-deceleration pilot lamp
(32) Engine oil pressure caution lamp
(33) Maintenance time caution lamp
(34) Lock lever automatic lock cancel pilot lamp
(35) Function switches (F1 to F6)

REMARK

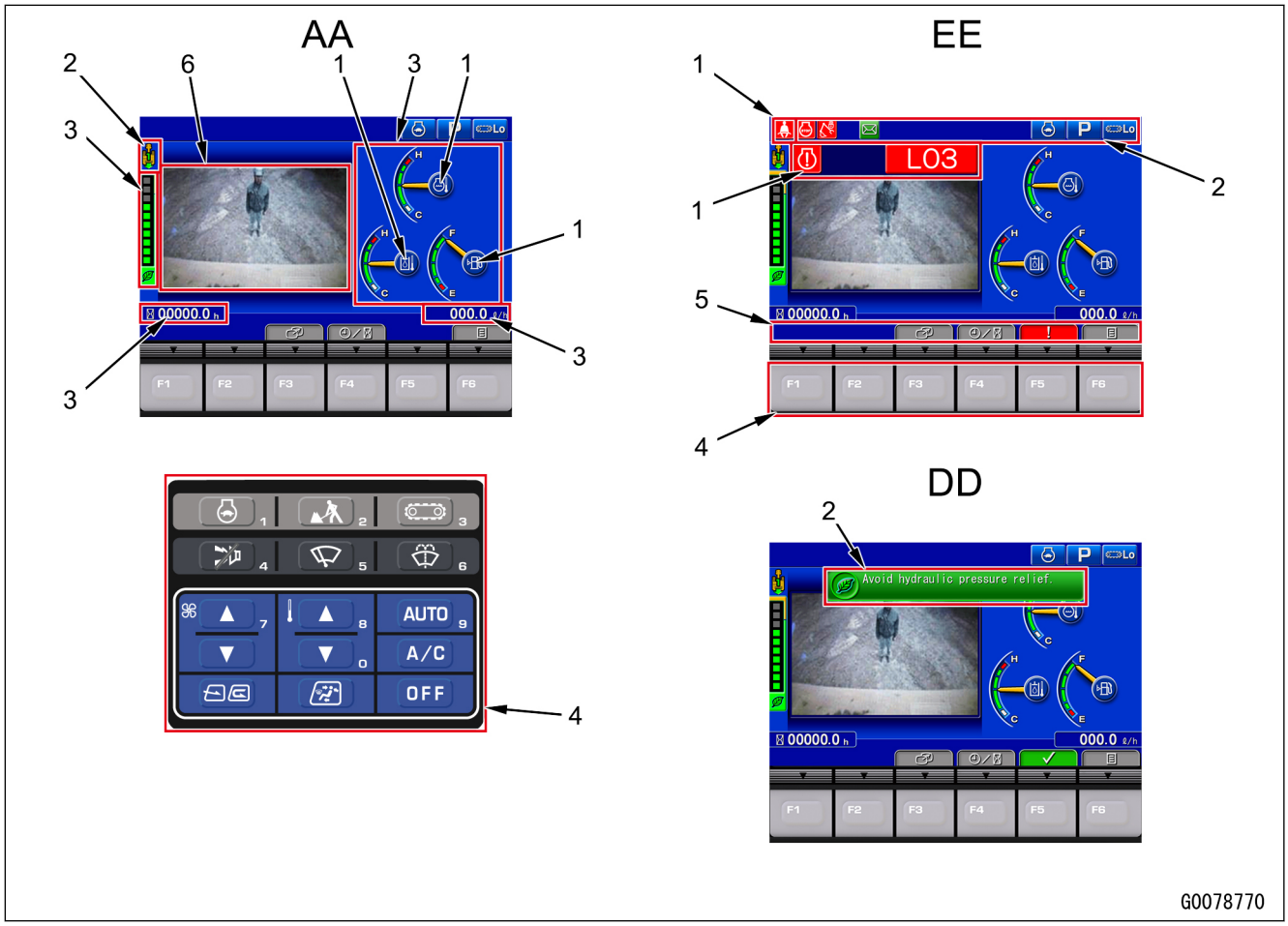
Only main symbols of caution lamps are shown in this figure.
For caution lamps not shown, see “Caution Lamp List (3-20)”.

Explanation of Components

The explanation of devices necessary to operate the machine is as follows.

For the correct, safe, and comfortable operations, understand the methods to operate the equipment, and the contents of the displays correctly.

Machine Monitor Equipment



AA: Standard screen, EE: Warning and Error screen, DD: Guidance screen

(1) Warning display

(2) Pilot display

(3) Meter display

(4) Monitor switch

(5) Guidance icon display

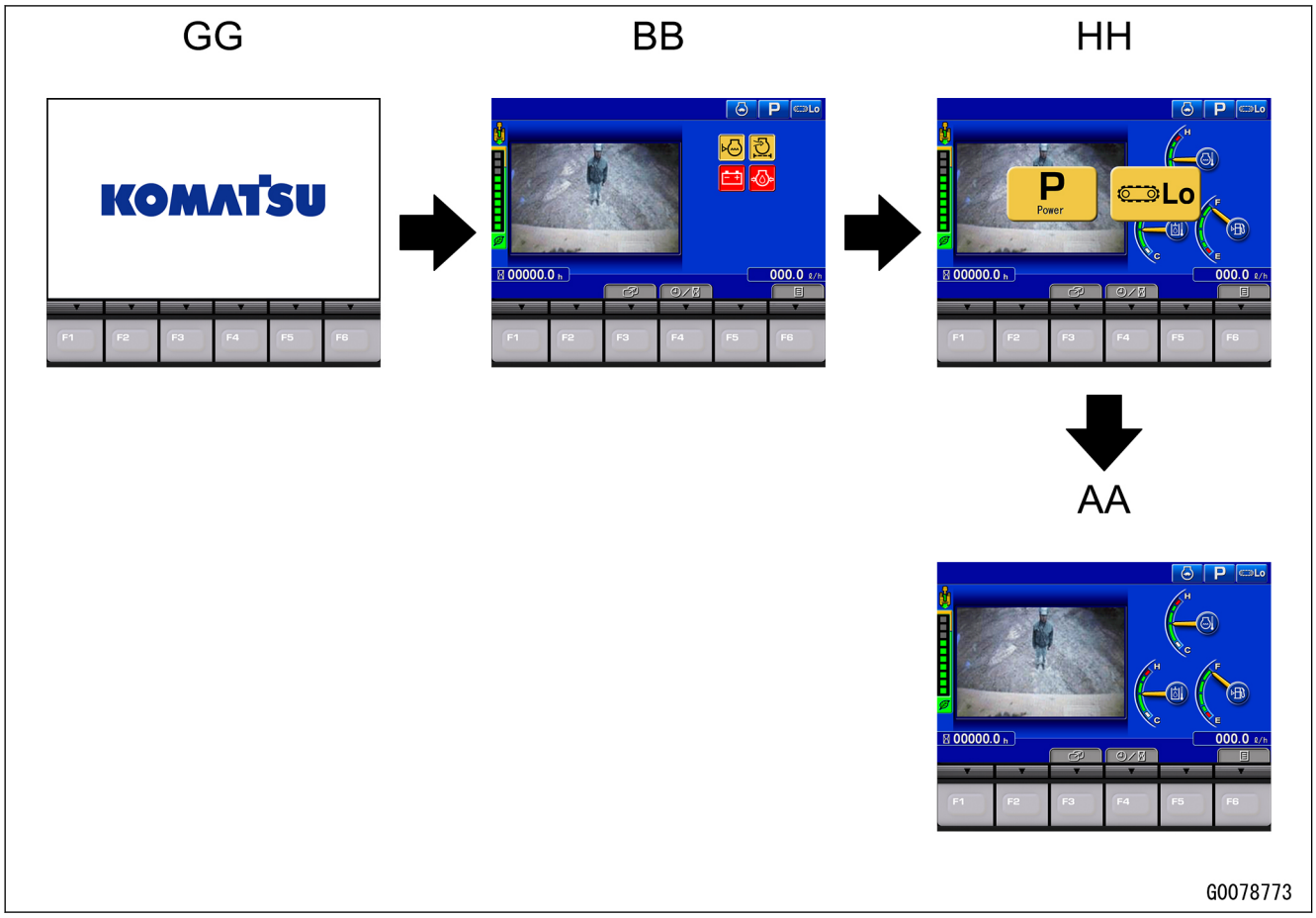
(6) Camera image display

REMARK

- If environmental temperature of the machine monitor is high, the brightness can be automatically reduced to protect the liquid crystal.
- The brightness or color of the objects shown on the screen changes in some cases because of the automatic adjustment function of the camera.

Basic Operation of Machine Monitor

Basic Operation of Machine Monitor When You Start Engine in Normal Situation



- When you turn the starting switch to the ON position, the start screen GG is shown.
- 2 seconds after the start screen GG is shown, the screen changes to the check before starting screen BB.
- 2 seconds after the check before starting screen BB is shown, the screen changes to the working mode/ travel mode display screen HH.
- 2 seconds after the working mode/travel mode display screen HH is shown, the screen changes to the standard screen AA.

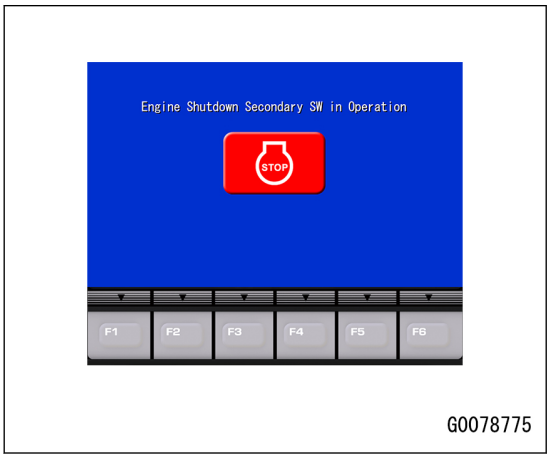
REMARK

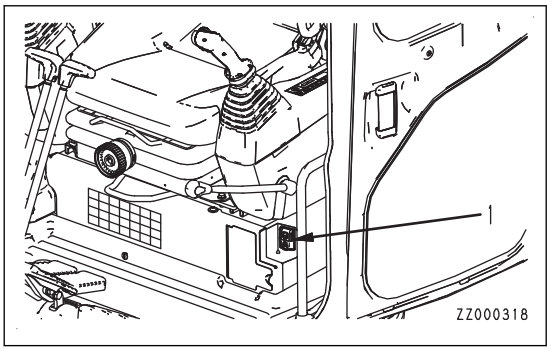
When the engine is started, the battery voltage can decrease suddenly by the temperature and the battery condition. In such case, the machine monitor will start again in some cases. It is not a problem.

Basic Operation of Machine Monitor When You Start Engine While Engine Shutdown Secondary Switch is on

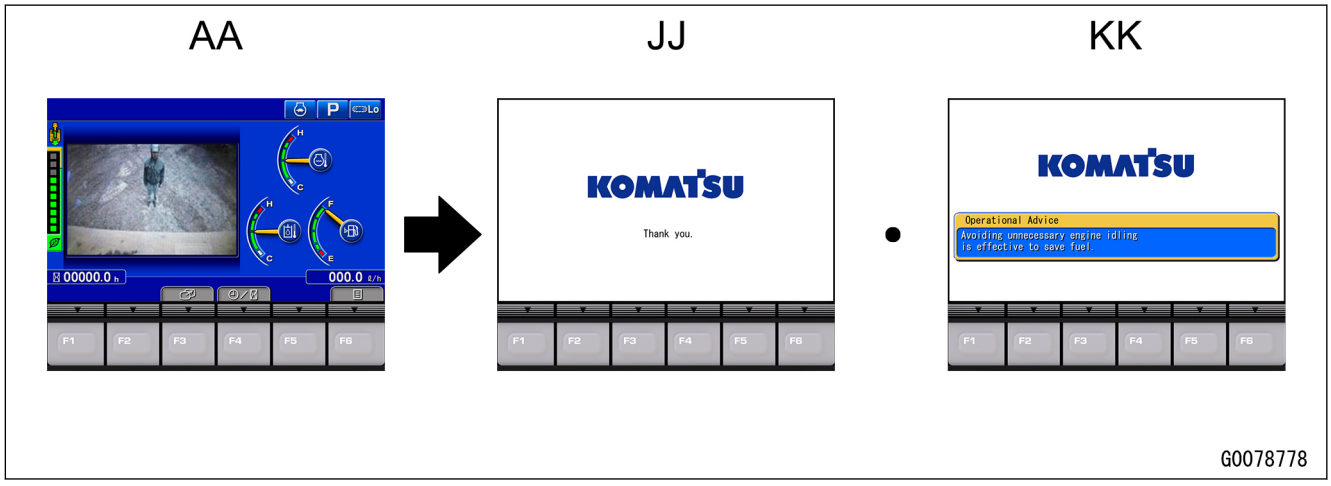
If the starting switch key is turned to the ON position while the engine shutdown secondary switch (1) is set to the ON position (engine is stopped), the screen in the figure is shown and the engine cannot be started.

When the engine shutdown secondary switch (1) is set to the OFF position (normal), the machine monitor returns to the standard screen, and you can start the engine with usual starting switch key operation.





Basic Operation of Machine Monitor When You Stop Engine in Normal Situation

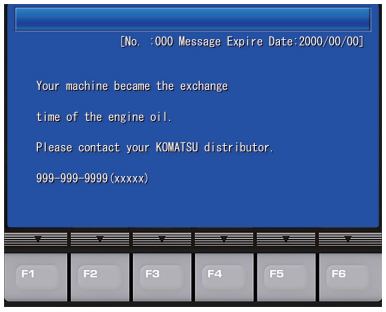


When the starting switch is turned to the OFF position, the end screen JJ or KK is shown for 5 seconds, and the screen goes off.

End Screen When a Message is Received

When there is a message from Komatsu distributor, the message is shown on the end screen.

In such case, turn the starting switch to the ON position to check the message again, and make a reply if it is required.



G0055272

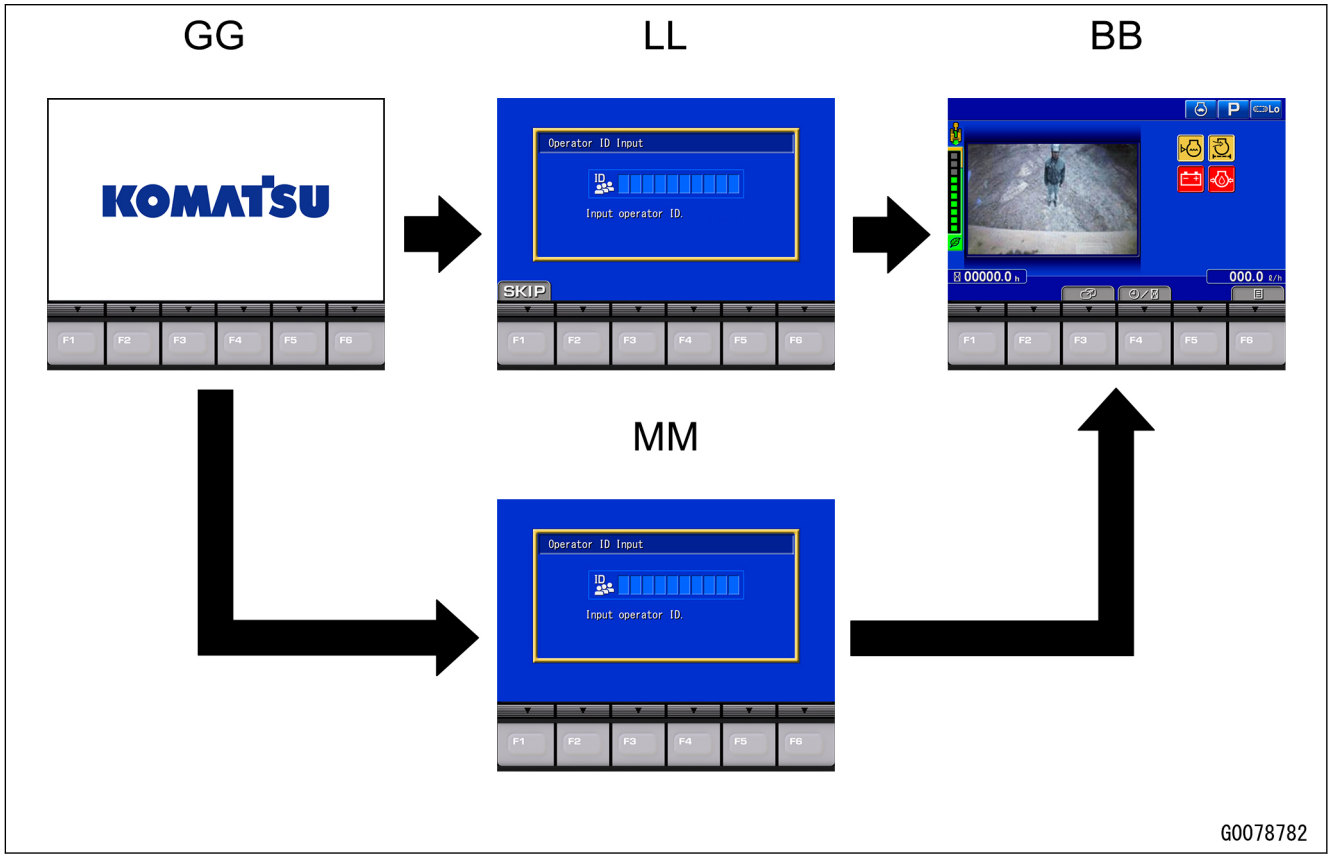
Basic Operation of Machine Monitor When Starting Switch is ON While Operator ID Input is Set

NOTICE

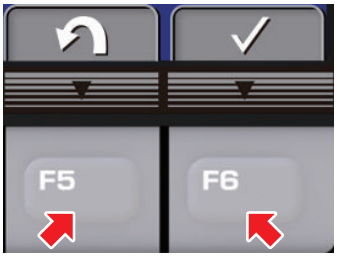
Do not use the operator identification function to enhance the security. The operator identification function has no effect of security enhancement or theft prevention.
We will not be responsible for theft or damage of the machine caused by the actions that follow.

- **Misuse of ID**
- **Unauthorized use of ID by unauthorized person**

Consult your Komatsu distributor for setting, change, or cancel of the operator identification function.



- If the “ID Number Input (with SKIP)” of “Operator ID Setting” is set, start screen GG changes to “Operator ID Input”(with SKIP) screen LL when you turn the starting switch key to the ON position.
- If the “ID Number Input (without SKIP)” of “Operator ID Setting” is set, start screen GG changes to “Operator ID Input”(without SKIP) screen MM when you turn the starting switch key to the ON position.
- Input the registered ID number on “Operator ID Input” (with SKIP) screen LL or “Operator ID Input” (without SKIP) screen MM, and push the switch F6. The screen changes to the check before starting screen BB. If you input an incorrect ID number, push the switch F5, and delete it one character at a time.



When the switch F1 is pushed on “Operator ID Input” (with SKIP) screen LL, the screen changes to the check before starting screen BB without ID number input.

If you input an incorrect ID number for 3 times, you cannot input the ID number in the next 5 minutes. Wait for 5 minutes or more, and enter the ID number again.

As long as “Operator ID Input” screen is shown, the engine cannot be started. If you forget the ID number and cannot start the engine, check the ID number with the administrator of the vehicle.

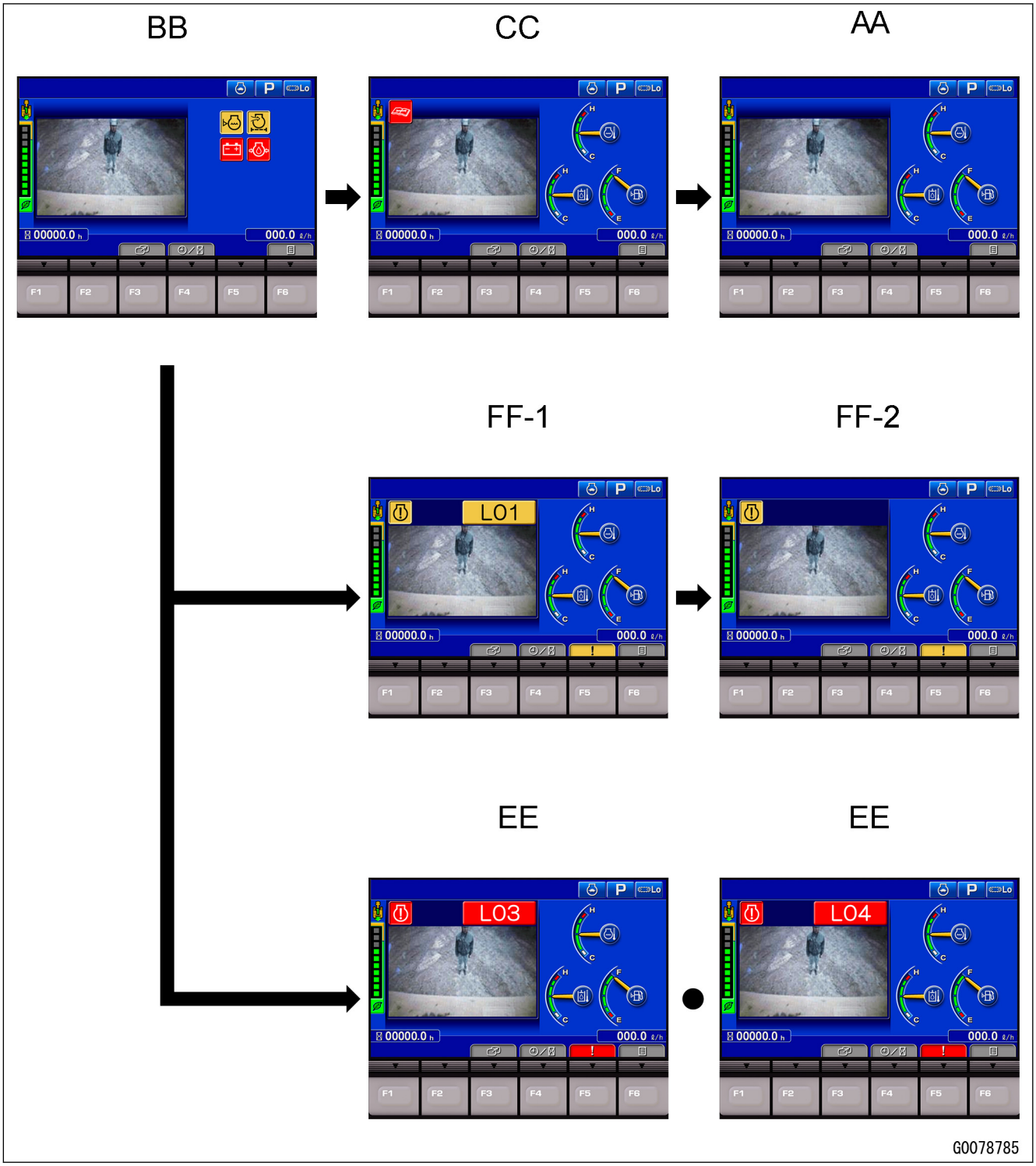


G0055275

REMARK

Even if the ID number input is set for “Operator ID Setting”, “Operator ID Input” (with SKIP) screen LL or “Operator ID Input” (without SKIP) screen MM is not shown in some setting values of “Operator ID Holding Time with Key OFF” in setting items in operator identification function.

Basic Operation of Machine Monitor When You Start Engine in Abnormal Situation

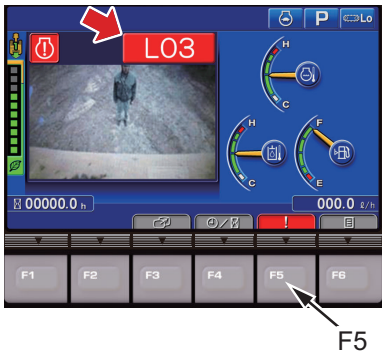


- If there is a problem when you start the engine, the check before starting screen BB changes to the maintenance time warning screen CC, warning screen FF, or error screen EE.
- After the check before starting screen BB is shown for 2 seconds, the screen changes to the maintenance time warning screen CC.
- After the maintenance time warning screen CC is shown for 30 seconds, the screen changes to the standard screen AA.

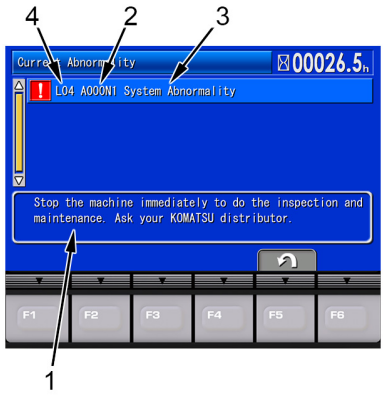
- 2 seconds after the check before starting screen BB is shown, the screen changes to the warning screen FF or error screen EE.

When you push the switch F5 while the action level is shown on the machine monitor, “Current Abnormality” screen is shown.

Do the necessary actions shown on the message (1). Call the shown phone number when you consult Komatsu distributor. In that case, tell the failure code (2), failure name (3), and action level (4).

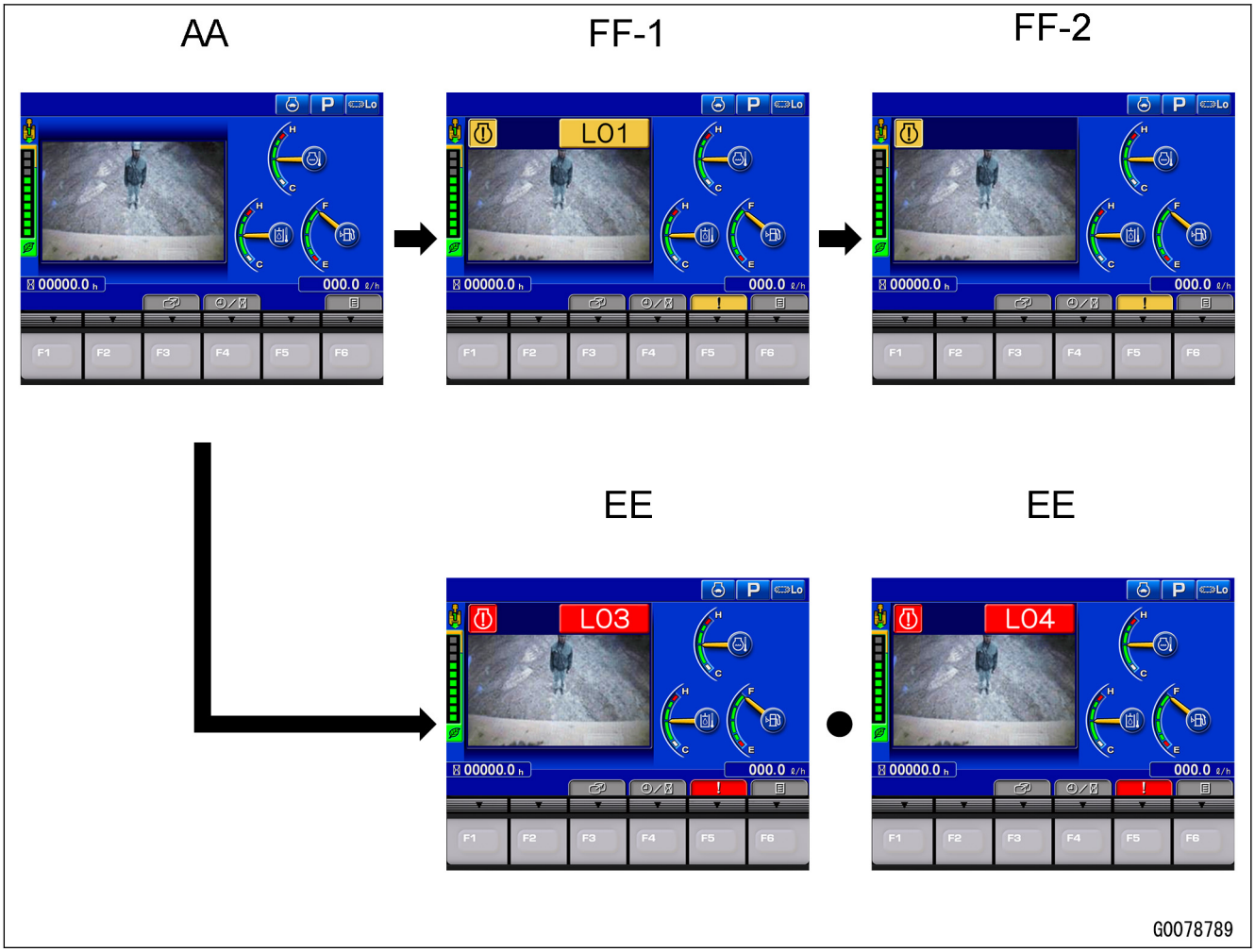


G0078793



G0078786

Basic Operation of Machine Monitor When Trouble Occurs While You Operate Machine

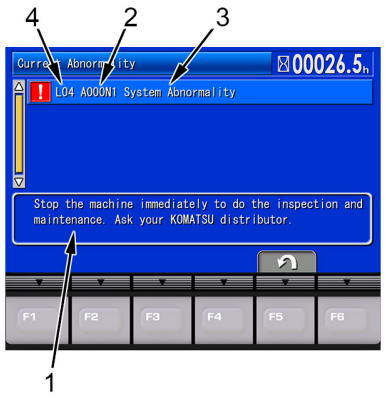


- If a problem occurs during the work, the standard screen AA changes to the warning screen FF-(1) or the error screen EE.
- After the warning screen FF-(1) is shown for 2 seconds, the screen changes automatically to the warning screen FF-(2).

When you push the switch F5 while the action level is shown on the machine monitor, “Current Abnormality” screen is shown.

Do the necessary actions shown on the message (1). Call the shown phone number when you consult Komatsu distributor. In that case, tell the failure code (2), failure name (3), and action level (4).

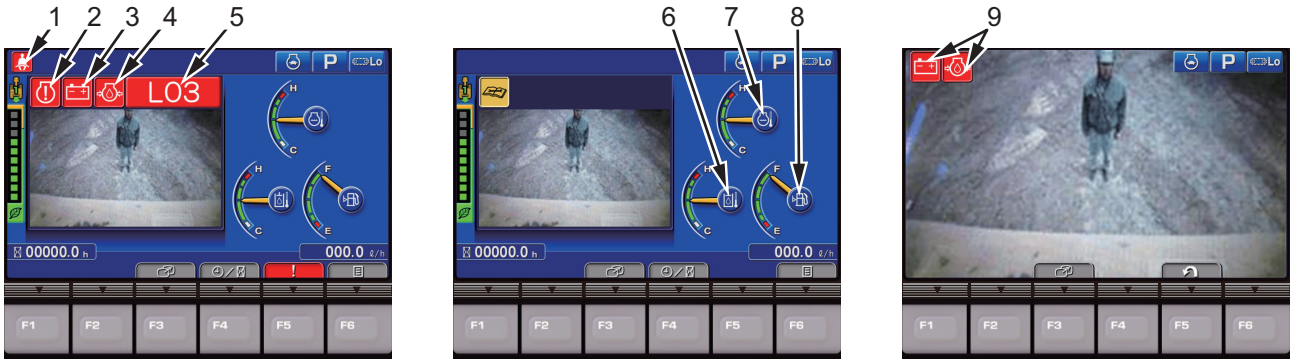




Warning Display

NOTICE

If one of action levels “L01” to “L04” is shown on the machine monitor, there is an abnormality on the machine. Do the applicable action instructed on “ List of action level displays and required actions”. The caution lamp lights up in red when an action level is shown, and it gives a warning to stop the machine immediately, or to stop the current operation temporarily. Do the action immediately. If no action is taken, it can have serious effects on the machine.



(1) Seatbelt caution lamp
(2) Caution lamp
(3) Caution lamp
(4) Caution lamp
(5) Action level display
(6) Hydraulic oil temperature caution lamp
(7) Engine coolant temperature caution lamp
(8) Fuel level caution lamp
(9) Caution lamp

Standard screen (camera display and meter display)

When 1 warning occurs, it is shown on the caution lamp (2).

When 2 warnings occur, they are shown on the caution lamps (2) and (3).

When 3 warnings occur, they are shown on the caution lamps (2), (3), and (4).

When 4 or more of warnings occur, they are shown on the caution lamps (2), (3) and (4) alternately at intervals of 2 seconds.

Full-screen camera display

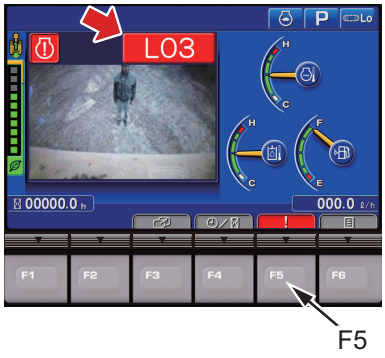
The occurred warning is shown by flashing of the caution lamp (9).

If 2 or more warnings occur, they are shown in the order from the left end of the screen.

Action Level Display

The action level shows the degree of urgency of the problem currently found on the machine by “L01” to “L04”. The larger the number in the table is, the more dangerous effects the problem can have on the machine if it is left with no action.

When the machine monitor shows an action level, do the necessary actions instructed on “List of action level displays and required actions”.



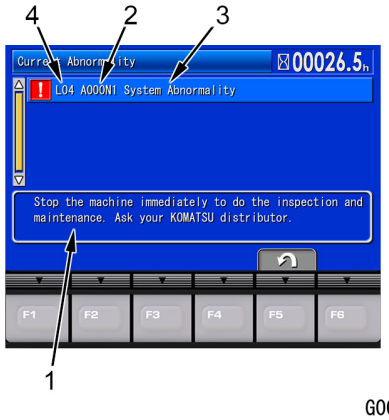
List of Action Level Display and Required Procedures

Degree of urgency	Action level	Buzzer	Color of caution lamp	Action
High ↑	L04	Operates continuously	Lights up in red	Stop the machine immediately and consult your Komatsu distributor for inspection and maintenance.
	L03	Operates intermittently	Lights up in red	Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.
	L02	Operates intermittently	Lights up in red	Stop the operation, and then run the engine at medium speed with no load or stop the engine. If the condition does not become better, consult your Komatsu distributor for inspection and maintenance.
↓ Low	L01	Does not operate	Lights up in yellow	Some functions can be restricted, but the machine can be operated. When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

If an action level is shown on the machine monitor, check the message shown on the monitor.

When you push the switch F5 while the action level is shown on the machine monitor, “Current Abnormality” screen is shown.

Do the necessary actions shown on the message (1). Call the shown phone number when you consult Komatsu distributor. In that case, tell the failure code (2), failure name (3), and action level (4).



Caution Lamp List

NOTICE

- **These caution lamps do not guarantee the condition of the machine. Do not simply rely on the caution lamp for checks-before-starting (start-up inspection). Be sure to get off the operator's seat and check each item directly.**
- **If the caution lamp is shown in red, the serious effect will be caused to the machine if it is left with no action done. Do the action immediately.**
- **Based on the contents of the caution, the engine output or engine speed can be restricted and the machine operation speed can possibly become slow.**

Caution Lamp and Color

Symbol	Type of caution lamp	Display color/Machine condition (action level)			
		Red	Yellow	White	Blue
 G0055284	Engine coolant temperature caution lamp	High temperature (L02)	-	Low temperature	Normal
 G0055286	Hydraulic oil temperature caution lamp	High temperature (L02)	-	Low temperature	Normal
 G0055287	Fuel level caution lamp	Low level	-	-	Normal
 G0055288	System state caution lamp	Abnormal (L04, L03)	Abnormal (L01)	-	-
 G0055289	Hydraulic system caution lamp	Abnormal (L04, L03)	Abnormal (L01)	-	-
 G0055295	Engine system caution lamp	Abnormal (L04, L03)	Abnormal (L01)	-	-
 G0078794	Caution lamp for engine sudden stop by auto idle stop	Abnormal (L03)	Abnormal (L01)	-	-
 G0055298	Engine oil pressure caution lamp	Low oil pressure (L03)	-	-	-
 G0055300	Radiator coolant level caution lamp	Low coolant level (L02)	Low coolant level (L01)	-	-

Symbol	Type of caution lamp	Display color/Machine condition (action level)			
		Red	Yellow	White	Blue
 G0055301	Charge level caution lamp	Abnormal (L03)	-	-	-
 G0055302	Air cleaner clogging caution lamp	-	Clogged (L01)	-	-
 G0055303	Air conditioner system caution lamp	-	Abnormal (L01)	-	-
 G0055305	Maintenance time caution lamp	Due time is over	Notice	-	-
 G0055304	Seatbelt caution lamp	Not fastened	-	-	-
 G0055299	Engine overrun caution lamp	Overspeed (L02)	-	-	-
 G0055297	Fan control system caution lamp	Abnormal (L03)	Abnormal (L01)	-	-
 G0078795	Camera system caution lamp	Abnormal (L03)	Abnormal (L01)	-	-

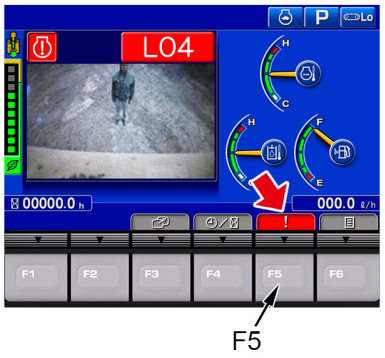
For the explanation of each caution lamp and required action, see the section of each caution lamp.

Current Abnormality Display Switch

When there is an error, “!” is shown above the switch F5.

If you push the switch F5 when “!” is shown, you can change the screen on the monitor display to the “Current Abnormality” screen.

Take appropriate actions in response to the message shown on the monitor.



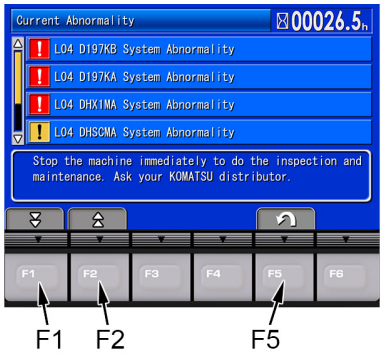
Operation on “Current Abnormality” Screen

On the “Current Abnormality” screen, you can do the operations that follow with the switches F1, F2, and F5.

F1: Shows the next page. When on the last page, it shows the first page.

F2: Shows the previous page. When on the first page, it shows the last page.

F5: The screen goes back to the standard screen.



Engine Coolant Temperature Caution Lamp



The engine coolant temperature caution lamp gives a warning about states caused by engine coolant temperature.

When abnormal

The caution lamp lights up in red, and the action level “L02” is shown.

The engine coolant temperature is abnormally high.

While it is lit, the overheat prevention system is automatically activated, and the engine speed decreases.

Stop the operation, and keep the engine at low idle state until the caution lamp shows display color at correct temperature (blue light).

When temperature is low

The caution lamp lights up in white.

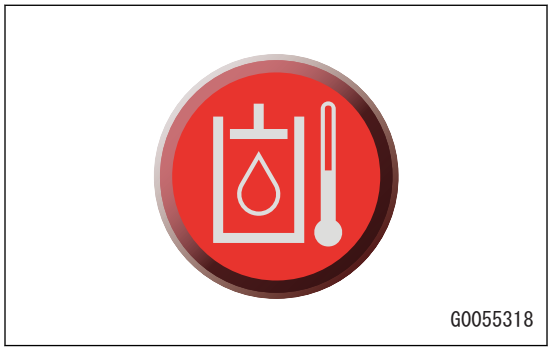
The engine coolant temperature is low.

The engine needs the warm-up operation. Do the warm-up operation for the engine until the caution lamp shows the display color (blue light) at the correct temperature. For details, see “Engine Warm-up Operation (3-144)”.

When temperature is correct

The caution lamp lights up in blue.

Hydraulic Oil Temperature Caution Lamp



The hydraulic oil temperature caution lamp gives a warning about states caused by hydraulic oil temperature.

When abnormal

The caution lamp lights up in red, and the action level “L02” is shown.

The hydraulic oil temperature is abnormally high.

Stop the operation, and run the engine at low idle or stop it until the caution lamp changes to the display color (blue) at the correct temperature.

When temperature is low

The caution lamp lights up in white.

The hydraulic oil temperature is low.

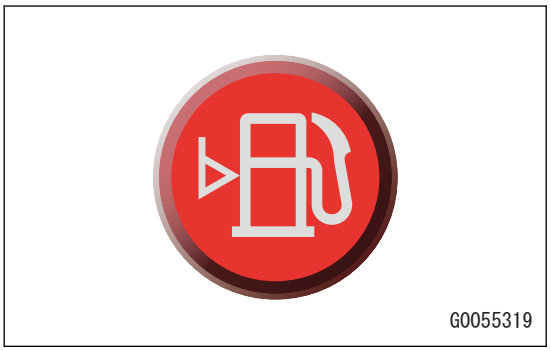
It is necessary to warm up the hydraulic component. Do the warm-up operation for the hydraulic component until the caution lamp changes to the display color (blue) at the correct temperature. For details, see “Hydraulic System Warm-up Operation (3-146)”.

When temperature is correct

The caution lamp lights up in blue.

Fuel Level Caution Lamp

The fuel level caution lamp gives a warning about low level of remaining fuel.



When fuel level is low

The caution lamp lights up in red.

The remaining fuel quantity has been reduced to approximately 23ℓ {6.08US gal} or below.

Add fuel shortly.

When normal

The caution lamp lights up in blue.

System Caution Lamp

The system caution lamp gives a warning about a problem in the machine system such as sensors.



When the action level “L04” is shown

The caution lamp lights up in red, and the alarm buzzer operates continuously.

Stop the machine immediately and consult your Komatsu distributor for inspection and maintenance.

When the action level “L03” is shown

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

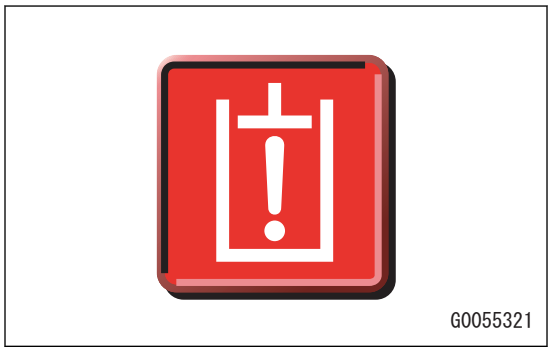
When the action level “L01” is shown

The caution lamp lights up in yellow.

Some functions can be restricted, but the machine can be operated.

When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Hydraulic System Caution Lamp


G0055321

The hydraulic system caution lamp gives a warning about an abnormality in the hydraulic system.

When the action level “L04” is shown

The caution lamp lights up in red, and the alarm buzzer operates continuously.

Stop the machine immediately and consult your Komatsu distributor for inspection and maintenance.

When the action level “L03” is shown

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

When the action level “L01” is shown

The caution lamp lights up in yellow.

Some functions can be restricted, but the machine can be operated.

When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Engine System Caution Lamp

⚠ CAUTION

There is a danger that the machine will have an unwanted serious effect if you continue operation with the red caution lamp lit. Stop the engine immediately.


G0055329

The engine system caution lamp gives a warning about a problem in the engine system.

When the action level “L04” is shown

The caution lamp lights up in red, and the alarm buzzer operates continuously.

Stop the machine immediately and consult your Komatsu distributor for inspection and maintenance.

When the action level “L03” is shown

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

When the action level “L01” is shown

The caution lamp lights up in yellow.

Some functions can be restricted, but the machine can be operated.

When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Caution Lamp for Engine Sudden Stop by Auto Idle Stop

Caution lamp for engine sudden stop by auto idle stop gives caution for abnormality when engine stops suddenly by auto idle stop more than specific number of times.



When the action level “L03” is shown

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

When the action level “L01” is shown

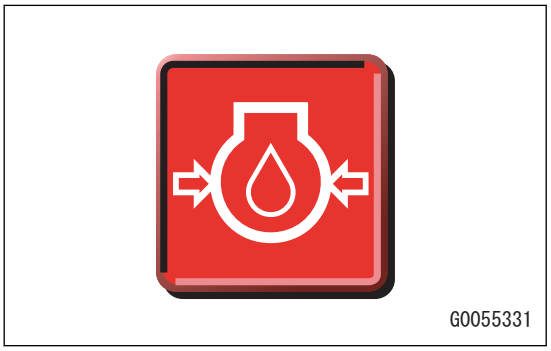
The caution lamp lights up in yellow.

There is a possibility that the engine durability is decreased, but the work can be done.

When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Engine Oil Pressure Caution Lamp

The engine oil pressure caution lamp gives a warning about a problem of the engine lubricating oil pressure.



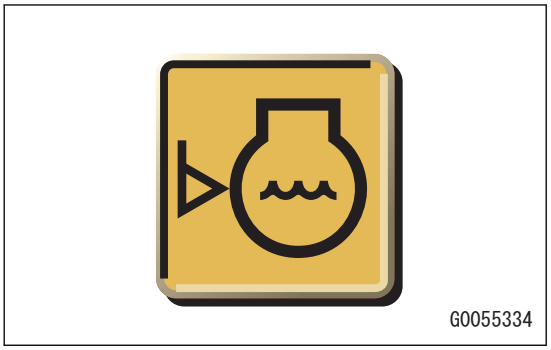
When oil pressure is low

The caution lamp lights up in red, and the action level “L03” is shown. The alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

Radiator Coolant Level Caution Lamp

The radiator coolant level caution lamp gives a warning about the decrease of the radiator coolant level.



When the coolant level is continuously low

The caution lamp lights up in red, and the action level “L02” is shown. The alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and check the coolant level in the radiator and add coolant. For details, see “How to Examine Coolant Level, Add Coolant (3-117)”.

When the coolant level is low

The caution lamp lights up in yellow, and the action level “L01” is shown.

The radiator coolant level is low.

Check the coolant level in the reservoir tank of the radiator and add coolant. For details, see “How to Examine Coolant Level, Add Coolant (3-117)”.

If it occurs again in a short time, the coolant possibly leaks from the radiator. Consult your Komatsu distributor for the inspection and maintenance.

Charge Level Caution Lamp

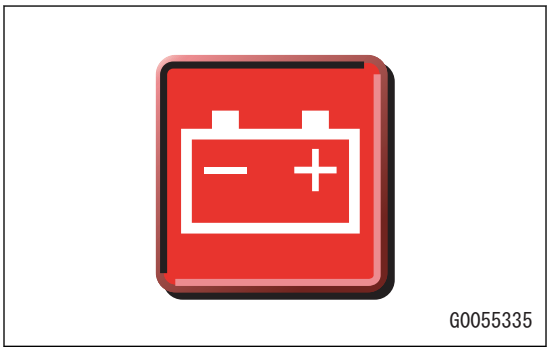
The charge level caution lamp gives a warning about a problem in the charge system while the engine is in operation.

When abnormal

The caution lamp lights up in red, and the action level “L03” is shown. The alarm buzzer operates intermittently.

The battery is not charged correctly while the engine is in operation.

Stop the engine and check the fan belt for damage. Then consult your Komatsu distributor for inspection and maintenance.



Air Cleaner Clogging Caution Lamp

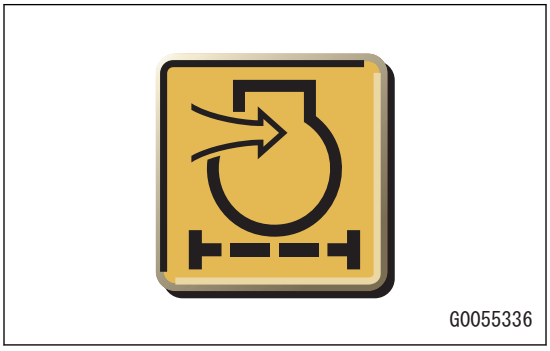
The air cleaner clogging caution lamp gives a warning that the air cleaner is clogged.

When clogged

The caution lamp lights up in yellow, and the action level “L01” is shown.

The air cleaner is clogged.

Stop the engine. Then, check and clean the air cleaner. For details, see “How to Examine, Clean and Replace Air Cleaner (4-16)”.



Air Conditioner System Caution Lamp

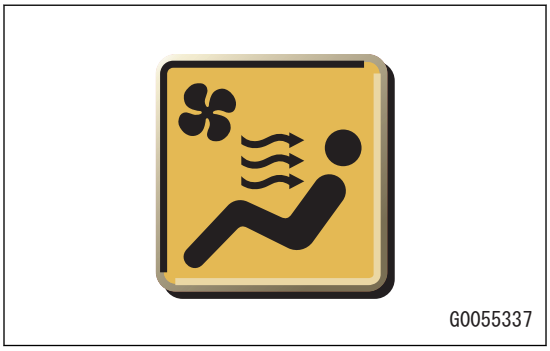
The air conditioner system caution lamp shows an abnormality in the air conditioner system.

When abnormal

The caution lamp lights up in yellow, and the action level “L01” is shown.

A problem is found in the air conditioner system.

Consult your Komatsu distributor for the inspection and maintenance as fast as possible.



Maintenance Time Caution Lamp

The maintenance time caution lamp shows the notices and alarms for the maintenance time.

It lights up when you turn the starting switch to “ON” position, goes off after 30 seconds, and the screen changes to the standard screen.



G0055339

When due time is over

The caution lamp lights up in red.

The maintenance due time is over.

If no remedies are taken, the machine performance will deteriorate and the machine life will decrease. Do the necessary maintenance as fast as possible.

When notice is given

The caution lamp lights up in yellow.

The maintenance time is near.

Prepare the necessary parts for maintenance.

REMARK

- Push the switch F6 on the maintenance time caution screen shown in the right figure or on the standard screen, and check the necessary maintenance item on “Maintenance” tab screen. For the operations on “Maintenance” tab screen, see “Maintenance (3-67)”.
- By default, the maintenance time caution lamp (yellow) is set to light up when the remaining time becomes 30 hours or below. You can change this setting.
  Consult your Komatsu distributor to change it.



G0078802



G0078803

Seatbelt Caution Lamp

The seat belt caution lamp is shown when the seat belt is not fastened. It goes off when the seat belt is fastened.

To fasten the seat belt, see “How to Fasten and Unfasten Seat Belt (3-131)”.



Engine Overrun Caution Lamp

The engine overrun caution lamp gives a warning about the overspeed of the engine.

When engine overspeeds

The caution lamp lights up in red, and the action level “L02” is shown. The alarm buzzer operates intermittently.

Stop the work immediately, and operate the machine with moderate travel speed until the engine overrun caution lamp goes off. If you continue to do the work, there is a danger that it can damage the engine and hydraulic devices.



Fan Control System Caution Lamp

The fan control system caution lamp gives a warning about a problem in the fan control system.

When the action level “L03” is shown

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

When the action level “L01” is shown

The caution lamp lights up in yellow.



Some functions can be restricted, but the machine can be operated.

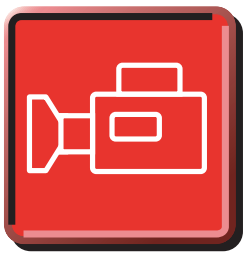
When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Camera System Caution Lamp

⚠ WARNING

Do not move the machine unless the camera image is shown on the machine monitor.
Make sure to have a signalman present when you move the machine to a safe area. If there is a sign, the operator must pay attention to the sign and obey the instructions of the signalman.

The camera system caution lamp gives a warning about the trouble in camera signal caused by breakage in cables, loose and disconnected connectors.


G0078808

When the action level “L03” is shown

A problem is found in the camera signal.

The caution lamp lights up in red, and the alarm buzzer operates intermittently.

Camera image is not shown on the machine monitor when the caution lamp lights up.

Stop the operation, move the machine to a safe area, and consult your Komatsu distributor for inspection and maintenance.

When the action level “L01” is shown

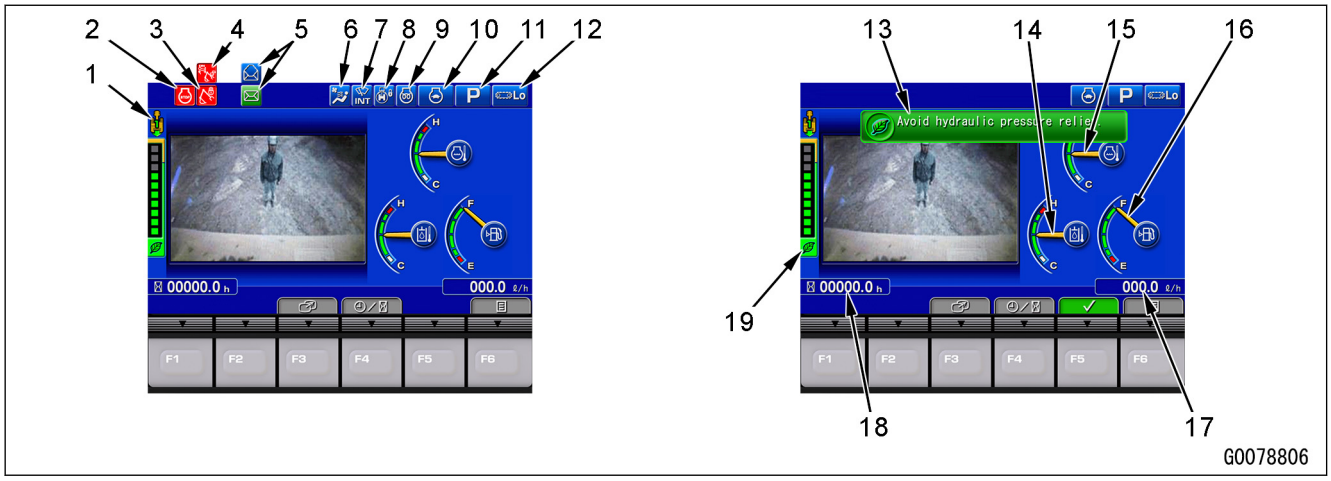
The caution lamp lights up in yellow.

Camera image is not shown on the machine monitor when the caution lamp lights up.

When you operate the machine, visually check the safety around the machine.

When you complete the operation, be sure to do the inspection and maintenance. Consult your Komatsu distributor for inspection and maintenance as needed.

Pilot Display and Meter Display



Pilot display

(1) Camera selection display
(2) Engine stop pilot lamp
(3) Work equipment lock pilot lamp
(4) Lock lever automatic lock cancel pilot lamp
(5) Message display
(6) Air conditioner pilot lamp
(7) Wiper pilot lamp
(8) Swing lock pilot lamp
(9) Preheating pilot lamp
(10) Auto-deceleration pilot lamp
(11) Working mode display
(12) Travel speed display
(13) ECO guidance

Meter display

(14) Hydraulic oil temperature gauge
(15) Engine coolant temperature gauge
(16) Fuel gauge
(17) Fuel consumption gauge
(18) Service meter/clock
(19) ECO gauge

Pilot Display

The pilot display consists of the pilot lamps to check the operation state of each function.

The pilot lamp lights up when each function is in operation while the starting switch is at ON position.

Preheating Pilot Lamp

The preheating pilot lamp is shown while the engine at 0℃ or below is preheated before you start it.

When the temperature is low (in cold weather) and the automatic preheating function operates, the preheating pilot lamp lights up. It goes off when the preheating is completed.

The maximum automatic preheating time is approximately 30 seconds.



G0055346

Wiper Pilot Lamp

The wiper pilot lamp shows the operation state of the wiper.

The operation of the wiper switch is shown by the pilot lamp as follows.

When ON lights up: Wiper operates continuously

When INT lights up: Wiper operates intermittently

When nothing lights up: Wiper stops



G0078809

Swing Lock Pilot Lamp

The swing lock pilot lamp shows the state of the swing parking brake cancel switch.

The pilot lamp display by the swing parking brake cancel switch operation is as follows.

Pilot lamp flashes: Swing parking brake cancel switch ON

Pilot lamp is not lit: Swing parking brake cancel switch OFF



G0078810

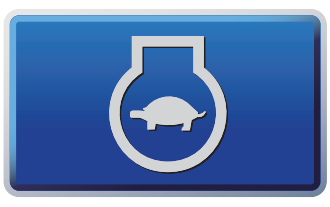
Auto-Deceleration Pilot Lamp

The auto-deceleration pilot lamp shows which one of ON or OFF the auto-deceleration function is set.

The pilot lamp display by the auto-deceleration switch operation is as follows.

Pilot lamp is lit: Auto-deceleration is ON

Pilot lamp is not lit: Auto-deceleration is OFF



G0078811

Working Mode Display

Working mode display shows the working mode which is set for the work.

The working mode display with the working mode switch operation is shown as follows.

“P”: P mode (for heavy-duty operations)

“E”: E mode (for operations with emphasis on fuel consumption)

“L”: L mode (for fine control operations)

“B”: B mode (for breaker operations) (for machines ready for installation of attachments)



“ATT/P”: ATT/P mode (for operations of 2-way attachment like crusher, etc.)

“ATT/E”: ATT/E mode (for operations of 2-way attachment like crusher, etc. with emphasis on fuel consumption)

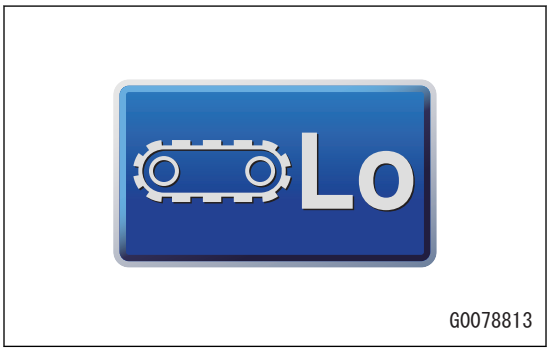
Travel Speed Display

The travel speed display shows the set mode of the travel speed.

The travel speed set with the travel speed selector switch operation is shown as follows.

“Lo”: Low-speed travel

“Hi”: High-speed travel



Air Conditioner Pilot Lamp

The air conditioner pilot lamp shows the operation state of the air conditioner.

Pilot lamp is lit: Air conditioner ON

Pilot lamp is not lit: Air conditioner OFF



Message Display

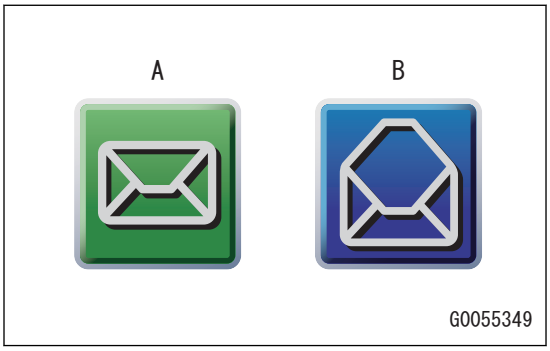
The message display lights up when there is a message from Komatsu.

To read the message, see “Message Display (3-77)”.

Lights up in green (A): There is an unread message.

Lights up in blue (B): There is a message to which no reply is made.

OFF: No message



Engine Stop Pilot Lamp

The engine stop pilot lamp is shown while the engine is stopped. It goes off when the engine is started.



G0055351

Work Equipment Lock Pilot Lamp

The work equipment lock pilot lamp lights up when the work equipment is locked.

It lights up when the work equipment lock state changes from release to lock.



G0078814

Lock Lever Automatic Lock Cancel Pilot Lamp

Lock lever automatic lock cancel pilot lamp shows the state of lock lever automatic lock cancel switch.

The pilot lamp display by the lock lever automatic lock cancel switch operation is as follows.

Pilot lamp flashes: The lock lever automatic lock cancel switch is ON

Pilot lamp is not lit: The lock lever automatic lock cancel switch is OFF



G0078815

ECO Guidance

Guidance to recommend energy saving operation to decrease the fuel consumption can be shown during operation.

The details of the guidance are as follows.



G0078817

Idling Stop Guidance

If no operation is done for 5 minutes or longer, and when the engine runs at idle, “Avoid long time idling.” is shown on the monitor. When you wait for the work or stop operation for a short period, stop the engine to decrease fuel consumption.

“Idling stop guidance” goes off when you operate the lever again, or push the switch F5.



G0078820

Guidance to Avoid Hydraulic Relief

If relief of the hydraulic oil is kept for 3 seconds or longer during operation, “Avoid hydraulic pressure relief.” is shown on the monitor.

“Guidance to avoid hydraulic relief” goes off after it is shown for 10 seconds or longer, or when the switch F5 is pushed.



G0078823

Economy Mode Recommended Guidance

If you do the work with light load 10 minutes or more in P mode or ATT/P mode, “E mode is recommended to save fuel.” will be shown. During the work with light load, set the working mode to the Economy mode to decrease fuel consumption.

“Economy mode recommended guidance” goes off after it is shown for 10 seconds or longer, or when the switch F5 is pushed.

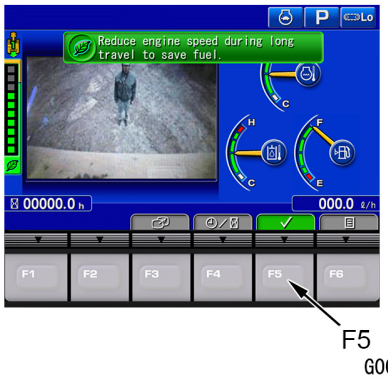


G0078826

Travel Partial Mode Recommendation Guidance

When the travel mode is “Hi”, the fuel control dial is at the MAX position, and travel state is kept for 2 minutes or more, “Reduce engine speed during long travel to save fuel.” is shown. When you drive the machine for a long time, turn down the fuel control dial to reduce the fuel consumption.

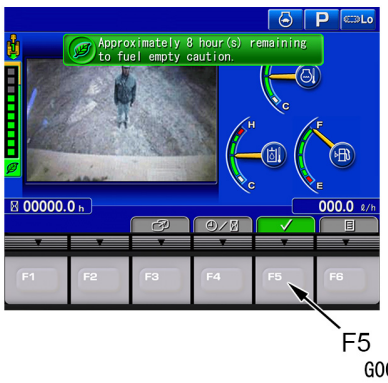
“Travel partial recommendation guidance” goes off after it is shown for 10 seconds, or when the switch F5 is pushed.



Fuel Low Level Guidance

If the starting switch key is set to the ON position when the available operating hours estimated from the remaining fuel level and the latest average fuel consumption is less than 8 hours, “FUEL LOW LEVEL GUIDANCE” is shown.

“Fuel low level guidance” goes off after it is shown for 10 seconds or longer, or when the switch F5 is pushed.



Meter Display

Engine Coolant Temperature Gauge

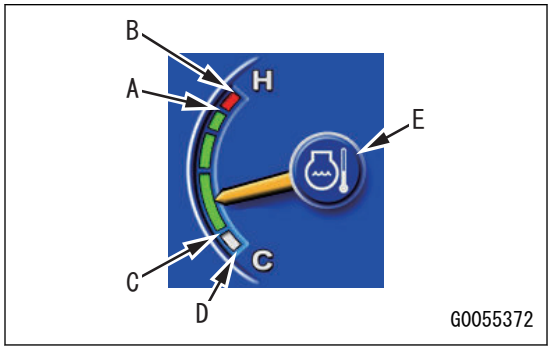
The engine coolant temperature gauge shows the engine coolant temperature.

During operations, it is correct if the pointer is in the green range. If the pointer exceeds the red range (A) position during operations, the overheat prevention system activates.

(A) to (B): Shows the red range.

(A) to (C): Shows the green range.

(C) to (D): Shows the white range.



The overheat prevention system operates as follows.

Red range (A) position: The engine coolant temperature caution lamp (E) becomes a display at abnormal temperature.

Red range (B) position: The engine speed changes to the low idle, and the engine coolant temperature caution lamp (E) becomes a display at abnormal temperature. At the same time, the alarm buzzer operates.

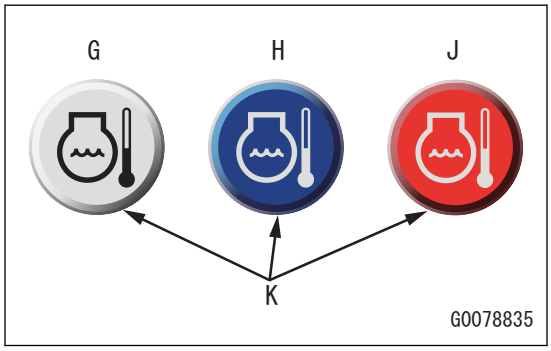
The overheat prevention system continues its operation until the pointer gets in the green range.

Engine coolant temperature caution lamp (E) shows low temperature display when the pointer is in the (D) position at the engine start. In this case, do the engine warm-up operation.

Display (G) when temperature is low: The caution lamp background (K) is white

Display (H) when temperature is correct: The caution lamp background (K) is blue

Display (J) when temperature is abnormal: The caution lamp background (K) is red



Hydraulic Oil Temperature Gauge

The hydraulic oil temperature gauge shows the hydraulic oil temperature.

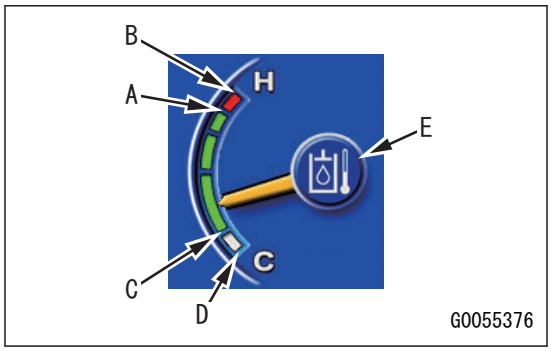
During operations, it is correct if the pointer is in the green range.

When you do operations, if the pointer is near the red range (A), hydraulic oil temperature is 102℃ {215.6℉} or more. Set the engine at low idle or stop the engine, and wait until the hydraulic oil temperature goes down.

(A) to (B): Shows the red range.

(A) to (C): Shows the green range.

(C) to (D): Shows the white range.



REMARK

Hydraulic oil temperature when the pointer is near the red range (A) is as follows.

Red range (A) position:102℃ {215.6℉} or more

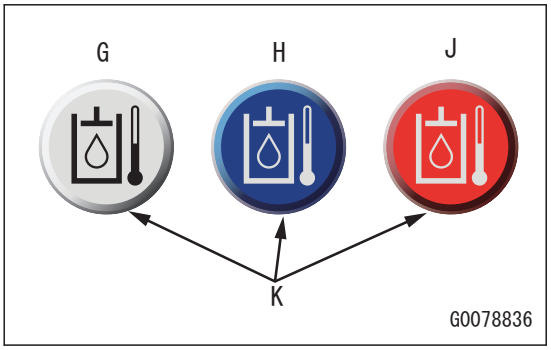
Red range (B) position:105℃ {221℉} or more

When the pointer is in the red range of (A) to (B), the hydraulic oil temperature caution lamp (E) becomes a display of abnormal temperature.
When the pointer is in the range of (C) at the engine start, the hydraulic oil temperature is 20℃ {68℉} or below. Hydraulic oil temperature caution lamp (E) becomes a display of low temperature. In this case, do the engine warm-up operation. See “Hydraulic System Warm-up Operation (3-146)”.

Display (G) when temperature is low: The caution lamp background (K) is white

Display (H) when temperature is correct: The caution lamp background (K) is blue

Display (J) when temperature is abnormal: The caution lamp background (K) is red



Fuel Gauge

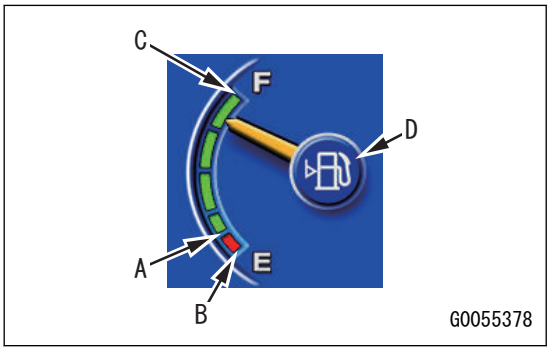
The fuel gauge shows the quantity of fuel in the fuel tank.

During operations, it is correct if the pointer is in the green range.

During operations, if the pointer is near the red range (A), the fuel quantity is 32ℓ {8.45US gal} or below. Check and add fuel.

(A) to (B): Shows the red range.

(A) to (C): Shows the green range.



REMARK

If the pointer reaches the red range (B), the fuel quantity is 23ℓ {6.08US gal} or below.
If the pointer is in the red range (B), the fuel level caution lamp (D) lights up in red.

The pointer cannot show the correct position for a while after the starting switch is turned to the ON position. It is not an abnormality.

Service Meter/Clock

The service meter/clock shows the total operation hours of the machine or the current time.

While the engine is in operation, the service meter increases even if the machine does not move. The service meter increases by 0.1 for 6 minutes of engine operation regardless of the engine speed.

The clock can be changed between 12-hour display and 24-hour display.

- Service meter display



G0055380

- Clock display (12-hour display)



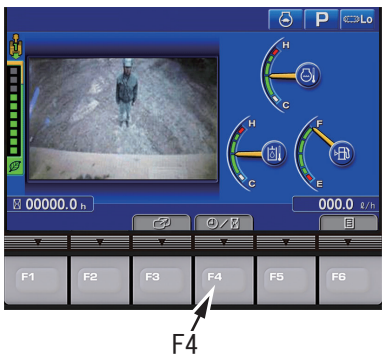
G0055381

- Clock display (24-hour display)



G0055382

The clock display and service meter display can be selected when the switch F4 is pushed on the standard screen.



G0078838

REMARK

- If the battery is kept disconnected for a long period for storage or such, the time information will be lost in some cases.
- To set the clock display and adjust the time, see “Clock Adjustment (3-70)”.

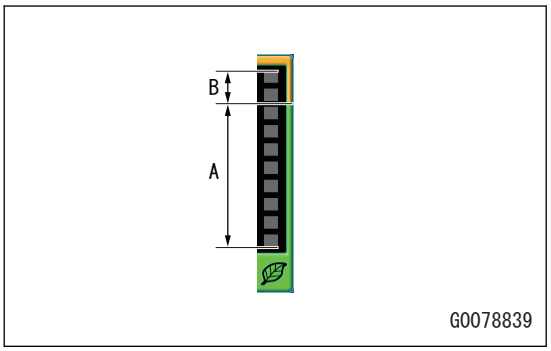
ECO Gauge

ECO gauge shows the instantaneous fuel consumption.

The instantaneous fuel consumption shows the fuel consumption ratio at each moment, and changes by the work load and engine speed.

When the gauge is in the green range A, the instantaneous fuel consumption is at a good to medium level.

When the gauge is in the yellow range B, the instantaneous fuel consumption is at a bad level.



REMARK

Even if the gauge is in the yellow range, this is not an abnormality of the machine. But make the engine output as low as possible, and do the energy saving operation in the green range for conservation of global environment. Also, energy saving operation is possible if travel frequency is reduced. It is recommended to reconsider the construction method.

Fuel Consumption Gauge

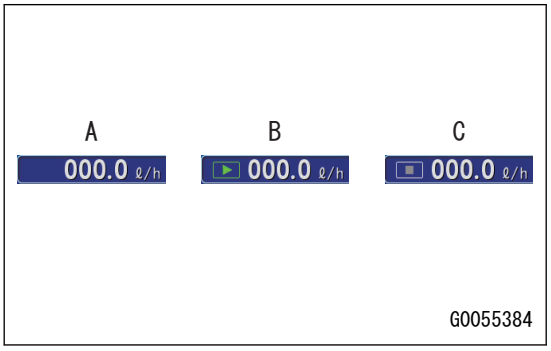
The fuel consumption gauge shows the average fuel consumption of the machine.

You can change the display on the fuel consumption gauge between the average fuel consumption of a day and the average fuel consumption during a selected period (split fuel consumption).

(A): The average fuel consumption of a day (from 0:00 a.m. of the day to 0:00 a.m. of the next day)

(B): The split fuel consumption during measurement

(C): The split fuel consumption while measurement is stopped



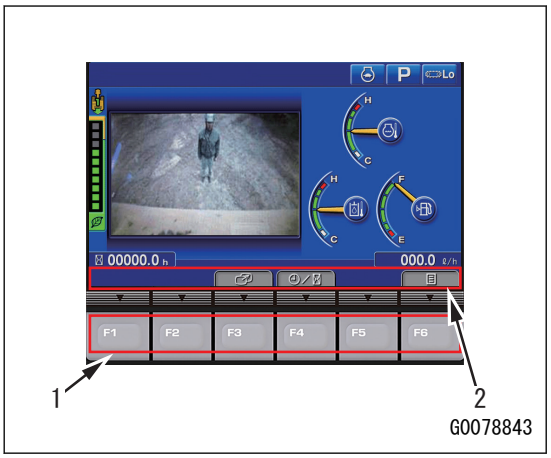
Monitor Switch



(1) Function switch
(2) Working mode selector switch
(3) Auto-deceleration switch
(4) Travel speed selector switch
(5) Wiper switch
(6) Window washer switch
(7) Buzzer cancel switch
(8) Air conditioner switch

Function Switch and Guidance Icon

- There are 6 function switches (1) (F1 to F6) at the bottom of the monitor display. The function of each switch changes in response to the content of the screen.
- The function of the function switch (1) on each screen can be checked by the guidance icon (2) that is shown above the function switch.
- While the guidance icon (2) is not shown, the function switch (1) does not operate even if it is pushed.
- Even if the guidance icon (2) is pushed, it does not operate. Push the function switch (1) directly below the guidance icon (2) to operate the function.

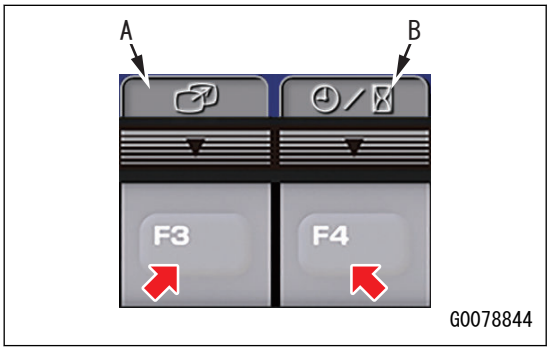


When the monitor display shows the standard screen, the types of guidance icons and functions of the function switches are as follows.

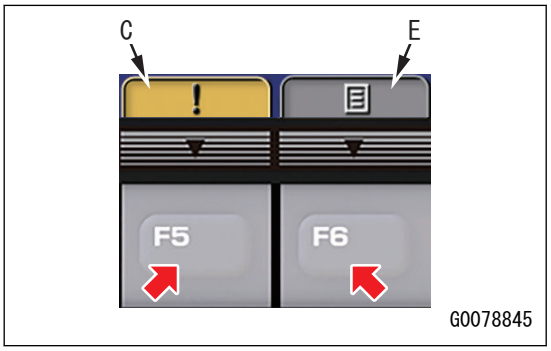
For the details of each function, see the explanation of each item.

(A) Switch F3: Camera image selector switch

(B) Switch F4: Service meter/clock display selector switch

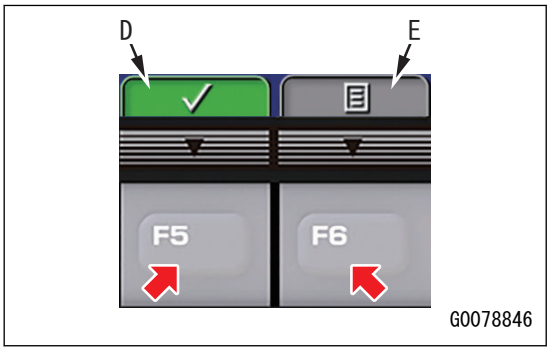


(C) Switch F5: “Current Abnormality” display switch
(only while the caution lamp is lit)



(D) Switch F5: ECO guidance cancel switch
(only while the ECO guidance display is shown)

(E) Switch F6: User menu display switch



REMARK

- Even if some guidance icons look the same, their display positions and function switches can be different in response to the screen that shows the icons.
- For the guidance icons and their functions that are not explained above, see the pages where the control methods of each screen are explained.

Working Mode Selector Switch

Working mode selector switch is a switch that set the movement and power of the work equipment.

Your work will be easily done when you select the mode that matches the contents of work.

P mode: For heavy-duty operation

E mode: For operation with emphasis on fuel consumption

L mode: For fine control operation

B mode: For breaker operation

ATT/P mode: For operation of 2-way attachment like crusher (for machines ready for installation of attachment)

ATT/E mode: For operation of 2-way attachment like crusher, etc. and operations with emphasis on fuel consumption (for machines ready for installation of attachment)



G0078851

- When you start up the monitor, the mode when the starting switch was turned to the OFF position is automatically set.
- When you push the working mode selector switch, the working mode selector screen is shown. “P”, “E”, “L”, “B”, “ATT/P”, “ATT/E” are shown on the working mode display on the top right of the monitor display for each mode.
- For machines ready for installation of attachment, the attachment mode is additionally shown.

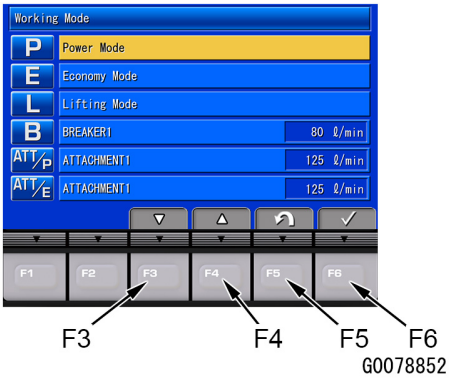
If you would like to automatically set the P, E, L, B, ATT/P, and ATT/E modes (initial option settings) when you start the engine, ask Komatsu distributor to change the settings.

Operation Procedure

1. When you push the working mode selector switch, the working mode selector screen is shown on the monitor.
2. Push the switches F3, F4 at the bottom of the screen or the working mode selector switch to change the mode selection one by one.
   If you do not touch a switch for more than 5 seconds, the working mode selected at that time is automatically set, and the screen moves to step 3 and step 4.

   REMARK

   To go back to the standard screen without changing the working mode, push the switch F5.



G0078852

3. After you select the mode you want to change, push the switch F6 and the mode will be shown in the center of the monitor display.

   (Example: Power mode: “P”)

4. After 2 seconds, the working mode display on the top right of the screen will be highlighted in yellow.



G0078856

5. After 2 seconds, the screen goes back to the standard screen.

   The yellow work mode display, which was highlighted in step 4, goes back to blue.



G0078859

Auto-Deceleration Switch

Auto-deceleration switch is a switch that automatically decreases the engine speed when the control lever is in the NEUTRAL position and turns on the function that makes fuel consumption less.

Auto-deceleration pilot lamp is lit: Auto-deceleration ON

Auto-deceleration pilot lamp is not lit: Auto-deceleration OFF

Each time you push the switch, the auto-deceleration turns on or off.



G0078861

Auto-Deceleration Function

When the auto-deceleration function is turned on, the engine speed decreases from the work speed to the idle speed after about 4 seconds when the work equipment lever and travel lever are set to the NEAUTRAL position. This reduces fuel consumption. If you operate even one of these levers again in this state, the engine speed goes back to the original work speed and you can do the work.

1. When you push the auto-deceleration switch to turn on the auto-deceleration function, the mode is shown in the center of the monitor display and it goes back to the standard screen after 2 seconds.



G0078863

2. The auto-deceleration pilot lamp is lit on the standard screen.

   (It is not lit when the auto-deceleration is turned off.)



G0078865

Travel Speed Selector Switch

⚠ WARNING

- **Stop the machine always before you change the travel mode with travel speed selector switch. If you change between high speed travel and low speed travel while you drive the machine, travel direction can deviate even in straight travel.**
- **Set the travel mode to the “Lo” when you load to and unload from a trailer.**

Travel speed can be changed in 2 levels with travel speed selector switch.

“Lo” lights up: Low speed travel

“Hi” lights up: High speed travel

“Lo” is automatically set when engine is started.

Each time you push the travel speed selector switch, the setting changes between “Lo” and “Hi”, alternately.

Even when you drive the machine in high speed travel (“Hi”), it changes to low speed travel (“Lo”) automatically when travel force is needed on soft ground or slope. You need not change the switch. For the travel speed display on the monitor display, “Hi” (high speed) stays lit.



G0078867

REMARK

Each time you change the travel speed selector switch, the mode is shown in the center of the monitor display, and after 2 seconds, the screen goes back to the standard screen.



G0078869



G0078871

Wiper Switch

Wiper switch operates the windshield wiper at the front window glass.

Each time you push the switch, the operation changes as “INT” →“ON”→STOP (lamp goes out).

When the “INT” of wiper pilot lamp is lit: Windshield wiper operates intermittently.

When the “ON” of wiper pilot lamp is lit: Windshield wiper operates continuously.

When the wiper pilot lamp in not lit: Windshield wiper is stopped.



G0078873

REMARK

Each time you change the wiper switch, the mode is shown in the center of the monitor display, and after 2 seconds, the screen goes back to the standard screen.



G0078875



G0078877

Window Washer Switch

When you push the window washer switch, window washer fluid is sprayed to the front window glass. When you let go of the switch, it stops.



G0078878

- If you continue to push the switch when the windshield wiper is stopped, wind washer fluid is sprayed and windshield wiper operates continuously at the same time. When you let go of the switch, windshield wiper operates 2 times and stops.
- If you continue to push the switch when the windshield wiper operates intermittently, wind washer fluid is sprayed and windshield wiper operates continuously at the same time. When you let go of the switch, windshield wiper operates 2 times and goes back to intermittent operation.

Buzzer Cancel Switch

The buzzer cancel switch is used to stop the alarm buzzer for the warning item that has a problem.



G0078879

Air Conditioner Switch

The air conditioner switch and numeric keypad consist of 9 types of switches.

For details of the switches, see “Handle Air Conditioner (3-190)”.



G0078880

Function Switch

Function switch operation on the standard screen

Camera Image Selector Switch

When the switch F3 is pushed on the standard screen, the screen changes to the display with only the camera image.



G0055409

Operation on the Camera Image Display Screen

Operation how to select the camera image display is described in this section.



G0078882

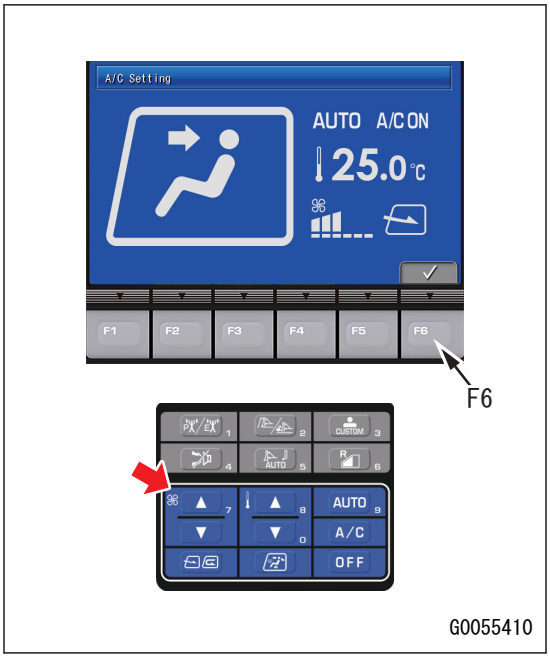
- Camera image is always shown on the left on the monitor in the standard screen AA.
- On the standard screen AA, when you push the switch F3, the full-screen camera image NN is shown. Camera image is shown in the all area of the machine monitor on the camera image whole display screen NN.

Other Mode Operations While the Full-Screen Camera Image is Shown

Even while the full-screen camera image is shown, it is possible to operate the modes that follow.

- The air conditioner can be operated.

  When you operate the air conditioner switch, the screen changes to “A/C Setting” screen. When the screen changes to “A/C Setting” screen, push the switch F6 to go back to the full-screen camera display. Or if no operation is done for 5 seconds after the screen changes to “A/C Setting” screen, the screen automatically goes back to the full-screen camera display.



G0055410

- You can change the working mode when you push the working mode selector switch.

  When you change the working mode, the screen automatically goes back to the camera image whole display screen. At that time, the working mode display at the top right on the monitor display will be highlighted in yellow for 2 seconds, and goes back to blue.



G0078884

- You can change the travel speed when you push the travel speed selector switch.

  When you change the travel speed, the travel speed display at the top right on the monitor display will be highlighted in yellow for 2 seconds, and goes back to blue.



G0078885

- You can shift the ON/OFF of the auto-deceleration function when you push the auto-deceleration switch.

  The full-screen camera display does not change to other screen or go back to the standard screen display when the auto-deceleration switch is operated.



G0078886

- Push the buzzer cancel switch to stop the alarm buzzer sound for the abnormal warning items.

  The full-screen camera display does not change to other screen or go back to the standard screen when the buzzer cancel switch is operated.



G0078879

- You can operate the windshield wiper with the wiper switch.

  The full-screen camera display does not change to other screen or go back to the standard screen when the wiper switch is operated.



G0078887

- You can operate the window washer with the window washer switch.

  The full-screen camera display does not change to other screen or go back to the standard screen when the window washer switch is operated.



G0078878

Procedures Against Warning While the Full Camera Image is Shown

If a problem occurs on the machine when the camera image whole display is shown, the caution lamp flashes at the top left of the screen.

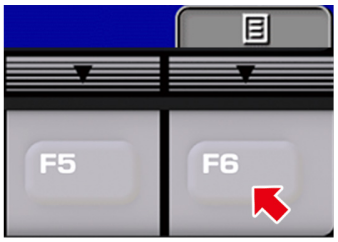
- If the caution lamp is shown, push the switch F3 to go back to the standard screen, and then check the details of the error or warning display.
  If no lever is operated for 10 seconds or longer while the caution lamp flashes, the screen automatically returns to the standard screen.
  When the screen goes back to the standard screen, the caution lamp on the upper left of the screen goes off, and then the caution lamp and action level are shown.
- If a caution lamp is shown, move the machine to set it in a safe posture immediately, and have it checked.



G0078889

User Menu Display Switch

When the switch F6 is pushed on the standard screen, the user menu screen for each setting of the machine is shown on the monitor display.



G0089987

User Menu

You can check various settings and states when the machine is stopped.

The screen goes to the user menu screen with operation of standard screen > menu switch.

There are items that follow in user menu.

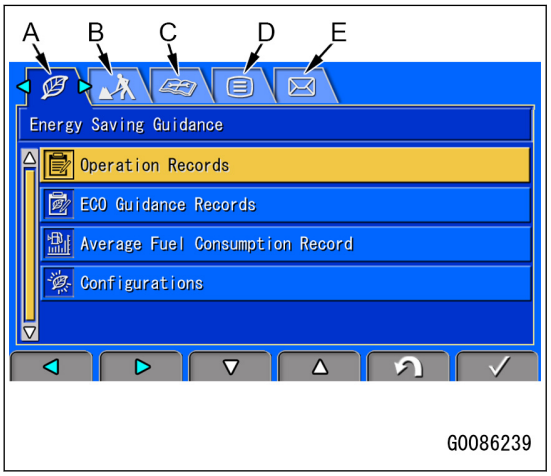
(A) Energy Saving Guidance

(B) Machine Setting

(C) Maintenance

(D) Monitor Setting

(E) Message display



User Menu Contents

User Menu Screen 3-55
Energy Saving Guidance 3-56
Operation Records 3-56
ECO Guidance Records 3-56
Average Fuel Consumption Record 3-57
Configurations 3-58
Machine Setting 3-61
Economy Mode Adjustment 3-61
Breaker Setting 3-62
Attachment Setting 3-64
Auto Idle Stop Timer Setting 3-66
Maintenance 3-67
Reset Remaining Time for Maintenance 3-67
Monitor Setting 3-69
Screen Adjustment 3-69
Screen Adjustment (Camera) 3-70
Clock Adjustment 3-70
Language Settings 3-74
Operator ID 3-75
Message Display 3-77
Reply Message 3-78

User Menu Screen

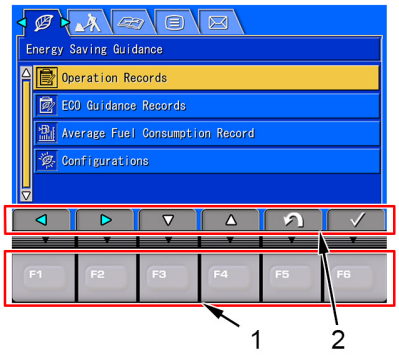
The user menu screen is shown only while the machine stops fully.

(1) Switch

(2) Guidance icon

If no switch is operated for 30 seconds when the user menu screen is shown, the screen automatically goes back to the previous screen or the standard screen.

If the machine travels while the user menu screen is shown, the screen automatically goes back to the standard screen.



G0086240

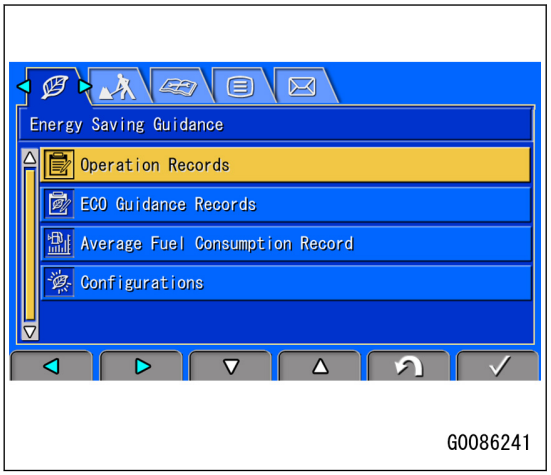
The switch (1) and the guidance icon (2) work on the user menu screen as shown below.

Function switches	Guidance icon	Explanation
 G0089990	 G0089991	The left menu screen is shown. When on the left end, the right end menu screen is shown.
 G0089992	 G0089993	The right menu screen is shown. When on the right end, the left end menu screen is shown.
 G0089994	 G0089995	Selects the item 1 line below. On the last line, it selects the first line item.
	 G0089996	Shows the next page. On the last page, it shows the first page.
 G0089997	 G0089998	Selects the item 1 line above. On the first line, it selects the last line item.
	 G0089999	Shows the previous page. On the first page, it shows the last page.
 G0090000	 G0090001	Cancels the setting, and the screen goes back to the previous screen.
 G0090002	 G0090003	Shows the selected item and enters it.

Energy Saving Guidance

You can check the settings and information of the items that follow for the energy saving on “Energy Saving Guidance” menu screen.

- Operation Records
- ECO Guidance Records
- Average Fuel Consumption Record
- Configurations
  - Average Fuel Consumption Display
  - ECO Gauge Display
  - ECO Gauge Display Fuel Target Value
  - ECO Guidance Display
  - ECO Guidance Display at Key OFF



G0086241

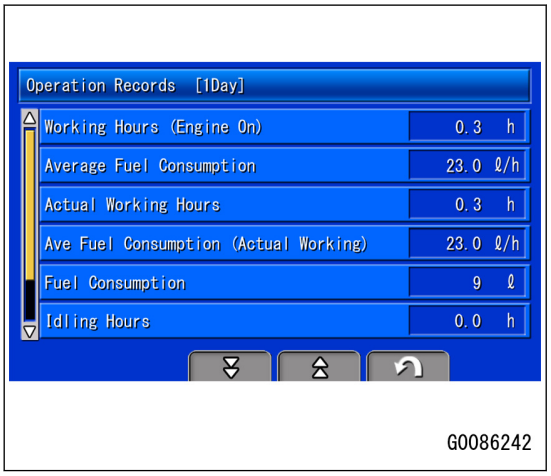
“Operation Records” and “ECO Guidance Records” can show information for one day, or a split measurement period.

Operation Records

Change the screen as “Energy Saving Guidance” > “Operation Records”, and the screen shown in the figure is shown.

Information as shown below can be checked on the “Operation Records” screen.

- Working Hours (Engine On)
- Average Fuel Consumption
- Actual Working Hours
- Ave Fuel Consumption (Actual Working)
- Fuel Consumption
- Idling Hours
- Economy Mode Ratio



G0086242

ECO Guidance Records

Change the screen as “Energy Saving Guidance” > “ECO Guidance Records”, and the screen shown in the figure is shown.

You can check the number of ECO guidance having been shown and the “Operational Advice”.

REMARK

- In “Operational Advice” section, the advice is shown for the ECO guidance appeared most frequently.
- The ECO guidance count increases when display conditions are satisfied even if the ECO guidance is not shown.



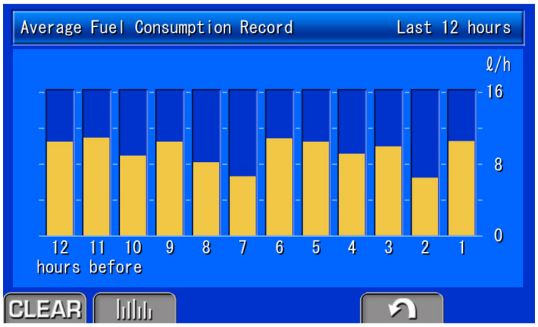
G0086243

Average Fuel Consumption Record

Change the screen as “Energy Saving Guidance” > “Average Fuel Consumption Record”, and the screen shown in the figure is shown.

You can do operations that follow on the “Average Fuel Consumption Record” screen.

- Change graph display
- Delete fuel consumption record

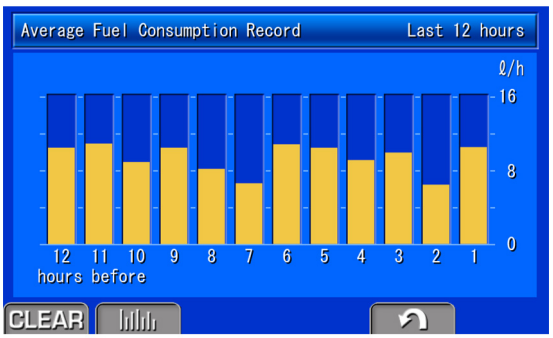


G0086244

Change Graph Display

“Average Fuel Consumption Record” screen can be shown in 2 types of display that follow. Each time you push the switch F2, the graph display changes alternately.

Average fuel consumption by 1 hour in the last 12 hours



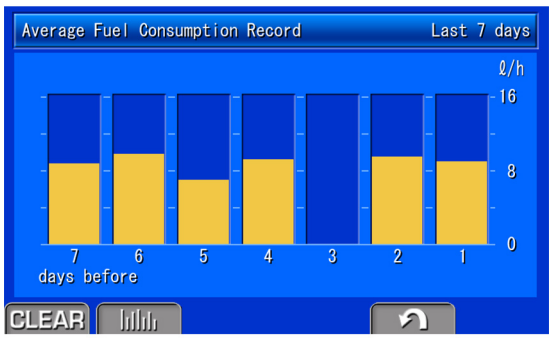
G0086244

F2

G0089992

←→

Average fuel consumption by 1 day in the last 1 week



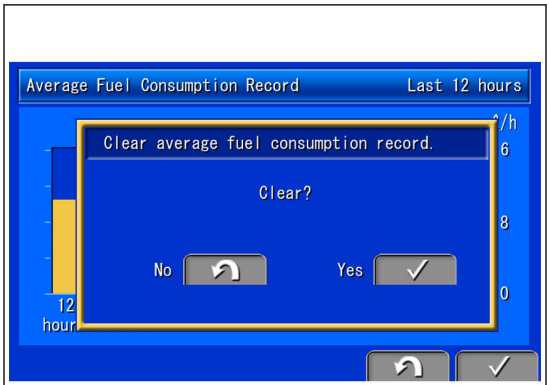
G0090008

Clear Fuel Consumption Record

1. Push the switch F1 on “Average Fuel Consumption Record” screen.

   “Clear average fuel consumption record.” screen is shown.

2. After each of the operations that follow, the screen goes automatically back to “Average Fuel Consumption Record” screen.
   - Push the switch F6 to clear the fuel consumption record.
   - Push the switch F5 to cancel the operation that clears the record.



G0090022

If you clear the fuel consumption record, the data of “Last 12 hours” and “Last 7 days” is cleared.

Configurations

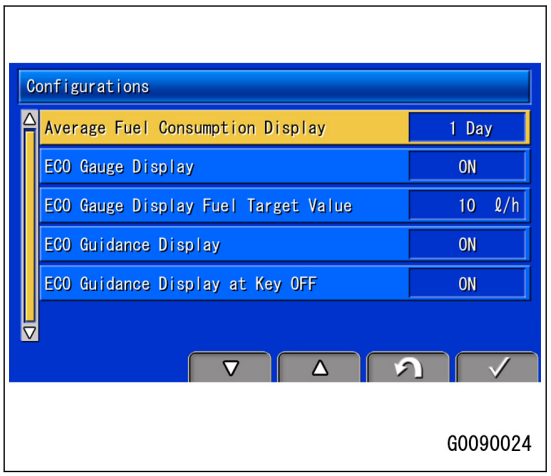
Change the screen as “Energy Saving Guidance” > “Configurations”, and the screen shown in the figure is shown.

You can change the settings that follow on “Configurations” menu screen.

- Average Fuel Consumption Display
- ECO Gauge Display
- ECO Gauge Display Fuel Target Value
- ECO Guidance Display
- ECO Guidance Display at Key OFF

When you set the “ECO Gauge Display” to OFF, items of “ECO Gauge Display Fuel Target Value” are not shown.

When you set the “ECO Guidance Display” to OFF, items of “ECO Guidance Display at Key OFF” are not shown.



G0090024

Fuel Consumption Gauge Display

Change the screen as “Energy Saving Guidance” > “Configurations” > “Average Fuel Consumption Display”, and the screen shown in the figure is shown.

“Average Fuel Consumption Display” can be set as shown below.

1 Day

Shows the average fuel consumption on the fuel consumption gauge from 0:00 a.m. of the day to 0:00 a.m. of the next day.

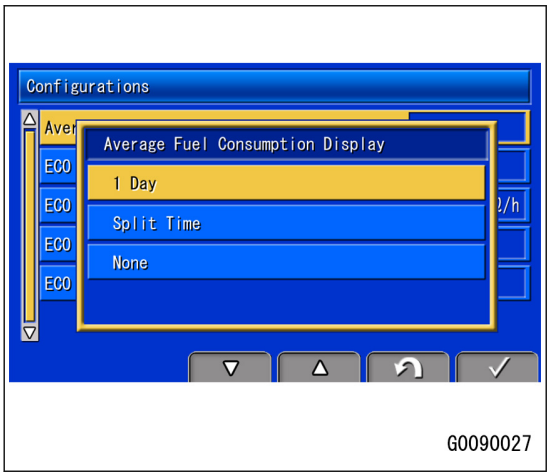
Split Time

Shows the average fuel consumption on the fuel consumption gauge during the split time measurement period.

Split measurement starts at the same time as it is selected.

OFF

Fuel consumption gauge is not shown on the standard screen.

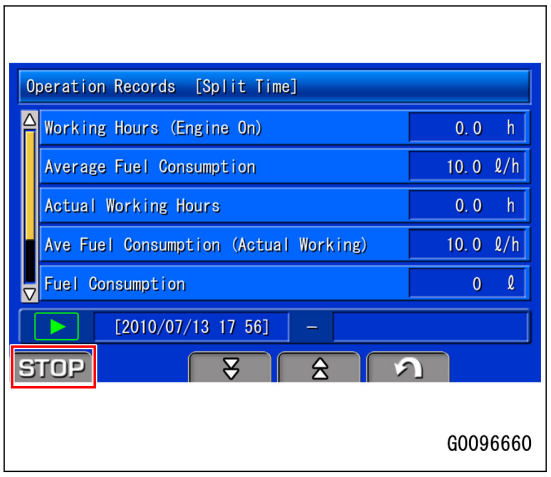


G0090027

Stop Split Measurement

When you start the split measurement, guidance icon is shown on the “Energy Saving Guidance” > “Operation Records”, or “Energy Saving Guidance” > “ECO Guidance Records” screen. (The figure shows “Operation Records” screen.)

Push the switch F1 to stop the split measurement.



G0096660

ECO Gauge Display

Change the screen as “Energy Saving Guidance” > “Configurations” > “ECO Gauge Display”, and the screen shown in the figure is shown.

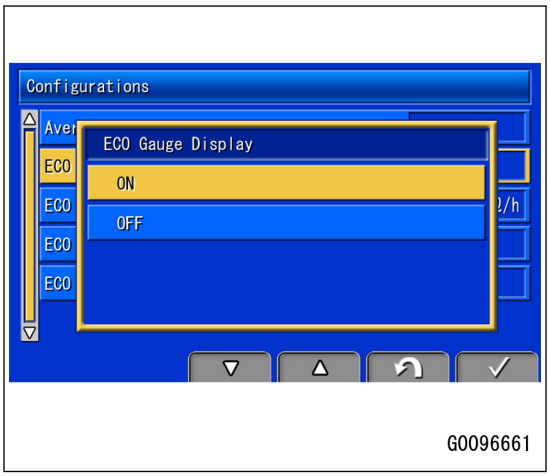
The display/non-display of the ECO gauge can be selected on “ECO Gauge Display” screen.

ON

The ECO gauge is shown on the standard screen.

OFF

The ECO gauge is not shown on the standard screen.

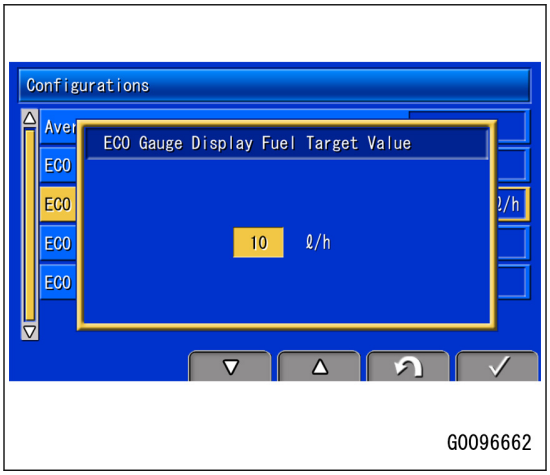


ECO Gauge Display Fuel Target Value

Change the screen as “Energy Saving Guidance” > “Configurations” > “ECO Gauge Display Fuel Target Value”, and the screen shown in the figure is shown.

On the “ECO Gauge Display Fuel Target Value” screen, you can change the target value of shown fuel consumption of ECO gauge (upper limit of green range)

- If the target fuel value is increased, the fuel consumption value which is shown when the ECO gauge is at the maximum is also increased in proportion.
- If the target fuel value is decreased, the fuel consumption value which is shown when the ECO gauge is at the maximum is also decreased in proportion.



ECO Guidance Display

Change the screen as “Energy Saving Guidance” > “Configurations” > “ECO Guidance Display”, and the screen shown in the figure is shown.

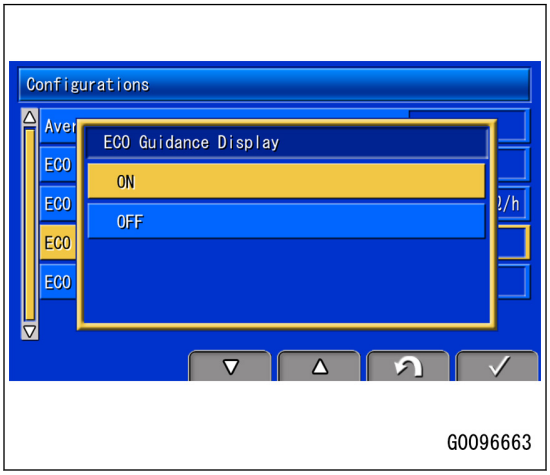
The display/non-display of the ECO guidance can be selected on “ECO Guidance Display” screen.

ON

The ECO guidance is shown on the standard screen.

OFF

The ECO guidance is not shown on the standard screen.



Guidance Display at Key Off

Change the screen as “Energy Saving Guidance” > “Configurations” > “ECO Guidance Display at Key OFF”, and the screen shown in the figure is shown.

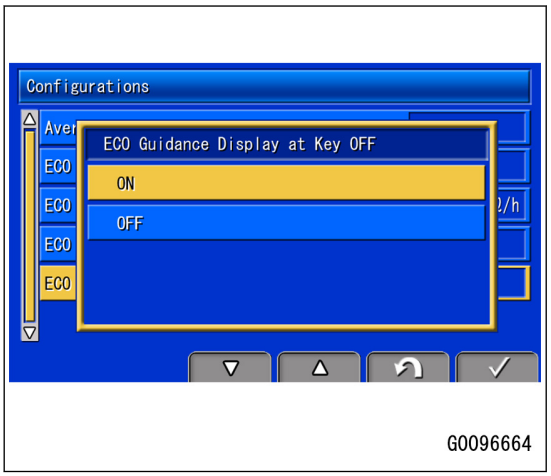
On the “ECO Guidance Display at Key OFF” screen, you can change the setting of DISPLAY/NOT DISPLAY of “Operational Advice” shown on the end screen.

ON

“Operational Advice” is shown on the end screen.

OFF

“Operational Advice” is not shown on the end screen.



G0096664

Machine Setting

You can set the items that follow which are related to the machine on the “Machine Setting” menu screen.

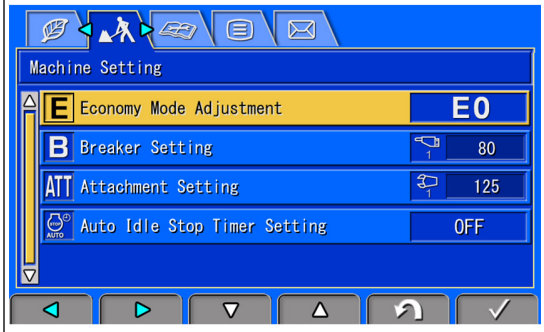
The figure shows the screen of a machine ready for installation of work equipment attachment such as breaker and crusher.

Standard machine

- Economy Mode Adjustment
- Auto Idle Stop Timer Setting

Machine ready for installation of work equipment attachment such as breaker and crusher

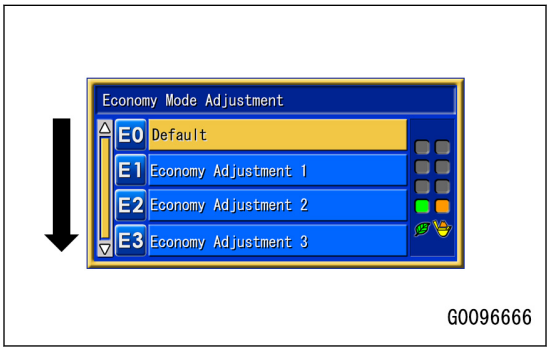
- Economy Mode Adjustment
- Breaker Setting
- Attachment Setting
- Auto Idle Stop Timer Setting



G0096665

Economy Mode Adjustment

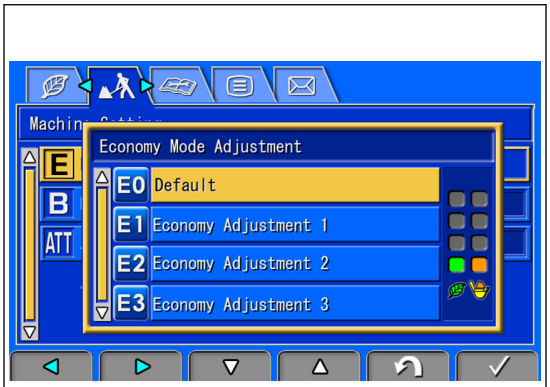
You can adjust the output of economy mode. In economy mode, the output decreases in the sequence of E0, E1, E2, and E3, and the fuel efficiency becomes better accordingly.



G0096666

1. Change the screen as “Machine Setting” > “Economy Mode Adjustment”, and the screen shown in the figure is shown.
2. Select the desired setting with the switches F3 and F4.
3. Push the switch F6.

   When you cancel the selection, push the switch F5.

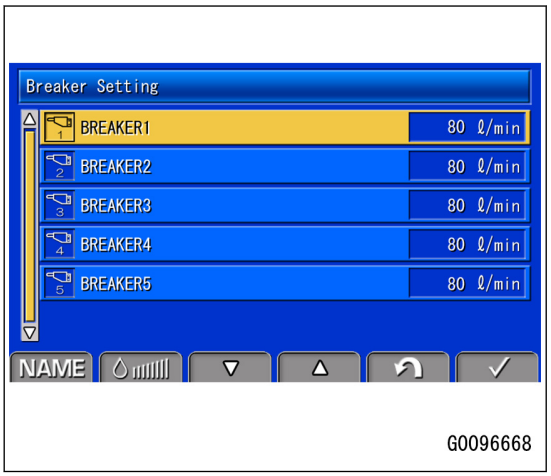


G0096667

Breaker Setting

1. Change the screen as “Machine Setting” > “Breaker Setting”, and the screen shown in the figure is shown.
2. Select the desired setting with the switches F3 and F4.
3. Push the switch F6.

   When you cancel the selection, push the switch F5.



You can change the settings that follow on “Breaker Setting” screen.

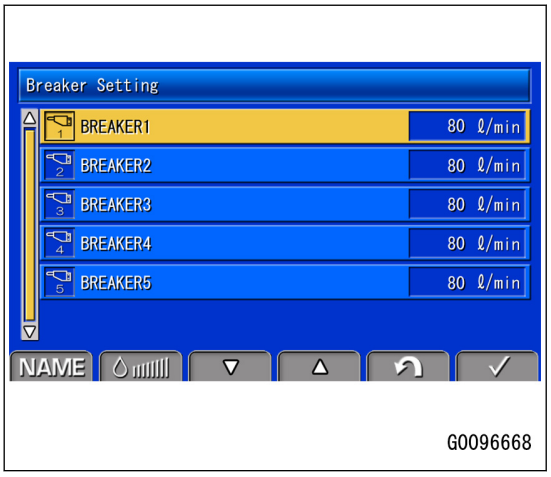
- Set the name of breaker.
- Set the flow rate of breaker.

You can register 5 types of contents for setting.

Change Breaker Name Setting

The characters that can be used are alphabets (A to Z), numbers (0 to 9), symbols (#, *, +, -, /) and blanks (spaces).

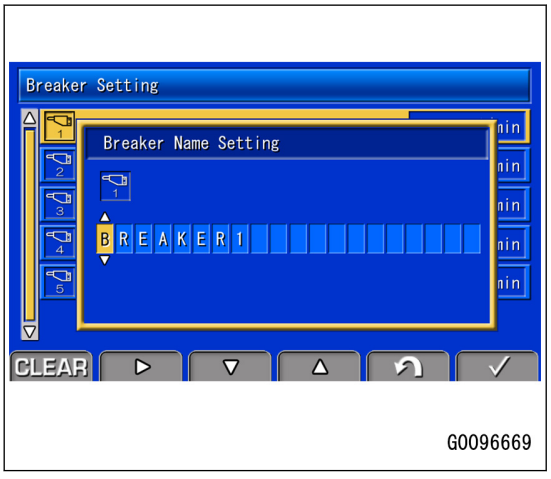
1. Select the item to be changed on “Breaker Setting” screen.



2. Push the switch F1.

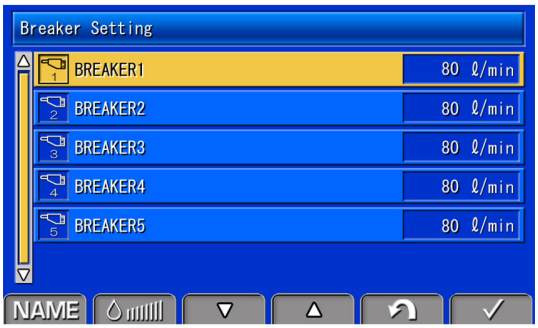
   “Breaker Name Setting” screen is shown.
3. Do the operations that follow to change the name.
   - Push the switch F1 to erase all the characters.
     If you delete all the characters, the default name is shown.
   - Push the switch F2 to move to the right.
   - Push the switch F3 to show the next alphabet (or number/symbol).
   - Push the switch F4 to show the previous alphabet (or number/symbol).
4. Push the switch F6.

   When you cancel the selection, push the switch F5.



Change Breaker Flow Setting

1. Select the item to be changed on “Breaker Setting” screen.



2. Push the switch F2.

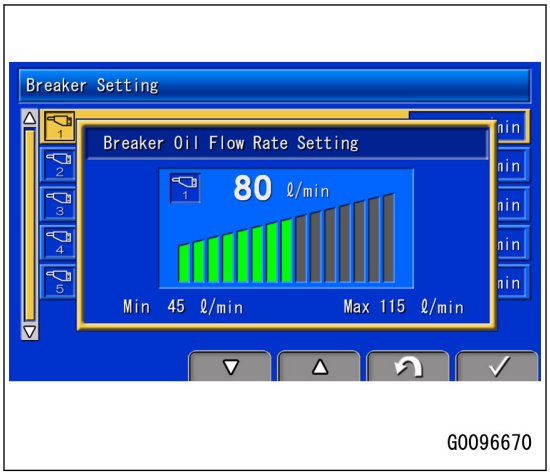
   “Breaker Oil Flow Rate Setting” screen is shown.

   The left end of the graph is the minimum adjustable flow rate.

   The right end of the graph is the maximum adjustable flow rate.

3. Do the operations that follow to change the flow rate.
   - Push the switch F3 to reduce the flow rate.
   - Push the switch F4 to increase the flow rate.
4. Push the switch F6.

   When you cancel the selection, push the switch F5.



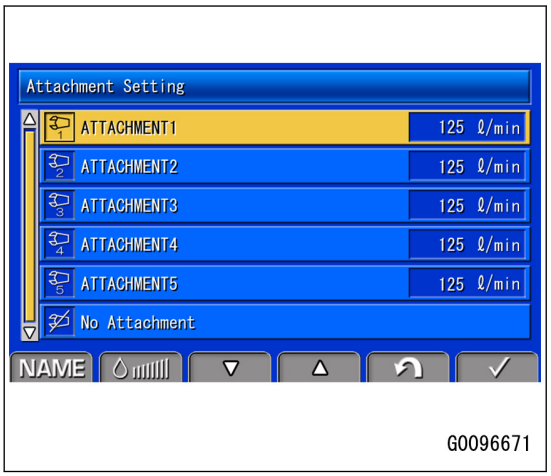
Attachment Setting

1. Change the screen as “Machine Setting” > “Attachment Setting”, and the screen shown in the figure is shown.
2. Select the desired setting with the switches F3 and F4.
3. Push the switch F6.

   When you cancel the selection, push the switch F5.

   REMARK

   If you select the “No Attachment”, it will be P mode when the working mode is ATT/P, E mode when ATT/E.



You can change the settings that follow on “Attachment Setting” screen.

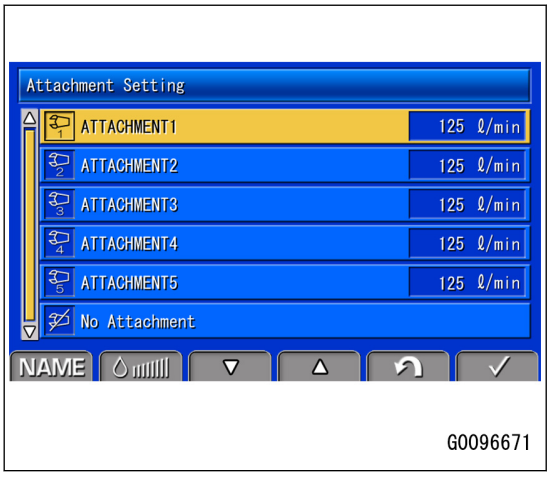
- Set the name of attachment.
- Set the flow rate of attachment.

You can register 5 types of contents for setting.

Change Attachment Name Setting

The characters that can be used are alphabets (A to Z), numbers (0 to 9), symbols (#, *, +, -, /) and blanks (spaces).

1. Select the item to be changed on “Attachment Setting” screen.

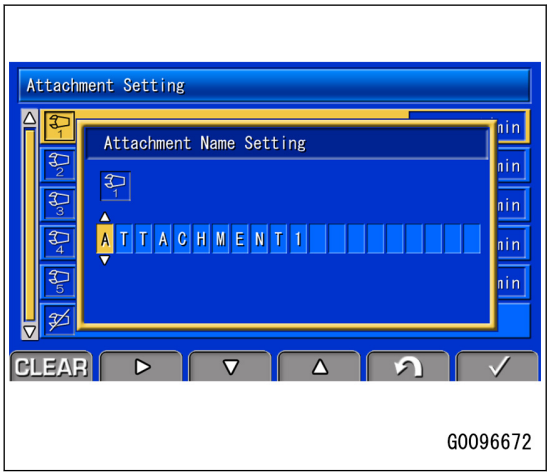


2. Push the switch F1.

   “Attachment Name Setting” screen is shown.

3. Do the operations that follow to change the name.
   - Push the switch F1 to erase all the characters.
     If you delete all the characters, the default name is shown.
   - Push the switch F2 to move to the right.
   - Push the switch F3 to show the next alphabet (or number/symbol).
   - Push the switch F4 to show the previous alphabet (or number/symbol).
4. Push the switch F6.

   When you cancel the selection, push the switch F5.



Change Attachment Flow Setting

1. Select the item to be changed on “Attachment Setting” screen.



G0096671

2. Push the switch F2.

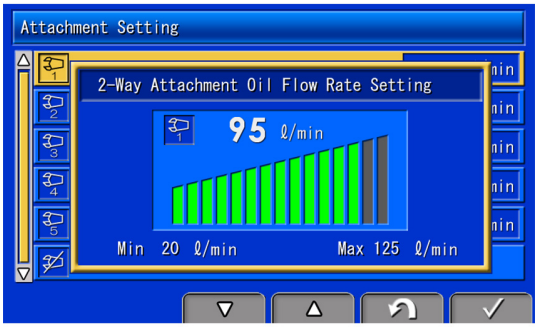
   “2-Way Attachment Oil Flow Rate Setting” screen is shown.

   The left end of the graph is the minimum adjustable flow rate.

   The right end of the graph is the maximum adjustable flow rate.

3. Do the operations that follow to change the flow rate.
   - Push the switch F3 to reduce the flow rate.
   - Push the switch F4 to increase the flow rate.
4. Push the switch F6.

   When you cancel the selection, push the switch F5.



G0096673

Auto Idle Stop Timer Setting

Auto idle stop function stops the engine to reduce fuel consumption when a period of time has passed in low idle state. It operates when all of the conditions below are satisfied.

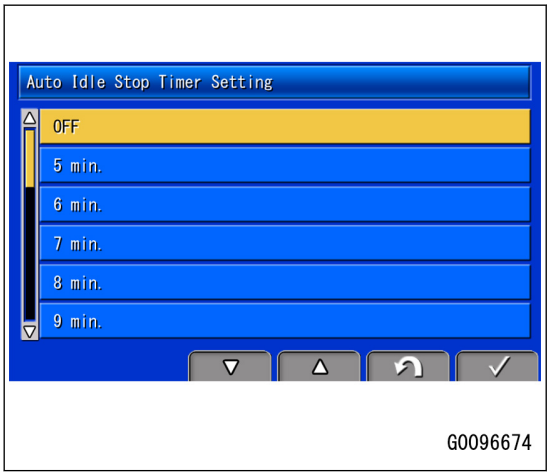
- The lock lever is in LOCK position.
- The engine coolant and hydraulic oil are not overheating.
- The engine is not in automatic warm-up operation.
- The machine is not in the L mode.

You can change the time being set to operate the auto idle stop function on the “Auto Idle Stop Timer Setting” screen.

1. Change the screen as “Machine Setting” > “Auto Idle Stop Timer Setting”, and the screen shown in the figure is shown.
2. Select the desired time with the switches F3 and F4.

   When you select “OFF”, the auto idle stop function is disabled.
3. Push the switch F6.

   The setting is changed and the screen goes back to “Machine Setting” menu screen.



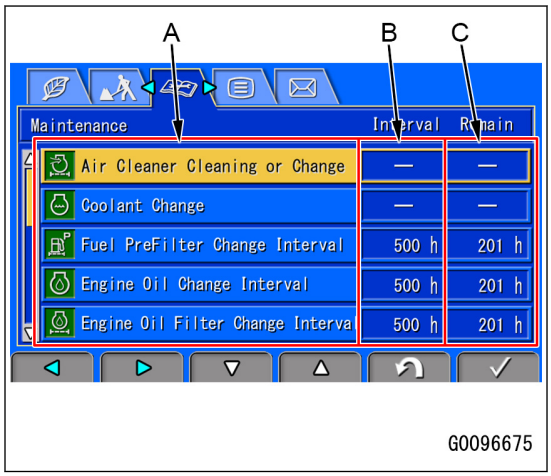
Maintenance

On the “Maintenance” menu screen, you can check the information related to the maintenance.

(A) Maintenance item

(B) Default maintenance interval settings (h)

(C) Remaining time to maintenance (h)



- The color changes when the remaining time to next maintenance (C) is less than maintenance notice time.
  Default maintenance notice time setting is 30 hours.
  Consult your Komatsu distributor if you want to change the maintenance notice time.
  - When the remaining time to maintenance is between 30 hours to 1 hour, the color is yellow.
  - When the remaining time to maintenance becomes 0 hour, the color becomes red.
- When you use the engine oil for cold district, the maintenance interval must be changed.
  Ask Komatsu distributor for change of maintenance interval for “Engine Oil Change” and “Engine Oil Filter Change”.

The items shown on “Maintenance” menu screen are as follows.

List of Maintenance Items and Default Interval Settings

For the items of which the remaining interval is “-”, consult your Komatsu distributor and set the applicable interval.

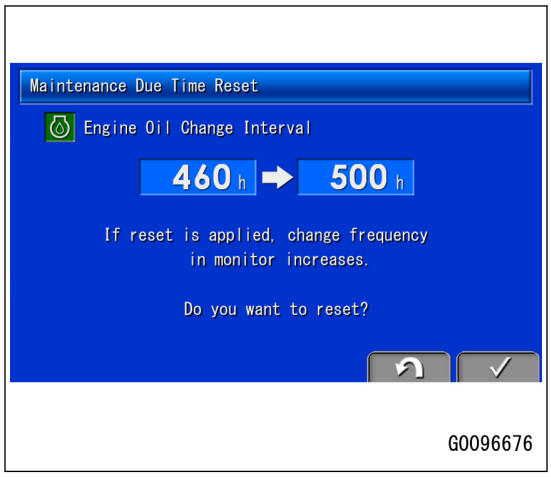
Item	Interval (h)	Item	Interval (h)
Air Cleaner Cleaning or Change	-	Fuel Main Filter Change	1000
Coolant Change	-	Hydraulic Oil Filter Change	1000
Fuel Prefilter Change	500	PTO Gear Case Oil Check Refilling	1000
Engine Oil Change	500	Swing Machinery Case Oil Change	1000
Engine Oil Filter Change	500	Final Drive Case Oil Change	1000
Hyd Oil Tank Breather Change	1000	Hydraulic Oil Change	5000

Reset Remaining Time for Maintenance

1. Select an item to reset the remaining time on “Maintenance” screen, and then hold down the switch F6 for 1.5 seconds or longer.

   “Maintenance Due Time Reset” screen is shown.

   If the time you push the switch F6 is too short, operation sound can sound but the screen does not change to the screen shown in the figure.



2. Push the switch F6.

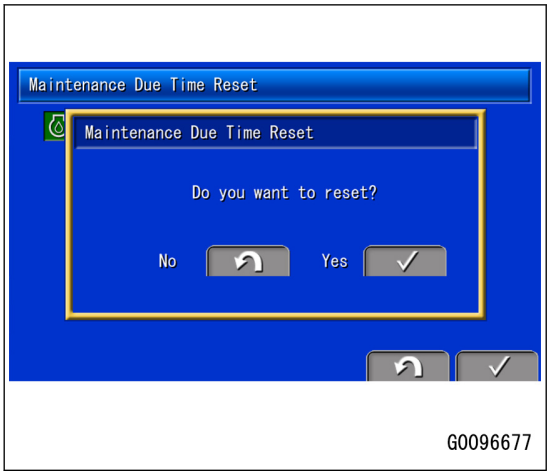
Pop-up screen is shown for confirmation.

When you cancel the reset, push the switch F5.

3. Push the switch F6.

   The remaining time to maintenance is reset and the screen goes back to “Maintenance” menu screen.

   When you cancel the reset, push the switch F5.

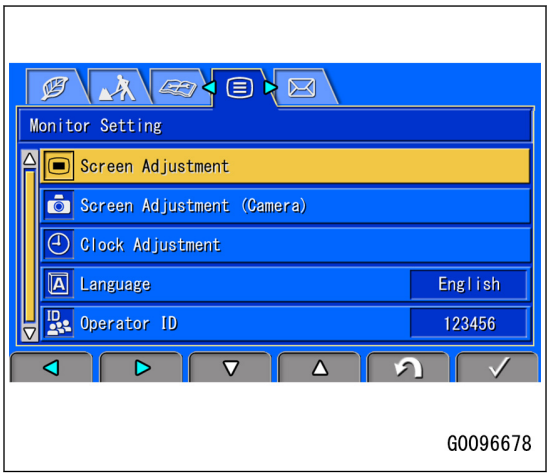


G0096677

Monitor Setting

You can check the settings and information that follow for the monitor on “Monitor Setting” menu screen.

- Screen Adjustment
- Screen Adjustment (Camera)
- Clock Adjustment
  - GPS Synchronization
  - Calendar
  - Time
  - 12h/24h Mode
  - Daylight Saving Time
- Language
- Operator ID



Screen Adjustment

You can adjust the brightness of the screen on “Screen Adjustment ” menu. Adjust the brightness if the screen is dark.

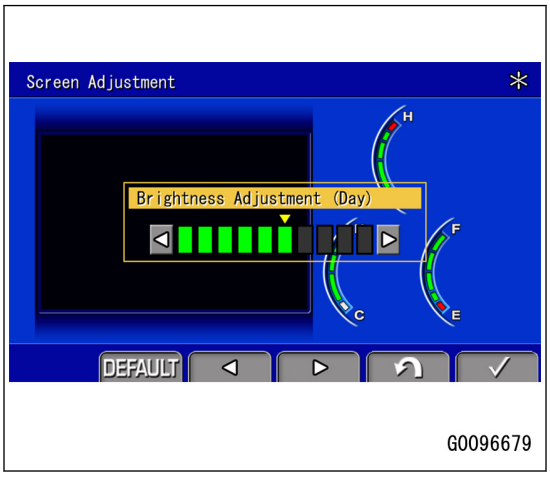
You can adjust the brightness in the 2 modes shown below.

- Night mode: When adjustment is done with the lamp switch at the night position
- Day mode: When adjustment is done with the lamp switch at the day position

When the “*” mark is shown on the right top of the “Screen Adjustment” screen, brightness adjustment cannot be done in some cases. The machine monitor adjusts automatically the brightness to protect the liquid crystal.

1. Change the screen as “Monitor Setting” > “Screen Adjustment ”, and the screen shown in the figure is shown.
2. Do the procedure below to adjust the brightness to the desired one.
   - Push the switch F4 to make it brighter.
   - Push the switch F3 to make it darker.
   - Push the switch F2 to let the value go back to the default value.
3. Push the switch F6.

   When you cancel the adjustment, push the switch F5.



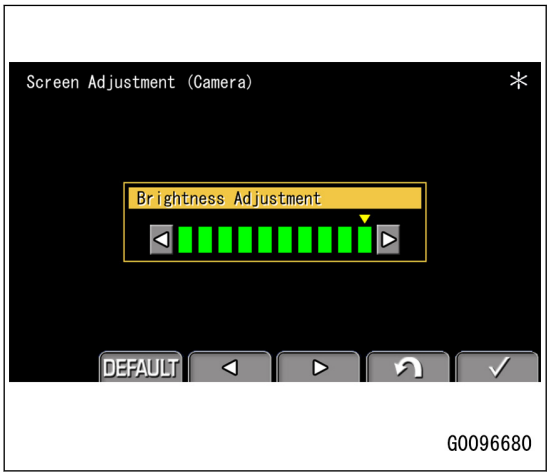
Screen Adjustment (Camera)

You can adjust the brightness of the screen on “Screen Adjustment (Camera)” menu. Adjust the brightness if the screen is dark.

When the “*” mark is shown on the right top of the “Screen Adjustment” screen, brightness adjustment cannot be done in some cases. The machine monitor adjusts automatically the brightness to protect the liquid crystal.

1. Change the screen as “Monitor Setting” > “Screen Adjustment (Camera)”, and the screen shown in the figure is shown.
2. Do the procedure below to adjust the brightness to the desired one.
   - Push the switch F4 to make it brighter.
   - Push the switch F3 to make it darker.
   - Push the switch F2 to let the value go back to the default value.
3. Push the switch F6.

   When you cancel the adjustment, push the switch F5.



Clock Adjustment

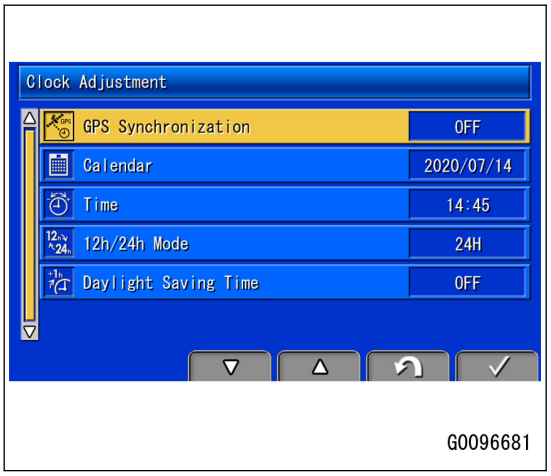
Change the screen as “Monitor Setting” > “Clock Adjustment”, and the screen shown in the figure is shown.

You can do settings and checks that follow for the clock on “Clock Adjustment” menu screen.

- GPS Synchronization
- Calendar
- Time
- 12h/24h Mode
- Daylight Saving Time

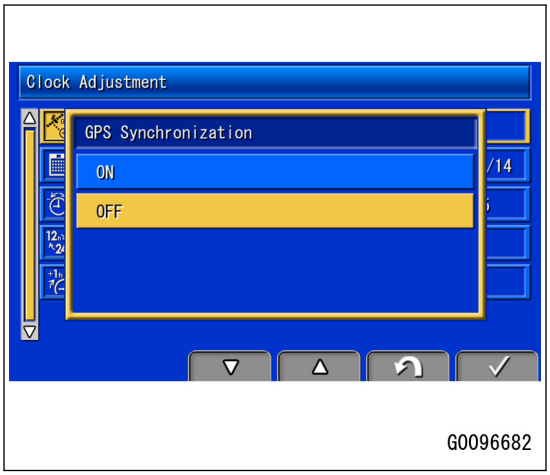
You cannot select “Calendar” and “Time” menus when “GPS Synchronization” is set to ON.

After the machine has been stored for a long time, adjust the date and time with “Calendar” and “Time” again.



GPS Synchronization

Change the screen as “Monitor Setting” > “Clock Adjustment” > “GPS Synchronization”, and the screen shown in the figure is shown.



G0096682

If the machine has KOMTRAX which has been established, the date and time shown on the machine monitor are synchronized with information from GPS satellites when the “GPS Synchronization” is selected.

ON

The information of the date and time shown on the machine monitor are gotten from GPS satellites and corrected automatically.

OFF

The date and time shown on the machine monitor are not corrected automatically.

If the machine cannot receive the radio waves from GPS satellites, turn it to OFF, and correct them with “Calendar” and “Time”.

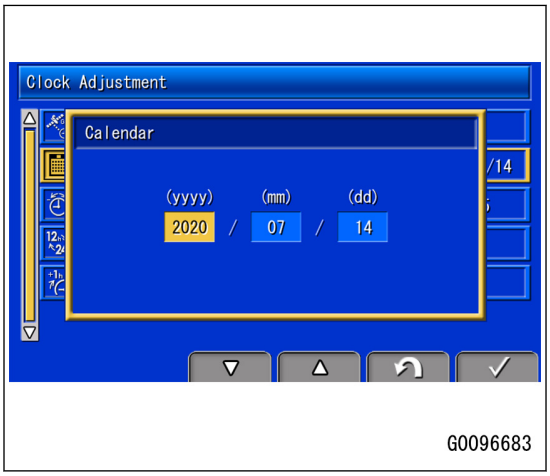
Calendar

The date of the machine monitor can be adjusted on “Calendar” screen.

1. Change the screen as “Monitor Setting” > “Clock Adjustment” > “Calendar”, and the screen shown in the figure is shown.

   “Year” display part becomes yellow.
2. Adjust the “Year” with the switches F3 and F4.

   When you cancel the adjustment, push the switch F5.

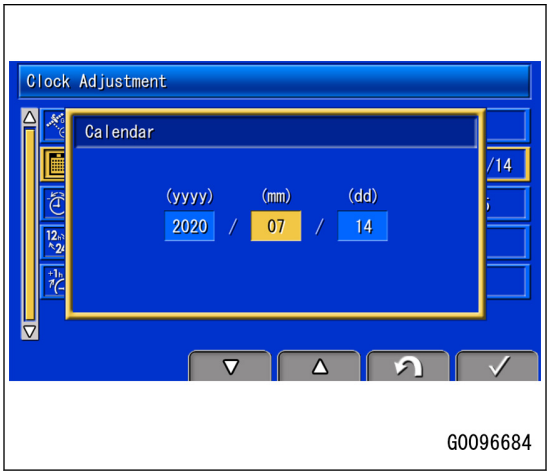


G0096683

3. Push the switch F6.

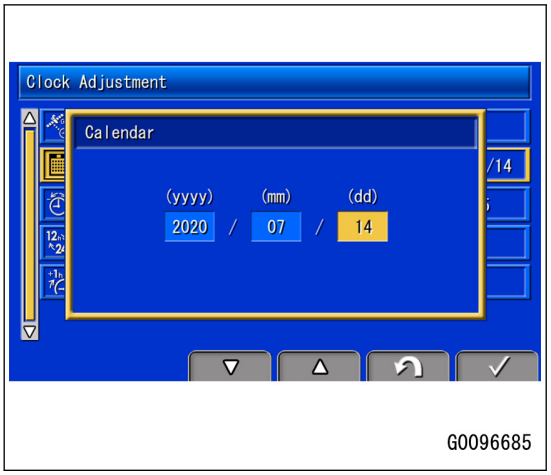
   “Month” display part becomes yellow.
4. Adjust the “Month” with the switches F3 and F4.

   When you adjust “Year” again, push the switch F5.



G0096684

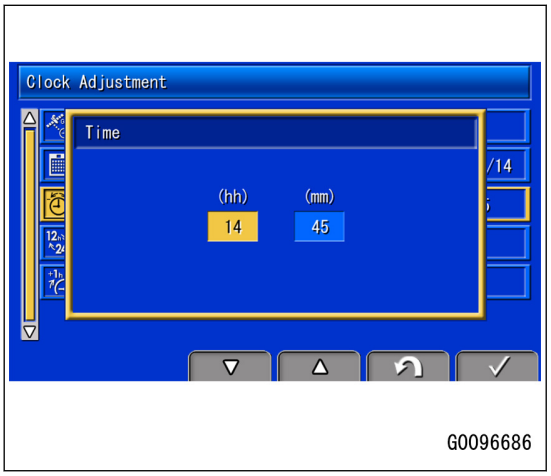
5. Push the switch F6.
   “Day” display part becomes yellow.
6. Adjust the “Day” with the switches F3 and F4.
   When you adjust “Month” again, push the switch F5.
7. Push the switch F6.
   The date has been changed as it is shown on the machine monitor, and the screen goes back to the “Clock Adjustment” menu screen.



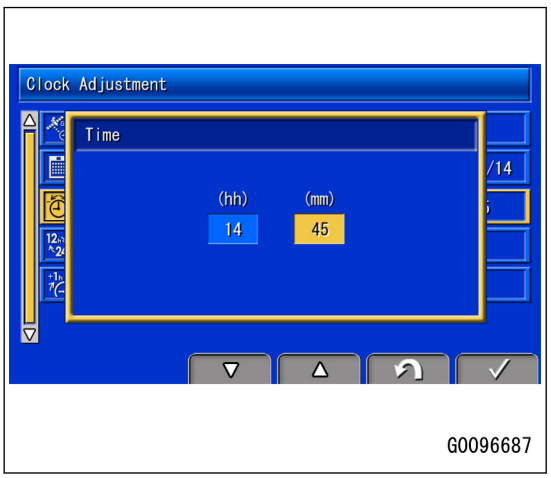
Time Setting

You can adjust the time of the machine monitor on “Time” screen.

1. Change the screen as “Monitor Setting” > “Clock Adjustment” > “Time”, and the screen shown in the figure is shown.
   “Hour” display part becomes yellow.
2. Adjust the “Hour” with the switches F3 and F4.
   When you cancel the setting, push the switch F5.



3. Push the switch F6.
   “Minute” display part becomes yellow.
4. Adjust the “Minute” with the switches F3 and F4.
   When you adjust “Hour” again, push the switch F5.
5. Push the switch F6.
   The time has been changed to the time shown on the machine monitor, and the screen goes back to the “Clock Adjustment” menu screen.



12H/24H Mode

You can set the clock for the 12-hour display (AM/PM) or 24-hour display on “12h/24h Mode” screen.

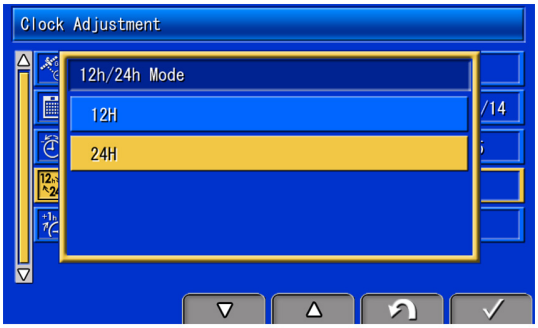
Change the screen as “Monitor Setting” > “Clock Adjustment” > “12h/24h Mode”, and the screen shown in the figure is shown.

12H

The clock is set to the 12-hour display (AM/PM).

24H

The clock is set to the 24-hour display.



G0096688

Daylight Saving Time

Standard time and daylight saving time can be changed on the “Daylight Saving Time” screen.

Daylight saving time is the practice to set the clock one hour advance in summer to let people use the longer daytime hours in a day effectively.

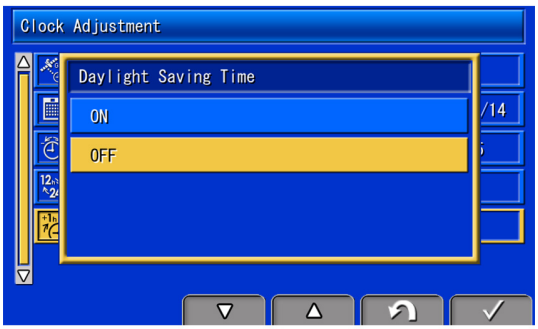
Change the screen as “Monitor Setting” > “Clock Adjustment” > “Daylight Saving Time”, and the screen shown in the figure is shown.

ON

Time is shown on clock 1 hour advance than the standard time.

OFF

Time is shown on clock in the standard time.



G0096689

Language Settings

You can change the language for the machine monitor display on the “Language” screen.

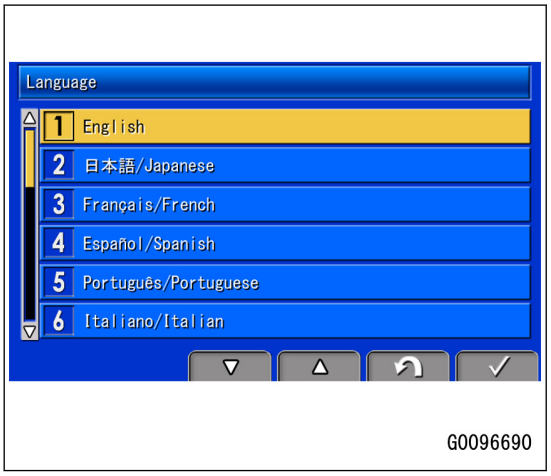
The languages that can be selected are as follows.

English, Japanese, French, Spanish, Portuguese, Italian, German, Swedish, Dutch, Danish, Norwegian, Finnish, Icelandic, Czech, Hungarian, Polish, Slovak, Slovene, Romanian, Croatian, Estonian, Latvian, Lithuanian, Bulgarian, Greek, Turkish, Serbian

1. Change the screen as “Monitor Setting” > “Language”, and the screen shown in the figure is shown.
2. Select the desired language with the switches F3 and F4.
3. Push the switch F6.

   When you cancel the selection, push the switch F5.

   The language is selected and the screen goes back to “Monitor Setting” menu screen.



Operator ID

You can check and change ID which is in the identification state on “Operator ID” screen.

When the operator identification function is disabled, “Operator ID” is not shown on “Monitor Setting” menu screen.

REMARK

Consult your Komatsu distributor for setting, change, or cancel of the operator identification function.

Operator Identification Function

NOTICE

Do not use the operator identification function to enhance the security. The operator identification function has no effect of security enhancement or theft prevention.
We will not be responsible for theft or damage of the machine caused by the actions that follow.

- **Misuse of ID**
- **Unauthorized use of ID by unauthorized person**

If you use the operator identification function, you can see the operation information for each operator ID.

The operator identification function can be set to one of the settings below.

- The machine cannot be started unless the ID is identified.
- ID input can be skipped and machine can be operated even if it is not identified.

Consult your Komatsu distributor for the setting.

Examine Identified ID

If the machine can be operated even if the ID is not identified, you can check the operator ID with the operator identification function on “Monitor Setting” screen.

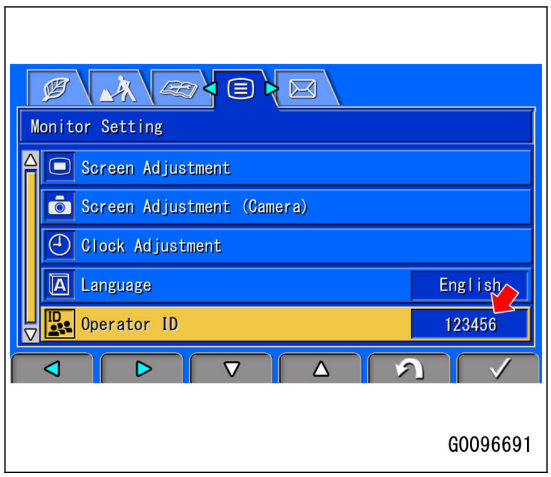
Items on the “Operator ID” are shown only when the operator identification function is enabled.

Identified ID is shown in a column of items.

“****” is shown if the machine does not identify the ID when the operator ID input is skipped and the machine is started.

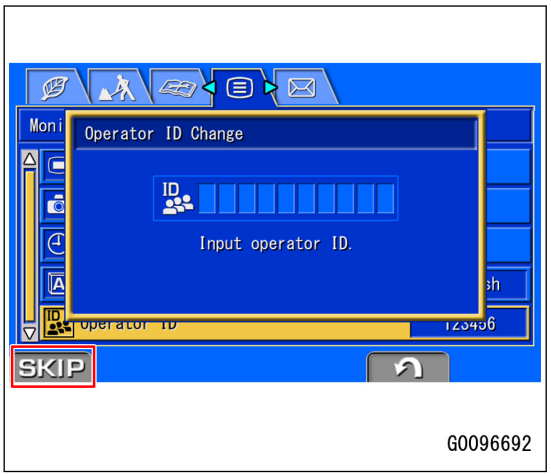
REMARK

If the machine cannot be started unless the ID is identified, the identified ID is not shown in a column of items.



Change Operator ID During Identification State

1. Change the screen as “Monitor Setting” > “Operator ID ”, and the screen shown in the figure is shown.
2. Input the operator ID with numeric keypad of the monitor switch.
   - If numeric value is inputted, one value can be deleted when you push the switch F5.
   - When you cancel the inputted value, delete all the numeric value and push the switch F5.
   - If the “SKIP” is shown above the switch F1, you can skip the input of ID. Push the switch F1 for operator ID not to be identified.



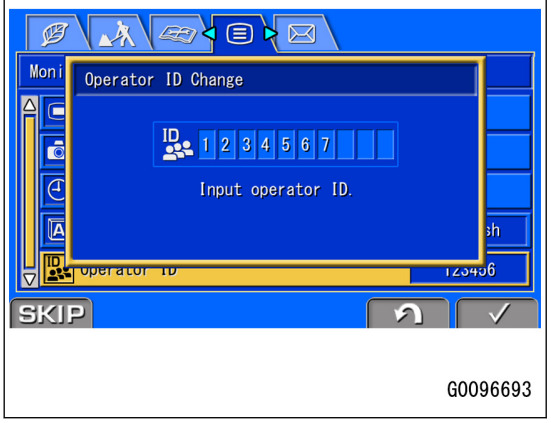
G0096692

3. Push the switch F6.

   The operator ID is changed, and the screen goes back to “Monitor Setting” menu screen.

   REMARK

   When you push the switch F6 after you input the operator ID that is not registered on “Operator ID Change” screen, a message is shown and the screen goes back to “Monitor Setting” menu screen.
   In this case, the operator ID under the identification process is not changed.



G0096693

Message Display

You can check the message when you push the switch F6 while the message display is lit as shown in the figure.

The message will be deleted when its expiration date comes or when a new message is received.

 G0090052	There is an unread message.
 G0090053	There is a read message to which no reply is made. Reply to your Komatsu distributor.
Not lit	There is no message.



G0090051

Messages from Komatsu distributor are shown on the machine monitor.

(A) Title of message

When no message has been received, “No message.” is shown.

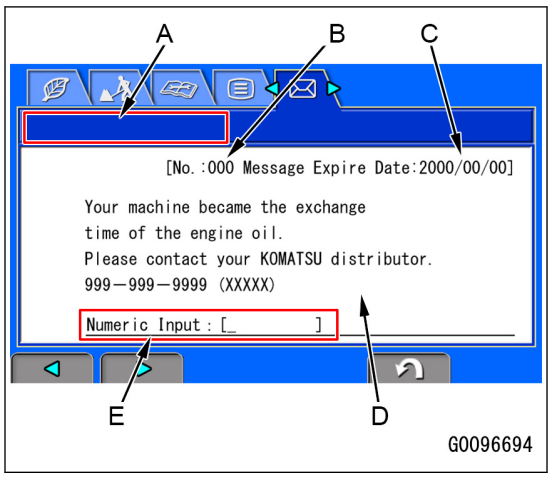
(B) Serial No. of message

(C) Validity

(D) Text

(E) “Numeric Input” column

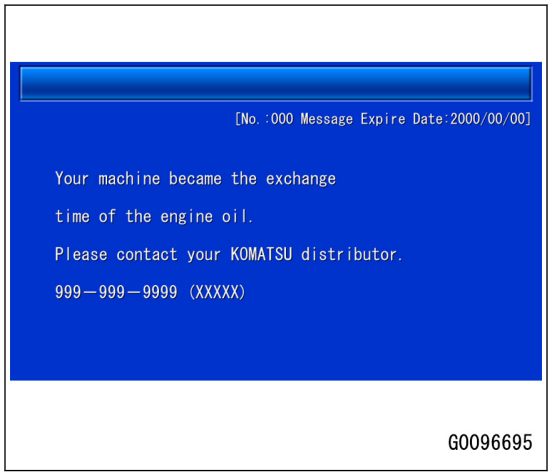
This is shown if the message needs reply.



G0096694

REMARK

If the starting switch is turned to the OFF position when there is an unread message, the message will be shown on the end screen.



G0096695

Reply Message

When the “Numeric Input” column is shown, send a reply with the procedures that follow.

1. Check the number of the selected item which is described in the body text (D).
2. Input the number of selected item with monitor switch.

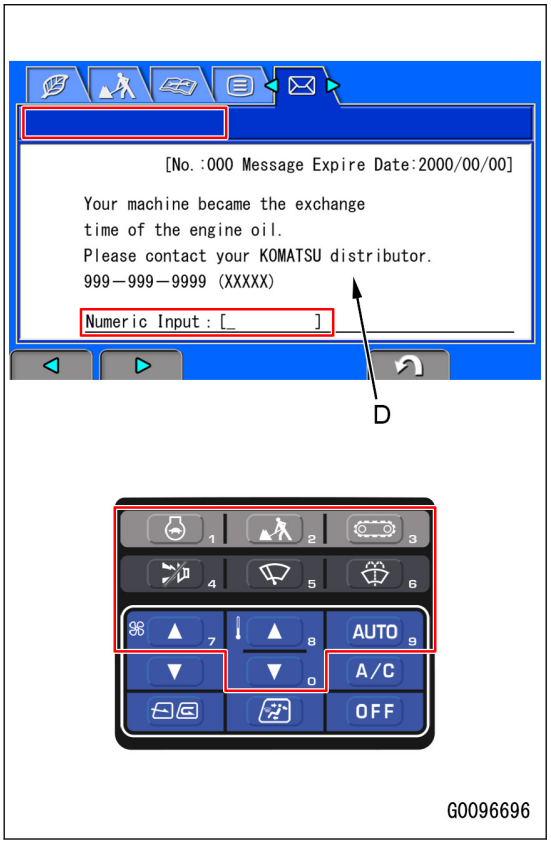
   Inputted value is shown in the “Numeric Input” column.

   If you input an incorrect number, push the switch F5, and you can clear a character at a time.
3. Check the inputted contents, and push the switch F6.

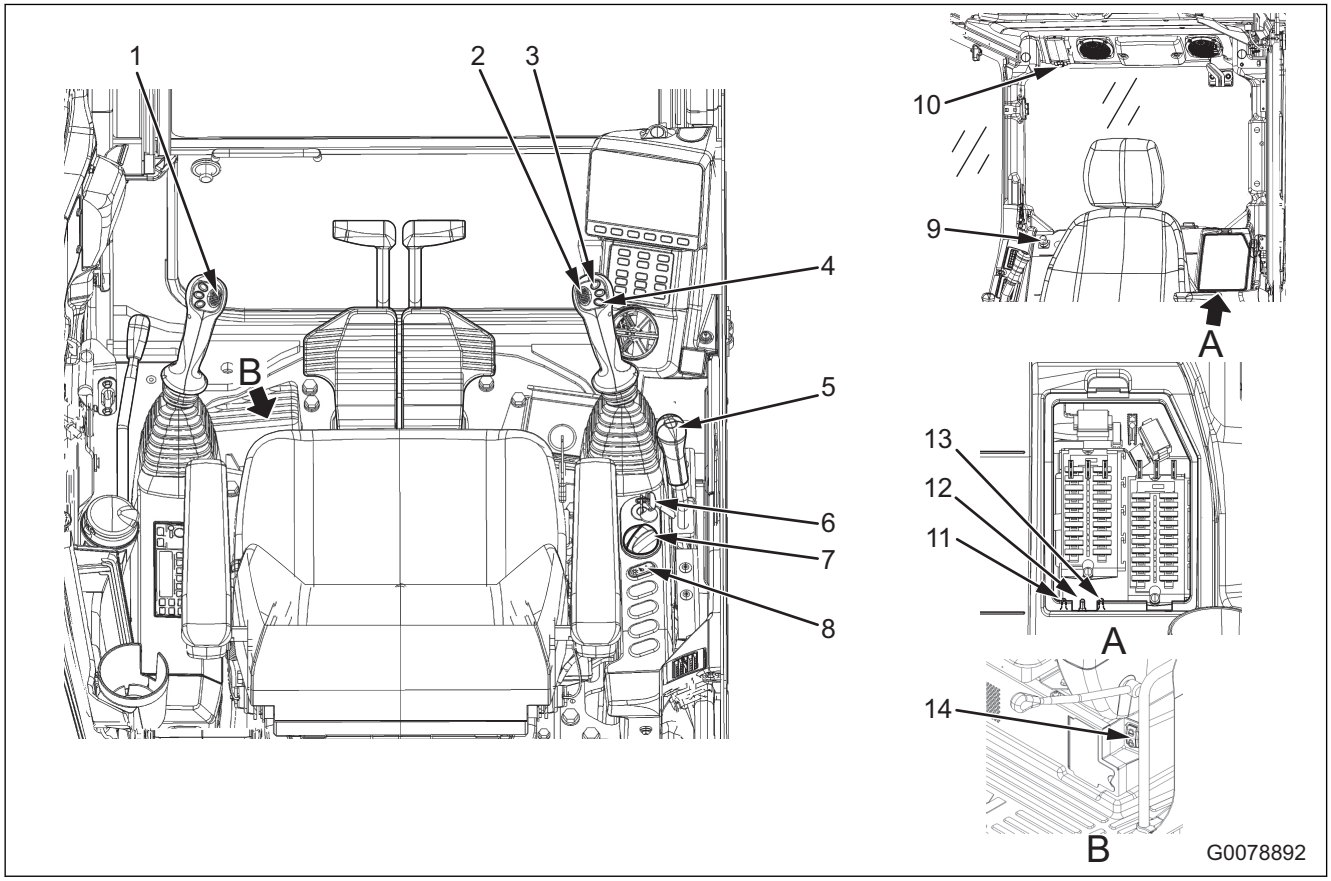
   “Do you send Numeric Input?” is shown.
4. Push the switch F6.

   When you change the number of selected item, push the switch F5.

   The input value is sent out.



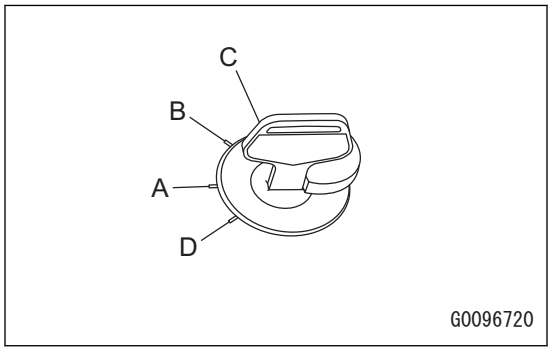
Names of Switch Panel Equipment



(1) 2nd-line attachment proportional switch
(2) 1st-line attachment proportional switch
(3) Breaker operation switch
(4) Horn switch
(5) Travel speed selector switch
(6) Starting switch
(7) Fuel control dial
(8) Lamp switch
(9) Cigarette lighter
(10) Room lamp switch
(11) Pump secondary drive switch
(12) Swing parking brake cancel switch
(13) Lock lever automatic lock cancel switch
(14) Engine shutdown secondary switch

Starting Switch

You can start and stop the engine with the starting switch.



(A): OFF position

The starting switch key can be put in or removed. The electrical current to the electrical system other than the room lamp stops being supplied, and the engine stops.

(B): ON position

Electric current flows through the charge circuit and lamp circuit. Keep the starting switch key in this position while the engine is in operation.

(C): START position

This is the engine start position. During the cranking, keep it at this position. When the engine is started, immediately take your hand off the key. When you let go of the key, it automatically goes back to the ON position (B).

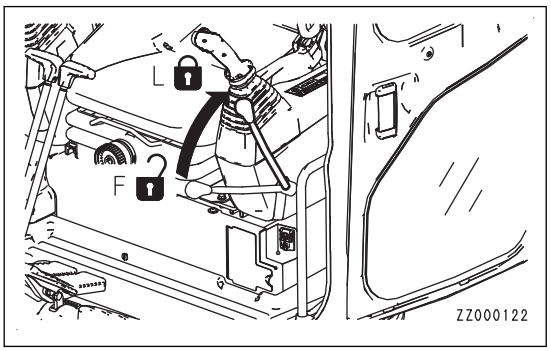
(D): HEAT (preheating) position

When you start the engine in cold weather, set the starting switch to this position.

When the key is turned to the HEAT position (D), the preheating pilot lamp lights up. Hold the key at this position until the preheating pilot lamp goes off. Take your hand off the key immediately after the preheating pilot lamp flashes. When you take your hand off the key, the switch goes back to the OFF position (A). Turn the key to the START position (C) immediately to start the engine.

REMARK

To start the engine, the lock lever must be set in the LOCK position (L).
Make sure that the lock lever is at the LOCK position (L), and operate the starting switch.



Fuel Control Dial

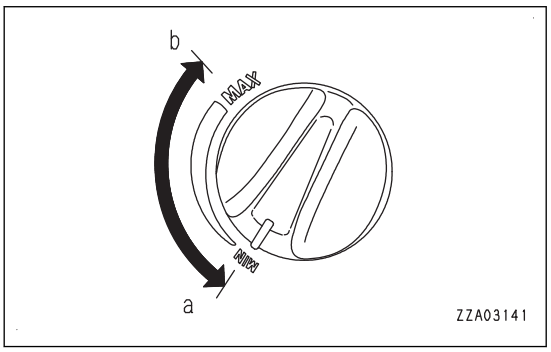
Fuel control dial is used to control the engine speed and output.

(a) Low idle (MIN)

The position where the dial is turned fully to the left

(b) High idle (MAX)

The position where the dial is turned fully to the right



REMARK

This machine uses optimum matching control of main pump by the electronic control for the engine. There is a dead zone on the dial in response to the working mode as shown below, but this is not a problem.

Range (c)

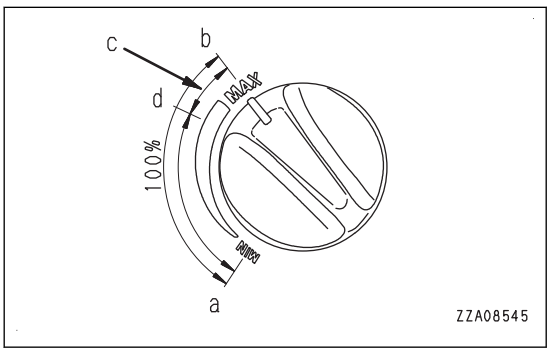
Dead zone (constant engine speed)

P mode: 11%

E mode: 14%

Position (d)

High idle



Cigarette Lighter

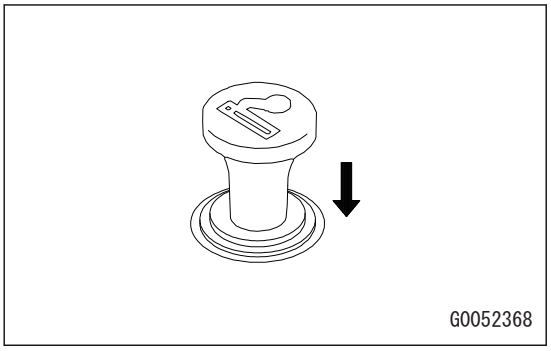
NOTICE

This cigarette lighter provides 24V power supply. Do not use as a power supply for a 12V device.

You can light a cigarette with the cigarette lighter.

When you push in the cigarette lighter, it goes back to the original position in some seconds. When it goes back to the original position, pull it out to use.

If the cigarette lighter is removed, the socket can be used as an 85W (24V×3.5A) power supply.

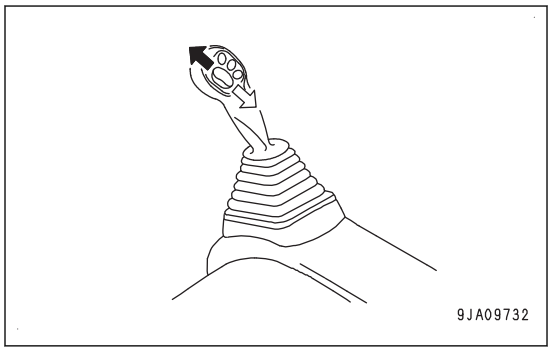


1st-Line Attachment Proportional Switch

Operate the 1st-line attachment proportional switch when you use general attachments.

You can increase or decrease the flow rate by the switch stroke.

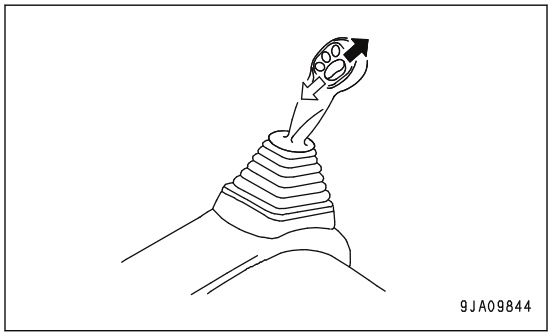
It operates only when the attachment mode is set on the machine monitor.



2nd-Line Attachment Proportional Switch

Proportional control rolling switch.

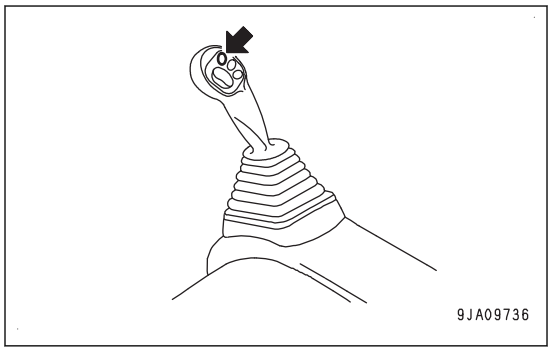
The 2nd-line attachment proportional switch operates the 2nd attachment circuit (e.g. clamshell rotation). The 2nd-line attachment proportional switch is a roller proportional control switch. Rolling the switch up produces rotation in one direction, rolling down produces rotation in the opposite direction. Slight movement of the roller will give slight movement of the clamshell; full movement of the roller will give faster movement of the clamshell.



Breaker Operation Switch

Use the breaker operation switch to operate the breaker.

For details on how to handle the breaker control switch, see “Handle Machine Ready for Installation of Attachment (6-6)”.



Lamp Switch

The working lamp or the monitor illumination lights up with the lamp switch.

(a) Night position

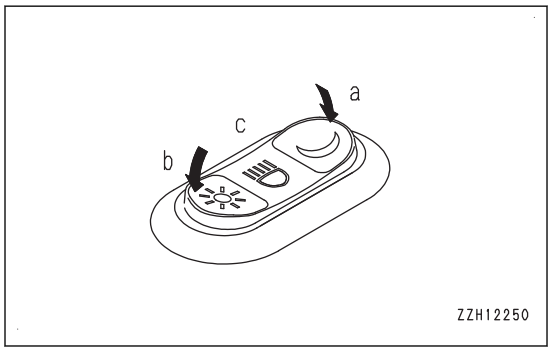
The lamps light up and the monitor illumination is set to night mode.

(b) Day position

The lamps light up and the monitor illumination is set to day mode.

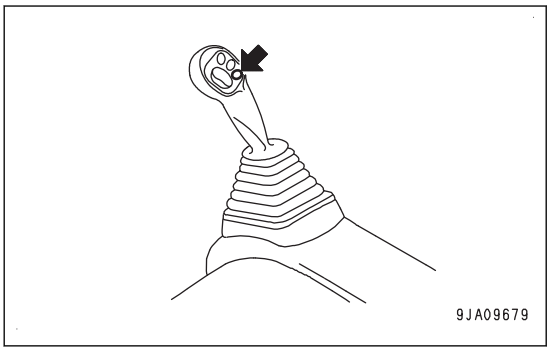
(c) OFF position

The lamps go off and the monitor illumination is set to day mode.



Horn Switch

You can operate the horn with the horn switch.



Room Lamp Switch

NOTICE

After you use the room lamp, be sure to turn the switch to the OFF position. If you forget to turn off the lamp, it can cause the battery to discharge.

The room lamp switch is used to turn on the room lamp.

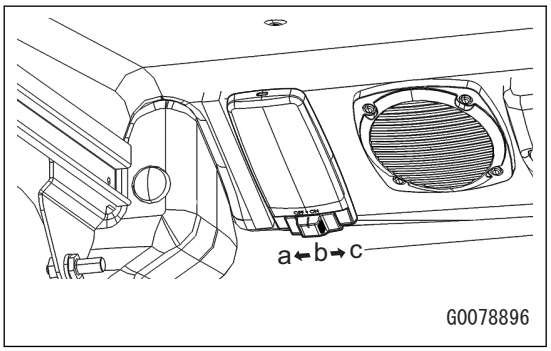
The room lamp lights up even when the starting switch is at the OFF position.

(a) OFF position

Not lit

(b), (c): ON position

Lights up

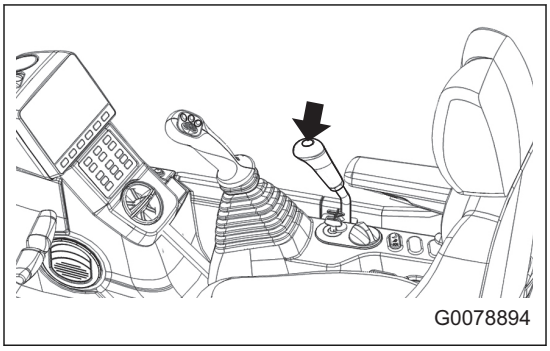


Travel Speed Selector Switch

⚠ WARNING

- **Set the travel mode to the “Lo” when you load to and unload from a trailer.**
- **Stop the machine always before you change the travel mode with travel speed selector switch. If you change between high speed travel and low speed travel while you drive the machine, travel direction can deviate even in straight travel.**
- **Do not change the travel mode with the travel speed selector switch while you use the blade.**

You can change the travel mode with travel speed selector switch.


G0078894

“Lo” display

Low-speed travel

“Hi” display

High-speed travel

Change the travel mode after you start the engine.

When you turn the starting switch key to the ON position, low speed travel (“Lo”) is automatically set.

Each time you push the travel speed selector switch, the setting changes between “Lo” and “Hi”, alternately.

Check the travel speed setting at travel speed display on the machine monitor.

Even if the high speed travel (“Hi”) is set, the travel speed automatically changes to the low speed (“Lo”) when travel force is required such as when you drive the machine on soft ground or slope, but the travel speed display remains high speed (“Hi”).



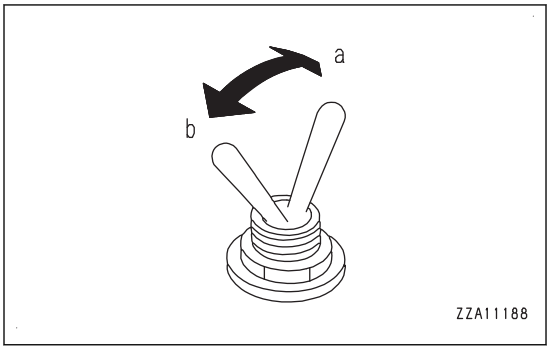
G0078854

Pump Secondary Drive Switch

NOTICE

- **Do not use the pump secondary switch when the machine is normal. If there is an abnormal part, immediately repair it.**
- **If you use this switch in the emergency position by mistake when the machine is normal, “L03” is shown on the machine monitor.**
  If “L03” is shown when you do the work, check that the switch is in the normal position.

Pump secondary drive switch is a switch that enables the work equipment and the machine to move temporarily when there is an abnormality in pump control system. When “L03” is shown by an abnormality in pump control system, the work can be done if you turn this switch to the emergency position (a).



ZZA11188

(a) EMERGENCY

When abnormal (switch is set to back)

(b) NORMAL

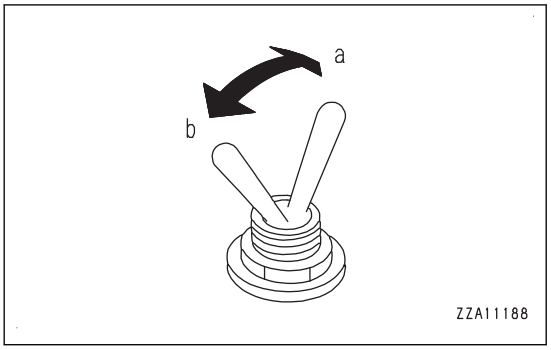
When normal (switch is set to front)

Swing Parking Brake Cancel Switch

NOTICE

Do not use the swing parking brake cancel switch when the machine is normal. If there is an abnormal part, immediately repair it.

The swing parking brake cancel switch makes swing operations possible temporarily when there is a problem in the swing parking brake system. When the upper structure does not swing but the machine monitor does not show “L03”, move this switch to the CANCEL position (a), and there is a possibility that you can do the operation.



(a) CANCEL

When abnormal (switch is set to back)

(b) NORMAL

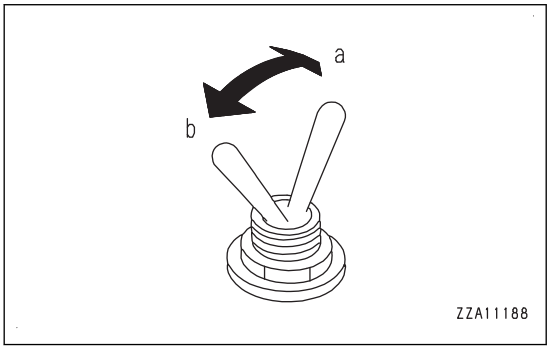
When normal (switch is set to front)

Lock Lever Automatic Lock Cancel Switch

NOTICE

Use the lock lever automatic lock cancel switch only when you need to temporarily move the machine or the work equipment in an abnormal and emergency condition. If there is an abnormal part, immediately repair it.

If the lock lever automatic lock function is abnormal, even when the lock lever is canceled normally in the condition that the work equipment control lever or travel lever is in the NEUTRAL position, this function works by mistake and the machine or the work equipment cannot move. If you set the lock lever automatic lock cancel switch to the CANCEL position (a), the machine or the work equipment can be operated temporarily. For the lock lever automatic lock function, see “Lock Lever (3-86)”.



(a) CANCEL

When in problem and emergency (switch is set to back)

(b) NORMAL

When normal (switch is set to front)

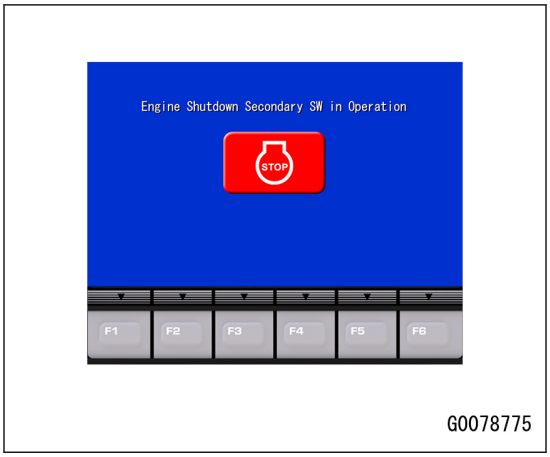
- When the lock lever automatic lock cancel switch is set to the CANCEL position (a), the lock lever automatic lock cancel pilot lamp lights up. At the same time, the mode is shown in the center of the monitor display, and after 2 seconds, the screen goes back to the standard screen.
- If you canceled the switch to move the machine or the work equipment temporarily, stop the engine, move back the switch to the NORMAL position (b). After that, consult your Komatsu distributor for repair.



Engine Shutdown Secondary Switch

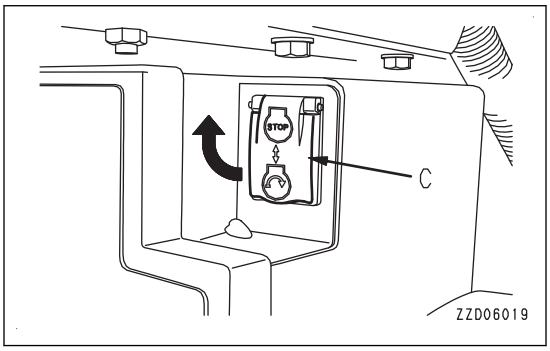
NOTICE

- **Do not use the engine shutdown secondary switch when the machine is normal. If there is an abnormal part, immediately ask for repair.**
- **If the engine shutdown secondary switch is set to the stop engine position by mistake while the machine operates normally, “Engine Shutdown Secondary SW in Operation” is shown on the machine monitor. When the “Engine Shutdown Secondary SW in Operation” is shown on the machine monitor, check that the switch is in the normal position. If it is in the stop engine position, move the switch back to the normal position.**



When the engine is not stopped even after you turned the starting switch to the OFF position, use the engine shutdown secondary switch to stop the engine.

1. Raise the cover (C) to open it.



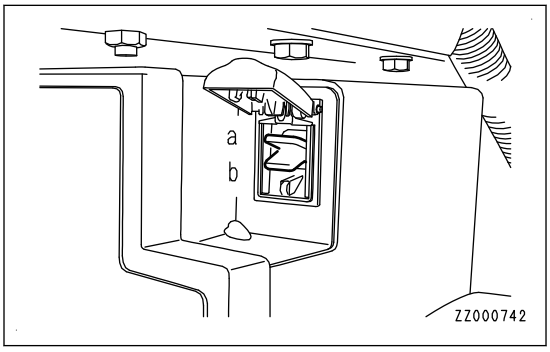
2. Set the engine shutdown secondary switch to the upper position (a) to stop the engine.

   (a) ENGINE STOP

   When it is abnormal (switch is set to upper position)

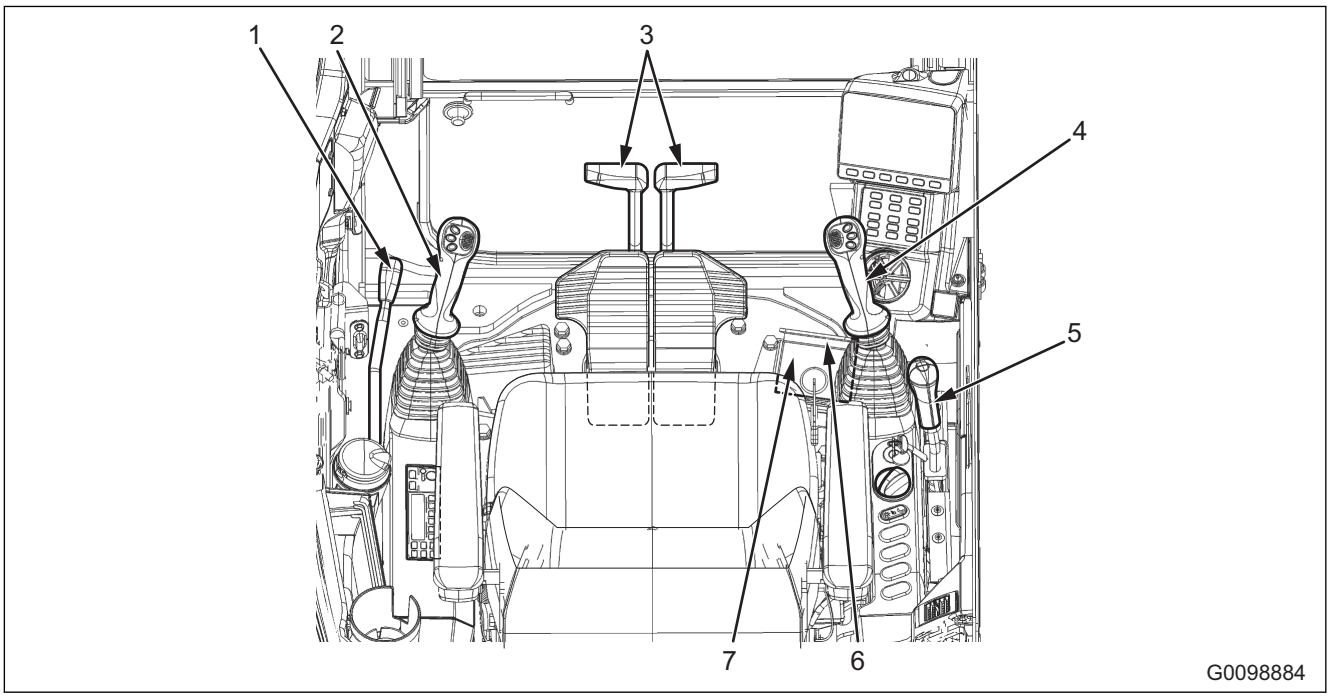
   (b) NORMAL

   When it is normal (switch is set to lower position)



Close the cover (C). The engine shutdown secondary switch automatically goes back to the NORMAL position (b).

Names of Control Levers and Pedals



(1) Lock lever

(2) L.H. work equipment control lever (with auto-deceleration mechanism)

(3) Travel lever (with pedal, auto-deceleration mechanism)

(4) R.H. work equipment control lever (with auto-deceleration mechanism)

(5) Blade control lever (with auto-deceleration system)

(6) Swing lock cover

(7) Boom swing control pedal (with auto-deceleration system)

Lock Lever

⚠ WARNING

- **When you stand up from the operator's seat, set the lock lever securely to the LOCK position. If the lock lever is in the FREE position and the control lever and control switch are touched by mistake, it can cause serious personal injury or death.**
- **Make sure that the lock lever is securely in the LOCK position.**
- **When you pull up or push down the lock lever, be careful not to touch the work equipment control levers. Make sure that your clothes do not get caught by the work equipment control levers.**
- **Before you set the lock lever to the FREE position, make sure that all levers and pedals are set to the NEUTRAL position. If they are not in the NEUTRAL position, the work equipment or machine possibly moves suddenly and it can cause a serious personal injury or death.**

The lock lever locks the work equipment operations, swing, travel, and attachment (option) operations.

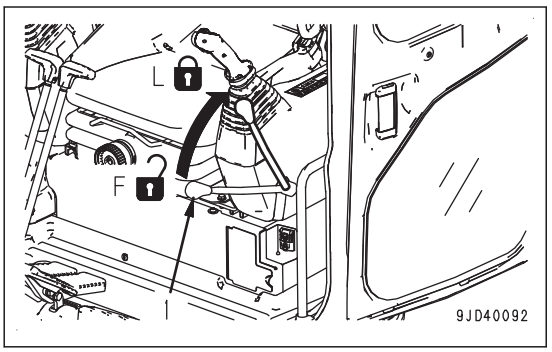
Hold the red part at the tip of the lock lever (1), and operate it.

(L) LOCK position

The machine does not move even if each control lever and attachment control pedal (option) are operated.

(F) FREE position

The machine moves in response to the operation of levers or attachment control pedals (option).



When you set the lock lever to the LOCK position (L), the work equipment lock pilot lamp lights up. At the same time, the mode is shown in the center of the monitor display, and after 2 seconds, the screen goes back to the standard screen.

REMARK

Lock lever operates in hydraulic lock method. Machine does not move while the control levers or control switches move when the lock lever is in the LOCK position (L).



G0078900

Automatic Lock Function of Lock Lever

⚠ WARNING

- **The lock lever automatic lock function helps the operator to make a judgment and to reduce damage caused by accident. It is not a function that can stop the work equipment or machine in all situations.**
- **Do not overestimate the lock lever automatic lock function. Even if this function is activated, the work equipment or machine does not stop immediately, but it possibly stops after some movement. The function does not operate in some cases that follow.**
  - **When the hydraulic oil temperature is low (When the hydraulic oil temperature caution lamp shows low temperature)**
  - **When the viscosity of the hydraulic oil used is higher than that of the genuine hydraulic oils which Komatsu recommends**
    For the genuine hydraulic oil which Komatsu recommends, see “Recommended Fuel, Coolant, and Lubricant (7-4)”.
  - **When the system has a failure.**
- **Before you set the lock lever to the FREE position, make sure that all levers and pedals are set to the NEUTRAL position. If they are not in the NEUTRAL position, the work equipment or machine possibly moves suddenly and it can cause a serious personal injury or death.**

Automatic lock function of lock lever is a function that makes the machine state to be the same as that of when lock lever is automatically locked even when you cancel the lock lever while you operate the work equipment control lever and travel lever. This is to prevent the operation of the work equipment or machine to continue.

When this function is activated, the operation of the work equipment, swing, travel, and attachment operation are locked automatically and the message as in the figure is shown.

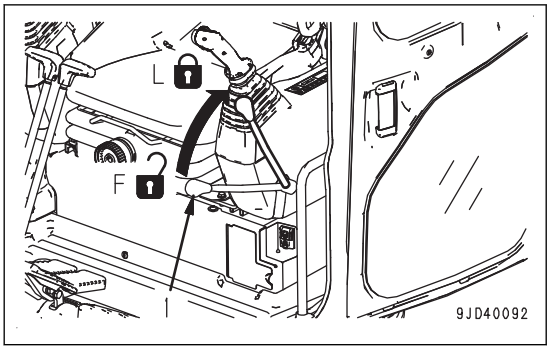
While this function is in operation, the machine does not move even when each control lever and attachment control switch are operated while the lock lever is in the FREE position (F).

When you cancel the lock, do as follows.



G0078902

1. Move the lock lever back to the LOCK position (L).
2. Check that control levers and attachment control switch are in NEUTRAL state.
3. Set the lock lever to the FREE position (F).

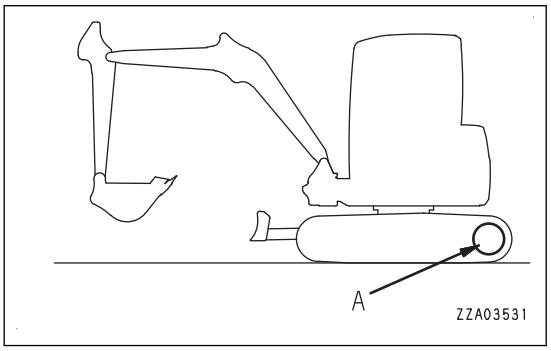


Travel Lever

⚠ WARNING

- **Be very careful for travel and steering with the pedals, and do not put your foot on the pedals unless necessary. If you operate the machine with your foot on the pedals and push them by mistake, the machine can suddenly start to travel. It can cause a serious personal injury or death.**
- **When you operate the travel lever, make sure the direction of the track frame if it faces forward or backward. (The track frame is set toward the front side when the sprocket side (A) is at the rear.)**

  When the track frame is set toward the rear side, the operation direction of the travel lever is the opposite to the direction of the movement of machine (forward/ reverse, right/left swing).



Use the travel lever to shift the travel direction to forward/ reverse. Description in the ( ) is for the pedal operation.

(a) FORWARD

The travel lever is pushed forward.

(The front part of the pedal is pushed.)

(b) REVERSE

The travel lever is pulled back.

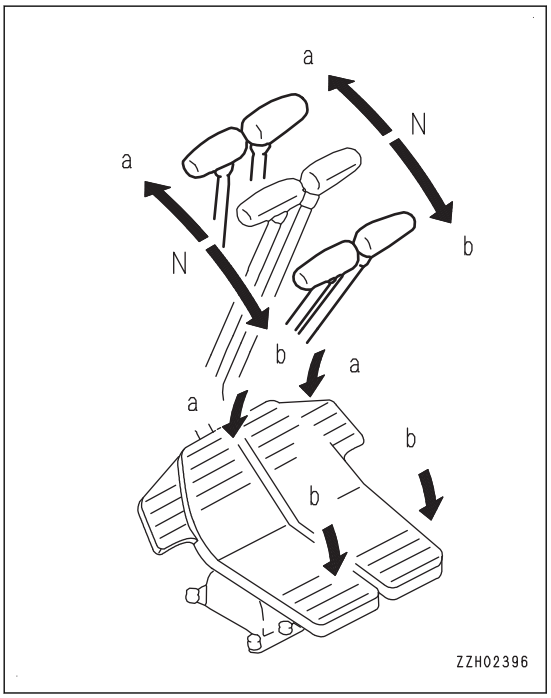
(The rear part of the pedal is pushed.)

N (NEUTRAL)

The machine stops.

REMARK

If the travel lever is shifted from the NEUTRAL position to the FORWARD position or the REVERSE position, the alarm makes a sound to warn that the machine starts to move.

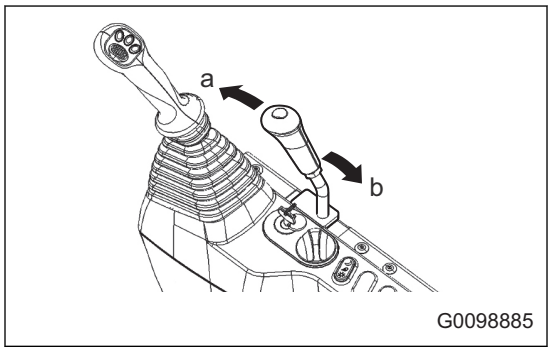


Blade Control Lever

The blade control lever is used to control the blade.

(a): LOWER

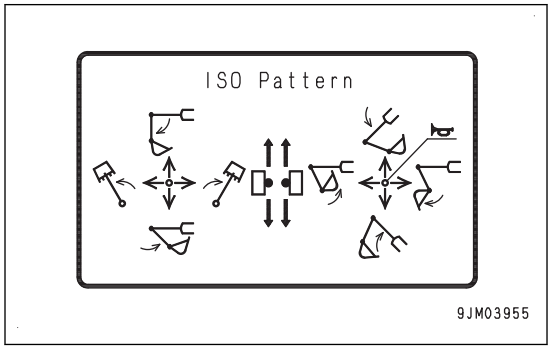
(b): RAISE



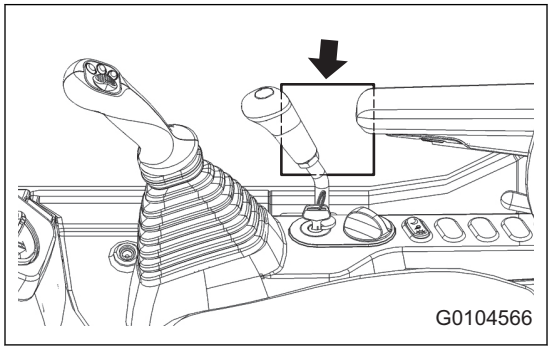
Work Equipment Control Lever

⚠ WARNING

- **The control pattern is set to the standard control method (ISO pattern).**
  If it is necessary to change the control pattern, consult your Komatsu distributor.
- **For details of the operation patterns other than ISO pattern, see ATTACHMENTS AND OPTIONS. Before you start the operation, be sure to read and understand the description.**
- **When you changed the operation pattern, be sure to replace the control pattern card with one that agrees with the machine movement.**



The control pattern card is located at the position shown in the figure.



The L.H. work equipment control lever is used to operate the arm and upper structure.

Swing operation

(a) Swing RIGHT

(b) Swing LEFT

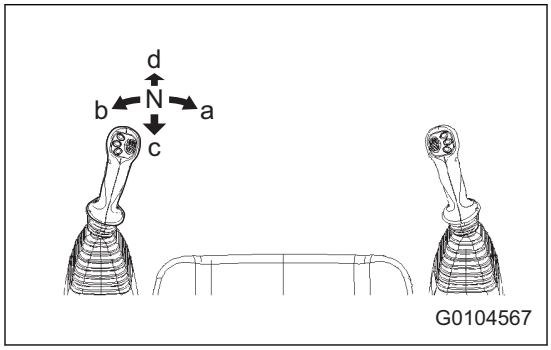
Arm operation

(c) Arm IN

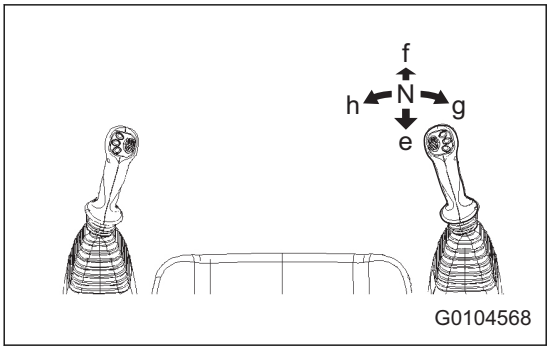
(d) Arm OUT

(N) NEUTRAL

The upper structure and arm are held at current position.



Use the R.H. work equipment control lever to operate the boom and bucket.



Boom operation

(e) Boom RAISE

(f) Boom LOWER

Bucket operation

(g) Bucket DUMP

(h) Bucket CURL

(N) NEUTRAL

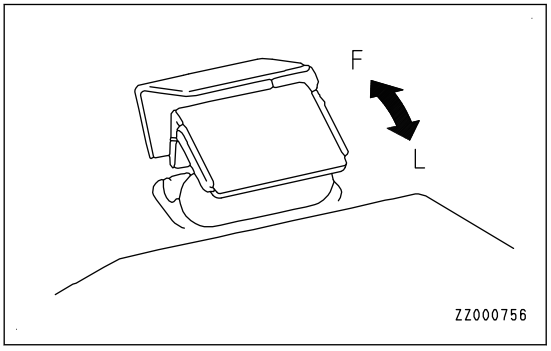
Boom and bucket are held at current position.

Swing Lock Cover

⚠ WARNING

When the boom swing operation is not done, lock the swing with the swing lock cover.
If the control pedal is not locked and it is touched by mistake, this can cause a serious injury or death.

You can lock the boom swing control pedal with the swing lock cover.



(F) FREE position

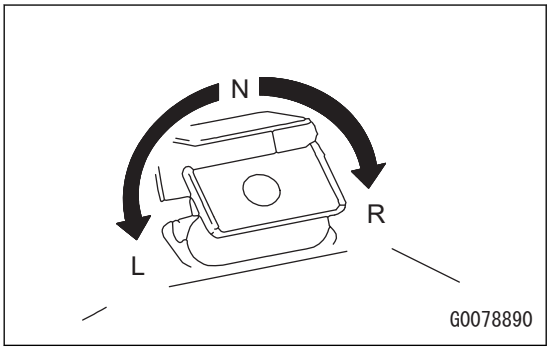
You can swing the boom to the right and left by operation of the boom swing control pedal.

(L) LOCK position

You cannot operate the boom swing control pedal.

Boom Swing Control Pedal

You can swing the boom with the boom swing control pedal.



(R) RIGHT swing position

Boom swings to the right.

(N) NEUTRAL position

Boom is held at current position.

(L) LEFT swing position

Boom swings to the left.

Other Equipment

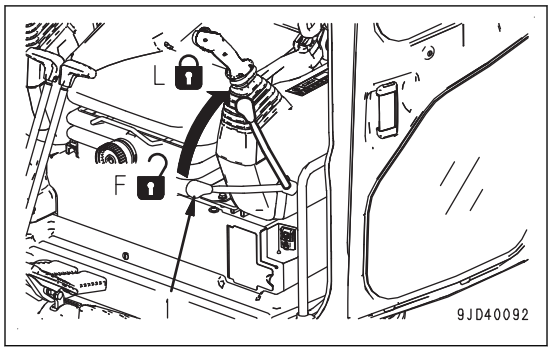
How to Open and Close Ceiling Window

⚠ WARNING

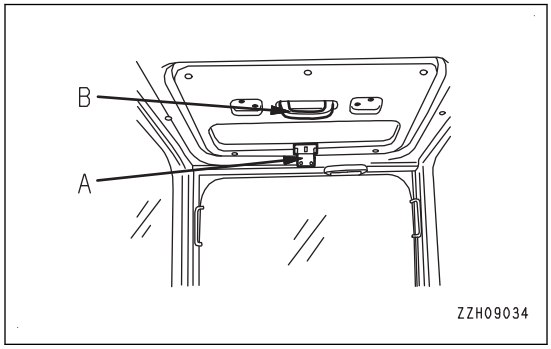
When you stand up from the operator's seat, set the lock lever securely to the LOCK position. If the lock lever is at the FREE position and the control lever, control pedal, or control switch is touched by mistake, it can cause serious personal injury or death.

When You Open

1. Hold the red part on the top of the lock lever (1), and then securely operate it to the LOCK position (L).



2. Push up the lock (A) in the front center of the ceiling window and check that the lock is released. Then hold the grip (B) and push up the ceiling window.



When You Close

1. Hold the handle (B), and lower the ceiling window.
2. Apply the lock (A).

If the lock cannot be applied, open the ceiling window one time, and pull down again.

How to Open and Close Cab Front Window

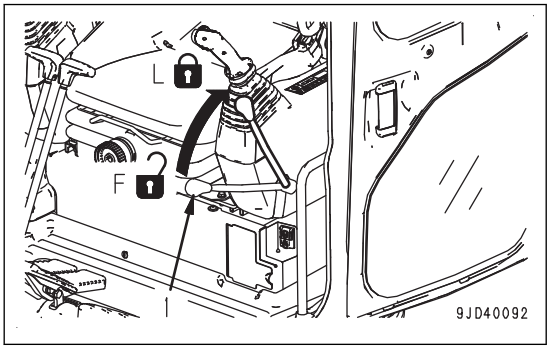
⚠ WARNING

- **Be sure to set the lock lever in the LOCK position when you open or close the front window, lower window, or door. If the lock lever is at the FREE position and the control lever, control pedal, or control switch is touched by mistake, it can cause serious personal injury or death.**
- **Lower the work equipment to the level ground, stop the engine, and then open or close the front window.**
- **When you open the front window, hold the handle securely with two hands to pull up. Do not let go of it until it is locked by the automatic lock catch.**
- **When you close the front window, tightly hold the handle with both hands. There is a danger that the window falls by its own weight.**

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

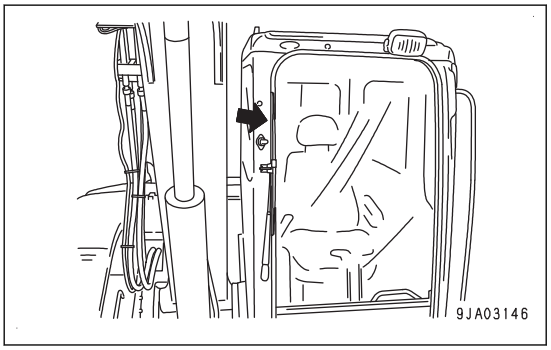
When You Open

1. Lower the work equipment to the ground on a level area, and stop the engine.
2. Hold the red part on the top of the lock lever (1), and then securely operate it to the LOCK position (L).



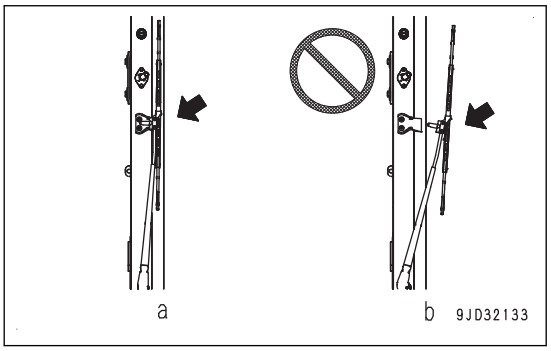
3. Make sure that the wiper blade is stowed in the right pole.

   If the wiper blade is in incorrect stowing position (b), lift it to move to the correct stowing position (a). If the wiper blade cannot go back to the correct stowing position, consult your Komatsu distributor for repair.



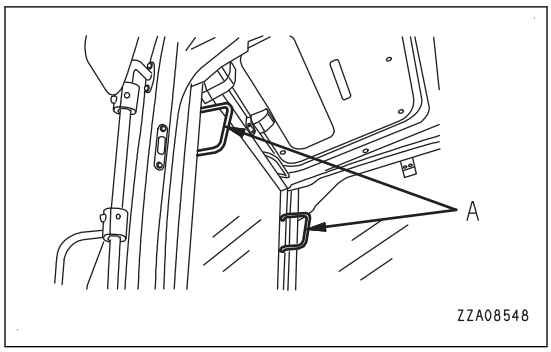
(a) Correct stowing position

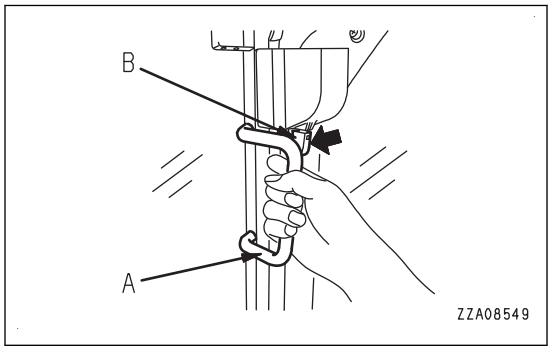
The wiper blade is on the cab.
(b) Incorrect stowing position
The wiper blade is on the glass.



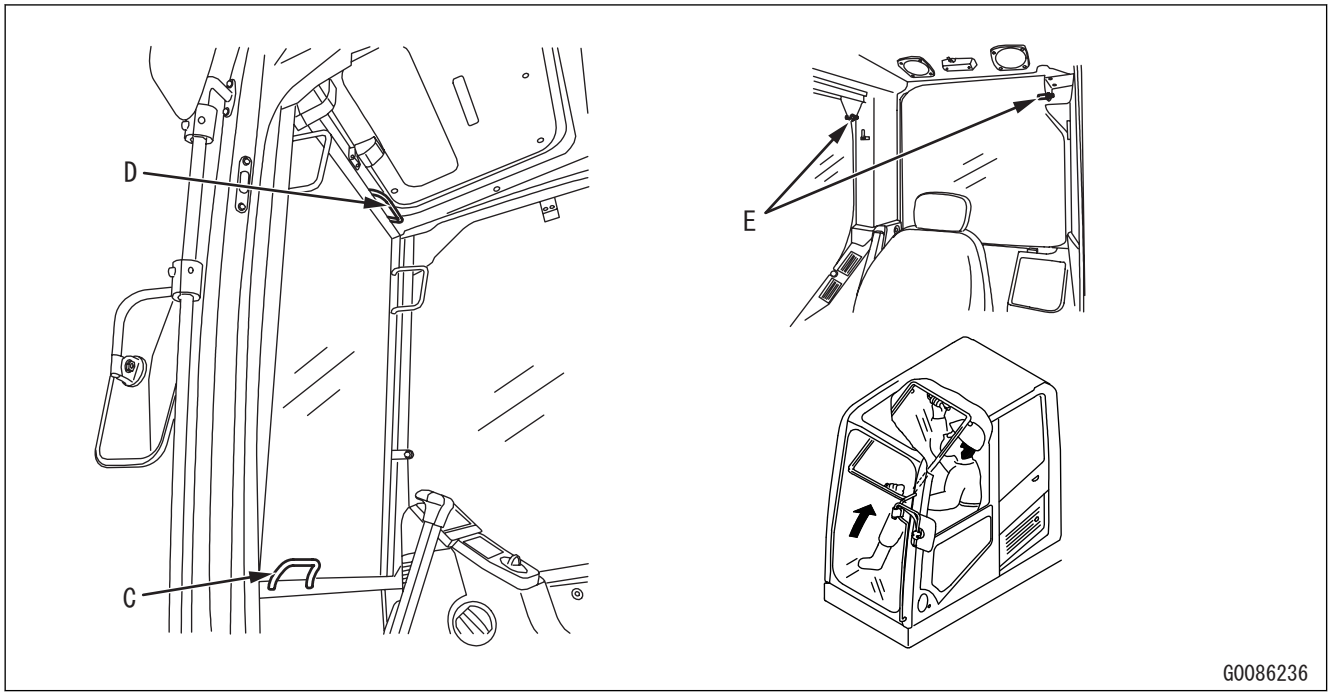
4. Hold the handles (A) (2 places) on the right and left top sides of the front window, and pull the levers (B) (2 places) to release the lock on the top of the front window.

   Upper part of the front window comes off.





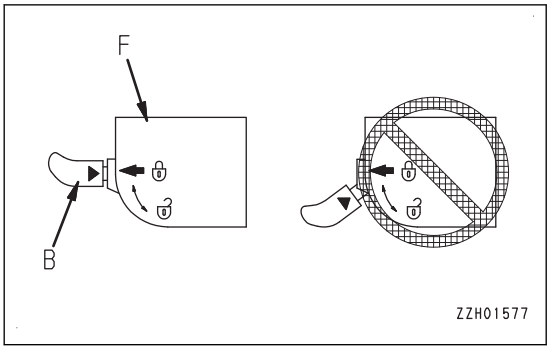
5. Pull up the lower handle (C) with your left hand from the inside of the operator's cab, hold the top handle (D) and pull it up with your right hand, and then push it against the lock catches (E) at the rear of the cab securely to lock the window.



REMARK

Do not hold and pull up the front window by the handles (A) on the right and left sides of top of the front window. The handles (A) are not to pull up the front window.

6. Visually check that the lever (B) is securely in the LOCK position.
   - The lock is engaged if the arrow on the lock case (F) is the same as the position of the arrow on the lever (B).
   - If the position of the arrow on the lock case (F) and the position of the arrow on the lever (B) do not match, do the operation in item 5 again and again to lock.



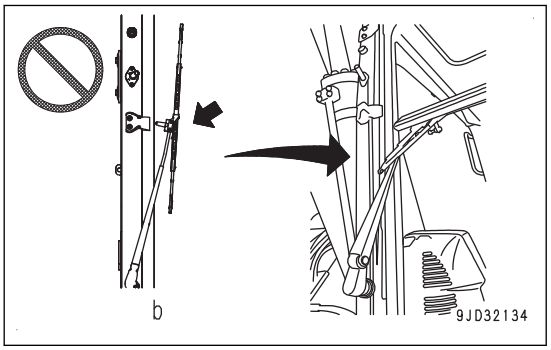
When You Close

⚠ CAUTION

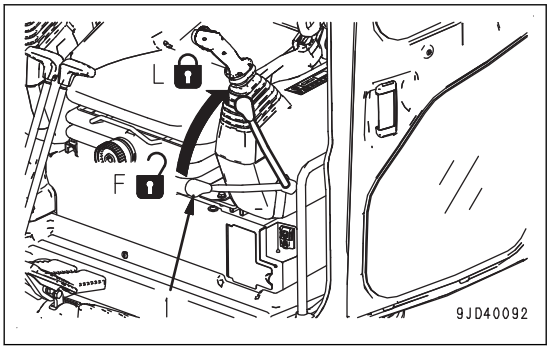
When you close the front window, lower it slowly and be careful not to get your hand caught.

NOTICE

Make sure that the wiper blade is stowed at the correct position (a), and close the front window.
If the front window is closed when the wiper blade is stowed at the incorrect position (b), be careful that the wiper blade can break.

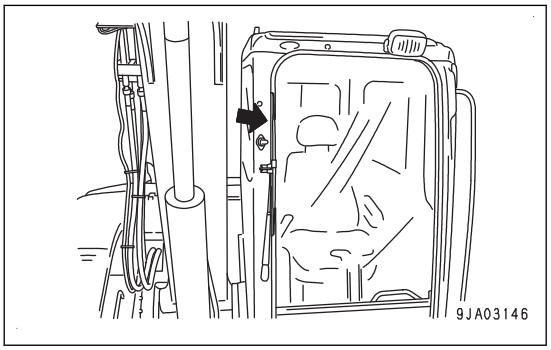


1. Lower the work equipment to the ground on a level area, and stop the engine.
2. Hold the red part on the top of the lock lever (1), and then securely operate it to the LOCK position (L).



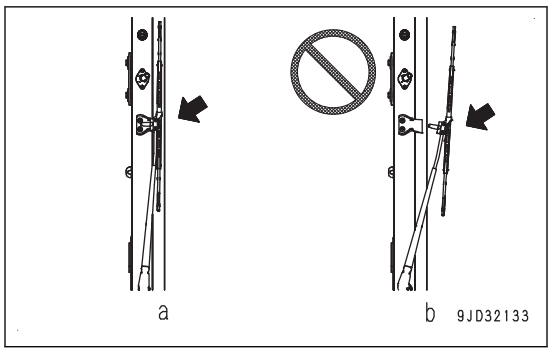
3. Make sure that the wiper blade is stowed in the right pole.

   If the wiper blade is in incorrect stowing position (b), lift it to move to the correct stowing position (a). If the wiper blade cannot go back to the correct stowing position, consult your Komatsu distributor for repair.

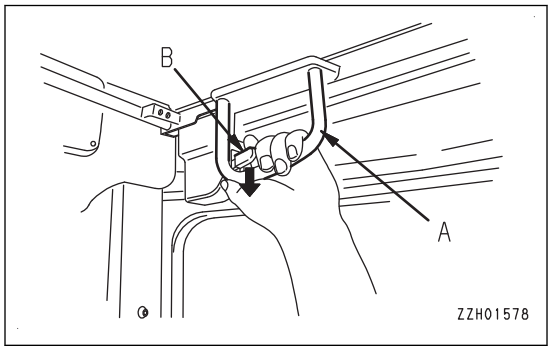


(a) Correct stowing position

The wiper blade is on the cab.
(b) Incorrect stowing position
The wiper blade is on the glass.



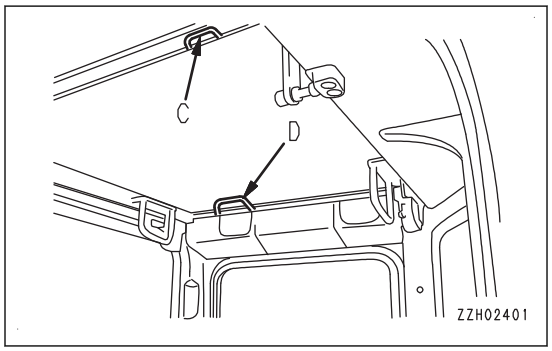
4. Hold the right and left handles (A), and pull down the lever (B) to release the lock.

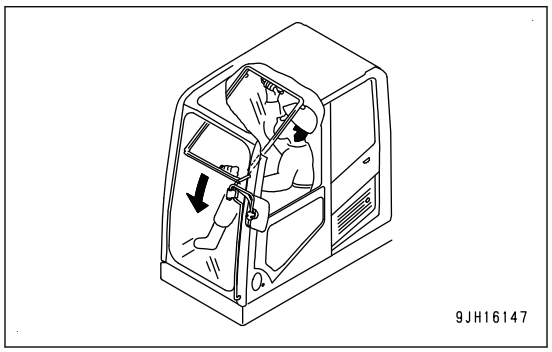


5. Hold the handle (C) at the bottom of the front window with your left hand and the handle (D) at the top with your right hand, push the window to the front, and lower it slowly.

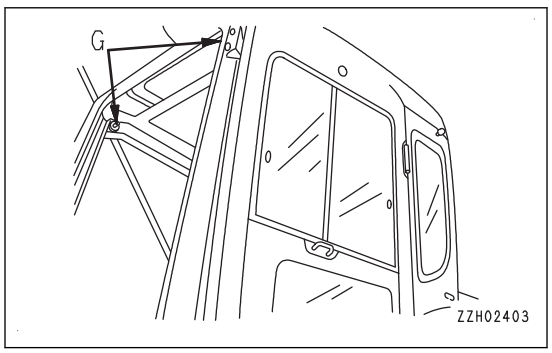
REMARK

Do not hold and pull down the front window by the handles (A) on the right and left sides of top of the front window. The handles (A) are not to pull down the front window.

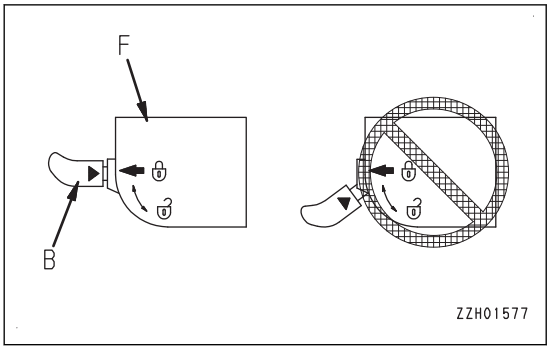




6. When the bottom of the window reaches the top of lower window, push the top of the window to the front to push it against right and left lock catches (G) and engage the lock.



7. Visually check that the lever (B) is securely in the LOCK position.
   - The lock is engaged if the arrow on the lock case (F) is the same as the position of the arrow on the lever (B).
   - If the position of the arrow on the lock case (F) and the position of the arrow on the lever (B) do not match, do the operation in item 6 again and again to lock.

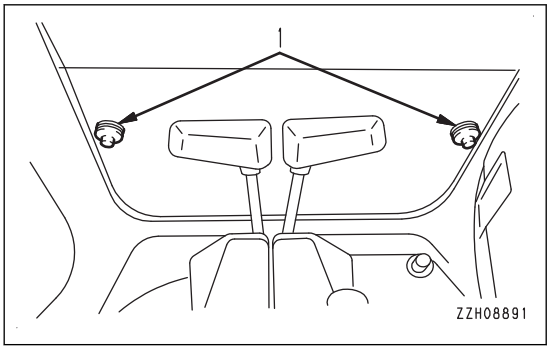


Removal of Front Window (Lower Side)

NOTICE

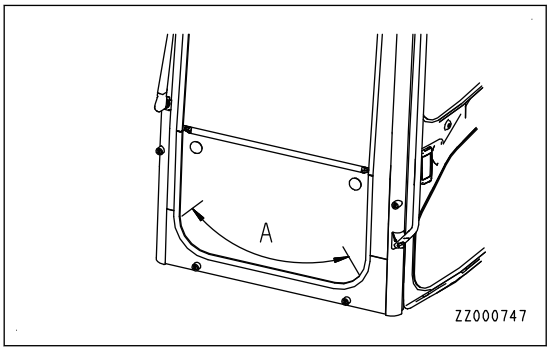
When you stow the glass, lock it securely and check that there is no play. If there is a play or the lock is not fully applied, there is a danger that the glass can fall.

1. Hold the knobs (1) and pull them up while the front window is open, and remove the lower window.

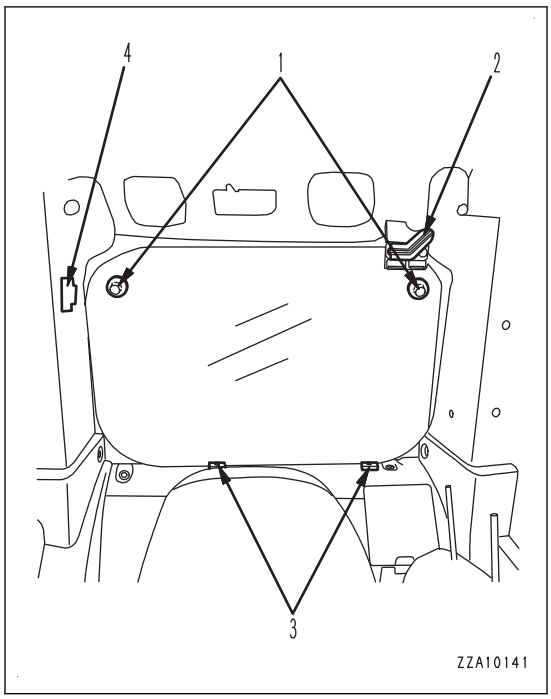


REMARK

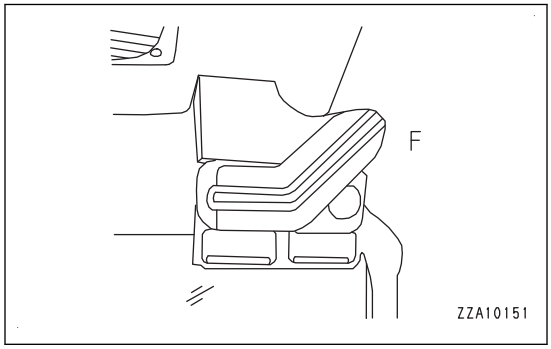
Clean the range (A), and remove the lower window. If dust is accumulated on the lower front of the front window, it is not easy to remove the lower window. Also, dirt such as dust attached to the glass enters the cab when the lower window is stored.



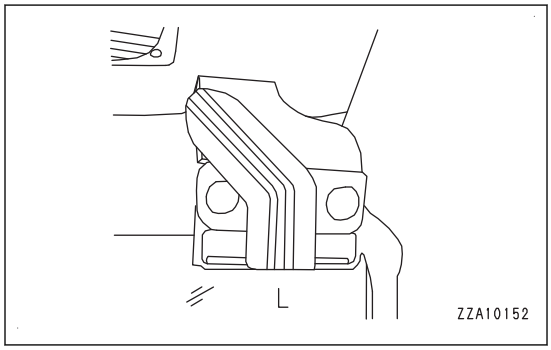
2. Store the removed lower window behind the operator's cab by the procedure that follows.
   1) Let the protrusion of the knobs (1) on the glass be on the inside, and insert the bottom of the glass into the grooves (3) on the seat.
   2) Insert the upper right part of the glass into the groove (4) on the seat.



   3) Set the lock (2) to the FREE position (F) and let the upper side of the glass be pushed to it.



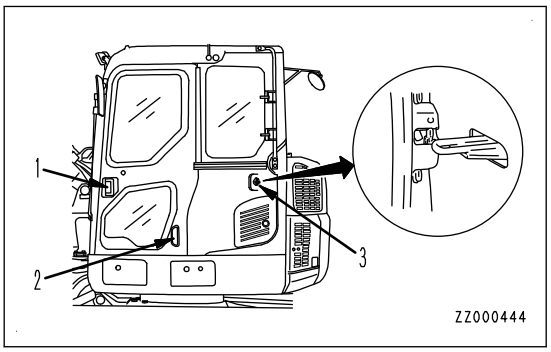
   4) Turn the lock (2) 90° counterclockwise to the LOCK position (L) to fix the upper side of the glass.
   5) When you remove the lower window from the stowing position, do the stowing procedure in the reverse order.



Slide Door

⚠ CAUTION

- **Before you use the machine, make sure that the slide door is locked regardless whether the door is open or closed.**
- **Park the machine on a flat ground when you open or close the door. Be very careful when you open or close the slide door if the machine is stopped on a slope. There is a danger that door opens and closes suddenly by its own weight.**
- **When you open or close the door, be sure to hold the door handle (1) and the knob (2).**
- **Be careful not to pinch your hand with the front pillar or the center pillar.**
- **Call out a warning before you open or close the door when there is anyone in the cab.**



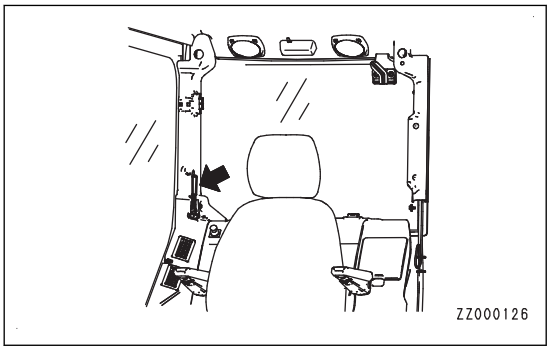
If the door is locked in open state, pull the door handle (1) rearward one time to release the lock (3).

Emergency Escape Hammer

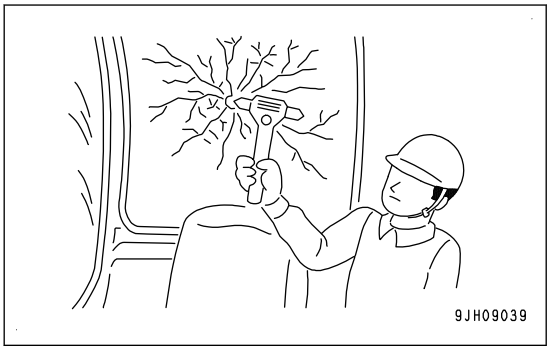
⚠ CAUTION

- **If it is necessary to break the window glass with the hammer, be very careful not to get injured with broken pieces of glass.**
- **When you escape, remove all the pieces of glass from the window frame first and be careful not to cut yourself on the glass.**
- **Be careful also not to slip on the broken pieces of glass on the ground.**

The hammer (1) is provided to break the glass. Escape through the window in case of emergency when you cannot open the cab door.



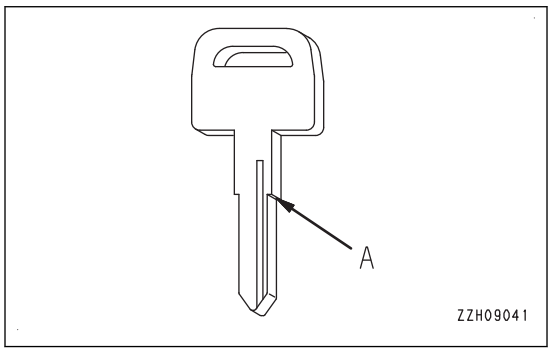
Use the hammer (1) to break the glass and escape through the window.



Cover with Lock

Use the starting switch key to open and close the cover with lock.

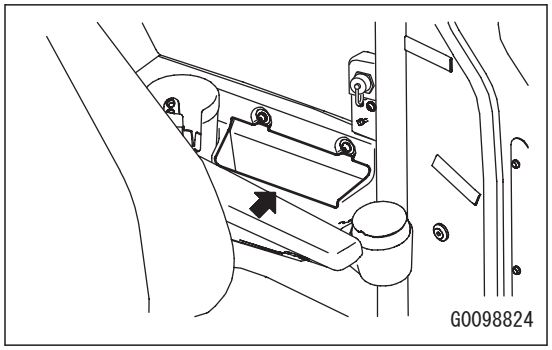
Insert the key until the part (A) touches, and then turn the key. If the key is turned when it is not inserted to the end, it can be damaged.



Magazine Box

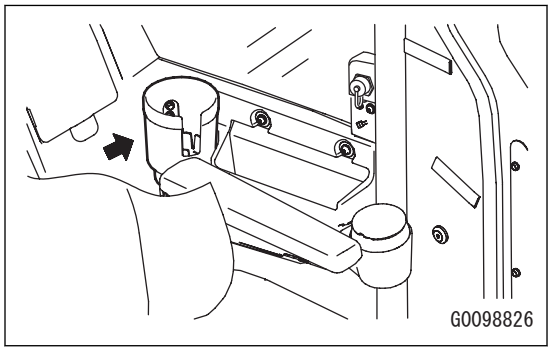
Pocket to store the Operation and Maintenance Manual and oil chart is in the location shown in the figure.

Put the Operation and Maintenance Manual in this pocket to make it available when you need it.



Cup Holder

The cup holders are in the positions shown in the figure.

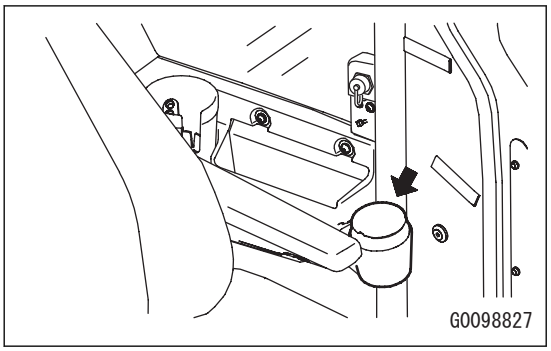


Ashtray

NOTICE

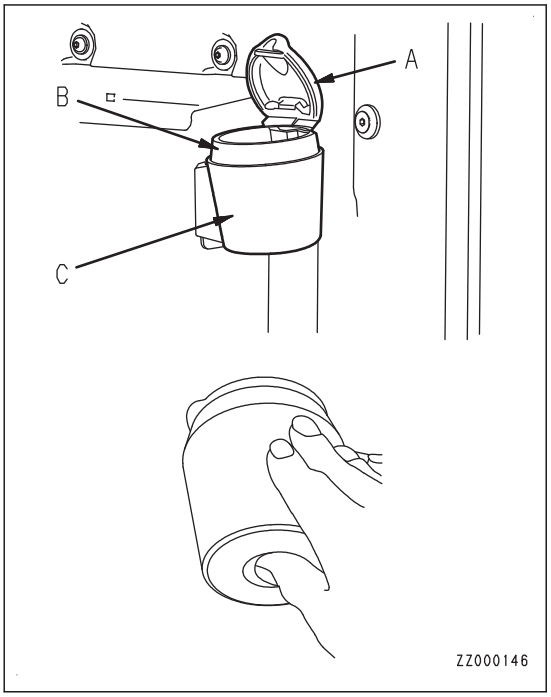
When you remove the ashtray, if you hold the ashtray lid (A) and twist it, the ashtray can be damaged.

The ashtray is in the position shown in the figure.



Be sure to extinguish your cigarette before you put it in the ashtray, and close the lid (A).

When you remove the ashtray, open the ashtray lid (A), and then hold the ashtray body (B) and twist it right and left to remove. Or, push up the ash tray body (B) with a finger through the hole under the ash tray holder (C).



Power Supply Outlet

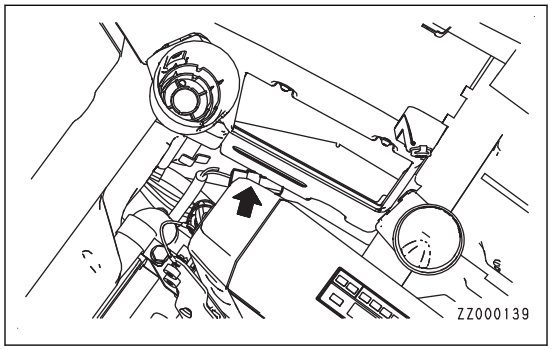
NOTICE

If you install an electrical component other than our company product, use it with 24V specification and up to 240W (equivalent to 10A). Consult your Komatsu distributor when you install an electrical component of larger capacity than that.

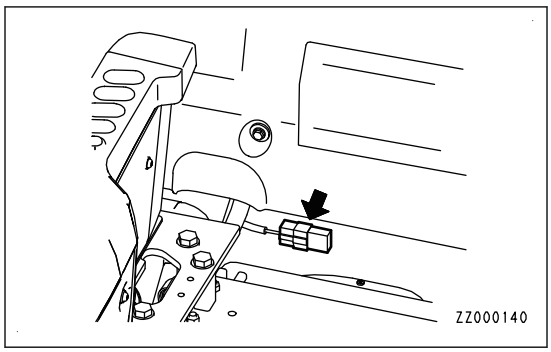
The connectors for the optional power supply are fixed to the right and left side under the floor console. Remove it to use.

This connector is provided to supply power for electrical components not manufactured by us.

No. of the left connector: M10



No. of the right connector: M09



For connection type connecters, see the table below.

No. of the left connector: M10

	X type housing (2 poles)		Terminal		Grommet	
	Body	Rear holder	AVS 0.5 to 1.25	AVS 2 to 3	AVS 0.5 to 1.25	AVS 2 to 3
Komatsu part number	08055-00212	08055-00230	08055-00040	08055-00041	08055-00060	08055-00061

No. of the right connector: M09

	X type housing (2 poles)		Terminal		Grommet	
	Body	Rear holder	AVS 0.5 to 1.25	AVS 2 to 3	AVS 0.5 to 1.25	AVS 2 to 3
Komatsu part number	08056-00212	08056-00230	08055-00040	08055-00041	08055-00060	08055-00061

24V Power Supply

NOTICE

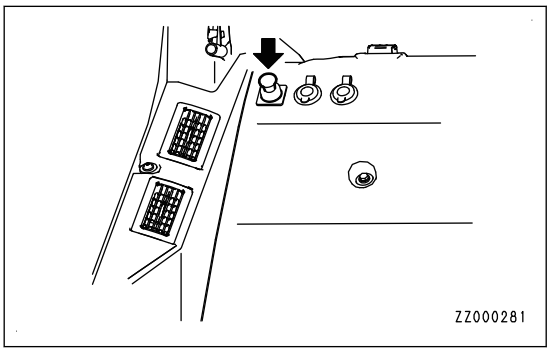
Do not use as a power supply for a 12V device. This will cause failure of the equipment.

When the cigarette lighter is removed, its socket can be used as a power supply.

The capacity of the cigarette lighter is 85W (24V×3.5A).

REMARK

Use the power supply while the engine is in operation.



12V Power Supply

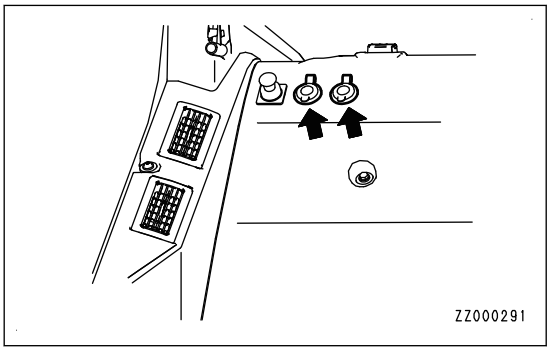
The capacity of the power supply is 144W (12V×12A).

When it is used at 1 place: 144W (12V×12A)

When it is used at 2 places: 144W in total

REMARK

Use the power supply while the engine is in operation.

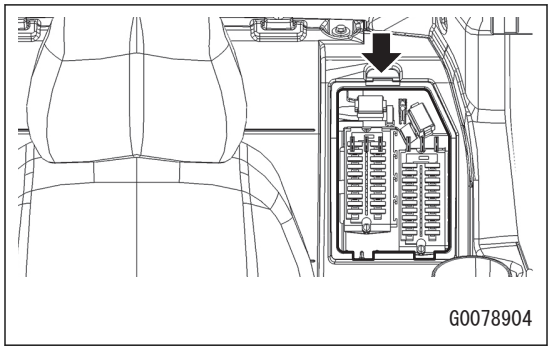


Fuse

NOTICE

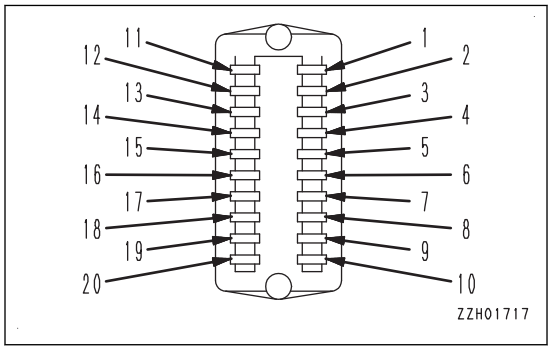
Before you replace the fuses, be sure to turn the starting switch to the OFF position. Check that the system operating lamp is not lit. Then turn the battery disconnect switch key to the OFF position.

- Fuse holder is installed on the inside of the cover on the left side behind the operator's seat.
- It protects the electrical component and wiring from burning out.
- If the fuse is corroded, looks white powdery, and there is looseness between the fuse holder and the fuse, replace the fuse.
- When you replace the fuse, replace it with one of the same capacity.

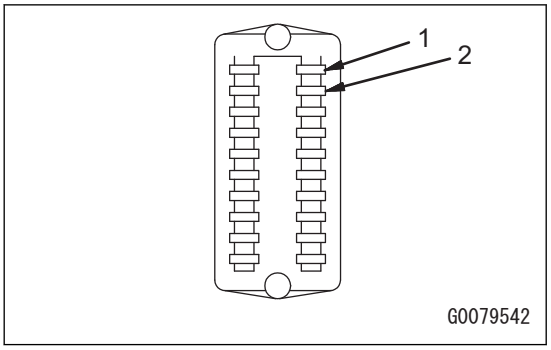


Fuse Capacities and Circuit Names

No.	FUSE	Name of circuit
(1)	5A	Redundant resistor, working lamp switch
(2)	30A	Solenoid valve
(3)	5A	PPC oil pressure lock solenoid
(4)	10A	Window washer, cigarette lighter
(5)	10A	Horn, coolant level sensor
(6)	5A	Spare
(7)	10A	Revolving lamp (option)
(8)	10A	Radio, speaker, travel selector SW, right knob SW
(9)	10A	Quick coupler
(10)	20A	Air conditioner unit
(11)	25A	Optional power supply
(12)	20A	Optional power supply (2), 12V power supply
(13)	5A	Air conditioner ECU power supply
(14)	5A	Key ACC signal
(15)	5A	Spare
(16)	10A	Radio backup, room lamp, system operating lamp
(17)	20A	Monitor, pump controller
(18)	30A	Engine controller
(19)	5A	Air conditioner ECU backup
(20)	30A	Optional power supply

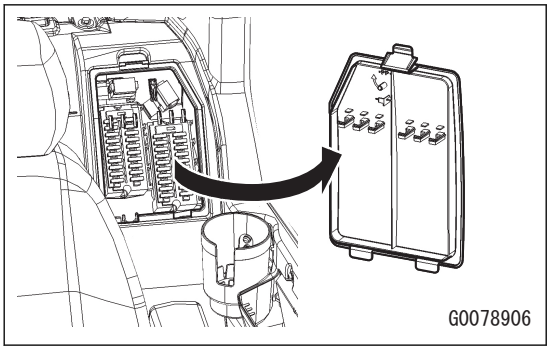


No.	FUSE	Name of circuit
(1)	20A	Working lamp
(2)	10A	Headlamp



REMARK

- The replacement spare fuses are installed behind the fuse holder lid at the rear left of the operator's seat.
- After the spare fuses are used, refill them immediately.
- One spare fuse is installed for each 5A, 10A, 20A, 25A, and 30A.

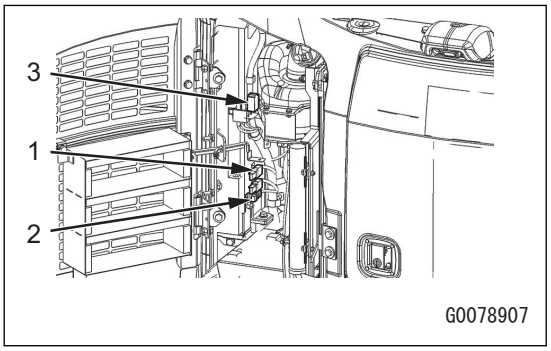


Fusible Link

NOTICE

Before you replace the fusible link, be sure to turn the starting switch to the OFF position. Make sure that the system operating lamp is not lit, and then turn the battery disconnect switch key to the OFF position.

If the phenomenon that follows occurred, open circuit of the fusible link is the possible cause. Open the rear left cover, inspect the fusible link, and replace it.



- If the starting motor does not operate even when the starting switch is turned to the START position, the fusible link (1) is possibly broken.
- If the battery runs out, open circuit of the fusible link (2) is the possible cause.
- In cold temperature, when you turn the starting switch to the HEAT (preheat) position and do preheating but still the engine does not start, the open circuit of fusible link (3) is the possible cause.

REMARK

A fusible link refers to the large-sized fuse wiring installed in the high current flow part of the circuit.
It protects electrical parts and wiring from burning out by abnormal current, in the same way as a normal fuse.

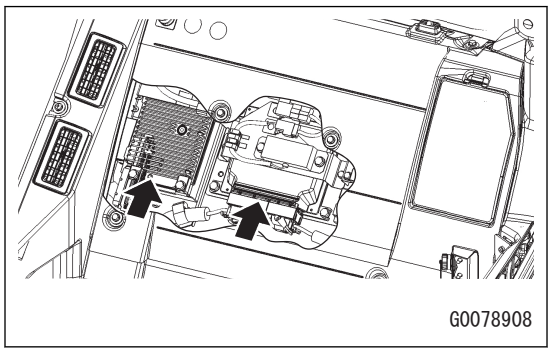
No.	Capacity	Name of circuit	Connector No.	Part number
(1)	65A	Normal power supply	F02	22U-06-11270
(2)	45A	Continuous power supply	F03	20T-06-81230
(3)	120A	Alternator	F05	421-06-22830
		Preheating	F06	

Controller

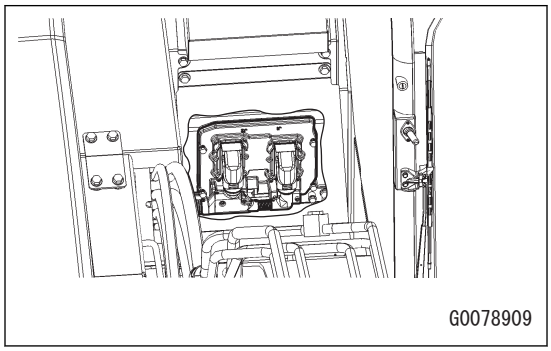
NOTICE

- **Do not splash water, dirt, drinks on the controller. It can cause failure.**
- **If an error occurs on the controller, do not repair it yourself, but consult your Komatsu distributor.**

The machine controller and KOMTRAX controller are installed on the inside of the rear cover behind the operator cab.



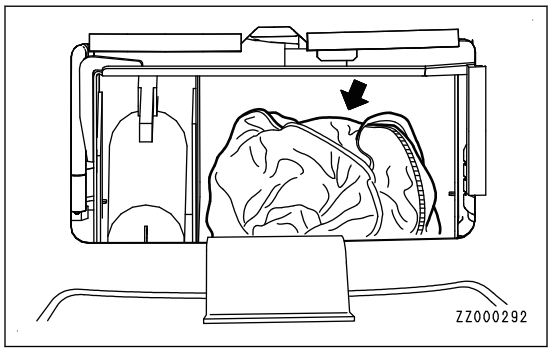
Engine controller is installed to the partition plate.



Tool Box

When you open the left side cover of the machine, you will find the standard tool box.

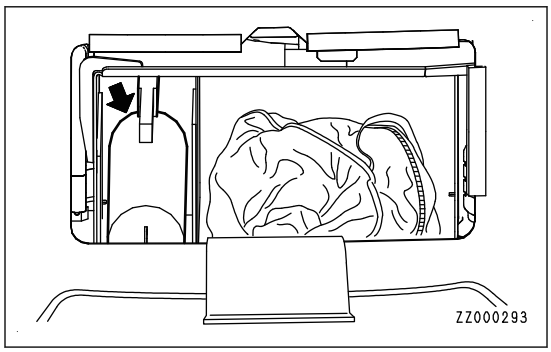
Put tools in the attached tool bag to store tools.



Grease Pump Holder

When you open the left side cover of the machine, you will find the storage place for the grease pump.

Put the nozzle of the grease pump into the hole at the end, put it to the end and store it.



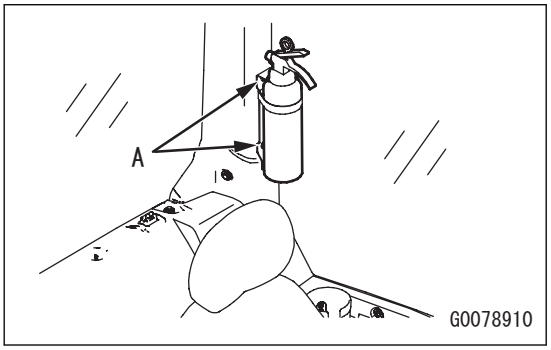
Fire Extinguisher

(option)

You can fix the fire extinguisher in the position (A) shown in the figure.

For the parts necessary to fix it, consult your Komatsu distributor.

The directions are described on the nameplate attached to the fire extinguisher. Carefully read and understand them for the possibility of fires.



Battery Disconnect Switch

⚠ CAUTION

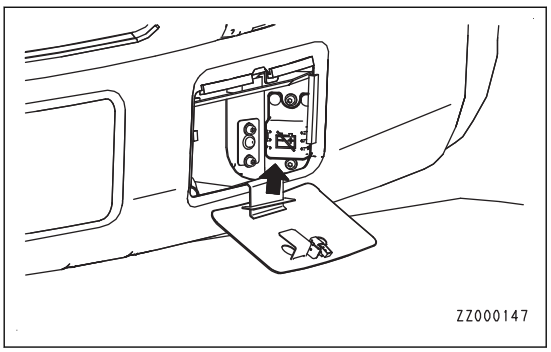
- **Do not operate the battery disconnect switch while the engine is running. The large current occurred from the alternator can burn the electric parts and it causes a fire in some cases. Operate the battery disconnect switch only when the engine is stopped.**
- **Remove the switch key always when you turn the battery disconnect switch to the OFF position. If other person turns the key to the ON position carelessly, this is very dangerous.**

NOTICE

- **Keep the battery disconnect switch in the ON position except the cases that follow.**
  - **When you store the machine for a long time (more than a month)**
  - **When you repair the electrical system**
  - **When you do the electric welding**
  - **When you handle the battery**
  - **When you replace the fuse or such**
- **Do not turn the battery disconnect switch to the OFF position while the system operating lamp is lit. If you turn it to the OFF position while the lamp is lit, the data in the controller can be lost and system trouble can occur.**
- **If the switch is turned to the OFF position, all the electrical system is cut out and the functions of KOMTRAX stop. In addition, the time information of the clock and the radio tuning information can be lost. In this case, set them again. For details, see “Clock Adjustment (3-70)” and “Handle Radio (3-205)”.**

The battery disconnect switch is used to cut out the electricity from the battery.

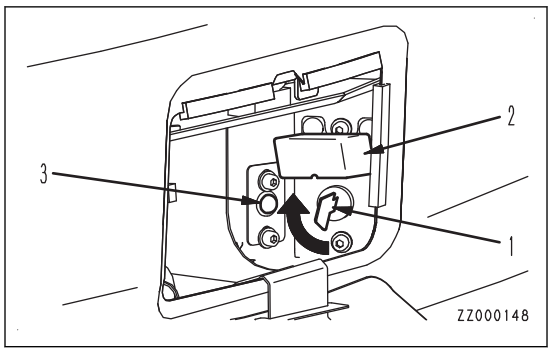
This is installed on the inside of the cover on the left side of the machine.



You can find the battery disconnect switch when you pull up the rubber cover (2).

REMARK

Operate it while the system operating lamp (3) is not lit.



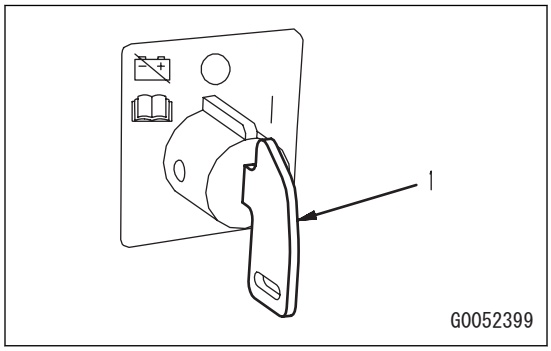
(O): OFF position

The switch key (1) can be inserted or removed. The current from the battery is cut out.

(I): ON position

The electric current from the battery flows into the circuit.

Before you start the machine, be sure to set it to this position.

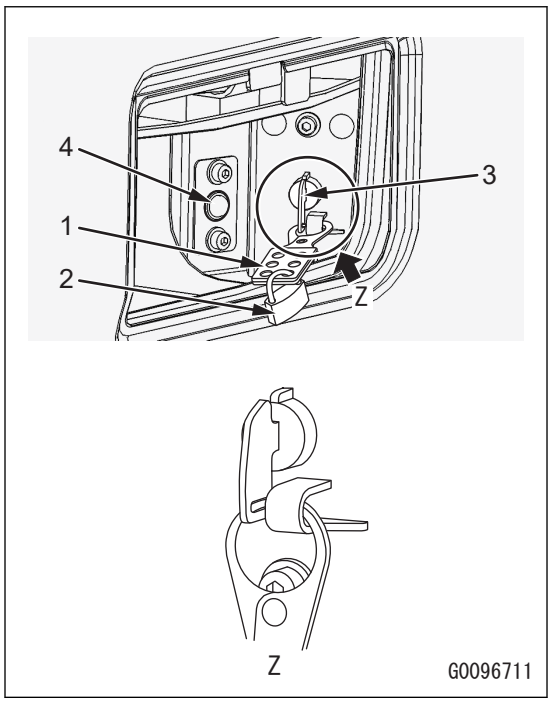


Operate Battery Disconnect Switch

The battery disconnect switch can be locked out with the hasp (1) and padlock (2) at the position where the switch key (3) is in the OFF position.

NOTICE

- **Prepare an applicable padlock (2) by yourself.**
- **If the hasp (1) is broken or lost, purchase the same hasp (part number: 17A-54–55280) which is attached to the machine, or procure it locally.**
- **Check the items that follow before the lockout.**
  - **Battery disconnect switch must be locked out with the hasp (1) and the padlock (2).**
  - **You cannot move the switch key (3) to the ON position while it is in the locked out condition.**
  - **The system operating lamp (4) is not lit.**



System Operating Lamp

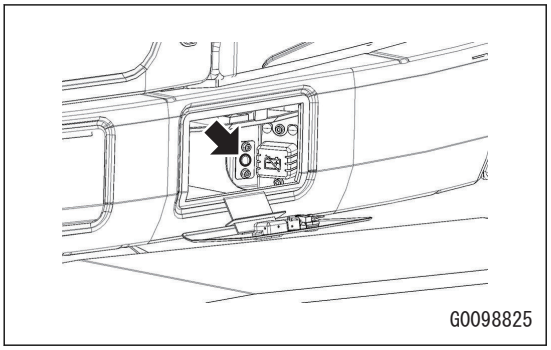
NOTICE

While the system operating lamp is lit, do not set the battery disconnect switch to the OFF position. You can lose the data in the controller.

The system operating lamp shows that the electric power is supplied to the controller mounted on the machine.

The system operating lamp lights up while the power is supplied to the controller. Normally, it goes off in Approximately 1 to 2 minutes after the starting switch is turned to the OFF position.

Before you set the battery disconnect switch to the OFF position, make sure that the system operating lamp is not lit.



REMARK

- Even if the starting switch is in the OFF position, the controller can operate in some cases.
  The system operating lamp lights up while the controller is in operation. It is not a problem.
- After the starting switch is turned to the OFF position, the system operating lamp keeps lit for a long time in some cases.
  Consult your Komatsu distributor if the system operating lamp keeps lit for a long time.
- Even if the system operating lamp is not lit, the lamp can illuminate in the dark. It is because of very small leakage of current in the controller, and it is not a problem.

KOMTRAX

⚠ WARNING

- **Do not disassemble, repair, modify, or move the communication terminal, antennas, and cables of the wireless communication device. It can cause a failure or fire on the wireless equipment or the machine itself.**
- **Near the blasting jobsite, there is a danger of explosion because of use of the wireless equipment, and serious personal injury or death could be caused. If it is necessary to operate the machine in the range of 12m {39ft 4in} from the remote blasting device, the power supply cable of the wireless communication device must be disconnected.**

KOMTRAX is a vehicle management system that remotely manages the machines with the KOMTRAX device by the satellite communication or portable radio communication.

The GPS (Global Positioning System) receiver, and communication system are installed in the vehicle management system.

The machine information such as the machine maintenance, maintenance management, operation situation management, and machine location management is collected from the inner network of the machine. It is used for the machine management by the customer and improvement of our products and service.

Types of information which are sent from machine can be different by machines of customers. About the station set-up for the KOMTRAX communication, consult your Komatsu distributor.

Power Supply for KOMTRAX

- Even when the starting switch key is in OFF position, KOMTRAX system consumes a small amount of electric power.
  It is recommended to start the engine periodically to charge the battery.
- When you use the battery disconnect switch, turn the starting switch to the OFF position, and after you check that the system operating lamp is not lit, set the battery disconnect switch key to the OFF position and pull it out.
  When the battery disconnect switch is turned to the OFF position, it can prevents the consumption of the battery power, but the functions of KOMTRAX stop at the same time.
- If the power supply cable of KOMTRAX system device needs to be disconnected, consult your Komatsu distributor.

Machine Operations and Controls

Checks and Adjustment Before You Start Engine

Walk-Around Check

⚠ WARNING

- **When you do inspection and maintenance in the engine hood or dirt cover, open the hood or cover to the top end, and make sure to fix it with a stopper.**
- **Check carefully around the high temperature part of engine such engine muffler or around the battery that there is no accumulated flammables, no fuel leakage, no oil leakage. If there is an abnormality, make sure to repair it or consult Komatsu distributor. If you ignore it, it can cause a fire of the machine.**

Before you start the engine, look at the areas around and below the machine to check the items that follow.

- The bolts and nuts are not loosened.
- There is no leakage of oil, fuel or coolant.
- The state of work devices and hydraulic system is normal.
- There is no looseness or play in electric wiring.
- No dust has been accumulated on the high temperature parts.

If the machine is at an angle, make it level before check.

Do the inspections and cleaning as follows before you start the engine for the day's work.

1. Check the work equipment, cylinders, linkages, and hoses for damage, wear, and clearance.

   Check the work equipment, cylinders, linkage and hoses for cracks, excessive wear, and abnormal clearance. If a problem is found, repair it.

2. Remove dirt from around the engine and radiator.

   Check for dirt accumulated around the engine and radiator. Also check for flammable materials (dry leaves, twigs, etc.) around the high temperature engine parts such as engine muffler. If dirt or flammable materials are found, remove them.

   For removal of dirt from the radiator, see “How to Examine and Clean Fins (4-73)”.

3. Check around the engine for coolant or oil leakage.

   Check the engine for oil leakage, and check the cooling system for coolant leakage. If a problem is found, repair it.

4. Make sure that there is no dirt, especially electrolyte such as snow melting agent or salt on the battery, and no deposits around the battery.

   Do the cleaning around the battery. For how to handle the battery such as cleaning precautions, see “Precautions for Check and Maintenance (2-41)”, “Battery”. Also, do not use a direct air blow or dry cloth to clean the battery. A wet cloth will prevent fire or explosion from static electricity.

5. Check the fuel line for leakage.

   Check for leakage of fuel or damage to the hoses and tubes. If a problem is found, repair it.

6. Check the hydraulic component, hydraulic tank, hoses, and joints for oil leakage.

   Check for oil leakage. If a problem is found, repair the place where there is oil leakage.

7. Check the undercarriage (track, sprocket, idler, guard) for a problem, wear, loose bolts, or oil leakage from rollers.

   If a problem is found, repair it.

8. Check the handrails and steps for a problem and bolts for looseness.

   If a problem is found, repair it. Tighten the loose bolts again.

9. Check and clean the machine monitor.

   Check the machine monitor in the operator's cab for damage. If a damage is found, replace the part. Clean dirt on the monitor surface with a clean, soft and dry cloth.

   REMARK

   When you clean the dirt on the monitor surface, brush it off with a clean, soft and dry cloth.
   For sticky dirt such as oil, remove it with detergent such as glass cleaner for family use on the market (weakly acid to weakly alkaline which contains no abrasive), and then finish-wipe with a clean, soft, and dry cloth.

10. Check that the windows do not come off or have damage.

    Check that the windows do not come off or have damage. If one of them is broken, repair it. If the window comes off or is damaged during operation, do not continue the operation but repair the window immediately.

11. Check and clean the rearview mirror.

    Check the rearview mirror for problem. If it is damaged, repair it. Clean the surface of the mirror and adjust the angle to let the lower area at the rear (the part hidden by the engine hood) be seen from the operator's seat.

12. Check the seat belt and mounting hardware.

    Check the seat belt and mounting hardware for problem. If a damage is found, consult your Komatsu distributor to replace it with a new one.

13. Check the bucket with hook (option) for damage.

    Check the hook, guide, and hook mount for damage. If a problem is found, consult your Komatsu distributor for repair.

14. Check and clean the camera

    When you clean the camera, wipe off dirt with soft cloth.

    If you stand on an unbalanced footing or you are in an unbalanced posture when you clean the camera, you could fall and be injured. Put a stepladder or step on the level and firm ground, and clean the camera in a stable balance.

    Check the camera for problem. If a problem is found, consult your Komatsu distributor.

15. Check around muffler for exhaust gas leakage.

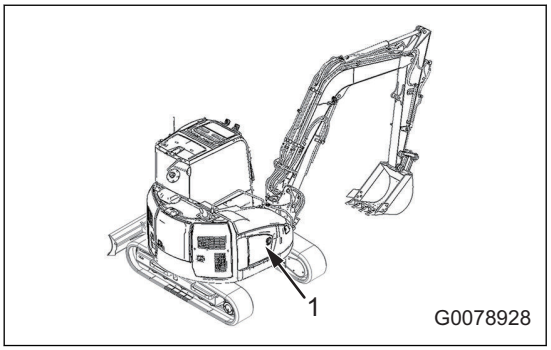
    Check that no exhaust gas is leaked (no soot is attached) from the pipes that connect turbocharger and muffler. If a problem is found, consult your Komatsu distributor for repair.

How to Examine Before You Start Operation

Check the items that follow before you start the engine for the day's work.

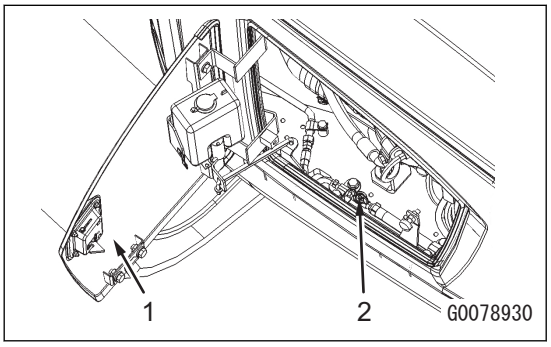
How to Drain Water and Sediment from Fuel Tank

1. Swing the upper structure to let the right side inspection cover (1) be between tracks.
2. Open the inspection cover (1) on the right side.
3. Put a container to collect drained fuel below the drain hose.



4. Open the drain valve (2) to discharge the sediment and water together with fuel.

   Be careful not to get fuel on yourself.
5. When only clean fuel flows out, close the drain valve (2).
6. Close the inspection cover (1) on the right side.

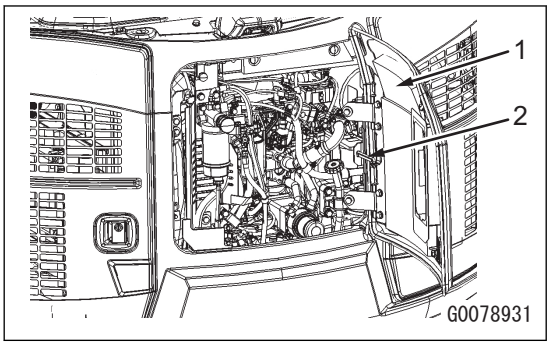


How to Examine Water Separator, Drain Water and Sediment

NOTICE

If water in the transparent cup (4) freezes, wait until the frozen water is melted fully, and obey the procedure to drain water.

1. Open the rear cover (1).
2. Lock it securely with the hood support lever (2).

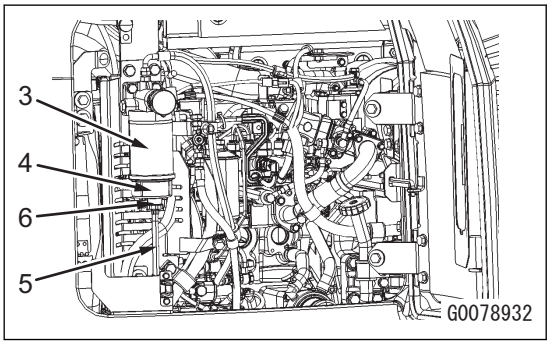


3. Check that water and sediment are not accumulated.

   The water separator is one unit with the fuel prefilter (3).

   Look through the transparent cup (4) to judge the water level and amount of sediment.

   If water or sediment is accumulated, do steps 4 to 6 to drain water.



REMARK

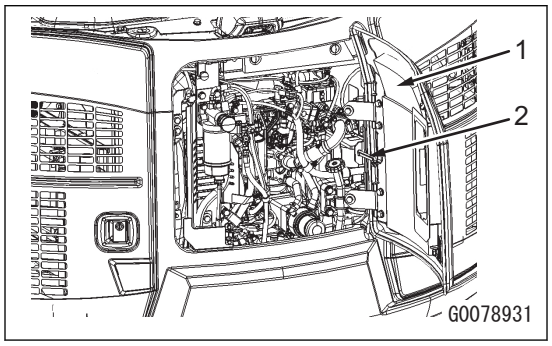
- If the transparent cup (4) is so dirty that the inside cannot be seen, clean the transparent cup (4) when you replace the fuel prefilter cartridge (3).
- If the drain valve (6) was removed when you clean, apply grease to O-ring and tighten until it touches the bottom.

4. Put a container under the drain hose (5) to drain the water.
5. Loosen the drain valve (6) and drain the water.
6. Immediately after fuel starts being drained from the drain hose (5), tighten the drain valve (6) to stop the drainage.

How to Adjust the Drain Valve

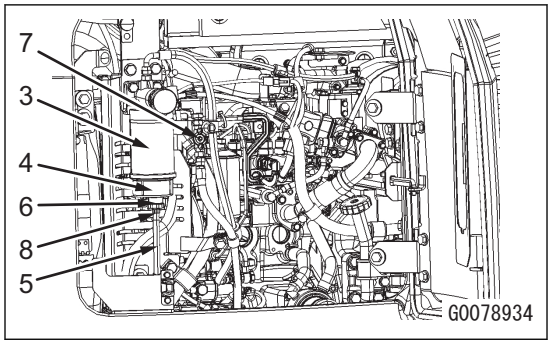
If the drain valve (6) does not move easily, apply grease to the O-ring of the drain valve, and it will move smoothly.

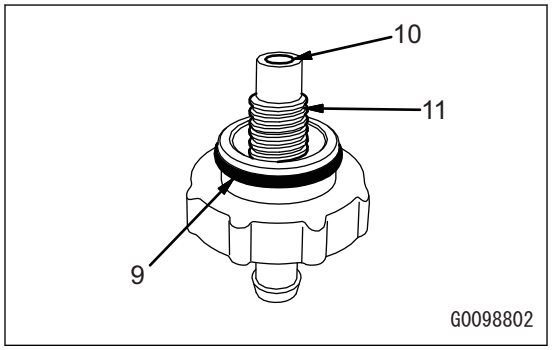
1. Open the rear cover (1).
2. Lock it securely with the hood support lever (2).



3. Set the valve (7) to the CLOSE position (S).
4. Put a container to collect fuel below the fuel prefilter cartridge.
5. Loosen the drain valve (6) and drain water and sediment from the transparent cup (4), and also drain all the fuel accumulated in the fuel prefilter cartridge (3).
6. Check that nothing comes out from the drain hose (5), then remove the clip (8).
7. Remove the drain hose (5).
8. Remove the drain valve (6).
9. Apply correct quantity of grease to the O-ring (9).

   When you apply grease, be careful not to let grease attach to the drain port (10) and the threaded part (11) of the drain valve.
10. Tighten the drain valve (6) by hand until it touches the transparent cup (4).
11. Install the drain hose (5) with the clip (8).
12. Remove the container to receive the fuel.
13. Set the valve (7) to the OPEN position (O).





How to Examine Oil Level in Hydraulic Tank, Add Oil

⚠ WARNING

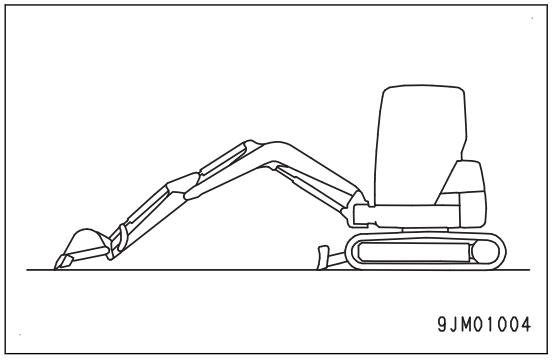
- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **Loosen the cap of the oil filler port slowly to release the internal pressure, and then remove it carefully. Oil can spurt out.**

1. Set the machine posture to state A or B.

   "State A"

   When you set the machine posture to state A, do the procedure below.

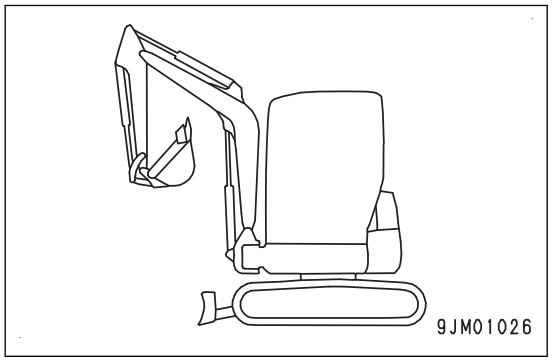
   1) Start the engine, and run it at low speed.
   2) Lower the blade to the ground.
   3) Set the cylinders of the arm and bucket to the stroke end on the IN and CURL sides.
   4) Swing the boom to the center.
   5) Lower the boom and put the bucket tooth onto the ground.
   6) Stop the engine.



   "State B"

   When you set the machine posture to state B, do the procedure below.

   1) Start the engine, and run it at low speed.
   2) Lower the blade to the ground.
   3) Set the cylinders of the arm and bucket to the stroke end on the IN and CURL sides.
   4) Swing the boom to the center.
   5) Raise the boom at the maximum RAISE position.
   6) Stop the engine.



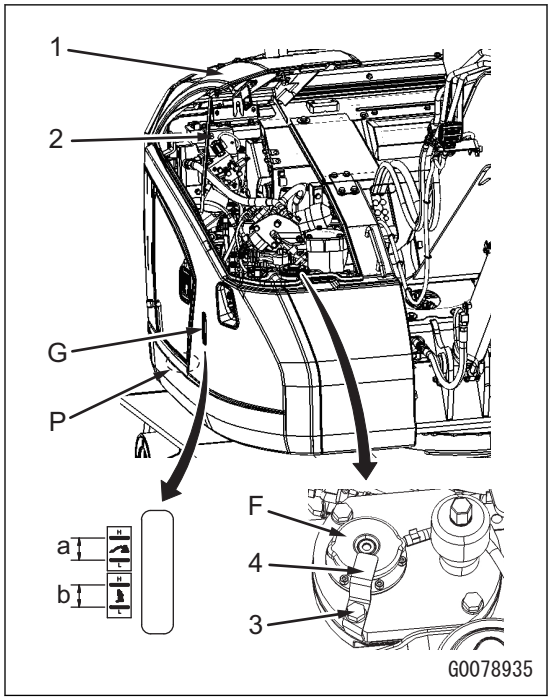
2. Check the sight gauge (G) through the small inspection window on the right cover.

   If the oil level is in the range shown below, it is proper.

   State A: In the range (a)

   State B: In the range (b)

   If the oil level is below the L level, the hydraulic oil is not sufficient. Do the procedure as follows.



   1) Open the dirt cover (1).

      When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.

   2) Lock it securely with the cover support lever (2).

   3) Loosen the bolt (3) and remove the plate (4) on the top of the oil filler port (F).

   4) Loosen the cap of the oil filler port (F) gradually to release the internal pressure.

   5) Remove the cap of the oil filler port (F).

   6) Add oil through the oil filler port (F) until the oil level comes between the H and L levels of the sight gauge (G).

      NOTICE

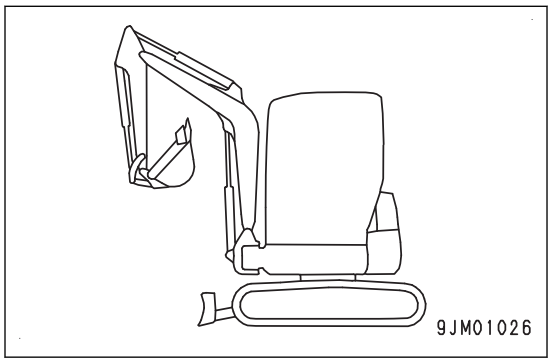
      Do not add oil more than the H level. The hydraulic circuit can be damaged, or oil will spurt out. If the refilled oil exceeds H level, swing the upper structure until the drain plug (P) beneath the hydraulic tank comes between the right and left tracks and stop the engine. Wait for the oil to cool down sufficiently, then drain the excessive oil through the drain plug (P) into an oil container.

      REMARK

      The oil level will change in response to the oil temperature. Check the oil level with the guidelines that follow.

      - Before you start operation, oil temperature near the L level is 10 to 30℃ {50 to 86℉}.
      - When you normally operate, oil temperature near the H level is 50 to 80℃ {122 to 176℉}.

   7) If oil is added in state B, pressurize the hydraulic tank by the steps 8) to 10).



      NOTICE

      If the hydraulic tank is not pressurized, air is sucked in the pump and it has bad effects on the components.

   8) Fully extend the boom, arm, and bucket cylinders.

   9) Remove the oil filler cap.

   10) Install the oil filler cap.

   11) Move the plate (4) to the center of the cap and fix it with the bolt (3).

   12) Remove the cover support lever (2) from the fixed position, and put it in the slide position.

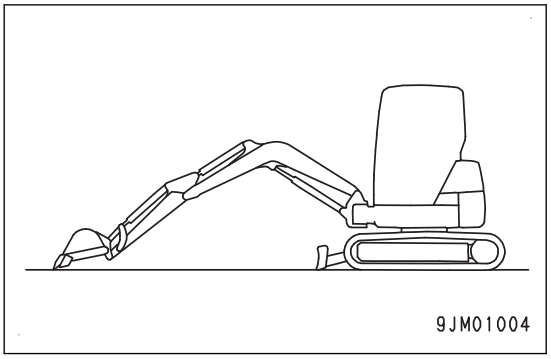
   13) Close the dirt cover (1).

14) Set the machine posture to state A.

The hydraulic tank is pressurized.

NOTICE

If the hydraulic tank is not pressurized, air is sucked in the pump and it has bad effects on the components.



How to Examine Coolant Level, Add Coolant

⚠ WARNING

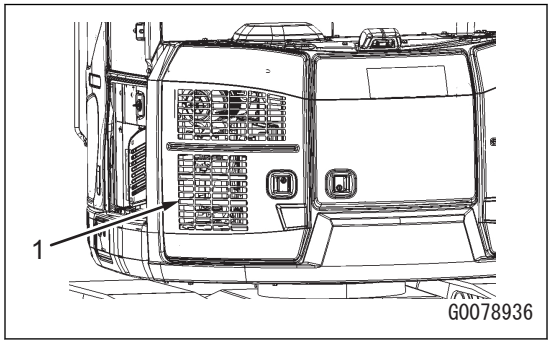
- **Do not open the expansion tank unless necessary. Check the coolant with the fluid level gauge when the engine is cold.**
- **Wait for the temperature to go down, and turn the cap of the expansion tank slowly to release the pressure, and remove the cap carefully. Immediately after the engine is stopped, the coolant is very hot and the pressure is accumulated in the expansion tank. If you remove the cap in this state, it can cause burn injury.**

NOTICE

If the expansion tank (5) is empty, the coolant can be leaked. If a problem is found after inspection, do the repair immediately.

Prepare a step.

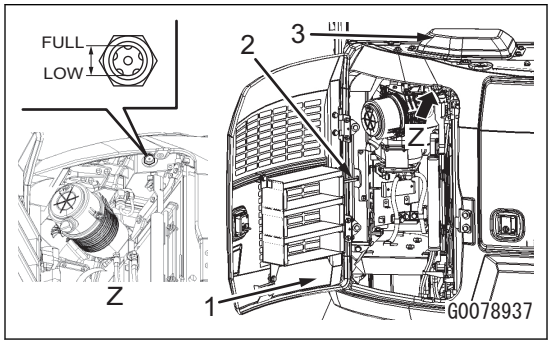
1. Put the step to make the work easier.
2. Open the left rear cover (1).



3. Lock it securely with the cover support lever (2).
4. Check that the coolant level is in the range between FULL and LOW marks of the expansion tank level gauge.

   If the coolant level is in the range between FULL and LOW, the level is correct.

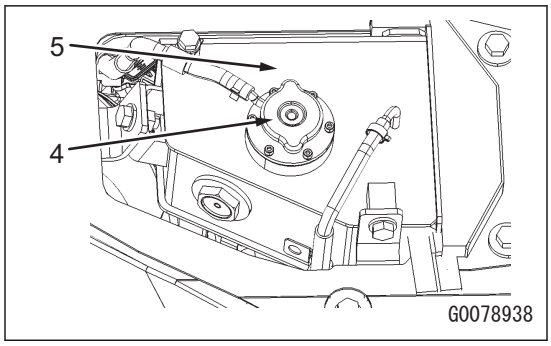
   If the coolant level is below LOW, the coolant is insufficient.
5. Remove the upper cover (3).



6. Remove the cap (4) of expansion tank, and add coolant up to the FULL line through the filler port.

   REMARK

   If you add coolant too much, the excessive coolant will be discharged through the drain hose of expansion tank to below the undercover.
7. Install the upper cover (3).
8. Close the left rear cover (1).



How to Examine Oil Level in Engine Oil Pan, Add Oil

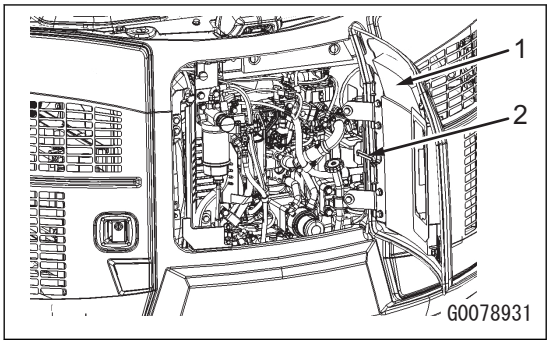
⚠ WARNING

Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.

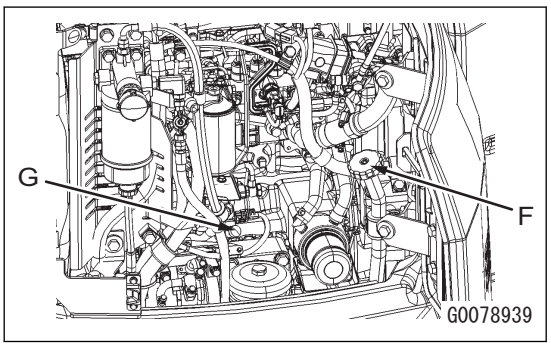
To check the oil level after the engine is started, stop the engine, and wait for 15 minutes or more.

If the machine is at an angle, set the machine horizontal before you do the inspection.

1. Open the rear cover (1).
2. Lock it securely with the rear cover support lever (2).

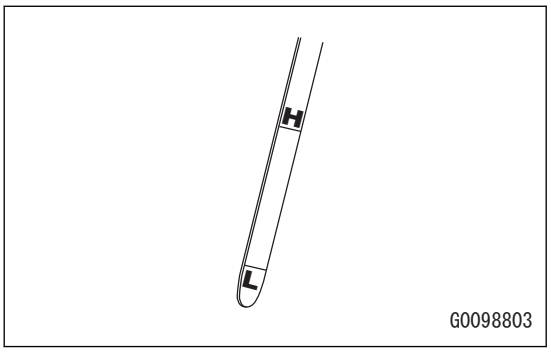


3. Pull out the dipstick (G) and wipe the oil off with a cloth.
4. Fully put the dipstick (G) into the dipstick pipe again, and then pull it out.

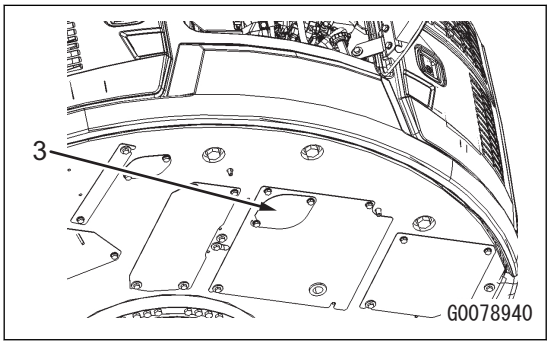


5. Check if the oil is attached between the marks H and L on the dipstick (G).

   The oil level is correct if it is between the marks H and L.
6. If the oil level is below the mark L, add oil through the oil filler port (F).
7. If the oil level is above the mark H, decrease it to the applicable level as follows.



   1) Put the container to receive oil under the engine oil pan under cover (3).
   2) Drain the excessive engine oil through the drain plug.
   3) Check the oil level again.
8. If the oil level is correct, tighten the cap of the oil filler port securely.
9. Remove the rear cover support lever (2) and tighten it to the lever lock securely.
10. Close the rear cover (1).



How to Examine Electric Wiring

⚠ CAUTION

- **If fuses are frequently blown or if there are traces of short-circuiting on the electrical wiring, promptly ask your Komatsu distributor to locate the cause of it and to perform the repair.**
- **Keep the top surface of the battery clean and check the vent hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap with water to clear the vent hole.**

NOTICE

Be careful about the wiring of “battery”, “starting motor”, “alternator”, and do checks.

- Check that the fuse is not damaged, and check that the fuse of specified capacity is used.
- Check that there is no wire breakage or sign of short-circuit in the electric wiring and no damage to the coating.
- Check that the terminal is not loose. Retighten it if it is loose.
- Check that no flammable material is accumulated around the battery. Remove it if it is accumulated.

How to Examine Fuel Level, Add Fuel

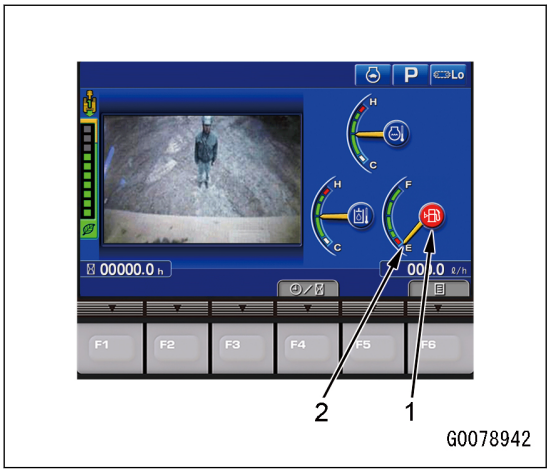
⚠ WARNING

When you add fuel, do not let it overflow. It can cause a fire.
Wipe up all the spilled fuel fully. If it spills over soil or sand, remove that soil or sand.
Fuel is flammable and dangerous. Do not let an open flame be near.

1. Turn the starting switch to the ON position.
2. When the fuel level caution lamp (1) lights up in red, check the fuel level with the fuel gauge (2) on the monitor.

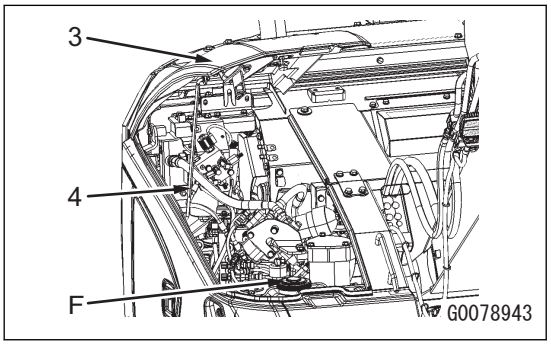
   Even if the fuel level caution lamp (1) is not lit in red, when the fuel gauge pointer is in the red range, the fuel quantity is 32ℓ {8.45US gal} or below.

   The fuel level is low. Add fuel.
3. After you check, turn the starting switch back to the OFF position.



4. Open the dirt cover (3).

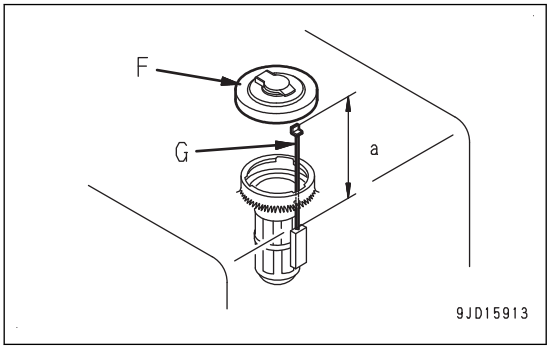
   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.
5. Lock it securely with the cover support lever (4).
6. Open the filler cap (F) of the fuel tank.



7. Add fuel through the filler port until the float gauge (G) rises to the maximum position.

   Fuel tank capacity: 125ℓ {33US gal}

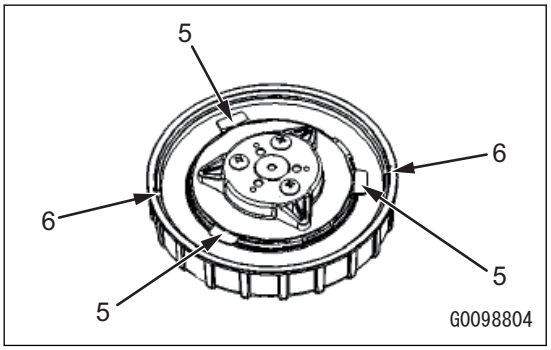
   The tip end position (a) of the float gauge (G) when fuel tank is full: Approximately 105mm {4.1in} from the top surface of fuel tank



8. After it is added, push the float gauge (G) straight down with the filler cap (F), and tighten the filler cap (F).

   NOTICE

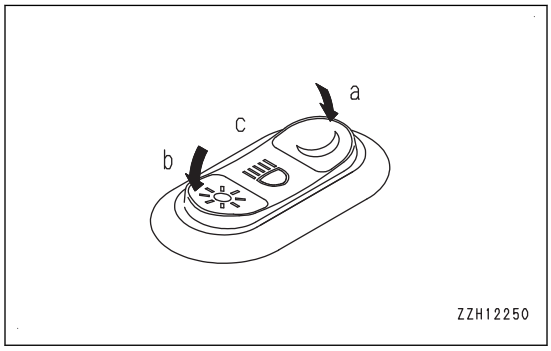
   - **Be careful that the float gauge (G) does not get caught by a nail of filler cap (5) when you tighten the filler cap (F).**
   - **When the breather hole (6) of the cap is clogged, the pressure in the tank decreases, and the fuel sometimes does not flow. Clean it from time to time.**



How to Examine Working Lamp

Check that the working lamp and the lamp in the instrument light up normally, and that there is no stain or damage.

1. Turn the starting switch to the ON position.
2. Turn the lamp switch in the night mode (a) position or the day mode position (b), and check that the working lamp lights up.
3. After the inspection is completed, turn the lamp switch to the OFF (c) position, and turn off the working lamp.
4. After the check, set the starting switch to the OFF position.

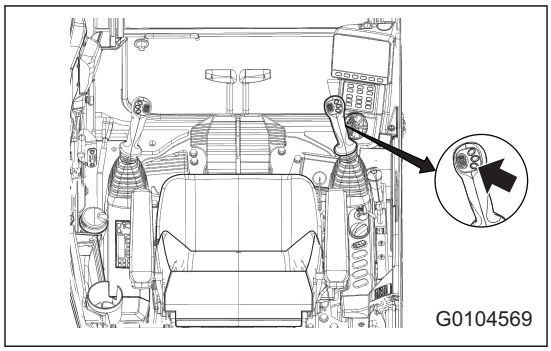


If the lamp does not light up, a burned-out bulb and open circuit are the possible causes. Consult your Komatsu distributor for repair.

How to Examine Horn

1. Turn the starting switch to the ON position.
2. Check that the horn operates immediately when the horn switch is pushed.

   If the horn does not operate, consult your Komatsu distributor for repair.
3. Turn the starting switch to the OFF position.



How to Adjust

Adjust Operator Seat

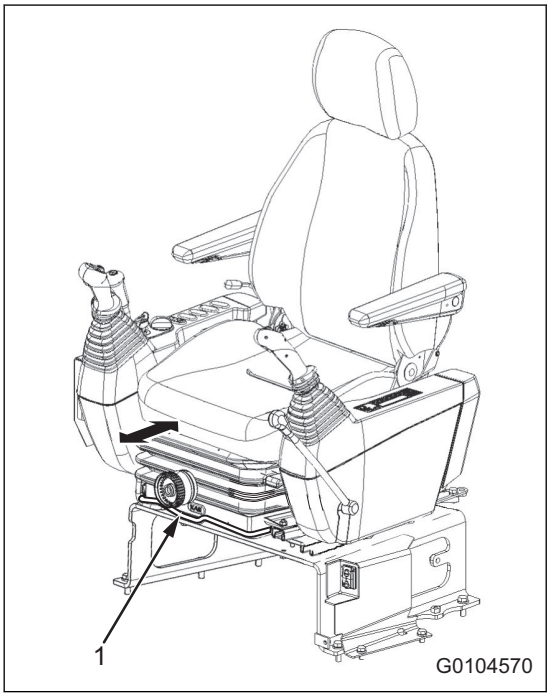
⚠ WARNING

When you adjust the position of the operator's seat, be sure to set the lock lever to the LOCK position to prevent contact with the control levers accidentally.

- Be sure to adjust the operator's seat before you start each operation or when the operators change shift.
- Make sure to adjust the seat to let the operator operate the control levers and switches freely with the back against the backrest of operator's seat.

How to Adjust Seat in Fore-and-Aft Direction

Pull the fore-aft adjustment lever (1) up, set the seat to the desired position, and then let go of the fore-aft adjustment lever (1).
Fore-and-aft adjustment: 50mm {2in} (5 steps)



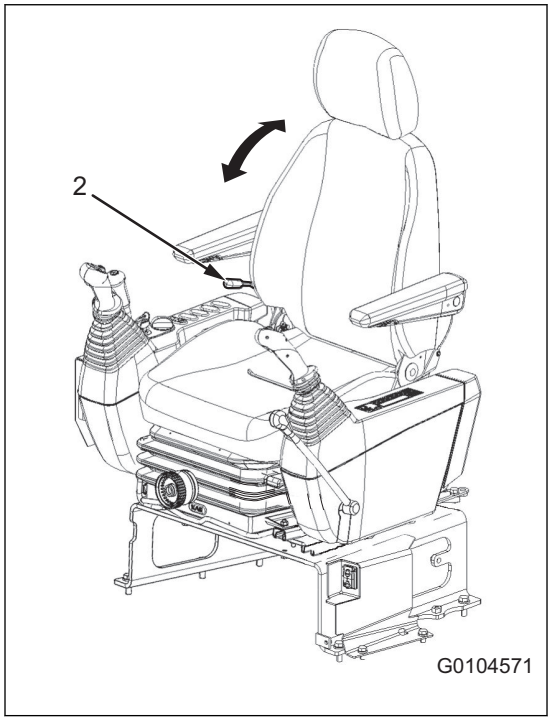
How to Recline Seat

The seat reclining amount is larger when the seat is moved forward, and is smaller when the seat is moved backward. When you move the seat backward, move the backrest back to its original position.

Pull the reclining adjustment lever (2) upwards to adjust the backrest to a position where it is easy to operate, and then let go of the reclining adjustment lever (2).

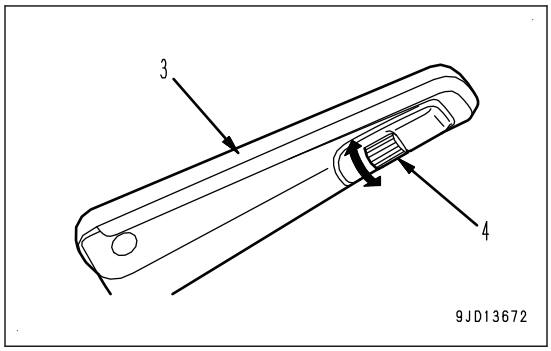
REMARK

Sit with your back against the backrest to adjust the reclining angle. If your back is not on the backrest, it can suddenly go back to the initial position.



How to Adjust Armrest Angle

- Flip the armrest (3) and adjust it up to approximately 90° by hand.

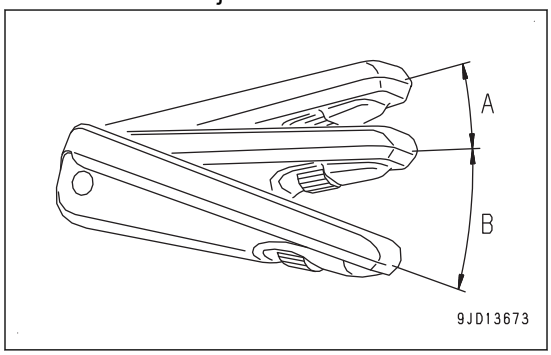


- Rotate the adjustment dial (4) at the bottom of the armrest to finely adjust the angle up and down. Rotate the adjustment dial (4) clockwise to adjust it upward and counterclockwise to adjust it downward.
  Angle adjustment amount: 25° ((A):5°, (B):20°)

  If the adjustment dial (4) reaches the highest or lowest positions, it does not rotate further. In that case, rotate the adjustment dial (4) counterclockwise at the highest position and clockwise at the lowest position.

  REMARK

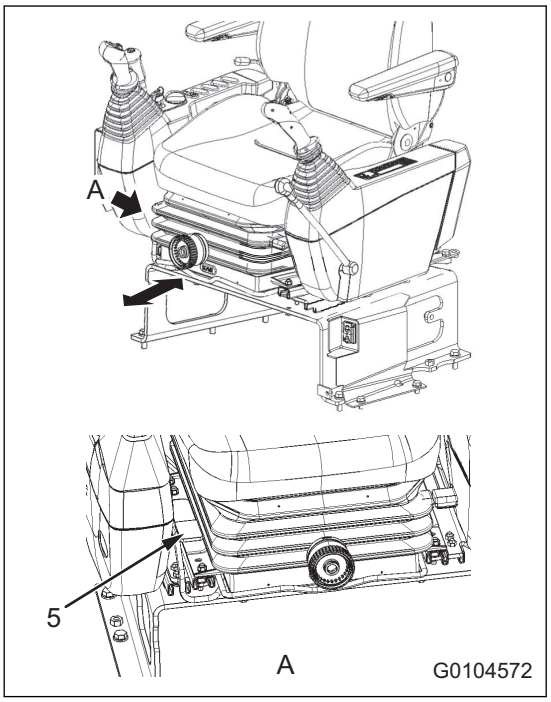
  If the backrest is tilted to the front without raising the armrest (3), the armrest (3) will be automatically raised.



How to Adjust Seat Unit in Fore-and-aft Direction

Pull the fore-aft adjustment lever (5) rearward, set the seat to the desired position, and then release the fore-aft adjustment lever (5).
The operator's seat, right and left levers, and lock lever slide (move) together.

Fore-and-aft adjustment: 80mm {3.1in} (10 steps)



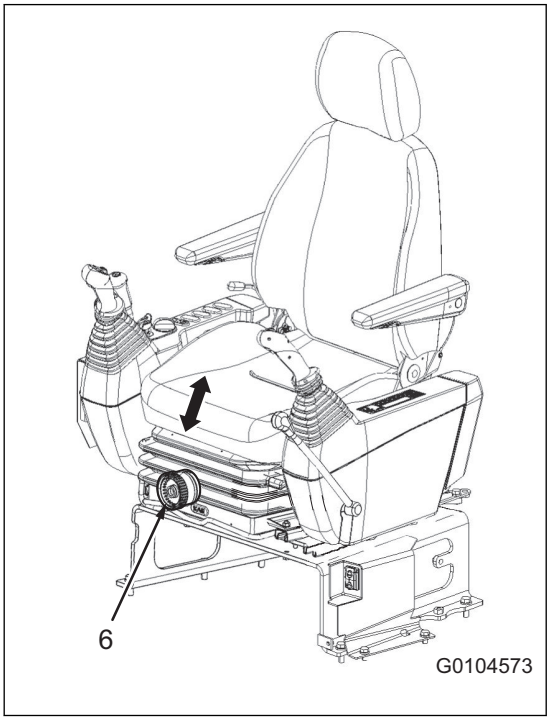
How to Adjust Suspension Seat Hardness

(option)

The adjustment dial (6) is marked with a number of the weight as a scale. Turn the adjustment dial (6) to let the number of your weight come at the top.
Adjustment range for the weight: 60 to 150kg {132.3 to 330.8lb}

To make the seat softer, adjust the adjustment in lighter direction, and to make the seat harder, adjust the adjustment in heavier direction.

Before the machine travels on rough road surfaces, make the seat harder than standard.



How to Adjust Mirrors

⚠ WARNING

Be sure to adjust the mirrors before the work. If the mirrors are not correctly adjusted, you cannot keep the visibility. There is a danger that you will suffer from injury or that a serious personal injury or death is caused.

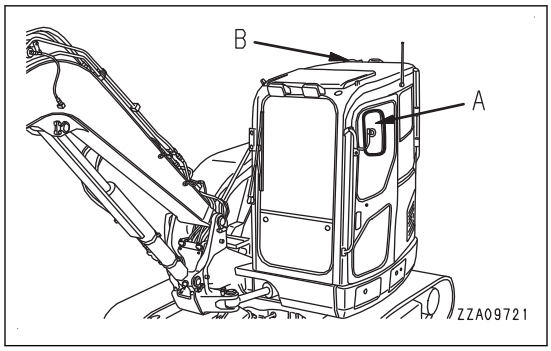
⚠ CAUTION

To prevent the machine movement during the work, make sure that the machine is in the conditions that follow before you start the work.

- **The machine is parked on a level ground.**
- **The work equipment is lowered to the ground in a stable posture.**
- **The lock lever is in LOCK position.**
- **The engine is stopped.**

Mirror (A): Left front mirror of machine

Mirror (B): Rear mirror of machine



How to Adjust Left Front Mirror

⚠ CAUTION

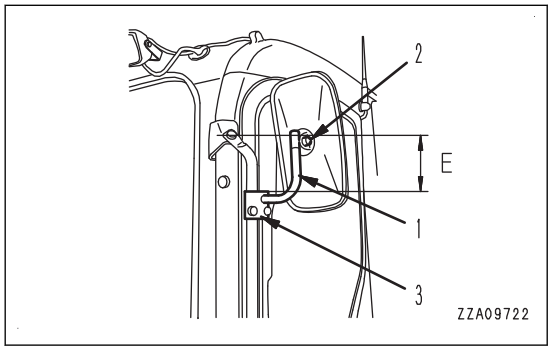
To prevent the machine movement during the work, make sure that the machine is in the conditions that follow before you start the work.

- **The machine is parked on a level ground.**
- **The work equipment is lowered to the ground in a stable posture.**
- **The lock lever is in LOCK position.**
- **The engine is stopped.**

If the mirror is removed, install it at the position shown in the figure to do adjustment

(E): 94mm {4in}

Adjust the mirror to allow yourself to see the operator a person at the rear left of the machine.

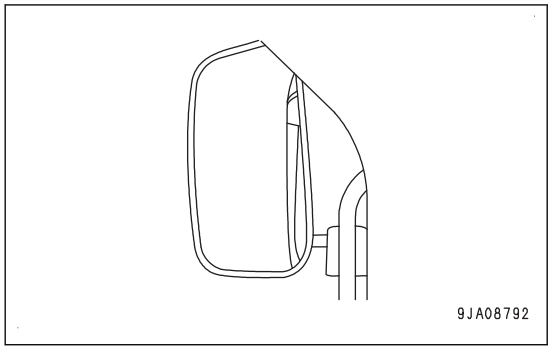


1. Adjust the mirror with your hand to let the side of the machine reflected in the mirror as shown in the figure.

   If the mirror does not move smoothly when adjusting it, loosen the mirror fixing bolt (2) and the stay mounting bolt (3).

   Tightening torque of the bolt (2): 15.7 to 19.6Nm {1.6 to 2.0kgfm, 11.6 to 14.5lbft}

2. Check that you can see a person at the rear left end of the machine.



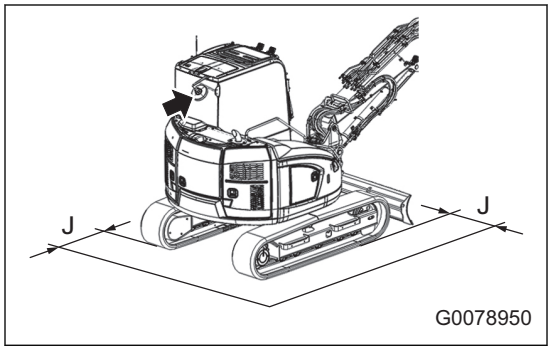
How to Adjust Rear Mirror

⚠ CAUTION

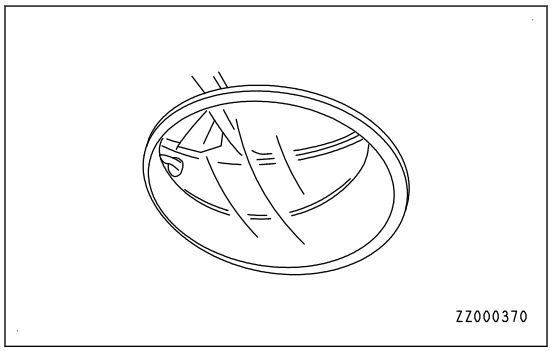
- **Use a step when you adjust the mirrors. There is a danger that you fall if you stand on the engine hood without step ladder.**
- **To prevent the machine movement during the work, make sure that the machine is in the conditions that follow before you start the work.**
  - **The machine is parked on a level ground.**
  - **The work equipment is lowered to the ground in a stable posture.**
  - **The lock lever is in LOCK position.**
  - **The engine is stopped.**

Adjust the mirrors to let the operator see the person around 1m {3ft 3in} around the machine from the operator's seat.

(J):1m {3ft 3in}

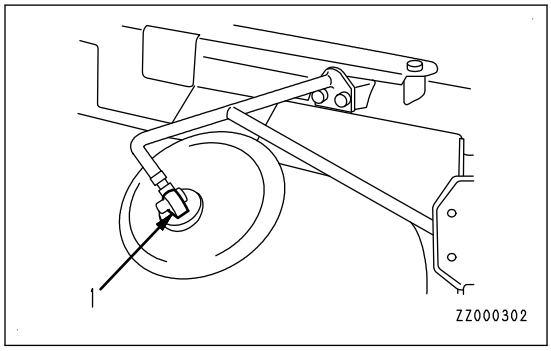


1. Adjust the mirror to let the rear of the machine be reflected in the mirror as shown in the figure.



   Loosen the mirror fixing bolt (1) to adjust the mirror if the movement of it is hard.

   Tightening torque of the bolt (1): 15.7 to 19.6Nm {1.6 to 2.0kgfm, 11.6 to 14.5lbft}



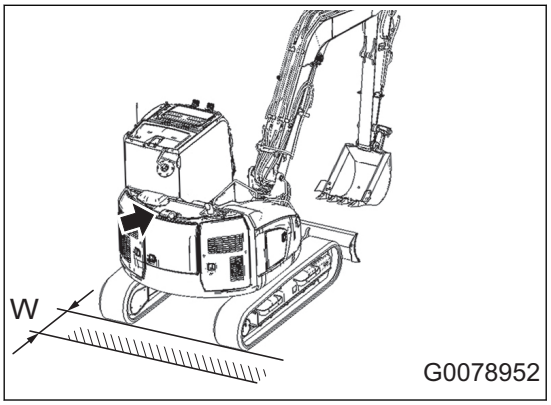
2. Make sure that you can see a person 1m {3ft 3in} around the machine.

How to Adjust Rearview Camera Angle

⚠ WARNING

- **If the rear view shown on the monitor is not aligned correctly, the camera angle must be adjusted. If the camera is not adjusted correctly, you cannot keep a good visibility, and it can cause serious personal injury and death.**
- **When you adjust the camera, put a stepladder or step on the level and firm ground, and adjust the camera in a stable balance. If you stand on an unbalanced footing or you are in an unbalanced posture, you could fall and be injured.**

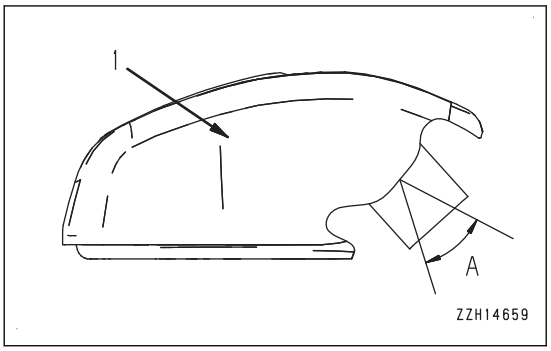
Adjust the angle of the rearview camera to let the person within approximately 1m {3ft 3in} away from the machine's rear part (W) be shown in the machine monitor at the operator's seat.



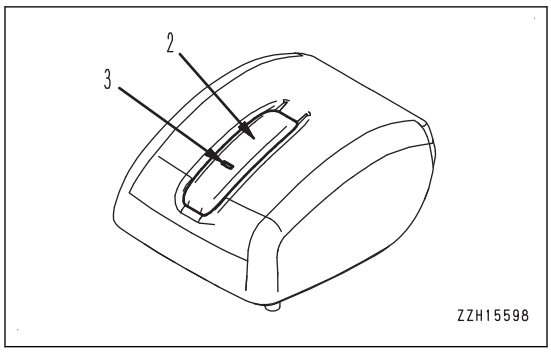


If the image on the monitor is not aligned correctly, follow the below procedure and adjust the mounting angle (A) of the rearview camera.

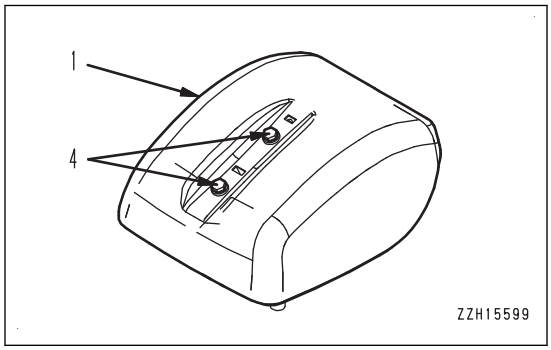
You can adjust the angle (A) within the range from 30 to 60°.



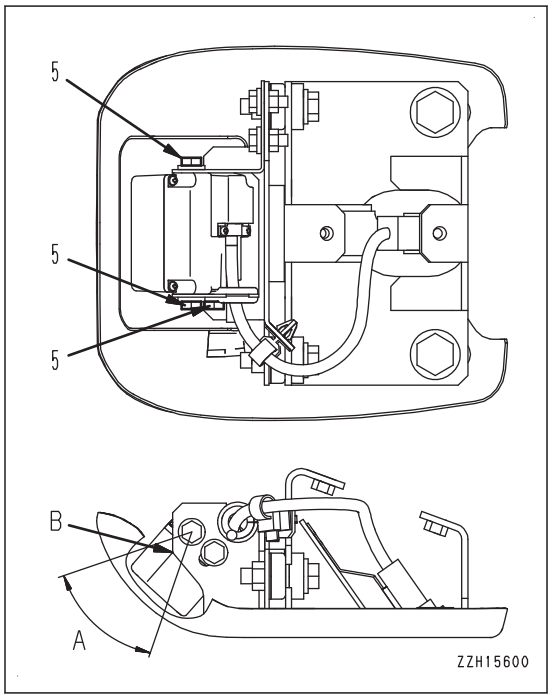
1. Insert a tool such as a flat-head screwdriver into the hole (3) of the bolt cover (2) and push the inside tooth to remove the bolt cover (2).



2. Remove the 2 bolts (4).
3. Remove the cover (1).



4. Loosen the 3 camera mounting bolts (5), and adjust the camera mounting angle (A) to let the camera side line and the bracket corner (B) be matched.



5. After adjustment, tighten the bolt (5).
   Tightening torque: 11.8 to 14.7Nm {1.2 to 1.5kgfm, 8.68 to 10.8lbft}

REMARK

A part of the machine is shown on the monitor screen.

6. Install the covers (1) and (2).



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Do the setting of the camera again if the rearview which is reflected on the monitor is not correct even after the angle adjustment. Consult your Komatsu distributor.

How to Fasten and Unfasten Seat Belt

⚠ WARNING

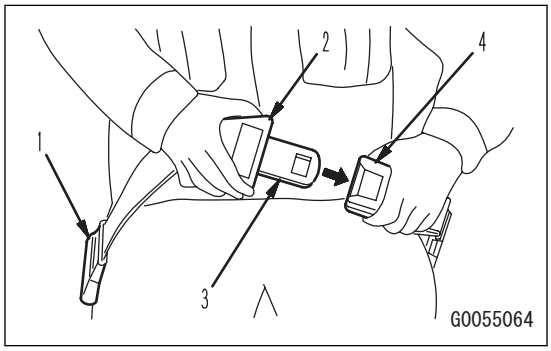
- **Before you fasten the seat belt, make sure that there is no abnormality in the belt mounting bracket or mounting belt. If it is worn or damaged, replace it.**
- **Even if no problem can be seen on the appearance of the seat belt, replace it every 3 years from starting usage or 5 years after manufacture that comes first.**
- **Be sure to use the seat belt during the operation.**
- **Do not twist the seat belt when you use it.**

REMARK

- The date of manufacture of the belt is shown on the back of the belt.
- The date shown on the seat belt is the manufactured date. This date is the start of the 5-year period from the production. It is not the start of the 3-year period of actual usage.
- No length adjustment is required because this seat belt has a retractable device.

How to Fasten Seat Belt

1. Hold the grip (2) and pull out the belt from the retractable device (1).
2. Make sure that the belt is not twisted. Insert the tongue (3) into the buckle (4) securely.



3. Pull the belt lightly to make sure that it is locked correctly.

   REMARK

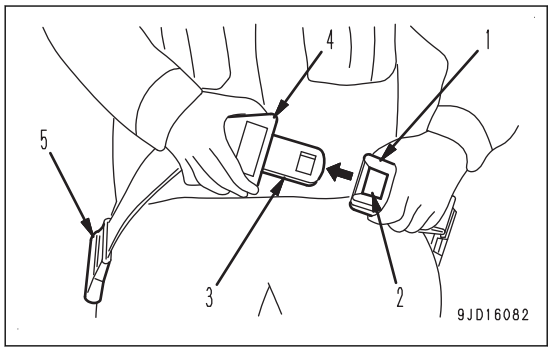
   If the tongue of the seat belt is not inserted in the buckle, the seatbelt caution lamp is shown on the upper left on the monitor screen. Be sure to fasten the seat belt.



How to Unfasten Seat Belt

1. Push the button (2) on the buckle (1), and remove the tongue (3) from the buckle (1).
2. Hold the grip (4) and put back the belt to the winder (5) slowly.

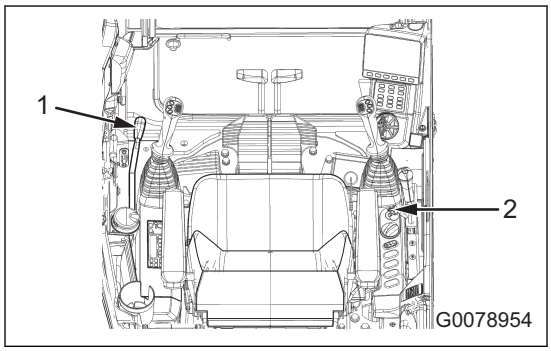
   The belt retracts automatically.



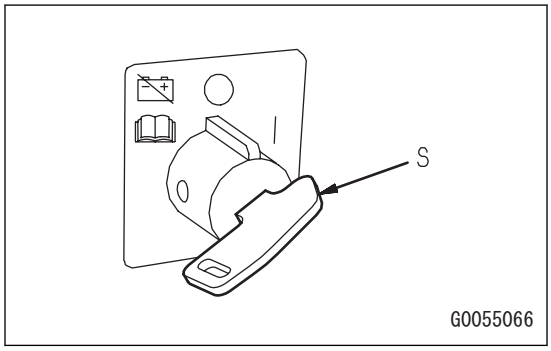
Operations and Checks Before You Start Engine

⚠ WARNING

Before you start the engine, make sure that the lock lever is securely in the LOCK position.
At the same time when you start the engine, if you touch the control lever and control pedal by mistake, the machine will move unexpectedly, and serious personal injury or death can be caused.

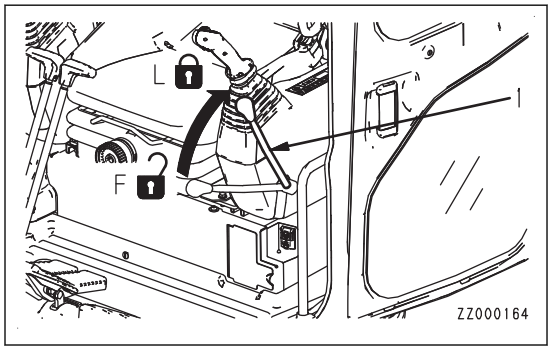


1. Check that the battery disconnect switch (S) is in the ON position (I).

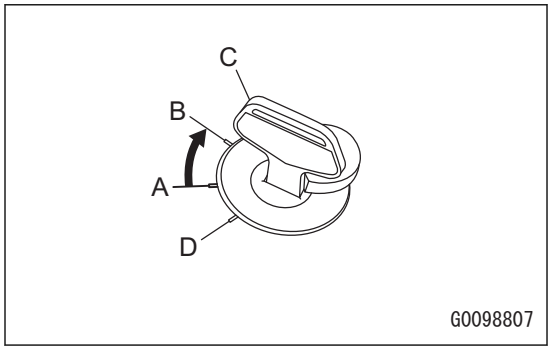


2. Make sure that the lock lever (1) is in the LOCK position (L).
3. Make sure that each control lever and control pedal are in the NEUTRAL position.

   If all the control levers and control pedals are not touched, they go back to the NEUTRAL position.



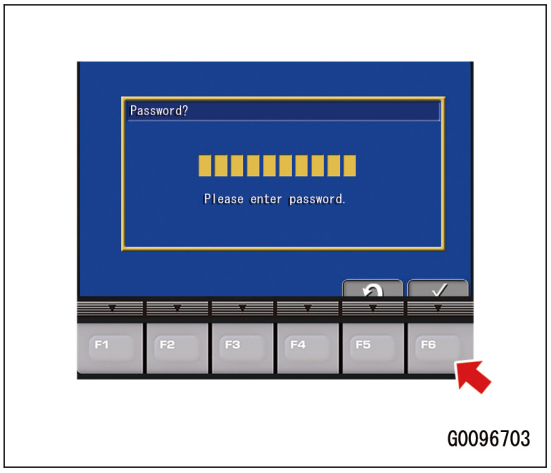
4. Insert the key in the starting switch (2) and turn the key to the ON position (B).



- If a password is set, the input display screen will be shown on the monitor screen. When the input display screen is shown on the monitor screen, input the password and push the switch F6.

  REMARK

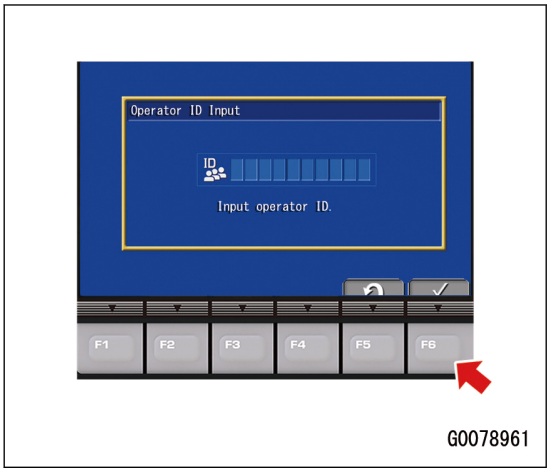
  To set, change, or cancel the password, consult your Komatsu distributor.



- When ID number input for operator identification function is set, “Operator ID Input” is shown on the monitor screen. When “Operator ID Input” screen is shown on the monitor screen, input the operator ID and push the switch F6.

  REMARK

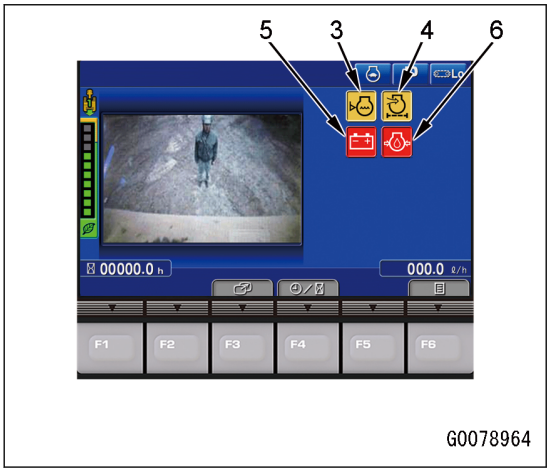
  Consult your Komatsu distributor for setting, change, or cancel of the operator identification function.



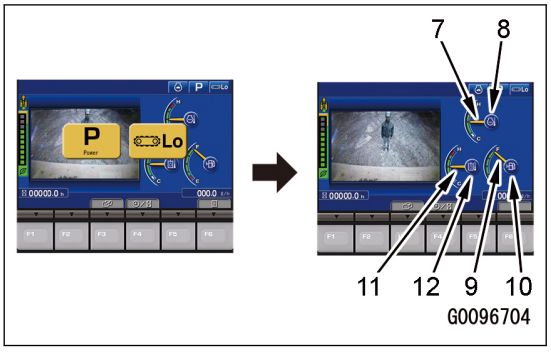
5. Do the checks that follow on the machine monitor.

   1) The buzzer operates for approximately 2 seconds and the caution lamps that follow light up for approximately 2 seconds.
      - Radiator coolant level caution lamp (3)
      - Air cleaner clogging caution lamp (4)
      - Charge level caution lamp (5)
      - Engine oil pressure caution lamp (6)

      If the caution lamp does not light up or the buzzer does not operate, the monitor possibly has a failure. Consult your Komatsu distributor for repair.



   2) The screen changes to the working mode/travel speed display in approximately 2 seconds, and it changes to the standard screen.
      - Engine coolant temperature gauge (7)
      - Engine coolant temperature caution lamp (8)
      - Fuel gauge (9)
      - Fuel level caution lamp (10)
      - Hydraulic oil temperature gauge (11)
      - Hydraulic oil temperature caution lamp (12)



3) If the caution lamp (13) stays lit in red, immediately inspect the items the lamps are lit in red.

   For the contents and check methods for caution lamp, see “Caution Lamp List (3-20)”.



4) If there is an item for which the maintenance time has expired, the maintenance time caution lamp (14) lights up in red for 30 seconds.

5) Push the switch F6 (15) to check the items that the maintenance due time has expired, and immediately do the maintenance.

   For the check method of the maintenance time, see EXPLANATION OF COMPONENTS, “Maintenance (3-67)”.



How to Start Engine

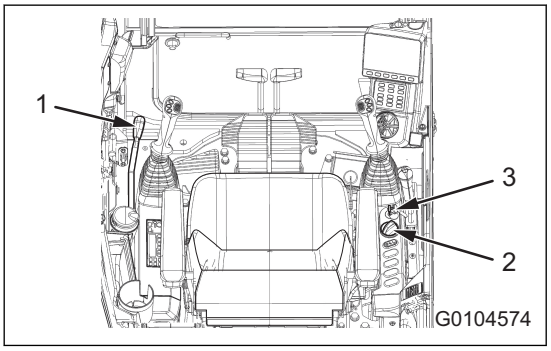
How to Start Engine in Normal Weather

⚠ WARNING

- **When you start the engine, be sure to sit on the operator's seat.**
- **Do not start the engine by short circuit of the engine starting circuit. Serious personal injury or death or fire can be caused.**
- **Make sure that there is no person or obstacle in the area around the machine, operate the horn, and then start the engine.**
- **The exhaust gas is poisonous. When you start the engine in confined spaces, be careful to have good ventilation.**
- **Close the covers when you operate the machine always other than when you do checks.**

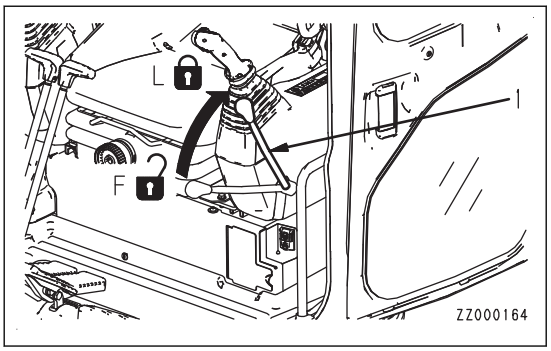
NOTICE

- **Do not start the engine when the fuel control dial (2) is at the High idle (MAX) position. It can cause damage to the engine parts.**
- **Do not keep the starting switch (3) key at the START position continuously for 20 seconds or more. If the engine does not start, wait for approximately 2 minutes, and then try to start the engine again.**

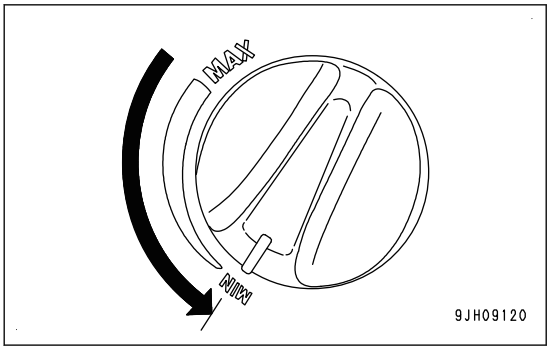


1. Make sure that the lock lever (1) is in the LOCK position (L).

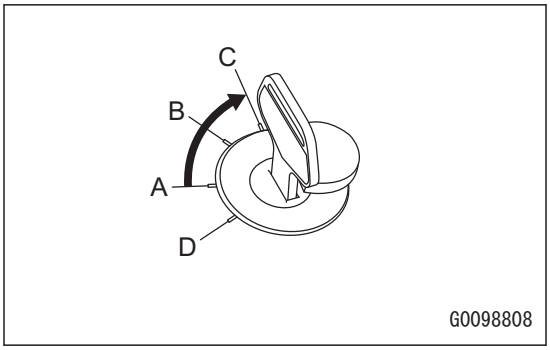
   If the lock lever (1) is in the FREE position (F), the engine does not start.



2. Set the fuel control dial (2) to the Low idle (MIN) position.



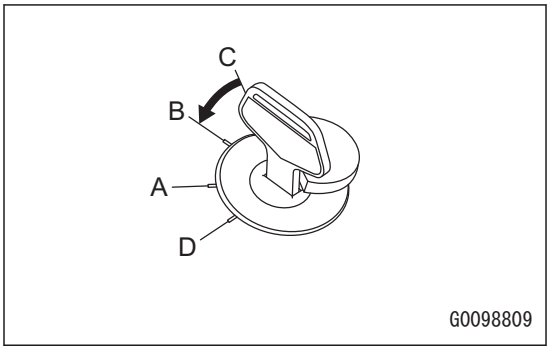
3. Turn the starting switch (3) key to the START position (C).
   The engine starts.



4. After the engine starts, let go of the starting switch (3) key.
   The key automatically goes back to the ON position (B).

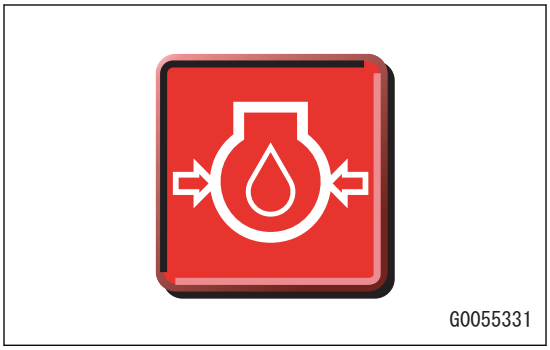
   REMARK

   When the engine is started, the battery voltage can decrease suddenly by the temperature and the battery condition. In such case, the machine monitor can go off temporarily and light up again. It is not a problem.



NOTICE

- **Do not touch the control lever and the control pedal while the engine oil pressure caution lamp is lit even when the engine is started.**
- **If the engine oil pressure caution lamp does not go off after 4 to 5 seconds, stop the engine immediately. Check the items for the engine oil pressure such as oil level and oil leakage, and take necessary measures.**



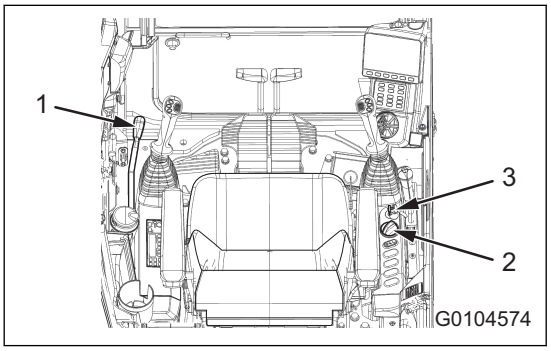
How to Start Engine in Cold Weather

⚠ WARNING

- **When you start the engine, be sure to sit on the operator's seat.**
- **Do not start the engine by short circuit of the engine starting circuit. Serious personal injury or death or fire can be caused.**
- **Make sure that there is no person or obstacle in the area around the machine, operate the horn, and then start the engine.**
- **The exhaust gas is poisonous. When you start the engine in confined spaces, be careful to have good ventilation.**
- **Close the covers when you operate the machine always other than when you do checks.**

NOTICE

- **Do not start the engine when the fuel control dial (2) is at the High idle (MAX) position. It can cause damage to the engine parts.**
- **Do not keep the starting switch (3) key at the START position continuously for 20 seconds or more. If the engine does not start, wait for approximately 2 minutes, and then try to start the engine again.**

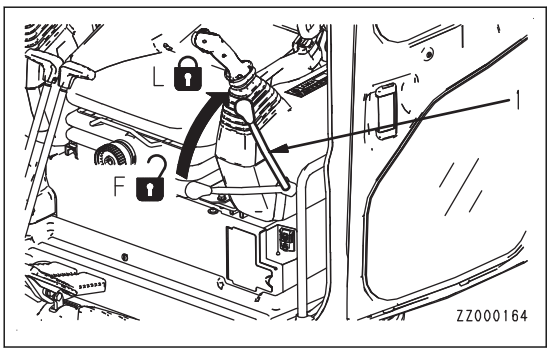




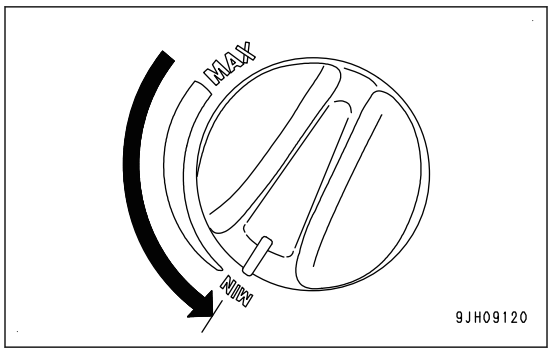
When the ambient temperature is low, start the engine in the procedure that follows.

1. Make sure that the lock lever (1) is in the LOCK position (L).

   If the lock lever (1) is in the FREE position (F), the engine does not start.

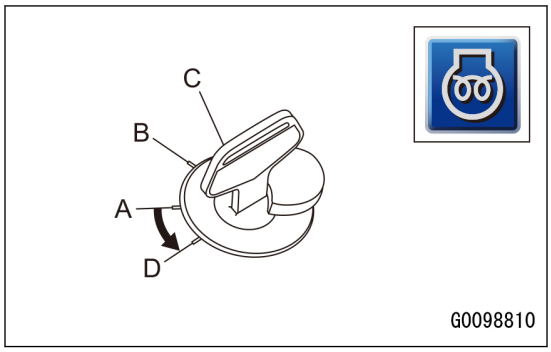


2. Set the fuel control dial (2) to the Low idle (MIN) position.



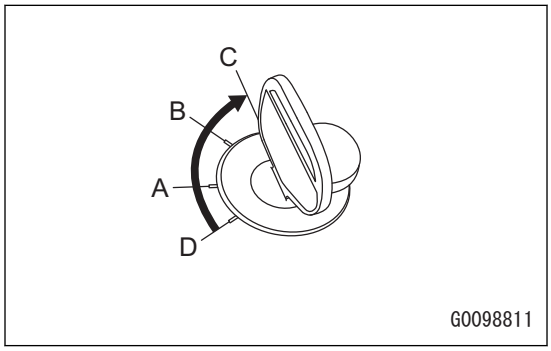
3. Hold the key in the starting switch (3) to the HEAT position (D).

   The preheating pilot lamp (4) lights up, and approximately after 30 seconds, the preheating pilot lamp (4) flashes for 10 seconds to show that the preheating is completed.



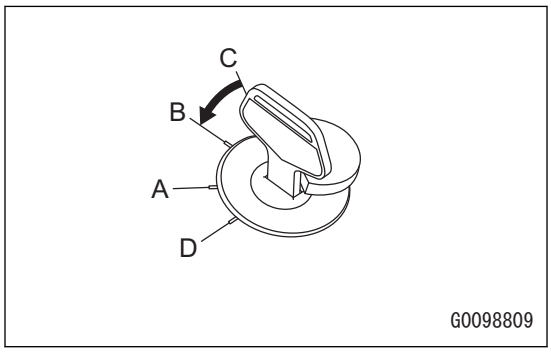
4. When the preheating pilot lamp (4) goes off, turn the key in the starting switch (3) to the START position (C).

   The engine starts.



5. After the engine starts, let go of the starting switch (3) key.

   The key automatically goes back to the ON position (B).



NOTICE

- **Run the engine at idle for 15 seconds immediately after the engine is started. Do not operate the control levers or the fuel control dial during this time.**

- **Do not touch the control lever and the control pedal while the engine oil pressure caution lamp is lit even when the engine is started.**
- **If the engine oil pressure caution lamp does not go off after 4 to 5 seconds, stop the engine immediately. Check the items for the engine oil pressure such as oil level and oil leakage, and take necessary measures.**



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Turbo Protect Function

The turbo protect function controls the engine speed at low idle or below immediately after the engine is started to protect the turbo.

- When the turbo protect function is activated, the engine speed is held at low idle or below, regardless of the position of the fuel control dial.
- When the turbo protect function is activated, the engine speed is held at low idle or below, even if the fuel control dial is operated.
- When the turbo protect function is canceled, the engine speed is set to the speed for the position of the fuel control dial.
- The activation time of the turbo protect function is limited to 20 seconds.

Auto Idle Stop Function

Auto idle stop function is a function that automatically stops the engine when engine is in idle state for a period of time with the lock lever is in the LOCK position.

The auto idle stop function operates only when the conditions below are satisfied.

- The auto idle stop time is not set to OFF.
- The engine runs normally.
- The lock lever is in LOCK position.
- The engine coolant and hydraulic oil are not overheating.
- The engine is not in automatic warm-up operation.
- The machine is not in the L mode.

1. When the idling time becomes 30 seconds before the set time, the monitor goes back to the standard screen and changes to the countdown screen.

   If you set the lock lever to the FREE position, the count-down stops and the screen goes back to the standard screen.



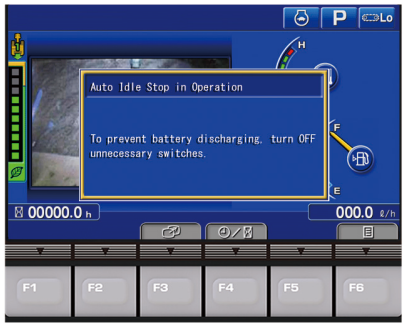
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2. When the countdown reaches 0, the engine stops, and the screen changes to “Auto Idle Stop in Operation” screen.

   When the auto idle stop is in operation, only the engine is stopped. Not only electrical components such as air conditioner, radio, lamps and windshield wipers, but also devices such as machine monitor and inverter keep their states before the engine is stopped. Turn off all the switches including the starting switch to prevent battery discharge.
   If the auto idle stop function is operated for a long time, the battery life can decrease. Especially for the machines with Komatsu maintenance-free battery, the battery life is likely to decrease.
   Turn the starting switch as always if you start the engine again.

   REMARK

   When the number of engine stop by the auto idle stop function exceeds 1000 times at engine speed of 1400rpm or more, action level “L01” is shown. If it exceeds 2000 times, “L03” is shown.



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Operations and Checks After You Start Engine

⚠ WARNING

- **If there are failures such as emergency stop or abnormal operation, turn the key in the starting switch to the OFF position.**
- **Do not work or operate the lever or pedal suddenly when the hydraulic oil temperature is low. Make sure to do warm-up operation for the hydraulic equipment until the hydraulic oil temperature caution lamp shows the correct temperature.**
- **Be sure to do the warm-up operation for the hydraulic components. Especially in cold weather, do the warm-up operation sufficiently for the hydraulic components. If the work equipment is operated without sufficient warm-up operation for the hydraulic component, there is a possibility that the response of the machine is slow and the machine does not move as control levers and control pedals intended.**
- **Keep away from the exhaust pipe of the engine while the engine runs or immediately after the engine stops. Do not let the flammable materials come near the exhaust pipe outlet.**

Warm-up operation has 2 types, one is warm-up operation for engine and the other is for hydraulic component. Also, how to operate the warm-up operation will be different by environment and conditions. Follow the description for each operation to do the engine warm-up operation.

The hydraulic component is not warmed only by the engine warm-up operation. Make sure to do warm-up operation for the hydraulic component separately from the warm-up operation for the engine. The hydraulic oil is warmed by the warm-up operation of the hydraulic components. The warm hydraulic oil is supplied to all the control circuits.

How to Examine Starting Condition and Unusual Noise of Engine

1. When the engine is started, make sure that the engine causes no abnormal noise and starts up easily and smoothly.
2. Make sure that there is no abnormal noise when the engine is at low idle or when the engine speed is increased.

If there is an abnormal noise, immediately consult your Komatsu distributor for inspection. When there is an abnormal noise and if the engine is kept operated, the engine can be damaged.

How to Examine Low-Speed Run and Acceleration of Engine

- Make sure that the engine does not hunt or stop suddenly when the machine is stopped during the normal travel operation.
- Make sure that the engine speed increases smoothly when the fuel control dial is turned to the High idle (MAX) position.
  - Be very careful around the machine to do the inspection in a safe area.
  - If the condition of low-speed run and acceleration are very bad, immediately consult your Komatsu distributor for inspection. If the engine performance continues to be very bad in the condition of low-speed run and acceleration, it can cause damage to the engine, confuse the operator's sense of driving, or lower the braking efficiency. It can lead to an unexpected accident.

REMARK

- The smell of the exhaust gas is different from that of the conventional diesel engine because of the exhaust gas filtering function.
- Black smoke or white smoke can be released for a short time immediately after the engine is started in cold weather. It is not a problem.

Operate Engine in Break in Period

NOTICE

This machine has been fully inspected and parts have been adjusted at the factory before shipment, but if you apply a full load before the parts are fitted in, it will have a bad effect to the performance and service life of the machine.
Do the break-in operation of the machine for approximately initial 100 hours (as shown on the service meter).

Make sure that you fully understand the descriptions in this Operation and Maintenance Manual, and then do the break-in operation. Be careful of the precautions that follow.

- Run the engine at idle for 15 seconds immediately after the engine is started. Do not operate the control levers or the fuel control dial during this time.
- Do the warm-up operation for 5 minutes after the engine starts.
- Do not operate the machine with heavy loads or at high speed.
- Immediately after the engine starts, do not do the sudden start, sudden acceleration, sudden stop unnecessarily, or sudden change in direction of the machine.

Engine Warm-up Operation

NOTICE

- **Do not suddenly accelerate the engine before the warm-up operation is completed.**
- **Do not run the engine at low idle or high idle with no load for 20 minutes or more. This will have a bad effect on the environment and also on the internal structure of the engine. If it is necessary to run the engine at idle for 20 minutes or more, apply a load from time to time or run it at a medium speed.**

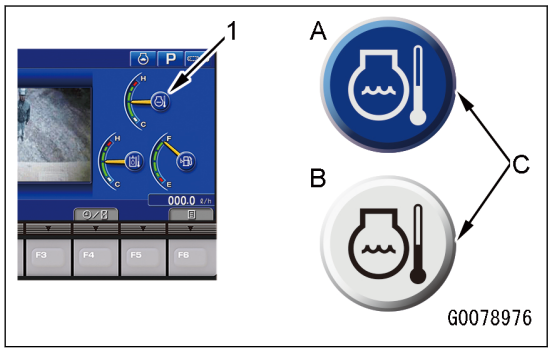
The automatic engine warm-up system is installed to the machine. If the engine coolant temperature is 30℃ {86℉} or below after the engine is started, the engine warm-up operation starts automatically. When the engine automatic warm-up operation starts, the engine speed is held higher than the normal speed at low idle. If the engine coolant temperature becomes 30℃ {86℉} or more, or if the warm-up operation time exceeds 10 minutes, the automatic warm-up operation is canceled and the engine speed decreases to the normal speed at low idle.

Do not move the machine immediately. Do the operations and checks as follows.

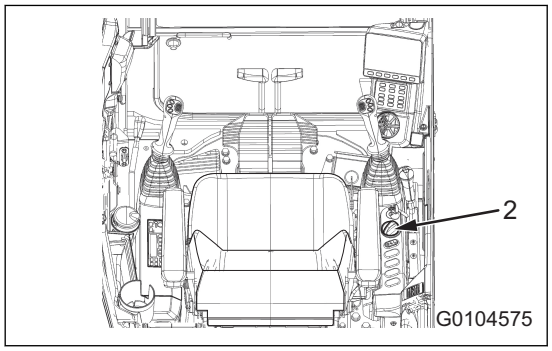
1. Make sure that the engine coolant temperature caution lamp (1) shows the correct temperature.

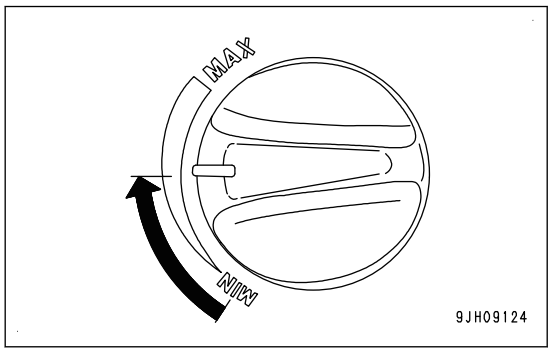
   If it shows the low temperature range, obey the step 2 to do the additional warm-up operation until it shows the correct temperature.

   - Display (A) when temperature is correct: The caution lamp background (C) is blue
   - Display (B) when temperature is low: The caution lamp background (C) is white



2. Turn the fuel control dial (2) to a middle position between the Low idle (MIN) and High idle (MAX), and run the engine at a medium speed with no load.





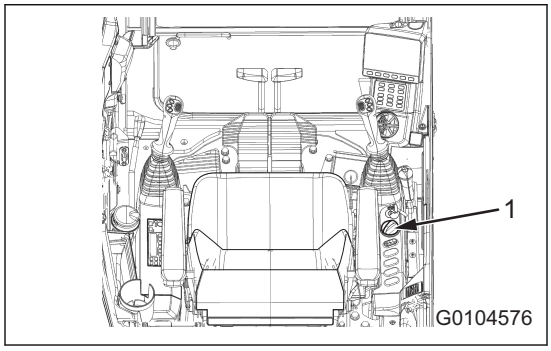
When the engine coolant temperature gauge shows the correct temperature, the engine warm-up operation is completed.

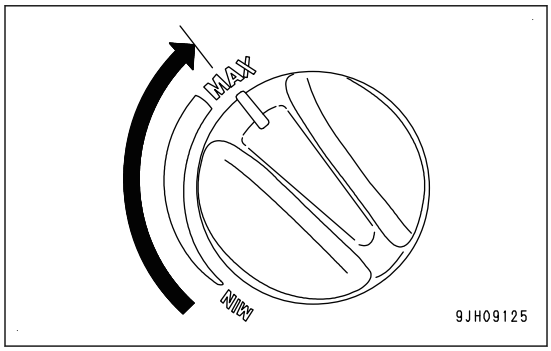
And then, do the warm-up operation for the hydraulic components.

How to Cancel Automatic Warm-up Operation

If you need to cancel the automatic warm-up operation in an emergency and change the engine speed to low idle, do as follows.

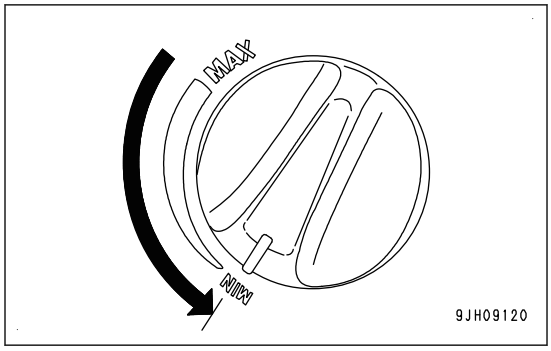
1. Set the fuel control dial (1) to the High idle (MAX) position, and hold it for 3 seconds or more.





2. Set the fuel control dial (1) to the Low idle (MIN) position.

   The automatic warm-up operation is canceled, and the engine speed decreases.



REMARK

The priority is set to the turbo protect function over the engine automatic warm-up operation.
When the turbo protect function activates, the engine runs at low idle even when the engine coolant temperature at startup is 30℃ {86℉} or below. And then, the automatic warm-up operation starts to increase the engine speed.

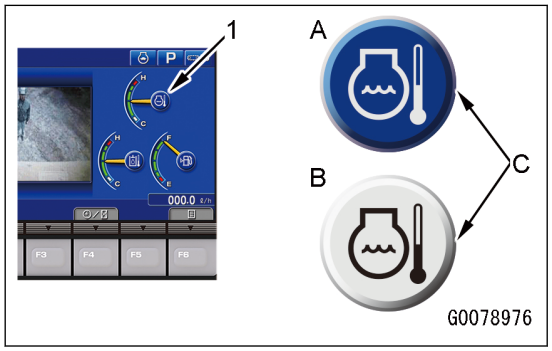
Hydraulic System Warm-up Operation

⚠ WARNING

- **Before you do the hydraulic component warm-up operation, make sure that there is no person or obstacle in the area around the machine, operate the horn, and then start the operation.**
- **Be sure to do the hydraulic component warm-up operation until the hydraulic oil temperature caution lamp shows the correct temperature display.**
- **The hydraulic component warm-up operation is necessary not only for the circuit between the pump and cylinders, and the circuit between the pump and motor, but also for the control circuits. Do the operation in all directions for all the work equipment (boom, arm, and bucket), swing, travel, and attachment (if installed). It is not sufficient if the operation is done just for one cylinder or motor, or the operation just in one direction.**
- **Check the direction of the track frame before you operate the travel lever.**
- **For control patterns other than the standard control method (ISO pattern), see the ATTACHMENTS AND OPTIONS.**

1. Make sure that the engine coolant temperature caution lamp (1) shows the correct temperature.
   - Display (A) when temperature is correct: Caution lamp background (C) is blue
   - Display (B) when temperature is low: Caution lamp background (C) is white

   If it shows the low temperature, do additional warm-up operation of the engine until the engine coolant temperature caution lamp (1) shows the correct temperature. For details, see “Engine Warm-up Operation (3-144)”.



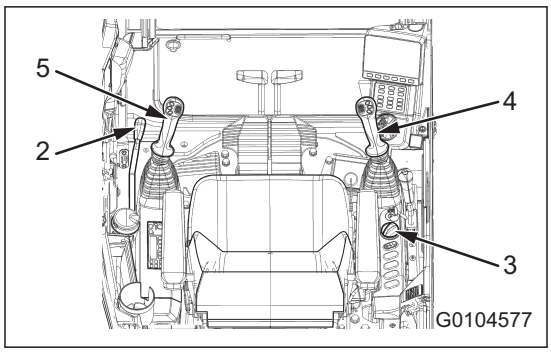
2. Set the working mode to the P mode (heavy-duty operation mode).

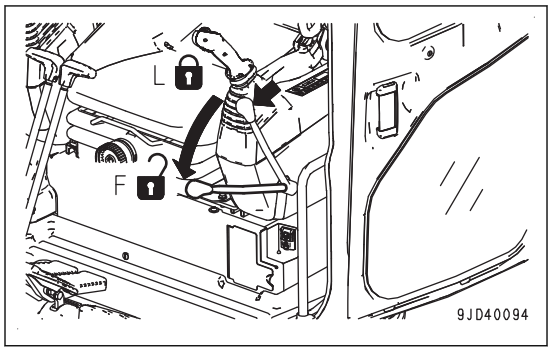
   It quickens the warm-up of the hydraulic component.

   For the working mode setting, see “Working Mode Selector Switch (3-43)”.

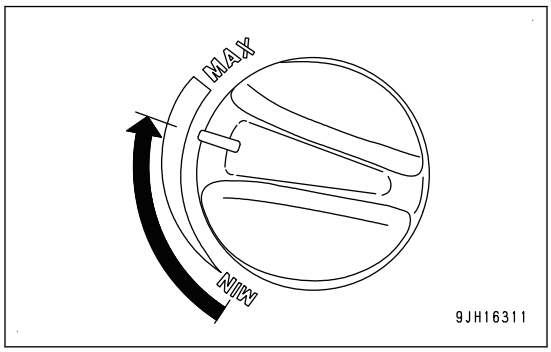


3. Hold the red part at the top of the lock lever (2), and then slowly and securely set it to the FREE position (F).
4. Raise the bucket off from the ground.





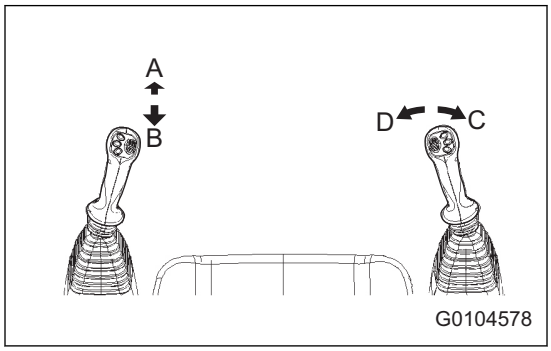
5. Turn the fuel control dial (3) to a point of 2/3 between the Low idle (MIN) position and the High idle (MAX) position.



6. Operate the work equipment to warm up the hydraulic components.

NOTICE

When you operate the work equipment, be careful not to let it interfere with the machine or ground.

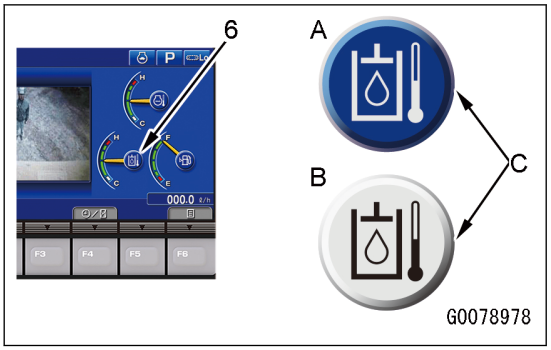


1) Move the R.H. work equipment control lever (4) slowly in the direction of the bucket CURL position (D). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
2) Move the R.H. work equipment control lever (4) slowly in the direction of the bucket DUMP position (C). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
3) Next, move the L.H. work equipment control lever (5) slowly in the direction of the arm IN position (B). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
4) Move the L.H. work equipment control lever (5) slowly in the direction to the arm OUT position (A). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.

7. Continue the operation of step 6 for 5 minutes.

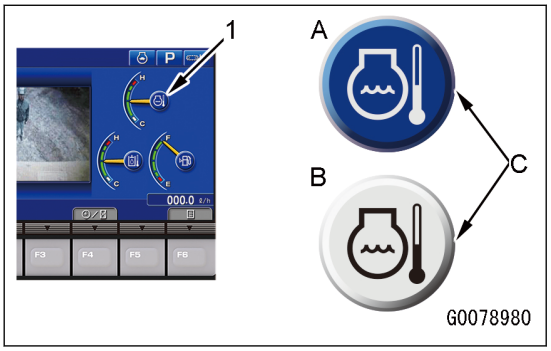
8. Make sure that the hydraulic oil temperature caution lamp (6) shows the correct temperature.
   - Display (A) when temperature is correct: Caution lamp background (C) is blue
   - Display (B) when temperature is low: Caution lamp background (C) is white

   If the hydraulic oil temperature caution lamp (6) shows low temperature, do the step 6 again and again until the lamp shows the correct temperature.



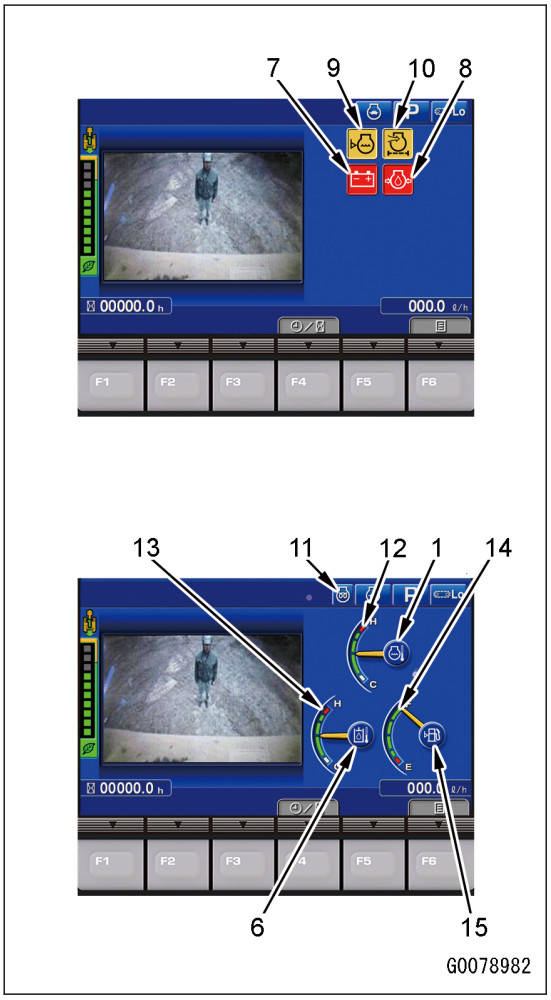
9. Make sure that the engine coolant temperature caution lamp (1) shows the correct temperature.
   - Display (A) when temperature is correct: Caution lamp background (C) is blue
   - Display (B) when temperature is low: Caution lamp background (C) is white

   If the engine coolant temperature caution lamp (1) shows the low temperature, do the engine warm-up operation until the correct temperature is shown. For details, see “Engine Warm-up Operation (3-144)”.



10. Check that the hydraulic oil temperature caution lamp (6) and the engine coolant temperature caution lamp (1) show the correct temperature, and then check that all the caution lamps, pilot lamps, and gauges on the machine monitor are in the conditions that follow.
    - The charge level caution lamp (7) is not lit.
    - The engine oil pressure caution lamp (8) is not lit.
    - The radiator coolant level caution lamp (9) is not lit.
    - The air cleaner clogging caution lamp (10) is not lit.
    - The preheating pilot lamp (11) is not lit.
    - The engine coolant temperature gauge (12) pointer is in the green range.
    - The engine coolant temperature caution lamp (1) shows the correct temperature.
    - The hydraulic oil temperature gauge (13) pointer is in the green range.
    - The hydraulic oil temperature caution lamp (6) shows the correct temperature.
    - The fuel gauge (14) pointer is in the green range.
    - The fuel level caution lamp (15) shows the correct level.
11. Make sure that there is no abnormal exhaust gas color, noise, or vibration.

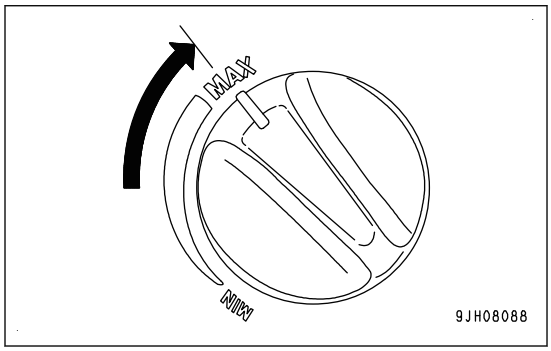
    If a problem is found, consult your Komatsu distributor.
12. In cold weather (ambient temperature is lower than 0℃ {32℉}), do the operation that follows.



NOTICE

Do this operation to warm-up all the hydraulic component in cold weather (ambient temperature below 0℃ {32℉}) even when the hydraulic oil temperature caution lamp shows the correct temperature.

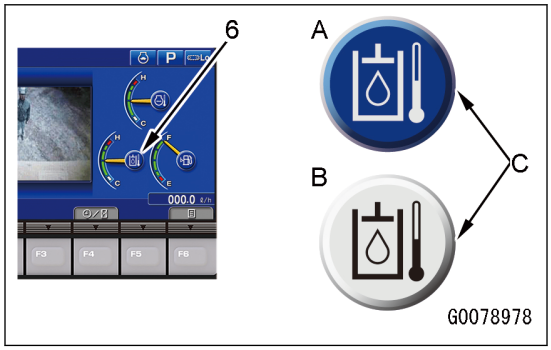
1) Turn the fuel control dial (3) to the High idle (MAX) position.



2) Continue the work equipment operation of step 6 for 10 minutes.

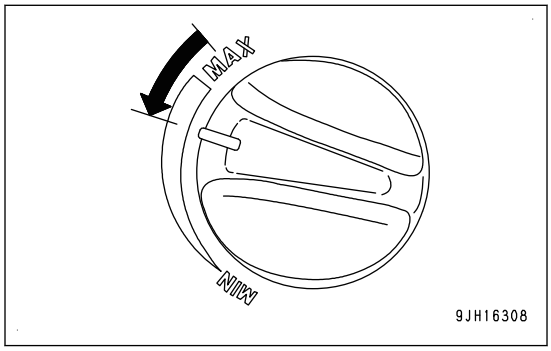
3) Make sure that the hydraulic oil temperature caution lamp (6) shows the correct temperature.
   - Display (A) when temperature is correct: Caution lamp background (C) is blue
   - Display (B) when temperature is low: Caution lamp background (C) is white

   If the hydraulic oil temperature caution lamp (6) shows low temperature, continue the work equipment operation in the step 6 until the lamp shows the correct temperature.



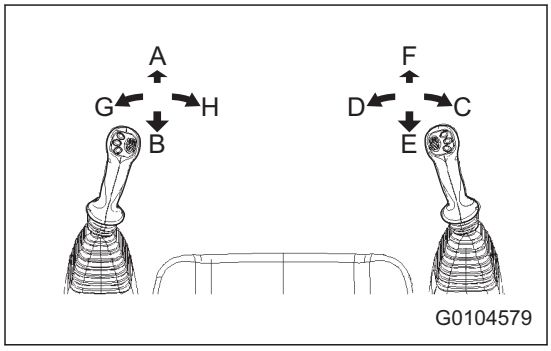
13. Before you start the work, make sure that the fuel control dial (3) is at a point of 2/3 between the Low idle (MIN) position and the High idle (MAX) position.

    If it is not at the 2/3 position, set it at the 2/3 position, and do the operation.

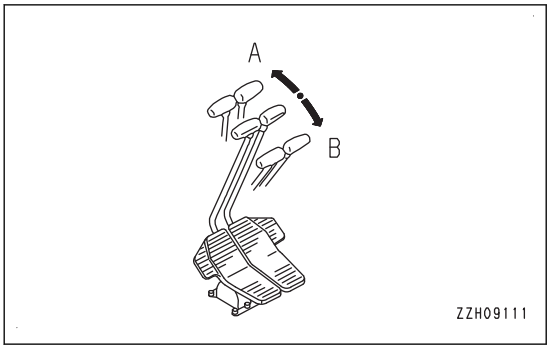


14. Before you start the actual operations, do the operations that follow slowly 3 to 5 times to circulate warm oil through the all control circuits.

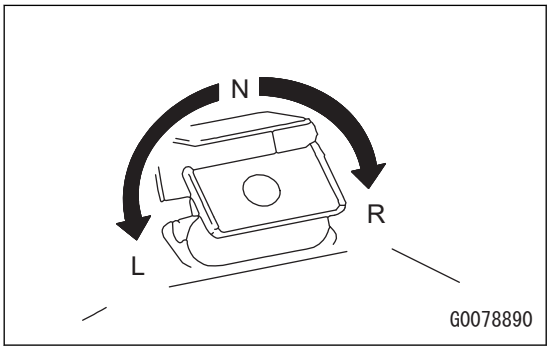
Boom operation	RAISE (E) ⟷ LOWER (F)
Arm operation	IN (B) ⟷ OUT (A)
Bucket operation	CURL (D) ⟷ DUMP (C)
Swing operation	LEFT (G) ⟷ RIGHT (H)



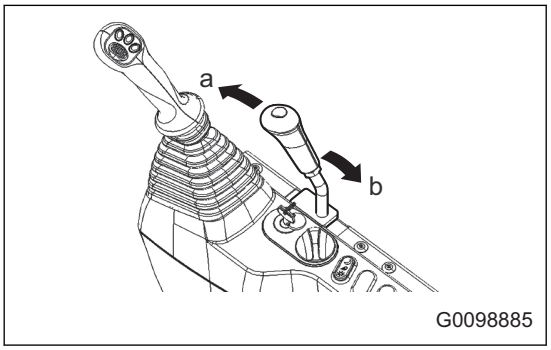
Travel (Lo) operation FORWARD (A) ←→ REVERSE (B)



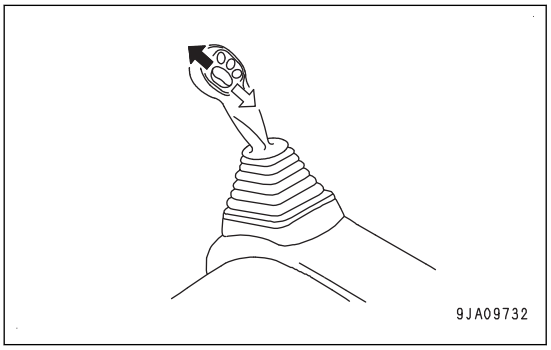
Boom swing operation Swing LEFT (L)←→ Swing RIGHT (R)



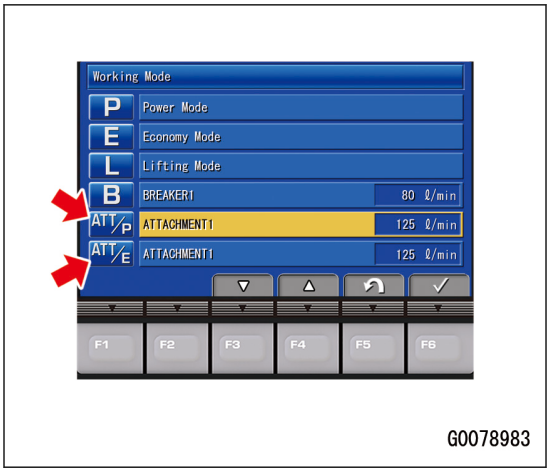
Blade operation LOWER (a) ←→ RAISE (b)



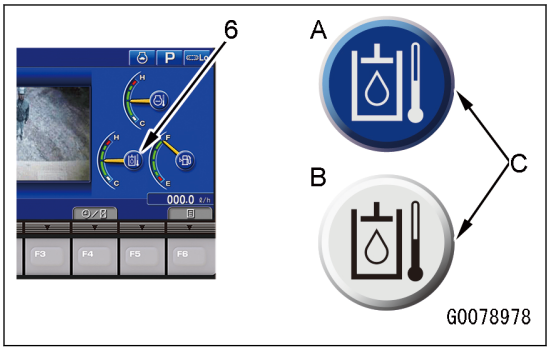
Attachment operation



For attachment operations (option), change the working mode to the attachment mode.



15. Make sure that the hydraulic oil temperature caution lamp (6) shows the correct temperature.
    - Display (A) when temperature is correct: Caution lamp background (C) is blue
    - Display (B) when temperature is low: Caution lamp background (C) is white
    - If the hydraulic oil temperature caution lamp (6) does not show the correct temperature, operate the work equipment as shown in the step 6 again and again until the lamp shows the correct temperature.
    - When the hydraulic oil temperature caution lamp (6) shows the correct temperature, the hydraulic equipment warm-up operation is completed.



Check that the hydraulic oil temperature caution lamp (6) shows the correct temperature, and then conduct the operation to be done after the warm-up operation is completed.

Air Conditioner Warm-up Operation

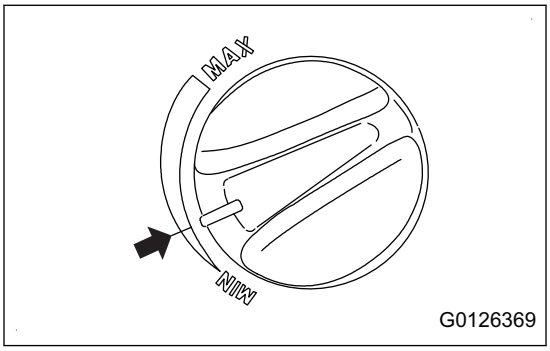
NOTICE

To prevent the failure of the air conditioner compressor, do the warm-up operation of the air conditioner one time a day when you use the air conditioner for the first time. If you turn on the air conditioner while the engine runs at high speed, the excessive load is applied to the air conditioner compressor, and it can cause the seizure in the air conditioner compressor.

When you operate the machine while the auto switch or the air conditioner switch is turned on, use the air conditioner in the conditions that follow for 3 minutes after the air conditioner is started.

1. Set the fuel control dial as shown in the figure (at the 1/4 position between the low idle (MIN) and high idle (MAX) position).
2. Set the temperature to the lowest, set the air flow to the maximum, and continue for 3 minutes.

   The air conditioner compressor starts up securely, and the warm-up operation of the air conditioner is done.

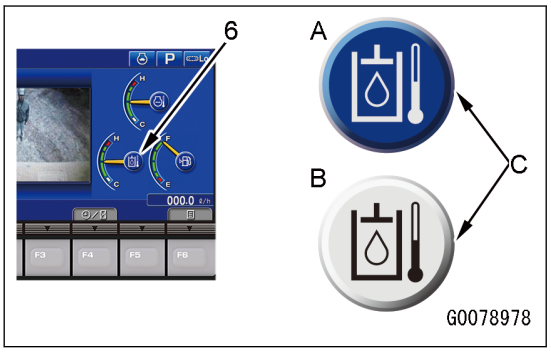


How to Operate Machine After Warm-up Operation is Ended

1. Make sure that the hydraulic oil temperature caution lamp (6) shows the correct temperature.

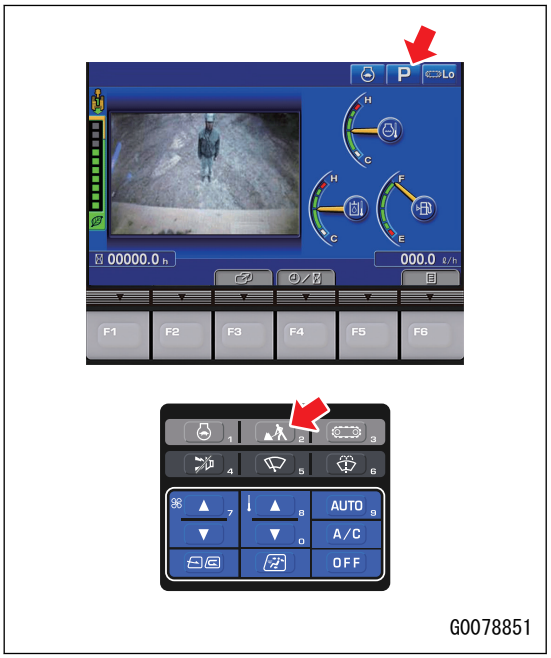
   Display (A) when temperature is correct: The caution lamp background (C) is blue

   Display (B) when temperature is low: The caution lamp background (C) is white



2. Push the working mode selector switch on the machine monitor to change to the working mode to be used.

   To change the working mode, see “Working Mode Selector Switch (3-43)”.



Working Mode Display

Monitor display	Mode name	Use
 G0078985	P mode	For heavy-duty operations
 G0078986	E mode	For operations with emphasis on fuel consumption
 G0078987	L mode	For operations with fine control
 G0078988	B mode	For breaker operations
 G0078989	ATT/P mode	For operations of 2-way attachment such as crusher
 G0078990	ATT/E mode	For 2-way attachment work such as crusher (when fuel efficiency is important)

How to Stop Engine

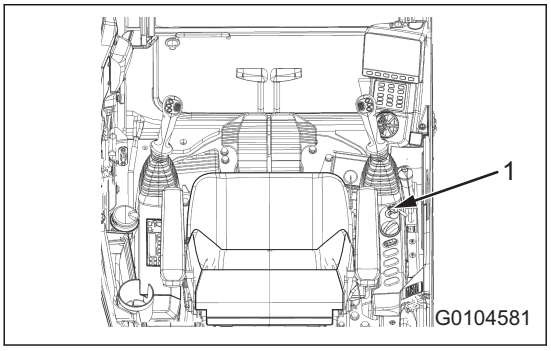
⚠ WARNING

Keep away from the exhaust pipe immediately after the engine stops.

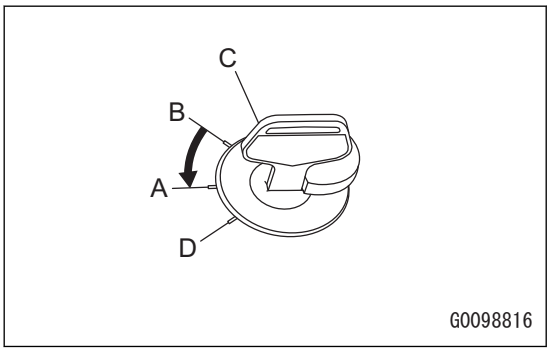
NOTICE

Sudden stop of engine is done only in emergency. If the engine is suddenly stopped, the service life of the engine parts can be decreased.
If the engine is overheated, do not try to stop it suddenly but run it at medium speed to allow it to cool down gradually, and then stop it.

Stop the engine as follows.

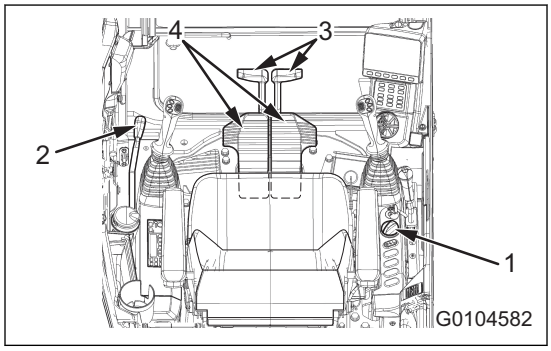


1. Run the engine at low idle for approximately 5 minutes.
   Engine cools down slowly.
2. Turn the starting switch (1) key to the OFF position (A).
   The engine stops.
3. Remove the key from the starting switch (1).



How to Start Machine (Travel FORWARD and REVERSE) and Stop Machine

⚠ WARNING

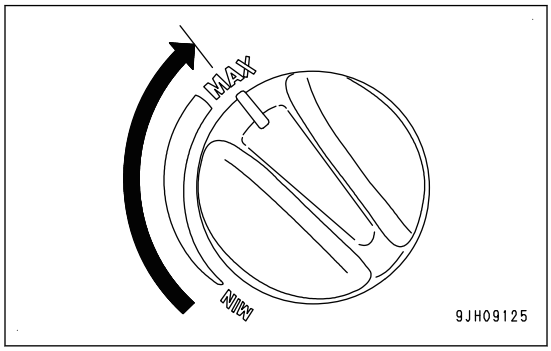


- **Before you operate the travel levers or travel pedals, check the travel direction of the track frame. When the track frame is set toward the rear side (sprocket is at the front), the operation direction of the travel levers or travel pedals are the opposite to the travel direction of the machine (forward/reverse, right/left turn).**
- **Make sure that the area around the machine is safe and operate the horn before you move off the machine.**
- **Keep persons away from around the machine.**
- **Clear the obstacles from the travel path.**
- **If the auto-deceleration is activated, operate carefully the travel lever and the travel pedal. If you operate the travel lever and the travel pedal when the engine speed decreases by the auto-deceleration function, the engine speed will suddenly increase.**
- **Make sure that the travel alarm operates normally during travel.**
- **If it is the machine with rearview camera, check the camera image on the monitor before you travel reverse.**

Prepare to Move Machine

Follow the procedure that follows and do preparation to move the machine.

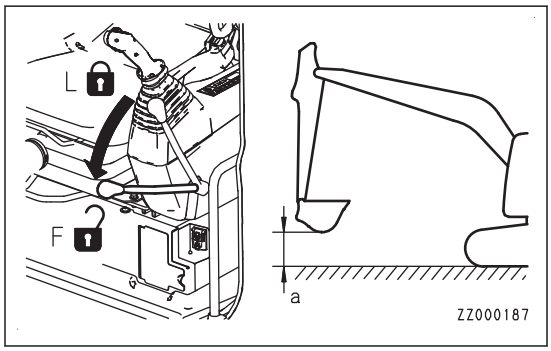
Turn the fuel control dial (1) to the High idle (MAX) position
The engine speed increases.



How to Travel FORWARD

1. Hold the red part on the top of the lock lever (2), and then operate it to the FREE position (F).
2. Set the work equipment in the travel posture and raise it to the height (a).

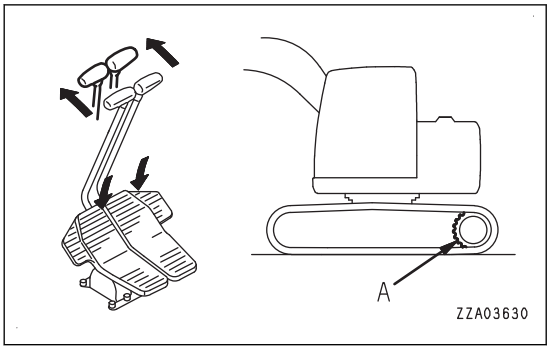
   (a):40 to 50cm {15.7 to 19.7in}
3. Raise the blade.



4. Operate the R.H. and L.H. travel levers (3) or the travel pedal (4) as follows.

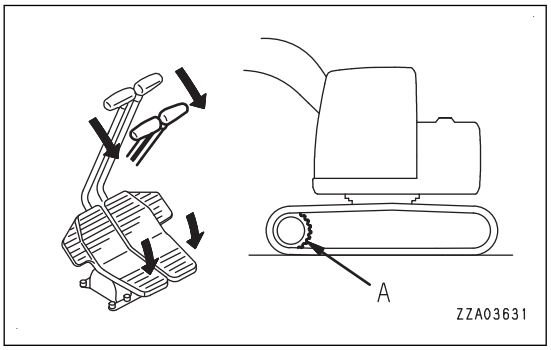
- When the sprocket (A) is at the rear of the machine

  Push the R.H. and L.H. travel levers (3) forward slowly or push the front part of the travel pedal (4) slowly to move the machine.



- When the sprocket (A) is at the front of the machine

  Pull the R.H. and L.H. travel levers (3) toward you slowly or push the rear part of the travel pedal (4) slowly to move the machine.



5. When you drive the machine, check that the travel alarm operates normally.

   If the travel alarm does not operate, consult your Komatsu distributor for repair.

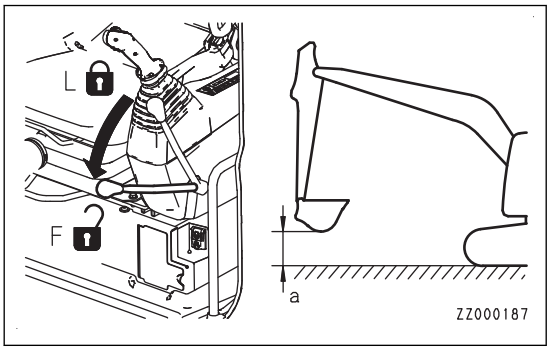
   REMARK

   - At low temperature, if the machine travel speed is not normal, do the warm-up operation fully.
   - If the undercarriage is packed with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.

How to Travel REVERSE

1. Hold the red part on the top of the lock lever (2), and then operate it to the FREE position (F).
2. Set the work equipment in the travel posture and raise it to the height (a).

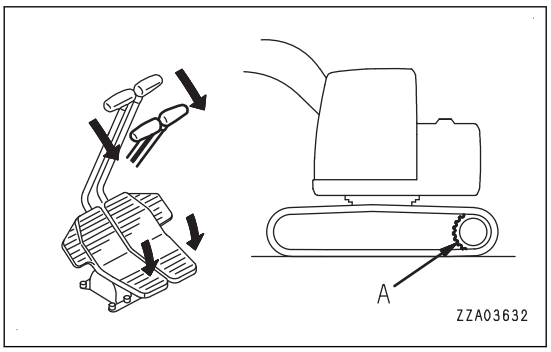
   (a):40 to 50cm {15.7 to 19.7in}
3. Raise the blade.



4. Operate the R.H. and L.H. travel levers (3) or the travel pedal (4) as follows.

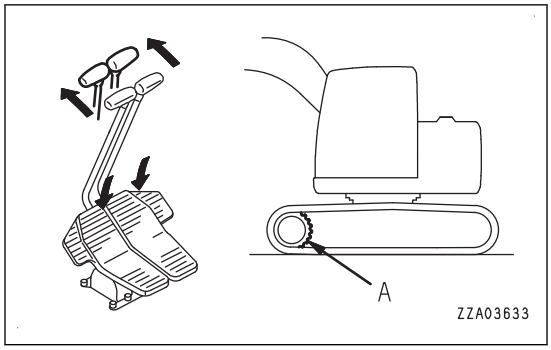
   - When the sprocket (A) is at the rear of the machine

     Pull the R.H. and L.H. travel levers (3) toward you slowly or push the rear part of the travel pedal (4) slowly to move the machine.



- When the sprocket (A) is at the front of the machine

  Push the R.H. and L.H. travel levers (3) forward slowly or push the front part of the travel pedal (4) slowly to move the machine.



5. When you drive the machine, check that the travel alarm operates normally.

   If the travel alarm does not operate, consult your Komatsu distributor for repair.

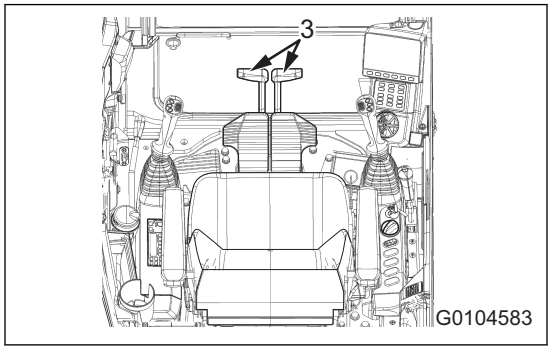
   REMARK

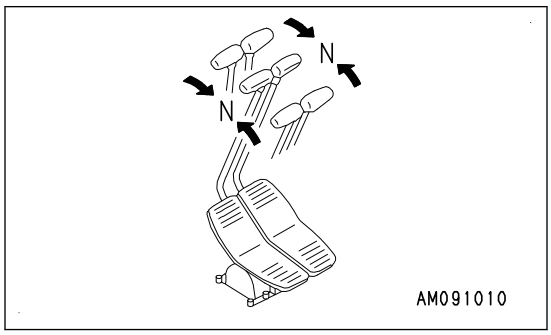
   - At low temperature, if the machine travel speed is not normal, do the warm-up operation fully.
   - If the undercarriage is packed with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.

How to Stop Machine

Avoid a sudden stop. Stop the machine gradually.

Set the R.H. and L.H. travel levers (3) in the NEUTRAL (N) position.
The machine stops.





Steer Machine

How to Steer Machine (Change Direction)

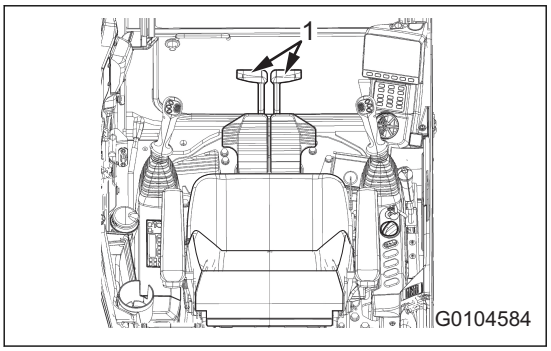
⚠ WARNING

Before you operate the travel levers or travel pedals, check the travel direction of the track frame. When the track frame is set toward the rear side (sprocket is at the front), the operation direction of the travel levers or travel pedals are the opposite to the travel direction of the machine (forward/reverse, right/left turn).

Use the travel levers to change direction.

Avoid sudden changes of direction to travel as much as possible. When you do the counter-rotation turn (spin turn), stop the machine before the turn.

Operate the 2 travel levers (1) as follows.



When you change the direction while the machine is stopped

To turn left in forward travel, push the right travel lever forward.

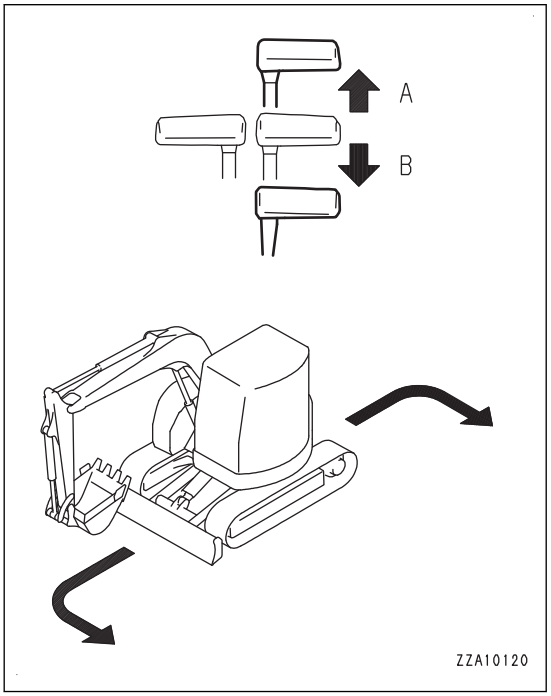
To turn left in reverse travel, push the right travel lever rearward.

(A): FORWARD left turn

(B): REVERSE left turn

REMARK

To turn right, operate the left travel lever in the same manner.



To change the direction of machine to the right or left in FORWARD travel

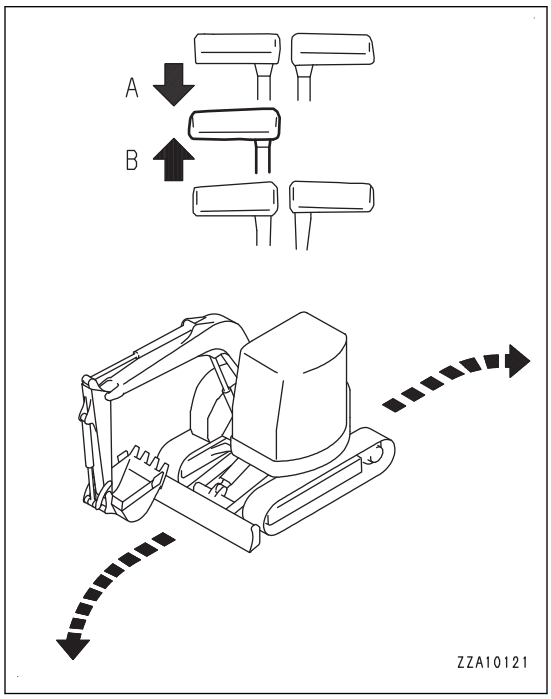
To turn left, move the left travel lever back to the NEUTRAL position.

(A): FORWARD left turn

(B): REVERSE left turn

REMARK

To turn right, operate the right travel lever in the same manner.

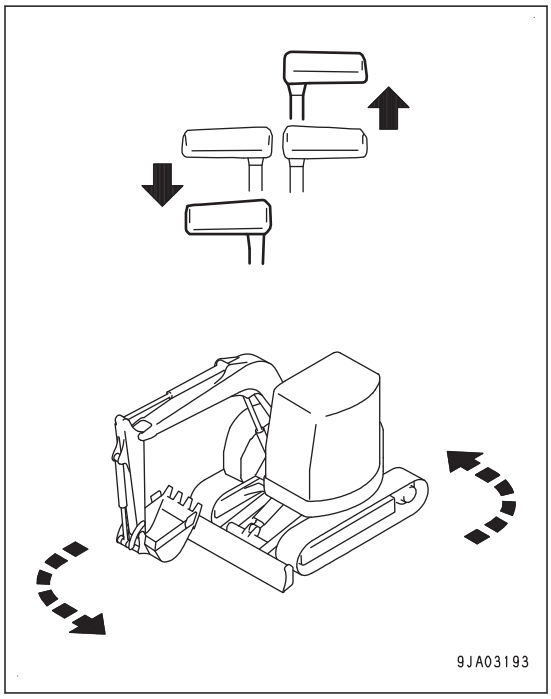


To do the counter-rotation turn (spin turn)

To do the counter-rotation turn to the left, pull the left travel lever to your side, and push the right travel lever forward.

REMARK

To do the counter-rotation turn to the right, pull the right travel lever to your side, and push the left travel lever forward.

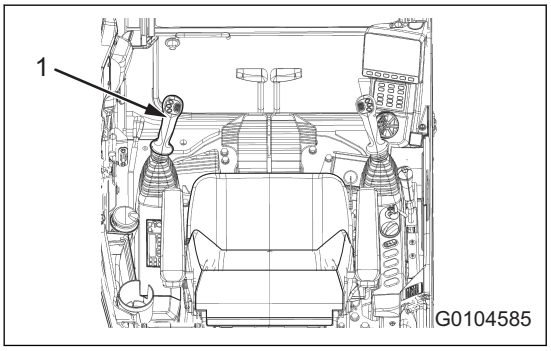


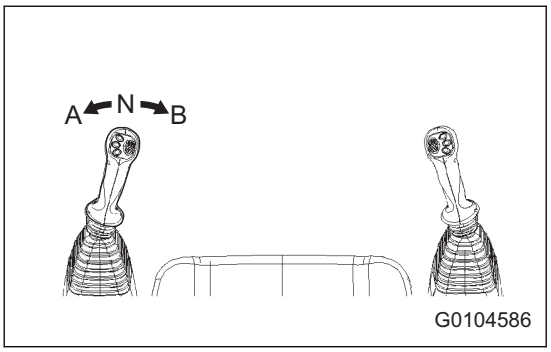
How to Swing Machine

⚠ WARNING

- **The tail of the machine extends outside the tracks. Before swing operation, make sure that the area around the machine is safe by visual check or mirror.**
- **For control patterns other than the standard control method (ISO pattern), see the ATTACHMENTS AND OPTIONS.**
- **If the auto-deceleration is activated, operate carefully the travel lever and the travel pedal. If you operate the travel lever and the travel pedal when the engine speed decreases by the auto-deceleration function, the engine speed will suddenly increase.**

- Operate the L.H. work equipment control lever (1) to do the swing.
  (A): Swing LEFT
  (B): Swing RIGHT
- When you do not do swing operation, set the left work equipment control lever (1) to the N (NEUTRAL) position. The swing brake is applied.





How to Operate Work Equipment

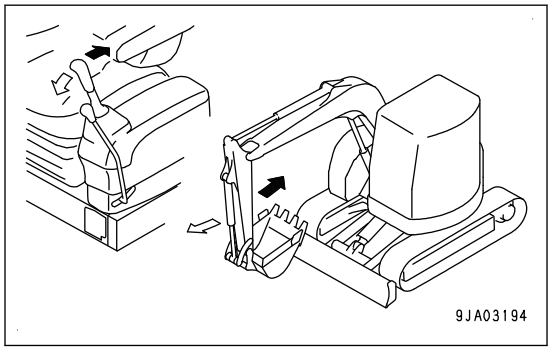
⚠ WARNING

- **For control patterns other than the standard control method (ISO pattern), see the ATTACHMENTS AND OPTIONS.**
- **If the auto-deceleration is enabled, operate the travel lever and travel pedal carefully. If you operate the travel lever and travel pedal when the engine speed decreases by the auto-deceleration function, the engine speed will suddenly increase.**

Operate the work equipment control lever on the right and left as follows.
When you let go of the work equipment control levers, they go back to the NEUTRAL position and the work equipment is held in that position.

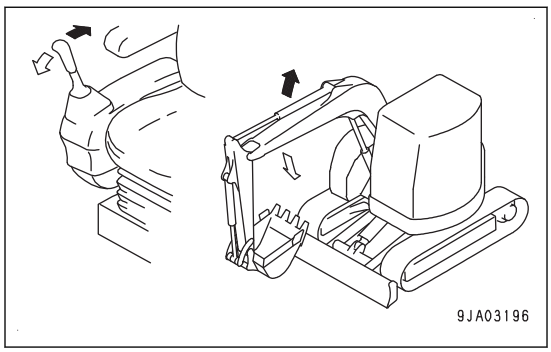
- When you operate the arm

  Move the L.H. work equipment control lever back and forth.



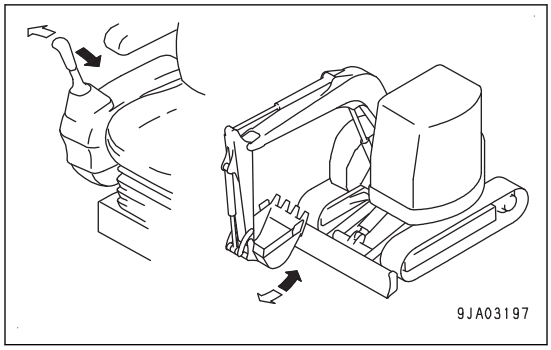
- When you operate the boom

  Move the R.H. work equipment control lever back and forth.



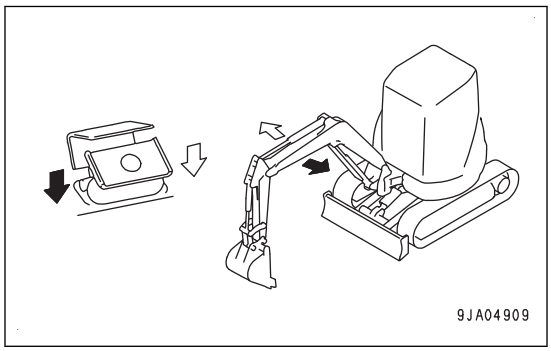
- When you operate the bucket

  Move the R.H. work equipment control lever to the right and left.

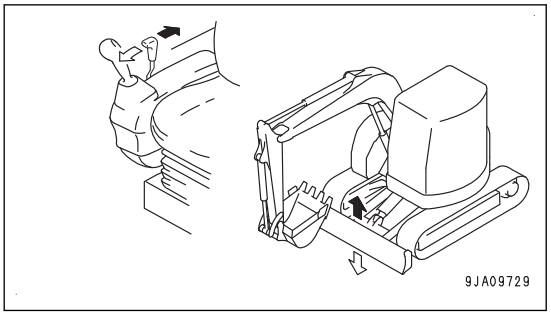


- When you operate the boom swing

  Push the boom swing control pedal to the right or left.



- When you operate the blade
  Operate the blade control lever back and forth.



If the auto deceleration is enabled, when the work equipment control lever is set to the NEUTRAL position while the machine is stopped, the engine speed is low even if the fuel control dial is at the High idle (MAX) position.

REMARK

The accumulator is installed to the control circuit of this machine. You can lower the work equipment to the ground by the operation below within 15 seconds after the engine is stopped.

1. Turn the starting switch to the ON position.
2. Set the lock lever to the FREE position.
3. Operate the work equipment control lever in the LOWER direction for the work equipment.

You can use this procedure to release the remaining pressure in the hydraulic cylinder circuits or to lower the boom after you load the machine onto a trailer.

Handle Working Mode

How to Select Working Mode

NOTICE

Set the machine in breaker mode when you do breaker work. Do not do the breaker operation in a mode other than the breaker mode. There is a danger that it damages the hydraulic component.

Select the working mode that matches the work conditions or purpose. This will make it possible to do the operations efficiently.

Obey the procedures that follow to change the working mode.

When the starting switch is turned to the ON position, the working mode is set to the mode when the key was last turned off.

Set the mode to the most applicable mode for the work.

Working mode	Applicable operations
P mode	Normal digging, loading work (production conscious operation)
E mode	Normal digging, loading work (fuel consumption conscious operation)
L mode	Aligning positions or such (fine operation)
B mode	Breaker operation
ATT/P mode	For operations of 2-way attachment such as crusher (production conscious operation)
ATT/E mode	For operations of 2-way attachment such as crusher (fuel consumption conscious operation)



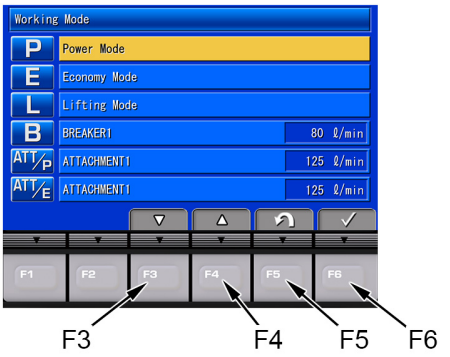
G0078851

1. Push the working mode selector switch.
   The screen changes to “Working Mode” screen.



G0078884

2. Push the working mode selector switch, or push the switch F3 or F4 to select the appropriate working mode.



3. Select a working mode that you want to set, and push the switch F6.

   The setting is applied and the screen goes back to the standard screen.

   When the switch F5 is pushed, the mode does not change and the screen goes back to the standard screen.

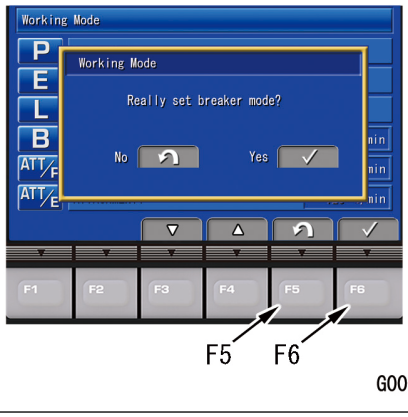
   REMARK

   - If nothing is done for 5 seconds after the working mode is selected, the selected working mode is automatically applied and the screen goes back to the standard screen.
   - If the working mode switch is pushed and held with the working mode selected, the selected mode is applied and the screen goes back to the standard screen.



4. If you select the breaker mode, push the switch F6 on the check screen of “Really set breaker mode?”.

   When you push the switch F5, the screen goes back to the working mode selection screen.



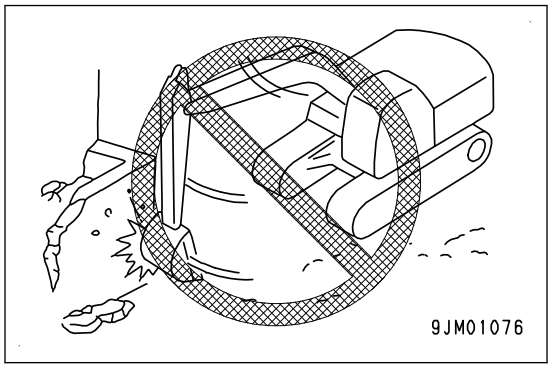
Prohibited Operations

⚠ WARNING

- **Do not operate the work equipment control lever while the machine travels.**
- **If the auto-deceleration is activated, operate carefully the travel lever and the travel pedal. If you operate the travel lever and the travel pedal when the engine speed decreases by the auto-deceleration function, the engine speed will suddenly increase.**

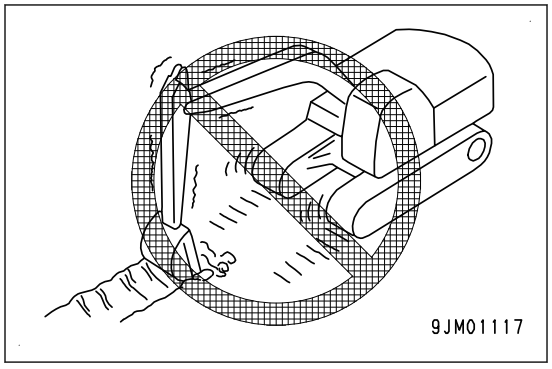
Do Not Use the Swing Force to Hit and Give Shocks to the Object

Destruction of the object by shock or levelling by hitting with swing force significantly shortens the service life of the machine and there is a danger.



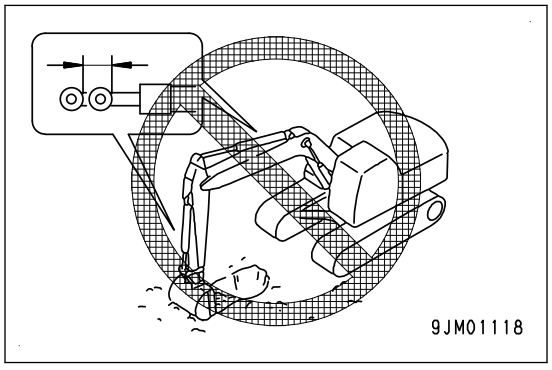
Prohibition of Operations by Travel Force

Do not do digging work while the machine travels with the bucket thrusted into the ground. Digging with the travel force can cause damage to the machine.



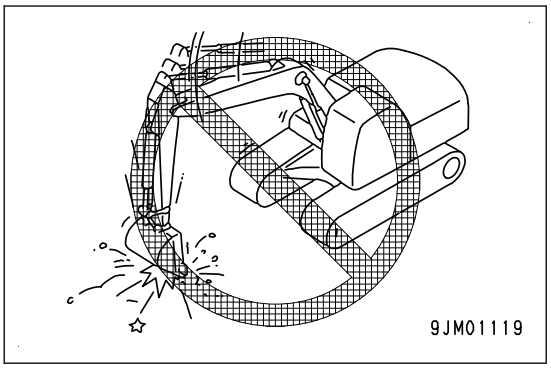
Prohibition of Operations at Stroke End of Hydraulic Cylinder

Do not do the work with the hydraulic cylinder at stroke end (fully extended or fully retracted). When external force impact is applied to the work equipment at the stroke end, it can cause damage to the hydraulic cylinder, which can cause serious personal injury or death.



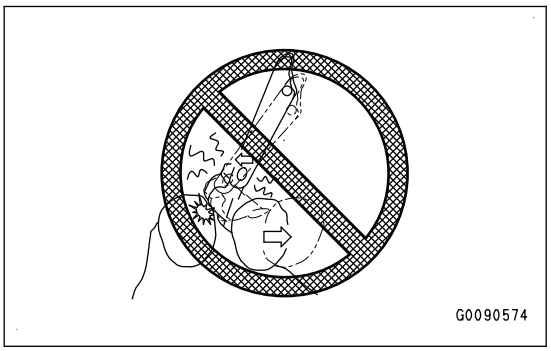
Prohibition of Operations by Bucket Drop Force

Do not use the drop force of the main body to dig. Do not use bucket as the mattock. Do not use bucket to impact digging or pile driving. These usage will significantly shorten the service life of the machine.

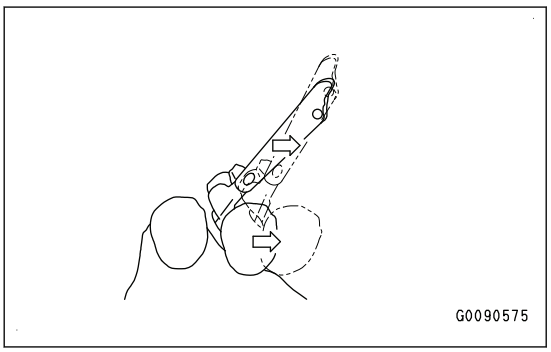


Prohibition of Operations Which You Use Bucket as Lever

Do not put the bucket back to a rock and use it as a lever to dig. This can apply an excessive force to the machine, which can cause damage.

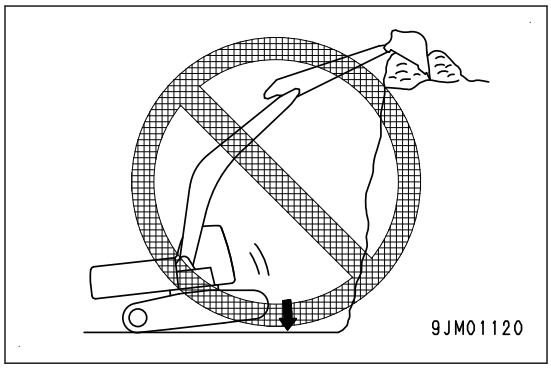


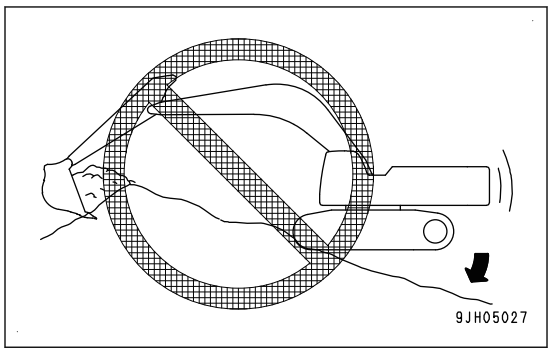
As shown in the figure, dig only by the force of the arm or bucket. An excessive force can be automatically controlled to prevent damage to the machine.



Prohibition of Operations by Machine Drop Force

Do not use the dropping force of the machine to excavate.

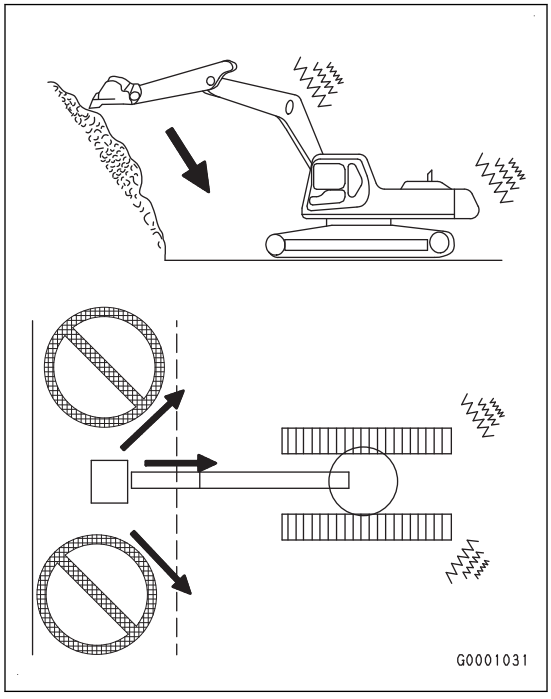




Prohibition of Digging Operation at an Angle When Teeth Do Not Engage

When the bucket teeth do not engage a hard rock in digging upper side, do not do the digging work while the machine swings. A large vibration occurs on the machine because the teeth slip down on the rock surface, which can cause cracks on the work equipment and the frame part.

If the bucket tooth slides and collides with a rock, an excessive load occurs in the work equipment and frame, which can shorten the service life of the machine.

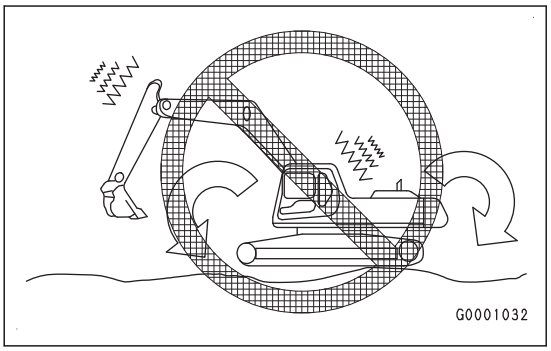


Prohibition of Dig Operation on Hard Rocky Ground

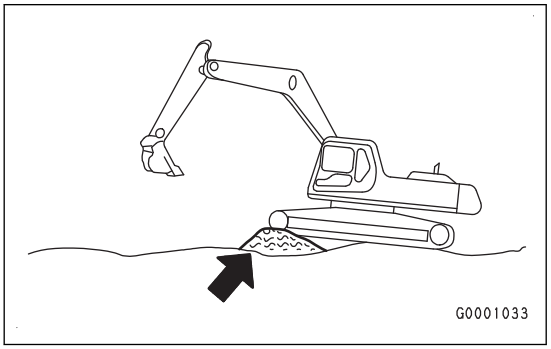
Do not attempt to directly excavate hard rocky ground with the work equipment. It is better to dig it after you break it up by some other means. This will not only save the machine from damage but will make for better economy.

Prohibition of Operations When Machine is Not in Stable Condition

If the undercarriage is not stable during the work, torsional load occurs at the frames, which makes the machine's service life shorter.



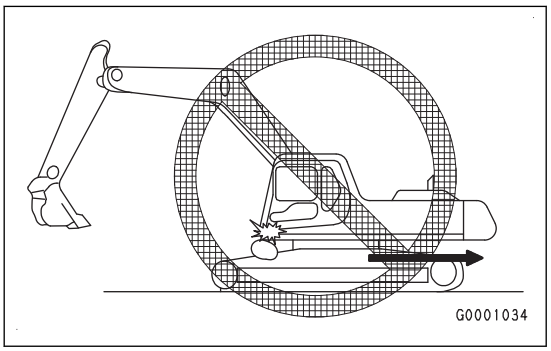
When the undercarriage is not stable, make a pile of soil under the front of the tracks to make the machine stable. Then, start the work.



Prohibition of Swing or Travel When Rocks and Soils are on Top of Track Assembly

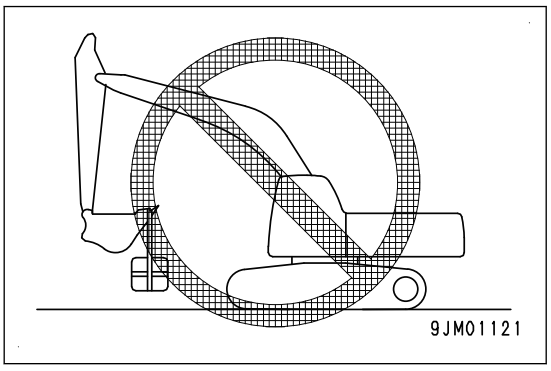
Before the travel or the swing operation, make sure that there is no rock or soil on the tracks.

If you travel or swing the machine with rocks and soils on the tracks, it can cause damage to the undercover and the frames. Furthermore, damage to the hydraulic component can cause serious personal injury or death.



Prohibition of Lifting Operation

Lifting operation by this machine is not allowed, but it is allowed only when the exclusive lifting hook is installed.



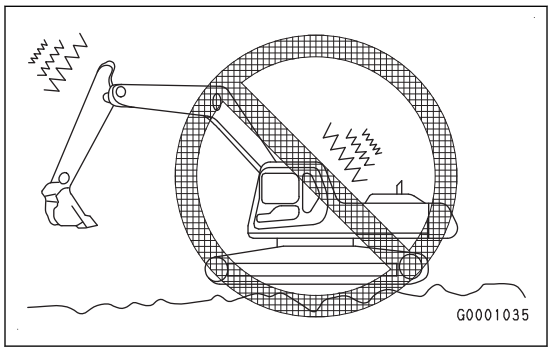
Prohibition of Sudden Operation of Travel Lever or Travel Pedal

Do not make a sudden operation of the travel levers and pedals such as operations that follow.

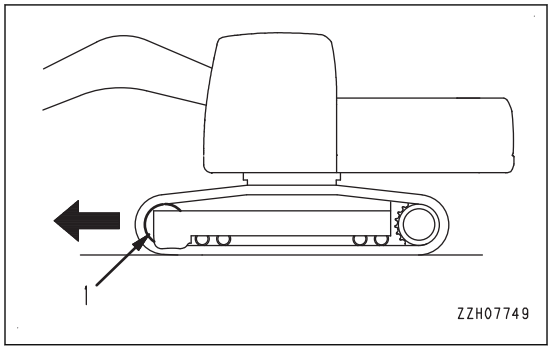
- A sudden operation to make a sudden start
- A sudden change of the travel direction
- A sudden stop from almost the maximum speed

Prohibition of High-Speed Travel Operations on Rough Ground

If you drive the machine on rough ground such as rock-bed, etc. at high speed, large push-up loads are applied to the machine each time it rides over uneven road surface, which shortens the service life of the machine body.

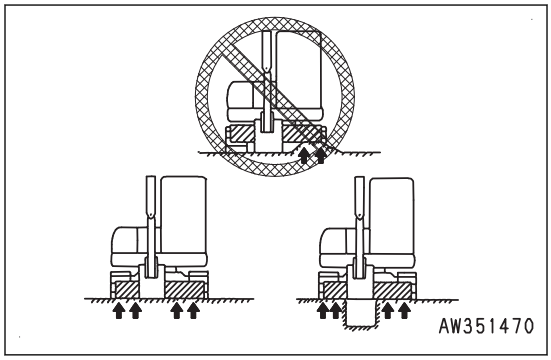


If you drive the machine on rough ground such as rock-bed, set the idler (1) toward the direction of travel and drive it at low speed.

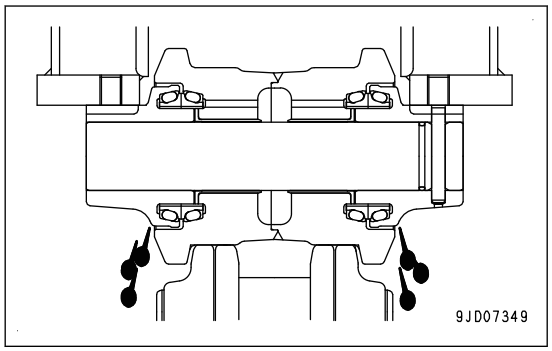


Support Machine with Two Sides of Blade

When you use the blade as an outrigger, do not support the machine with only one side of the blade.



Prohibition of Long-Time Continuous Travel



When you drive the machine at high speed for 1.5 hours or more, the temperature of the lubrication oil in the track rollers and final drive rises to a high temperature. There is a danger that this high temperature lubrication oil damages the oil seal and causes oil leakage.

When you drive the machine for a long time, stop for 30 minutes every 1.5 hours of travel to reduce the temperature of the lubrication oil in the track rollers and final drive.

If the machine travels with the tracks loosened for a long time, damage can be caused to the undercarriage parts in a short period.

When you drive the machine for a long time, check the tension of the track every 1.5 hours of travel, and adjust the tension if it is loose.

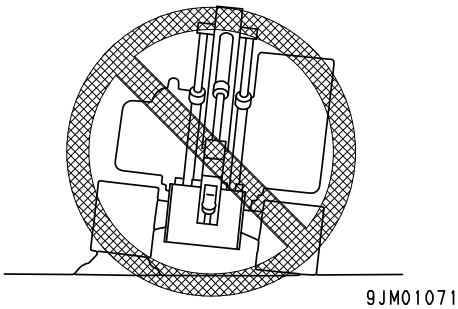
For the adjustment, see the MAINTENANCE, “How to Examine and Adjust Track Tension (4-29)”.

Work Precautions

Precautions When Machine Travels

Obstacles such as large boulders and stubs must be avoided or removed in advance. Do not ride over them as long as possible. If the machine travels over an obstacle, a large impact can occur and cause damage to the machine (especially the undercarriage).

If there is no way to avoid it, reduce the travel speed, keep the work equipment close to the ground. Also, drive the machine with the center of the track over the obstacle.

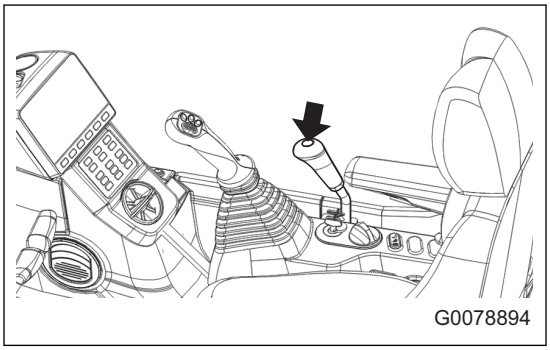


Precautions for High Speed Travel

When you drive the machine on a rock-bed with a lot of unevenness or on a bumpy road with a lot of boulders, reduce the travel speed to “Lo”. Also, when you drive the machine in “Hi” speed, set the idler to the driving direction.

Push the travel speed selector switch to change the travel speed.



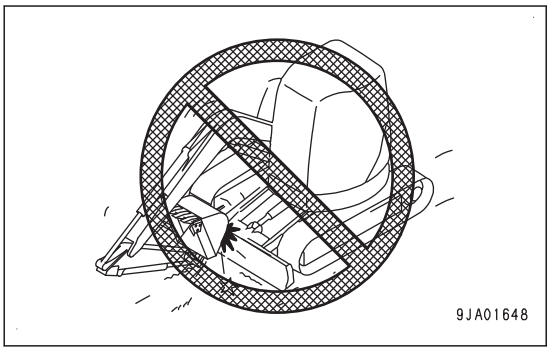


The travel speed (“Lo”, “Hi”) is shown on the travel speed display.



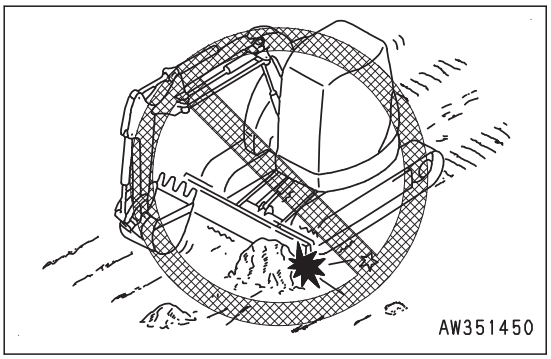
Precautions When You Retract Work Equipment

When you fold the work equipment in the travel or transportation posture, be careful not to let the bucket hit the blade.



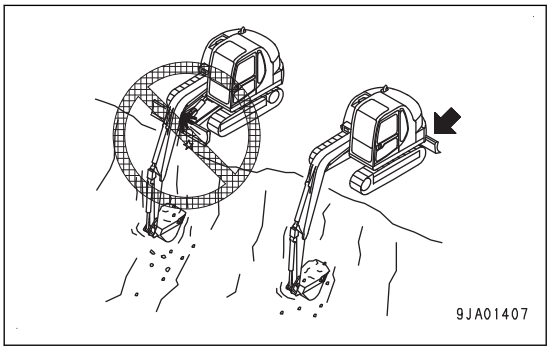
Precautions When You Use Blade

Do not hit the blade against an object such as a rock mass that can put a heavy load on the blade. It makes the lives of the blades and cylinders shorter.



Precautions for Blade Position During Backhoe Operation

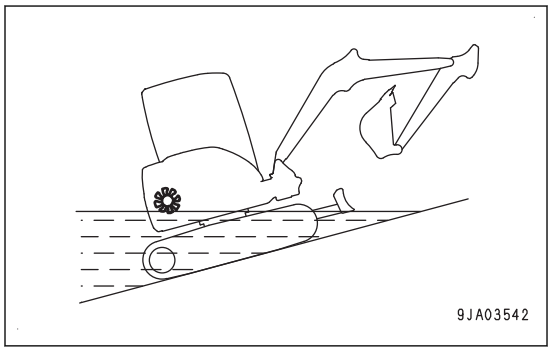
If you operate the backhoe operation when the blade is on the front of the machine, be careful not to allow the boom cylinder to touch the blade. Keep the blade always on the rear of the machine unless it is needed.



Allowable Depth of Water or Soil

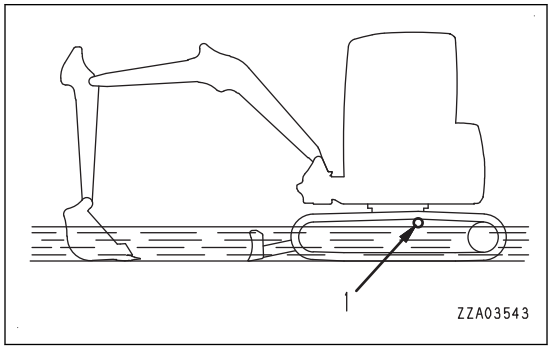
NOTICE

When the machine goes out of water, if you set the machine to climbing posture with a steep angle of 15° or more, it is possible that the rear part of the upper structure stays in the water, which can cause damage to the radiator fan because water is screwed by the fan. Be very careful when the machine goes out of the water.



Use the machine in the depth of the carrier roller (1) center if it is in water or in the earth and sand.

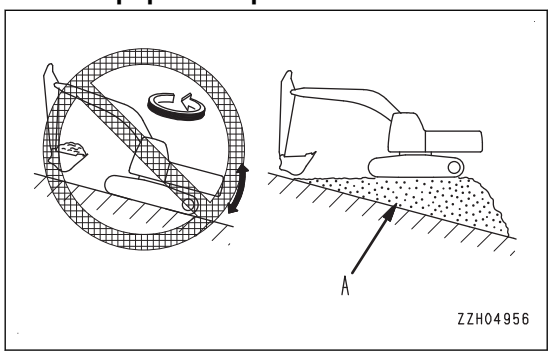
After the work, be sure to supply grease to the parts which have been under water for a long time until the used grease is projected. (Around the bucket pin, in particular)



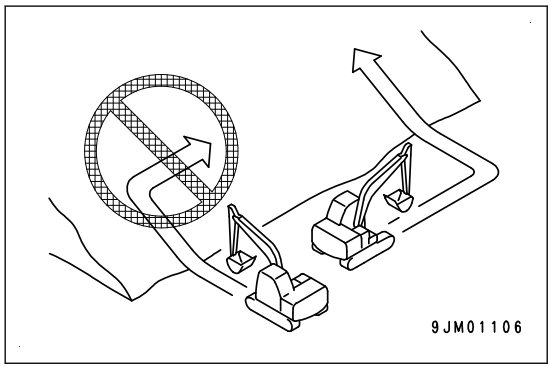
Precautions When You Work on Slope

⚠ WARNING

- **Avoid the work on a slope as much as possible. There is a danger that the machine loses the balance and tips over when you operate swing operation and work equipment operation.**
  It is very dangerous to swing downhill when the bucket is loaded. If it is inevitable to do such operations, prepare an embankment to make a platform (A) on the slope to make the machine level.



- **Do not drive the machine or do operation on the slope where the steel plates or such are laid. Even a slight slope is slippery and it is very dangerous.**
- **Do not climb up and travel down on the steep slope. There is a danger that the machine tips over.**
- **When you drive the machine, raise the bucket by approximately 20 to 30cm {7.9 to 11.8in} above the ground. Do not drive down in reverse on a slope.**
- **Do not steer the machine or travel across on the slope. Go down to a level area, and the use a safer way such as a detour.**



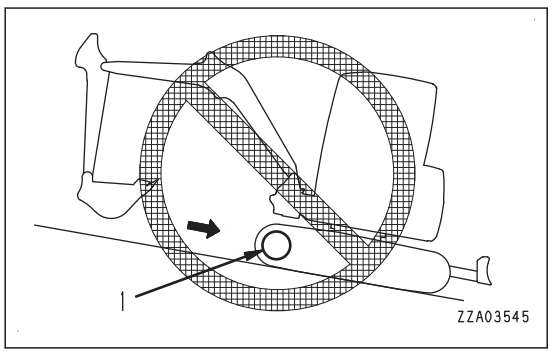
- **While you operate or travel, be ready to stop safely when the machine slips or becomes not stable.**
- **Do not pull the arm to use the force of the work equipment to help the machine travel uphill when the tracks slip and the machine cannot travel uphill with only the force of the tracks. There is a danger that the machine tips over.**
- **On a slope, even if the engine is stopped, the machine can swing with its own weight when the swing operation is done with the L.H. work equipment control lever.**
  Be sure not to do this swing operation by its own weight. This operation cannot be controlled with lever, and there is a danger that serious personal injury or death occur by the movement that the operator does not intend.

⚠ CAUTION

- **On a slope, do not open or close the slide door when you drive or operate the machine. Also, on a slope, lock the slide door. The slide door can be open or closed suddenly when you drive or operate the machine.**
- **Be very careful when you open or close the slide door if the machine is stopped on a slope. There is a danger that door opens and closes suddenly by its own weight.**

NOTICE

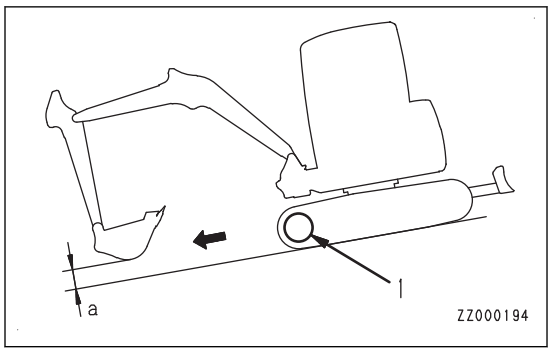
Set the sprocket (1) toward down side when you drive the machine downhill.
If you drive the machine downhill with sprocket (1) set toward up side, the tracks is likely to be loosened and can cause jump teeth.



- When the machine travels down the steep slope, use the travel lever and fuel control dial to keep the travel speed low.

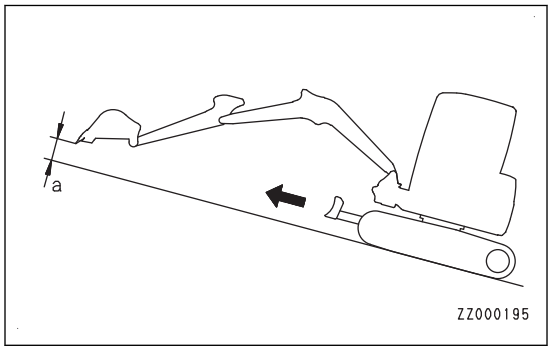
  When the machine travels down the steep slope with an angle of 15° or more, set it to the posture shown in the figure with the sprocket (1) downward and lower the engine speed.

  (a):20 to 30cm {7.9 to 11.8in}



- When you drive the machine on a steep uphill of 15° or more, set the machine to the posture shown in the figure.

  (a):20 to 30cm {7.9 to 11.8in}



Brake On Downhill Slope

Set the travel lever to the NEUTRAL position to apply the brake automatically.

If Engine Stops

If the engine stops while the machine travels up the slope, set the travel lever to the NEUTRAL position, lower the bucket to the ground, stop the machine, and then start the engine again.

Escape from Soft Ground

Move the machine carefully not to get stuck in soft ground such as mud. If the machine gets stuck in soft ground, you can escape as follows.

How to Escape When Track on One Side is Stuck

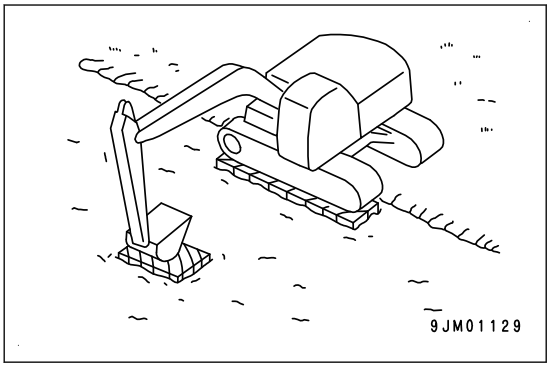
NOTICE

When the boom or arm is used to lift the machine, push the ground with the bucket bottom. (Do not push with the tooth)
At this time, set the angle between the boom and arm to 90 to 110°.
Do the same when inverted bucket is used.

When the track on one side gets stuck, get the machine out according to the procedure that follows.

1. Put the bucket on the ground on the stuck side, and push the ground.

   The track is raised.
2. Put a log or wooden blocks under the track to make footing.
3. Raise the bucket and escape.

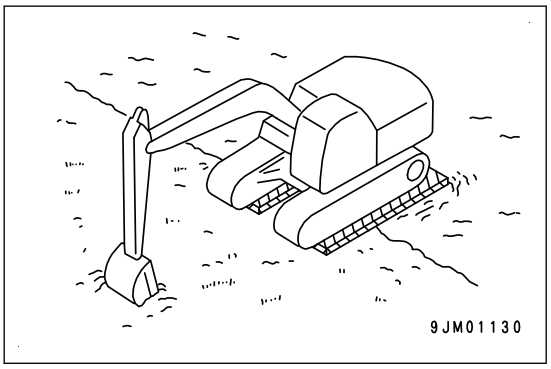


How to Escape When Tracks on Two Sides are Stuck

When the two tracks get stuck, get the machine out according to the procedure that follows.

1. Put items to make footing for the tracks on the two sides.
   1) Place the bucket along the side of the machine to push the ground.

      The track is raised.
   2) Put a log or wooden blocks under the raised track as footing.
2. Thrust the bucket into the front ground.
3. Move the arm IN as in digging work and set the travel lever to FORWARD to get the machine out.



Recommended Applications

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

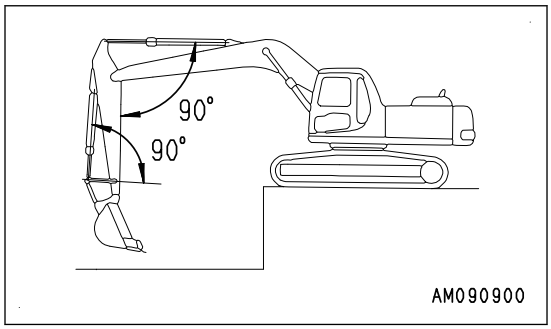
Digging Work

Backhoe Work

It is suitable for excavation of the areas that are lower than the machine.

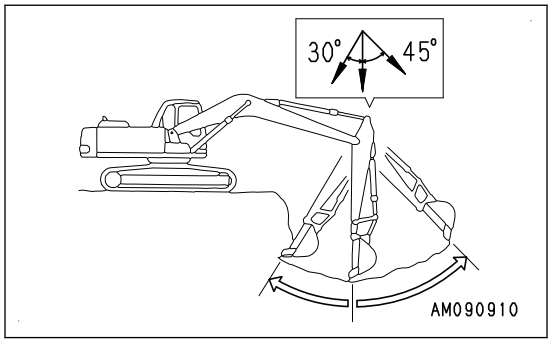
When the state of the work equipment is as shown in the figure (angle between the bucket cylinder and the link, and angle between the arm cylinder and the arm are 90°), the digging force from the pushing out of each cylinder is maximized.

Operation efficiency can be optimized if you use this angle effectively during the digging work.



When you do digging with arm, make sure that arm angle is in the range between 45° forward and 30° toward you.

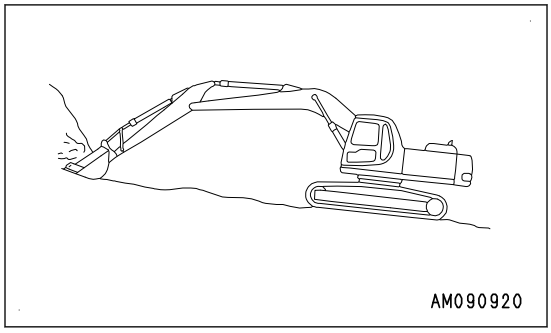
Do not do digging at the stroke end of the cylinder, and make sure that you do the arm operation in the range described above, there will be a little difference in response to the digging depth though.



Shovel Work

It is suitable for excavation of the areas that are higher than the machine.

For this work, invert the bucket and install.



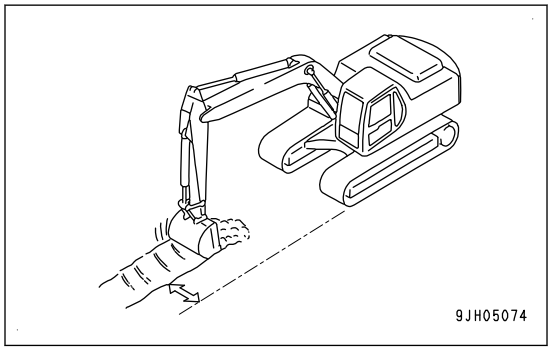
Ditching Work

The machine can do ditching work.

The basic procedure to excavate a wide ditch is to dig the two sides first and finally remove the center.

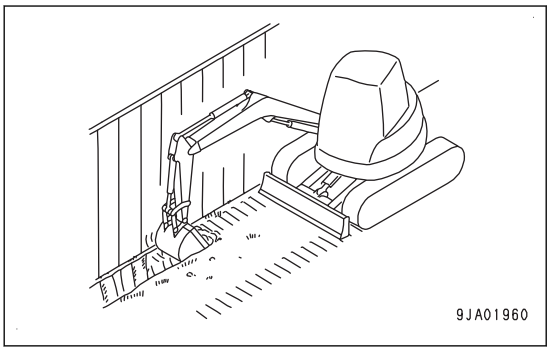
The efficiency of ditching work increases with the steps that follow.

- Install the bucket that is appropriate for ditching work.
- Make the tracks parallel to the groove which is ditched.



Side Ditching Work

You can do ditching work in a narrow space with the combination of swing and boom swing operations.

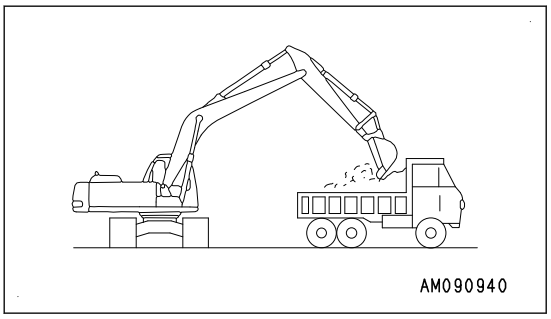


Loading Work

The machine can load rocks and soils, etc. to a dump truck.

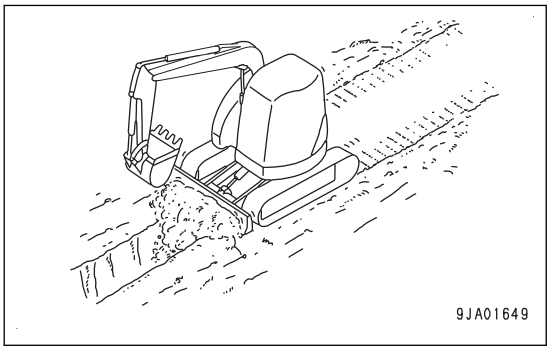
You can put the dump truck in an area which provides a small swing angle and good visibility for better efficiency in loading.

The loading will be easier when the machine is at the rear of the dump track. More rocks and soils can be loaded than when the machine is lateral to the track.



Leveling Work

Backfill after digging and leveling work is possible with the blade.



How to Replace and Invert Bucket

⚠ WARNING

- **When you do the work, wear the protective equipment such as goggles, hard hat, and gloves. When you hit the pins with a hammer, pieces of metal could fly and cause serious injury.**
- **When you put the removed bucket, keep it in a stable condition.**
- **Because the pins are hit with a strong force, they can fly out and cause injury to people around the bucket. Make sure that there is no one around the bucket.**
- **When you pull out the pins, do not stand behind the bucket. Be very careful not to put your foot from the side to do the work.**
- **Be very careful not to get your fingers caught when you remove or insert the pins.**
- **When you align the holes, you must not insert your hands into the pin holes.**

Do the work on a level ground in good condition. Also, when multiple workers work together, assign a person who will direct the work and follow the person's instructions.

How to Replace Bucket

NOTICE

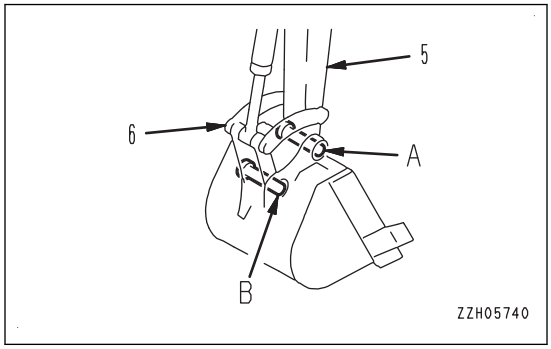
- **After the pins are removed, make sure that mud or sand does not get on them.**
- **Dust seals are installed in the two ends of bushings. Be careful not to cause damage to them. If damage is caused to the dust seal, replace it with a new one. If it is used without replacement, sand and dirt can enter the inside and cause abnormal wear of the pin.**

1. Lower the bucket on the level ground.

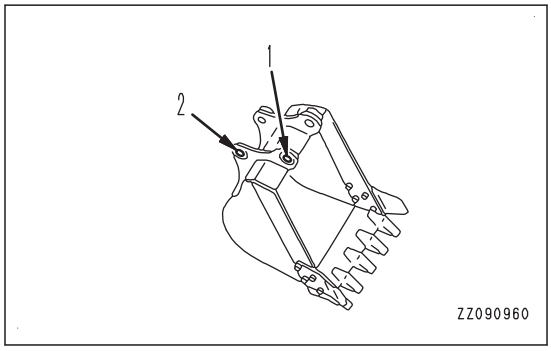
   REMARK

   If you pull out the pins, place the bucket with the feeling as if you lower it on the ground lightly.
   If the bucket hits strongly on the ground, the resistance will be increased and it will be difficult to remove the pins.

2. Remove the double nut of stopper bolt at the arm pin (A) and the link pin (B), and then pull out the bolts.
3. Pull out the arm pin (A) and the link pin (B) to remove the bucket.



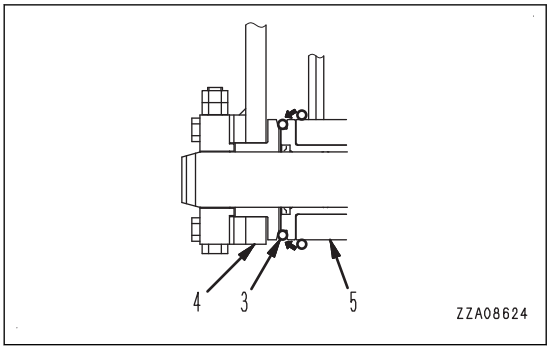
4. Align the arm (5) with the hole (1) of the replacement bucket.
5. Align the link (6) with the hole (2) of the replacement bucket.



6. Install the greased pins (A) and (B) into the holes (1) and (2) of the bucket.

Because the O-ring (3) is easily damaged, when you install the bucket (4), do the operations as follows.

1) Put the O-ring (3) to the position on the arm (5) shown in the figure.
2) After you insert the pins, put the O-ring (3) into the regular groove.



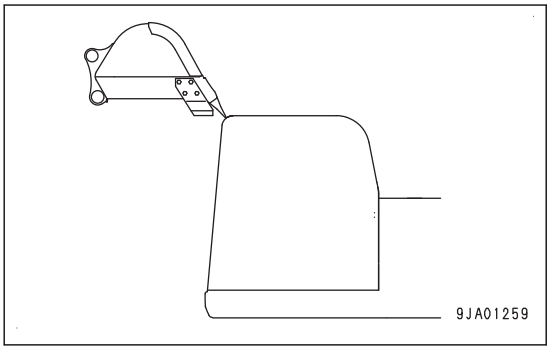
7. Install the stopper bolt and nut of each pin.
8. Supply grease to each pin.

   Supply grease sufficiently until grease protrudes from the shaft end.

How to Invert Bucket

⚠ WARNING

When you invert the bucket, do the work very carefully that the bucket does not interfere with the cab. When you invert the bucket, the trail of the bucket blade sticks out and interferes with the cab, and there is a danger that serious accident occurs.



NOTICE

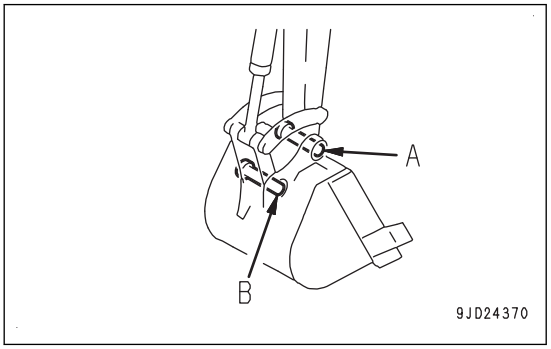
- **After the pins are removed, make sure that mud or sand does not get on them.**
- **Dust seals are installed in the two ends of bushings. Be careful not to cause damage to them. If damage is caused to the dust seal, replace it with a new one. If it is used without replacement, sand and dirt can enter the inside and cause abnormal wear of the pin.**

1. Lower the bucket on the level ground.

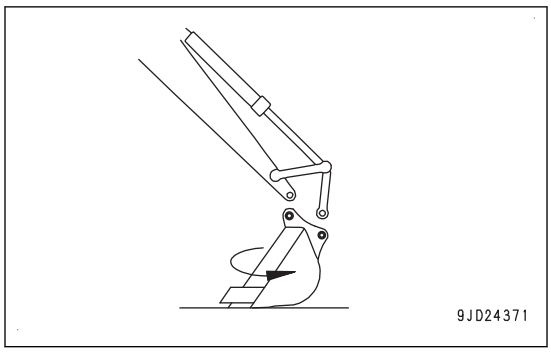
   REMARK

   If you pull out the pins, place the bucket with the feeling as if you lower it on the ground lightly.
   If the bucket hits strongly on the ground, the resistance will be increased and it will be difficult to remove the pins.

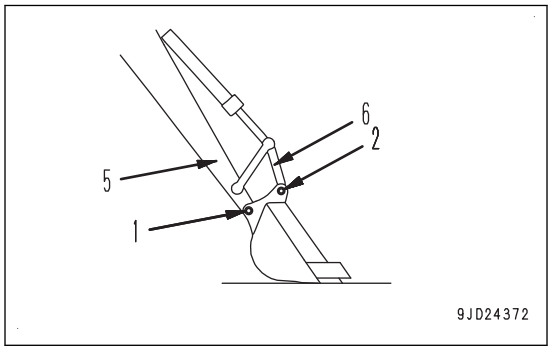
2. Remove the double nut of stopper bolt at the arm pin (A) and the link pin (B), and then pull out the bolts.
3. Pull out the arm pin (A) and the link pin (B) to remove the bucket.



4. Invert the removed bucket.



5. Align the arm (5) to the mounting part (1).
6. Align the link (6) to the mounting part (2).

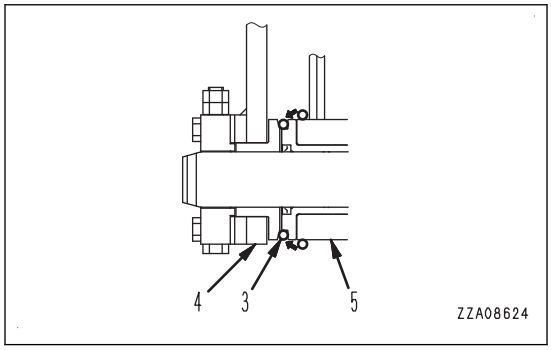


7. Install the grease applied pin (A) to the mounting part (1). Install the pin (B) to the mounting part (2).

   Attach the O-ring (3) to the mounting part (1) of the arm (5) and the bucket (4).

   Because the O-ring (3) is easily damaged, when you install the bucket (4), do the operations as follows.

   1) Put the O-ring (3) to the position on the arm (5) shown in the figure.
   2) After you insert the pins, put the O-ring (3) into the regular groove.



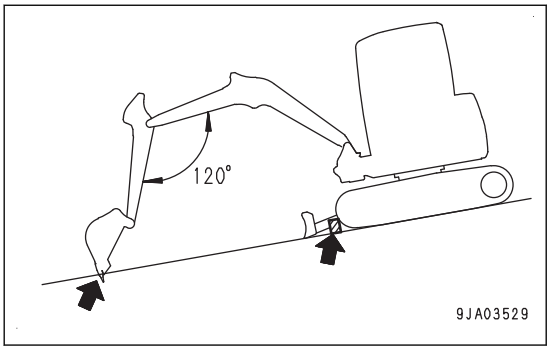
8. Install the stopper bolt and nut of each pin.
9. Supply grease to each pin.

   Supply grease sufficiently until grease protrudes from the shaft end.

How to Park Machine

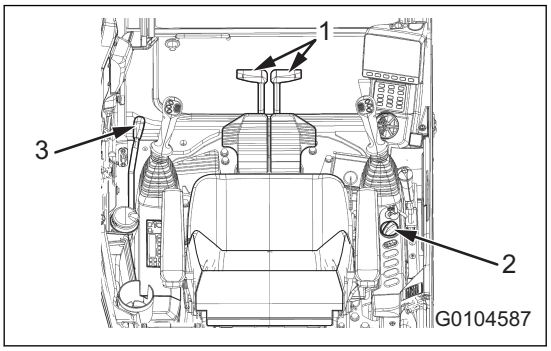
⚠ WARNING

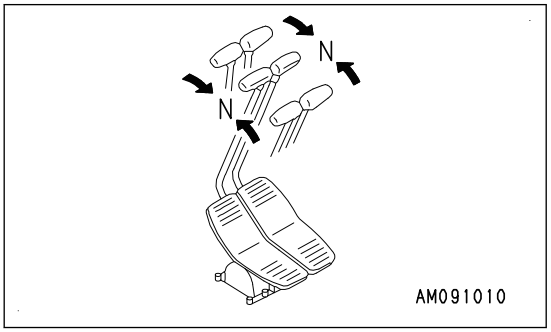
- **Park the machine on a firm, level ground. If you need to park the machine on a slope, lock the machine with safeguard to prevent the machine movement, and thrust the work equipment into the ground. This time, set the blade to the ground toward root side.**
- **Before you stand up from the operator's seat, be sure to set the lock lever to the LOCK position. If you touch the control levers by mistake when the lock lever is in the FREE position, there is a danger that the machine suddenly moves and causes serious personal injury or death.**



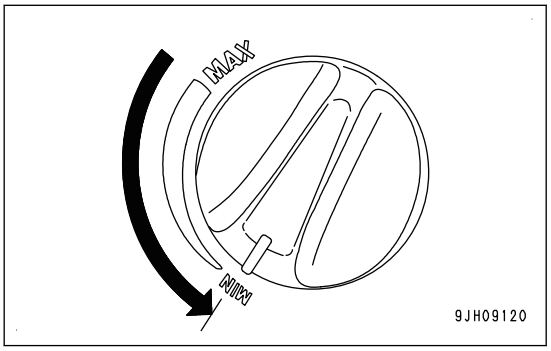
1. Set the R.H. and L.H. travel levers (1) in the NEUTRAL position.

   The machine stops.

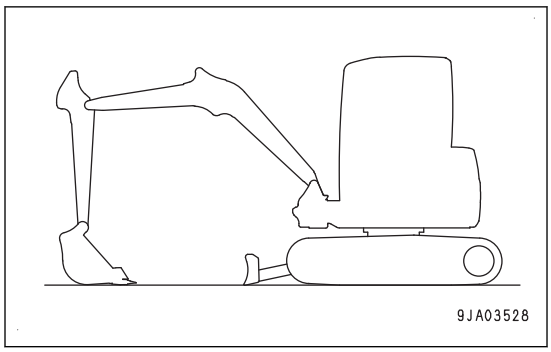




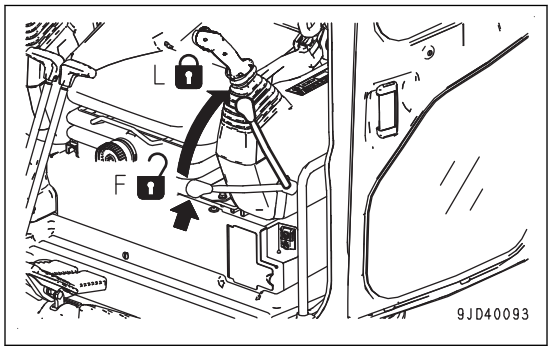
2. Turn the fuel control dial (2) to the Low idle (MIN) position to decrease the engine speed.



3. Align the directions of undercarriage and upper structure so that the bottom of the bucket is horizontal and grounded.
4. Lower the blade to the ground.



5. Hold the red part at the tip of the lock lever (3) to operate it, and set it to the LOCK position (L).



6. Measure the engine coolant temperature and the engine oil pressure with the machine monitor.
   - If the engine coolant temperature gauge is in the red range, cool down the coolant until the gauge goes in the green range, and stop the engine. Then see “Troubles and Procedures (3-236)” to do the inspection and remedy.
   - If the engine oil pressure caution lamp is lit, stop the engine immediately. And see “Troubles and Procedures (3-236)” to do the inspection and remedy.
7. Stop the engine.



If the operator's seat and console are in front position, move them rearward to keep a sufficient space to get off the machine.

How to Examine After You Complete Work

After the work is completed and the engine stopped, check and clean the machine.

1. Do the walk-around check to make sure of the items that follow.
   - No leakage of oil or water is found.
   - No abnormality is found on the work equipment, exterior parts, and undercarriage.
   - No collection of dust or flammable material is found.

   For details, see OPERATION, “Walk-Around Check (3-110)”.

   If a problem is found, repair it.
2. Fill up the fuel tank.
3. Remove dirt around the undercarriage.

Lock

Lock Position

Be sure to lock the parts that follow. Use the starting switch key to lock and unlock all these places.

(1) Operator's cab door

(2) Toolbox and grease pump storage cover

(3) Rear cover

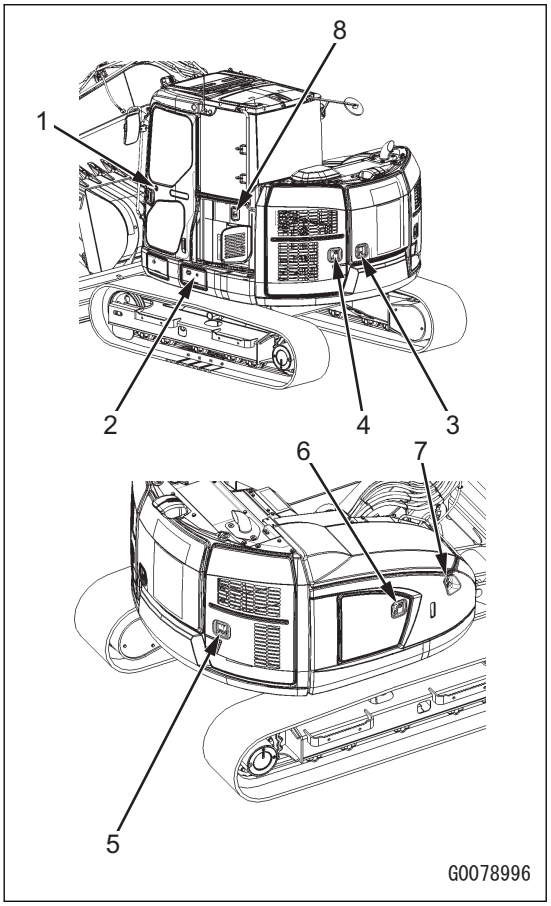
(4) Left rear cover

(5) Right rear cover

(6) Right side inspection cover

(7) Soil cover

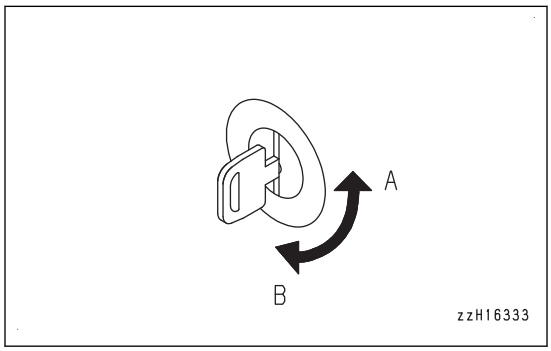
(8) Air conditioner fresh air filter storage cover



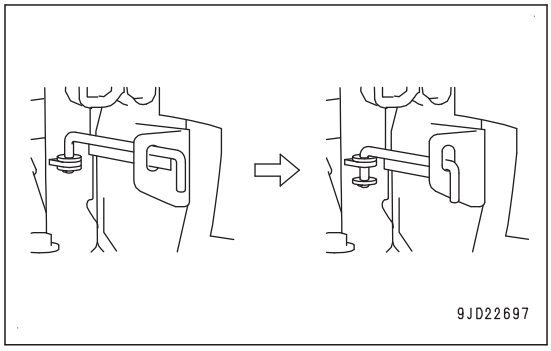
How to Open and Close Cover with Lock

Procedure to Open Cover with Lock

1. Insert the key into the key slot.
2. Turn the key counterclockwise and pull the cover handle.
   Position (A): OPEN (UNLOCK)
   Position (B): CLOSE (LOCK)

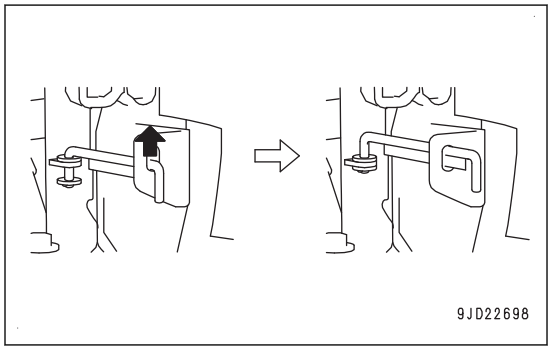


3. If there is a stay to support the cover, open the cover until the stay is put in the LOCK position.



Procedure to Lock Cover with Lock

1. If a stay for cover support is available, lift the stay from the LOCK position.
2. Close the cover and insert the key into the key slot.
3. Turn the key clockwise and remove it.



How to Open and Close Dirt Cover

⚠ WARNING

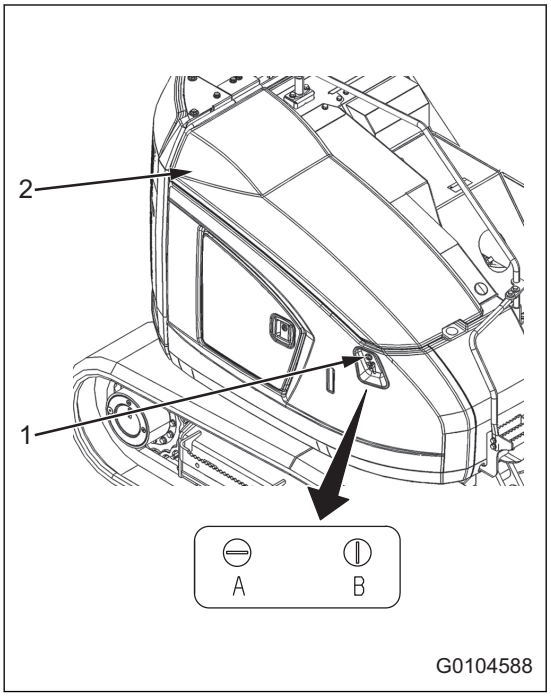
- **Do not stand on the dirt cover. There is a danger that you could slip and fall.**
- **Use the cover support lever always when you do inspection and maintenance on the inside of the dirt cover, and keep the cover open.**
- **Dirt cover must be closed when you operate the machine unless you do inspection.**

NOTICE

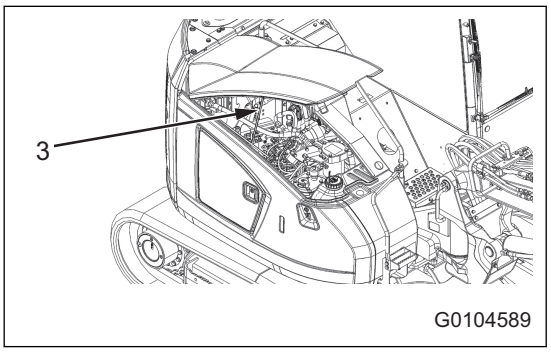
Always keep the cover locked unless you need to open it.
You can check whether it is locked or not by direction of the key groove of the open knob.

Procedure to Open Dirt Cover

1. Lower the work equipment to the ground, and stop the engine.
2. Insert the key into the key slot.
3. Turn the key counterclockwise (A), and remove it.
   Position (A): OPEN (UNLOCK)
   Position (B): CLOSE (LOCK)
4. While you lower the dirt cover open knob (1), hold the grip part of the cover, and open the cover (2).

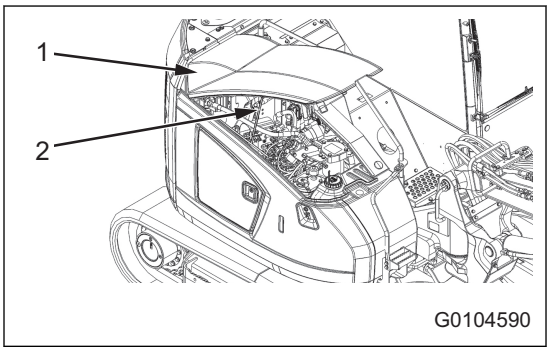


5. Fix the cover support lever (3) into the cover fixed position.



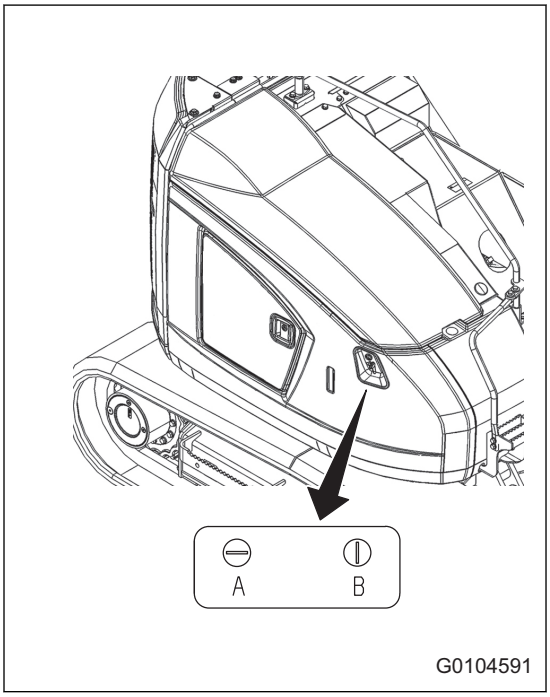
Procedure to Lock Dirt Cover

1. Hold the grip part of the cover (1), and remove the cover support lever (2) from the fixed position of cover.
2. Insert the cover support lever (2) into the slide position.
3. Put down the cover (1) slowly, push it to apply lock fully.



G0104590

4. Insert the key into the key slot.
5. Turn the key clockwise (B) and remove it.
   (A): OPEN
   (B): CLOSE



G0104591

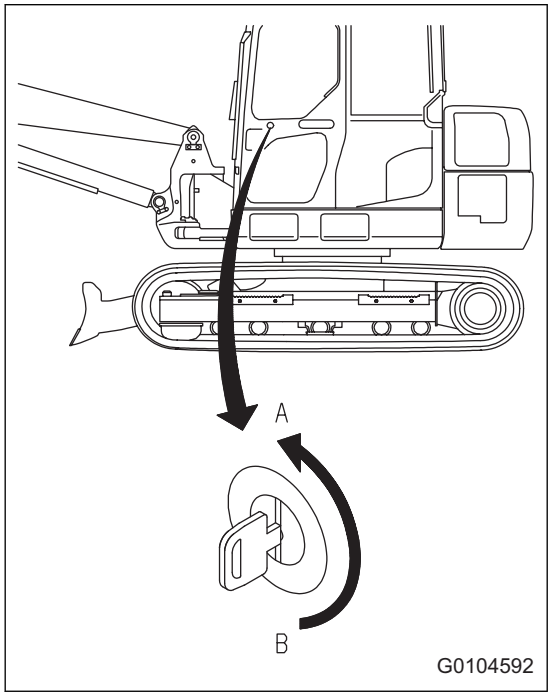
How to Open and Close Operator Cab Door

⚠ CAUTION

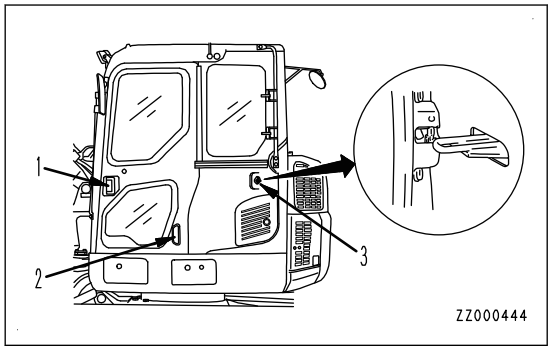
- **Park the machine on a flat ground when you open or close the door. Be very careful when you open or close the slide door if the machine is stopped on a slope. There is a danger that door opens and closes suddenly by its own weight.**
- **When you open or close the door, be sure to hold the door handle (1) and the knob (2).**
- **Be careful not to pinch your hand with the front pillar or the center pillar.**
- **Call out a warning before you open or close the door when there is anyone in the cab.**

Procedure to Open Operator Cab Door

1. Insert the key into the key slot.
2. Turn the key counterclockwise (A), and remove it.
   Position (A): OPEN (UNLOCK)
   Position (B): CLOSE (LOCK)

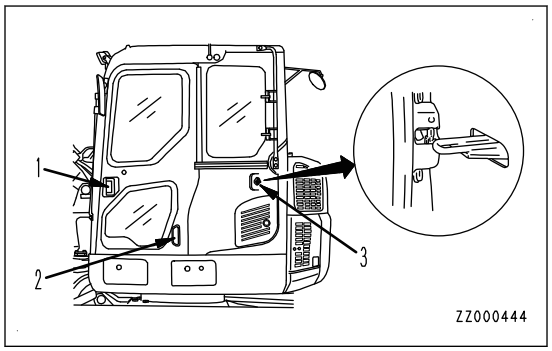


3. Hold the door handle (1) and the grip (2) to open the cab door.
4. Push the cab door against the door lock (3) and fix it securely.

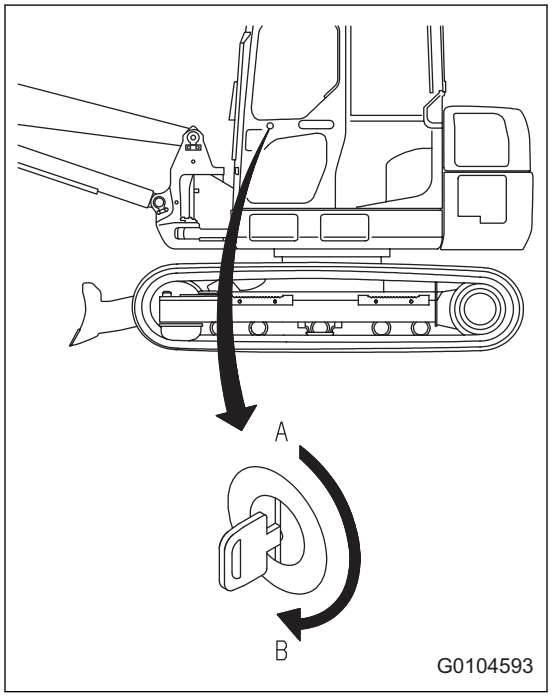


Procedure to Lock Operator CAB Door

1. Pull the door handle (1) rearward, and cancel the lock (3).
2. Hold the door handle (1) and the grip (2) to close the cab door.



3. Insert the key into the key slot.
4. Turn the key clockwise (B) and remove it.
   Position (A): OPEN (UNLOCK)
   Position (B): CLOSE (LOCK)



Handle Air Conditioner

⚠ WARNING

Do not let open flame be near them.

NOTICE

- **When you do the air conditioner running-in operation, start it while the engine is at low idle. Do not start the air conditioner while the engine runs at high speed. It can cause a failure on the air conditioner.**
- **If water goes into the control panel or sunlight sensor, it can cause a failure. Do not let water touch them.**
- **For the auto function of the air conditioner to work correctly, be sure to keep the sunlight sensor clean. Do not put things around the sunlight sensor that can prevent its sensor function.**
- Be sure to lubricate each part of components.
  When the air conditioner is not used regularly, operate the air conditioner while the engine is at low speed from time to time and do cooling or dry heating for some minutes.
- When the temperature in the cab is low, it is possible that the air conditioner cannot operate. Supply the recirculation air to warm the cab, and then push the air conditioner switch.
- If a problem is sensed in the equipment or sensor in the air conditioner, the air conditioner system caution lamp lights up on the monitor screen.

  If the caution lamp lights up, consult your Komatsu distributor for inspection and maintenance.



G0079005

Ventilation While Cooling

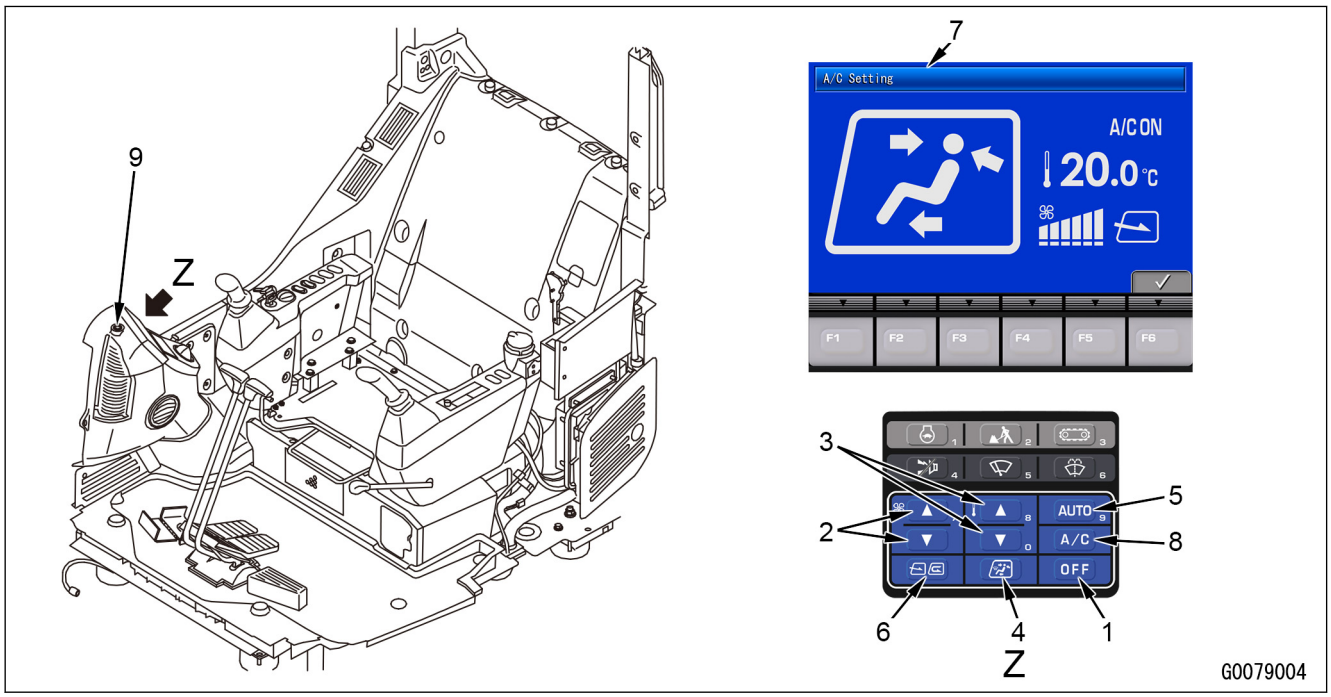
- When you operate the air conditioner for a long time, do ventilation and cooling approximately one time an hour.
- If you smoke while the air conditioner is on, the smoke can damage your eyes. Open the window and do ventilation and cooling to let smoke out.

Temperature Control

The cooling temperature is optimum for health when you feel moderately cool (5 to 6℃ {9 to 10.8℉} lower than the ambient temperature) as you go into the cab.

Be careful to select the correct temperature.

Air Conditioner Equipment



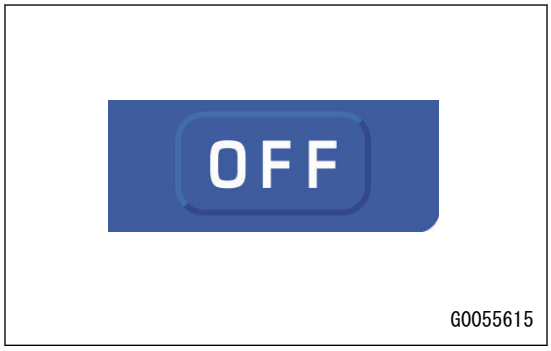
(1) OFF switch
(2) Fan switch
(3) Temperature control switch
(4) Vent selector switch
(5) Auto switch
(6) FRESH/RECIRC air selector switch
(7) Monitor
(8) Air conditioner switch
(9) Sunlight sensor

OFF Switch

The OFF switch is used to stop the fan and air conditioner.

REMARK

When the OFF switch is pushed, the monitor screen does not change to the air conditioner adjustment screen.

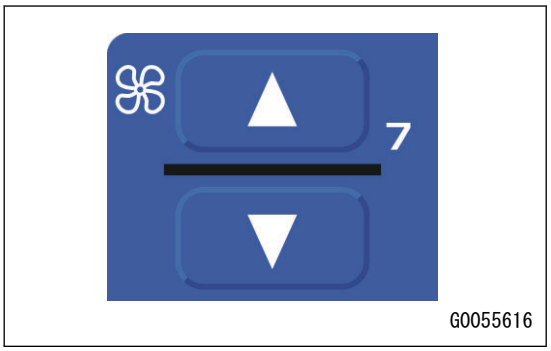


Fan Switch

The fan switch is used to adjust the air flow.

You can adjust the air flow to 6 levels.

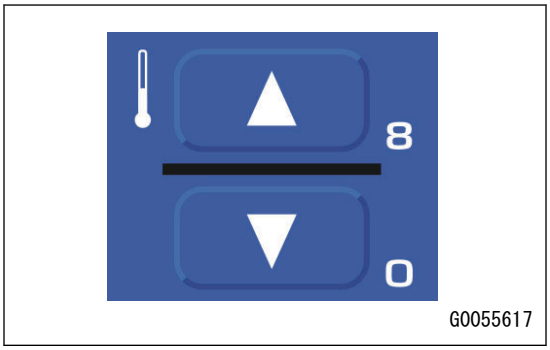
- Push the △ switch to increase the air flow.
- Push the ▽ switch to decrease the air flow.
- During automatic operation, the air flow is automatically adjusted.



Air Conditioner Display and Air Flow Rate

Monitor display	Air flow rate
	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



Use the temperature control switch to adjust the temperature in the cab.

You can set the temperature between 18 to 32 °C {64.4 to 89.6 °F}.

- Push the △ switch to increase the set temperature.
  Push the ▽ switch to decrease the set temperature.
  The set temperature is shown on the display monitor.
- Set 25 °C {77 °F} normally.
- The temperature can be set in the stages of 0.5 °C {0.9 °F}.

Monitor display and function

When the temperature is set to the minimum (18.0℃ {64.4℉}), the air flow is fixed to the maximum cooling temperature.

When the temperature is set to 18.5 to 31.5℃ {65.3 to 88.7℉}, the temperature in the cab is adjusted to the set temperature.

When the temperature is set to the maximum (32.0℃ {89.6℉}), the air flow is fixed to the maximum heating temperature.

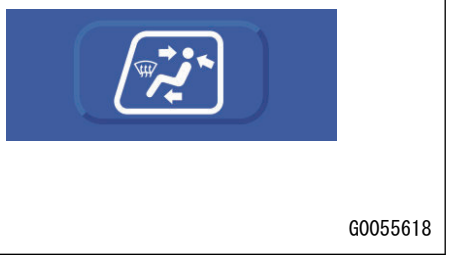
REMARK

If the temperature is set to 18.0°C {64.4°F} or 32.0°C {89.6°F} during automatic operation, the air flow of the fan is set to “HIGH” all the time, and it does not change even when the temperature in the cab reaches the set value.

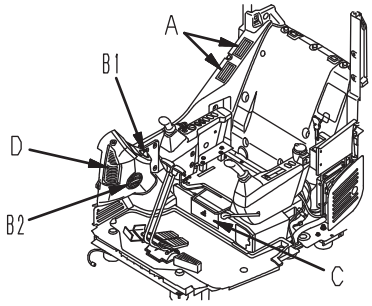
Vent Selector Switch

The vent selector switch is used to select the vents.

- When the vent selector switch is pushed, the liquid crystal display (LCD) on the monitor display changes and air blows out from the vents shown.
- During automatic operation, the vents are automatically selected.



(A) Rear vents (2 places)
(B1) Face vent (1 place)
(B2) Foot vent (1 place)
(C) Foot vent (1 place)
(D) Front window glass vents (2 places)



Monitor display	Air vent mode	VENT				Remarks
		(A)	(B)	(C)	(D)	
	Front and rear vents	○	○			-
	Front, rear and foot vents	○	○	○		-
	Foot vent			○		-
	Foot vent Defroster vent	○		○	○	Not selected during automatic operation
	Defroster vent	○			○	Not selected during automatic operation

Air blows out from the vents marked with ○.

Auto Switch

The auto switch is used to change the operation to the automatic operation.

It changes the air flow, vents, recirculated air, and fresh air automatically in accordance with the set temperature and the ambient environment.

- Normally, push this switch, and use the temperature control switch (1) to set the temperature. The air conditioner operates in automatic mode.
- When you change the operation mode from automatic to manual, operate each switch to select the air flow rate, vents, and air source (FRESH/RECIRC).



G0055619

REMARK

If the temperature is set to 18.0℃ {64.4℉} or 32.0℃ {89.6℉} during automatic operation, the air flow is set to “HIGH” all the time, but this is not a problem.



G0079007

Fresh/Recirc Air Selector Switch

Use the FRESH/RECIRC air selector switch to change the air source between recirculation of the air in the cab and intake of fresh air.

The air source automatically changes between recirculation of the air in the cab and intake of fresh air during the automatic operation.

RECIRC

Fresh air is blocked. Air in the cab is recirculated.

Use RECIRC when you cool down the cab quickly or when fresh air is contaminated.


G0055621

FRESH

Outside air is taken into the cab.

Use FRESH when you take fresh air into the cab or remove fog from the windshield.

Display Monitor

“A/C Setting” screen on the monitor shows the state of the temperature setting (a), the air flow rate (b), and the vents (c).

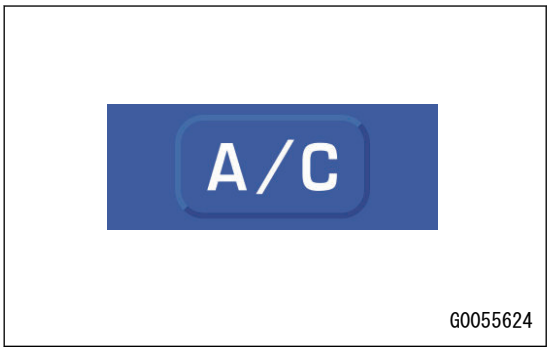
When the OFF switch is pushed, the display of the set temperature (a) and the air flow rate (b) goes off, and the operation stops.



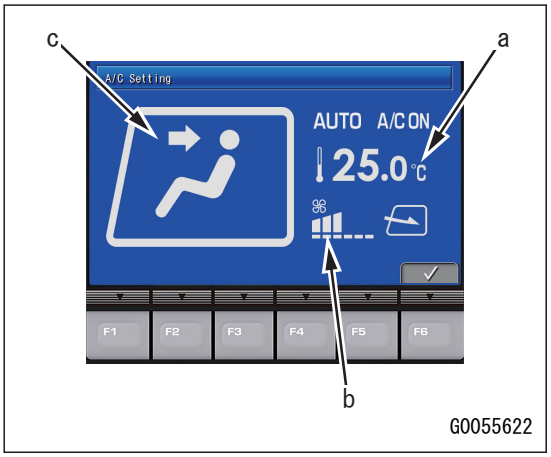
G0055622

Air Conditioner Switch

Use the air conditioner switch to turn on or off the cooling/dry heating function.



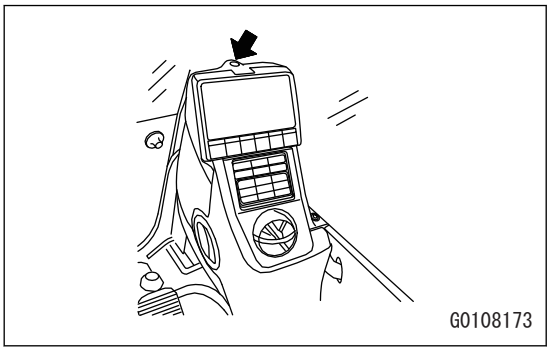
- When the fan is in operation (air flow level is shown on the air conditioner display), the air conditioner turns on or off each time the air conditioner switch is pushed.
- While the fan stops, the air conditioner does not operate.



Sunlight Sensor

The sunlight sensor senses the strength of the sunlight during automatic operation of the air conditioner . The sunlight sensor adjusts the air flow from the vents automatically against the strength of the sunlight.

It senses the changes in the temperature inside the cab caused by the sudden changes in the strength of the sunlight in advance, and automatically adjusts the air temperature from the vents.

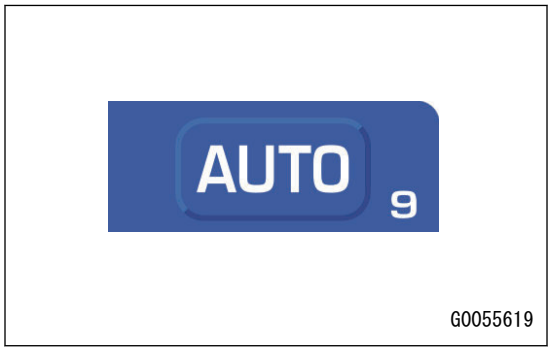


How to Operate Air Conditioner

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

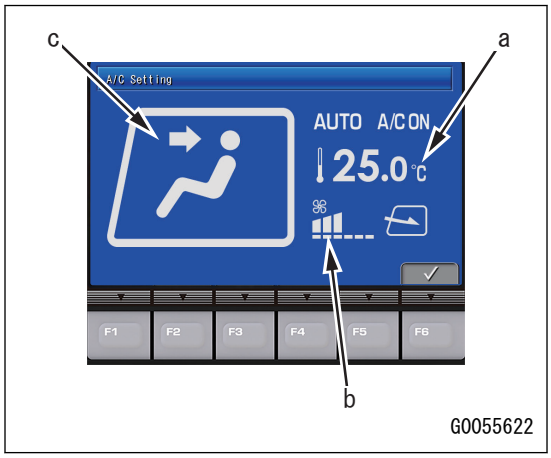
How to Use Automatic Operation

1. Push the Auto switch.



G0055619

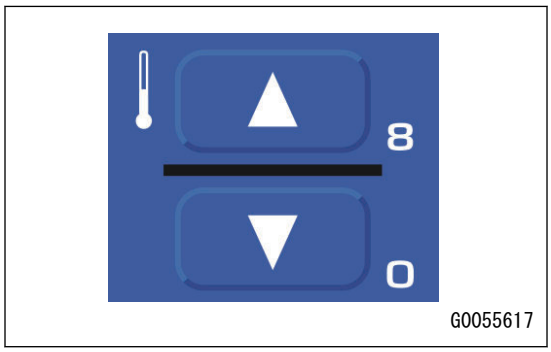
The set temperature (a) and the air flow rate (b) are shown on “A/C Setting” screen.



G0055622

2. Push △ or ▽ on the temperature control switch to set to the desired temperature.

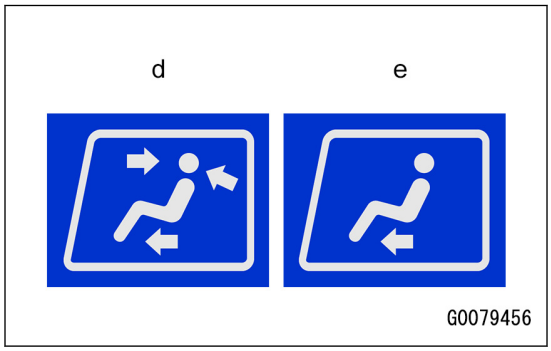
   The air flow rate, vents, and FRESH/RECIRC air are automatically selected in accordance with the set temperature and ambient environment, and the air conditioner operates automatically to provide the set temperature.



G0055617

REMARK

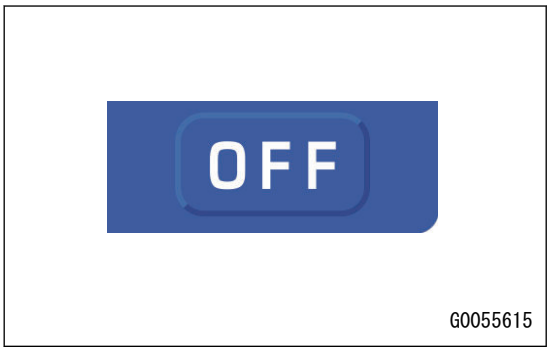
When the vent (c) display shows (d) or (e), and engine coolant temperature is low, the air flow rate is automatically controlled not to blow out cold air.



G0079456

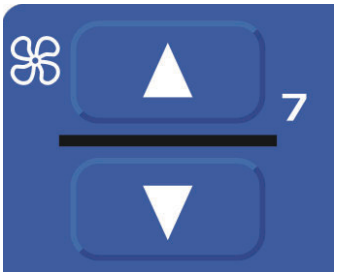
How to Stop Automatic Operation

Push the OFF switch.
The air conditioner stops.



How to Use Manual Operation

1. Push △ or ▽ on the fan switch to adjust the air flow.



G0055616

2. Check that the set temperature (a) and the air flow rate (b) are shown on “A/C Setting” screen of the monitor.



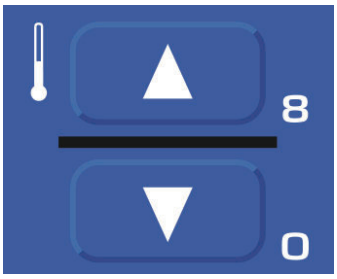
G0079474

3. Push the air conditioner switch.



G0055624

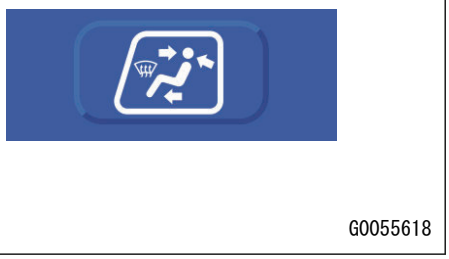
4. Push △ or ▽ on the temperature control switch to set to the desired temperature.



G0055617

5. Push the vent selector switch to select the vent.

   The display for the vent (c) of the “A/C Setting” screen on the monitor changes by the selection.



G0055618



G0079474

6. Push the FRESH/RECIRC air selector switch to select the recirculation of the air in the cab (RECIRC) or the intake of fresh air (FRESH).



G0055621

How to Stop Manual Operation

Push the OFF switch.
The air conditioner stops.

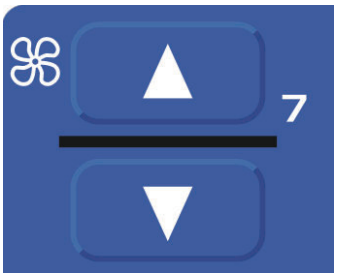


G0055615

Cold Air to Face and Warm Air to Feet

To blow cold air to the face and warm air to the feet, operate the air conditioner as follows.

1. Adjust the air flow with the fan switch.



G0055616

2. Check that the set temperature (a) and the air flow rate (b) are shown on “A/C Setting” screen of the monitor.



G0079474

3. Push the vent selector switch to set the display of the vent (c) as shown in the figure.



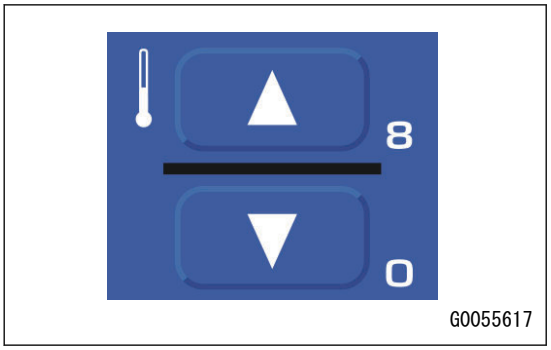
G0079457

4. Push the air conditioner switch to activate the dry heating function.



G0055624

5. Adjust the temperature with the temperature control switch.

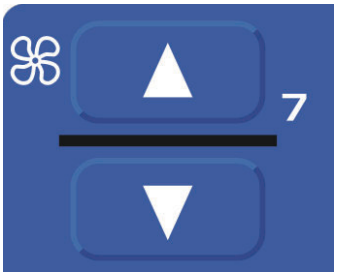


6. Use the FRESH/RECIRC air selector switch to select the recirculation of the air in the cab (RECIRC) or the intake of fresh air (FRESH).



How to Use Defroster

1. Adjust the air flow with the fan switch.



G0055616

2. Check that the set temperature (a) and the air flow rate (b) are shown on “A/C Setting” screen of the monitor.

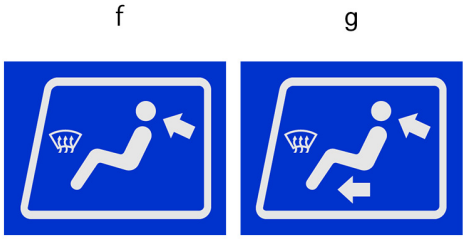


G0079474

3. Push the vent selector switch, and set the display of the vent (c) as shown in the figure (f) or (g).



G0055618

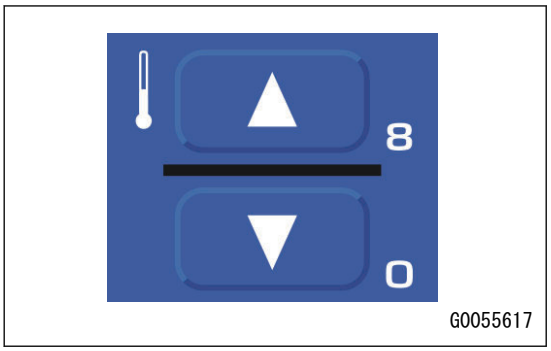


G0079458

4. Push the FRESH/RECIRC air selector switch and set the mode to FRESH.



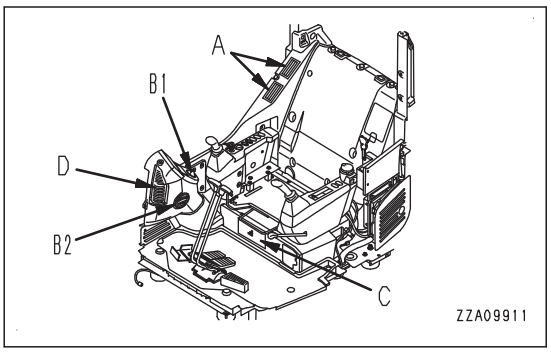
5. Push the temperature control switch to set the temperature to max. heating.



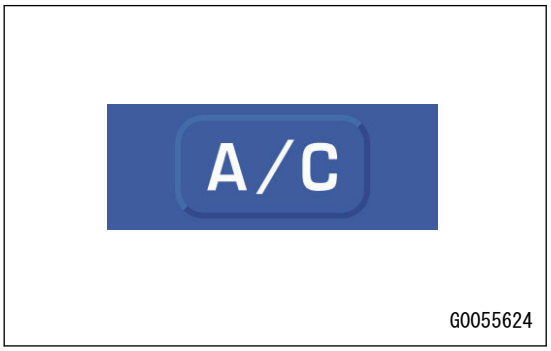
6. Adjust the vents (A), (B1), (B2) to let the air blow come to the window glass.

   REMARK

   The vents (C), (D) are fixed type.



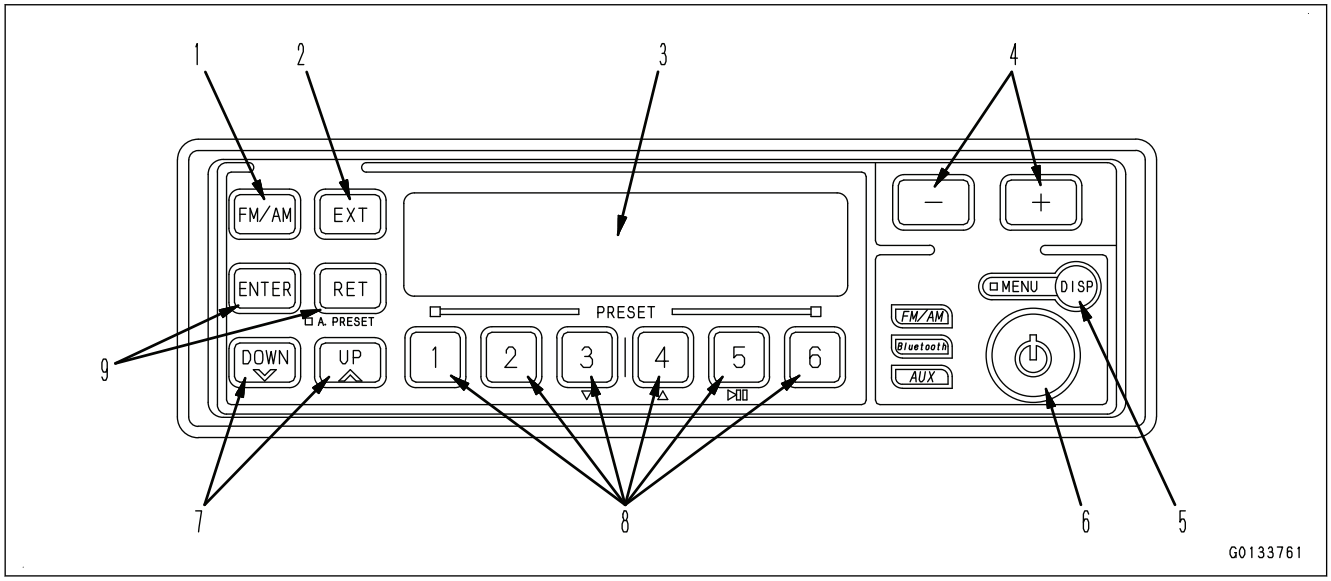
7. When you get the window clear or dehumidify it, push the air conditioner switch to activate cooling or dry heating.



Handle Radio

- To keep the safety, adjust the sound volume to a level where you can hear the external sounds.
- Do not splash the water on the speaker or radio. If water goes into them, it can cause a failure.
- Do not wipe the display or switches with solvent such as benzene or thinner. When you clean the display, use clean, dry, and soft cloth. Use a moderate cleaner if necessary.
- When the battery disconnect switch is set to the OFF position or the power for the machine is turned off for the work such as replacement of the battery, the clock can be initialized. In such case, set the clock again.

Explanation of Radio Equipment



(1) Radio band selector switch
(2) AUX selector switch
(3) Display
(4) Volume control switch
(5) Display selector switch
(6) Power switch
(7) Tuning/time setting switch
(8) Preset/audio switch
(9) Menu switch

Radio Band Selector Switch

You can select the desired band with the radio band selector switch.

The display changes in the order of FM1, FM2, and AM each time the radio band selector switch is pushed.

AUX Selector Switch

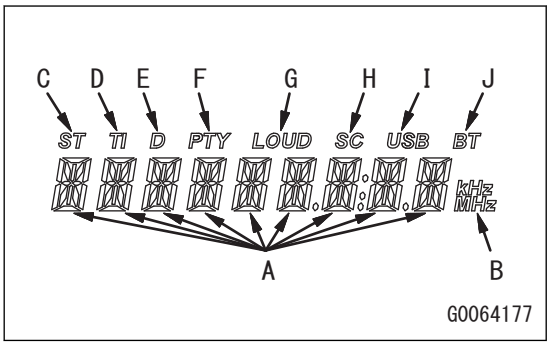
You can select the desired external source with the AUX selector switch.

The display changes in the order of Bluetooth®, AUX each time the AUX selector switch is pushed.

You cannot connect the AUX devices to this machine.

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Display



You can check the information that follow on the display.

(A) Source name, frequency, and other character/numeric information are shown.

(B) Unit of frequency is shown.

(C) Lights up when a stereo signal is received while FM1 or FM2 is selected.

(D) Not used

(E) Not used

(F) Not used

(G) Lights up when the loudness is set to ON.

(H) Not used

(I) Not used

(J) Lights up when the Bluetooth® connection is active.

Volume Control Switch

You can adjust the volume with the volume control switch.

The range of the volume is 0 to 32.

Push the (+) switch to increase the volume. Push the (-) switch to decrease the volume.

Hold down the volume control switch to change the volume continuously.

If the volume control switch is not operated for 5 seconds, the screen returns to the previous screen.

Display Selector Switch

You can change the contents of display with the display selector switch.

The display items changes by the selected source.

When FM1, FM2, or AM is Selected

The display changes in the order of the source name, frequency, and clock each time the display selector switch is pushed.

When Bluetooth® Connection is Selected

The display changes in the order of the Source Name and Clock each time the display selector switch is pushed.

Power Switch

Use the power switch to turn on or off the radio.

The radio turns on or off each time the power switch is pushed.

When the radio is turned on, the selected source is shown on the display.

When the radio is turned off, the clock is shown.

Tuning/Time Setting Switch

Use the tuning/time setting switch to do operations as follows.

- Selection of radio frequency
- Clock setting
- Sound adjustment
- Selection of each setting menu

Preset/Audio Switch

When the Radio Source is Selected

You can preset and select the radio station by the preset/audio switch.

It is possible to preset 6 stations each for AM, FM1, and FM2.

If you preset the desired radio stations, you can easily select each station with the switch.

When the External Source is Selected

You can control the audio device with the preset/audio switch.

Menu Switch

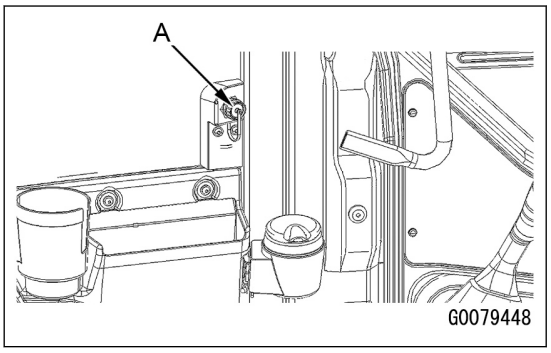
With the menu switch, you can enter each setting and go back to the menu selection.

USB Terminal for Charge

You can use the A-type of USB connector for the charging.

You can charge a smartphone and such with it.

Open the cap (A) at the position shown in the diagram. Connect the device.



Bluetooth®

By the pairing of the Bluetooth® audio player, you can connect the radio and play the music files.

For details, see “Pairing (3-214)”.

The Bluetooth® profiles below are supported.

- A2DP
- AVRCP

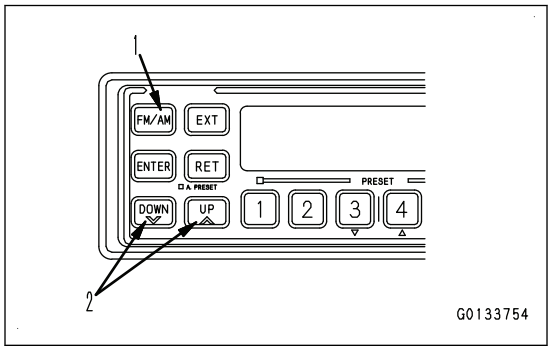
In some versions of the Bluetooth®, connection cannot be done.

Even if the Bluetooth® profile of the equipment is supported, the Bluetooth® connection cannot be done, or the display and actuation could be different by the characteristics and specifications of the destination equipment.

How to Operate Radio

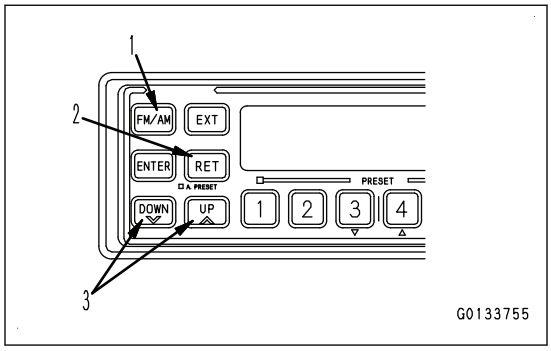
How to Operate Radio When You Listen

How to Adjust Frequency



1. Push the radio band selector switch (1) and select FM1, FM2, or AM.
2. Push the tuning/time adjustment switch (2) to adjust the frequency.
   - Push the UP switch to increase the frequency.
   - Hold down the UP switch to increase the frequency continuously.
     When the UP switch is released at this state, the tuning stops automatically at the frequency in good reception.
   - Push the DOWN switch to decrease the frequency.
   - Hold down the DOWN switch to decrease the frequency continuously.
     When the DOWN switch is released at this state, the tuning stops automatically at the frequency in good reception.

Auto Preset Setting

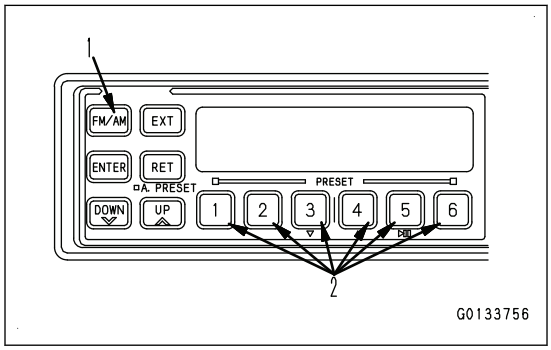


1. Push the radio band selector switch (1) and select FM1, FM2, or AM.
2. Hold down the RET switch (2) on the menu switch.

   Push the tuning/time setting switch (3) to cancel the sensing.

   When a frequency in good reception is sensed, it is automatically registered to preset memories 1 to 6.

How to Load Preset



1. Push the radio band selector switch (1) and select FM1, FM2, or AM.
2. Push one of the 1 to 6 switches of the preset/audio switch (2).

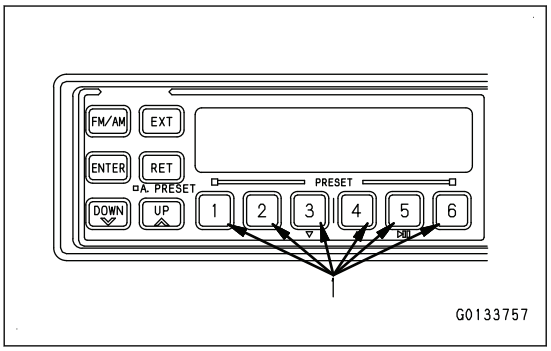
   The frequency registered in the preset number is called up and received.

   The preset number which is received and the frequency are shown on the display.

How to Preset Station

Hold down one of 1 to 6 of the preset/audio switches (1) during radio reception.
The preset number flashes 3 times, then the currently received frequency is shown.

The currently received frequency is registered to the selected preset number.



How to Play Music with Bluetooth® Connected

The situations that follow can occur by the device to connect or by the version of the Bluetooth®.

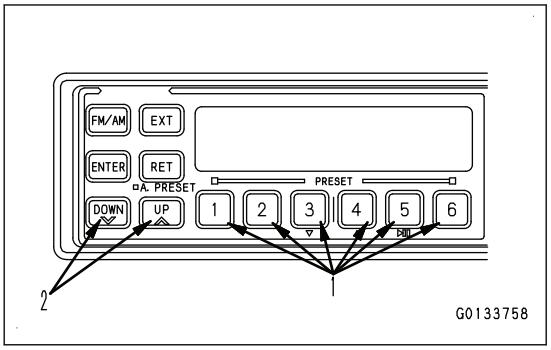
- Operation method is different.
- Action is different.
- Music cannot be played.

Do the pairing (Bluetooth® device authentication) to do the Bluetooth® connection.

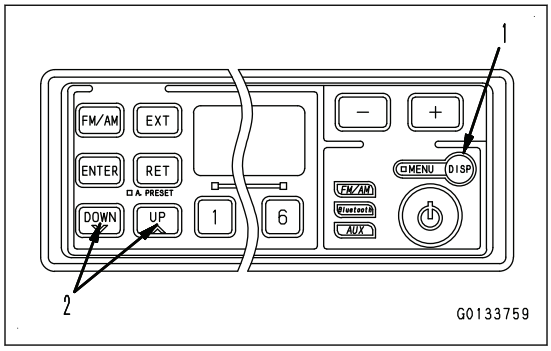
For details, see “Pairing (3-214)”.

When you do the Bluetooth® connection, operate it as follows.

- Push the 5 of the preset/audio switch (1) to play back or pause.
  The current track is played back or paused.
- Push the tuning/time setting switch (2) to move the track.
  The track moves.
- When you do the operations that follow, operate from the connected playback device.
  - Move folder
  - Change playback mode (Repeat or Random)



Radio Setting



1. Hold down the display selector switch (1) to move to the menu screen of the setting mode.
2. Push the tuning/time setting switch (2) to select the setting items.

   The setting items are different when the power supply is turned ON or OFF.

   - When the power supply is turned ON, the display changes in the order of Sound Balance adjustment, Treble adjustment, Bass adjustment, Loudness adjustment, Clock adjustment, Pairing (Bluetooth® device authentication), Destination display, and Version display.
   - When the power supply is turned OFF, the display changes in the order of Clock adjustment, and Pairing (Bluetooth® device authentication).

How to Adjust Sound Balance

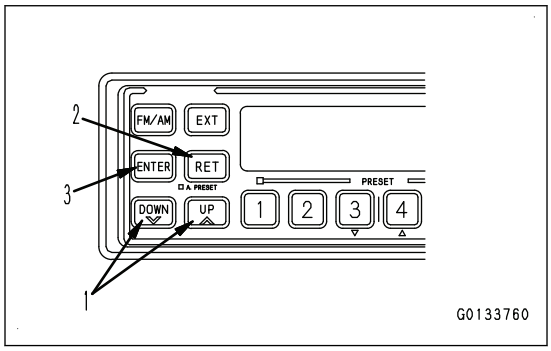
You can set it only when the power is turned on.

You can adjust the ratio of the right and left sound which is outputted from the speaker.

The default value is 0.

1. Change the screen to the menu screen of setting mode.

   For details, see “Radio Setting (3-211)”.



2. Push the tuning/time setting switch (1) and select “BALANCE”.
3. Push the ENTER (3) on the menu switch while “BALANCE” is shown.

   You can adjust the sound balance.
4. Push the tuning/time setting switch (1) to adjust the sound balance.
   - When the UP switch is pushed, the speaker output on the R side increases by 1.
     You can select from R1 to R10.
   - When the DOWN switch is pushed, the speaker output on the L side increases by 1.
     You can select from L1 to L10.
   - Push the RET (2) on the menu switch to return to the previous step.
5. Push the ENTER (3) on the menu switch to validate the adjusted value.

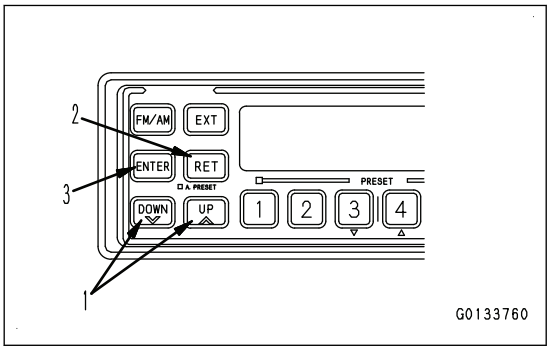
High Register Range (Treble) Setting

You can set it only when the power is turned on.

You can adjust the sound quality of the treble part which is outputted from the speaker.

The default value is 0.

1. Change the screen to the menu screen of setting mode.
   For details, see “Radio Setting (3-211)”.
2. Push the tuning/time setting switch (1) and select “TREBLE”.
3. Push the ENTER (3) on the menu switch while “TREBLE” is shown.
   You can adjust the level of high register range.
4. Push the tuning/time setting switch (1) to adjust the level of high register range.
   - When the UP switch is pushed, the treble level increases by 1.
     The maximum value is +10.
   - When the DOWN switch is pushed, the treble level decreases by 1.
     The minimum value is -10.
   - Push the RET (2) on the menu switch to return to the previous step.
5. Push the ENTER (3) on the menu switch to validate the adjusted value.



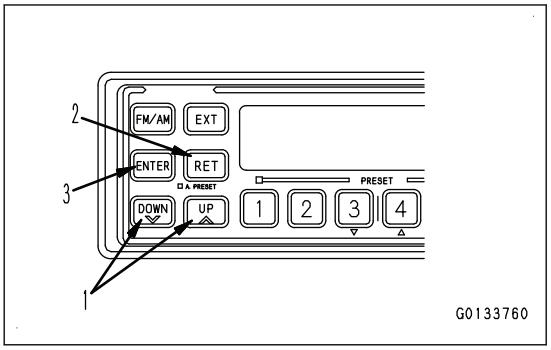
Low Register Range (Bass) Setting

You can set it only when the power is turned on.

You can adjust the sound quality of the bass part which is outputted from the speaker.

The default value is 0.

1. Change the screen to the menu screen of setting mode.
   For details, see “Radio Setting (3-211)”.
2. Push the tuning/time setting switch (1) and select “BASS”.
3. Push the ENTER (3) on the menu switch while the “BASS” is shown.
   You can adjust the level of low register range.
4. Push the tuning/time setting switch (1) to adjust the level of low register range.
   - When the UP switch is pushed, the bass level increases by 1.
     The maximum value is +10.
   - When the DOWN switch is pushed, the bass level decreases by 1.
     The minimum value is -10.
   - Push the RET (2) on the menu switch to return to the previous step.
5. Push the ENTER (3) on the menu switch to validate the adjusted value.



Loudness Setting

You can set it only when the power is turned on.

You can increase the low register range and high register range when the sound volume is low.

The default value is the OFF.

1. Change the screen to the menu screen of setting mode.

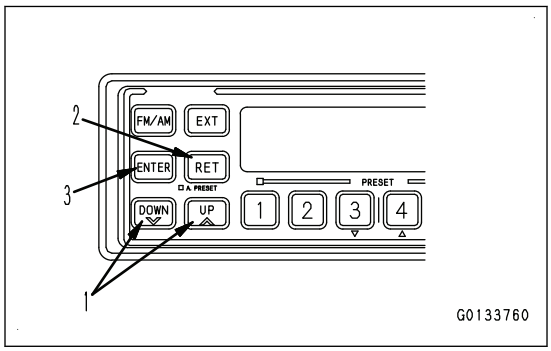
   For details, see “Radio Setting (3-211)”.

2. Push the tuning/time setting switch (1) and select “LOUDNESS”.

3. Push the ENTER (3) on the menu switch while “LOUDNESS” is shown.

   The loudness setting is available.

4. Push the tuning/time setting switch (1), and change the ON and OFF of the loudness setting.
   - When the loudness setting is the ON, the low register range and high register range are increased.
   - When the loudness setting is the OFF, the low register range and high register range are not increased.
   - Push the RET (2) on the menu switch to return to the previous step.



5. Push the ENTER (3) on the menu switch to validate the adjusted value.

Clock Setting

You can set it regardless of ON/OFF of power supply.

1. Change the screen to the menu screen of setting mode.

   For details, see “Radio Setting (3-211)”.

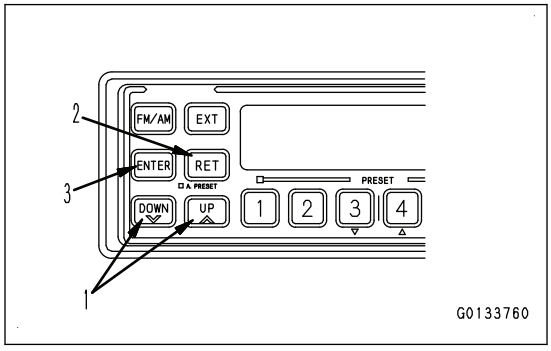
2. Push the tuning/time setting switch (1) and select “CLOCK”.

3. Push the ENTER (3) on the menu switch while “CLOCK” is shown.

4. Select 12-hour mode or 24-hour mode with the tuning/time setting switch (1), and push the ENTER (3) on the menu switch.

   Push the RET (2) on the menu switch to return to the previous step.

   The clock setting is available.



5. Push the tuning/time setting switch (1) to adjust the hour.
   - When the UP switch is pushed, “HOUR” display increases by 1.
   - When the DOWN switch is pushed, “HOUR” display decreases by 1.
   - Push the RET (2) on the menu switch to return to the previous step.

6. Push the ENTER (3) on the menu switch.

   You can adjust the minute display.

7. Push the tuning/time setting switch (1) to adjust the minute.
   - When the UP switch is pushed, “MINUTE” display increases by 1.
   - When the DOWN switch is pushed, “MINUTE” display decreases by 1.
   - Push the RET (2) on the menu switch to return to the previous step.

8. Push the ENTER (3) on the menu switch to validate the time.

Pairing

You can set it regardless of ON/OFF of power supply.

It is an authentication of the Bluetooth® device which is used on this machine.

The maximum registration of the pairing is 16. From the 17th and after, the oldest information is overwritten by the newest one. If the information was overwritten and you cannot connect it, do the pairing again.

1. Change the screen to the menu screen of setting mode.

   For details, see “Radio Setting (3-211)”.

2. Push the tuning/time setting switch (1) and select “PAIRING”.

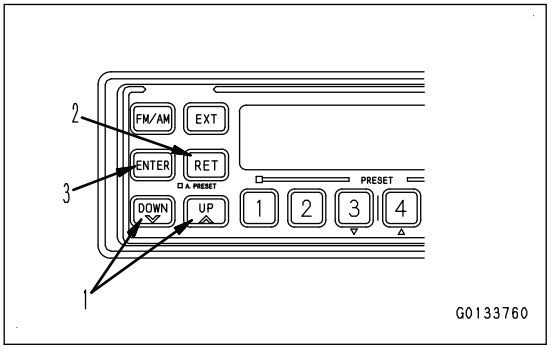
3. Push the ENTER (3) on the menu switch while “PAIRING” is shown.

   “PUSH ENT” is shown.

4. Push the ENTER (3) on the menu switch.

   “WAIT” is shown.

   When the preparation is completed, the pass key (4 digits) and the serial number (4 digits) of the Bluetooth® on radio side are shown alternately.



5. Do the pairing on the side of the device to connect, in this state.

   For the operation, obey the instruction manual of the device to connect.

   In some cases, a pass key can be required by the device to be connected. At this time, input the pass key which is shown on the radio.

   - When the pairing is done successfully, “PAIR OK” is shown.
   - If there is no response for 180 seconds, “TIMEOUT” is shown.

6. Push the RET (2) on the menu switch and go back to the menu screen.

   If “TIMEOUT” is shown, do the procedure from the start again.

How to Examine Preset Region of Radio

You can set it only when the power is turned on.

You can check the region of the radio frequency band.

1. Change the screen to the menu screen of setting mode.

   For details, see “Radio Setting (3-211)”.

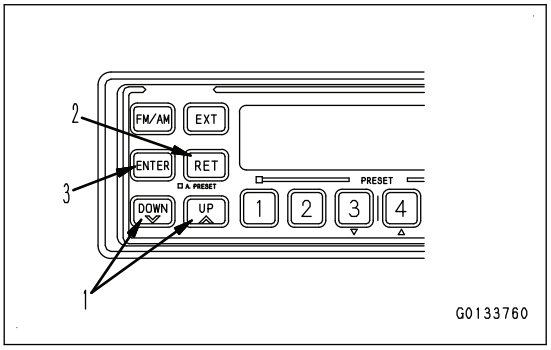
2. Push the tuning/time setting switch (1) and select “REGION”.

3. Push the ENTER (3) on the menu switch while “REGION” is shown.

   The set value of the region is shown.

   The main regions are as follows.

   - JP: For Japan
   - AE: For Europe, Asia, Oceania
   - US: For North America
   - SA: For Central and South America



4. Push the RET (2) on the menu switch and go back to the menu screen.

How to Examine Version of Radio

You can set it only when the power is turned on.

You can check the version of radio.

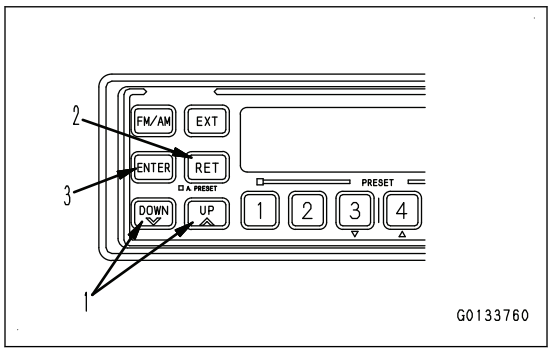
1. Change the screen to the menu screen of setting mode.

   For details, see “Radio Setting (3-211)”.

2. Push the tuning/time setting switch (1) and select “VERSION”.
3. Push the ENTER (3) on the menu switch while “VERSION” is shown.

   The version is shown.

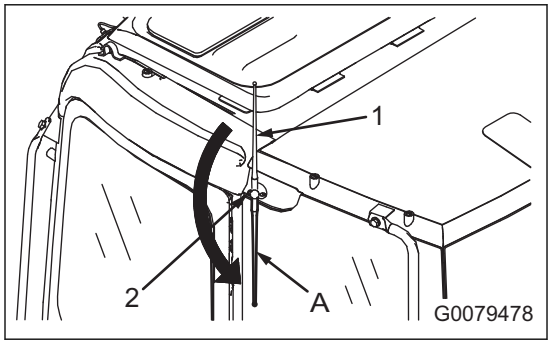
4. Push the RET (2) on the menu switch and go back to the menu screen.



Stow Antenna

Before the transportation of the machine or storage in a building, stow the antenna to prevent interference.

1. Loosen the bolt (2) of the antenna (1), and make it in the stow position (A).
2. Tighten the bolt (2) to fix the antenna (1).



Handle Road Liners and Rubber Shoes

(Road liner, rubber shoe specification)

Recommended Use

The road liner and the rubber shoe have superior features which the steel shoe does not have. If you use the rubber shoe in the same manner as the steel shoe, you cannot make the most of the features of the rubber shoe.

Do the optimum operation according to the condition of the site and contents of work.

Compare of Road Liners, Rubber Shoe and Steel Shoes

◎: Very good, ○: Good, △: Average

	Road liner	Rubber shoe	Steel shoe
Less vibration	◎	◎	△
Smooth travel (No creak)	○	◎	○
Small sound	◎	◎	△
No damage to pavement	◎	◎	△
Easy to handle	△	◎	△
Resistant to damage	○	△	◎
Large traction force	◎	◎	◎

The road liner and the rubber shoe demonstrate many advantages from the performance unique to their material, but have weakness in strength. Please fully understand the features of the road liner and the rubber shoe. By preserving the prohibited work and the precautions for handling, you can extend the service life of the road liner and the rubber shoe and maximize their advantages.

Guarantee for Road Liner and Rubber Shoes

Komatsu is not responsible for damages caused by the uses shown below that are not written in the Operation and Maintenance Manual.

- If the prohibited work and the precautions for handling are not preserved.
- If the check and maintenance for the track tension were not sufficiently done.
- For the work at worksite where the rubber shoe can be cut up as shown below.
  - Corners of iron plates, U-shaped grooves, and blocks
  - Corners of quarries or rocks
  - On reinforcing bars and steel debris

Precautions When You Use Roadliners and Rubber Shoes

Prohibited Operations

Do not do the work that follows.

- The work and swing in the areas that follow can cause damage to the road liner and rubber shoes.
  - Quarry ground
  - Hard rock-bed with large unevenness
  - On reinforcing bars and steel debris
  - Around edges of iron plates

- In areas such as riverbed where there are many large and small boulders, stones can be caught in the road liner or rubber shoes, and it will cause damage to them or make the rubber shoes easily run off. If the machine is used for dozing forcibly while the shoes slip, the service lives of the road liner and the rubber shoes are shortened.
- Take care that oil, fuel, or chemical solvent does not stick to the road liner and the rubber shoes. If one of them sticks, wipe it off immediately. Also, if oil, fuel, or chemical solvent has accumulated on the road surface, do not travel on it.
- When you store the machine for a long period (3 months or more), store it indoors to avoid direct sunlight and rain.
- Do not move the machine into a high temperature area such as a bonfire, steel plate exposed to the hot sun, newly spread asphalt, etc.
- If you lift the track on one side off the ground with the work equipment and move with the other track, it will cause a rubber shoe to come off or a damage.
- If the rubber of the road liner is worn or damaged and the head of the mounting bolt is scratched, replace the shoe with a new one. If the head part is crushed, it will not be possible to do removal and installation of the bolt.
- When you install the road liner, install it on all links on the right and left. If it is installed only partially, the durability will be significantly reduced.

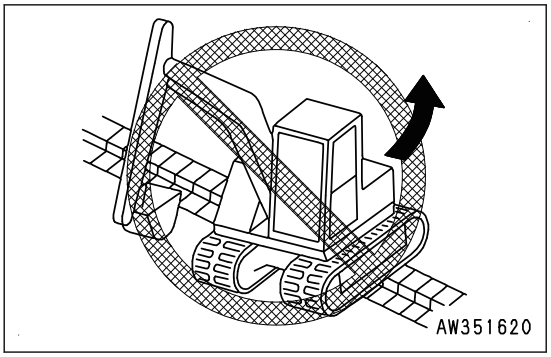
Precautions

Do the operation according to the precautions that follow.

- Do not make a pivot turn on a concrete road because rubber marks are made on the road surface.
- Avoid sudden changes of direction to travel as much as possible. Such sudden changes can cause early wear and chipping of the road liner and rubber shoe.
- Avoid turns at an area with a large level difference.
  Ride over level differences at an angle nearest to 90 degrees to not let the rubber shoes come off.
- If you used the work equipment to raise the machine, lower it slowly.
- Avoid crushed and oily materials (pomace of soybeans, corn, rapeseed, etc.), or wash the machine with water after the work.
- When the salt, ammonium sulfate, potassium chloride, potassium sulfate, or double superphosphate is used as the object material, it can cause a bad effect on the adhesion of the cored bar. Avoid the use of these material, or wash the machine with water after the work.
- Avoid operations near coasts. Salt content can affect the adhesion of the core metals.
- When the road liner or rubber shoe has a deep scratch, repair the rubber's chipped part. When you handle food such as salt, sugar, wheat, and soy beans, the chipped rubber like lug can be mixed in.
- Do not rub the road liner and the rubber shoes against obstacles such as concrete ridges and walls.
- The road liner and the rubber shoes are very slippery on wet steel plates, snow-covered or frozen road surfaces, or clay soil.
  Be careful not to slip when you travel on a face of slope or do the work on a slope.
- If the road liner and the rubber shoes are used in a very cold district, their characteristics change and their service lives are shortened accordingly.
- Use the road liner in a range from -25 to 65℃ {-13 to 149℉}.
  Use the rubber shoes in a range from -25 to 55℃ {-13 to 131℉}.
- Be careful not to cause damage to the road liner and the rubber shoes with the bucket during operation.
- Keep the proper rubber shoe tension at which the rubber shoes do not come off the rollers.
  When the rubber shoe tension is loose in the conditions that follow, the rubber shoes can sag and come off.
  Even if the rubber shoe tension is correct, the rubber shoes can sag in such conditions, be very careful when you steer the machine.

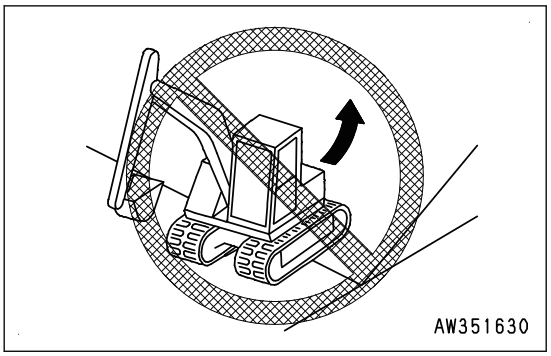
1. Do not steer the machine on curb stones or rocks where there are level differences (approximately 20cm {7.9in} or more).

   Ride over a level difference at a right angle.



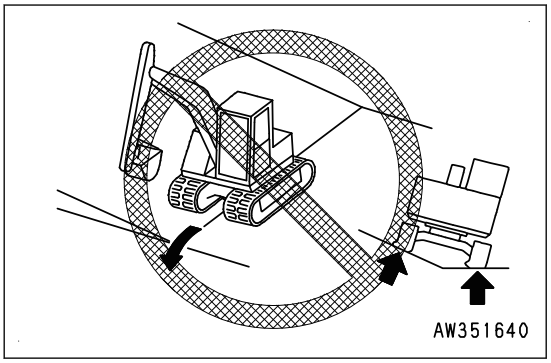
2. When you travel uphill in reverse, do not steer and climb at the point where the ground changes from flat to inclined.

   If you must steer while you climb, steer slowly.

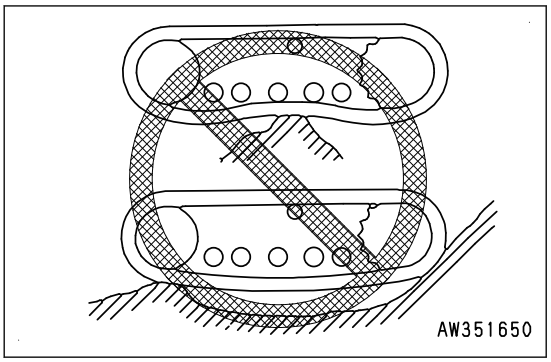


3. Do not travel with either track raised on a slope or convex ground surface (with the machine leaning approximately 10° or more) and the other track on the level ground.

   Travel with two tracks on the same level to protect the road liner and the rubber shoes from damage.



4. Avoid steering operation when the track is in the condition shown in the figure.



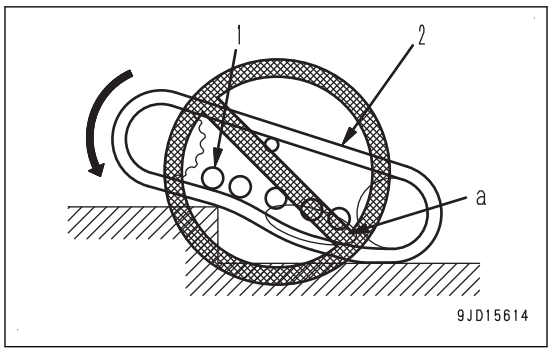
Mechanism that Causes Rubber Shoe to Come Off

The rubber shoe comes off in the cases that follow.

- When the machine travels in reverse and rides over a level difference.

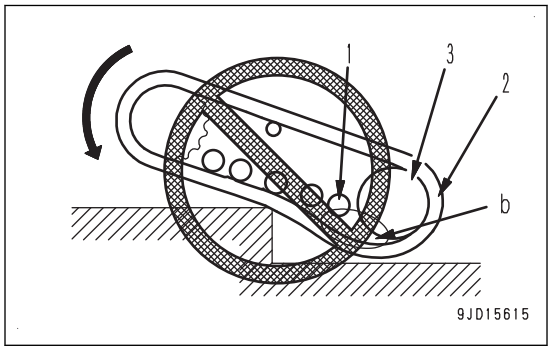
1. Clearance (a) is made between track rollers (1) and rubber shoes (2).

   Rubber shoe (2) can come off even under this condition.

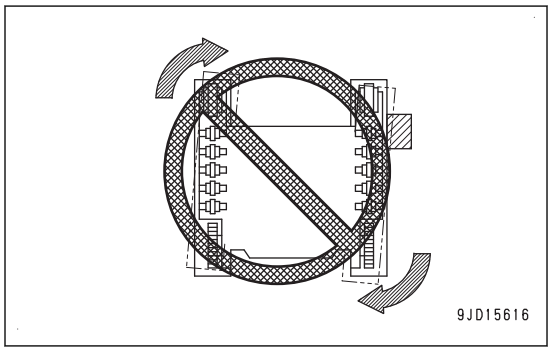


2. When the machine travels further in reverse, clearance (b) is made between track roller (1), idler (3), and rubber shoe (2).

   Rubber shoe (2) comes off under this condition.



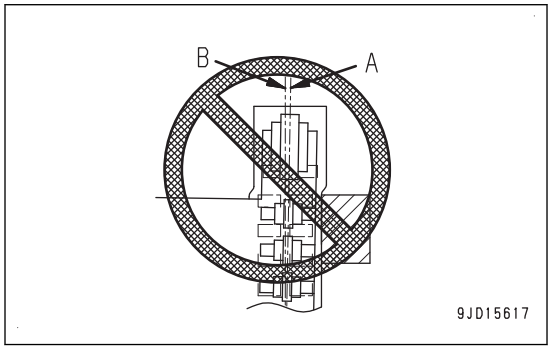
- When steering is done with an obstacle on the side of the rubber shoe.



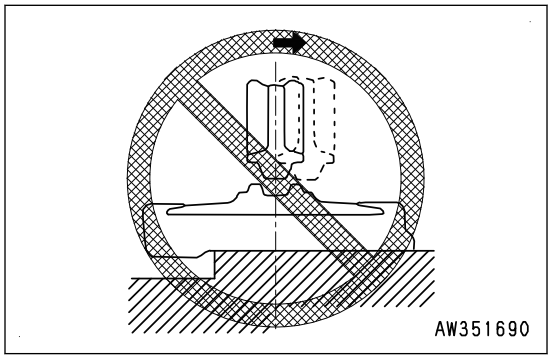
- When the idler or track rollers deviate from the core metal because of misalignment of the rubber shoes.

  (A) Frame side

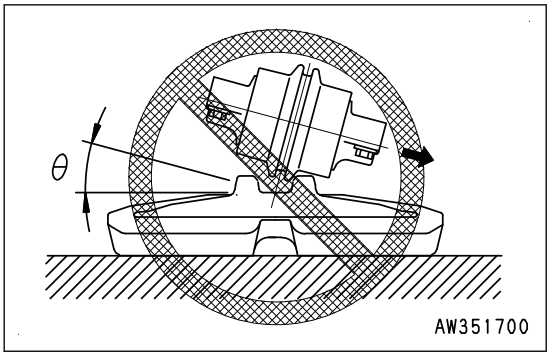
  (B) Rubber shoe side



- When the machine travels in reverse with idler under the condition shown in the figure.



- When the machine turns with track roller under the condition shown in the figure.



Transportation

Obey the related laws and regulations, and transport the machine safely.

Transportation

When you transport the machine, select the transportation method in reference to the weight and dimensions shown in “Specifications (5-2)”.

Be careful that the weight and dimension can be different by the type of track or arm, etc.

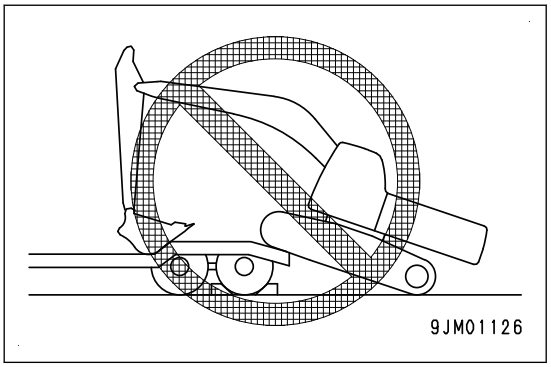
Load onto and Unload from a Trailer

Precautions When You Load and Unload

⚠ WARNING

Always obey the items below when you do loading or unloading operation.

- **Do the work on a firm and level area.**
- **Keep a sufficient distance from the road shoulder.**
- **Be sure to turn off (cancel) the auto-deceleration switch. If the auto-deceleration switch is ON and you operate the machine, the machine starts suddenly in some cases.**
- **Before you load or unload the machine, let the machine be in the state that follows.**
  - **Set the travel speed to low speed (Lo) and set the engine speed to low idle.**
  - **Do the warm-up operation until the engine's revolution becomes stable.**
- **Travel with low speed when you load or unload the machine.**
- **Always use ramps. It is dangerous to use the work equipment for loading and unloading operations.**
- **Do not change the direction on the ramps. If you change the direction, the machine can fall over. Go back to the ground from the ramps, or go back onto the trailer platform and correct the direction.**
- **On the ramps, do not operate the levers other than the travel lever.**
- **Slowly travel over the border of the ramps and the trailer. The gravity center of the machine can suddenly move to cause the machine to fall over.**



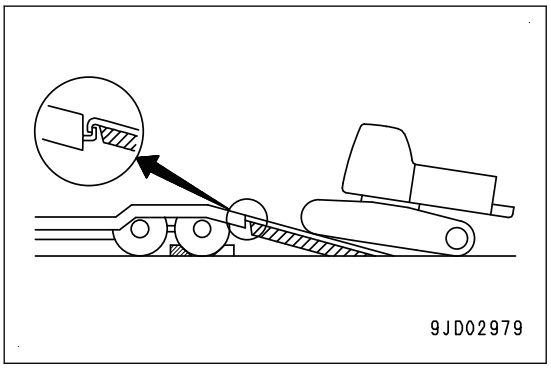
- **If it is necessary to swing the upper structure on the trailer platform, because the footing is not stable, be careful not to let the machine fall over. When the work equipment is installed, the machine is not stable. Slowly swing the upper structure with the work equipment pulled in.**
- **Allocate a signalman to give guidance not to let the machine come off the ramps. Be careful of the safety.**
- **Be sure to keep the cab door fixed at the opened state or closed state.**

Precautions for Ramps and Platform

⚠ WARNING

Always obey the items below for the ramps and platform.

- **Select ramps with allowable width, length, thickness, and strength. Be sure to fix the ramps to the trailer to keep its slope at 15° or less.**
- **When piled soil is used for the platform, compact the piled soil fully to prevent breakage of slope face.**
- **Before the loading or unloading, clean the machine's undercarriage and the ramps to prevent a sideways slip. Oil, mud, ice, or snow around the machine's undercarriage or on the ramps is dangerous because it causes slippage.**



- **Do not open or close the cab door on the ramps or platform. There is a danger that door opens and closes suddenly by its own weight.**

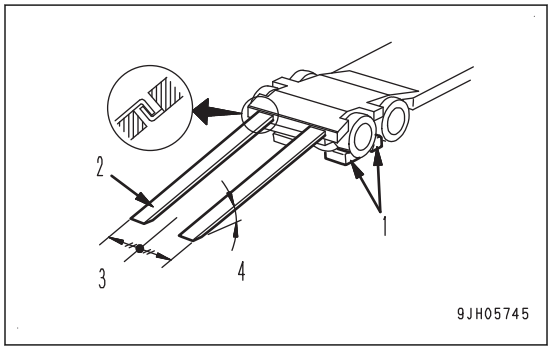
Procedures to Load Machine

1. Park a trailer on a flat and firm ground.

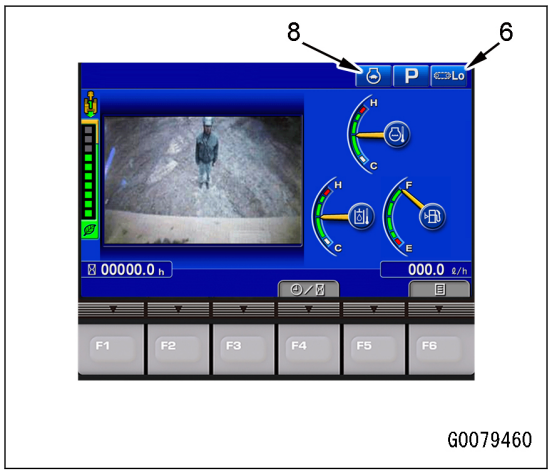
   Keep a sufficient distance from the road shoulder.
2. Apply the brake of the trailer.
3. Put the chocks (1) on the tires to fix the trailer not to move.
4. Fix the ramps (2) to the trailer as follows.
   - Set the ramps parallel and equally distant from the center of the trailer (3).
   - Keep the installation angle (4) at 15° or below. Do not allow the ramps to come off during the work.
5. If the ramps (2) bend largely by the weight of the machine, put the block such as wooden block under the ramps.

   It prevents the deflection of the ramps (2).
6. Set the travel speed to the low speed (“Lo” is lit).

   Push the travel speed selector switch (5) to set the travel speed. The travel speed (“Lo”, “Hi”) is shown on the travel speed display (6).
7. Set the auto-deceleration switch (7) to the OFF position, and turn the fuel control dial to reduce the engine speed.
   - Each time you push the auto-deceleration switch (7), it changes from OFF to ON, from ON to OFF in turn.
   - When you set the auto-deceleration switch (7) to the OFF position, the auto-deceleration pilot lamp (8) goes off.

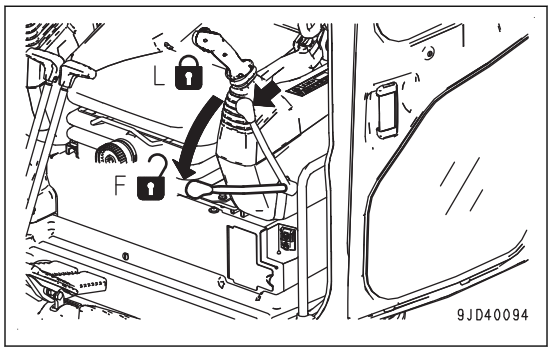






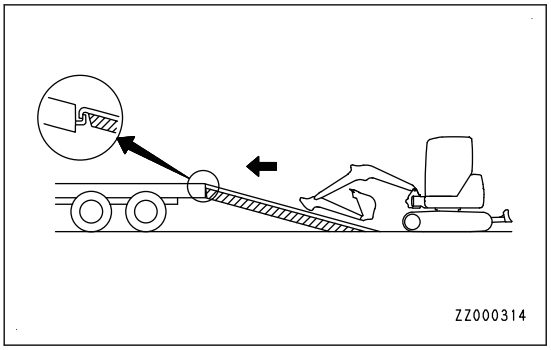
8. Set the lock lever to the FREE position (F).

   Be sure to operate the lock lever by the operating part on the top.



9. Operate the work equipment control lever to swing the upper structure until the work equipment is on the front side and the blade is on the rear side.

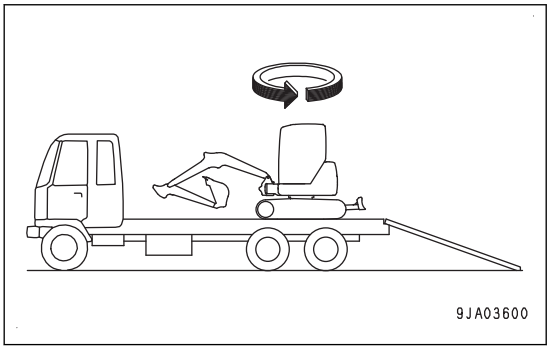
   At this time, make the undercarriage parallel with the upper structure.



10. Check that the machine is in the conditions that follow before it rides on the ramps.
    - The position of the machine is straight to the ramps.
    - The centers of the machine and the trailer are aligned.
11. Lower the work equipment as much as possible.

    Have the height of the work equipment in the range that does not interfere an obstacle.
12. Set the travel direction toward the ramps and drive slowly.

    On the ramps, do not operate the levers other than the travel lever.
13. After the machine rides on the platform of the trailer, stop the machine.
14. Operate the work equipment control lever to slowly swing the upper structure by 180°.



15. Travel in reverse carefully to the specified position on the trailer, and then stop the machine.

How to Secure Machine

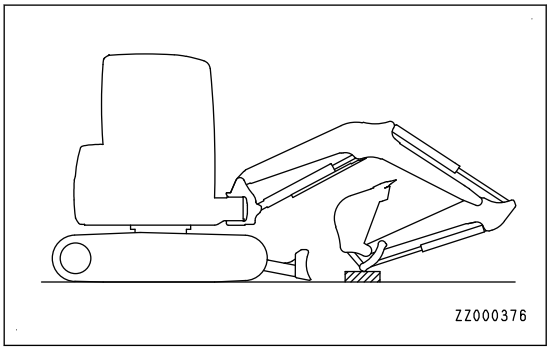
NOTICE

Put a wooden block below the tip of the bucket link to prevent contact of the bucket cylinder with the floor. If the bucket cylinder gets in contact with the floor during transportation, damage can occur.

After the machine is loaded onto the trailer, secure the machine as follows.

1. Set the machine in the posture shown in the figure.
   1) Operate the blade control lever to lower the blade to the ground.
   2) Operate the work equipment control lever to fully extend the bucket cylinder and the arm cylinder.
   3) Operate the work equipment control lever to lower the boom carefully.
   4) Put a wooden block below the tip of the bucket link.

      Prevent contact of the bucket cylinder with the floor.

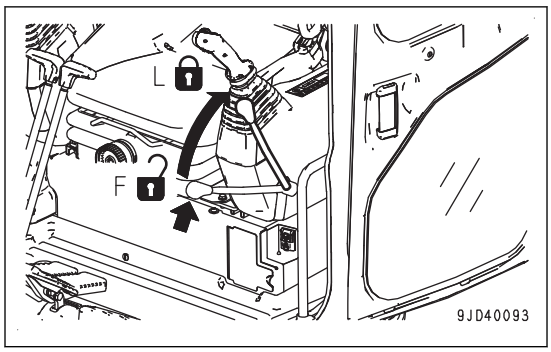


5) Set the lock lever to the LOCK position (L).

Be sure to operate the lock lever by the operating part on the top.

6) Stop the engine.

7) Remove the starting switch key.



2. Close all the doors, windows, and covers.
3. Stow the antenna.

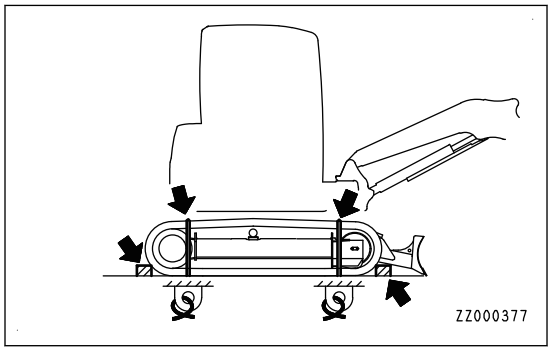
   For the procedure to stow the antenna, see “Stow Antenna (3-215)”.
4. Assemble the mirrors again to make them set in the width of the machine.
5. Lock all the doors, covers and caps that have locks.
6. Secure the machine.

   Select the way to secure the machine according to the local transportation form.

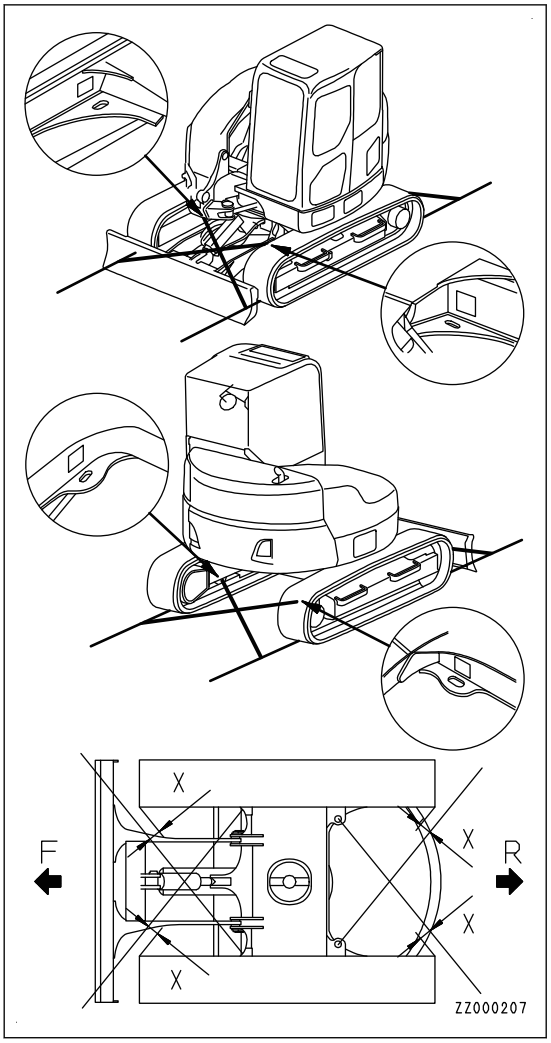
   • Method to secure the machine without tie-down point

   1) Put wooden blocks on the front and rear sides of the tracks to prevent movement of the machine during transportation.

   2) Fix the machine securely with chains or wire ropes of correct strength to prevent side slip.
   At this time, put pieces of wood between the wire ropes and the machine to prevent damage.



- Method to secure the machine with tie-down point
  1) Use the tie-down holes to securely fix the machine with chain or wire rope with correct strength.
     Let the chains and wire ropes in front of machine go through below the blade.
     At this time, keep the chains off the track frame. Make the distance (X) between the track frame and the chain or the wire rope 50 to 100mm {2.0 to 3.9in}.
  2) Put a cloth on the blade.
     Prevent direct contact of the chain or the wire rope with the blade.

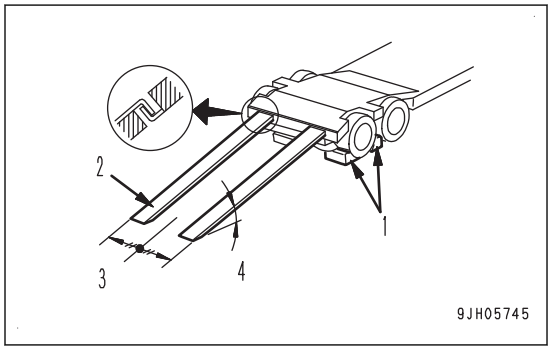


Procedures to Unload Machine

1. Park a trailer on a flat and firm ground.

   Keep a sufficient distance from the road shoulder.
2. Apply the brake of the trailer.
3. Put the chocks (1) on the tires to fix the trailer not to move.
4. Fix the ramps (2) to the trailer as follows.
   - Set the ramps parallel and equally distant from the center of the trailer (3).
   - Keep the installation angle (4) at 15° or below. Do not allow the ramps to come off during the work.
5. If the ramps (2) bend largely by the weight of the machine, put the block such as wooden block under the ramps.

   It prevents the deflection of the ramps (2).

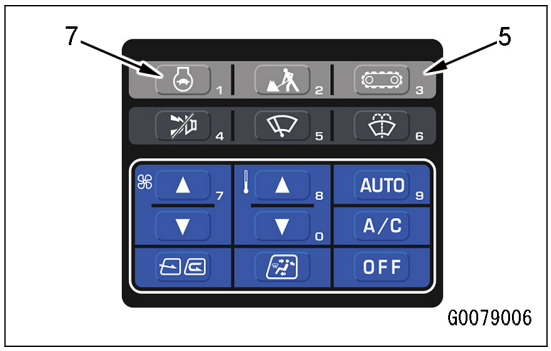


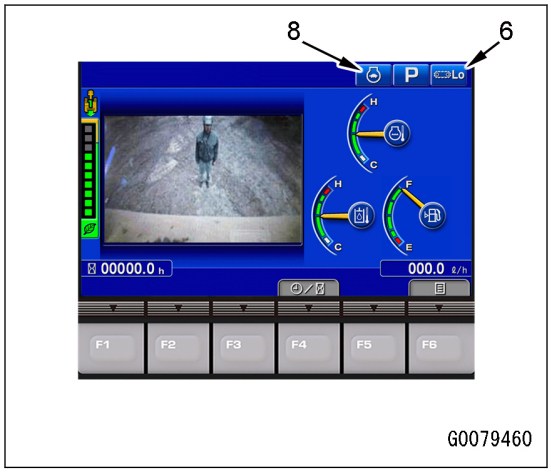
6. Assemble the mirror again to the original state.
7. Remove the chains or the wire ropes which are used to fix the machine.
8. Start the engine.

   In cold weather, make sure to do the engine warm-up operation.

   For the method of engine warm-up operation, see “Engine Warm-up Operation (3-144)”.
9. Set the travel speed to the low speed (“Lo” is lit).

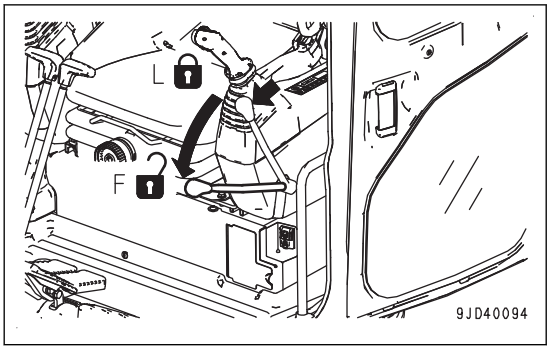
   Push the travel speed selector switch (5) to set the travel speed. The travel speed (“Lo”, “Hi”) is shown on the travel speed display (6).
10. Set the auto-deceleration switch (7) to the OFF position, and turn the fuel control dial to reduce the engine speed.
    - Each time you push the auto-deceleration switch (7), it changes from OFF to ON, from ON to OFF in turn.
    - When you set the auto-deceleration switch (7) to the OFF position, the auto-deceleration pilot lamp (8) goes off.





11. Set the lock lever to the FREE position (F).

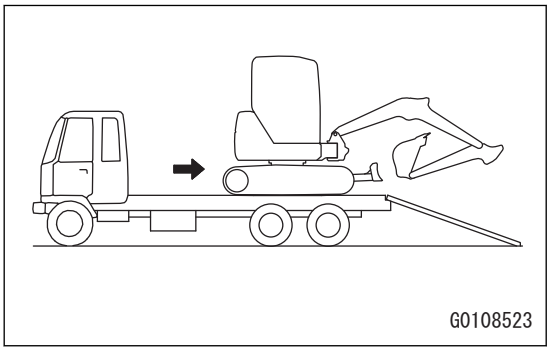
    Be sure to operate the lock lever by the operating part on the top.



12. Raise the work equipment, curl the arm below the boom, and move the machine slowly.

⚠ CAUTION

Check the position of the sprocket, and operate the travel lever.

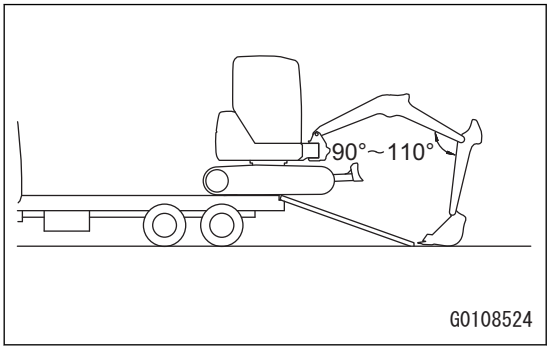


13. Make the machine to be horizontal on the top of the rear end of the trailer, and stop the machine.

14. Set the angle between the arm and boom to be 90° to 110°.

    NOTICE

    Keep the angle between the arm and boom to be 90° to 110° at all time while you unload the machine.
    If the machine is unloaded while the arm is curled, it can cause damage to the machine.



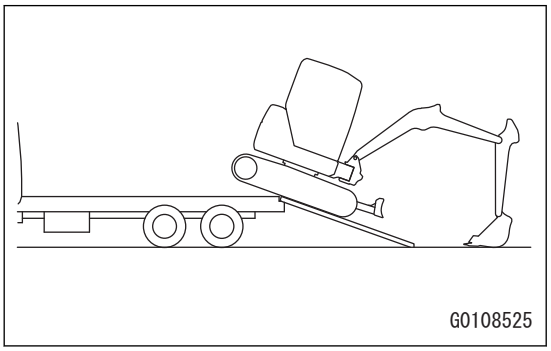
15. Lower the bucket to the ground.

    NOTICE

    Do not hit the bucket to the ground. The hydraulic cylinder can be damaged.

16. With the bucket lowered to the ground, move the machine to the ramps slowly from the rear end of the trailer.

17. Operate the boom and the arm slowly and unload the machine carefully until it is off the ramps fully.



How to Lift Machine

⚠ WARNING

- **The person who does the lifting work must be qualified to operate the crane.**
- **Do not lift the machine with a person on it.**
- **Use a wire rope for lifting that has sufficient strength for the weight of the machine.**
- **Keep the machine horizontal when you do the lifting work.**
- **Before you do the lifting work, do the operations that follow to prevent sudden movement of the machine.**
  - **Operate the lock lever to the LOCK position.**
  - **Set the swing lock cover in the LOCK state.**
- **Do not go in the area below or around the lifted machine.**
- **Do not lift the machine in a posture other than that shown below. Do not lift the machine with lifting tools other than those shown below. There is a danger that the machine loses its balance.**

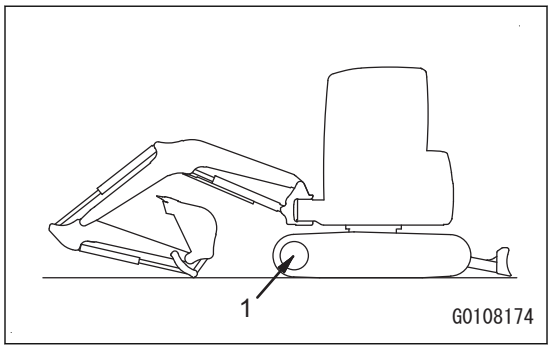
NOTICE

- **The lifting method below applies to the standard specification machine.**
  The lifting method is different by the attachments and options installed.
  For the lifting method of machines other than the standard specification, consult your Komatsu distributor.
- **When you lift the machine, do not install the wire ropes to the machine fixing brackets. If the fixing brackets are used to lift the machine, the machine will be damaged.**
- **Put pieces of wood between the wire ropes and the machine to prevent damage to the ropes and the machine.**

For the weight, see “Specifications (5-2)”.

Before you start the work, let the machine be in the posture shown in the figure on a hard and level ground.

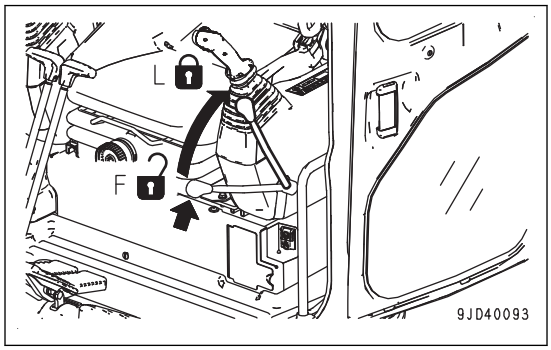
- Set the work equipment direction to the sprocket side (1). Make the undercarriage parallel with the upper structure.
- Lower the blade to the ground.
- Extend the bucket cylinder and the arm cylinder fully, and lower the boom to lower the work equipment to the ground.
- Close all of the doors and windows.



Set the lock lever to the LOCK position (L) and stop the engine.

When you operate the lock lever, hold the red part on the top and operate it.

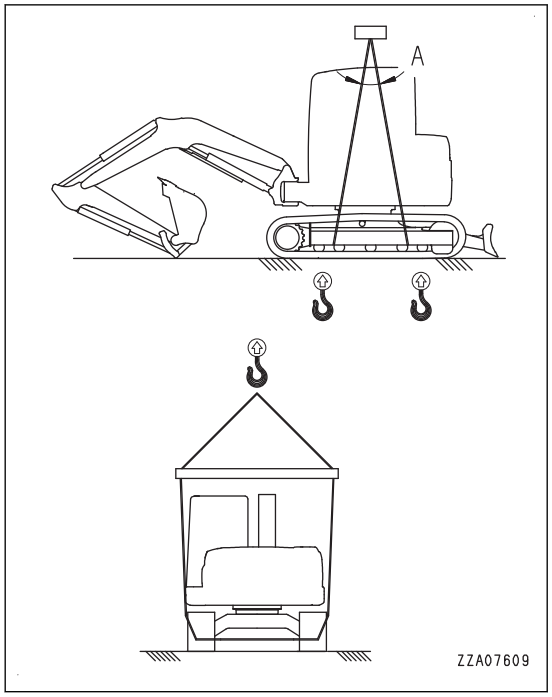
Check that there is nothing in the operator's compartment when you get off the machine.



1. From the front of the machine, run the wire rope between the 1st track roller and the 2nd track roller.
2. From the rear of the machine, run the wire rope between the 1st track roller and the 2nd track roller.
3. Set the lifting angle (A) of the wire rope to 10 to 20°. Then lift the machine slowly.
4. After the machine comes off the ground, check the hook condition and the lifting posture.

   NOTICE

   Do not allow the wire rope to touch the machine.
5. Lift the machine slowly.



Cold Weather Operation

Cold Weather Operation Information

If the ambient temperature becomes low, there is a possibility that the engine can not be easy to start or the coolant can freeze.

Obey the precautions that follow.

Fuel and Lubricants

Change the fuel and oil with ones of low viscosity.

For the specified viscosity, see REPLACEMENT PARTS, “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.

Coolant

⚠ WARNING

- **The coolant is poisonous. Be careful not to allow the coolant to contact your eyes or your skin.**
  If the coolant gets on you, immediately wash the part by a lot of clean water and consult a doctor.
- **Consult your Komatsu distributor or a qualified company for disposal of the discharged coolant.**
  The coolant is poisonous. Do not put it into drainage ditches or drain it onto the ground surface.

NOTICE

Komatsu recommends the use of Non-Amine Engine Coolant (AF-NAC).

For the coolant change interval and the density of Non-Amine Engine Coolant (AF-NAC), see REPLACEMENT PARTS, “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.

Battery

⚠ WARNING

- **Battery discharges flammable gas.**
  There is a danger of explosion. Do not let an open flame be near.
- **Battery electrolyte is dangerous object. Be careful not to allow the battery electrolyte to contact your eyes, skin or clothes.**
  If the battery electrolyte gets into your eyes, immediately wash your eyes with a large quantity of clean water and consult a doctor.
  If the battery electrolyte gets on your clothes or skin, immediately wash the part by a lot of clean water.
- **Battery electrolyte peels off the painting. If battery electrolyte is spilled, immediately wash it off.**
- **Do not charge the frozen battery or start the engine with a different power source. Explosion can occur.**
- **Battery electrolyte is poisonous. Do not pour it into drainage ditches or drain it onto the ground surface.**

- Low ambient temperatures can cause battery performance to decrease significantly.
  Put a cover on the battery or remove it from the machine and put it in a warm area. And then install it next morning.
- When the battery charge level is low, battery electrolyte can freeze.
  Keep the battery charge level as near as possible to 100%.
- If the electrolyte level is low, add purified water in the next morning before the work.
  Do not add purified water after the day's work to prevent freezing of the battery electrolyte during the night.

For the machine with Komatsu maintenance-free battery, see the display of the indicator, and obey the instruction. For details how to read the indicator, see “How to Examine Komatsu Maintenance-Free Battery Indicator (4-27)”.

Measure the specific gravity of the electrolyte and calculate the battery charge level from the table below.

For the machine with Komatsu maintenance-free battery, see the display of the indicator, and obey the instruction. For details how to read the indicator, see “How to Examine Komatsu Maintenance-Free Battery Indicator (4-27)”.

Fluid temperature (℃ {℉}) Battery charge level (%)	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

Precautions After Daily Work Ends in Cold Weather

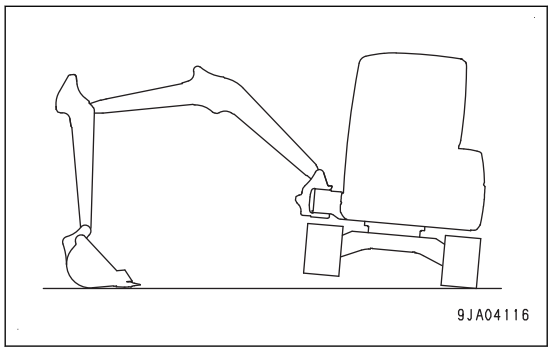
If mud and water become frozen around the undercarriage of the machine, there is a possibility that the machine cannot move in the next morning. Obey the precautions that follow to prevent the freezing of the machine.

- Remove mud or water stuck to the machine.
  Especially, clean the hydraulic cylinder rod. Prevent entry of mud or dirt together with drops of water on the rod into the seal.
- Fill up the fuel tank. If you make the space of the tank small, you can prevent the water drop generation because of changes in temperature.
- After operation in water or mud, remove water according to the procedure that follow to extend the service life of the undercarriage.

⚠ WARNING

Make sure that the area around the machine is safe before you let the tracks rotate off the ground. Do not allow anyone to come near the track because it is dangerous.

1. Run the engine at low idle.
2. Make the machine be the posture shown in the figure.
   1) Swing the upper structure by 90° to make the work equipment sideway.
   2) Operate the work equipment control lever to lower the bottom part of the bucket to the ground.
   3) Operate the work equipment control levers slowly. Push the ground with the bucket bottom to raise the track slightly.
3. Operate the travel lever to rotate the track off the ground.
4. Rotate the right and left tracks off the ground in the same manner again and again.



- Park the machine on a firm, dry ground.
  If there is no solid and dry ground, put boards on the ground and park the machine on them.
- Open the drain valve to drain the water accumulated in the fuel system.
- When the ambient temperature is low, the capacity of the battery decreases significantly.
  Cover it or remove it from the machine, and put it in the warm area. Then install it in the next morning.
- If the electrolyte level is low, add purified water in the next morning before the work.
  Do not add purified water after the day's work to prevent freezing of the battery electrolyte during the night.

After Cold Weather Season

Change the fuel and oil in components with ones which have correct viscosity for the ambient temperature.

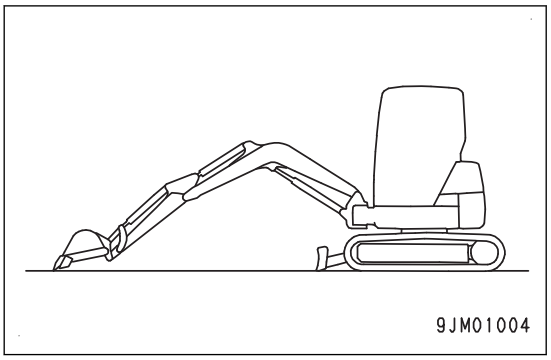
For the specified viscosity, see REPLACEMENT PARTS, “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.

Long-Term Storage Precautions

Prepare for Long-Term Storage

NOTICE

When the machine is to be stored for a long time (1 month or more), set the machine in the posture shown in the figure. If the machine is stored in a posture other than that shown in the figure, the piston rod of the hydraulic cylinder can rust.



When you store the machine for a long time (1 month or more), store it as follows.

1. Clean all the parts of the machine and store the machine indoors.

   If the machine needs to be stored outdoors, cover it with waterproof sheet and park it on a level ground.
2. Fix each lever and pedal with the lock lever and the lock cover.
3. If the machine is a machine ready for installation of attachment, set the selector valve to the “General attachments such as crusher” position.
4. Fill up the fuel tank.

   This prevents dew condensation.
5. Lubricate the parts and change oil.
6. Apply grease to the exposed part of the hydraulic cylinder piston rod.
7. Store the battery in the procedure that follows.
   1) Turn the starting switch to the OFF position, and then remove the key.
   2) Make sure that the main power is not supplied.

      Turn the starting switch to the OFF position and remove the key. If the system operating lamp is not lit, the power is not supplied.
   3) Turn the battery disconnect switch to the OFF position, and remove the key.

      For the operation of the battery disconnect switch, see “Battery Disconnect Switch (3-106)”.
   4) Put a cover on the battery, or remove it from the machine and store it with a cover on it.
8. To prevent rust, use the Non-Amine Engine Coolant (AF-NAC) with a density of 30% or more for the cooling system.

Maintenance During Long-Term Storage

⚠ WARNING

If it is necessary to run the engine indoors, open the windows of the building for air ventilation.

During storage, do the monthly maintenance as follows.

1. Wipe off all the grease from the hydraulic cylinder piston rods before you operate the work equipment.
2. Operate the machine so that films of oil on lubricated parts are kept and the battery is charged.
3. Operate the cooling of air conditioner for 3 to 5 minutes while you run the engine at low idle.
   With this operation, grease of each part of the air conditioner compressor is not dried out.
   Check the refrigerant gas level two times for a year.

How to Start Machine After Long-Term Storage

NOTICE

If the machine is stored without monthly maintenance, consult your Komatsu distributor.

Do the procedure as follows before you operate the machine after long-term storage.

1. Wipe off all the grease from the hydraulic cylinder piston rods.
2. Add oil and grease at all lubrication points correctly.
3. Install the battery or remove the cover.
4. Insert the battery disconnect switch key and turn it to the ON position.
   For the operation of the battery disconnect switch, see “Battery Disconnect Switch (3-106)”.
5. Check all the oil and water levels before you start the engine.
   When the machine is stored for a long period, moisture in the air will mix with the oil.
   If there is water in the oil, change all the oil.
6. Start the engine.
7. Check oil at all the parts again after the engine is started.
   If there is water in the oil, change all the oil.
8. Do the warm-up operation as long as possible.
   For the method of engine warm-up operation, see “Engine Warm-up Operation (3-144)”.

If the machine is stored for a long period while the battery disconnect switch is at the OFF position or the battery terminal is disconnected, it can cause the loss of the clock time information and radio tuning information. In this case, set them again. For details, see “Clock Adjustment (3-70)” and “Handle Radio (3-205)”.

Troubles and Procedures

Procedures When You Run Out of Fuel

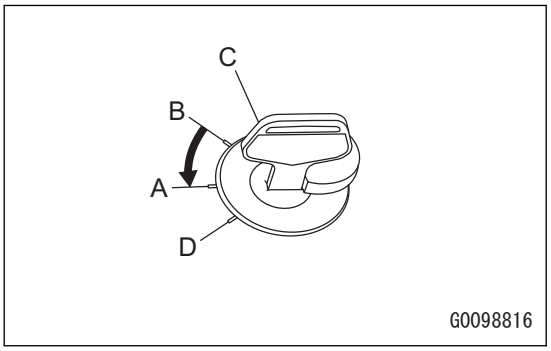
If you start the engine again after running out of fuel, fill up with fuel and bleed air from the fuel system.

Make sure to check the fuel level to prevent running out of fuel.

If the engine stopped because you run out of fuel, it is necessary to bleed a sufficient quantity of air from the fuel circuit.

Procedure to Bleed Air from Fuel Circuit

1. Turn the starting switch key to the OFF position (A).



2. Loosen the knob of the feed pump (1), pull it out, and then push and pull it again and again until the movement becomes heavy.

   REMARK

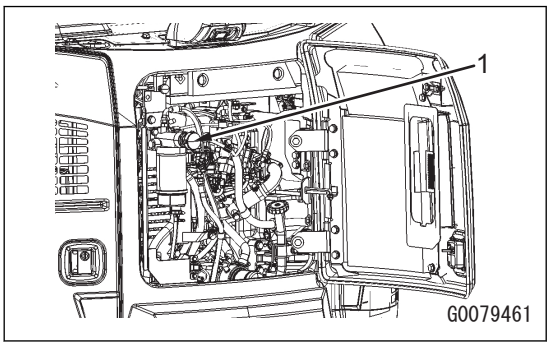
   It is not necessary to remove the plugs at the fuel prefilter head and at the fuel main filter head.

3. Push in the knob of the feed pump (1) and tighten it.
4. Turn the starting switch key to the START position.

   NOTICE

   Do not keep the starting switch (3) key at the START position continuously for 20 seconds or more.
   If the engine does not start, wait for approximately 2 minutes, and then try to start the engine again. Do this operation up to 4 times.

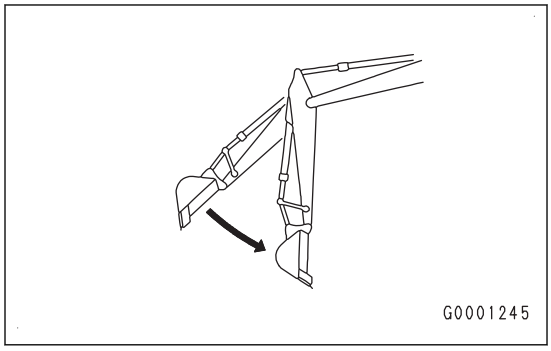
   The engine starts.



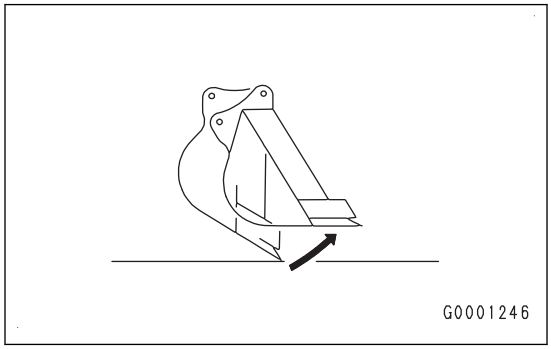
Phenomena that are Not Failures

Note that the phenomena below are not failures.

- When you go down a steep slope at low speed, a noise comes out of the travel motor brake valve.
- When you start or stop the swing, a noise comes out of the brake valve.
- Phenomena when you do digging from a high position without load
  - When the arm is retracted toward you, it becomes slow momentarily at around its vertical position.



  - The bucket teeth becomes slow momentarily at around its horizontal position.



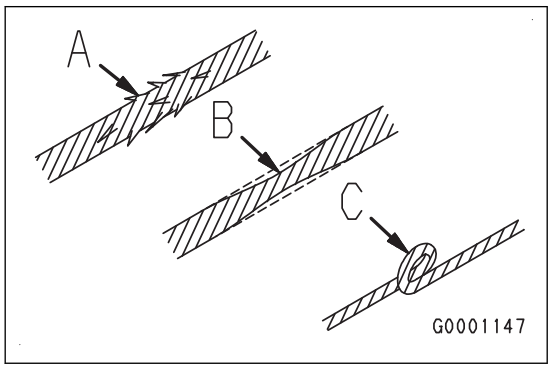
- The bucket and the arm wobble during heavy digging work.

Precautions When You Tow Machine

⚠ WARNING

In the towing and being towed operation, a mistake in the selection of the wire rope or drawbar or procedures can lead to serious personal injury or death.

- **Make sure that the towing wire rope or drawbar has the strength at least 1.5 times the working weight of the machine to be towed.**
- **A wire rope which has cut strands (A), reduced diameter (B), or kinks (C) can break. Do not use it.**
- **Wear the leather gloves always when you handle the wire ropes.**
- **Do not do the towing operation on a slope.**
- **During the towing operation, do not go into the area between the towing machine and the towed machine.**
- **Move the machine slowly. Do not put a sudden load to the machine.**
- **Do not use the holes for towing light objects or tie-down holes when you tow the machine.**

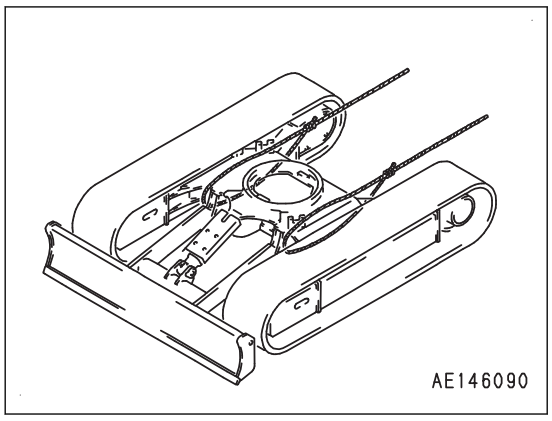


NOTICE

- **Do not tow the machine for a long distance.**
  When you tow a machine, tow it at a low speed of 1km/h {0.6MPH} or below, and for a distance of several meters to an area where you can do inspection and maintenance.
  If the machine must be moved a long distance, transport it.
- **The allowable towing load of this machine is 50400N {5140kgf}. Do not tow with load more than this.**

Do not tow the machine if it is normal. If it is necessary to tow the machine, be careful of the precautions that follow.

- If the machine sinks in mud and cannot get out by its own power, or if the machine tows a heavy object, put a wire rope as shown in the figure.
- Do not tow the machine with the force 1.5 times or more of the operating weight.
- Put pieces of wood between the wire ropes and the machine. It prevents damage to the wire rope and the machine.
- Keep the angle of the towing line minimum. Do not let it become 10° or more from the straight-travel direction.



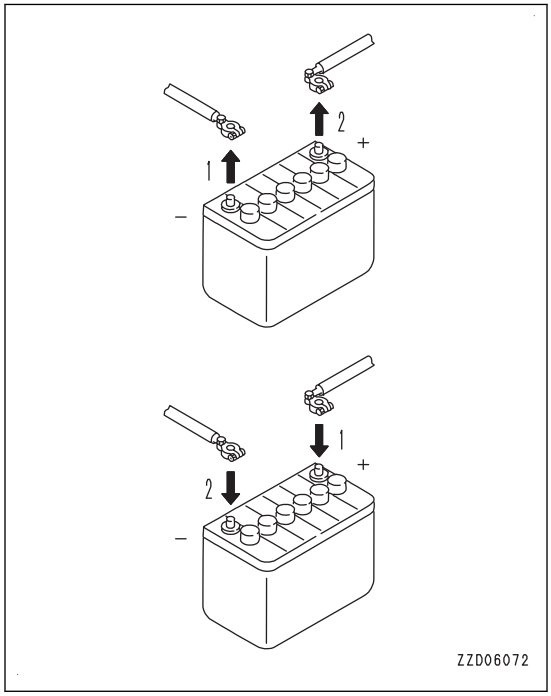
Precautions for Severe Work Condition

- If the mounting pins for the work equipment are soaked during the digging work in the water, grease the pins every time you do the work.
- When you do heavy or deep digging work, grease the mounting pins for the work equipment every time before the work.
  After greasing, operate the boom, arm, bucket and blade several times, and then grease again.

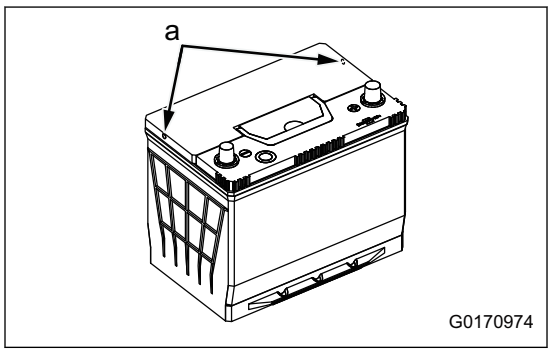
Procedures When Battery is Discharged

⚠ WARNING

- **Before you handle the battery, stop the engine and turn the starting switch to the OFF position. Turn the battery disconnect switch to the OFF position, and remove the key.**
- **Wear the protective eyeglasses and rubber gloves.**
- **Battery discharges flammable gas. There is a danger of explosion. Do not let an open flame be near.**
- **Battery electrolyte is dangerous object. Be careful not to allow the battery electrolyte to come in contact with your eyes, skin or clothes.**
  If the battery electrolyte gets into your eyes, immediately wash your eyes with a large quantity of clean water and consult a doctor.
  If the battery electrolyte gets on your clothes or skin, immediately wash the part by a lot of clean water.
- **Before you charge the battery, be sure to remove the battery from the machine. If you charge the battery while it is installed to the machine, it is dangerous.**
- **When you remove or install, check the location of positive (+) terminal and negative (-) terminal.**
- **When you remove the battery, disconnect the negative (-) terminal (ground side) first. Then, disconnect the positive (+) terminal.**
  When you install the battery, connect the positive (+) terminal first. Then, connect the negative (-) terminal (ground side).
  To avoid sparks, do not allow an energizing object such as a tool to contact between the positive (+) terminal of battery and the machine.
- **Install the terminals securely.**
  If a terminal is loose, there is a danger of explosion by a spark because of a defective contact.
- **For the removal of the battery, see "Remove Battery (3-240)", for the installation of the battery, see "Install Battery (3-242)".**



- **For the machines with Komatsu maintenance-free battery, be careful not to block the vent hole (a) when you install the battery.**

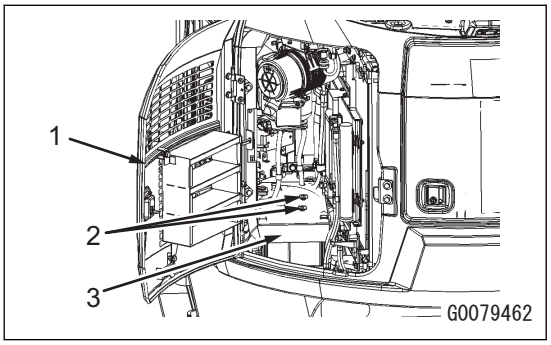


Remove Battery

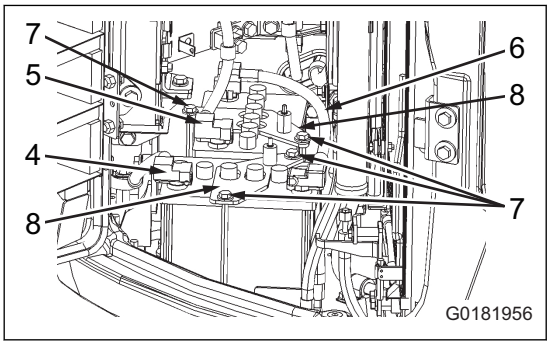
⚠ CAUTION

- **Before you handle the battery, stop the engine and turn the starting switch to the OFF position. Turn the battery disconnect switch to the OFF position, and remove the key.**
- **Disconnect the terminal from the negative (-) (ground) side to the positive (+) side in this order. To avoid sparks, do not allow an energizing object such as a tool to contact between the positive (+) terminal of battery and the machine.**

1. Open the left rear cover (1).
2. Lock it securely with the cover support lever.
3. Remove the 2 wing nuts (2).
4. Remove the rubber cover (3).



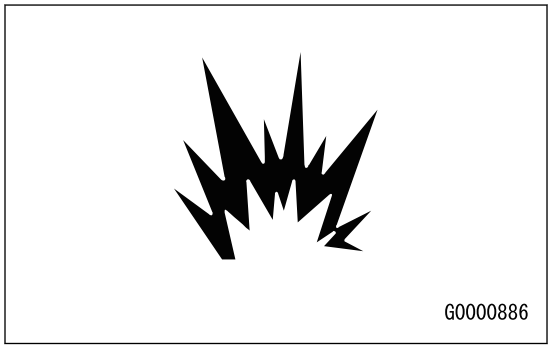
5. Disconnect the connection cable (4) on the negative (-) terminal (ground side).
6. Disconnect the cable (5) and the connection cable (6) on the positive (+) terminal side.
7. Remove the 4 mounting bolts (7).
8. Remove the mounting hardware (8).
9. Remove the battery from the machine.



Precautions When You Charge Battery

⚠ WARNING

When you charge the battery, if the battery is not handled correctly, there is a danger that the battery can explode. Obey the instructions in the instruction manual of the battery charger, and obey the precautions that follow, too.



- **Adjust the voltage of the battery charger by that of the battery to be charged. If the voltage is not set correctly, the battery charger will overheat and cause a fire. It can cause an explosion.**
- **Connect the positive (+) charger clip of the battery charger to the positive (+) terminal of the battery, and connect the negative (-) charger clip of the battery charger to the negative (-) terminal of the battery. Be sure to fix the clips securely.**
- **Set the charge current to 1/10 or less of the value of the rated battery capacity. When you do the charge operation with the quick charger, set it to less than the rated battery capacity.**
  For machines with Komatsu maintenance-free battery, set the charge current to 1/10 or less of the value of the rated battery capacity. Do not charge it with the quick charger.
  If the charge current is too high, the electrolyte will leak or the battery cells will dry up, and this can cause the battery to catch fire and explode.
- **When battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a danger that battery electrolyte can catch fire and explode.**
- **Do not use or charge the battery if the battery electrolyte level is less than the LOWER LEVEL line. It can cause explosion. Be sure to examine the battery electrolyte level in the specified intervals, and add purified water (such as a commercial battery fluid) to UPPER LEVEL line.**
  For the machine with Komatsu maintenance-free battery, see the display of the indicator, and obey the instruction. For details how to read the indicator, see “How to Examine Komatsu Maintenance-Free Battery Indicator (4-27)”.

Install Battery

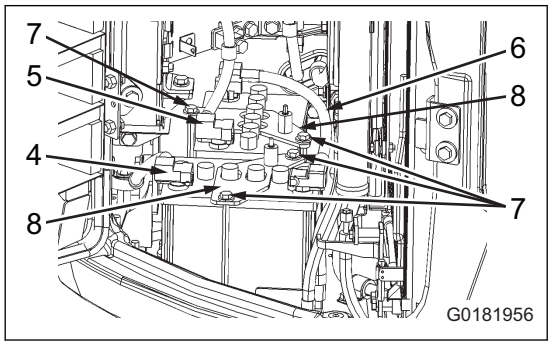
⚠ CAUTION

- **Connect the terminal from the positive (+) side to the negative (-) side (ground side) in this sequence.**
- **When you replace the battery, fix the battery body with the battery mounting hardware.**
- **To prevent fire, be careful that the rubber cover is not turned up when you install it. If damage is caused to the rubber cover, replace it immediately.**
- **If chloride is accumulated on the top surface of battery and around terminals, clean them with warm water of approximately 40℃ {104℉}. After it is cleaned, dry it fully, and then connect the cables.**

1. Put the battery in the specified position.
2. Fix the battery with the mounting hardware (8) and the mounting bolt (7).

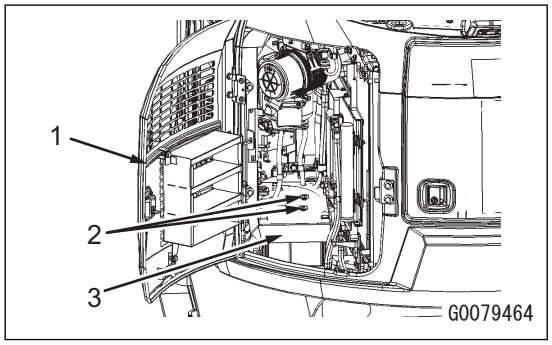
   Tightening torque:9.8 to 19.6Nm {1 to 2kgfm, 7.23 to 14.5lbft}
3. Make sure that the battery does not move.

   If the battery moves, fix it again.
4. Connect the cable (5) on the positive (+) terminal side.
5. Connect the connection cable (6) from the positive (+) terminal side.



6. Connect the cable (4) on the negative (-) terminal side (ground side).
7. Install the rubber cover (3) with the wing nut (2).

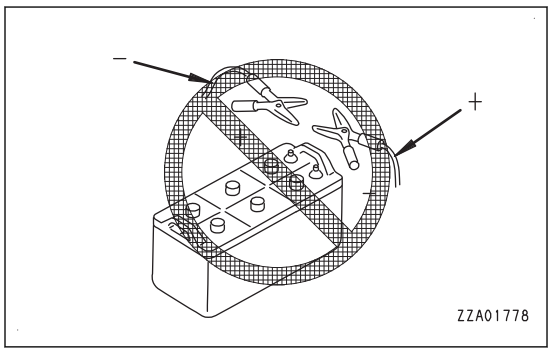
   Do not allow the rubber cover (3) to be flipped.
8. Remove the cover support lever though the hole of undercover, and put it in the mounting hole of the rear left cover (1).
9. Close the left rear cover (1).



Start Engine with Jumper Cables

⚠ WARNING

- **Do not connect the positive (+) terminal and negative (-) terminal.**
- **Wear the protective eyeglasses and rubber gloves.**
- **Be careful not to allow the normal machine to touch the failed machine.**
  Battery emits flammable hydrogen gas and it can explode.
  Do not cause sparks near the battery.
- **Connect the jumper cables correctly.**
  When the final cable is connected to the upper structure frame of the failed machine, sparks are made. Connect it to a point as far as possible from the battery.
- **Do not make the cable clips contact with other clips or with the machine.**
- **Do not start the engine by short-circuit of the starting motor (jump start).**



NOTICE

- **The starting system for this machine uses 24V. Use the machine that uses 24V which is the same as the failed machine.**
- **The sizes of the jumper cables and clips must be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the failed machine.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are connected correctly.**
- **Make sure that the machines and work equipment are locked.**
- **Make sure that each lever is in the NEUTRAL position.**
- **Be sure to check that the main power of the failed machine is not supplied before you turn the battery disconnect switch key to the OFF position. This prevents damage to the electrical parts of the failed machine. Turn the starting switch to the OFF position and remove the key. If the system operating lamp is not lit, the power is not supplied. For the operation method of the battery disconnect switch, see "Battery Disconnect Switch (3-106)".**

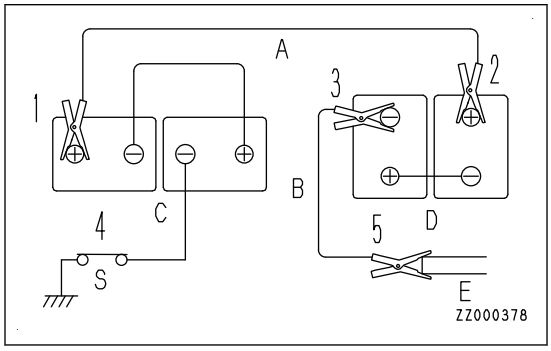
Procedure to Connect Jumper Cables

Be sure to check that the main power of the failed machine is not supplied before you turn the battery disconnect switch to the OFF position.

Turn the starting switch of the normal machine to the OFF position.

1. Connect the clip of the jumper cable (A) to the positive (+) terminal of the battery (C) on the failed machine.
2. Connect the clip at the other end of the jumper cable (A) to the positive (+) terminal of the battery (D) on the normal machine.
3. Connect the clip of the jumper cable (B) to the negative (-) terminal of the battery (D) on the normal machine.
4. Turn the battery disconnect switch (S) of the failed machine to the ON position.
5. Connect the clip at the other end of the jumper cable (B) to the upper structure frame (E) of the failed machine.

   Do not connect to the work equipment because the current does not easily flow through it.



How to Start Engine with Jumper Cables

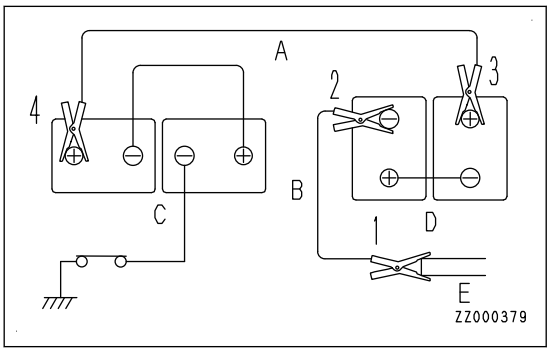
1. Make sure that the lock levers are in LOCK position for both of the normal machine and failed machine.
2. Make sure that the control levers are in NEUTRAL position for both of the normal machine and failed machine.
3. Make sure that the clip is connected correctly.
4. Start the engine of the normal machine. Operate it at high idle.
5. Start the engine of the failed machine.

   If the engine does not start, wait for approximately 2 minutes, and then do the procedure again.

Procedure to Disconnect Jumper Cables

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

1. Disconnect the clip of the jumper cable (B) from the upper structure frame (E) of the failed machine.
2. Disconnect the clip of the jumper cable (B) from the negative (-) terminal of the battery (D) on the normal machine.
3. Disconnect the clip of the jumper cable (A) from the positive (+) terminal of the battery (D) on the normal machine.
4. Disconnect the clip of the jumper cable (A) from the positive (+) terminal of the battery (C) on the failed machine.



Other Trouble

Troubles and Procedures on Electrical System

- Consult your Komatsu distributor for the actions shown with (*) in the remedy column.
- If a trouble or cause other than listed in the table is found, consult your Komatsu distributor for repair.

Problem	Main causes	Remedy
Lamp does not light up brightly when the engine runs at high idle.	Defective wiring or deteriorated battery	Check the terminal for looseness and the wiring, repair them, and replace the battery. (*)
	Looseness and damage of fan belt	Check the tension of the fan belt, replace. (*)
Lamp flickers while the engine is in operation.	Defective wiring or deteriorated battery	Check the terminal for looseness and the wiring, repair them, and replace the battery. (*)
	Looseness and damage of fan belt	Check the tension of the fan belt, replace. (*)
Battery charge level caution lamp lights up while the engine is in operation.	Defective alternator	Replace the alternator. (*)
	Defective wiring	Check and repair the wiring. (*)
	The fan belt is loose.	Check the tension of the fan belt, replace. (*)
You hear unusual noise from the alternator.	Defective alternator	Replace the alternator. (*)
Starting motor does not rotate even when starting switch is turned to the START position.	Defective wiring	Check and repair the wiring. (*)
	Defective starting motor	Replace the starting motor. (*)
	Battery charge is not sufficient.	Charge the battery.
	Battery disconnect switch is at the OFF position.	Turn the battery disconnect switch to the ON position.
	Engine shutdown secondary switch is at “ENGINE STOP” position.	Set it to “NORMAL” position and close the cover.
Pinion of starting motor engages and disengages continuously (rattles).	Battery charge is not sufficient.	Charge the battery.
	Safety relay is defective.	Replace. (*)
Starting motor cannot crank engine smoothly.	Battery charge is not sufficient.	Charge the battery.
	Defective starting motor	Replace the starting motor. (*)
Before the engine starts, the starting motor disengages (rattles).	Defective wiring, defective ring gear and pinion	Check, repair. (*)
	Battery charge is not sufficient.	Charge the battery.
Preheating pilot lamp does not light up.	Defective wiring	Check and repair the wiring. (*)
	Defective heater relay	Replace. (*)
	Defective machine monitor	Replace the machine monitor. (*)
Engine oil pressure caution lamp does not light up when engine is stopped (starting switch is at the ON position).	Defective machine monitor	Replace the machine monitor. (*)
	Defective caution lamp switch	Replace. (*)

Problem	Main causes	Remedy
Engine does not start easily at low temperature. Immediately after preheating, it is not felt warm when you touch the external part of the electric heater by hand.	Defective wiring	Check and repair the wiring. (*)
	Open circuit in the electric heater	Replace. (*)
	Defective heater relay	Replace. (*)
	Blown heater fuse	Replace. (*)
Engine cannot be started (“L04” is lit on the monitor).	Data in the controller is damaged.	Check, repair. (*)
	Other system has problems.	Check, repair. (*)
When travel lever is operated, travel alarm does not operate.	Defective wiring	Check and repair loose connector terminal or wire breakage. (*)
	Defective alarm	Replace. (*)
	Defective travel PPC pressure sensor	Replace. (*)
When rearview monitor shows nothing. (Machine with rearview camera)	Defective wiring	Check the loose or disconnected connector, or wire breakage, and repair them. (*)
	Defective camera	Replace. (*)
	Defective machine monitor	Replace the machine monitor. (*)
The engine does not start even if the starting switch key is turned to the START position and the starting motor rotates.	Defective engine controller power supply circuit	Replace. (*)
	Defective relay	Replace. (*)
	Defective connector on engine side	Check the loose or disconnected connector, or wire breakage, and repair them. (*)

Troubles and Procedures on Chassis

- Consult your Komatsu distributor for the actions shown with (*) in the remedy column.
- If a trouble or cause other than listed in the table is found, consult your Komatsu distributor for repair.

Problem	Main causes	Remedy
The speeds of travel, swing, work equipment, and blade are slow.	Hydraulic oil is not sufficient.	Adjust the oil level to the specified level. See “CHECK BEFORE YOU START”.
Boom cannot be raised at all.	Hydraulic oil is not sufficient.	Adjust the oil level to the specified level. See “CHECK BEFORE YOU START”.
Unusual noise comes from the pump. (Air intake)	Hydraulic tank strainer element is clogged or oil is not sufficient.	Clean the strainer. See “Every 2000 Hours Maintenance”.
Excessive rise in hydraulic oil temperature.	The fan belt is loose.	Check the tension of the fan belt, replace. (*)
	Oil cooler is dirty.	See “Every 500 Hours Maintenance” and clean.
	Hydraulic oil is not sufficient.	Adjust the oil level to the specified level. See “CHECK BEFORE YOU START”.
Track comes off.	The track is too loose.	Adjust track tension. See “When Required”.
Abnormal wear of sprocket	The track is too loose.	Adjust track tension. See “When Required”.

Troubles and Procedures on Engine Related Parts

- Consult your Komatsu distributor for the actions shown with (*) in the remedy column.
- If a trouble or cause other than listed in the table is found, consult your Komatsu distributor for repair.

Problem	Main causes	Remedy
The engine oil pressure caution lamp lights up (The alarm buzzer operates at the same time).	Oil level in the oil pan is not sufficient (air is sucked).	Adjust the oil level to the specified level. See “Examine Before You Start Operation”.
	Oil is not applicable. (Viscosity is not applicable.)	Replace oil. See “How to Use Fuel, Coolant and Lubricants by Ambient Temperature”.
	Oil filter cartridge is clogged.	Replace cartridge. See “Every 500 Hours Maintenance”.
	Oil leakage because oil pipe and pipe joint are not tightened correctly or they break.	Check and repair the oil pipe and the pipe joint. (*)
	Defective engine oil pressure sensor	Replace the engine oil pressure sensor. (*)
	Defective machine monitor	Replace the machine monitor. (*)
The pointer of the engine coolant temperature gauge is in the red range (The caution lamp lights up and the alarm buzzer operates at the same time).	Coolant is not sufficient or leaks.	Check, repair or add coolant. See “Examine Before You Start Operation”.
	The fan belt is loose.	Replace the fan belt, check the tension. (*)
	Accumulation of dirt or scale in cooling system	Clean inside of the cooling system and replace the coolant. See “When Required”.
	Clogged radiator fins or damaged fin	Clean and repair the fin. See “Every 500 Hours Maintenance”.
	Defective thermostat	Replace the thermostat. (*)
	The radiator cap is loose (in high altitude operation).	Tighten cap or replace packing.
	Defective machine monitor	Replace the machine monitor. (*)
Steam spurts out from top of radiator (pressure valve).	Coolant is not sufficient or leaks.	Check, repair or add coolant. See “Examine Before You Start Operation”.
	The fan belt is loose.	Replace the fan belt, check the tension. (*)
	Accumulation of dirt or scale in cooling system	Clean inside of the cooling system and replace the coolant. See “When Required”.
	Clogged radiator fins or damaged fin	Clean and repair the fin. See “Every 500 Hours Maintenance”.
	Defective thermostat	Replace the thermostat. (*)
	The radiator cap is loose (in high altitude operation).	Tighten cap or replace packing.
	Defective machine monitor	Replace the machine monitor. (*)

Problem	Main causes	Remedy
Starting motor turns but the engine does not start.	The fuel is not sufficient.	Adjust the oil level to the specified level. See “Examine Before You Start Operation”.
	Air in fuel system	Bleed air. See “Every 500 Hours Maintenance”.
	Defective fuel injection pump or defective nozzle	Replace pump or nozzle. (*)
	Starting motor cannot crank engine smoothly.	See “Troubles and Procedures on Electrical System”.
	Preheating pilot lamp does not light up.	See “Troubles and Procedures on Electrical System”.
	Defective compression (defective valve clearance)	Adjust valve clearance. (*)
Exhaust gas color is white or bluish.	Too much oil in oil pan	Adjust the oil level to the specified level. See “Examine Before You Start Operation”.
	Defective fuel	Replace it with specified fuel.
Exhaust gas becomes black from time to time.	Air cleaner element is clogged.	Clean and replace the air cleaner element. See “When Required”.
	Defective nozzle	Replace the nozzle. (*)
	Defective compression (defective valve clearance)	Adjust valve clearance. (*)
	Defective turbocharger	Clean or replace turbocharger. (*)
Combustion makes a breathing sound from time to time.	Defective nozzle	Replace the nozzle. (*)
Unusual noise comes out (combustion or mechanical).	Low grade fuel is used	Replace it with specified fuel.
	Overheat	See “The pointer of the engine coolant temperature gauge is in the red range (The caution lamp lights up and the alarm buzzer operates at the same time)” above.
	Damage on the inside of the muffler	Replace the inside of the muffler. (*)
	Valve clearance is too much.	Adjust valve clearance. (*)
Engine stops during operation.	Fuel prefilter is clogged.	Replace cartridge. See “Every 500 Hours Maintenance”.
	Fuel main filter is clogged.	Replace cartridge. See “Every 1000 Hours Maintenance”.
	Defective engine and fuel circuit	Check, repair. (*)

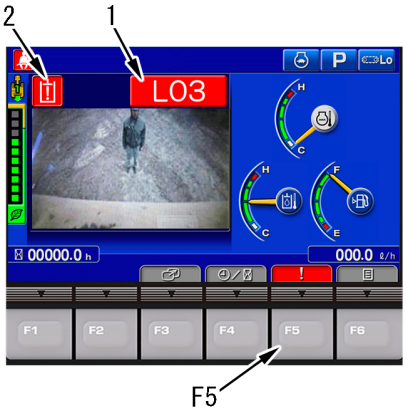
Procedures When Caution is Shown on Machine Monitor

When the caution lamp (1) and the action level (2) are shown on the machine monitor, do the steps that follow.

1. Push the switch F5.

   The “Current Abnormality” screen is shown.

2. Do the actions by the message on the monitor display.

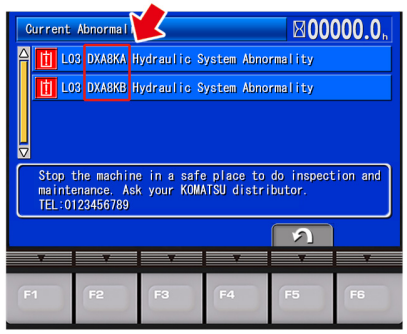


G0079466

3. Check the failure code.

   If necessary, consult your Komatsu distributor for repair.

   - When “DXA8KA” or “DXA8KB” is shown on “Current Abnormality” screen, set the pump secondary drive switch to the rear (emergency) position to make the operations available temporarily. After the work, immediately consult your Komatsu distributor for inspection and repair. For details of pump secondary drive switch, see “Pump Secondary Drive Switch (3-83)”.
   - If “CA2249” or “CA559” is shown on “Current Abnormality” screen while the machine has sufficient fuel, replace the fuel main filter and the fuel prefilter immediately. If an item is not cleared even after the replacement, the machine can do the normal operation, but consult your Komatsu distributor for inspection immediately. For how to replace the fuel main filter and the fuel prefilter, see “How to Replace Fuel Prefilter Cartridge (4-69)”, “How to Replace Fuel Main Filter Cartridge (4-84)”.

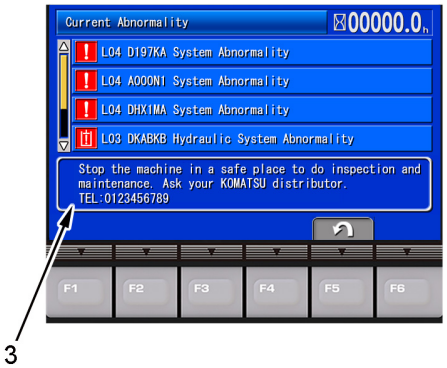


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Telephone number for the point of contact is shown in the message column (3) at the bottom of “Current Abnormality” screen when the error occurs.

REMARK

The contact telephone number is shown only when it is registered.
Consult your Komatsu distributor for the telephone number registration if necessary.



G0079468

Maintenance

⚠ WARNING

Before you read MAINTENANCE, read and understand SAFETY.

Precautions for Maintenance

Do the check and maintenance only as instructed in this manual. If you do the work not in this manual, it will be a cause of failure.

Examine Service Meter Reading

Check the service meter every day, and check that there is not maintenance item that reaches the maintenance due time.

Komatsu Genuine Replacement Parts

Use Komatsu genuine parts specified in Parts Book for replacement parts.

Komatsu Genuine Lubricants

If you do the replacement, use Komatsu genuine parts for replacement parts for oil and grease. Use oil and grease of the specified viscosity in response to the ambient temperature.

Always Use Clean Washer Fluid

Use a window washer for automobile, and be careful not to allow entry of foreign material.

Fresh and Clean Lubricants

Use the clean oil and grease.

Use clean containers and prevent entry of dirt.

Examine Drained Oil and Used Filter

If you replaced the filter when you changed oil, check the drained oil and used filter. If a lot of foreign materials are found, report it to a responsible person and take the correct measures.

Precautions When You Refill Oil or Fuel

If a strainer is attached to the oil filler port, do not remove the strainer when you add oil.

Precautions When You Weld

- Before you do the welding, turn the starting switch to the OFF position. Check that the system operating lamp is not lit. Then turn the battery disconnect switch key to the OFF position, and remove the key.
- Do not continuously apply a voltage 200V or more.
- Connect the ground cable at a position less than 1m {3ft 3in} from the welding part. If the ground cable is connected near electric devices or connectors, the device can be damaged.
- Make sure that there are no seals, bearings, or bushings between the welding part and ground.
  Sparks can cause the damage to the seals.
- Do not connect the ground cable around a pin or hydraulic cylinder.
  Sparks can cause damage of the plated parts of the pin or hydraulic cylinder.

Do Not Drop Things Inside Machine

- When you open the inspection windows or oil filler port of the tank for inspection, be careful not to drop things into the machine. It can cause damage or failure of the machine.
  If you drop something, be sure to take it out.
- Carry only things which are necessary for inspection.

Dusty Jobsites

When you work at dusty jobsites, obey the precautions that follow.

- Check frequently that the air cleaner is not clogged with the air cleaner clogging caution lamp.
  If it is clogged, clean the air cleaner element immediately.
- Clean it frequently to let the radiator core not be clogged.
- Clean and replace the fuel filter frequently.

- Clean the electrical components to prevent accumulation of dirt. Especially clean the starting motor and alternator to prevent accumulation of dirt.
- When you check oil or filters, and change oil or replace filter, prevent entry of dirt.

Avoid Mixing Oil

Do not mix different brand or grade of oil.

If it is necessary to use a different brand or grade of oil, change all the oil and replace the filter at the same time.

Lock Inspection Covers

If you do the maintenance while the inspection cover with a lock bar is opened, securely fix it into position.

If the inspection or maintenance is done while the inspection cover is not fixed securely, there is a danger that the cover suddenly shuts and causes personal injury.

Bleed Air from Hydraulic Circuit

When you repair or replace the hydraulic equipment, or remove the hydraulic piping, the air bleeding from the circuit is necessary. For air bleeding, see the MAINTENANCE, “How to Bleed Air from Hydraulic Circuit (4-54)”.

Precautions When You Install Hydraulic Hoses

- When you remove the O-rings or gasket seals, clean the mounting face, and replace them with new ones. Be sure to install new O-rings or gaskets.
- When you install the hoses, do not twist them or bend them too much.
  It decreases the service life of the hose significantly and causes damage.

Checks After Inspection and Maintenance

If you do not do the necessary checks after the inspection and maintenance, it can cause a failure and personal injury.

Pay attention to safety, check items that follow, and obey them.

Checks after operation (with engine stopped)

- All the inspection and maintenance items are completed.
- Check that there are no tools or parts left in the machine. (It is very dangerous if it gets caught especially in the lever linkage mechanism.)
- No leakage of water or oil is found.
- All the nuts and bolts are fully tightened.

Checks while the engine is running

When you do checks while the engine is running, fully pay attention to safety. See SAFETY, “Precautions Before You Start Inspection and Maintenance (2-37)”, “Precautions for Maintenance When Engine is in Operation”.

- No leakage of fuel or oil is found while the engine speed increases.
- Operation in places of check and maintenance is correct.

Select Fuel and Lubricants by Ambient Temperature

Use a fuel or lubricant that agrees with the ambient temperature.

For details, see “Recommended Fuel, Coolant, and Lubricant (7-4)”.

Lock Covers

When you close the cover after inspection and maintenance, be sure to lock it with the catch.

If the machine is operated while the cover is not fixed, there is a danger that the cover opens.

Precautions When You Clean Work Equipment Control Lever

- If oil or detergent gets onto the resin parts which are used at the knob of work equipment control lever of hydraulic excavator, they will become hard in a short time. Because of the hardening, you cannot push the

switch at the top of the lever such as horn switch. Be careful not to let oil get onto the work equipment control lever.

- If dirt gets onto the work equipment control lever, clean it with a dry cloth or a cloth wet with water or warm water. Do not use a detergent because oil or detergent can cause deterioration.

Maintenance Information

- Komatsu recommends the use of Komatsu genuine parts for replacement parts, grease, or oil.
- Do not mix different brand or grade of oil.
  If it is necessary to use a different brand or grade of oil, change all the oil and replace the filter at the same time.
  It is not a problem to mix the remaining oil in the piping into the new oil if it is not so much.
- Unless specified differently, when the machine is shipped from the plant, it is filled with the oil and coolant listed in the table below.

Item	Type
Engine oil pan	Engine oil EO10W30-LA (Komatsu genuine)
PTO gear case	Power train oil TO10 (Komatsu genuine)
Swing machinery case	Power train oil TO30 (Komatsu genuine)
Final drive case	
Hydraulic oil system	Power train oil TO10 (Komatsu genuine)
Radiator	Non-Amine Engine Coolant (AF-NAC) (Komatsu genuine) (density: 30% or more)

Oil, Fuel, and Coolant

Oil

- Oil deteriorates with time because it is used in the engine and hydraulic equipment in high temperature and pressure.
  Use oil that agrees with the grade and the ambient temperature as in the Operation and Maintenance Manual.
  Change the oil at the specified interval regardless of the condition of oil.
- Prevent entry of foreign material such as dirt or water into the new oil.
  The majority of failures of the machine are caused by the entry of foreign material.
  Prevent entry of foreign material when you store or add oil.
- Do not mix different brand or grade of oil.
- Add the specified capacity of oil to prevent failure.
- If oil in the hydraulic equipment is not clear, there can be water or air mixed in the circuit. Consult your Komatsu distributor.
- Replace the related filters at the same time when oil is changed.
- Komatsu recommends you to check the condition of the machine regularly with KOWA (Komatsu Oil Wear Analysis). For KOWA, consult your Komatsu distributor.
- The use of oil other than Komatsu genuine oil can reduce the replacement interval. Komatsu recommends you to check the condition of the machine with KOWA (Komatsu Oil Wear Analysis).

Fuel

- To prevent entry of water into the fuel, fill the fuel tank with fuel after work.
  This prevents water contained in the air in the fuel tank not to condense in the fuel tank.
- If you use the fuel which contains water or dust, it can be a cause of a malfunction of the fuel pump.
- Prevent entry of foreign material when you store or add fuel.
- Use the fuel that agrees with the temperature as in the Operation and Maintenance Manual.
  - If the fuel is used at the temperatures lower than the operating temperature (at temperatures below -15℃ {5℉}), the fuel will become solid.
  - If the fuel is used at temperatures higher than the operating temperature, the viscosity will decrease, and it can cause deterioration in performance.

- Before you start the engine, or wait for 10 minutes after you add fuel, drain the sediment and water from the fuel tank.
- Bleed air from the fuel circuit for the cases that follow.
  - When the fuel filter is replaced
  - When fuel is used up
  - When you start the engine for the first time after the fuel pipings or fuel system components are replaced or repaired
- If foreign material is mixed in the fuel tank, clean the tank and fuel system.

NOTICE

Be sure to use the ultra-low sulphur diesel fuel.
To get good fuel consumption properties and exhaust gas properties, the engine installed on this machine uses an electronically controlled high-pressure fuel injection device. The high-pressure fuel injection device requires high precision parts and lubrication. If low viscosity fuel is used, its durability can decrease significantly.
The use of fuel with high sulphur content can decrease the service life of the engine or degradation in performance.

Bio-Fuel

The biofuel is a fuel that is formed in a transesterification reaction of vegetable oil, animal fat, and edible oil.

The ASTM D975 diesel fuel can contain 5 % or less of biofuel.

Use the biofuel conforming to ASTM D7467 if its mixing ratio is between 6% to 20%.

The EN590 diesel fuel can contain 7 % or less of biofuel.

When you use 100% biofuel for mixing, it needs to conform to ASTM D6751 or EN14214.

In the United States, purchase the biofuel from the dealer certified by BQ-9000.

In the EU, purchase the biofuel from the member companies of European Biodiesel Board (EBB).

In other countries or regions, purchase the biofuel from the dealer that guarantees the same quality as BQ-9000 or EBB.

NOTICE

When you use biofuel other than the preceding diesel fuel and its mixing ratio is up to 20 %, obey the precautions that follow.

- **It is necessary to consult with the local regulatory authorities of engine exhaust gas regulation whether the biofuel can be used or not.**
- **The fuel can possibly leak because of the deterioration of rubber material of the fuel hose.**
  Replace it with the fuel hose applicable for biofuel. Consult your Komatsu distributor for replacement of the fuel hose.
- **Biofuel cannot be stored for a long time because it is easy to deteriorate and change in quality.**
  Use the fuel in the storage tank or the fuel tank of the machine within 6 months.
  If the deteriorated and altered biofuel is used, it can cause bad effects on the engine parts.
  When you store the machine which uses the diesel fuel mixed with the biofuel for more than 3 months, do the procedure that follows.
  - **Replace it with pure diesel fuel or the new diesel fuel mixed with the biofuel at the lowest possible mixing ratio.**
  - **After you change the fuel, run the engine for a minimum of 30 minutes before you store the machine.**
- **Because the biofuel dissolves the materials sticking to the fuel tank and fuel line, the fuel filter can be clogged with them.**
  When you change the diesel fuel to the biofuel, replace the fuel main filter cartridge and fuel prefilter cartridge with new ones. When you replace the fuel main filter cartridge and fuel prefilter cartridge, make the replacement interval half the normal time until the second replacement after you change the diesel fuel to the biofuel.
- **Because the biofuel absorbs moisture easily, it can possibly cause a growth of microorganism.**
  When the microorganism grows in the biofuel, it can cause corrosion of the fuel system and the clogging of the fuel filter.
  Drain the water from the fuel tank before you start the operation.
  When you complete the operation, fill the fuel tank to reduce the air layer.
- **If the biofuel is used in the conditions of the specific operation, the fuel can possibly get mixed into the engine oil.**
  The fuel level in the engine oil must not exceed 5 %. Deteriorated engine oil can cause adverse effects on the engine parts such as a reduction of lubricating function. It is recommended to take a sample of the oil on a periodic basis.
- **The characteristics of the biofuel change when outside air temperature is low. The fuel filter can be clogged and the fuel inside the fuel tank can be solidified. Store the biofuel in the warm building or in the storage tank.**

The energy density of the biofuel becomes lower by 7 to 10% with that of the diesel fuel. Fuel consumption and output can possibly be lowered when the mixing ratio is high.

Fuel hose quality can change as time passes due to the influence of material of bio when using BDF that mixing ratio is over 20% and they are likely to wear out or deteriorate.

Strongly recommend to replace Fuel hose every 2 years or every 4000 hours, whichever comes sooner.

Paraffin-based Fuel

The paraffin-based fuel is generated by natural gas, coal, vegetable oil, and animal and plant fat, and its main constituent is paraffin.

The paraffin-based fuel has almost the same characteristics as the diesel fuel.

Vegetable oil and fat-derived fuel are called renewable diesel (RD) and hydrogenated vegetable oil (HVO).

The fuel synthesized from natural gas is called gas-to-liquid (GTL).

NOTICE

Use the paraffin-based fuel which agrees with EN15940:2016 and ASTM D975.
As long as the fuel agrees with EN15940:2016 and ASTM D975, its mixing ratio can be up to 100%.

The energy density of the paraffin-based fuel becomes lower up to 10% with that of the diesel fuel. Thus, fuel consumption and output can possibly be lowered.

Coolant

- Komatsu machines are supplied with Non-Amine Engine Coolant (AF-NAC). Non-Amine Engine Coolant (AF-NAC) has excellent anti-corrosion, antifreeze and cooling properties and can be used continuously for every 3 years or every 6000 hours whichever occurs first in the below listed conditions;
  Conditions to meet every 2 years or 4000 hours to extended coolant life:
  - Must pass coolant test/analysis at 4000 hours, the test interval is a precautionary procedure intended to prevent cooling and engine system damage
  - All maintenance top offs and refills were done with Komatsu approved non-Amine (AF-NAC) coolant

  For more information (e.g. test method) on the Coolant test/Analysis, consult an authorized Komatsu Distributor.
  Continue to use the non-Amine Engine Coolant (AF-NAC) even in the area where freeze prevention is not necessary.
  If you use the coolant that is not recommended, it can cause dangerous failure such as the corrosion of the cooling system where the light weight metal such as aluminum is used or engine.
- When you use an antifreeze, be sure to obey the precautions in the Operation and Maintenance Manual.
- Use the coolant of the specified density that agrees with the ambient temperature.
  To prevent corrosion of the cooling system, use the Non-Amine Engine Coolant (AF-NAC) with a density of 30% or more.
  For the density of Non-Amine Engine Coolant (AF-NAC), see REPLACEMENT PARTS, “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.
- Do not mix water with the coolant.
  Coolant is supplied with Non-Amine Engine Coolant (AF-NAC) mixed with pure water.
- If the engine is overheated, wait for the engine to cool down before you add the coolant.
- If the coolant level is low, it will cause overheating of the machine, or corrosion of cooling circuit by entry of air.

Grease

- Grease is used to prevent joint seizure or noise.
- The construction machinery is used in heavy-duty conditions. Be sure to obey the recommended ambient temperatures and replacement intervals as in the Operation and Maintenance Manual.
  Also, Komatsu recommends the use of grease written in the Operation and Maintenance Manual.
- Lubricate the grease fittings specified in PERIODIC MAINTENANCE.
  If the grease fitting which is not given becomes stiff or creaks after it is used for long time, add grease.
- Wipe off the grease that is pushed out from the grease fitting.
  Wipe off the grease which contains sand and dirt especially on the rotating part because it will cause wear on the rotating part.

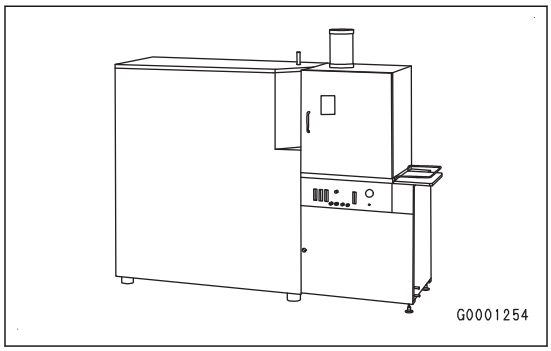
KOWA (Komatsu Oil Wear Analysis)

KOWA is a maintenance service to collect oil and analyze it regularly. It finds wear of the machine drive parts or other failures in a short period to prevent machine failure and downtime.

KOWA Analysis Items

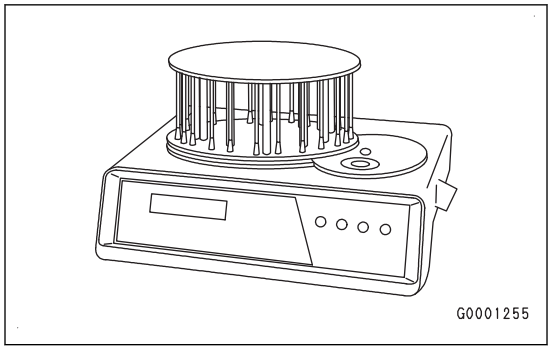
Measurement of metallic powder concentration

An ICP (Inductively Coupled Plasma) analyzer is used to measure the concentration of iron, copper, and other metal powder in the oil.



Measurement of quantity of iron particles

A PQI (Particle Quantifier Index) measuring instrument is used to measure the quantity of iron particles of 5 µm or more.



Others

Measure the items such as the ratio of water, coolant, fuel in the oil, and dynamic viscosity.

Oil Collection Interval

Every 500 hours

Precautions When You Collect Oil

- Mix the oil sufficiently, and then collect the oil.
- Collect the oil at the specified intervals continuously.
- Do not collect the oil on rainy or windy days to prevent entry of water or dirt.

For details about KOWA, consult your Komatsu distributor.

Oil and Fuel Storage

- Keep the oil and fuel indoors to prevent entry of foreign material such as water or dirt.
- When you keep the fuel or oil in drum can for a long period, put it on its side, and make sure that the filler port of the drum can comes below the liquid surface to prevent entrainment of humidity. If it is necessary to store them outdoors, cover them with waterproof sheet.
- To prevent deterioration of the quality during long-term storage, be sure to use in the order of first in - first out (use the first purchased oil or fuel first).

Filter

- The filters remove the foreign materials in the oil, fuel, and air circuits to prevent machine failure.
  Replace all the filters regularly. For details, see Operation and Maintenance Manual.
  But if the operation environment is dangerous or if you use oil that is different from genuine Komatsu products or fuel contains high ratio of sulphur, reduce the replacement interval.
- Cartridge type filter cannot be used again even it is washed.
  Replace it in response to the maintenance procedure.
- If the oil filter has been replaced, make sure that no foreign material is found in the used filters.
  If the foreign materials are found, consult your Komatsu distributor.
- Do not open the packages of spare filters until just before they are to be used.
- Komatsu recommends the use of Komatsu genuine filters.

Battery Terminal

- Make sure that the battery terminals have no looseness or corrosion.
- If there is looseness, make sure that there is no damage or corrosion, and retighten it.
- For the procedure to retighten and the torques, etc., see “Procedures When Battery is Discharged (3-239)”.
- If there is corrosion, fully clean the rust on the battery and battery cable, and replace the battery terminals.
- When you replace the battery terminals, obey the instructions given in “Precautions for Maintenance (2-37)”.

Electrical Components

⚠ WARNING

- **When the battery disconnect switch key is turned to the OFF position for the maintenance work, be sure to pull out the key and keep it with you. If the key is left in the switch, it can be turned on by mistake and it can cause an electric shock.**
  For the operation of the battery disconnect switch, see "Battery Disconnect Switch (3-106)".
- **Do not wash inside of the operator's compartment with water. There is a danger that the electrical leakage causes malfunction if the electrical component becomes wet and its coating is damaged. Be careful not to let water get into the electrical components when you wash the machine.**

- When it is raining or after you wash the machine, if the water drops stuck around connectors, wipe them off before you remove the connectors of the electrical components. Be careful not to allow water to enter into the connector.
- Check and maintenance items include checks for fan belt tension, fan belt damage, and battery electrolyte level.
- Install the electrical components specified by Komatsu.
- When you install the wireless devices to the machine, consult your Komatsu distributor first. There is a danger that the radio waves received and transmitted by wireless devices causes malfunction in the controller of the control system.
- When you operate the machine near the sea, clean all electrical components to prevent corrosion.
- When you install the electrical component, connect it to the specified power supply connector.
  Do not connect the optional power supply to the fuse, starting switch, or battery relay.

Standard Torque

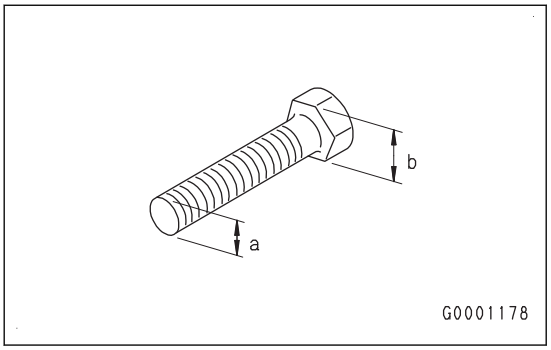
⚠ CAUTION

If you tighten the parts by other than the specified tightening torque, the parts will be damaged or loose, and the machine failures or operating problems will be caused.

Torque List for Bolts and Nuts

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table.

When you replace the bolts or nuts, Komatsu recommends the use of Komatsu genuine part of the same size as before replacement.



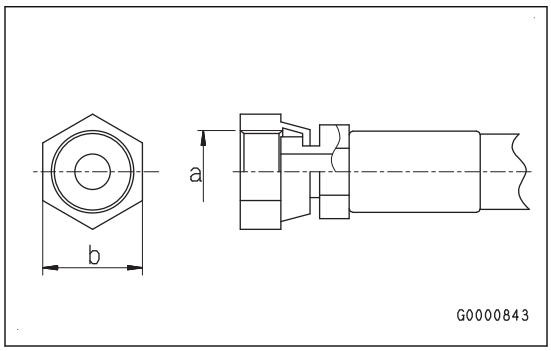
Outside diameter of the thread portion “a” (mm {in})	Width across flats “b” (mm {in})	Tightening torque (Nm {kgfm, lbft})	
		Target value	Allowable range
6 {0.236}	10 {0.394}	13.3 {1.35, 9.76}	11.8 to 14.7 {1.2 to 1.5, 8.68 to 10.8}
8 {0.315}	13 {0.512}	31 {3.2, 23.1}	27 to 34 {2.8 to 3.5, 20.3 to 25.3}
10 {0.394}	17 {0.669}	67 {6.8, 49.2}	59 to 74 {6 to 7.5, 43.4 to 54.2}
12 {0.472}	19 {0.748}	111 {11.3, 81.7}	98 to 123 {10 to 12.5, 72.3 to 90.4}
14 {0.551}	22 {0.866}	172 {17.5, 127}	153 to 190 {15.5 to 19.5, 112 to 141}
16 {0.63}	24 {0.945}	260 {26.5, 192}	235 to 285 {23.5 to 29.5, 170 to 213}
18 {0.709}	27 {1.063}	360 {37, 268}	320 to 400 {33 to 41, 239 to 297}
20 {0.787}	30 {1.181}	510 {52.3, 378}	455 to 565 {46.5 to 58, 336 to 420}
22 {0.866}	32 {1.26}	688 {70.3, 508}	610 to 765 {62.5 to 78, 452 to 564}
24 {0.945}	36 {1.417}	883 {90, 651}	785 to 980 {80 to 100, 579 to 723}
27 {1.063}	41 {1.614}	1295 {133, 962}	1150 to 1440 {118 to 147, 853 to 1060}
30 {1.181}	46 {1.811}	1715 {175, 1270}	1520 to 1910 {155 to 195, 1120 to 1410}
33 {1.299}	50 {1.969}	2205 {225, 1630}	1960 to 2450 {200 to 250, 1450 to 1810}
36 {1.417}	55 {2.165}	2745 {280, 2030}	2450 to 3040 {250 to 310, 1810 to 2240}
39 {1.535}	60 {2.362}	3260 {333, 2410}	2890 to 3630 {295 to 370, 2130 to 2680}

Torque List for Hoses

Tighten the hoses to the torque shown in the table.

Face Seal

Hose nominal number	Nominal - Threads per inch “a”	Width across flats “b” (mm {in})	Tightening torque (Nm {kgfm, lbft})	
			Target value	Allowable range
02	$^{9}/_{16}$-18UN	19 {0.748}	44 {4.5, 32.5}	34 to 54 {3.5 to 5.5, 25.3 to 47}
03	$^{11}/_{16}$-16UN	22 {0.866}	74 {7.5, 54.2}	54 to 93 {5.5 to 9.5, 39.8 to 68.7}
04	$^{13}/_{16}$-16UN	27 {1.063}	103 {10.5, 75.9}	84 to 132 {8.5 to 13.5, 61.5 to 97.6}
05	1-14UNS	32 {1.26}	157 {16.0, 116}	128 to 186 {13.0 to 19.0, 94 to 137}
06	$1^{3}/_{16}$-12UN	36 {1.417}	216 {22.0, 159}	177 to 245 {18.0 to 25.0, 130 to 181}



Maintenance Schedule

- If a hydraulic breaker is installed to the machine, the maintenance intervals for some parts are different. See “Maintenance Interval for Hydraulic Breaker (4-15)” and check the maintenance interval.
- When you use the engine oil for cold districts, the maintenance intervals of the engine oil and filter cartridge are changed to every 250 hours. For details, see the oil part number and note in “Recommended Fuel, Coolant, and Lubricant (7-4)”.
- Consult your Komatsu distributor to change the maintenance interval of the machine monitor.

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Maintenance Interval for Hydraulic Breaker

If a hydraulic breaker is installed to the machine, the hydraulic oil deteriorates faster than in the normal bucket digging operation. Set the maintenance interval as shown below in response to the operation ratio of the breaker.

Replace hydraulic oil filter element

For the first time of a new machine, replace the element after 100 to 150 hours. Replace the element in response to the maintenance interval by the table thereafter.

Change oil in hydraulic tank

Change the hydraulic oil in response to the maintenance interval by the table.

Replace additional filter element for breaker (option)

Replace the element in response to the maintenance interval by the table. 250 hours is a guide for when the breaker is used (if operation ratio of the breaker is 50% or more).

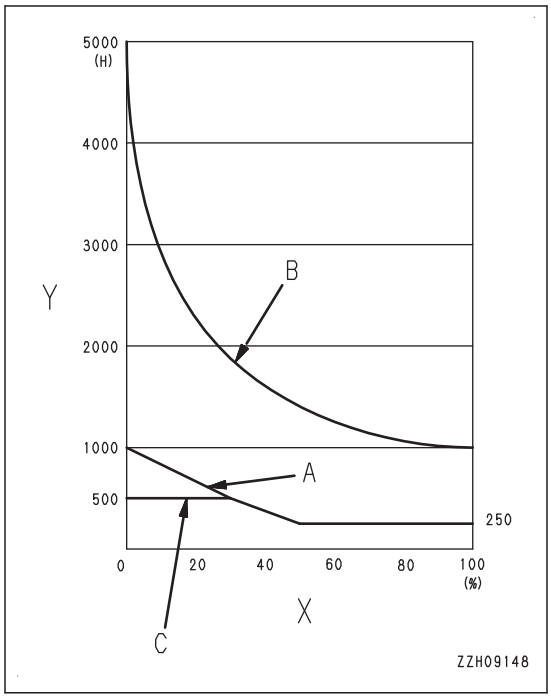
X: Operating ratio of breaker (%)

Y: Replacement interval (H)

(A): Element of hydraulic tank

(B): Hydraulic oil

(C): Element of additional filter



REMARK

Operation ratio of breaker 100%: Only breaker is used
Operation ratio of breaker 0%: Breaker is not used at all.

Lubricate

Lubricate every 100 hours when hydraulic breaker is installed. For details, see “How to Lubricate (4-65)”.

Maintenance Procedure

When Required

How to Examine, Clean and Replace Air Cleaner

⚠ WARNING

When you use the compressed air, use the protective equipment such as protective eyeglasses and dust mask. There is a danger of personal injury when dirt is scattered.

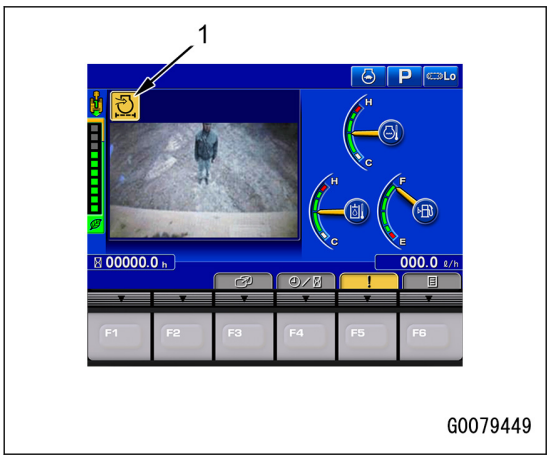
NOTICE

- **Do not clean the air cleaner element until the air cleaner clogging caution lamp on the machine monitor lights up. If the element is cleaned frequently before the air cleaner clogging caution lamp lights up, air cleaner cannot show its original performance and the cleaning effect decreases.**
  Also, if the element is cleaned frequently, dirt attached to the element can fall into the inner element more frequently.
- **Before you check, clean or replace the air cleaner, stop the engine. If you do the inspection, cleaning or maintenance while the engine is running, dirt enters into the fuel tank and causes damage to the engine.**
- **Store the unused element in a dry place. Do not open the package until just before you use it.**

How to Examine Clogging of Air Cleaner

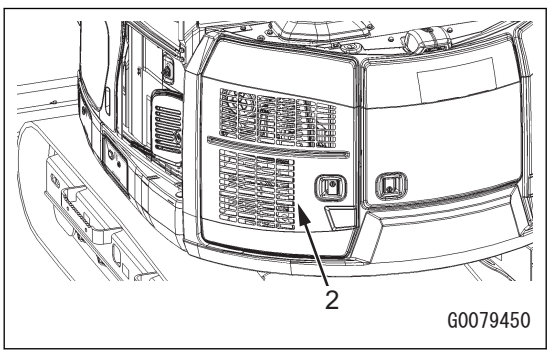
Make sure that the air cleaner clogging caution lamp (1) is lit.

Clean the air cleaner element when the air cleaner clogging caution lamp lights up.

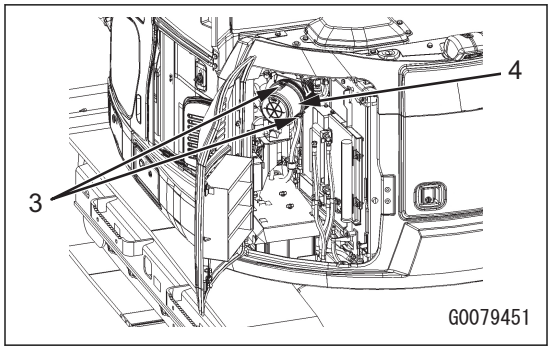


How to Clean Air Cleaner Outer Element

1. Open the rear left cover (2) on the left side of the machine.



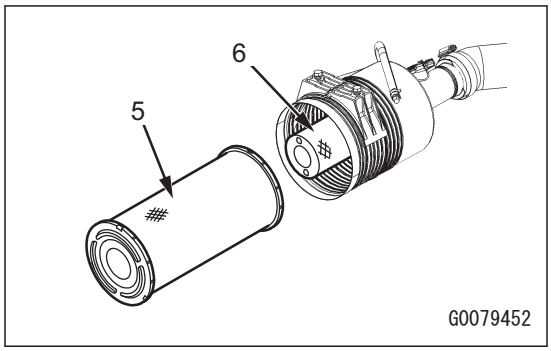
2. Remove the 3 clips (3), and remove the cover (4).



NOTICE

Do not remove the inner element (6). If it is removed, dirt will enter and can cause an engine problem.

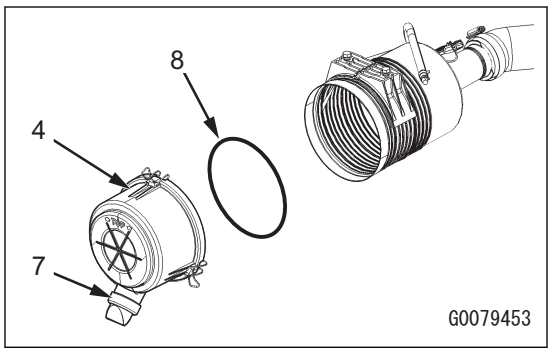
3. Pull out the outer element (5).



NOTICE

When you clean the cover (4), do not remove the vacuator valve (7).

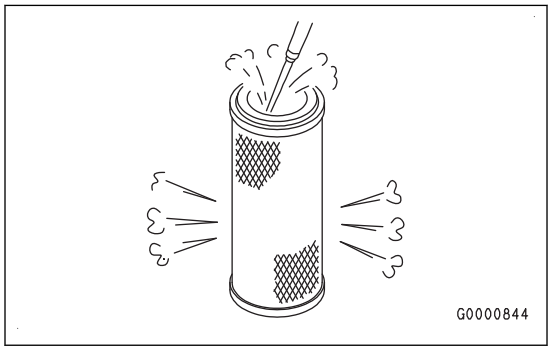
4. Clean the inside of the air cleaner body and the cover (4).
5. Replace the outer element (5) if you cleaned the outer element (5) 6 times or 1 year has passed since you started use.
   - When replacement is required
     Do not do the step 6 and after, see “How to Replace Air Cleaner Element (4-19)”, and replace the inner and outer elements with new ones.
   - When replacement is not required
     Follow the step 6 and after, and clean the outer element (5).



NOTICE

Do not clean and use the inner element (6) again. When you replace the outer element (5), replace the inner element with new one at the same time.
When you clean the element, do not hit it or beat it against something.
Do not use the element with its pleats, gaskets or seals damaged.

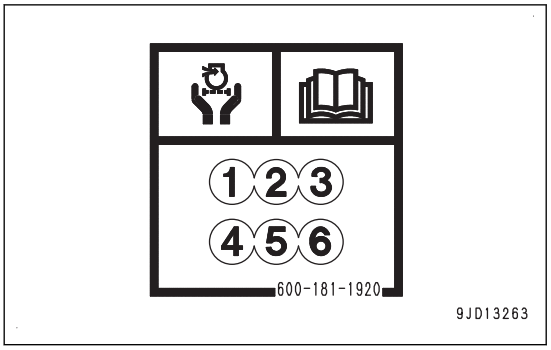
6. Blow the dry compressed air (0.2MPa {2.1kgf/cm^2, 29.9PSI} or below) to the outer element (5) in the sequence shown below.
   1) Blow it along the pleats from inside.
   2) Blow it along the pleats from outside.
   3) Blow it from inside again.



7. Peel off a sticker.

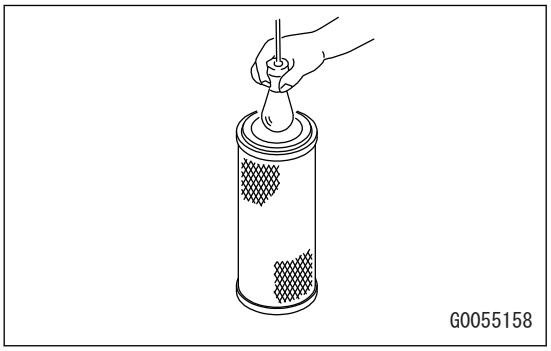
   REMARK

   The sticker is to record the number of times of cleaning from the time you started the use.



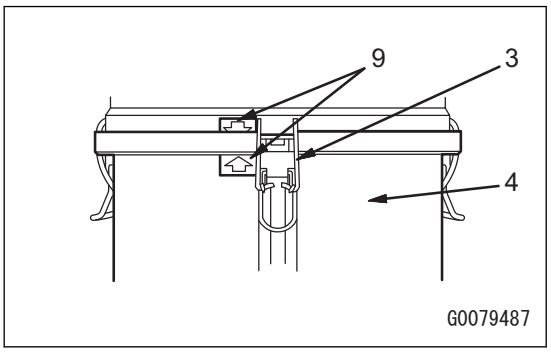
8. Illuminate the inner side of the element (5) to make sure that there is no small hole or thin part in it.

   If a problem is found, replace the element (5) with a new one.



9. Install the cover (4) as follows.
   1) Install the cleaned outer element (5).
   2) Check the O-ring (8).

      If damage is found, replace it.
   3) Align the matchmarks (9) of the body and the cover (4).
   4) Install the cover (4), and fix it with the clip (3).

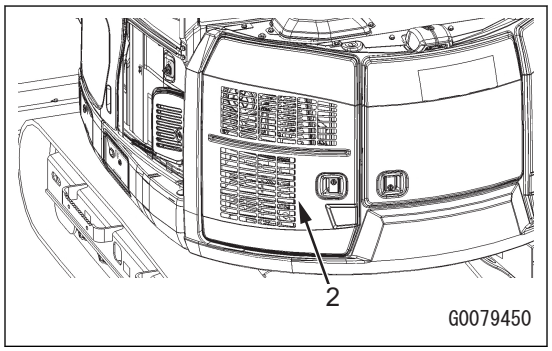


10. Check the air cleaner clogging caution lamp on the machine monitor.

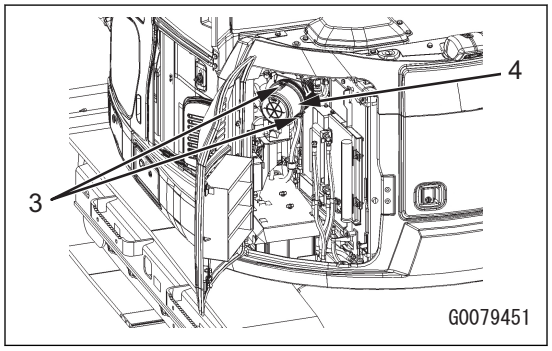
    If the lamp lights up immediately after the cleaning, replace the inner and outer elements.

How to Replace Air Cleaner Element

1. Open the rear left cover (2) on the left side of the machine.



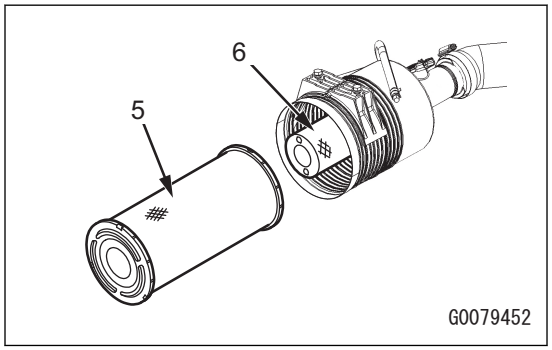
2. Remove the 3 clips (3), and remove the cover (4).



NOTICE

Do not remove the inner element (6). If it is removed, dirt will enter and can cause an engine problem.

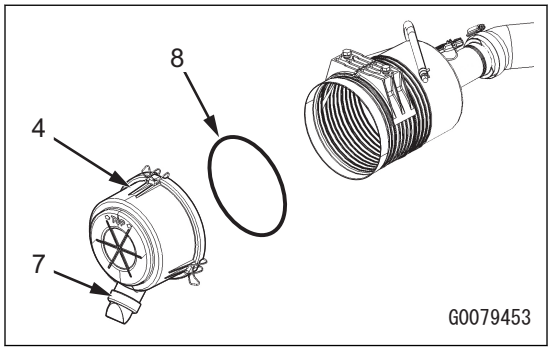
3. Pull out the outer element (5).



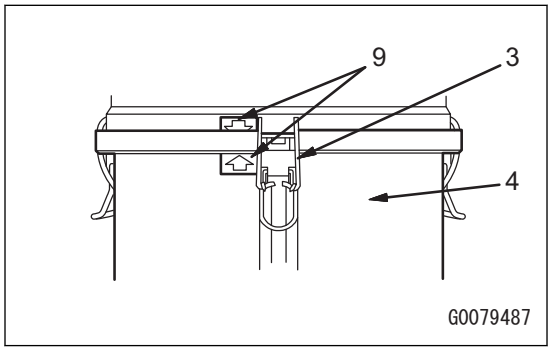
NOTICE

When you clean the cover (4), do not remove the vacuator valve (7).

4. Clean the inside of the air cleaner body and the cover (4).
5. Remove the inner element (6), and then quickly install the new inner element.

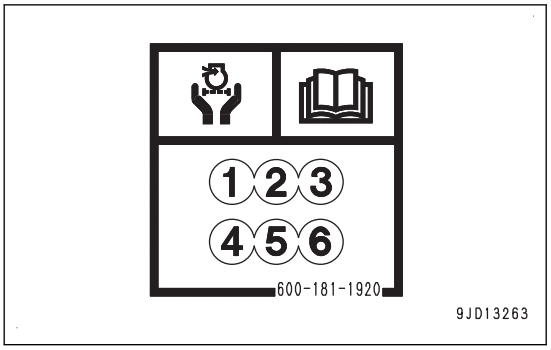


6. Install the cover (4) as follows.
   1) Install the new outer element (5).
   2) Check the O-ring (8).
      If damage is found, replace it.
   3) Align the matchmarks (9) of the body and the cover (4).
   4) Install the cover (4), and fix it with the clip (3).



7. Replace the sticker attached to the cover (4) with a new one.
8. Check the air cleaner clogging caution lamp on the machine monitor.

   If the lamp lights up immediately after the cleaning, replace the inner and outer elements.



Clean Inside of Cooling System

⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the cooling system is very hot and can cause burn injury.**
- **When you remove the expansion tank cap, wait for the temperature of the machine to go down, and turn the cap slowly to release the pressure, and remove the cap carefully. Immediately after the engine is stopped, the coolant is very hot and the pressure is accumulated in the expansion tank. If you remove the cap in this state, it can cause burn injury.**
- **Check that the conditions of the machine that follow are satisfied, and then stand up or go away from the operator's seat.**
  - **Each control lever is in the NEUTRAL position.**
  - **The lock lever is in LOCK position.**
- **When you wash it, operate the engine. While the engine is in operation, keep away from the rear part of the machine. It is dangerous if the machine starts moving when you are behind the machine.**
- **The coolant is poisonous. When you open the drain plug, be careful not to get coolant on you. If coolant gets into your eyes, immediately wash your eyes by a lot of clean water and consult a doctor.**
- **Consult your Komatsu distributor or a qualified company for disposal of the discharged coolant. The coolant is poisonous. Do not put it into drainage ditches or drain it onto the ground surface.**

NOTICE

Komatsu recommends the use of Non-Amine Engine Coolant (AF-NAC).

- Stop the machine on a hard and level ground, and clean inside of the cooling system or change the coolant. Clean inside of the cooling system and change the coolant as in the table that follows.

Coolant	Cleaning of inside of cooling system and change of coolant
Non-Amine Engine Coolant (AF-NAC)	Every 3 years or 6000 hours (See below for condition), whichever occurs first

- Komatsu machines are supplied with Non-Amine Engine Coolant (AF-NAC). Non-Amine Engine Coolant (AF-NAC) has excellent anti-corrosion, antifreeze and cooling properties and can be used continuously for every 3 years or every 6000 hours whichever occurs first in the below listed conditions
  (If other coolant than Komatsu approved non-Amine (AF-NAC) is used for refill or top off, the change interval is every 2 years or every 4000 hours whichever occurs first)
  Conditions to meet every 2 years or 4000 hours to extended coolant life:
  - Must pass coolant test/analysis at 4000 hours, the test interval is a precautionary procedure intended to prevent cooling and engine system damage
  - All maintenance top offs and refills were done with Komatsu approved non-Amine (AF-NAC) coolant

  Continue to use the non-Amine Engine Coolant (AF-NAC) even in the area where freeze prevention is not necessary.
  If you use the coolant that is not recommended, it can cause dangerous failure such as the corrosion of the cooling system where the light weight metal such as aluminum is used or engine.
  To prevent corrosion of the cooling system, use a coolant which its density is 30% or more even in the area where freeze prevention is not necessary.
- The supplied Non-Amine Engine Coolant (AF-NAC) is mixed with pure water.
  It is mixed with pure water, so it is not flammable.
- The coolant density is different by the ambient temperature. Find the lowest temperature in the past and select the correct density for the coolant as in the “Coolant density table” that follows.

Coolant Density Table

Min. atmospheric temperature (℃ {℉})	-10 {14} or more	-15 {5}	-20 {-4}	-25 {-13}	-30 {-22}	-35 {-31}	-40 {-40}	-45 {-49}	-50 {-58}
Density (%)	30	36	41	46	50	54	58	61	64

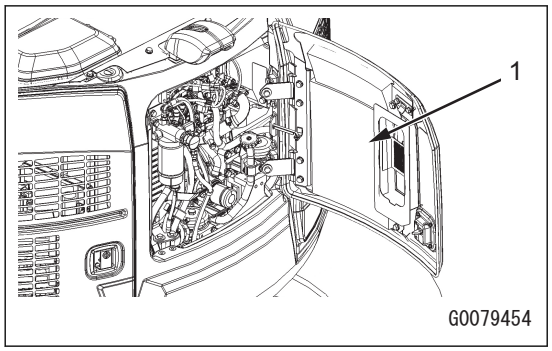
When you select the density for the coolant, set it for a temperature 10°C {18°F} lower than the actual lowest temperature in the jobsite.
The coolant density is different by the ambient temperature, but it must be 30% or more.
Check the density with a coolant tester.

How to Clean Inside of Cooling System

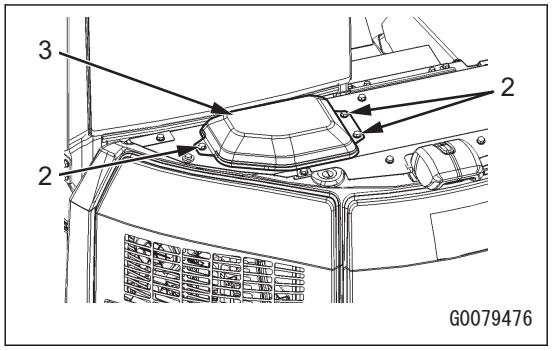
Items to be prepared

- Containers that have sufficient capacity to collect the drained coolant.
- A hose to add coolant
- Step
- Wire brush
- Liquid adhesive (LT-2)

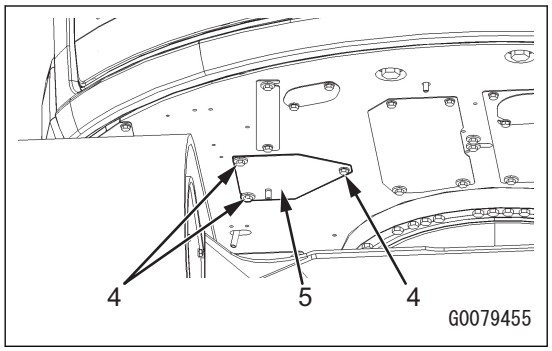
1. Stop the engine.
2. Open the rear cover (1).



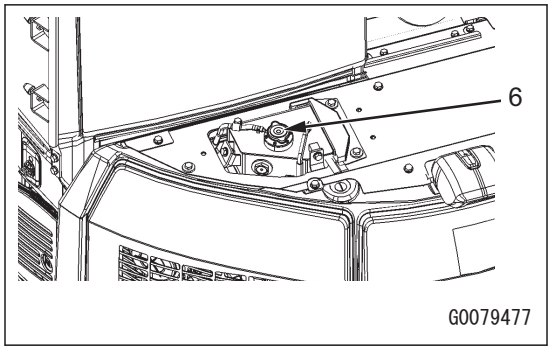
3. Place a step to let the work be easily done.
4. Remove the 3 cover mounting bolts (2) and remove the cover (3).



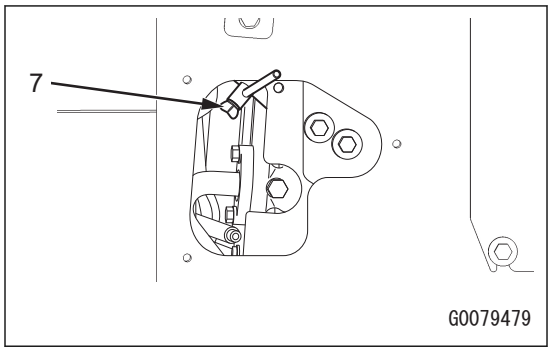
5. Remove the 3 cover mounting bolts (4) and remove the undercover (5).



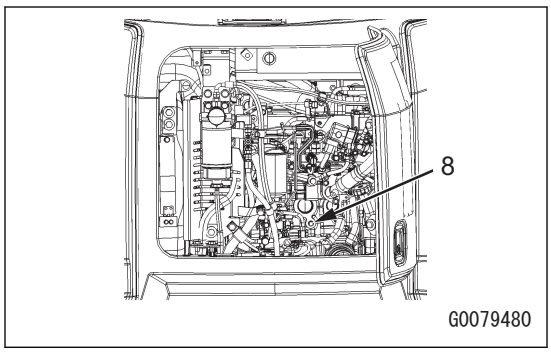
6. Make sure that the expansion tank cap is sufficiently cool to touch by bare hands.
7. Turn the expansion tank cap (6) slowly until it touches the stopper and release the pressure.



8. Put a container to collect the coolant below the drain hose installed to the drain valve (7) on the bottom of radiator.
9. Open the drain valve (7) from the bottom of machine.



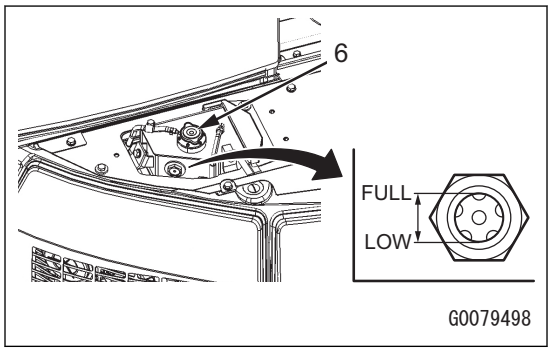
10. Put a container to collect the coolant below the drain plug (8) of the cylinder block.
11. Remove the drain plug (8) of the cylinder block, and drain coolant.
12. Close the drain valve (7).
13. Tighten the drain plug (8).



14. Remove the expansion tank cap (6), and add tap water.

    Add it to the FULL mark of expansion tank level gauge.
15. Tighten the expansion tank cap (6).
16. Start the engine.

    To start the engine, see OPERATION, “Operations and Checks Before You Start Engine (3-133)” and “How to Start Engine (3-136)”.

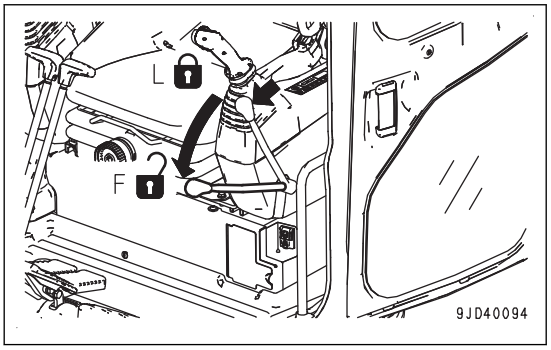


17. To complete the warm-up operation of the hydraulic component more quickly, set the working mode to the P mode (heavy-duty mode).

    For the working mode setting, see “How to Select Working Mode (3-163)”.

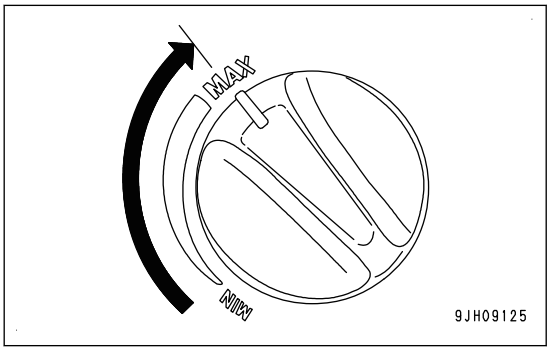


18. Hold the red part on the top of the lock lever, and then set it slowly and securely to the FREE position (F).
19. Raise the bucket from the ground.



20. Turn the fuel control dial to the High idle (MAX) position.

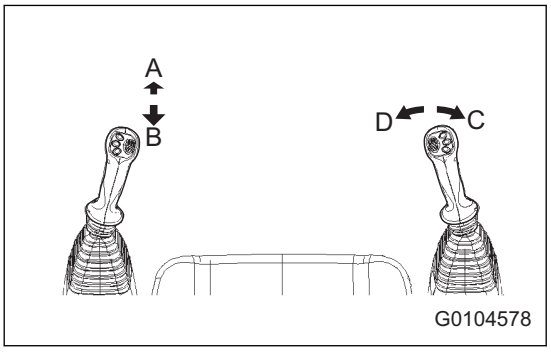
    Run the engine at high idle.



21. Operate the work equipment control levers as follows.

    NOTICE

    When you operate the work equipment, be careful not to let it interfere with the machine or ground.



    1) Move the R.H. work equipment control lever slowly in the direction of the bucket IN position (D). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
    2) Move the R.H. work equipment control lever slowly in the direction of the bucket OUT position (C). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
    3) Move the L.H. work equipment control lever slowly in the direction to the arm IN position (B). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.
    4) Move the L.H. work equipment control lever slowly in the direction to the arm OUT position (A). Operate the lever to the end of its stroke and hold it in the position for 30 seconds.

When the operations from step 1) to 4) continuously, the pointer of the engine coolant temperature caution lamp will rise. Pointer of the engine coolant temperature caution lamp drops one time at the position shown in the figure. After that, continue the operation for approximately 10 minutes.



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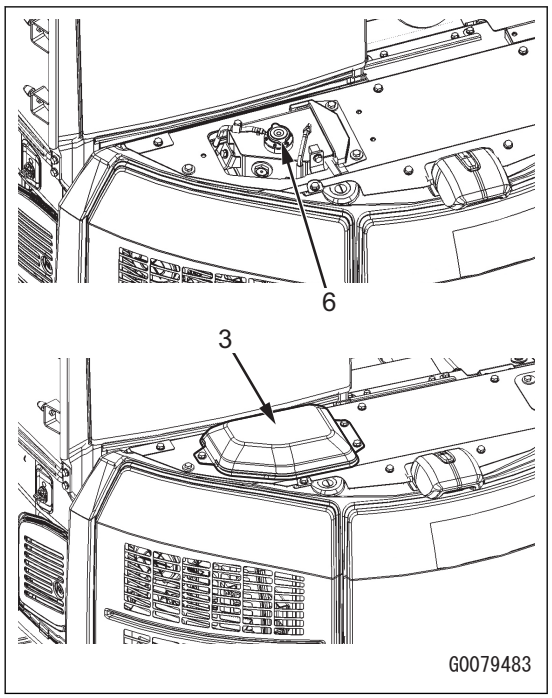
22. Stop the engine.
23. Make sure that the expansion tank cap (6) is sufficiently cool to touch by bare hands.
24. Turn the expansion tank cap (6) slowly until it touches the stopper and release the pressure.
25. Open the drain valve (7).
26. Remove the drain plug (8) and drain water.
27. Close the drain valve (7).
28. Brush off the adhesive attached to the drain plug (8) with wire brush.
29. Apply liquid adhesive (LT-2), and tighten it.
30. Install the undercover (5).
31. Add the Non-Amine Engine Coolant through the filler port to the FULL of the fluid level gauge of expansion tank.

    For the coolant density, see “Coolant density table”.
32. Tighten the expansion tank cap (6).
33. Run the engine at high idle until the pointer of the engine coolant temperature caution lamp comes to the position shown in the figure to bleed air mixed into the coolant.
34. Stop the engine.



G0079482

35. Wait approximately 3 minutes, and add the Non-Amine Engine Coolant to the FULL line of the fluid level gauge of expansion tank, then tighten the expansion tank cap (6).
36. Install the cover (3).



How to Examine Komatsu Maintenance-Free Battery Indicator

(Machine with Komatsu maintenance-free battery)

Check it before you start the machine.

⚠ WARNING

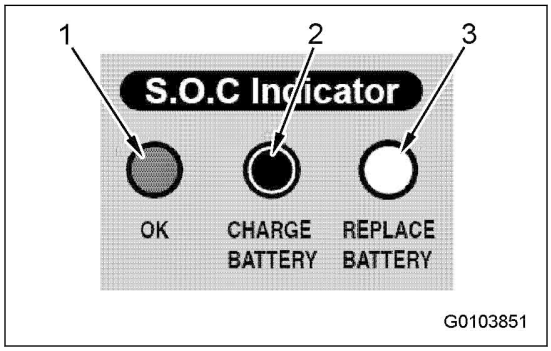
- **Do not let an open flame be near the battery. Flammable gas occurs from the battery, and it can cause an explosion.**
- **Battery electrolyte is dangerous object. Be careful not to let it get in your eyes or on your skin. If it gets on you, clean the part with a lot of water and consult a doctor immediately.**
- **You cannot add battery electrolyte.**

- The indicator that shows the battery charge level and battery electrolyte level is installed on the top of the battery.
- Check the display state, and obey the instruction.
- The display of the indicator cannot be shown correctly at low temperature in some cases.

(1) Green: The battery is in normal condition.

(2) Black: The battery requires to be charged. Obey the instruction manual of the battery charger, and handle it correctly.

(3) White: The battery electrolyte level is low. Replace the battery with a new one. You cannot add battery electrolyte.



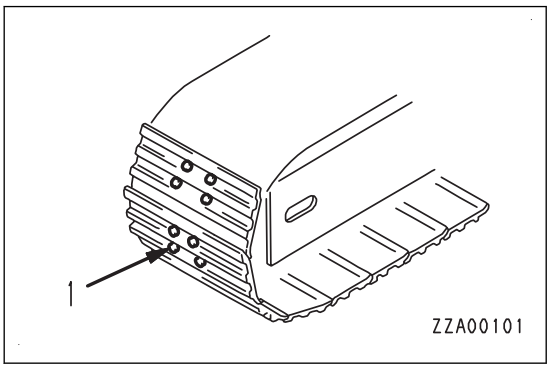
How to Examine Looseness of Track Shoe Bolts, Retighten Bolts

(Steel shoe specification)

NOTICE

Tighten the track shoe bolt immediately if it is loose. If it is used as it is loose, shoe bolt will be broken.

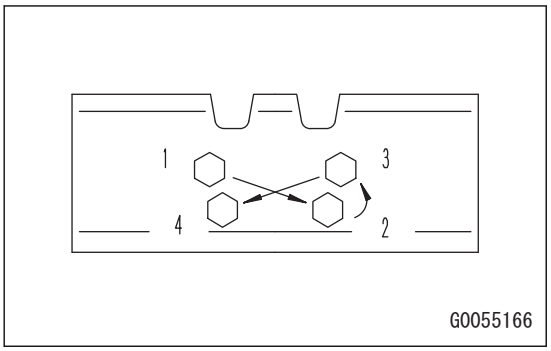
1. Check the track shoe bolts (1) for looseness.



2. If a loose bolt is found, tighten it in the sequence shown in the figure.

   Tightening torque: 98.1 to 137Nm {10 to 14kgfm, 72.3 to 101lbft}

3. Make sure that the nut and shoe contact with the link contact surface securely.
4. After you check it, retighten it by 80 to 100°.

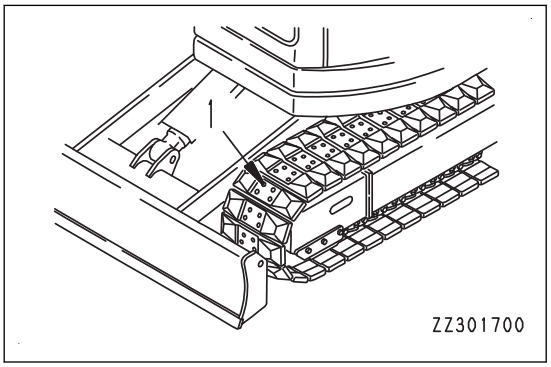


How to Examine Looseness of Roadliner Shoe Bolts, Retighten Bolts

NOTICE

Tighten the roadliner shoe bolt immediately if it is loose. If it is used as it is loose, shoe bolt will be broken.

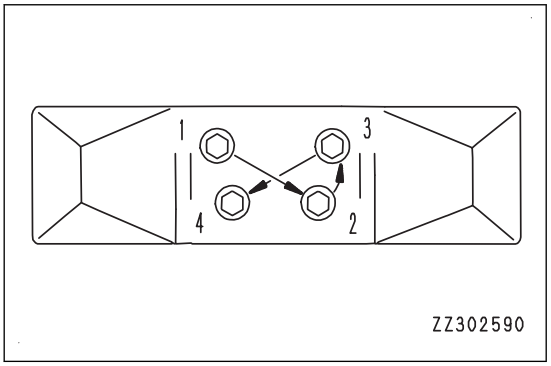
1. Check that the roadliner shoe bolt (1) is not loose.



2. If a loose bolt is found, tighten it in the sequence shown in the figure.

   Tightening torque: 177 to 216Nm {18 to 22kgfm, 130 to 159lbft}

3. Make sure that the nut and shoe contact with the link contact surface securely.



How to Examine and Adjust Track Tension

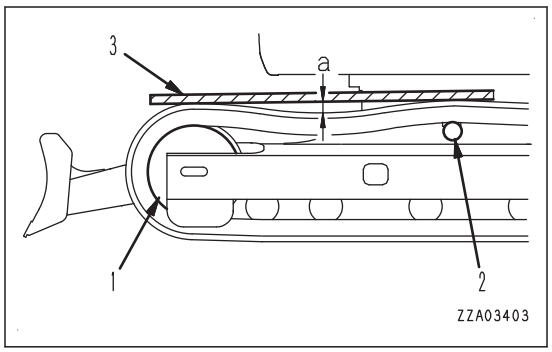
(Steel shoe, roadliner specification)

The wear of the pins and bushings of the undercarriage is different in response to the working condition and soil condition. Check the track tension in response to the state, and keep the standard tension.

Do the check and adjustment on a firm and level ground.

How to Examine Track Tension

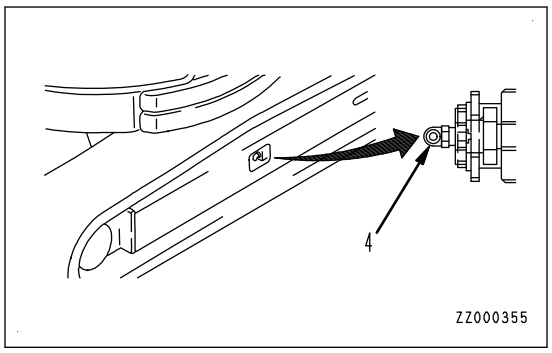
1. Run the engine at low idle.
2. Move the machine forward slowly for a distance equal to the length of the track on ground.
3. Put a wooden block (3) which reaches from the idler (1) to the carrier roller (2) on the track.
4. Measure the maximum deflection (a) between the wooden block and the track.
   - When the deflection (a) is in the range of the standard value (10 to 30mm {0.4 to 1.2in}), the tension of the track is correct.
   - When the deflection (a) is not in the range of the standard value (10 to 30mm {0.4 to 1.2in}), adjust the tension of the track in the procedure that follows.



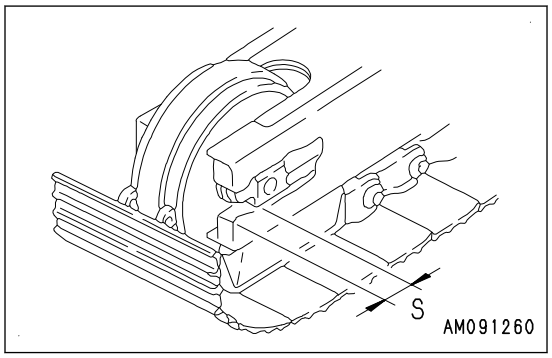
How to Increase Track Tension

Prepare the grease pump.

1. Push in the grease through the grease fitting (4) with a grease pump.



   The limit that grease can be push in is until the distance (S) from the idler support to the track frame becomes 0mm {0in}. If the tension remains loose, pins and bushings have been worn out. Consult your Komatsu distributor for turn the pins and bushing or replace them.
2. To check that the tension is correct, move the machine forward slowly for a distance equal to the length of the track on ground with the engine at low idle.
3. Check the tension of the tracks.



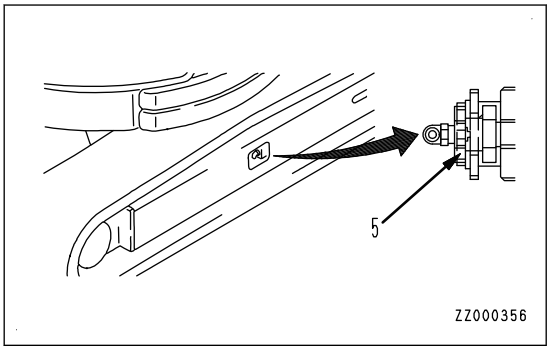
If the tension is not correct, adjust it again.

How to Decrease Track Tension

⚠ WARNING

The pressure inside of track tension adjustment device is high. If you do not follow the correct adjustment procedure, the plug (5) can fly out and cause serious injury or death. Obey the items that follow.

- **Do not stand in front of the plug (5).**
- **Do not loosen the plug (5) one turn or more. Be sure to slowly loosen the plug less than 1 turn.**
- **Loosen only the plug (5). Do not loosen other parts.**
- **Do not point your face towards the installation direction of the plug (5).**
- **If track tension is not loosened even when you adjust it with the correct procedure, consult your Komatsu distributor for repair.**



1. Loosen the plug (5) gradually to drain the grease.
   If the grease does not come out smoothly, move the machine back and forth for a short distance.
2. Tighten the plug (5) securely.
3. To check that the tension is correct, move the machine forward slowly for a distance equal to the length of the track on ground with the engine at low idle.
4. Check the tension of the tracks.

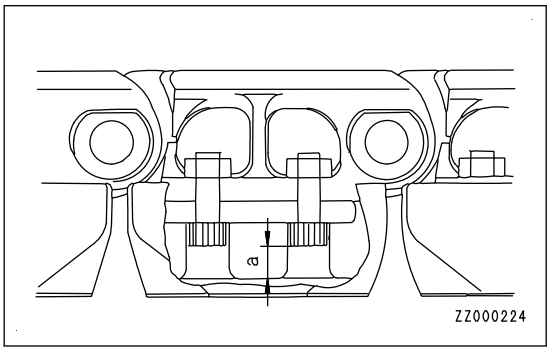
If the tension is not correct, adjust it again.

How to Examine Roadliners

Check that the height of the lug (a) is 5mm {0.197in} or higher.

REMARK

If the lug height (a) is reduced by wear, the drawbar pull will decrease.



If the lug height (a) is 5mm {0.197in} or less, ask your Komatsu distributor to make a determination regarding the roadliner, such as replacement, repair, or continued use.

How to Replace Roadliners

- If you replace all the roadliners installed on a machine, consult your Komatsu distributor for replacement.
- If you replace a part of roadliners, use tools for removal and installation of roadliner, and replace. Make an order of the tools to your Komatsu distributor.

How to Examine Rubber Shoe

The rubber shoe need repair or replacement with the conditions that follow. Consult your Komatsu distributor.

Lug height

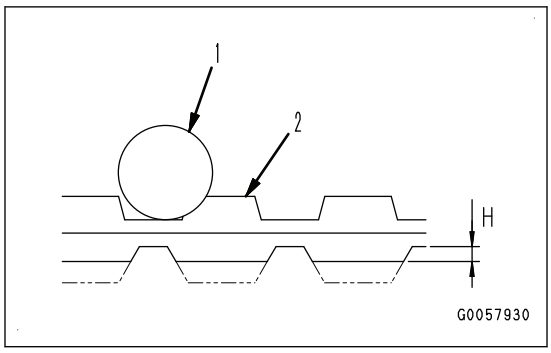
- When the lug height (h) is reduced to 5mm {0.197in} or less, replace it with a new one.

  (1) Track roller

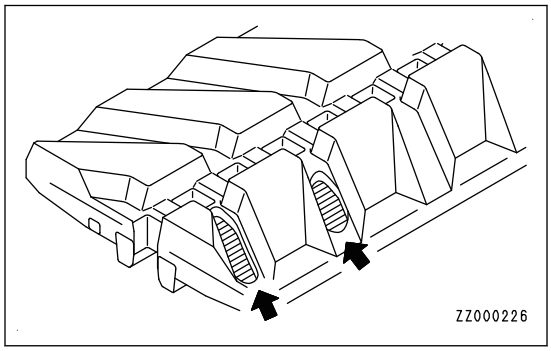
  (2) Rubber shoe

  REMARK

  If the lug height (h) is reduced by wear, the drawbar pull will decrease.

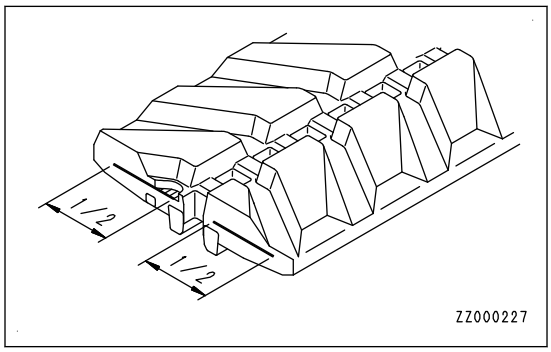


- If the lugs are worn and the steel cords in the shoes are exposed on 2 or more links, replace it with a new one.



Cut of rubber shoe steel cords

If a half or more of the steel cord layer is cut on one side, replace it with a new one.



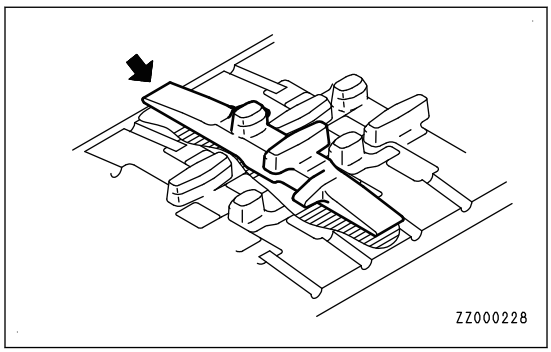
Separation of rubber shoe core metal

If the rubber shoe core metals are separated at 1 or more places, replace it with a new one.

Rubber shoes track tension

If the rubber shoe tension is loose and rubber shoe comes off even when you press-fit the grease, replace the seal in the grease cylinder, and press-fit the grease after that.

If the tension does not become better, replace the rubber shoe with a new one.



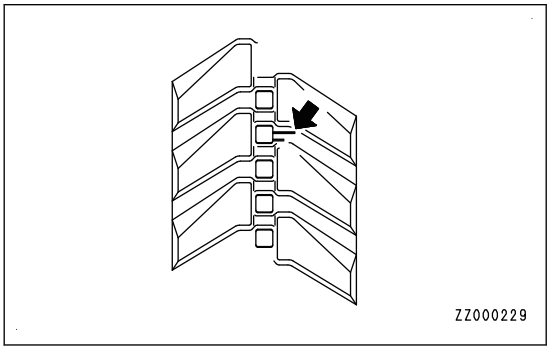
REMARK

When the looseness cannot be repaired and the rubber shoe is about to come off, one of the items that follow can be the cause.

- Stretched rubber shoes
- Failure of grease cylinder

Crack in rubber shoe

When the crack made between the lugs of the rubber shoe becomes approximately 60mm {2.4in}, consult your Komatsu distributor for repair.



NOTICE

Even if the crack is small and short, when the steel cords inside are shown, consult your Komatsu distributor for repair immediately.

When the crack is 30mm {1.2in} or less and its depth is 10mm {0.4in} or less, repair is not needed.

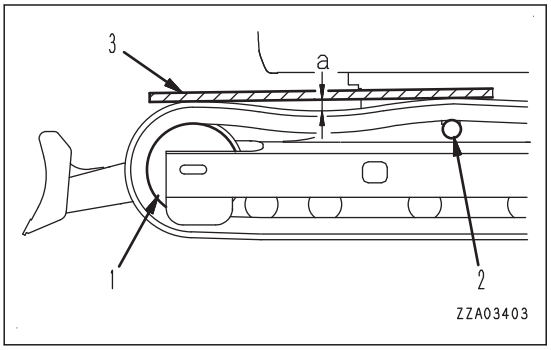
For judgment of replacement, repair, and continuation of use of the rubber shoe, consult your Komatsu distributor.

How to Examine and Adjust Rubber Shoe Track Tension

- The wear state of the rubber shoes is different by the working condition and soil condition. Check the wear state and track tension in response to the working condition Check and adjust the tension on a flat and solid ground.
- Initial looseness will be caused by traveling in 5 to 30 hours after the new rubber shoes were installed even when the machine is new. The risk of the shoe coming off increases if the rubber shoe track tension is not sufficient.
  To prevent the shoe not to come off, adjust the tension more frequently until there is no initial looseness.
- If you work with the rubber shoes loosened, the rubber shoes can come off and the core metal can wear in a short period.

How to Examine Rubber Shoe Track Tension

1. Run the engine at low idle.
2. Move the machine forward slowly for a distance equal to the length of the track on ground.
3. Put a wooden block (3) which reaches from the idler (1) to the carrier roller (2) on the track.
4. Measure maximum deflection (a) between the wooden block and the rubber shoe.
   - When the deflection (a) is in the range of the standard value (1 to 3mm {0.039 to 0.118in}), the tension of the track is correct.
   - When the deflection (a) is not in the range of the standard value (1 to 3mm {0.039 to 0.118in}), adjust the tension of the track in the procedure that follows.



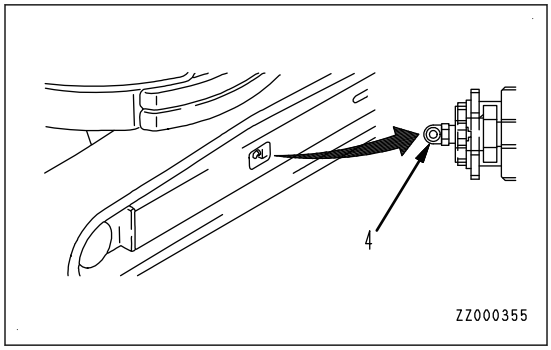
How to Examine Rubber Shoe Track Tension

NOTICE

Be very careful not to apply too much tension to the rubber shoe track because the standard value is small.

Prepare the grease pump.

1. Push in the grease through the grease fitting (4) with a grease pump.
2. To check that the tension is correct, move the machine forward slowly for a distance equal to the length of the track on ground with the engine at low idle.
3. Check the tension of the rubber shoe.



If the tension is not correct, adjust it again.

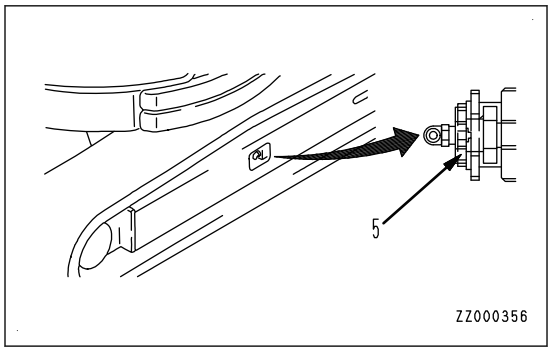
If the tension remains low even after the grease is pushed in, consult your Komatsu distributor to replace the seal in the grease cylinder or the rubber shoe.

How to Decrease Rubber Shoe Track Tension

⚠ WARNING

The pressure inside of track tension adjustment device is high. If you do not follow the correct adjustment procedure, the plug (5) can fly out and cause serious injury or death. Obey the items that follow.

- **Do not stand in front of the plug (5).**
- **Do not loosen the plug (5) one turn or more. Be sure to slowly loosen the plug less than 1 turn.**
- **Loosen only the plug (5). Do not loosen other parts.**
- **Do not point your face towards the installation direction of the plug (5).**
- **If track tension is not loosened even when you adjust it with the correct procedure, consult your Komatsu distributor for repair.**



1. Loosen the plug (5) gradually to drain the grease.

   If the grease does not come out smoothly, move the machine back and forth for a short distance.
2. Tighten the plug (5) securely.
3. To check that the tension is correct, move the machine forward slowly for a distance equal to the length of the track on ground with the engine at low idle.
4. Check the tension of the tracks.

If the tension is not correct, adjust it again.

How to Replace Rubber Shoe

⚠ WARNING

- **The work must be carried out by two people, and the operator must obey the sign of the other worker when you move the machine.**
- **For the replacement of the rubber shoe, the machine needs to be lifted. It is very dangerous if the machine is caused to fall by accident during the replacement work.**
  During the replacement work, make sure to move only the rubber shoe which is to be replaced. In addition, do not put a part of your body below the rubber shoes or the track frame.

NOTICE

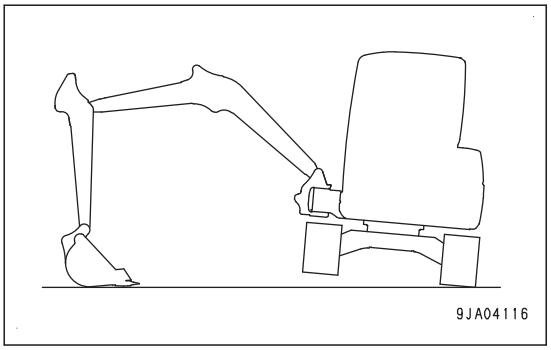
When you change the shoe from the rubber shoe to the roadliner or steel shoe, the idler cushion needs to be removed and adjusted. Consult your Komatsu distributor.

Items to be prepared

- Grease pump
- Steel pipe

Before you start the work, set the machine in the posture shown in the figure as follows and stop the engine.

1. Swing the machine to make the undercarriage and the upper structure at a right angle.
2. Lift the machine slowly with the boom and the arm, and then raise the one side of the track.

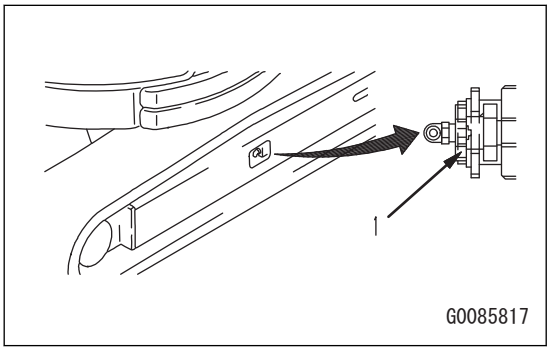


Remove Rubber Shoe

⚠ WARNING

The pressure inside of track tension adjustment device is high. If you do not follow the correct adjustment procedure, the plug (1) can fly out and cause serious injury or death. Obey the items that follow.

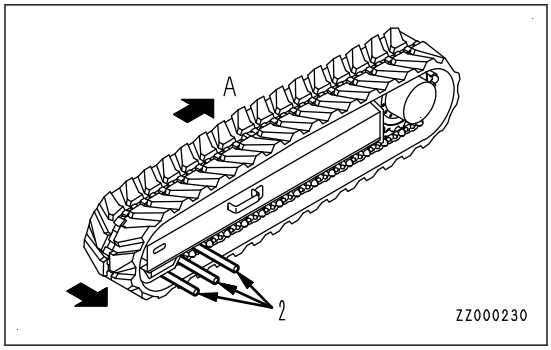
- **Do not stand in front of the plug (1).**
- **Do not loosen the plug (1) one turn or more.**
  Be sure to slowly loosen the plug less than 1 turn.
- **Loosen only the plug (1). Do not loosen other parts.**
- **Do not point your face towards the installation direction of the plug (1).**



- **If track tension is not loosened even when you adjust it with the correct procedure, consult your Komatsu distributor for repair.**
- **Before you remove the rubber shoe, check that the internal grease is fully discharged, and then turn the sprocket.**

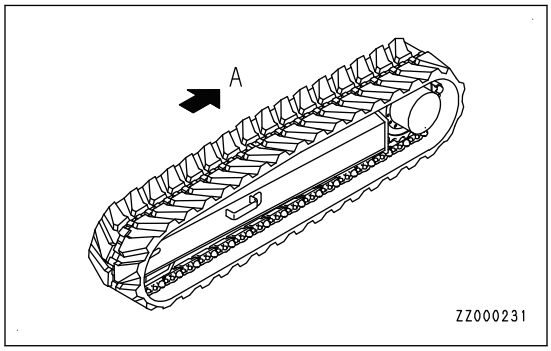
1. Loosen the plug (1) gradually to drain the grease.

2. Insert the steel pipe (2) between the rubber shoe and track frame.
3. Turn the sprocket in REVERSE direction (A).
   The rubber shoe track is lifted off the idler by steel pipe (2).
4. Slide the rubber shoe in the lateral direction to remove it.

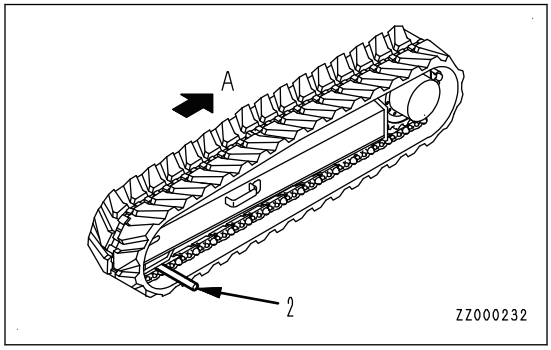


Install Rubber Shoes

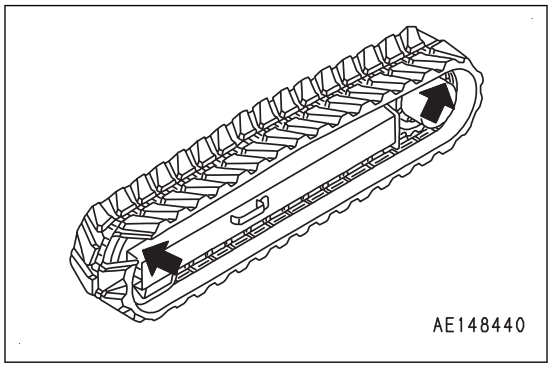
1. Engage the rubber shoe track with the sprocket and place it over the idler.
2. Turn the sprocket in REVERSE direction (A).
3. Push the rubber shoe to stop the rotation.



4. Insert the steel pipe (2) between the rubber shoe and track frame.
5. Turn the sprocket in REVERSE direction (A).
6. Securely engage the rubber shoe to the idler to stop the rotation.



7. Check that the rubber shoe track is securely engaged with the sprocket and idler.



8. Adjust the tension of the rubber shoe.
   For the tension adjustment, see “How to Examine and Adjust Rubber Shoe Track Tension (4-32)”.
9. Check that the rubber shoe track is securely engaged with the sprocket and idler and its tension is correct.
10. Operate the work equipment control lever to lower the machine slowly by using the boom and the arm.

How to Change Steel Shoes and Roadliners with Rubber Shoes

⚠ WARNING

When you change the shoes from the steel shoes or roadliners to the rubber shoes, or from the rubber shoes to the steel shoes or roadliners, the idler cushion needs to be adjusted. Be sure to consult your Komatsu distributor for the work.

How to Replace Bucket Teeth (Vertical Pin Type)

Replace the tooth before it is worn to the end surface of the adapter.

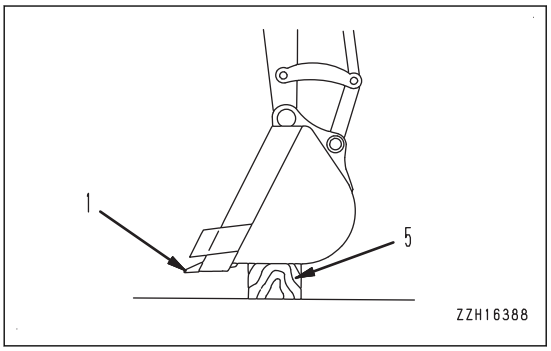
⚠ WARNING

- **Before you replace the tooth, set the machine to the state that follows. If the machine starts moving by mistake, it is dangerous.**
  - **The machine is kept in stable condition.**
  - **The engine is stopped.**
  - **The work equipment lock lever is in the LOCK position.**
- **When you do the work, wear the protective equipment such as protective eyeglasses and gloves. There is a danger that the broken pieces will fly.**
- **Make sure that there is no person around when you punch out a pin. There is a danger that the pin jumps out.**

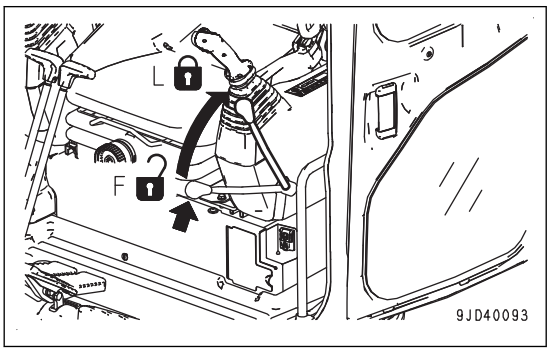
Items to be prepared

- Hammer
- Bar
- Putty knife

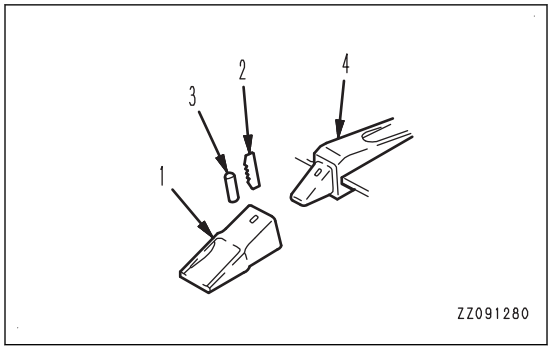
1. Set the work equipment to be the posture shown in the figure to let you punch out the pin of the tooth (1).
   1) Lower the blade to the ground.
   2) Put the block (5), and lower the bucket onto it to let the bottom face of the bucket be horizontal.
   3) Check that the work equipment is in a stable condition.



   4) Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
   5) Stop the engine.



2. Punch out the lock pin (2) with the hammer and the bar.



NOTICE

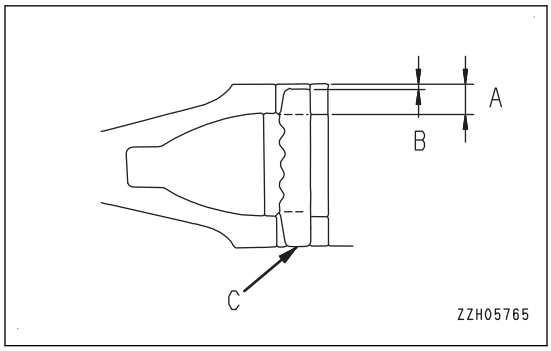
Set the bar against the back of the pin. If the bar is set against the rubber pin lock (3) when it is hit, the rubber pin lock possibly breaks.

3. After the lock pin (2) and rubber pin lock (3) are removed, check them.

   Check the shape of the lock pin (2) and the rubber pin lock (3), and replace it with a new one if an abnormality is found. Do not use the lock pin (2) and rubber pin lock (3) as shown. If you use them, the tooth (1) will come off during the operation.

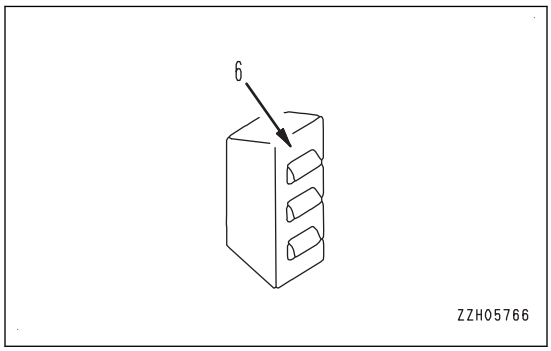
   - Lock pin (2) is too short.

     When dimension (B) is 1/3 or more of dimension (A) when the end surface of the lock pin (2) is aligned with the bottom face (C)



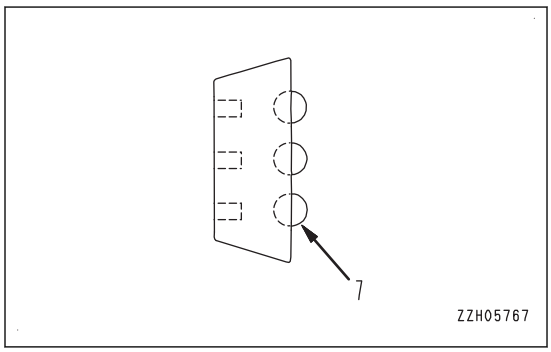
   - Steel ball is about to come off.

     The rubber (6) of the rubber pin lock (3) is deteriorated or damaged.



   - The steel ball (7) sinks.

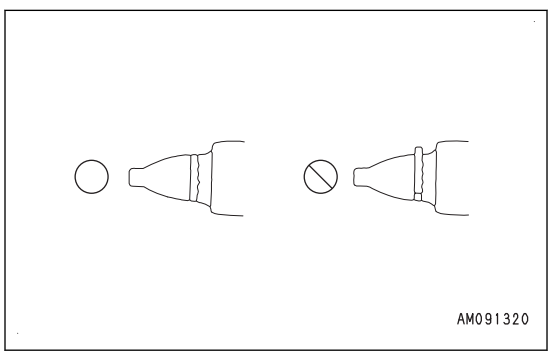
     Rubber of the rubber pin lock (3) is deteriorated and the steel ball (7) sinks into it when you push the ball by hand.



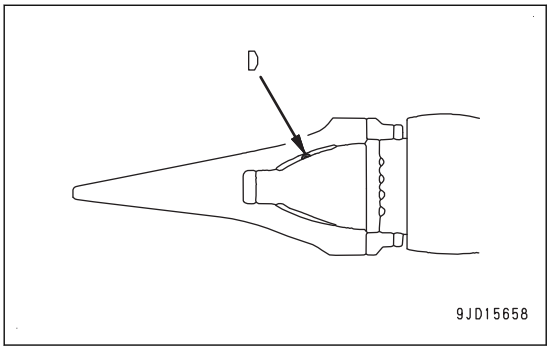
4. Remove dirt stuck to the adapter (4) with a putty knife.
5. Push the rubber pin lock (3) into the hole of the adapter (4) by hands or the hammer.

   At this time, be careful that the rubber pin lock (3) does not fly out from the adapter surface.
6. Clean the inside of tooth (1), and then install it to the adapter (4).

   If mud stuck to it or if there are protrusions, the tooth (1) will not be fully inserted to the adapter (4), and it does not engage well.

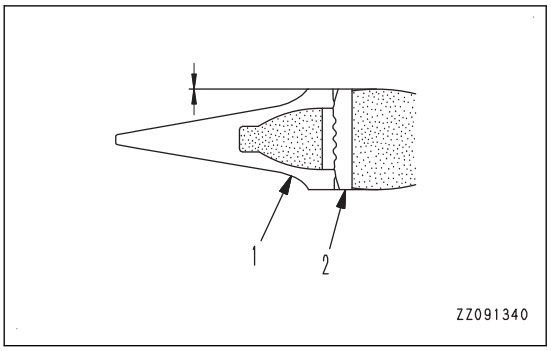


7. Set the tooth (1) to the adapter (4), and push the tooth (1) strongly.
8. Check that the back surface of the pin hole of the tooth (1) is almost on the same line of the back surface of the pin hole of the adapter (4).
   - If the back of the pin hole on the tooth (1) protrudes from the back of the pin hole on the adapter (4), remove the deposit (D) which prevents a full connection of the tooth (1) and adapter (4).

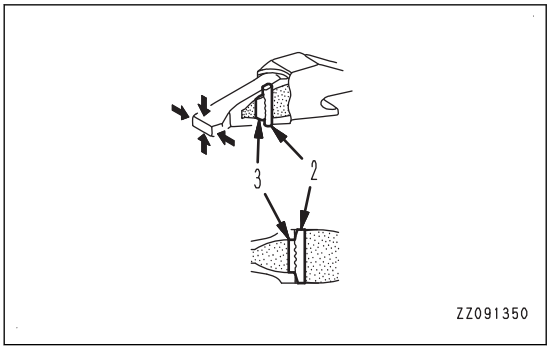


9. Insert the lock pin (2) in the pin hole in the tooth (1), and hit it in until the top surface of the lock pin (2) becomes the same height as the surface of the tooth (1).

   At this time, if you punch it in too strong, the position of the lock pin (2) can be misaligned. Be careful.
10. Punch back the lock pin (2) lightly in the opposite direction to that when you punched it in.
11. Lightly hit the top of the tooth (1) up and down and the sides from right and left with a hammer.



12. Check the items that follow.
    - The lock pin (2) is fixed on the face of the tooth (1).
    - The rubber pin lock (3) and the lock pin (2) are set as shown in the figure.



REMARK

- If you turn over the tooth (1) after you used it for some period of time, you can continuously use it while wear will be uniform, service life will be extended, and the number of replacements can be reduced.
- At the same time as you replace the tooth (1), replace the lock pin (2) and the rubber pin lock (3) with new ones. This will prevent a drop of tooth (1).

How to Replace Bucket Teeth (Horizontal Pin Type)

Replace the tooth before it is worn to the end surface of the adapter.

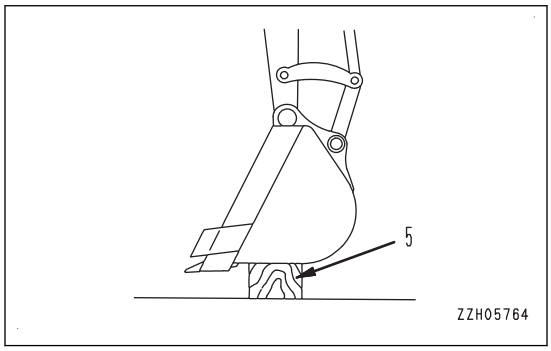
⚠ WARNING

- **Before you replace the tooth, set the machine to the state that follows. If the machine starts moving by mistake, it is dangerous.**
  - **The machine is kept in stable condition.**
  - **The engine is stopped.**
  - **The work equipment lock lever is in the LOCK position.**
- **When you do the work, wear the protective equipment such as protective eyeglasses and gloves. There is a danger that the broken pieces will fly.**
- **Make sure that there is no person around when you punch out a pin. There is a danger that the pin jumps out.**

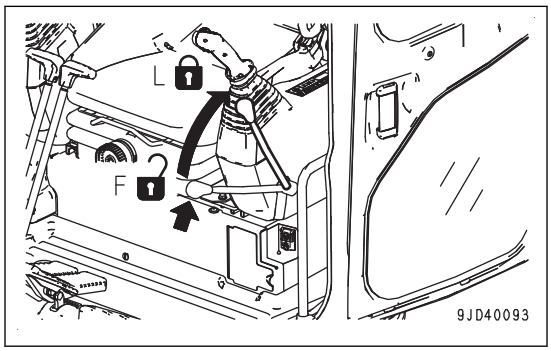
Items to be prepared

- Hammer
- Bar

1. Set the work equipment to be the posture shown in the figure to let you punch out the pin (1) of the tooth (2).
   1) Lower the blade to the ground.
   2) Put the block (5), and lower the bucket onto it to let the bottom face of the bucket be horizontal.
   3) Check that the work equipment is in a stable condition.



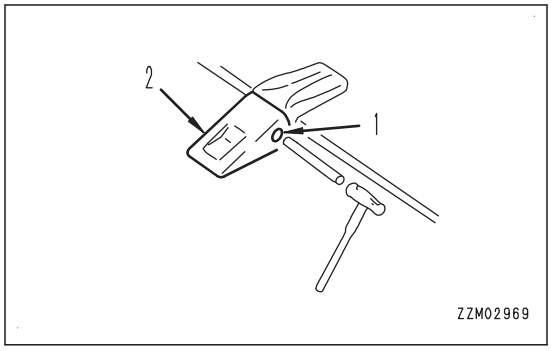
   4) Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
   5) Stop the engine.



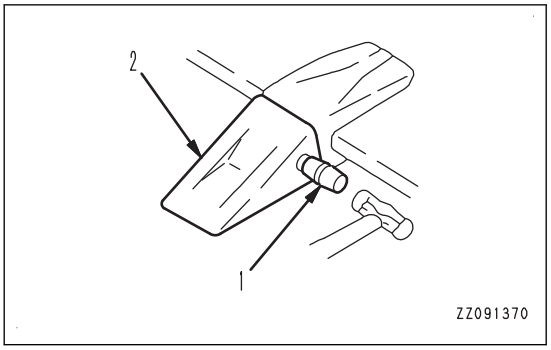
2. Put a bar on the pin (1), hit the bar with a hammer to push out the pin, and then remove the tooth (2).

   The bar must be round and thinner than the pin.

   If it cannot be removed by this method, consult your Komatsu distributor for replacement work.



3. Clean the mounting face and fit new tooth (2) to the adapter.
4. Insert the pin (1) to the half way.
5. Punch in the pin (1) with a hammer to install the tooth (2) to the bucket.



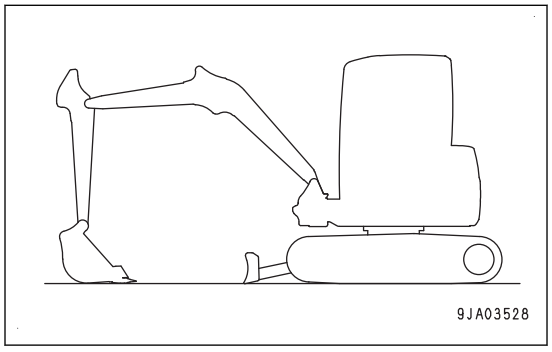
How to Adjust Bucket Clearance

⚠ WARNING

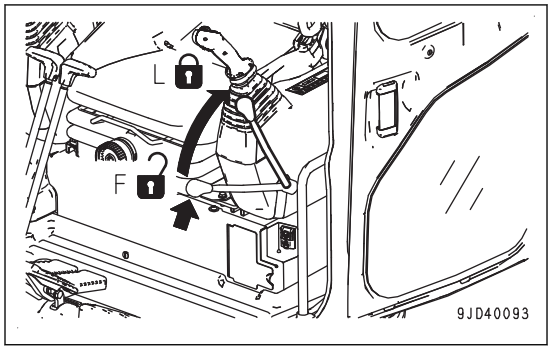
Before you adjust the bucket clearance, let the machine be in the state that follows. If the machine starts moving by mistake, it is dangerous.

- **The work equipment is lowered to the ground and kept in a stable condition.**
- **The engine is stopped.**
- **The work equipment lock lever is in the LOCK position.**

1. Set the machine to be in the work posture with the operations that follow.
   1) Lower the work equipment to the ground.
   2) Check that the work equipment is in a stable condition.



   3) Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
   4) Stop the engine.



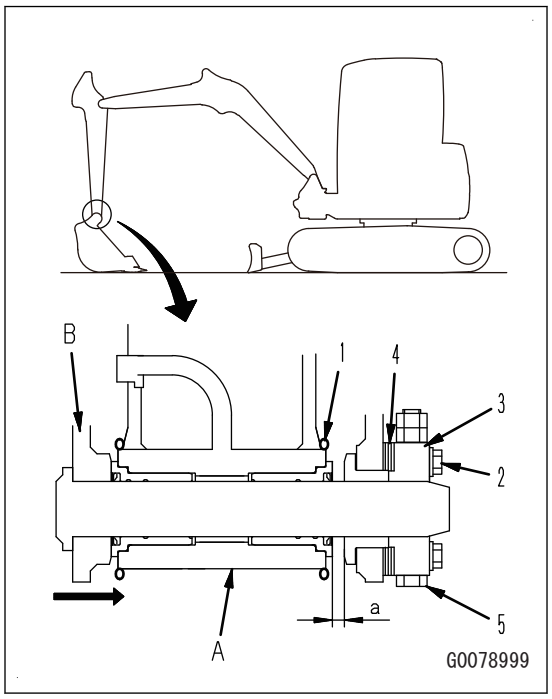
2. Move the O-ring (1) at the connecting part, and measure the play (a).

   A: Arm

   B: Bucket

   REMARK

   - If you move the bucket to one side, you can easily measure the play at 1 place. The figure shows the case when the bucket is moved to the right side.
   - Use a feeler gauge for easy and accurate measurement.



3. Loosen the 4 plate mounting bolts (2), and then loosen the plate (3).

The shim (4) is a split type. It is not necessary to remove the bolts when you do the work.

4. Install the shim (4) for the same quantity of the play (a).

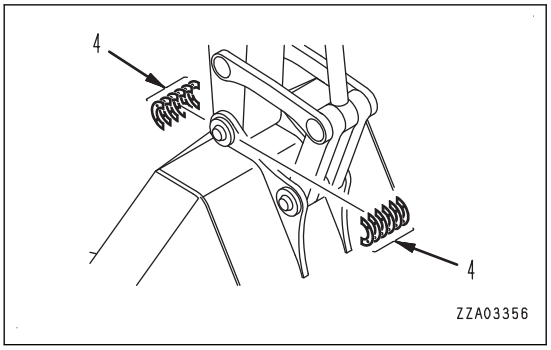
   The shim (4) is a pair of 2 pieces. The thickness of one piece of the shim (4) is 0.5mm {0.02in}.

   When the play (a) is smaller than the thickness of one piece of the shim, the bucket clearance is correct.

5. Tighten the 4 plate mounting bolts (2).

REMARK

If it is too tight to tighten the bolt (2), pull out the pin stopper bolt (5) one time, then it will be easy to tighten the bolt (2) in some cases.

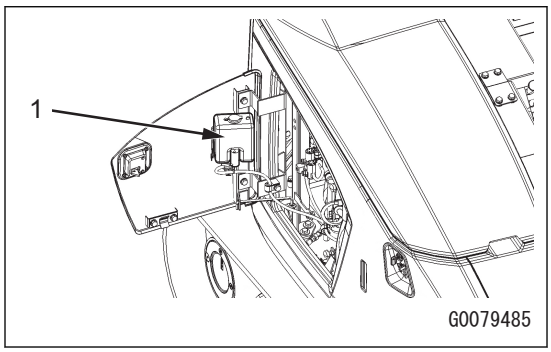


How to Examine and Add Window Washer Fluid

If air is mixed in window washer fluid, check the fluid level in the window washer tank (1).

1. Check the fluid level in the window washer tank (1).
2. If it is not sufficient, add window washer fluid for automobile.

   Be careful not to allow entry of foreign material when you add the window washer fluid.



Mixing Proportion of Pure Window Washer Fluid and Water

The mixing proportion is different by the ambient temperature. Add the window washer fluid mixed with water in the proportion that follows.

Area, season	Mixing proportion	Freezing temperature
Normal	Undiluted solution 1/3 : water 2/3	-10℃ {14℉}
Winter in cold district	Undiluted solution 1/2 : water 1/2	-20℃ {-4℉}
Winter in very cold district	Pure washer fluid	-30℃ {-22℉}

There are 2 types of commercially available window washer fluid for automobile (undiluted solution) by the freezing temperature, one is -10℃ {14℉} (for general use) and the other is -30℃{-22℉} (for cold district). Select by area or season.

REMARK

There is an air bleeding hole on the cap of window washer tank to prevent breakage caused by negative pressure in the tank when window washer is operated. The window washer fluid possibly leaks from the hole for air bleeding by its volume or the vibration of the machine, but it is not a failure.

Check and Maintenance Air Conditioner

Examine and Maintenance Items

Some maintenance items of the air conditioner are to be done regularly and the others are to be done when required.

Do the inspection and maintenance as in the table that follows.

Check and maintenance items	Content of check and maintenance	Guideline for maintenance interval
Refrigerant (gas)	Fill quantity	Two times a year (spring, autumn)
Air conditioner condenser	Clogged fins	Every 500 hours “How to Examine and Clean Fins (4-73)”
Compressor	Operation condition	Every 4000 hours
Blower motor, fan	Operating condition (Check for unusual noise)	When required
Control mechanism	Operating condition (Check that function is normal)	When required
Piping mounts	Mounting condition, looseness at tightening or connection part, leakage of gas, damage	When required

Even during the off-season, operate the air conditioner for 3 to 5 minutes one time a month to keep the oil film at all parts of the compressor.

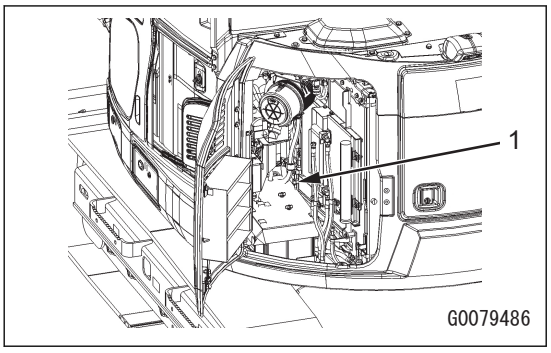
How to Examine Refrigerant Level for Air Conditioner (Gas)

⚠ WARNING

- **Do not loosen the parts of the refrigerant circuit. There is a danger that the refrigerant leaks.**
- **Do not touch the refrigerant of the air conditioner. There is a danger of loss of sight If the refrigerant gets into your eye, or frostbite if it is splashed on your hand.**
- **Do not let an open flame be near the point where the refrigerant gas leaks.**

If the refrigerant level is not sufficient, the performance of the air conditioner decreases.

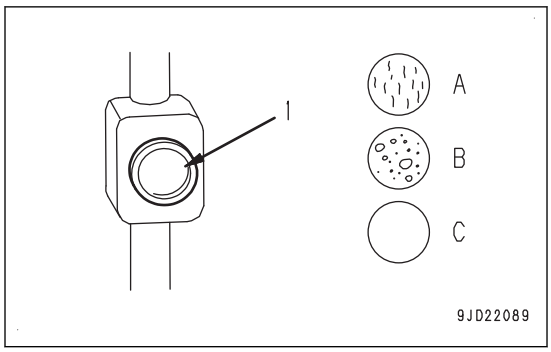
1. Run the engine at high idle.
2. Set the temperature to 18.0℃ {64.4℉} (maximum cooling) and operate the air conditioner.
3. Check the condition of the refrigerant gas (Hydrofluorocarbons HFC-R134a) in the refrigerant circuit, through the sight glass (1) (inspection window) at the refrigerant hose fitting.



(A) No bubbles are found in refrigerant flow: Sufficient

(B) Bubbles are found in refrigerant flow: Not sufficient (bubbles pass continuously)

(C) Colorless, transparent: No refrigerant



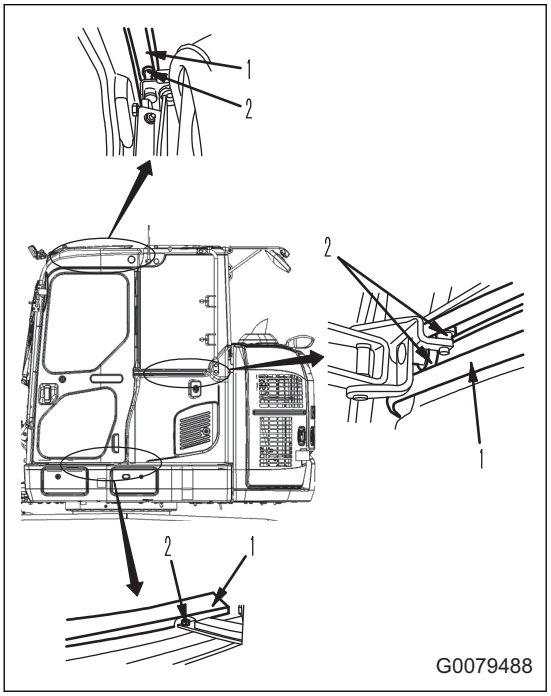
REMARK

If bubbles are found, the refrigerant gas is not sufficient. Consult your Komatsu distributor to add the refrigerant gas. If the air conditioner is operated with low refrigerant level, it can cause damage to the compressor.

How to Examine, Clean and Lubricate Slide Door Rail and Roller

How to Examine Slide Door Rail and Roller

Open and close the slide door to check that there is no foreign material such as mud stuck to the rail (1) or the roller (2) of the 3 slide doors shown in the figure.
If there are foreign materials such as mud stuck to there, the movement becomes bad.



If there are foreign materials such as mud stuck to there, clean the rail (1) and the roller (2) of the slide door, and lubricate them.

How to Clean Slide Door Rail

1. Open and close the slide door, and remove dirt in the rail (1) with a brush.
2. Remove dirt in the rail (1) with a cloth.

How to Lubricate Slide Door Rail and Roller

NOTICE

Do not use a high viscosity lubrication oil.
Product recommended by the manufacturer: “PANDO 18C” manufactured by ThreeBond Holdings Co., Ltd.

Prepare the lubricating oil.

1. Spray the spray type lubrication oil sufficiently to the rail (1) and the roller (2).
2. After lubrication, slide the door to check that you can smoothly open and close the door.

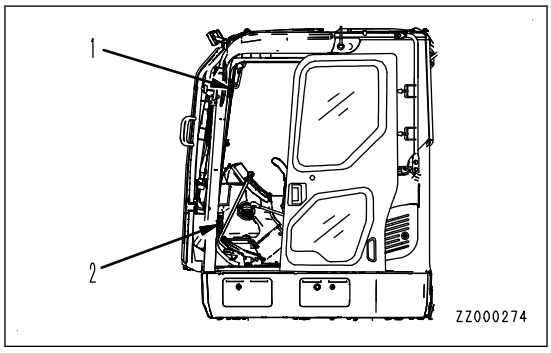
If you cannot smoothly open and close the door, consult your Komatsu distributor.

How to Examine, Clean and Lubricate Slide Door Stopper

Prepare the lubricating oil.

Lubricant recommended by manufacturer: Lithium grease

1. Check the items that follow.
   - No unusual noise such as creak sound is heard from the slide door stopper parts (1) and (2).
   - Slide door is not hard to be closed.
2. If an unusual noise such as creak or the slide door becomes hard to be closed, wipe off the stain at the stoppers.
3. Lubricate the stoppers.



If the stoppers are worn, consult your Komatsu distributor.

How to Examine Clearance at Stopper When You Pull Up Front Window

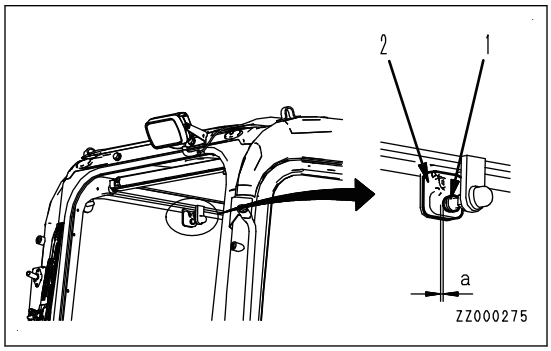
⚠ WARNING

- **Be sure to set the lock lever in the LOCK position when you open or close the front window, lower window, or door. If the lock lever is in the FREE position and the control lever or control switch is touched by mistake, it can cause serious personal injury or death.**
- **Before you open or close the front window, stop the machine on a level ground, lower the work equipment to the ground, and stop the engine.**
- **When you open the front window, hold the handle securely with two hands to pull up. Do not let go of it until it is locked by the lock catch.**
- **When you close the front window, hold the handle securely with two hands to close. The window is heavy, and there is a danger that you drop the window if you do not hold it securely.**

Do this when the front window is pulled up and it has backlash.

Check that there is the clearance (a) between the rubber stopper (1) and the resin guide (2).
A part of the rubber stopper (1) can be worn in some cases, but this is not a problem if there is no backlash or clearance.

If you find clearance, consult your Komatsu distributor.



How to Replace Additional Filter Element for Breaker

(option)

⚠ WARNING

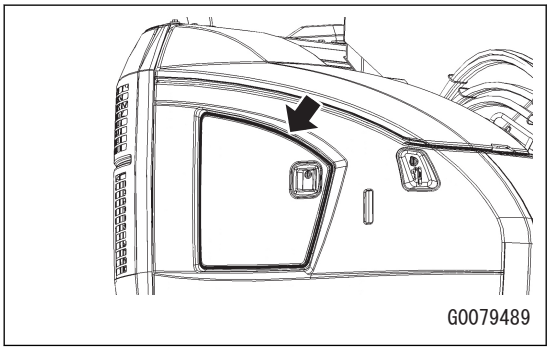
- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **Loosen the cap of the oil filler port (F) slowly to release the internal pressure, and then remove it carefully.**

NOTICE

For the element replacement interval, see "Maintenance Interval for Hydraulic Breaker (4-15)".

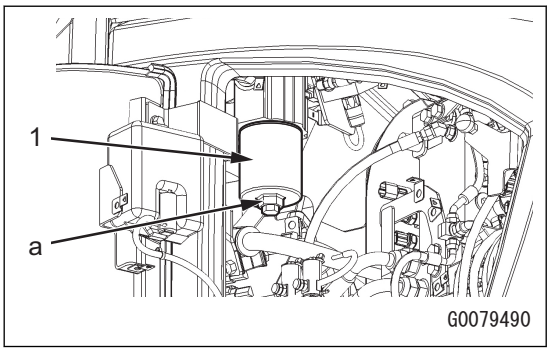
Prepare a container to collect oil.

1. Make sure that the hydraulic oil temperature becomes low.
2. Open the inspection cover on the right side.



3. Put a container to collect the oil below the filter element.
4. Turn the filter case (1) counterclockwise and remove it.

   Put the wrench which is installed to the machine to the hexagonal part (a) of the filter case, and turn.

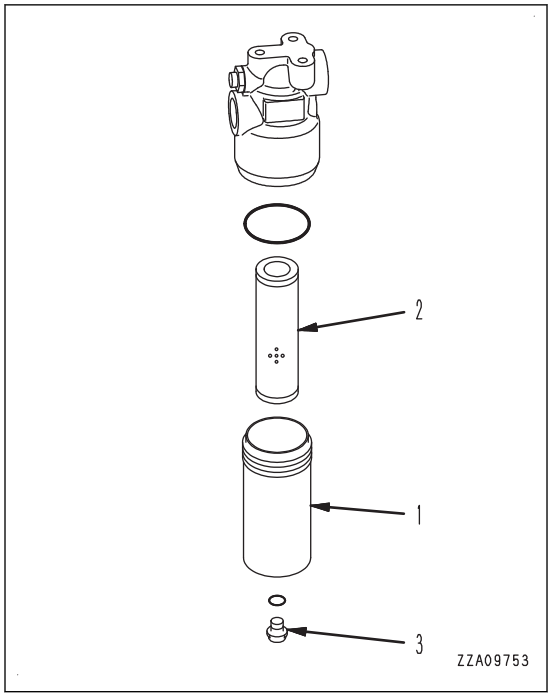


5. Remove the element (2).
6. Remove the plug (3) from the filter case (1).
7. Clean the removed parts.
8. Install the new element (2).
9. Install the filter case (1) and the plug (3).

   Tightening torque

   Filter case (1): 58.8 to 78.4Nm {6 to 8kgfm, 43.4 to 57.9lbft}

   Plug (3): 39.2 to 49Nm {4 to 5kgfm, 28.9 to 36.2lbft}



How to Clean Washable Floor

On the washable cab floor, you can flush out the dirt directly with water.

⚠ WARNING

- **Do the work on a firm and level area.**
- **Put strong blocks below the undercarriage to tilt the machine, and be very careful when you do the operation.**
- **Before you stand up from the operator's seat, be sure to set the lock lever to the LOCK position. If you touch the control levers by mistake with the lock lever is in the FREE position, there is a danger that the machine suddenly moves and it causes serious personal injury or death.**

How to Clean Cab Floor

NOTICE

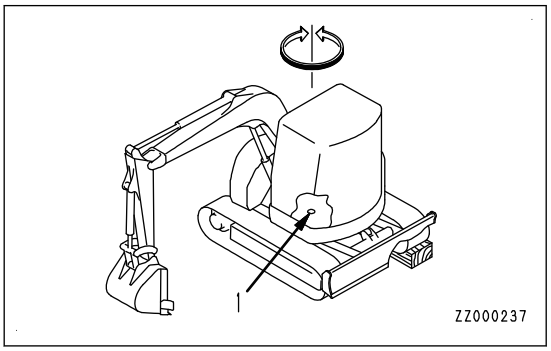
Do not let the monitors, connectors, air conditioner main unit, and filters in the operator cab get wet during the cleaning.

1. Tilt the machine.

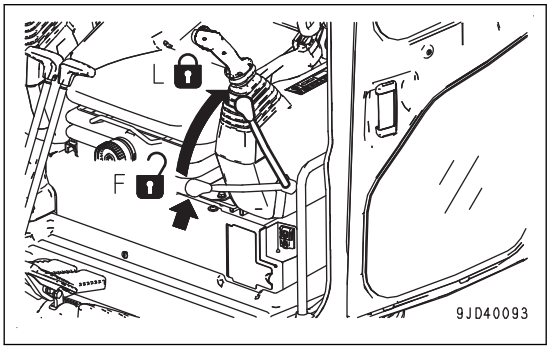
   Select the safest method for the state of the machine. See “How to Tilt Machine (4-51)”.

   Method to use blocks to tilt the machine for the work is explained here.

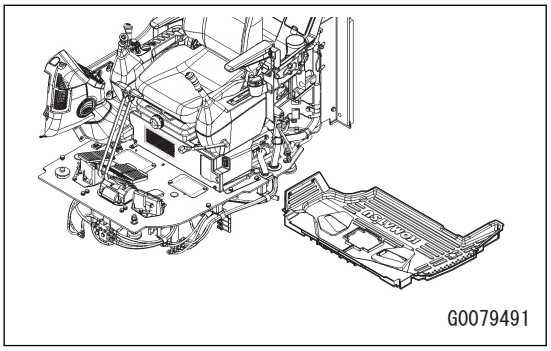
2. Slowly operate the swing operation to let the position of the drain outlet (1) on the cab floor be lower.
3. Lower the work equipment to the ground and keep it in a stable condition.



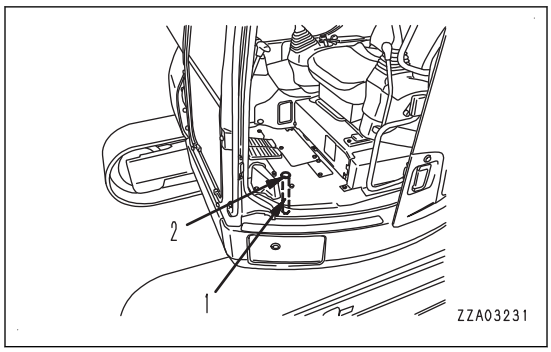
4. Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
5. Stop the engine.



6. Remove the floor mat.



7. Remove the cap (2) of the water drain port (1).
8. Flush out the dirt on the floor through the water drain port (1) directly with water.
9. After you complete the cleaning, install the cap (2) to the drain port (1).
10. Put the floor mat.



How to Tilt Machine

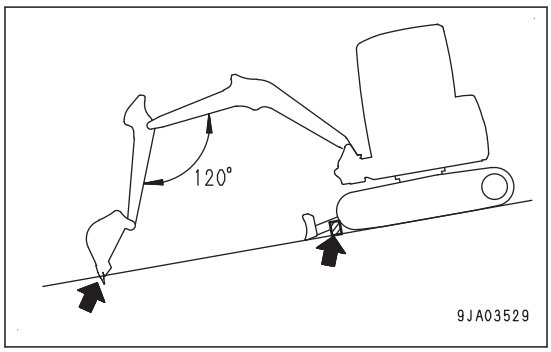
To tilt the machine, you can use a slope or you can use blocks. Select the safe way in response to the state of the machine.

How to Use a Slope

⚠ WARNING

- **Select firm ground without unevenness.**
- **Block the tracks to prevent the machine movement, and thrust the work equipment into the ground.**

1. Stop the machine to let the position of the work equipment come lower side of the slope.
2. Put the blocks, and thrust the edge of the blade in the ground

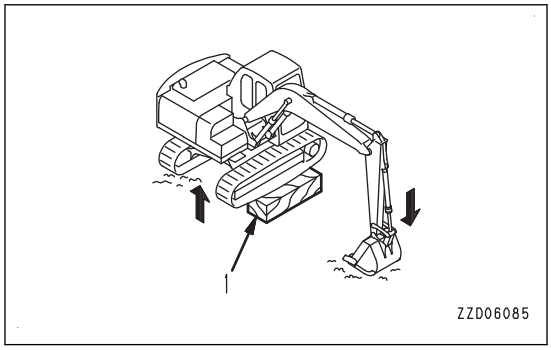


When You Use Blocks

⚠ WARNING

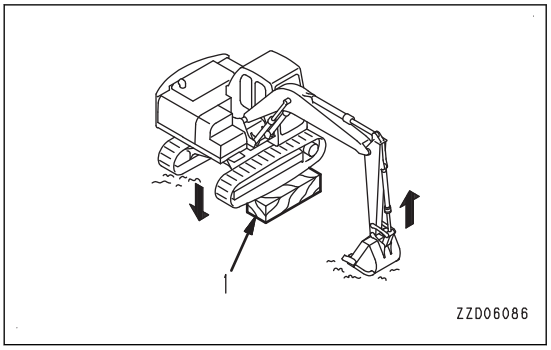
- **Do the work on a firm and level area.**
- **Put strong blocks below the undercarriage to tilt the machine, and be very careful when you do the operation.**

1. Raise the machine with boom and arm.
   Slowly operate the lever.
2. Put in the block (1) between the track lifted off the ground and the ground.



3. Slowly raise the boom, and lower the machine.

   Check the machine is stable always when you operate the lever.



How to Examine Gas Spring

⚠ WARNING

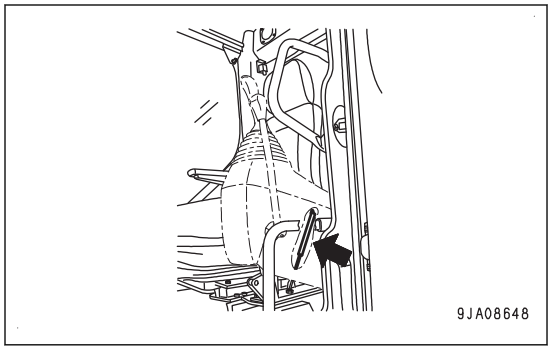
The gas springs include the high-pressure nitrogen gas. If there is a mistake when you handle them, an explosion can occur, and there is a danger of serious personal injury or death. Obey the items that follow.

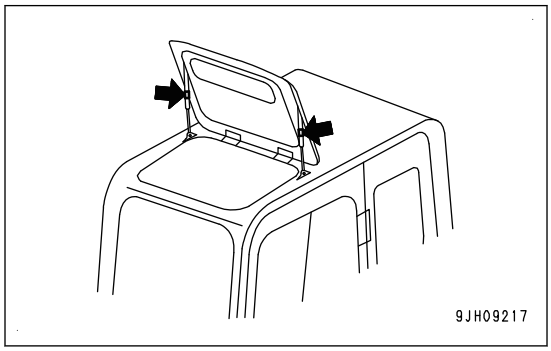
- **Do not disassemble.**
- **Do not let an open flame be near them. Do not throw them in fire.**
- **Do not do the drilling, welding or flame-cutting.**
- **Do not hit it or roll it, or give shocks to it.**
- **When you dispose of it, the gas must be released. Consult your Komatsu distributor.**

The gas springs are located in the left console (1 place) and at the ceiling window of cab (1 place each on right and left).

In the cases that follow, consult your Komatsu distributor for inspection, repair, or replacement.

- When the lock lever cannot be pulled up with light operation force
- When the lock lever does not stay at the LOCK position
- When the ceiling window cannot be pulled up with light operation force
- When the cab ceiling window does not stay open.
- When oil or gas leaks from the gas spring





How to Bleed Air from Hydraulic Circuit

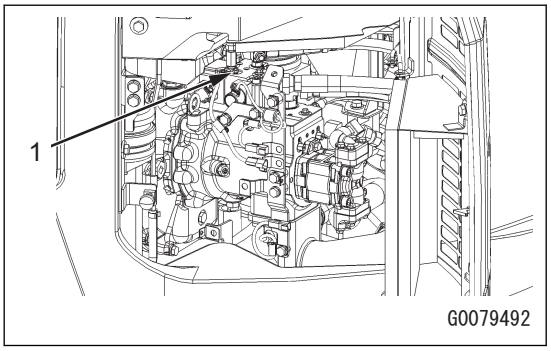
How to Bleed Air from Pump

NOTICE

Be sure to bleed air. If you do the operation when air bleed of the pump is not done, the pump can overheat abnormally, which causes damage to the pump in a short period.

Bleed air when you replace the hydraulic component or replace oil.

1. Run the engine at low idle.
2. Open the right rear cover.
3. Loosen the air bleeder (1) installed on the pump and make sure that small quantity of oil comes out through the air bleeder (1).
4. Tighten the air bleeder (1).



How to Bleed Air from Between Pump and Hydraulic Tank

Bleed air when you replace the hydraulic component or replace oil.

NOTICE

Be sure to bleed air. If the engine runs at high speed when air between the pump and the hydraulic tank has not been bled, the pump can overheat abnormally, which causes damage to the pump in a short period.

1. Start the engine, and hold the engine speed at a medium speed (1650rpm).
2. Slowly operate the work equipment for approximately 5 minutes.

   Air between pump and hydraulic tank is bled.

How to Bleed Air from LS Circuit

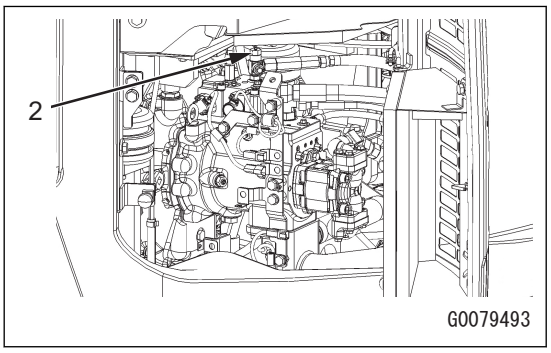
Do this only when you replaced the pump, valve, and hose of the LS circuit.

NOTICE

Be sure to bleed air. If the air is not bled from the LS circuit, the malfunction of the work equipment can occur.

1. Loosen the air bleeder (2) installed to the LS port of the pump.
2. Run the engine at low idle for 2 minutes.
3. Operate the bucket for approximately 2 minutes.

   Do the bucket DUMP/CURL operation to the stroke end again and again.
4. Tighten the bleeder (2).



How to Bleed Air from Cylinder

Bleed air when you replace the hydraulic component or replace oil.

NOTICE

If you run the engine at high speed immediately after the start-up or if you operate a cylinder to its stroke end, air taken in the cylinder can cause damage to the part such as a piston packing, etc.

1. Run the engine at low idle.
2. Extend and retract each of the cylinders 4 to 5 times. At this time, be careful not to operate them to the stroke end (stop them approximately 100mm {3.9 in} short of the stroke end).
3. Run the engine at medium speed (1650rpm).
4. Extend and retract each of the cylinders 4 to 5 times. At this time, be careful not to operate them to the stroke end (stop them approximately 100mm {3.9 in} short of the stroke end).
5. Run the engine at low idle.
6. Operate each cylinder to the stroke end 4 to 5 times.

   All of air in the cylinder will be bled.

How to Bleed Air from Swing Motor

Do this work only when you drain the oil in the swing motor case.

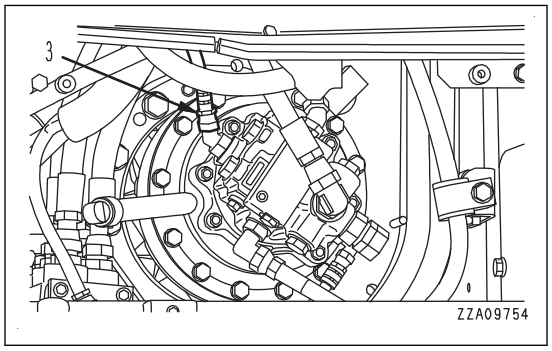
NOTICE

Be sure to bleed air. If the air is not bled from the swing motor, the motor bearings can be damaged.

1. Run the engine at low idle.
2. Loosen the hose (3), and tighten it soon after the oil flows.

   NOTICE

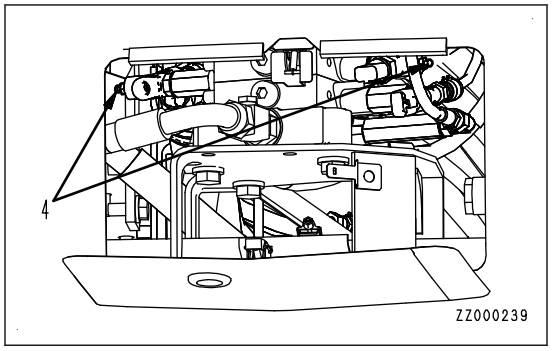
   Do not do the swing operation at this time.
3. Run the engine at low idle, and do swing operation slowly and equally in right and left direction 2 times or more.



How to Bleed Air from Swing PPC Circuit

Bleed air when you replace the hydraulic component or replace oil.

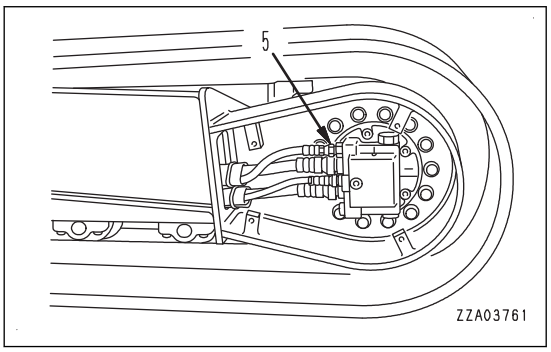
1. Run the engine at low idle.
2. Open the cover at the right of the machine.
3. Bleed air from the air bleeder (4) installed to the main valve in the cover on the right side of the machine.



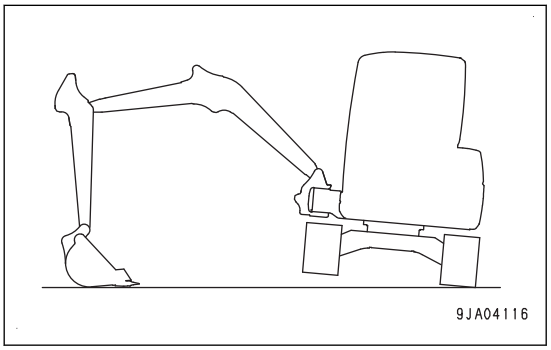
How to Bleed Air from Travel Motor

Do this work only when you drain the oil in the travel motor case.

1. Run the engine at low idle.
2. Loosen the hose (5) of the D port, and tighten it after the oil flows.



3. Swing the upper structure by 90° while the engine runs at low idle.
4. Operate the work equipment control levers slowly. Push the ground with the bucket bottom to raise the one side of the track to a small degree.
5. Operate the travel lever to rotate the track off the ground for 2 minutes.
6. Do the same operation on the opposite track.



How to Bleed Air from Attachment

(When attachment is installed on the machine)

Bleed air when you replace the hydraulic component or replace oil.

NOTICE

If the attachment has its own air bleeding procedure specified by the manufacturer, obey it.

If a breaker or other attachment is installed, do the air bleeding procedure until the air is fully bled from the attachment circuit.

1. Run the engine at low idle.
2. Operate the attachment control switch (approximately 10 times).

   Air is bled from the attachment circuit.

NOTICE

- **After the air is bled, stop the engine one time. Leave the machine for 5 minutes or longer, then start the operation. This operation bleeds air contained in the hydraulic oil in the tank.**
- **Check that no oil leaks. Wipe off the leaked oil off if found.**

How to Clean Air Conditioner Recirc Air Filter (Pollen Removal Filter)

(Option)

⚠ WARNING

Before you do the cleaning of the recirculation air filter, check that the slide door is locked regardless of whether it is open or closed. If the slide door moves during cleaning, you can get caught by the slide door, or the cover can be damaged.

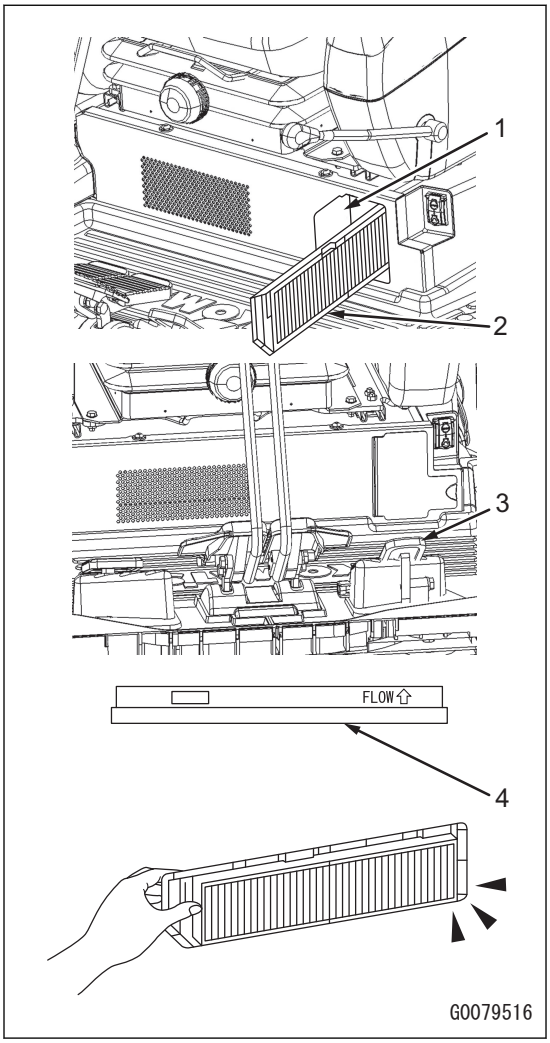
1. Open the cover (1) at the lower front left of the operator's seat.
2. Remove the recirculation air filter (2).

   Avoid the foot rest (3), and take it out diagonally.
3. Lightly tap the recirculation air filter with the intake side (4) diagonally down to drop off the dirt.

   Be sure not to deform or damage the filter.

   If you cannot remove the clogging, replace the filter which is attached to the recirculation air filter (2) with a new one.

   Install the filter to let “FLOW” mark on the filter case side and “FLOW” mark on the filter side be at the same position and face the same direction.
4. Set the recirculation air filter (2) to the original position, and close the cover (1).



Examine Before You Start Operation

For the items that follow, see OPERATION, “How to Examine Before You Start Operation (3-112)”.

- DRAIN WATER AND SEDIMENT FROM FUEL TANK
- CHECK WATER SEPARATOR, DRAIN WATER AND SEDIMENT
- CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL
- CHECK COOLANT LEVEL, ADD COOLANT
- CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL
- CHECK ELECTRIC WIRING
- CHECK FUEL LEVEL, ADD FUEL
- CHECK WORKING LAMP
- CHECK HORN

Every 100 Hours Maintenance

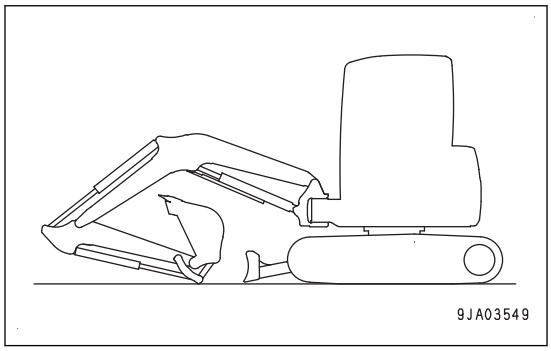
How to Lubricate Work Equipment

NOTICE

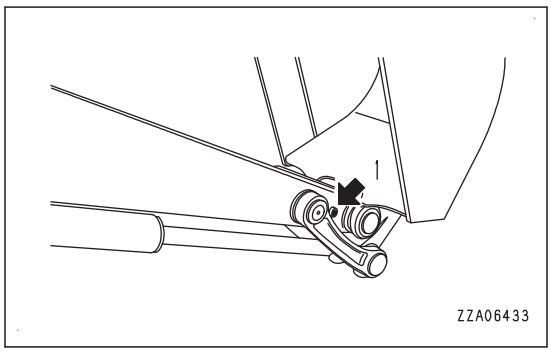
- **If unusual noise comes out of greasing point, do the greasing regardless of the greasing interval.**
- **On a new machine, add grease every 10 hours for the first 50 hours of operation.**
- **After digging work in the water such as private land digging is done, be sure to lubricate the pins that was submerged in the water.**

Prepare the grease pump.

1. Set the machine to the greasing posture as shown in the figure, and lower the work equipment to the ground, and then stop the engine.



2. Lubricate the grease fittings shown by arrows with a grease pump.
   (1) Arm and bucket connection pin (1 place)



3. Wipe off the grease that is pushed out from the grease fitting with cloth.

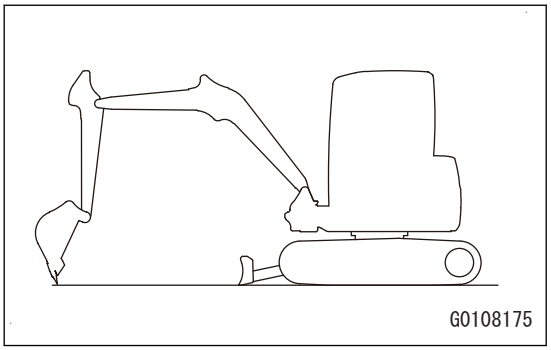
How to Examine Oil Level in Swing Machinery Case, Add Oil

⚠ WARNING

Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.

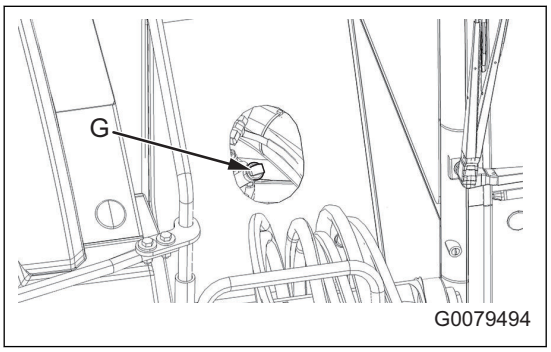
Prepare a container to collect oil.

1. Set the arm vertical and lower the bucket edge to the ground as shown in the figure.

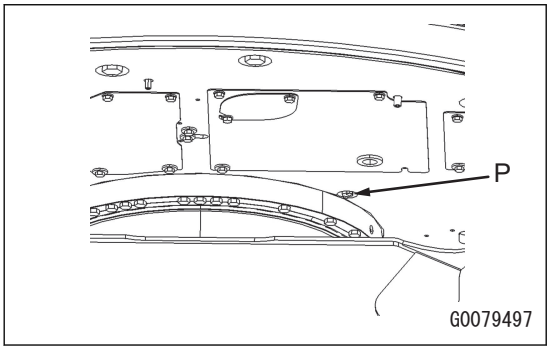


2. Pull out the dipstick (G).
3. Wipe off oil stuck to the dipstick with a cloth.
4. Fully put the dipstick (G) into the dipstick pipe again, then pull it out.
5. Check the oil level with the dipstick (G).

   If the oil level is between marks (H) and (L) of the dipstick, it is correct.



- If the oil level is lower than (L) mark on the dipstick (G), add oil through the dipstick insertion port.
- If the oil level is higher than (H) mark on the dipstick (G), make it to a correct level as follows.
  1) Swing the upper structure to let the drain plug (P) at the bottom of the machine come at the center between the right and left tracks.
  2) Put a container to receive oil below the drain valve (P).
  3) Loosen the drain valve (P), and drain the excessive oil.
  4) Check the oil level again.



6. Put the dipstick (G) into the insertion port.

Every 250 Hours Maintenance

How to Examine Oil Level in Final Drive Case, Add Oil

⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **When you disconnect the plug, loosen it slowly to release the pressure. If there is remaining pressure in the case, the oil or plug can jump out.**
- **Do not stand in front of the plug when you loosen the plug.**

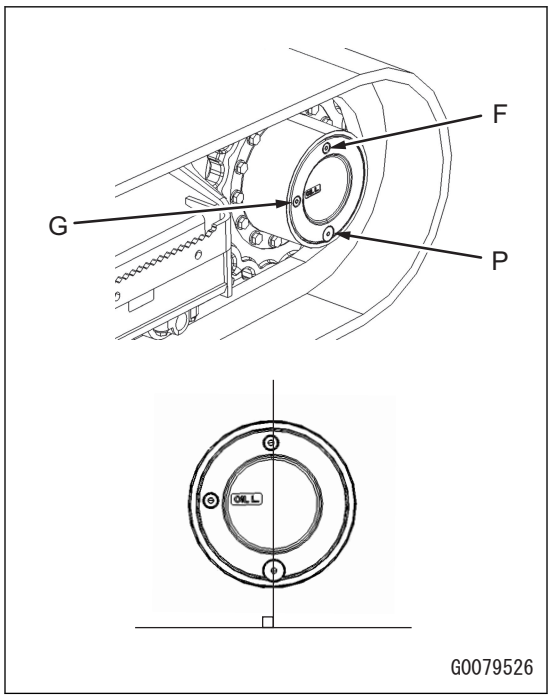
Items to be prepared

- Container to collect the oil
- Hexagonal wrench

1. Stop the machine with the plug (P) at the position directly below.
2. Put a container to collect the drained oil below the plug (G).
3. Remove the plug (G) with the hexagonal wrench.
4. Check the oil level.

   When the oil level exceeds the 10mm {0.4in} below the lower edge of the plug (G) hole, the oil level is correct.
5. If the oil is not sufficient, add it as follows.
   1) Remove the plug (F) with the hexagonal wrench.
   2) Add oil through the hole of the plug (F).

      Add oil until it flows out from the hole of the plug (G).
   3) Install the plug (F).
6. Install the plug (G).



How to Examine Battery Electrolyte Level

⚠ WARNING

- **Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. If you do so, it will deteriorate the inner side of battery and the service life of the battery can be decreased. In addition, it can cause an explosion.**
- **Battery discharges flammable gas. There is a danger of explosion. Do not let an open flame be near.**
- **Battery electrolyte is dangerous object. Be careful not to allow the battery electrolyte to get in contact with your eyes, skin or clothes.**
  If the battery electrolyte gets into your eyes, immediately wash your eyes with a large quantity of clean water and consult a doctor.
  If the battery electrolyte gets on your clothes or skin, immediately wash the part by a lot of clean water.
- **Do not use a direct air blow or dry cloth to clean the battery. A wet cloth will prevent fire or explosion from static electricity.**

NOTICE

- **Do not add battery electrolyte more than the UPPER LEVEL line. Battery electrolyte can leak and cause damage to the paint surface or corrosion to the parts.**
- **If there is a risk that battery electrolyte can freeze, add the battery electrolyte before you start the work on the next day.**
- **To prevent a fire, be careful that the rubber cover is not to be turned upward when install it.**

Do the battery electrolyte level check before you operate the machine.

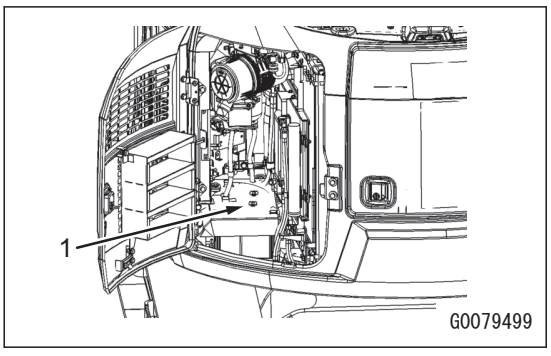
Check the battery electrolyte level for a minimum of one time in a month.

Prepare the purified water such as commercially available battery fluid.

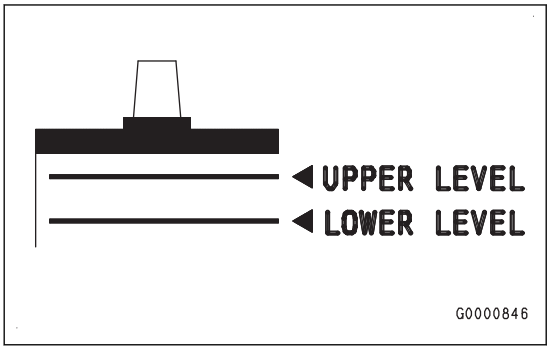
How to Examine Electrolyte Level from Side of Battery

When you check the electrolyte level from the side of the battery, check as follows.

1. Open the left rear cover.
2. Flip up the rubber cover (1) on the battery.
3. Clean the area around the electrolyte level lines with a wet cloth.

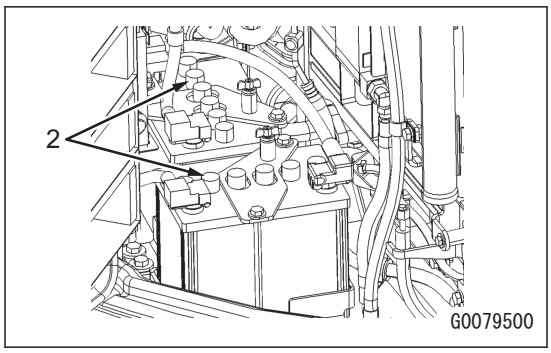


4. Make sure that the electrolyte level is between UPPER LEVEL and LOWER LEVEL.



5. If the battery electrolyte level is at a half or less in the range between UPPER LEVEL and LOWER LEVEL, immediately remove the cap (2), and add the battery electrolyte up to the UPPER LEVEL.

   If you added the battery electrolyte above UPPER LEVEL, suck it with a syringe until it drops to UPPER LEVEL.
6. Tighten the cap (2) securely.
7. Put the rubber cover (1) back to the original position.

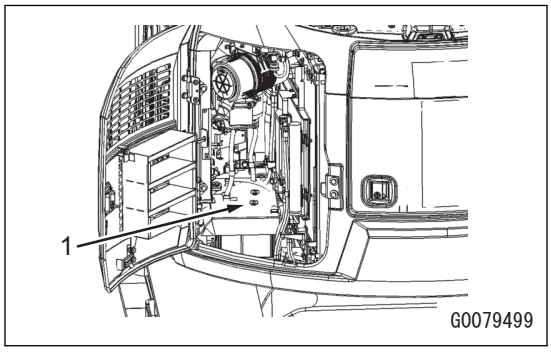


If you suck the battery electrolyte with the procedure of 5, neutralize the battery electrolyte with a chemical such as sodium bicarbonate, then rinse with plenty of water. If necessary, consult your Komatsu distributor or a battery manufacturer.

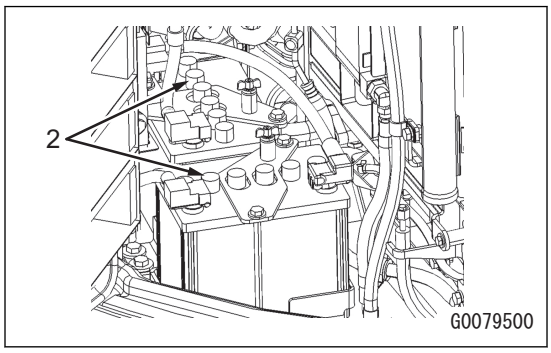
How to Examine Electrolyte Level When It is Not Possible to Examine from Side of Battery

If you cannot check the electrolyte level from the side of the battery, or there is no UPPER LEVEL line on the side of the battery, check as follows.

1. Open the left rear cover.
2. Flip up the rubber cover (1) on the battery.



3. Remove the cap (2) on the top surface of the battery.



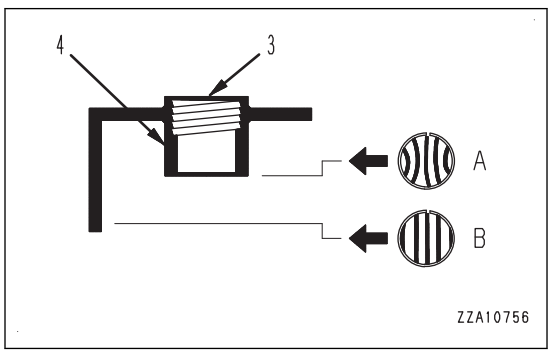
4. Check the battery electrolyte level through the filler port (3).

   (A) Correct level

   The electrolyte level reaches the bottom of the sleeve (4), so the surface tension causes the battery electrolyte surface to bulge and the pole plate does not look straight.

   (B) Not sufficient

   Electrolyte level is not up to bottom of sleeve (4), so poles appear straight and not bent.



5. If the electrolyte level does not reach the bottom of the sleeve (4), add the battery electrolyte until it reaches the bottom of the sleeve (4).

   If the battery electrolyte is added to a level above the bottom end of the sleeve, use a syringe to remove the electrolyte until it reaches the bottom of the sleeve (4).

6. Tighten the cap (2) securely.
7. Put the rubber cover (1) back to the original position.

If you suck the battery electrolyte with the procedure of 5, neutralize the battery electrolyte with a chemical such as sodium bicarbonate, then rinse with plenty of water. If necessary, consult your Komatsu distributor or a battery manufacturer.

Examine Electrolyte Level on Indicator

When you use an indicator to check the electrolyte level, obey the provided instructions.

For the machine with Komatsu maintenance-free battery, the indicator that shows the battery charge level and battery electrolyte level is installed on the top of the battery. For details how to read the indicator, see “How to Examine Komatsu Maintenance-Free Battery Indicator (4-27)”.

How to Replace Air Conditioner Recirc Air Filter (Pollen Removal Filter)

(Option)

Remove the filter with the same procedure as that when you clean it, and replace it with a new one.
For details, see “How to Clean Air Conditioner Recirc Air Filter (Pollen Removal Filter) (4-57)”.

Every 500 Hours Maintenance

Maintenance for every 100 hours and 250 hours must be done at the same time.

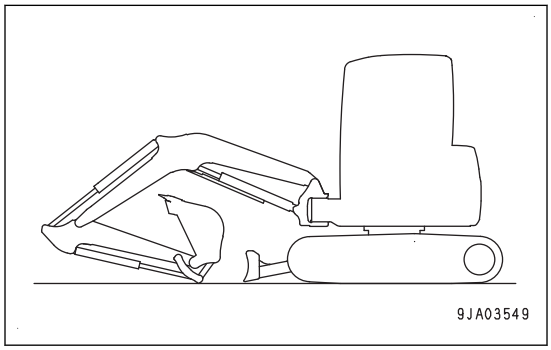
How to Lubricate

NOTICE

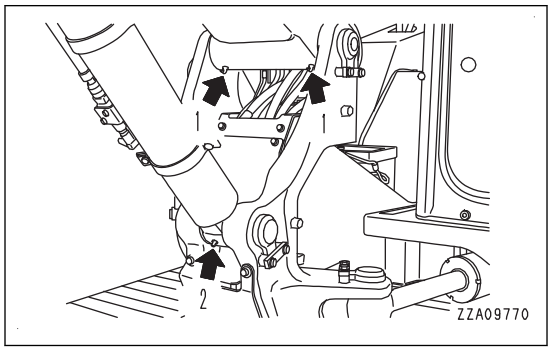
- **If unusual noise comes out of lubrication point, do lubrication regardless of the lubrication interval.**
- **On a new machine, add grease every 10 hours for the first 50 hours of operation.**
- **After digging work in the water such as digging of private land is done, be sure to lubricate the pins that have been in the water.**

Prepare the grease pump.

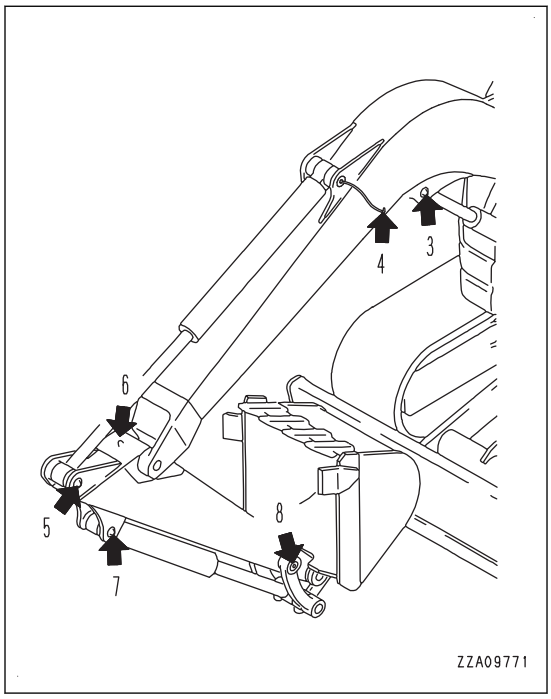
1. Set the machine to the lubrication posture as shown in the figure, and lower the work equipment to the ground, and then stop the engine.



2. Lubricate the grease fittings shown by arrows with a grease pump.
   (1) Boom foot pin (2 places)
   (2) Boom cylinder foot pin (1 place)



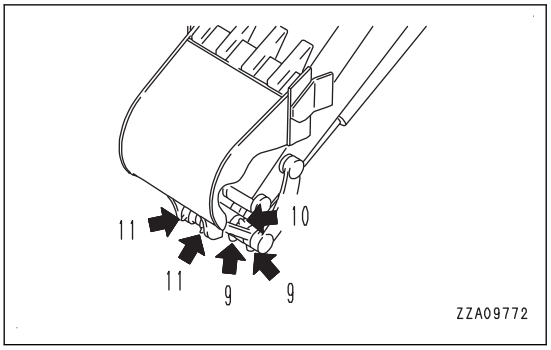
   (3) Boom cylinder rod end (1 place)
   (4) Arm cylinder foot pin (1 place)
   (5) Arm cylinder rod end (1 place)
   (6) Boom and arm connection pin (1 place)
   (7) Bucket cylinder foot pin (1 place)
   (8) Arm and link connection pin (1 place)



(9) Link connection pin (2 place)

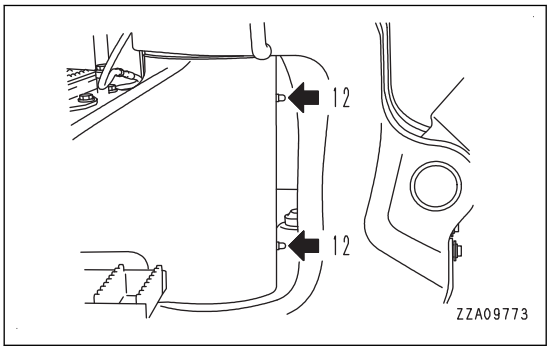
(10) Bucket cylinder rod end (1 place)

(11) Bucket and link connection pin (2 places)

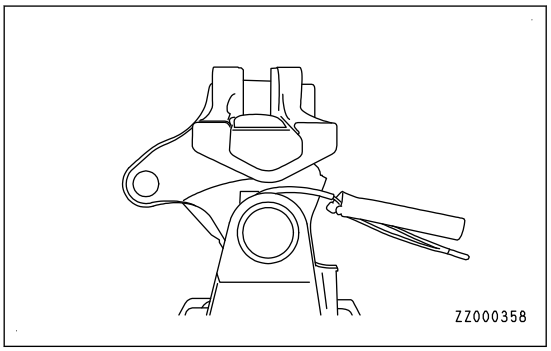


(12) Boom swing bracket pin (2 places)

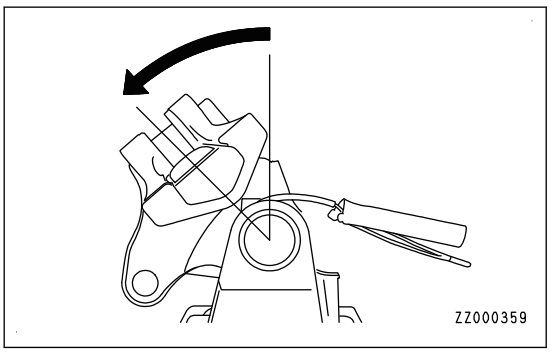
Supply grease to the boom swing bracket pin in the procedure that follows.



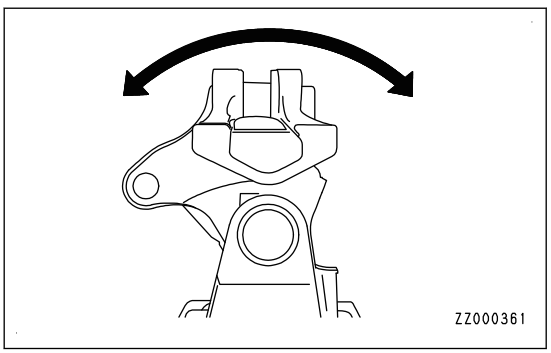
1) Set the boom to the swing neutral position and supply grease.



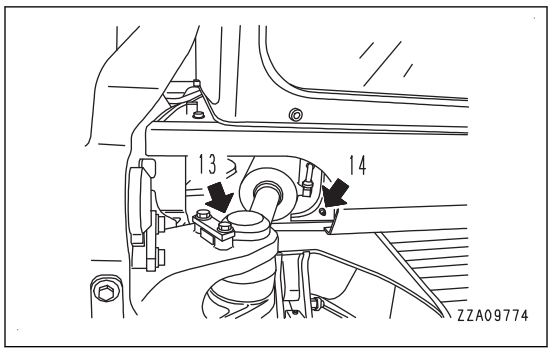
2) Swing the boom to the left stroke end and supply grease.



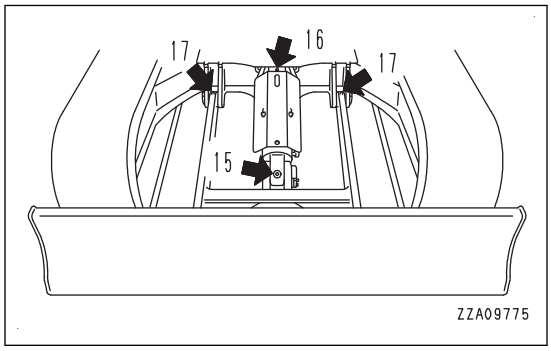
3) Swing the boom to the right and left several times.



(13) Boom swing cylinder rod end pin (1 place)
(14) Boom swing cylinder foot pin (1 place)



(15) Blade cylinder foot pin (1 place)
(16) Blade cylinder rod end (1 place)
(17) Blade foot pin (2 places)



3. Wipe off the grease that is pushed out from the grease fitting with cloth.

How to Change Oil in Engine Oil Pan and Replace Engine Oil Filter Cartridge

⚠ WARNING

Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.

Refill capacity: 10.5ℓ {2.77US gal}

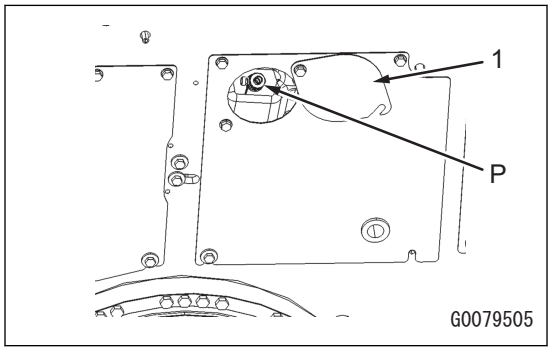
Items to be prepared

- Container to collect the oil
- Filter wrench

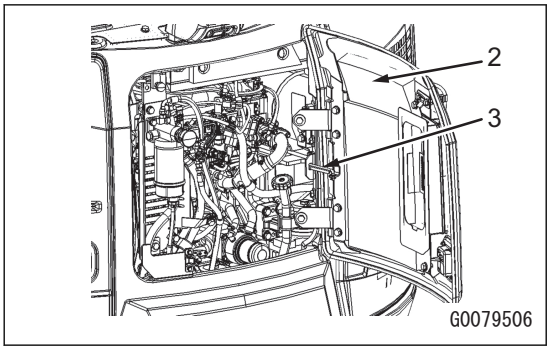
REMARK

Replace the oil filter and fuel prefilter at the same time.

1. Move the cover (1) under the engine oil pan on the lower side of the machine.
2. Put a container to receive oil below the drain cock (P).
3. Open the drain cock (P) slowly to drain oil. Be careful not to get oil on yourself.
4. Close the drain cock (P).



5. Open the rear cover (2).
6. Lock it securely with the cover support stay (3).

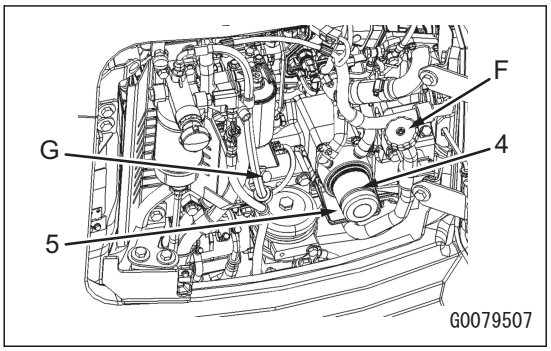


7. Put a waste cloth on the oil container (5).
8. Turn the filter cartridge (4) counterclockwise with the filter wrench, and remove it.
9. Clean the filter head.

   Make sure that there is no old packing attached to the filter head. If old packing is attached to the filter cartridge, it can cause oil leakage.

   REMARK

   It is recommended to use a waste cloth to wipe off oil collected in the oil container (5). Or, install a hose to drain.



10. Apply clean engine oil to the packing part and thread part of the new filter cartridge, and install it.

    When you install filter cartridge, tighten it by 1/2 turns after the packing surface touches the seal surface of the filter head.

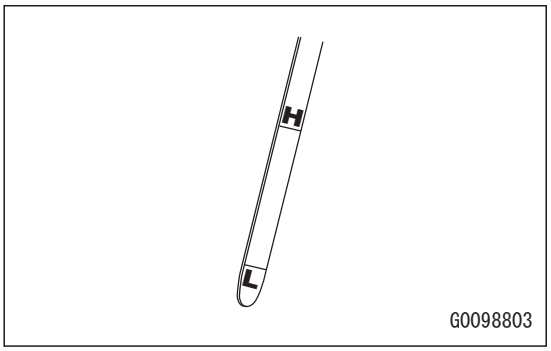
    REMARK

    It will not be a problem if you use grease as an alternative of engine oil.

11. Add engine oil through the oil filler port (F) until it is between H and L on the dipstick (G).
12. Run the engine at low idle for a while, and stop it.
13. Check the oil level in the engine oil pan.

    Make sure that the oil level is between marks H and L on the dipstick.

    For the oil level check procedure, see “How to Examine Oil Level in Engine Oil Pan, Add Oil (3-118)”.
14. Put the cover (1) under the engine oil pan back to the original position.



How to Replace Fuel Prefilter Cartridge

⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, all the parts are very hot, and they can cause burn injury.**
- **Do the replacement work of the filter 30 seconds or more after you stop the engine. High pressure occurs in the engine fuel pipes when the engine is in operation. The internal pressure lowers more than 30 seconds after you stop the engine.**
- **Do not let an open flame be near.**

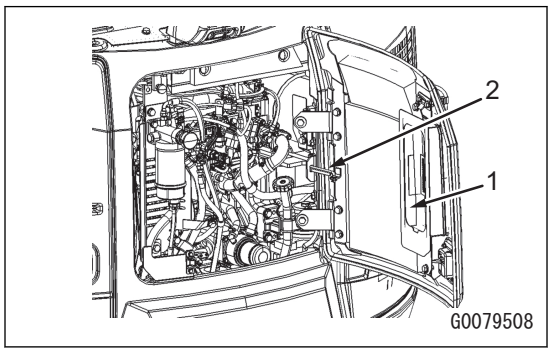
NOTICE

- **When you replace the fuel filter cartridge, it is recommended to use Komatsu genuine parts. Komatsu genuine fuel filter cartridges use a special filter that has high filtration efficiency. The common rail fuel injection system used on this machine consists of more accurate parts than those in the conventional injection pump and nozzles. If a fuel filter cartridge other than Komatsu genuine part is used, dirt or foreign material can be mixed and cause failure to the injection system.**
- **During inspection and maintenance of the fuel system, be very careful to prevent entry of foreign material. If dirt or such sticks, wash it off fully with fuel.**

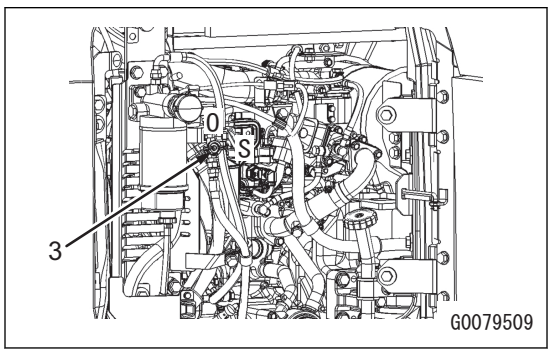
Items to be prepared

- Container to collect the fuel
- Filter wrench

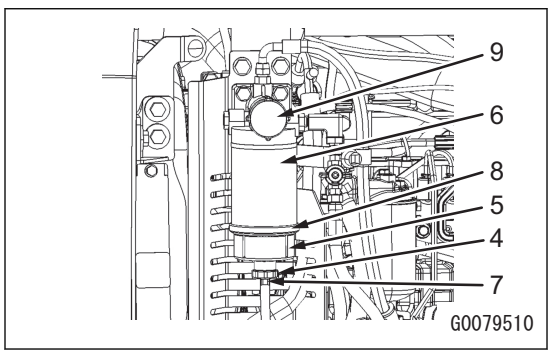
1. Open the rear cover (1).
2. Lock it securely with the cover support stay (2).



3. Set the valve (3) to the CLOSE position (S).



4. Put a container to collect the fuel below the fuel prefilter cartridge.
5. Loosen the drain valve (4) and drain water and sediment from the transparent cup (5), and also drain all the fuel accumulated in the filter cartridge (6).
6. Remove the clip (7) to remove the drain hose from the transparent cup (5).
7. Turn the transparent cup (5) counterclockwise with the filter wrench, and remove it.



This transparent cup (5) is used again.

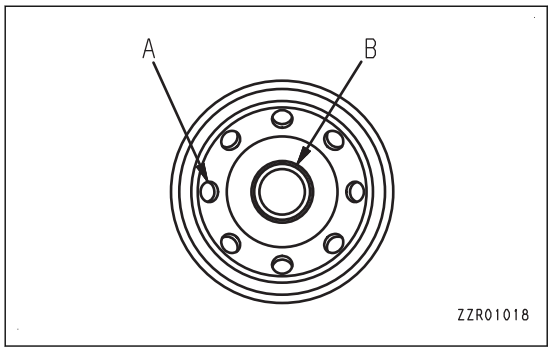
8. Turn the filter cartridge (6) counterclockwise with the filter wrench, and remove it.
9. Install the transparent cup (5) to the bottom of the new filter cartridge as follows.
   1) Replace the O-ring (8) with a new one.
   2) Apply thin layer of oil to the packing surface of the transparent cup (5).
   3) After the packing surface of the transparent cup (5) touches the seal surface of the filter cartridge (6), then tighten it 1/4 to 1/2 turn.

   NOTICE

   Be sure to obey the tightening angle of the transparent cup (5). If the transparent cup (5) is tightened too much, it can cause damage on the O-ring (8) and it causes fuel leakage. If it is tightened too loose, fuel can leak from the clearance of the O-ring (8).
10. Clean the filter head.
11. Fill the new filter cartridge with clean fuel.

    NOTICE

    - **When you add fuel, do not remove the cap (B) at center. Be sure to add fuel from the small holes (A) on the 8 places of dirty side.**
    - **Add clean fuel. Be careful to prevent entry of foreign material.**
    - **After you add fuel, remove the cap (B) at center, and install the fuel filter. Be careful to prevent entry of dirt into the clean side at the center.**



12. Apply thin layer of oil to the packing surface and install it to the filter head.

    After the packing surface touches the seal surface of the filter head, tighten it 3/4 turns .

    NOTICE

    - **Be sure to obey the tightening angle of the filter cartridge (6). If the filter cartridge (6) is tightened too much, it can cause damage on the packing and fuel leakage. If it is tightened too loose, fuel can leak from the clearance of the packing.**
    - **When you tighten it with a filter wrench, be very careful not to dent or damage to the filter.**
13. Make sure that the drain valve (4) is tightened fully.
14. Install the drain hose to the transparent cup (5) with the clip (7).
15. Set the valve (3) to the OPEN position (O).
16. After you replace the filter cartridge (6), bleed air as follows.
    1) Fill up the fuel tank with fuel.

       If the float is at the maximum position, the fuel tank is full.
    2) Loosen the knob of the feed pump (9), pull it out and push it in again and again, and then operate it until the movement becomes heavy.

    It is not necessary to remove the plugs at the fuel prefilter head and at the fuel main filter head.
17. Push in the knob of the feed pump (9), and tighten it.
18. Start the engine and run it at low idle for 10 minutes.
19. Make sure that there is no fuel leakage from the seal surface of the filter and mounting face of the transparent cup.

    If there is fuel leakage, check the tightening condition of the filter cartridge.

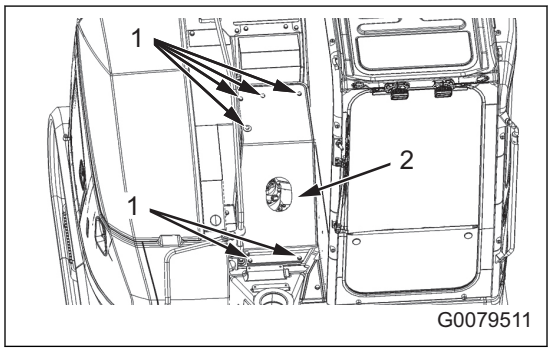
If fuel leaks continuously, remove the filter cartridge in the steps 3 to 8. If damage on the packing surface or pinched foreign material is found, replace the cartridge with a new one, and do the steps 9 to 18 again and again.

How to Examine Swing Pinion Grease Level, Add Grease

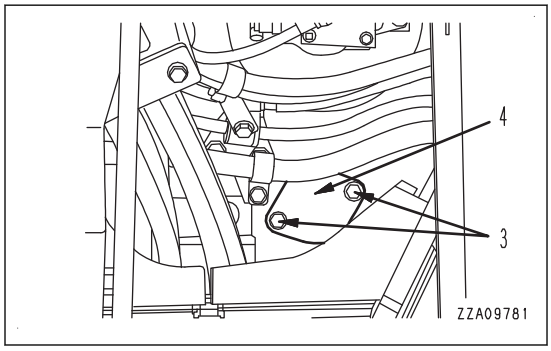
Items to be prepared

- Ruler
- Ratchet wrench

1. Remove the 6 bolts (1) and remove the cover (2).



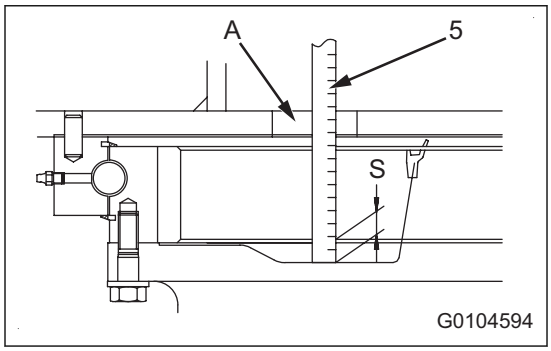
2. Remove the 2 bolts (3) on the top of the revolving frame and remove the grease filler port cover (4).



3. Insert the scale (5) through the inspection hole (A) into the grease to check the grease level at the pinion.
   - If the grease level (S) is 13mm {0.5in} or above, it is correct.
   - If the grease level (S) is 13mm {0.5in} or lower, add it.
4. Make sure that the grease is not milky white.

   Total quantity of grease: 5.5ℓ(5.0kg)

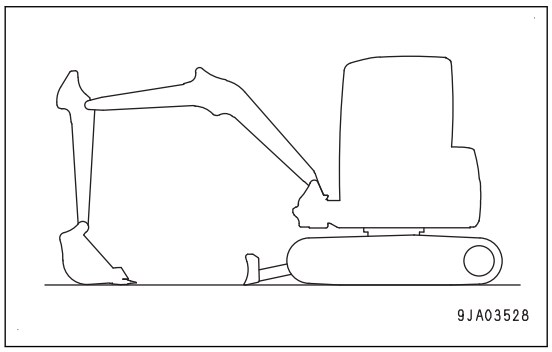
   If the grease is milky white, it needs to be replaced. Consult your Komatsu distributor for replacement.
5. Apply liquid gasket (LG-6) to the revolving frame side of the grease filler port cover (4), and install it with the bolt (3).
6. Install the cover (2) with the bolt (1).



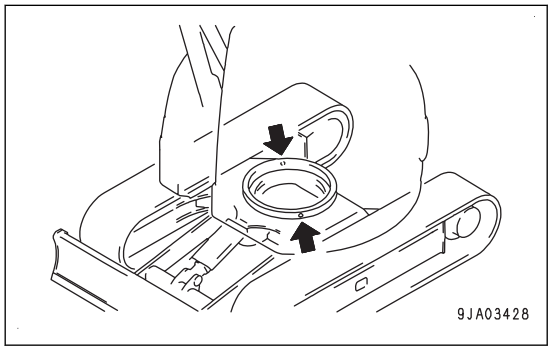
How to Lubricate Swing Circle

Prepare the grease pump.

1. Set the machine to the lubrication posture as shown in the figure, and lower the work equipment to the ground, and then stop the engine.



2. Use a grease pump to lubricate through the grease fittings (2 places) shown by arrow.



3. Wipe off the grease that is pushed out with cloth.

How to Examine and Clean Fins

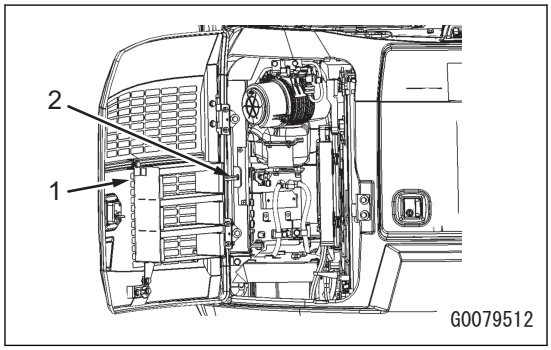
⚠ WARNING

Wear the protective equipment such as protective eyeglasses and dust mask. If the compressed air, high-pressure water, or steam hits your body directly or dirt is scattered by use of it, there is a danger of personal injury.

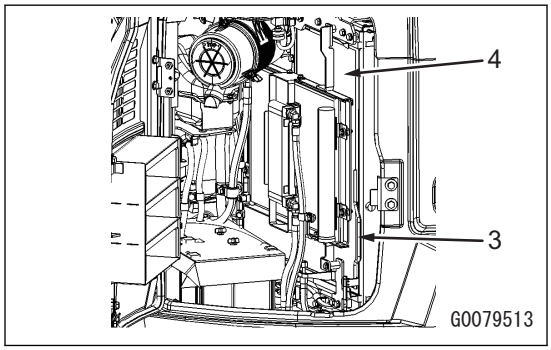
NOTICE

- **To prevent damage of fins, use the compressed air from a distance, and directly blow to the core with the right angle. Damage on the fins can cause water leakage and overheating.**
- **In a dusty jobsite, check the fins every day, regardless of the maintenance interval.**

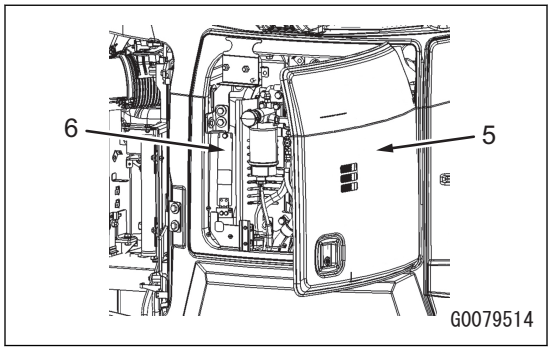
1. Open the left rear cover (1).
2. Lock it securely with the cover support lever (2).



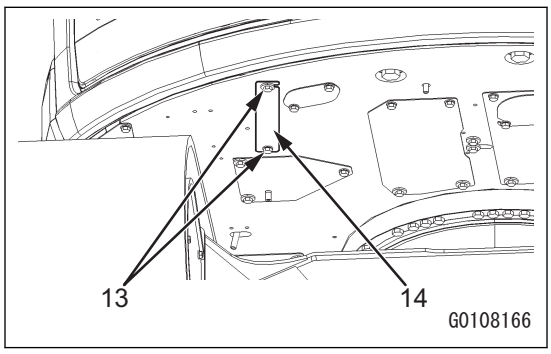
3. Remove the net (4) with the handle (3).
4. Clean the net (4).



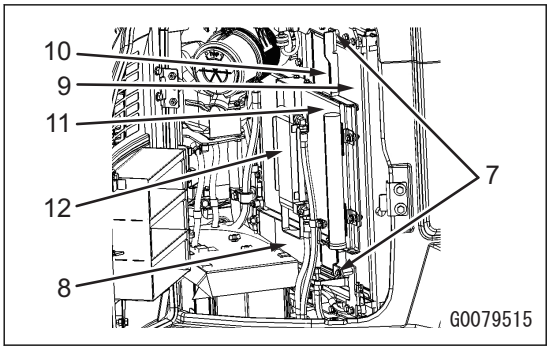
5. Open the rear cover (5).
6. Remove the bolt, and open the cleaning cover (6).



7. Loosen the bolt (13), and open the undercover (14).



8. Remove the 2 condenser fixing bolts (7), and move the condenser.
9. Check the front and rear surfaces of the oil cooler fins (8), radiator fins (9), aftercooler fins (10), air conditioner condenser fins (11), and fuel cooler fins (12). If there is foreign material such as mud, dirt, or leaves in the fins, blow it off with compressed air.



NOTICE

Steam or water can be used as an alternative for the compressed air. But, when you do the powerful steam cleaning (high-pressure machine wash) of the heat exchange equipment (radiator, oil cooler, aftercooler, fuel cooler, air conditioner condenser), keep a sufficient distance from the machine. If steam cleaning (high-pressure machine wash) is done from near, there is a danger that the internal fins of the heat exchange equipment will be deformed, and this will cause fast clogging and breakage of the equipment.

10. Move the condenser to clean.

NOTICE

Be careful not to apply force to the tube part of the air conditioner hose at this time.
If it is damaged, refrigerant gas is released, and it causes the air conditioner not to operate.

11. Check the rubber hose state, and check the hose clamp for looseness.
    - If the rubber hose is cracked or becomes weak, replace it.
    - If the hose clamps are loose, tighten them.
12. After you complete the check and cleaning, install the net (4) back into the original state.

NOTICE

If you close the inspection cover while the condenser is moved, there is a danger that the cover and the condenser get damaged by interference.

Clean Air Conditioner Fresh/Recirc Filters

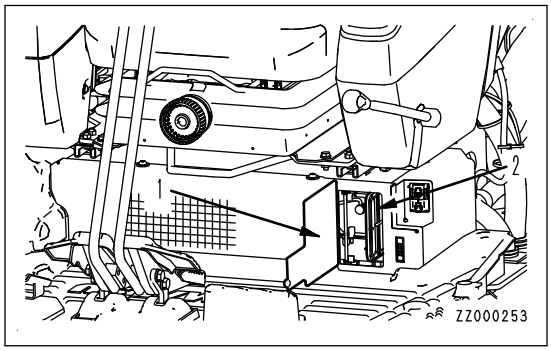
⚠ WARNING

- **When you use the compressed air, use the protective equipment such as protective eyeglasses and dust mask. There is a danger of personal injury when dirt is scattered.**
- **Before you do the cleaning of fresh/recirc air filters, be sure to check that the slide door is locked regardless of whether it is open or closed. If the slide door moves during cleaning, you can get caught by the slide door, or the cover can be damaged.**

NOTICE

- **The cleaning interval of 500 hours is an approximate standard. Do the cleaning at shorter intervals in dusty jobsites.**
- **If you use compressed air, it must be 0.2MPa {2.1kgf/cm^2, 29.9PSI} or below.**

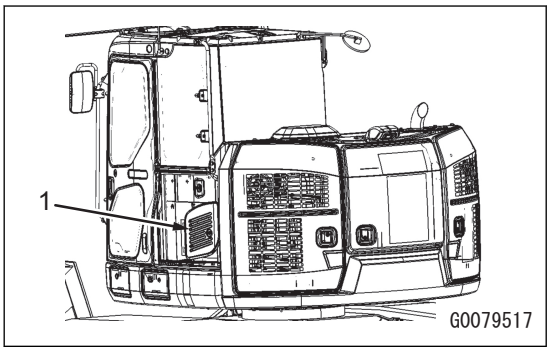
How to Clean Air Conditioner Recirc Air Filter



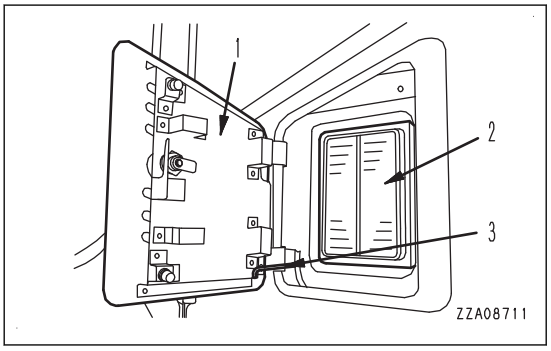
1. Open the cover (1) at the lower front left of the operator's seat.
2. Remove the recirculation air filter (2).
3. Clean the recirculation air filter (2) with compressed air.
   - If the recirculation air filter (2) is very dirty, especially if it is dirty with oil or such, wash it with a neutral detergent. After you wash it with water, install it which has been fully dried.
   - Replace the filter (2) with a new one in the cases that follow.
     - If the clogging cannot be removed by the compressed air
     - When it has been 1 year from the start of use.
4. Set the recirculation air filter (2) to the original position, and close the cover (1).

How to Clean Air Conditioner Fresh Air Filter

1. Open the cover (1) on the rear left of the operator's cab.

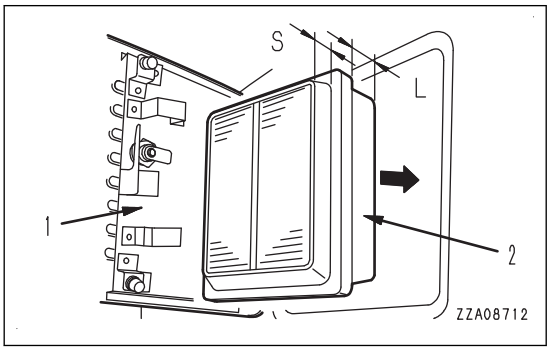


2. Fix it securely with the cover support lever (3).
3. Remove the filter (2).
4. Clean the filter (2) with compressed air.
   - If the filter (2) is very dirty, especially if it is dirty with oil or such, wash it with a neutral detergent. After you wash it with water, install it which has been fully dried.
   - Replace the filter (2) with a new one in the cases that follow.
     - If the clogging cannot be removed by the compressed air
     - When it has been 1 year from the start of use.



5. Install the filter (2) as follows.
   1) Insert the longer side (L) of the filter (2) first into the filter case.

      The filter (2) must be installed in the correct direction. If you insert the shorter side (S) first, you cannot close the cover (1).
   2) Fit in four corners of the filter (2).
6. Unlock the cover support lever (3).
7. Close the cover (1).



Every 1000 Hours Maintenance

Maintenance for every 100 hours, 250 hours, and 500 hours must be done at the same time.

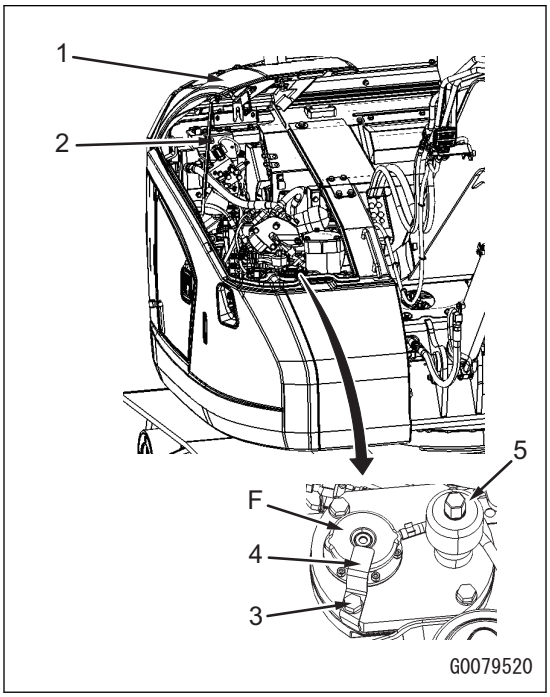
How to Replace Hydraulic Tank Breather Element

⚠ WARNING

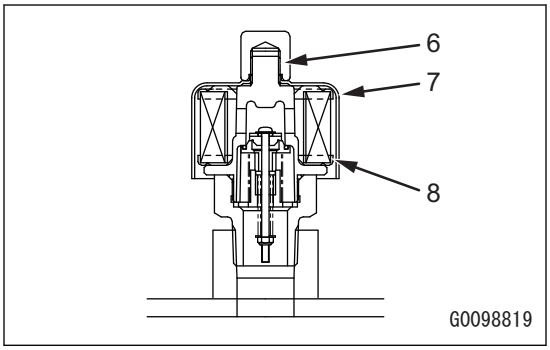
- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **When the oil filler cap is removed, oil can spurt out. Loosen it slowly to release the internal pressure, and remove it.**

1. Open the dirt cover (1).

   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.
2. Lock it securely with the cover support lever (2).
3. Loosen the bolt (3) and remove the plate (4) on the top of the oil filler port (F).
4. Loosen the cap of oil filler port (F) gradually to release the internal pressure.
5. Remove the cap of the oil filler port (F).



6. Remove the nut (6) of the breather (5), and remove the cover (7).
7. Replace the filter element (8) with a new one.
8. Install the cover (7) and nut (6).



How to Replace Hydraulic Oil Filter Element

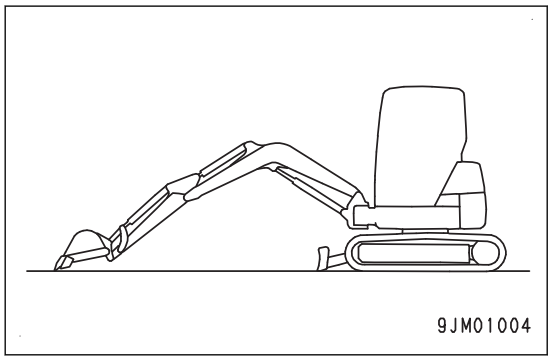
⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **When the oil filler cap is removed, oil can spurt out. Loosen it slowly to release the internal pressure, and remove it.**

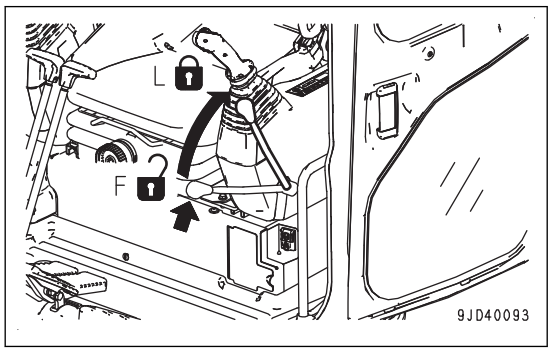
NOTICE

When a hydraulic breaker is installed to the machine, the hydraulic oil deteriorates faster than in the normal bucket digging operation. For the maintenance, see "Maintenance Interval for Hydraulic Breaker (4-15)".

1. Retract the arm and bucket cylinder, then lower the boom to lower the tooth to the ground.
2. Lower the blade.

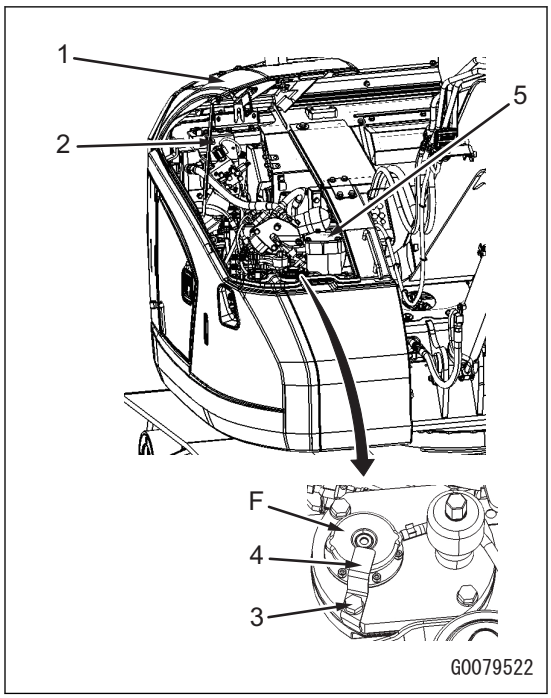


3. Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
4. Stop the engine.



5. Open the dirt cover (1).

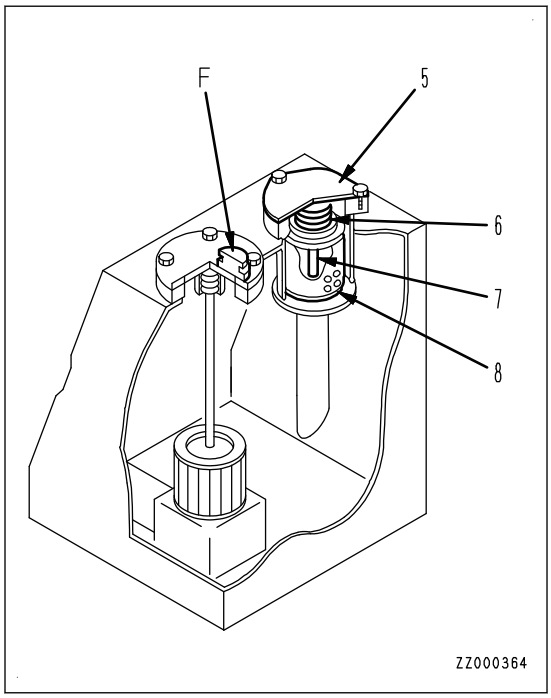
   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.
6. Lock it securely with the cover support lever (2).
7. Loosen the bolt (3) and remove the plate (4) on the top of the oil filler port (F).
8. Loosen the cap of oil filler port (F) gradually to release the internal pressure.
9. Remove the cap of the oil filler port (F).



10. Loosen the 3 bolts, and remove the cover (5).

    Remove the bolt while you push and hold the cover (5) down. The cover (5) can jump out by force of spring (6).
11. After you remove the spring (6) and valve (7), take out the element (8).
12. Clean the removed parts in flushing oil.
13. Install the new element in the position where the old element (8) was installed.
14. Check the O-ring to be installed between the hydraulic tank and the cover (5).

    If the O-ring is damaged, replace it.
15. Install the valve (7) and spring (6) on the top of the element.
16. Put the cover (5) and install the cover (5) with the bolts while you push it down with the hand.
17. Install the cap of the oil filler port (F).
18. Install the plate (4) to the top of the oil filler port (F) and fix it with the bolt (3).
19. Remove the cover support lever (2) and fix it to the lever lock securely.



20. Close the dirt cover (1).
21. Start the engine for air bleeding, run it at low idle for 10 minutes.
22. Stop the engine.

    NOTICE

    Let the machine be as it is for 5 minutes or more, and then start the operation. This operation bleeds air contained in the hydraulic oil in the tank.
23. Make sure that there is no oil leakage. Wipe off the leaked oil off if found.

How to Change Oil in Swing Machinery Case

⚠ WARNING

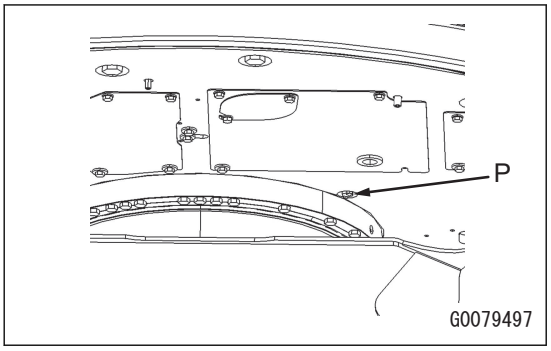
Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.

Refill capacity: 2.8ℓ {0.74US gal}

Prepare a container to collect oil.

1. Swing the upper structure to let the drain plug (P) at the bottom of the machine come at the center between the right and left tracks.
2. Put a container to collect oil below the drain plug (P).
3. Remove the drain plug (P) to drain, and tighten it after it is drained.

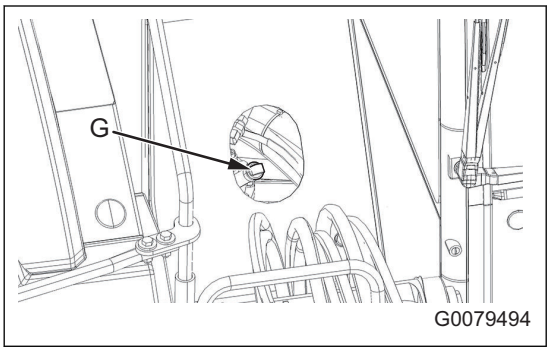
   Tightening torque: 44.1 to 93.2Nm {4.5 to 9.5kgfm, 32.5 to 68.1lbft}



4. Add the refill capacity of oil through insert port of the dipstick (G).
5. Check the oil level in the swing machinery case.

   Make sure that the oil level is between marks H and L on the dipstick (G).

   For the oil level check procedure, see “How to Examine Oil Level in Swing Machinery Case, Add Oil (4-60)”.



How to Change Oil in Final Drive Case

⚠ WARNING

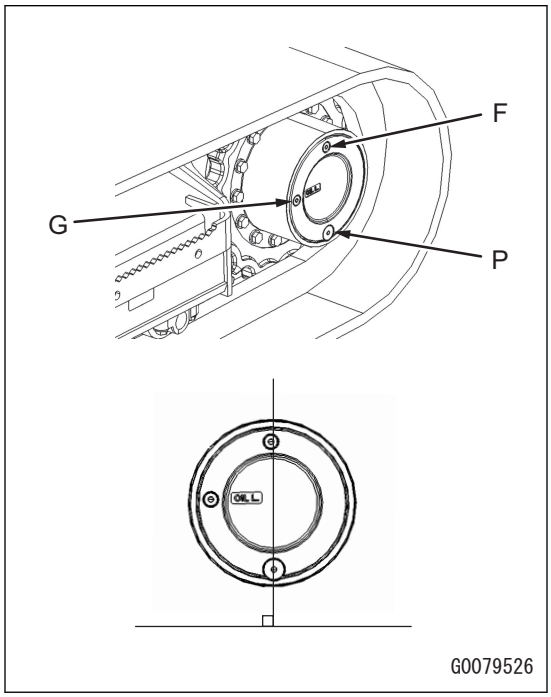
- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **When you disconnect the plug, loosen it slowly to release the pressure. If there is remaining pressure in the case, the oil or plug can jump out.**
- **Do not stand in front of the plug when you loosen the plug.**

Refill capacity: 1.1ℓ {0.29US gal} each for the right and left sides

Items to be prepared

- Container to collect the oil
- Hexagonal wrench

1. Stop the machine with the plug (P) at the position directly below.
2. Put a container below the plug (P) to collect the fuel.
3. Remove the plugs (P), (G), and (F) with the hexagonal wrench, and drain oil.
4. Install the plug (P).
5. Add refill capacity of oil through the hole of the plug (F).
6. When oil flows out from the plug (G) hole, install the plugs (G) and (F).

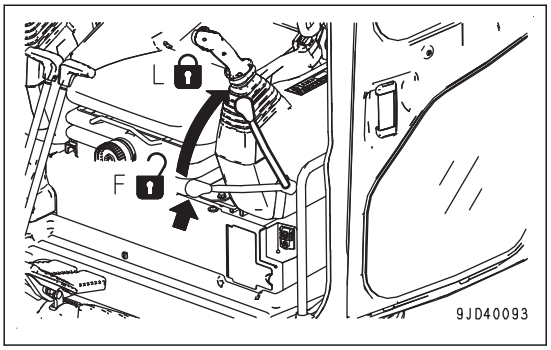


How to Examine Oil Level in PTO Gear Case, Add Oil

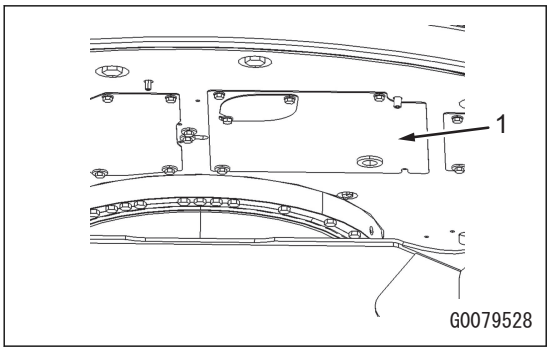
⚠ WARNING

Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.

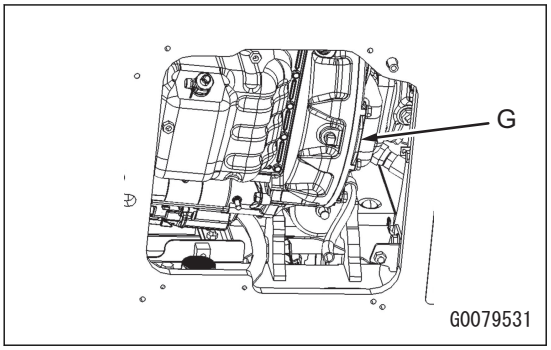
1. Swing the upper structure to let the PTO gear case come at the center between the right and left tracks.
2. Hold the red part on the top of the lock lever, and then set it to the LOCK position (L).
3. Stop the engine.



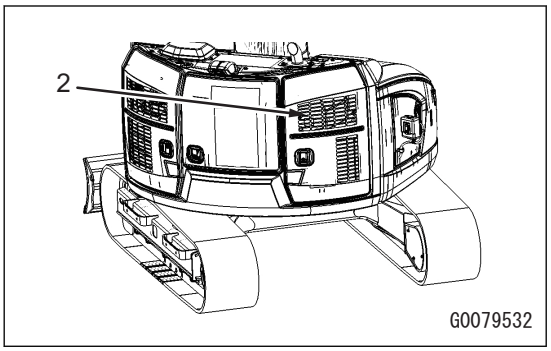
4. Remove the undercover (1) on the bottom of machine.



5. Remove the inspection plug (G).

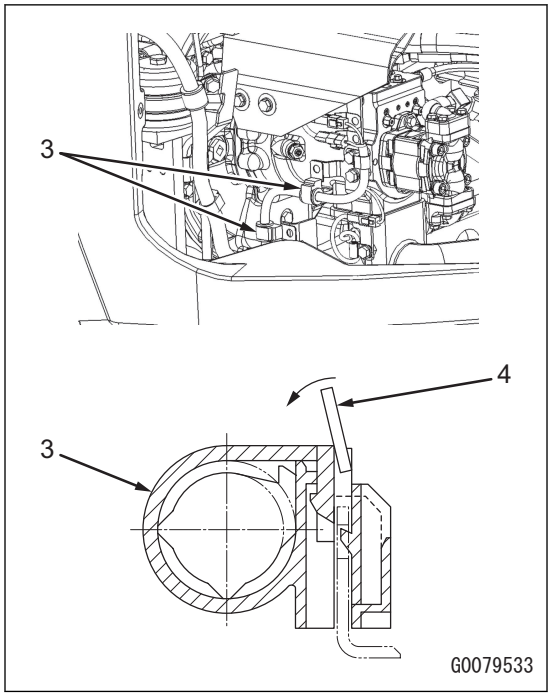


6. Open the right rear cover (2).



7. Remove the clip (3).

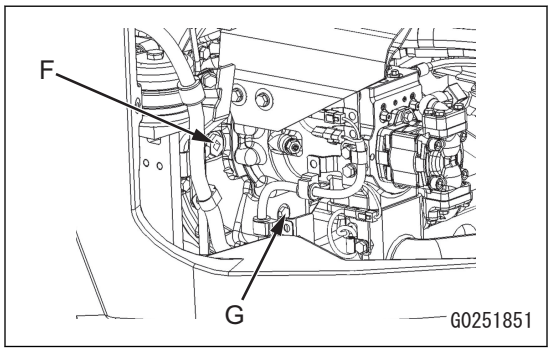
   Insert the tool (4) such as a screwdriver, and tilt it to the direction of arrow, then you can remove the clip (3).



8. Check the oil level through the inspection plug (G).

   If the oil level is near the lower edge of the plug hole, the oil level is correct.

9. If the oil is not sufficient, add it as follows.
   1) Remove the plug of the filler port (F).
   2) Add oil up to near the lower edge of the hole of the inspection plug (G).
   3) Install the plug of the oil filler port (F).
10. Install the clip (3).
11. Close the right rear cover (2).
12. Install the inspection plug (G).
13. Install the undercover (1) on the bottom of machine.



How to Replace Fuel Main Filter Cartridge

⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, all the parts are very hot, and they can cause burn injury.**
- **Do the replacement work of the filter 30 seconds or more after you stop the engine. High pressure occurs in the engine fuel pipes when the engine is in operation. The internal pressure lowers more than 30 seconds after you stop the engine.**
- **Do not let an open flame be near.**

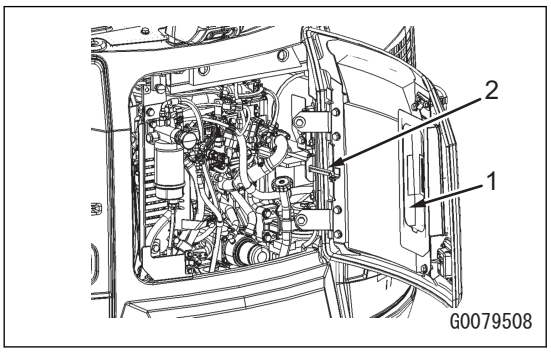
NOTICE

- **When you replace the fuel filter cartridge, it is recommended to use Komatsu genuine parts. Komatsu genuine fuel filter cartridges use a special filter that has high filtration efficiency. Also, the common rail fuel injection system used on this machine consists of more accurate parts than those in the conventional injection pump and nozzles. If a fuel filter cartridge other than Komatsu genuine part is used, dirt or foreign material can be mixed and cause failure to the injection system.**
- **During inspection and maintenance of the fuel system, be very careful to prevent entry of foreign material. If dirt or such sticks, wash it off fully with fuel.**

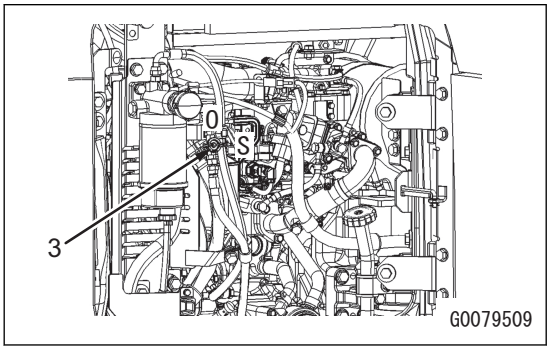
Items to be prepared

- Container to collect the fuel
- Filter wrench

1. Open the rear cover (1).
2. Lock it securely with the cover support stay (2).

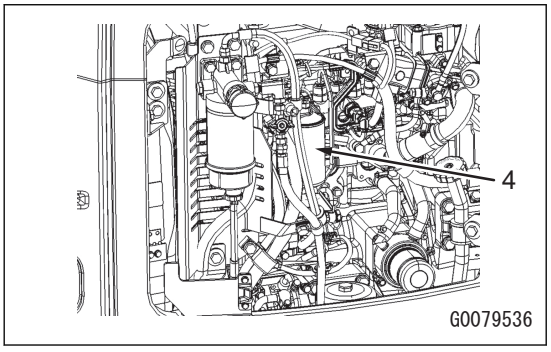


3. Set the valve (3) to the CLOSE position (S).

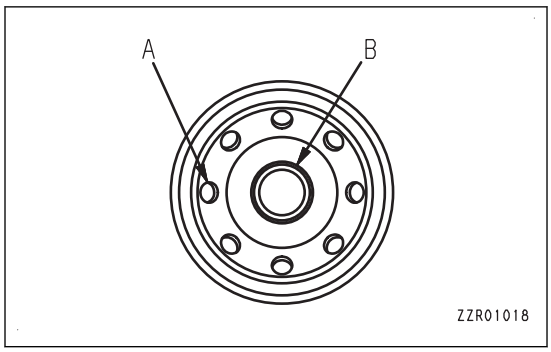


4. Put a container to collect the fuel below the filter cartridge (4).
5. Turn the filter cartridge (4) counterclockwise with the filter wrench, and remove it.

   Filter cartridge is filled with fuel. When you remove it, be very careful not to spill the fuel.
6. Clean the filter head.



7. Remove the cap (B) in the center of the new filter cartridge.



NOTICE

Do not fill the new filter cartridge with fuel.

8. Apply thin layer of oil to the packing surface and install it to the filter head.

   After the packing surface touches the seal surface of the filter head, tighten it more than 1 turn.

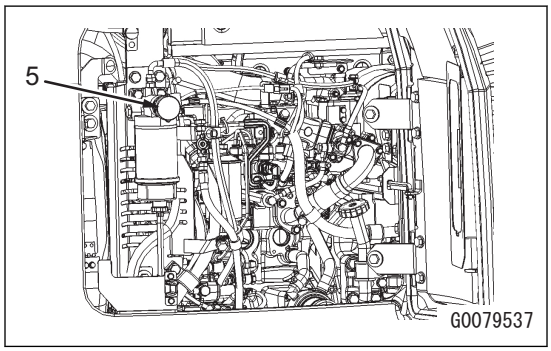
NOTICE

- **Be sure to obey the tightening angle of the filter cartridge (4). If the filter cartridge (4) is tightened too much, it can cause damage on the packing and fuel leakage. If it is tightened too loose, fuel can leak from the clearance of the packing.**
- **When you tighten it with a filter wrench, be very careful not to dent or damage to the filter.**

9. Set the valve (2) to the OPEN position (O).
10. After you replace the filter cartridge (4), bleed air as follows.
    1) Fill up the fuel tank with fuel.

       If the float is at the maximum position, the fuel tank is full.

    2) Loosen the knob of the feed pump (5), pull it out, and then operate it until the movement becomes heavy.



   It is not necessary to remove the plugs at the fuel prefilter head and at the fuel main filter head.

11. Push in the knob of the feed pump (5), and tighten it.
12. Start the engine and run it at low idle for 10 minutes.
13. Make sure that there is no fuel leakage from the seal surface of the filter and mounting face of the transparent cup.

    If there is fuel leakage, check the tightening condition of the filter cartridge.

If fuel leaks continuously, remove the filter cartridge in the steps 3 to 5. If damage on the packing surface or pinched foreign material is found, replace the cartridge with a new one, and do the steps 6 to 12 again and again.

Examine All Tightening Points of Engine Intake Pipe Clamps

Consult your Komatsu distributor for the check of each clamp between the air cleaner and turbocharger, between the turbocharger and aftercooler, and between the aftercooler and engine.

How to Examine Fan Belt Tension and Auto-Tensioner and Replace Auto-Tensioner

The fan belt tension is automatically adjusted by auto-tensioner (belt tensioner). Normally, no belt tension adjustment is required. But, if there is a problem of the tension of fan belt, you need to check the fan belt and auto-tensioner.

Special tools are required for the inspection and replacement of auto-tensioner.

Consult your Komatsu distributor.

Every 2000 Hours Maintenance

Maintenance for every 100 hours, 250 hours, 500 hours, and 1000 hours must be done at the same time.

How to Examine Function of Accumulator for Control Circuit and Release Internal Pressure in Hydraulic Circuit

⚠ WARNING

The accumulator includes the high-pressure nitrogen gas. If there is a mistake when you handle them, an explosion can occur, and there is a danger of serious personal injury or death. When you handle it, obey the items that follow.

- **The pressure in the hydraulic circuit cannot be fully released. When you remove the hydraulic equipment, do not stand in the direction that the oil spurts out. Loosen the screws slowly.**
- **Do not disassemble.**
- **Do not let an open flame be near them. Do not throw them in fire.**
- **Do not do the drilling, welding or flame-cutting.**
- **Do not hit it or roll it, or give shocks to it.**
- **When you dispose of it, the gas must be released. Consult your Komatsu distributor.**

NOTICE

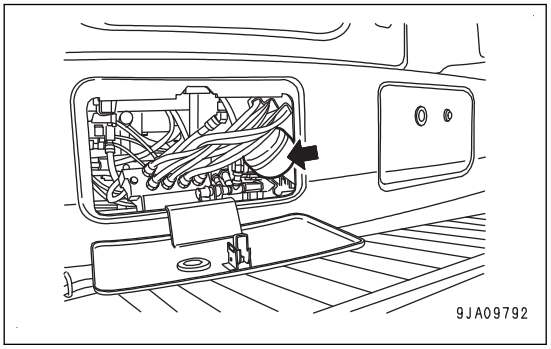
If the nitrogen gas charge pressure in the accumulator is low and operations are continued, it is not possible to release the remaining pressure in the hydraulic circuit if a failure occurs on the machine.

Function of Accumulator

The accumulator has a function to store the pressure of the control circuit in it. Even after the engine is stopped, the control circuit can be operated, so you can do the procedure that follows.

- If the control lever is operated in the direction to lower the work equipment, it is possible for the work equipment to go down under its own weight.
- You can release the pressure from the hydraulic circuit.

The accumulator is in the position shown in the figure.



How to Examine Nitrogen Gas Charge Pressure in Accumulator

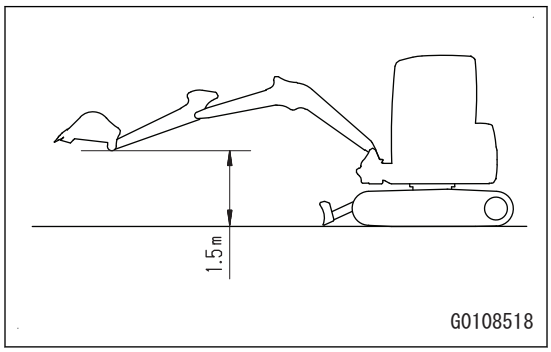
⚠ CAUTION

Check that there is no person or obstacles in the area around the machine before you start the work.

Replace the accumulator every 2 years or every 4000 hours that comes first.

Check the charged pressure of the nitrogen gas as follows.

1. Stop the machine on a firm, level ground.
2. Operate the work equipment control lever to set the work equipment at the maximum reach posture (arm OUT and bucket DUMP end).
3. Hold the work equipment 1.5m {4ft 11in} position off from the ground.

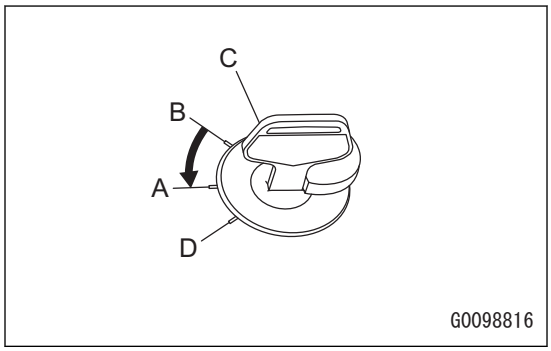


4. Do the procedure that follows in less than 15 seconds.

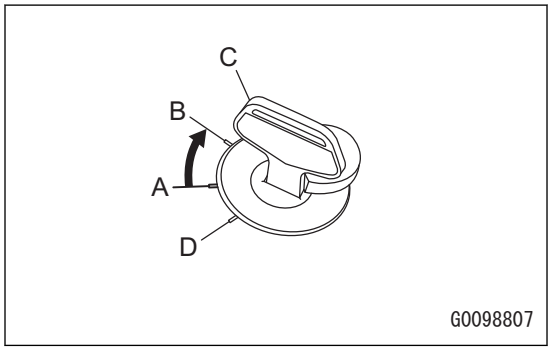
   After the engine stops, the accumulator pressure decreases gradually. If time has passed since the engine was stopped, you cannot do the inspection.

   1) Turn the starting switch to the OFF position (A).

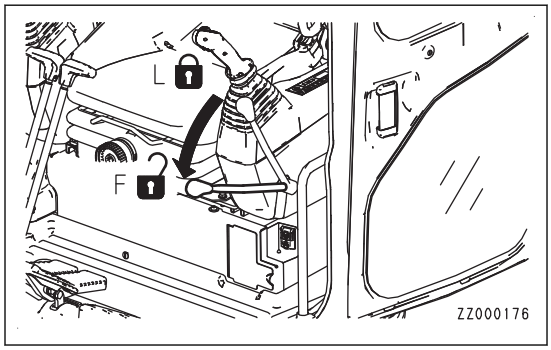
      Engine stops in a state that the work equipment is at the maximum reach posture.



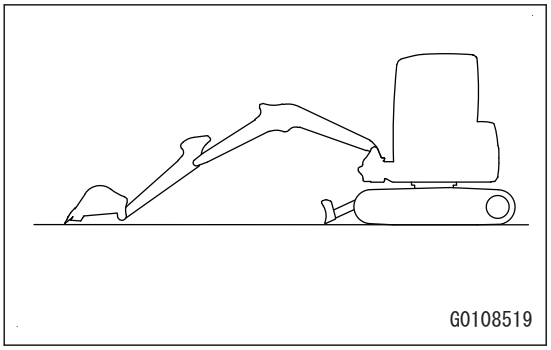
   2) Turn the starting switch to the ON position (B).



   3) Hold the red part on the top of the lock lever, and then set it to the FREE position (F).
   4) Slowly operate the work equipment control lever in the boom LOWER direction and check that the work equipment touches the ground.



- If the work equipment goes down with its own weight and it touches the ground, the accumulator is normal.
- If the work equipment does not go down or stops in midway, the charged pressure of the gas in the accumulator for the hydraulic circuit was possibly low. Consult your Komatsu distributor for inspection.

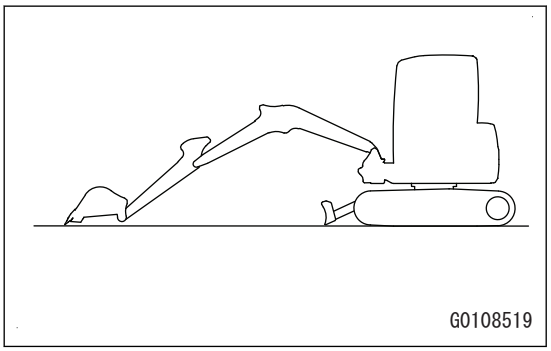


After completion of the inspection, set the lock lever to the LOCK position and turn the starting switch to the OFF position.

How to Release Internal Pressure in Hydraulic Circuit

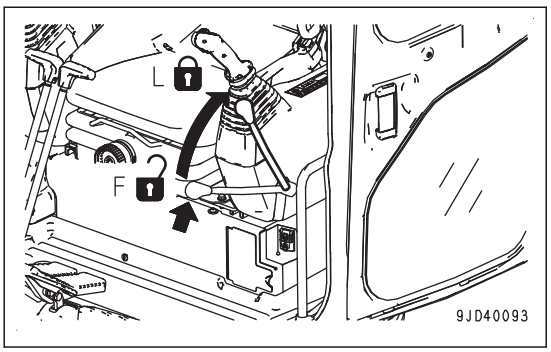
1. Operate the work equipment control levers to set the work equipment to the maximum reach posture (arm and bucket dump end).

   Close the crusher attachment jaws, etc.
2. Lower the work equipment to the ground.



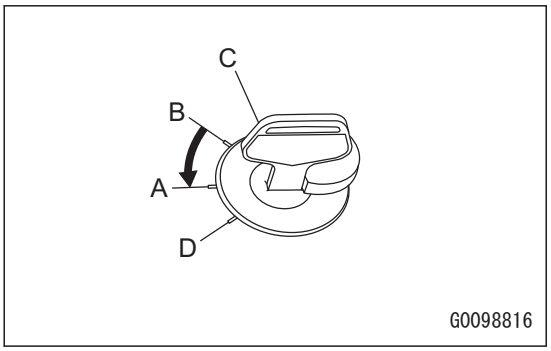
3. Hold the red part at the top of the lock lever, and then set it to the LOCK position (L).
4. Do the procedure that follows in less than 15 seconds.

   After the engine stops, the accumulator pressure decreases gradually. If time elapses after it stopped, you cannot do the inspection.

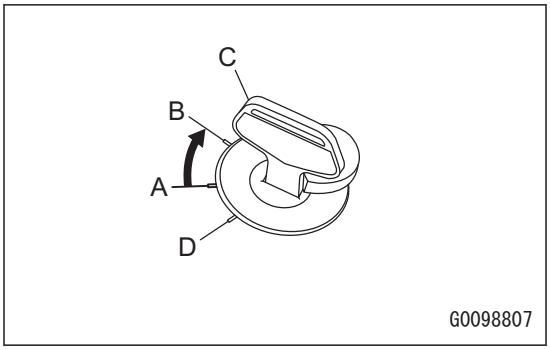


   1) Turn the starting switch to the OFF position (A).

      Engine stops when the work equipment is at the maximum reach posture.



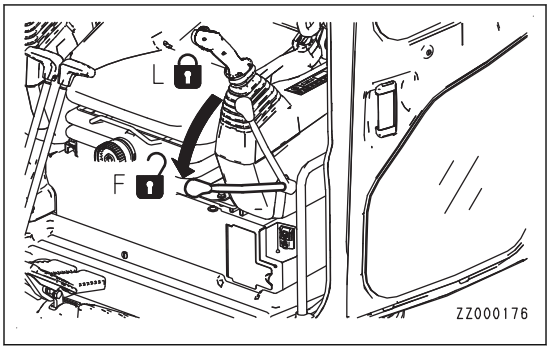
2) Turn the starting switch to the ON position (B).



3) Hold the red part at the top of the lock lever, and then set it to the FREE position (F).

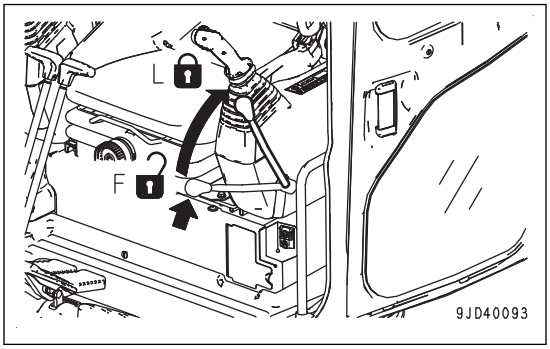
4) Operate the work equipment control levers and the attachment control switches in full stroke to the front, rear, right and left.

Air is bled from the operation circuit.

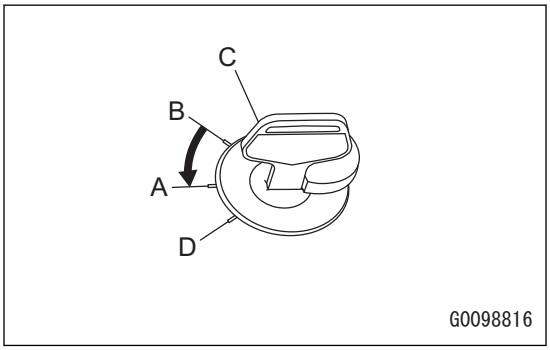


5. Hold the red part at the top of the lock lever, and then set it to the LOCK position (L).

Work equipment control lever and attachment control switch are locked.



6. Turn the starting switch to the OFF position (A).



Examine Alternator and Starting Motor

The brush can be worn or the grease cannot be sufficient on the bearing. Consult your Komatsu distributor for the inspection and repair.

If you start the engine frequently, consult for inspection every 1000 hours.

How to Examine and Adjust Engine Valve Clearance

Special tools are necessary to do the checks and adjustment. Consult your Komatsu distributor.

Every 4000 Hours Maintenance

Maintenance for every 100 hours, 250 hours, 500 hours, 1000 hours, and 2000 hours must be done at the same time.

How to Examine Water Pump

Do the inspection for play of pulley, leakage of oil, leakage of water and clogging of drain hole. If you found an abnormality, consult your Komatsu distributor for disassembly and repair or replacement.

How to Replace Accumulator (For Control Circuit)

⚠ WARNING

The accumulator includes the high-pressure nitrogen gas. If there is a mistake when you handle them, an explosion can occur, and there is a danger of serious personal injury or death. When you handle it, obey the items that follow.

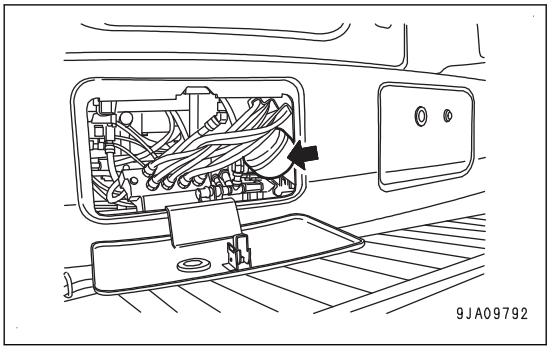
- **The pressure in the hydraulic circuit cannot be fully released. When you remove the hydraulic equipment, do not stand in the direction that the oil spurts out. Loosen the screws slowly.**
- **Do not disassemble.**
- **Do not let an open flame be near them. Do not throw them in fire.**
- **Do not do the drilling, welding or flame-cutting.**
- **Do not hit it or roll it or give shocks to it.**
- **When you dispose of it, the gas must be released. Consult your Komatsu distributor.**

NOTICE

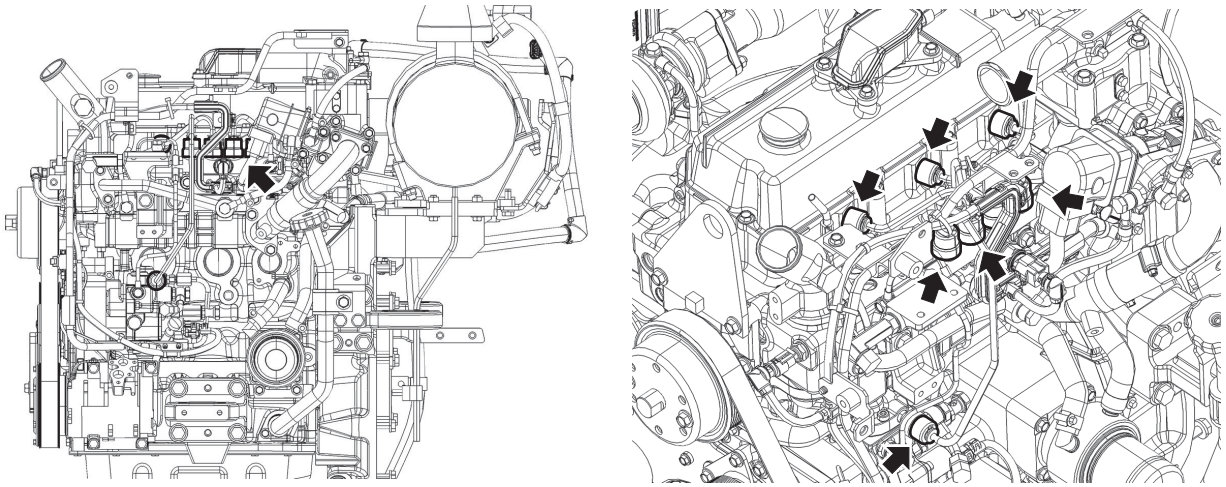
If the nitrogen gas charge pressure in the accumulator is low and operations are continued, it is not possible to release the remaining pressure in the hydraulic circuit if a failure occurs on the machine.

Replace the accumulator every 2 years or every 4000 hours that comes first. Consult your Komatsu distributor for replacement.

The accumulator is in the position shown in the figure.



How to Examine for Missing Fuel Spray Prevention Cap, Hardening of Rubber



The fuel spray prevention caps (8 places) at the fuel injection pipe and two ends of the high pressure pipe are protective parts, which prevent leakage and spray of fuel and fire due to contact with high-temperature parts of the engine.

Visually check or check with a finger that the fuel spray prevention cap is not come off, the bolts are not loose, and the rubbers are not hardened.

If a failure is found, consult your Komatsu distributor for replacement.

Every 5000 Hours Maintenance

Maintenance for every 100 hours, 250 hours, 500 hours, and 1000 hours must be done at the same time.

How to Change Oil in Hydraulic Tank, Clean Strainer

⚠ WARNING

- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**
- **When you remove the plug, loosen it slowly to release the pressure. If there is remaining pressure inside the case, the oil or plug can jump out.**

NOTICE

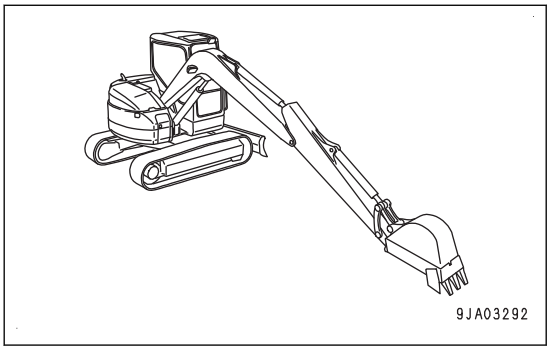
When a hydraulic breaker is installed to the machine, the hydraulic oil deteriorates faster than in the normal bucket digging operation. For the maintenance, see "Maintenance Interval for Hydraulic Breaker (4-15)".

Refill capacity: 56ℓ {14.8US gal}

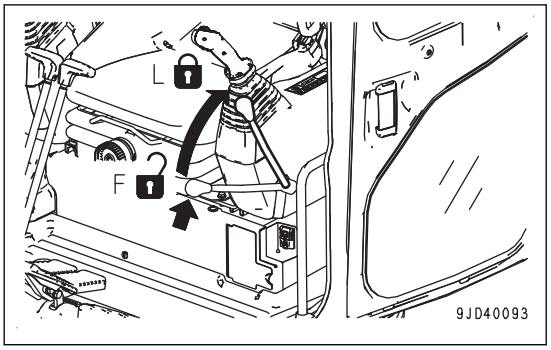
Items to be prepared

- Container to catch oil
- Socket wrench handle

1. Swing the upper structure to let the drain plug at the bottom of the hydraulic tank come to the middle between the right and left tracks.
2. Retract the arm and bucket cylinder rods, swing the boom to the center, and lower it to lower the teeth to the ground.
3. Lower the blade.



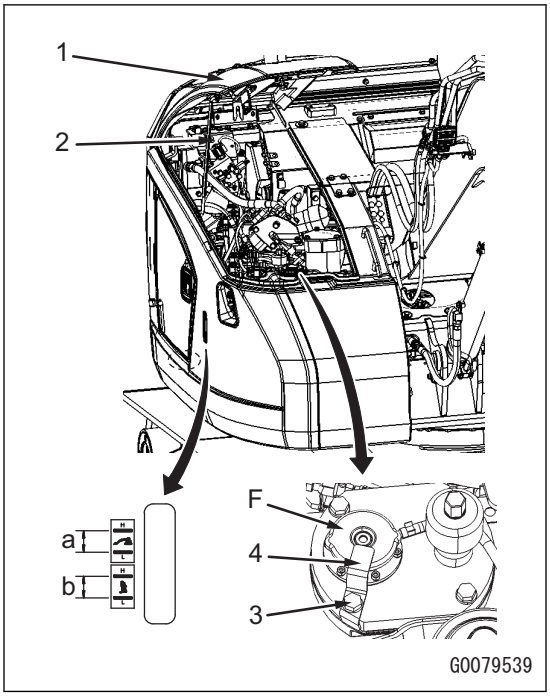
4. Hold the red part at the top of the lock lever, and then set it to the LOCK position (L).
5. Stop the engine.



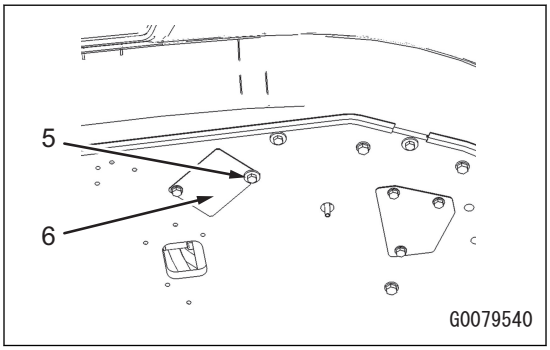
6. Open the dirt cover (1).

   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.

7. Lock it securely with the cover support lever (2).
8. Loosen the bolt (3) and remove the plate (4) on the top of the filler port (F).
9. Loosen the cap of the filler port (F) gradually to release the internal pressure.
10. Remove the cap of the oil filler port (F).



11. Loosen the bolt (5), move the cover (6) below the machine body.



12. Put the oil container below the drain plug (P) at the bottom of the machine to catch the oil.
13. Remove the drain plug (P) with the socket wrench handle to drain the oil.

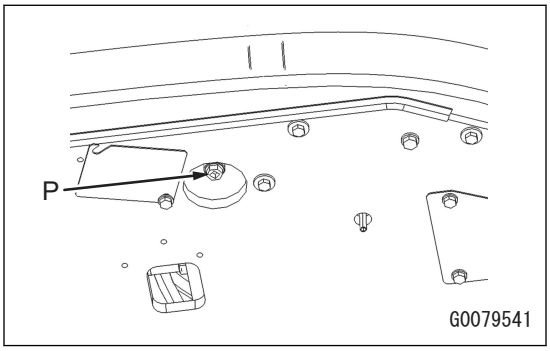
    When you remove the drain plug (P), be careful not to get oil on yourself.

14. Inspect the O-ring attached to the drain plug (P).

    If the O-ring is damaged, replace it.

15. After the oil is drained, tighten the drain plug (P).

    Tightening torque: 58.8 to 78.4Nm {6 to 8kgfm, 43.4 to 57.9lbft}



16. Put the cover (6) back to its original position and fix it with the bolt (5).

17. Loosen 4 bolts, and remove the cover (7).

    Remove the bolt while you push and hold the cover (7) down. The cover (7) can jump out by force of the spring (8).

18. Pull up the top of the rod (9), and remove the spring (8) and strainer (10).
19. Remove dirt from the strainer (10), then wash it in clean diesel fuel or flushing oil.

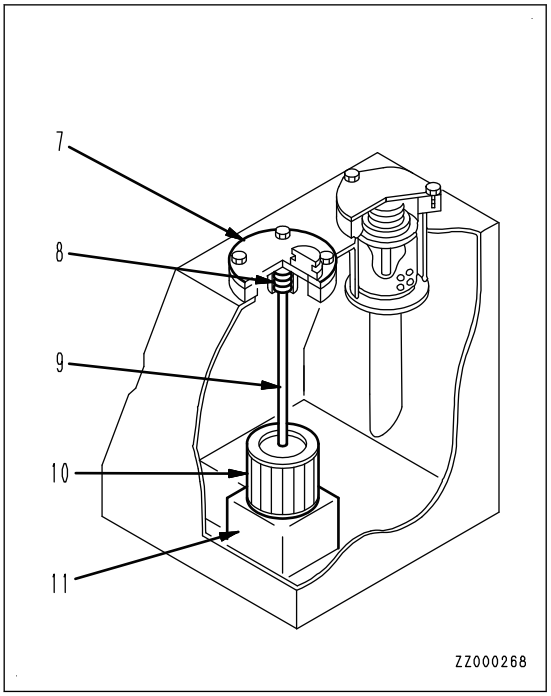
    If the strainer (10) is damaged, replace it with a new one.

20. Insert the strainer (10) into the protrusion part (11) of the tank to assemble it.
21. Inspect the O-ring attached to the cover (7).

    If the O-ring is damaged, replace it.

22. Put the cover (7), and install the cover (7) with bolts while you push it with hand.
23. Add the refill capacity of oil through the filler port (F).

    For the applicable oil, see “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.



24. Check that the oil level is between H and L marks on the sight gauge (G).

    For the method to check the oil level, see “How to Examine Oil Level in Hydraulic Tank, Add Oil (3-114)”.

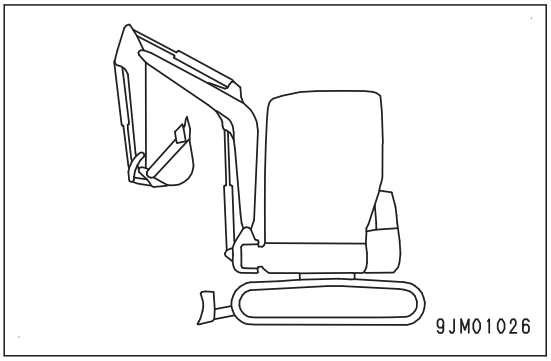
25. Install the cap of the oil filler port (F).
26. Start the engine.

    To start the engine, see the OPERATION, “Operations and Checks Before You Start Engine (3-133)” and “How to Start Engine (3-136)”.

27. Swing the boom to the center and fully extend the boom, arm, and bucket cylinders as shown in the figure.
28. To pressurize the tank, remove the filler port cap first, and install it again.

    NOTICE

    If the hydraulic tank is not pressurized, air is sucked in the pump and it has bad effects on the components.



29. Move the plate (4) to the center of the cap and fix it with the bolt (3).
30. Remove the cover support lever (2) and fix it to the lever lock securely.
31. Close the dirt cover (1).
32. Bleed air from the hydraulic circuit.

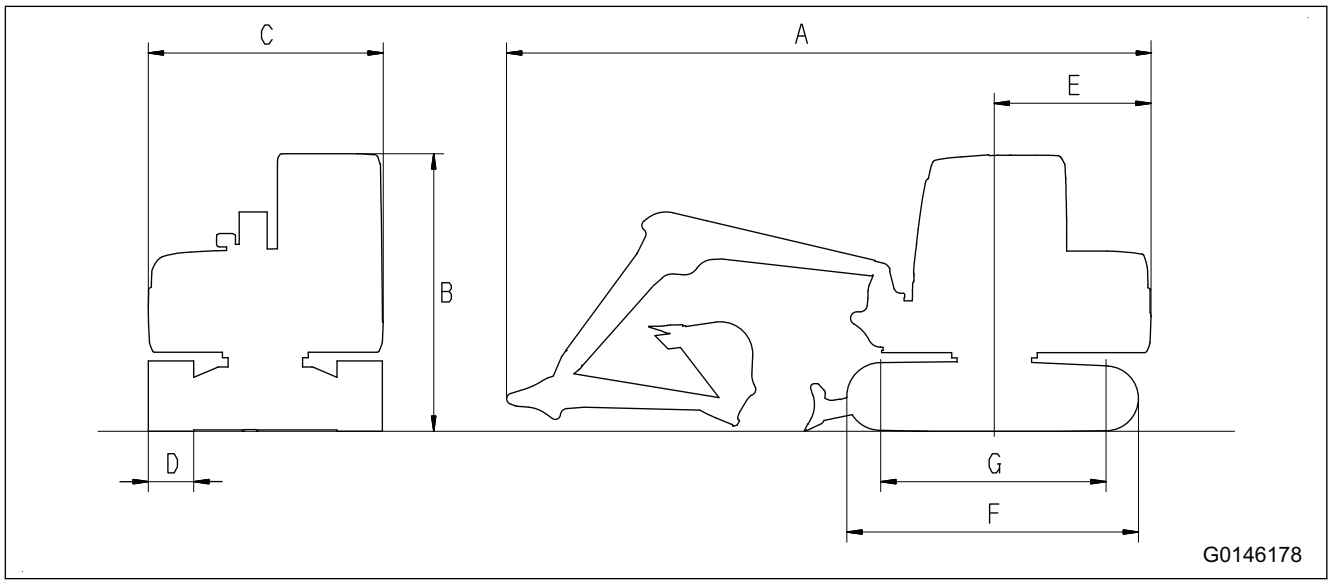
    For the air bleeding procedure of hydraulic circuit, see “How to Bleed Air from Hydraulic Circuit (4-54)”.

Specifications

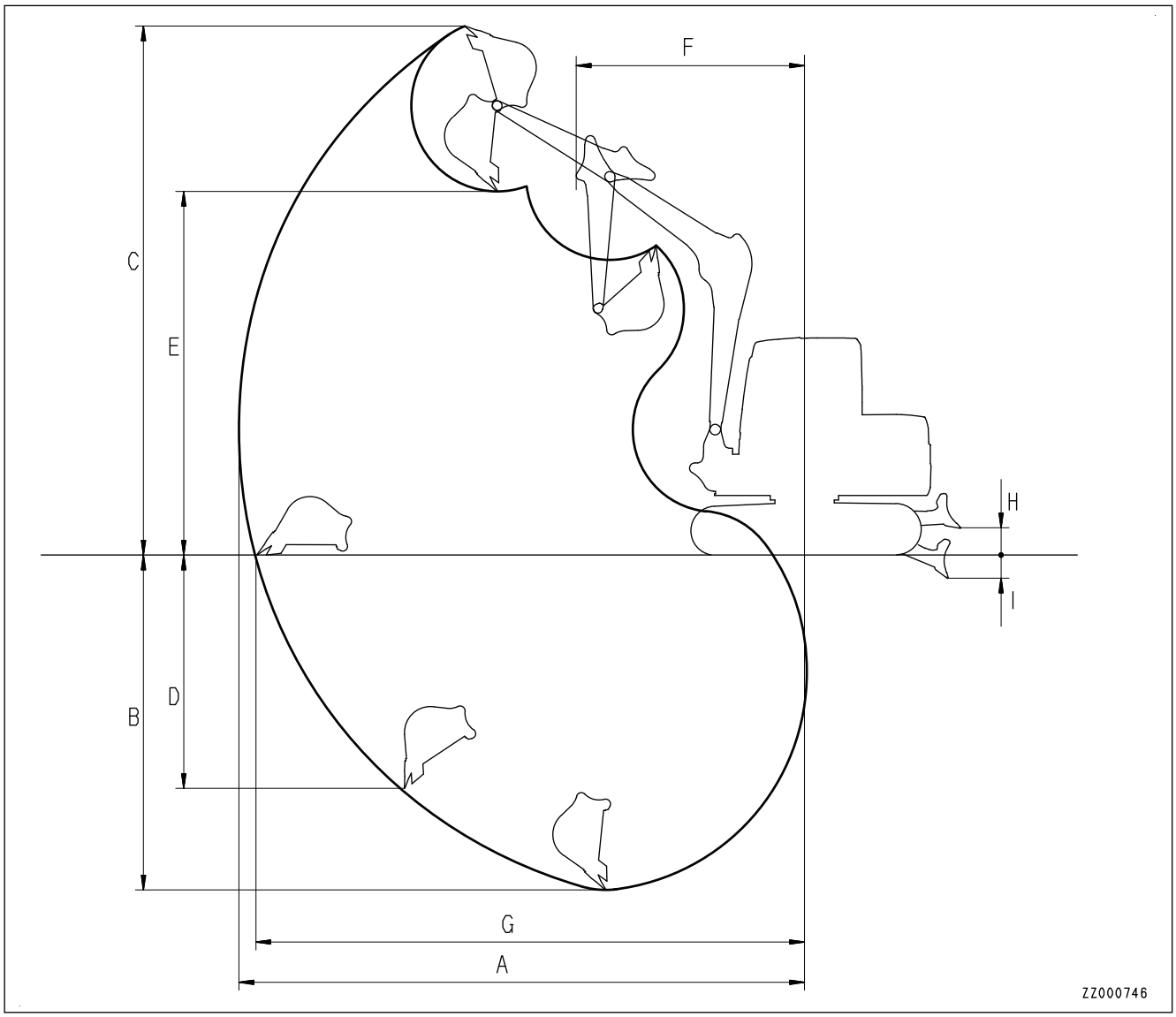
Specifications

	Item	Unit	Roadliner specification
	Machine weight (including blade)	kg {lb}	8640 {19050}
	Bucket capacity	m^3 {cu/yd}	0.20 {0.26}
	Engine model	-	KOMATSU SAA3D95E-1 diesel engine
	Rated horsepower • SAE J1995 (gross) • ISO 9249 /SAE J1349 (net)	kW/min^{-1} {HP/rpm}	 50.7/1900 {68.0/1900} 50.6/1850 {67.8/1850}
A	Overall length	mm {ft in}	6430 {21' 1"}
B	Overall height	mm {ft in}	2740 {9' 0"} 2710 {8' 11"} (*1)
C	Overall width	mm {ft in}	2330 {7' 8"}
D	Track width	mm {ft in}	450 {1' 6"}
E	Tail swing radius	mm {ft in}	1485 {4' 10"}
F	Overall length of track	mm {ft in}	2890 {9' 6"} 2840 {9' 4"} (*1)
G	Distance between tumbler centers	mm {ft in}	2235 {7' 4"}
H	Minimum ground clearance	mm {ft in}	410 {1' 4"}
	Travel speed (Lo/Hi)	km/h {MPH}	2.7 {1.7}/5.0 {3.1}
	Continuous swing speed	rpm	10.0

(*1): Steel shoe specification



	Item	Unit	2100mm arm specification
A	Maximum digging reach	mm {ft in}	7345 {24' 1"}
B	Maximum digging depth	mm {ft in}	4565 {15' 0"}
C	Maximum digging height	mm {ft in}	6800 {22' 4"}
D	Maximum vertical wall digging depth	mm {ft in}	3115 {10' 3"}
E	Maximum dumping height	mm {ft in}	4770 {15' 8"}
F	Minimum swing radius of work equipment Minimum swing radius of boom	mm {ft in}	2900 {9' 6"} 2545 {8' 4"}
G	Maximum reach at ground level	mm {ft in}	7135 {23' 5"}
H	Maximum blade lift above ground	mm {ft in}	550 {1' 10"}
I	Maximum blade drop below ground	mm {ft in}	390 {1' 3"}



Attachments and Options

⚠ WARNING

Before you read ATTACHMENTS AND OPTIONS, read and understand SAFETY.

Precautions When You Use Attachments and Options Safely

⚠ WARNING

Do not install attachments or optional devices other than those authorized by us. We will not be responsible for personal injury, damage, or property damage related to attachments or optional devices other than those authorized by us.

When you install the attachments or options to the machine, safety precautions are necessary. Obey the precautions below when you select, install or remove, or use the attachments or options.

Caution When You Select

When you install attachments and optional equipment, you need to take into consideration the following. Before that, consult your Komatsu distributor.

- By the type of the attachments or options, it can be necessary to install a front guard, overhead guard, or other safety structure to the machine.
- By the type of the attachments or options, the work equipment and the machine body possibly interfere with each other.

Read the Operation and Maintenance Manual Thoroughly

Before you install/remove or use the attachments or options, make sure that you fully read and understand the instruction manuals of the attachment or option and the Operation and Maintenance Manual of the machine.

If you lose the instruction manual or it is damaged, get a new one from the manufacturer of the attachments or options, or your Komatsu distributor.

⚠ WARNING

General precautions

- **For the attachment that makes hitting sound, it cannot be easy to communicate the work instructions between workers. Give a signalman in the location first and find the signals to be used.**
- **Do not swing the work equipment sideways with a heavy load on it. It will be more dangerous on a slope.**
- **If a breaker is installed to the machine, the machine is less balanced because a load larger than the bucket is applied to the front of the work equipment. To avoid the danger of falling, do not do the work sideways.**
- **If an attachment is installed, the swing range and the center of gravity of the machine change, and the machine moves unexpectedly. Be sure to check the condition of the machine.**
- **Before you start the work, make fences around the machine to prevent entry of person to the work area.**
  Also, when there is a person near the machine, do not move the machine.
- **To prevent an accident caused by operation error, you must not put your foot on the pedal other than when you operate the pedal.**

Precautions for removal and installation

When you remove and install the attachments or options, obey the precautions below, and be careful of the safety.

- **Do the work on a level and solid ground.**
- **When the operation is done by 2 or more persons, allocate a leader and follow his/her instructions.**
- **Use applicable devices such as a crane when you handle heavy objects that can cause death, personal injury, or other accidents.**
- **Before you remove a heavy object, use a support to prevent falling as necessary. Be careful of the balance of the machine after the heavy object was removed. When you lift a load with a crane, be very careful of the center of gravity.**
- **Do not do the operations while you keep the object lifted by a crane. Be sure to use a stand to prevent falling.**
- **Before the installation or after the removal, make the attachment or option be in a stable condition not to fall over.**
- **Do not enter the area below the object which is lifted by a crane.**
  Be sure to stay in an area that is safe even if the load falls off.

NOTICE

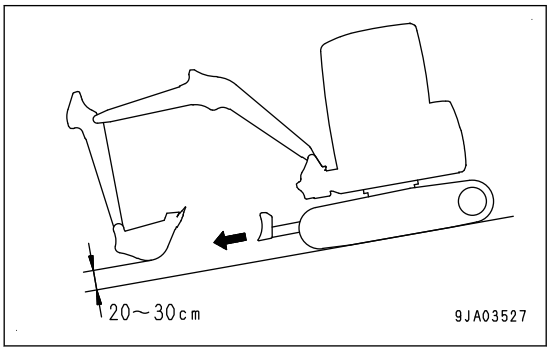
Qualifications are required to operate a crane. Only a qualified operator can operate.
For details about the removal and installation operations, consult your Komatsu distributor.

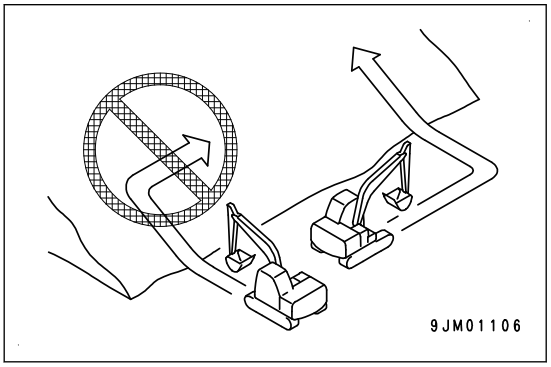
Precautions When Attachment is Installed

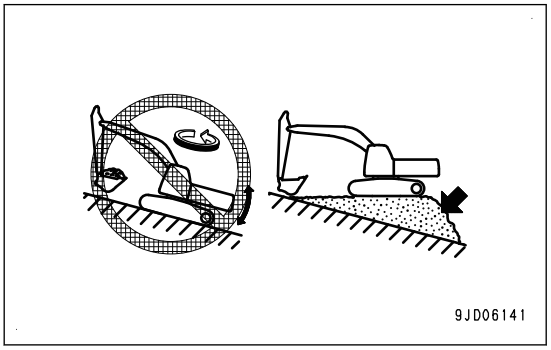
⚠ WARNING

If a long or heavy work equipment is installed, the machine is less stable, and it can lose balance and fall over when it travels down a steep slope or when it swings on a slope.
Do not do the works that follows. They are very dangerous.

- **Travel down a slope with work equipment raised**
- **Travel across a slope**
- **Swing operation on a slope**
- **If a heavy work equipment is installed, the swing overrun (the distance that the work equipment swings until it fully stops after you stopped the swing operation) will be larger. There is a possibility that you cannot judge the distance correctly and hit the work equipment. Operate while you keep the safe distance from the position where the swing operation is stopped. In addition, the hydraulic drift (the phenomenon that the work equipment lowers gradually by its own weight when it is held in air) increases, as well. When you stop the work equipment in the air, be careful of the hydraulic drift.**
- **To select the boom or arm, consult your Komatsu distributor. If you do not follow the correct work procedure, it can cause serious damage.**
- **If a long work equipment is installed, there is a danger that you cannot judge the distance correctly and hit the work equipment as the working range increases largely.**
  Always keep a safe distance from obstacles around the machine.







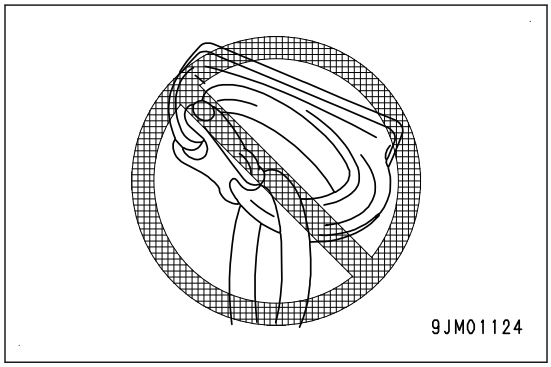
Handle Bucket with Hook

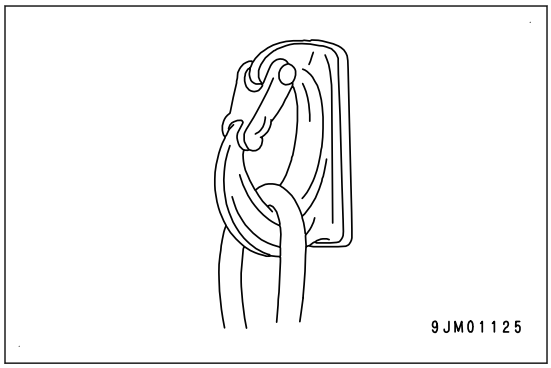
When you use the bucket with hook, check that there is no damage to the hook, stopper, or hook mounting part. If a problem is found, consult your Komatsu distributor.

Work Precautions

Precautions for Lifting Operations

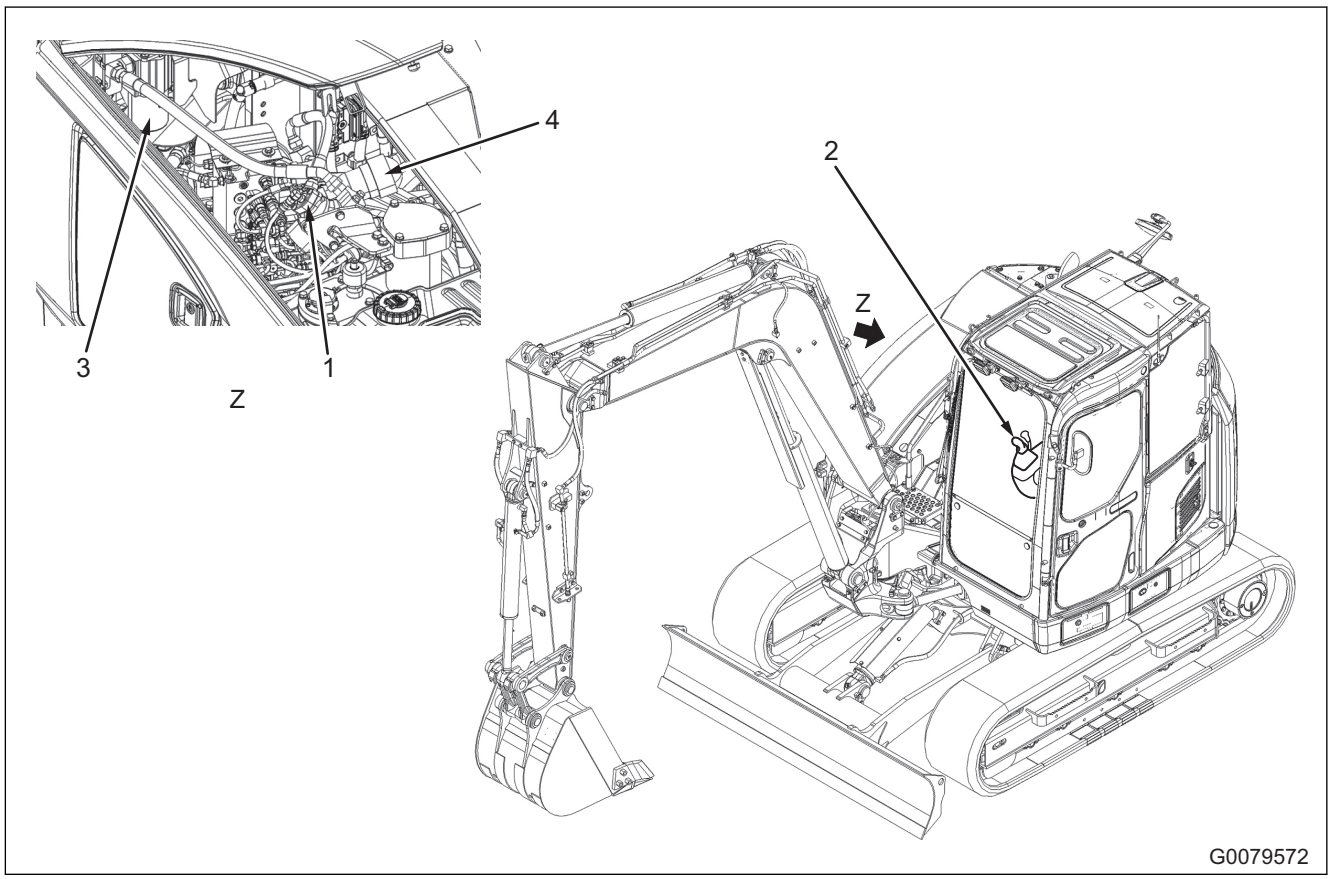
- Set the L mode before you do the lifting work.
- Do not drive the machine during the lifting operation.
- There is a danger that the wire or sling comes off the hook by the working posture. Be careful of the hook angle not to let it come off. Prohibit the personnel to be in the area around or below the lifted load.
- If the bucket with hook is inverted and used for operations, the arm and the bucket will interfere with each other during the bucket DUMP operation. Be careful.
- If you install a hook, consult your Komatsu distributor.





Handle Machine Ready for Installation of Attachment

Explanation of Components on Machines with Attachment



(1) Selector valve

(2) Breaker operation switch

(3) Additional filter for breaker

(4) Accumulator (for low pressure)

Selector Valve

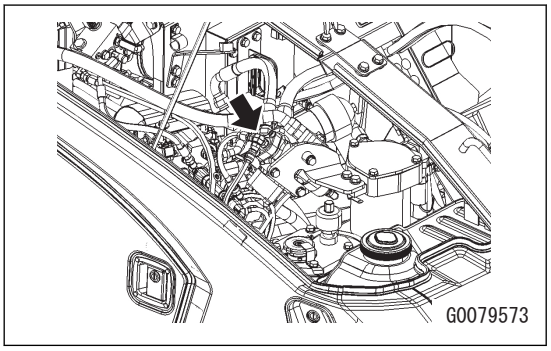
The selector valve changes the flow of the hydraulic oil.

It changes automatically in response to the selected working mode. Change the working mode to match the attachment that is installed.

To change the working mode, see “How to Change over Hydraulic Circuit of Attachment (6-9)”.

NOTICE

If you added a service circuit from the attachment manufacturer, the return circuit does not change automatically in some cases.

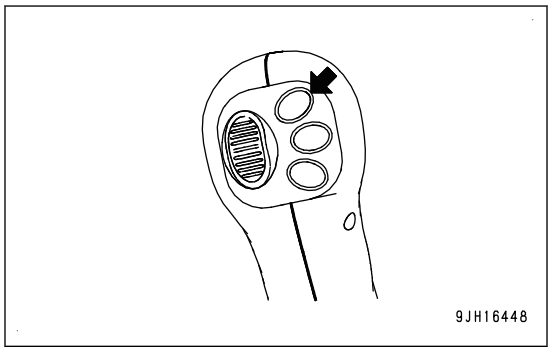


Breaker Operation Switch

Use the breaker operation switch to operate the breaker.

If this switch is pushed, the breaker operates.

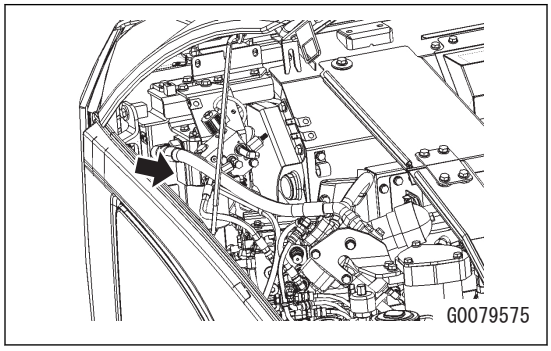
It operates only when the breaker mode is selected.



Additional Filter for Breaker

The additional filter for breaker prevents deterioration of the hydraulic oil when the breaker is used.

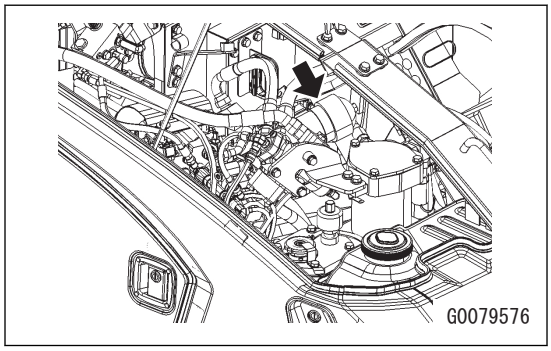
Oil flows only when you select the breaker mode.



Accumulator (For Low Pressure)

The accumulator (for low pressure) is installed to protect the oil cooler when you use the breaker.

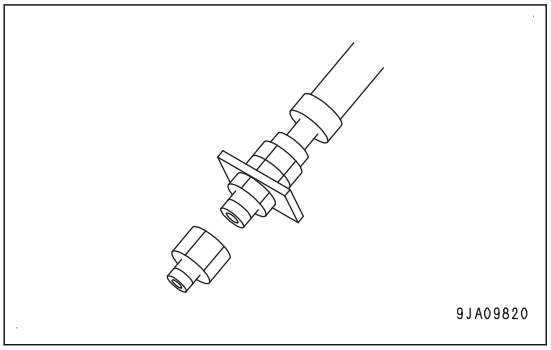
Consult the attachment manufacturer whether the installation is necessary or not.



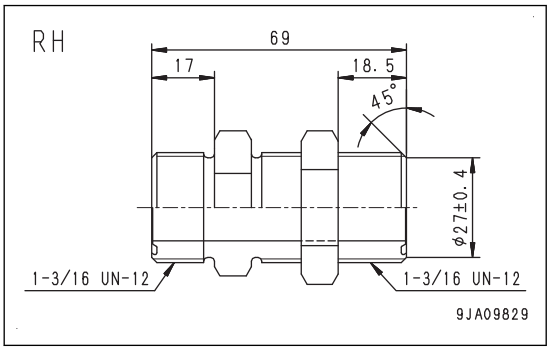
How to Connect Hydraulic Circuit of Attachment

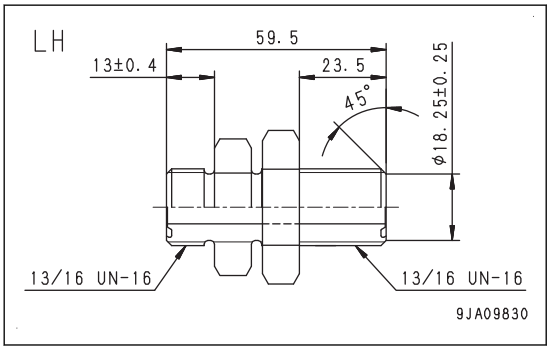
When you install the attachment, connect the hydraulic circuit as follows.

1. Connect the attachment piping provided by the attachment manufacturer.



The dimensions on the machine side are as shown in the figure.





2. After you connect the piping, bleed air from the hydraulic circuit in response to the procedures that follow.

NOTICE

If the method of air bleeding from the attachment is specified by the manufacturer, bleed air according to the specified procedure.

1) Start the engine.

   Keep the engine running at low idle for 10 minutes after the start, and then go to the next step.

2) Continue to operate the attachment control switch approximately 10 times while the engine is running at low idle.

   Fully bleed air from the attachment circuit.

3) Stop the engine.

   Keep the machine stopped for 5 minutes or more.

4) Start the engine.

   The air bubbles in the oil inside the tank are discharged.

5) Make sure that there is no oil leakage. Wipe off spilt oil.

How to Change over Hydraulic Circuit of Attachment

Set the working mode on the machine monitor in response to the type of attachment to be installed.

The hydraulic circuit and the set pressure of the safety valve in the service valve change in response to the working mode which has been set.

For some attachments, it is necessary to change the oil flow rate in the service circuit.

For the flow rate setting, see “Change Breaker Flow Setting (3-63)”, “Change Attachment Flow Setting (3-65)”.

Change Breaker and General Attachment

Install an attachment (option) and set the working mode to the B mode.
Hydraulic oil at the breaker circuit flows through the additional filter for breaker. The relief valve is set to the low pressure. The flow rate can be adjusted to the maximum in user menu.

Safety valve set pressure of service valve (when shipped from plant): 17.2MPa {175kgf/cm^2, 2490PSI}

The breaker circuit (one-way circuit) is formed.

Change Crusher or Other Attachment with 2-Way Circuit

Install an attachment (option) and set the working mode to the ATT/P or ATT/E mode.
Hydraulic oil at the crusher circuit does not flow through the additional filter for breaker. The relief valve is set to the high pressure. The flow rate can be adjusted to the maximum in user menu.

Safety valve set pressure of service valve (when shipped from plant): 19.6MPa {200kgf/cm^2, 2840PSI}

The circuit becomes the crusher circuit (2-way circuit).

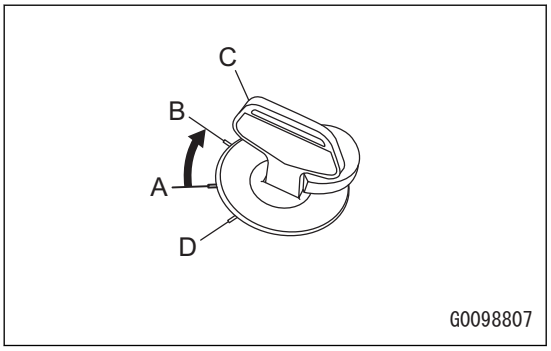
How to Remove and Install Attachment

⚠ WARNING

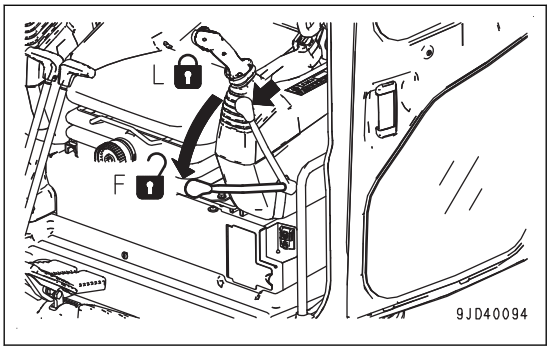
- **The pressure in the hydraulic circuit cannot be fully released. When you remove the hydraulic equipment, do not stand in the direction that the oil spurts out. Loosen the screws slowly.**
- **Wait for the temperature of the machine to go down, and then start the work. Immediately after the engine is stopped, the parts and oil are very hot and they can cause burn injury.**

How to Remove Attachment

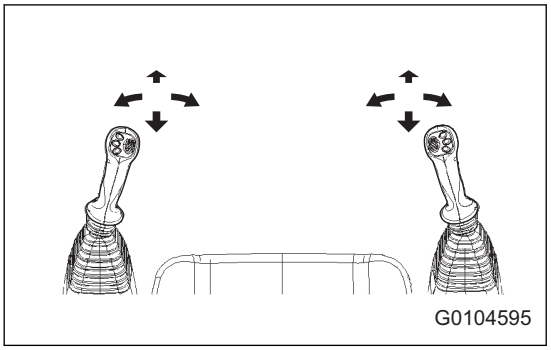
1. Lower the attachment to the ground, and stop the engine.
2. Turn the starting switch to the ON position (B).

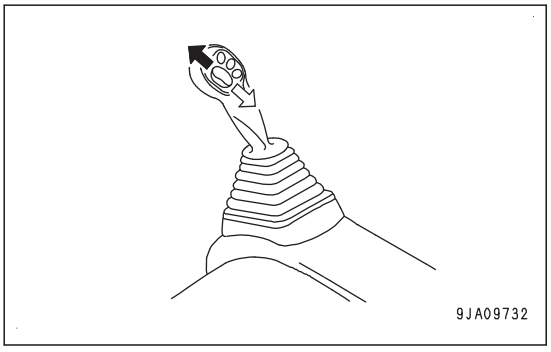


3. Hold the red part at the top of the lock lever, and then set it to the FREE position (F).

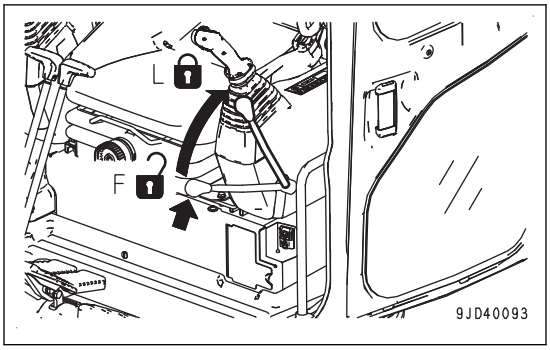


4. Operate each control lever (work equipment, travel) and attachment control switch 2 or 3 times fully in front, rear, right, and left less than 15 seconds after the engine is stopped to release the internal pressure in the hydraulic circuit.

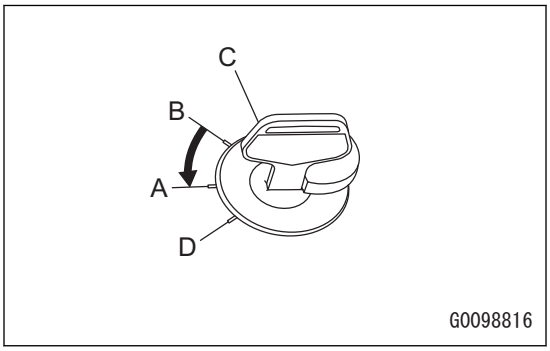




5. Hold the red part at the top of the lock lever, and then set it to the LOCK position (L).



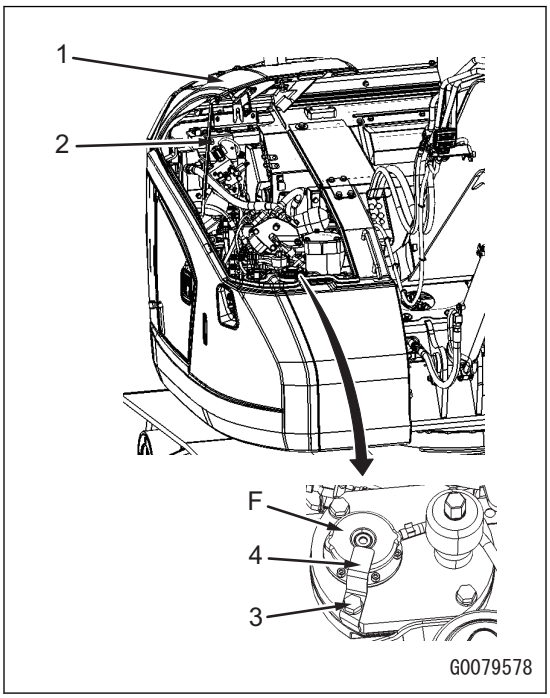
6. Turn the starting switch to the OFF position (A).



7. Open the dirt cover (1).

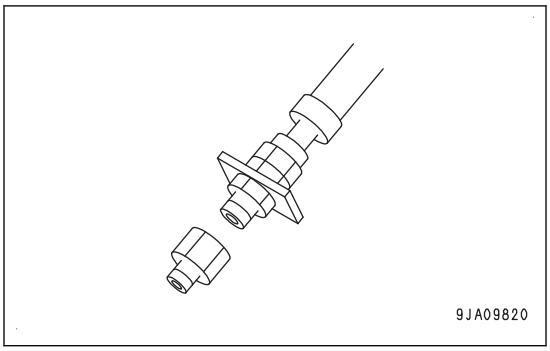
   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.

8. Lock it securely with the cover support lever (2).
9. Loosen the bolt (3) and remove the plate (4) on the top of the oil filler port (F).
10. Loosen the cap of the oil filler port (F) gradually to release the internal pressure.
11. Remove the cap of the oil filler port (F).
12. Makes sure that the hydraulic oil temperature becomes low.



13. Remove the hoses on the attachment side. Install the plugs to the outlets (2 places).

    The plug prevents the entry of foreign material that can be a cause of malfunction of the attachment. Install it securely for storage.

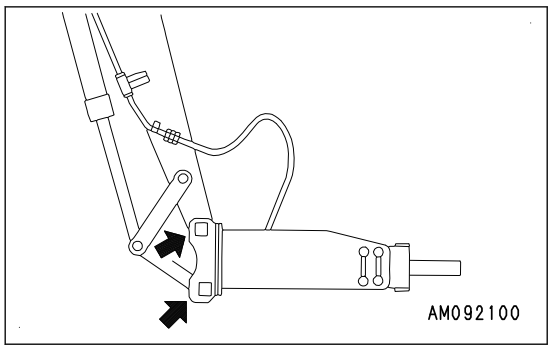


14. Pull out the 2 mounting pins to remove the attachment, and install the bucket.

    For the installation procedure of the bucket, see “How to Replace and Invert Bucket (3-179)”.

15. Examine the oil level in the hydraulic tank.

    For details, see “How to Examine Oil Level in Hydraulic Tank, Add Oil (3-114)”.

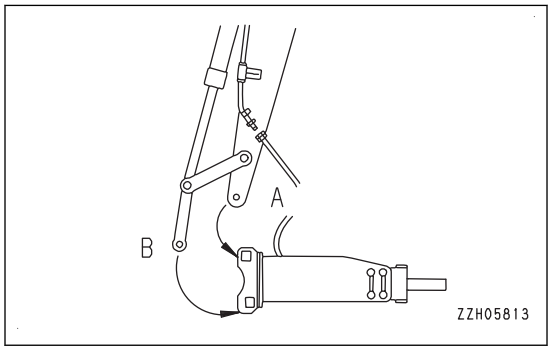


How to Install Attachment

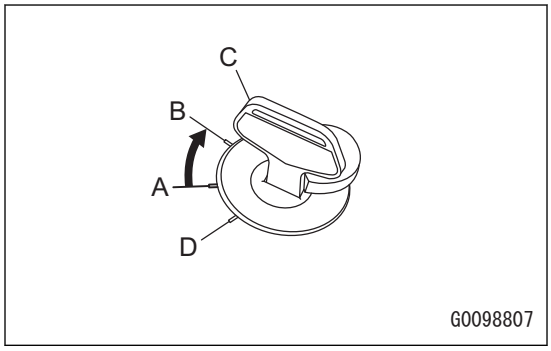
1. Remove the bucket.

   For the removal procedure of the bucket, see “How to Replace and Invert Bucket (3-179)”.

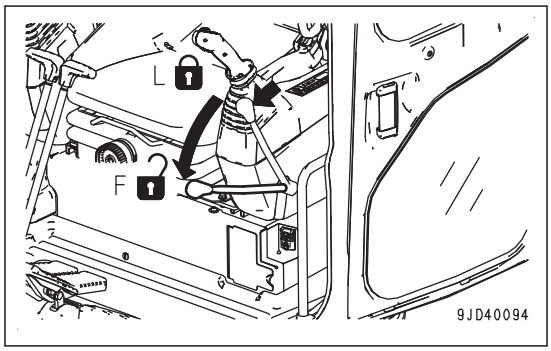
2. Put the attachment on a level area, install the pin (A) and the pin (B) in this order to the arm.
3. Lower the attachment to the ground, and stop the engine.



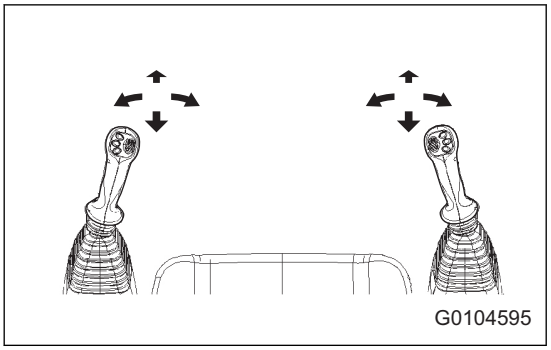
4. Turn the starting switch to the ON position (B).

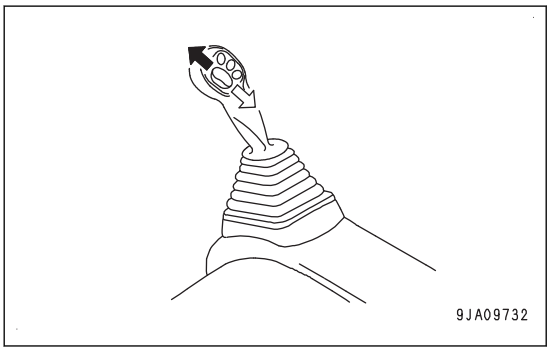


5. Hold the red part at the top of the lock lever, and then set it to the FREE position (F).

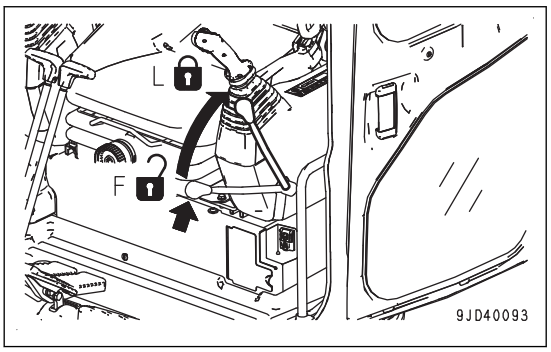


6. Operate each control lever (work equipment, travel) and attachment control switch 2 or 3 times fully in front, rear, right, and left less than 15 seconds after the engine is stopped to release the internal pressure in the hydraulic circuit.

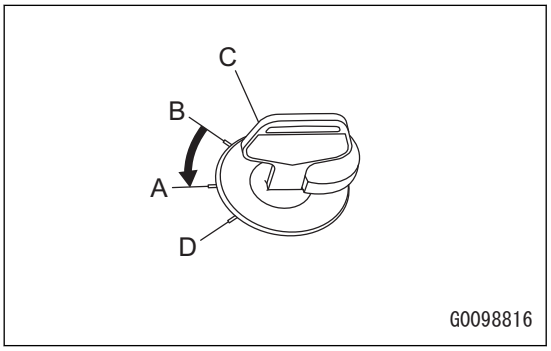




7. Hold the red part at the top of the lock lever, and then set it to the LOCK position (L).



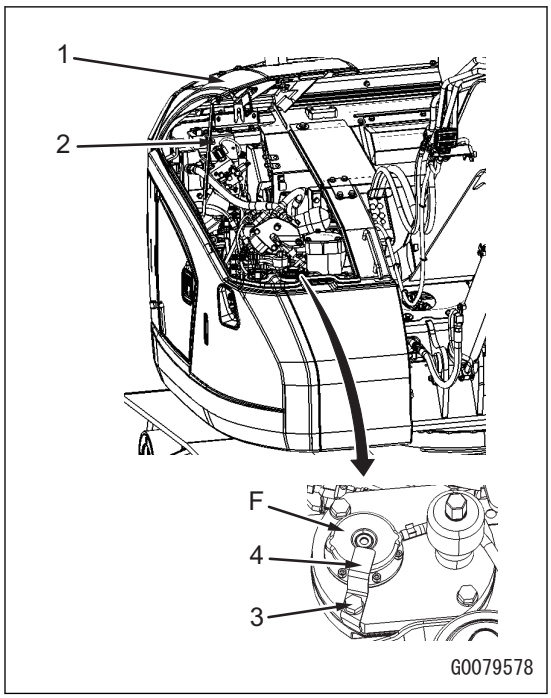
8. Turn the starting switch to the OFF position (A).



9. Open the dirt cover (1).

   When you open the dirt cover, see “How to Open and Close Dirt Cover (3-186)”.

10. Lock it securely with the cover support lever (2).
11. Loosen the bolt (3) and remove the plate (4) on the top of the oil filler port (F).
12. Loosen the cap of the oil filler port (F) gradually to release the internal pressure.
13. Remove the cap of the oil filler port (F).
14. Makes sure that the hydraulic oil temperature becomes low.



15. Remove the plugs (2 places) at the outlet and inlet.

    Be careful not to let foreign materials such as dirt or mud stick to the hose fitting.

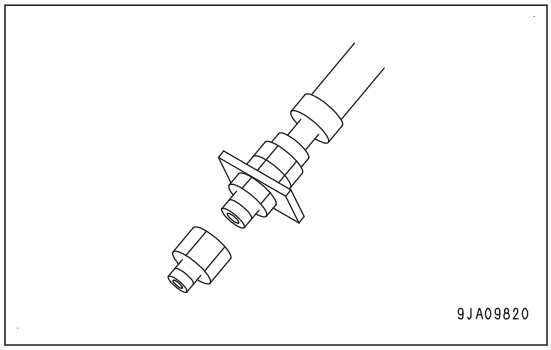
    If the O-ring is damaged, replace it with a new one.

16. Connect the hose at the attachment side.

    Check the flow direction of the oil and be careful not to make a mistake of it.

17. Examine the oil level in the hydraulic tank.

    For details, see “How to Examine Oil Level in Hydraulic Tank, Add Oil (3-114)”.



How to Operate Attachment

⚠ WARNING

If you operate the pedals when the engine speed decreases by the auto-deceleration function, the engine speed will suddenly increase. Be careful.

To change the flow setting for the breaker mode and attachment mode such as the crusher, see “Change Breaker Flow Setting (3-63)”, “Change Attachment Flow Setting (3-65)”.

Check Points Before You Use Breaker

- The working mode must be set to the B mode.
- The maintenance interval of the hydraulic oil and its element must be shorter than usual.
  If a hydraulic breaker is installed to the machine, the hydraulic oil deteriorates faster than in the normal bucket digging operation. See “Maintenance Interval for Hydraulic Breaker (4-15)” and check the maintenance interval.

  Consult the attachment manufacturer whether the installation of accumulator for attachment circuit is necessary or not.

  When you handle the breaker, obey the instruction given in the manual of the manufacturer of breaker and use it correctly.

How to Operate Machine When Working Mode is Not in Breaker Mode

If the breaker mode is not shown on the working mode, set the machine to the breaker mode as follows.

1. Push the working mode selector switch (1).

   The screen changes to the “Working Mode”screen.



2. Push the working mode selector switch (1) or push the switch F3 or F4 to select the column of “B” (Breaker mode).

   The column of “B” (Breaker mode) is highlighted in yellow.

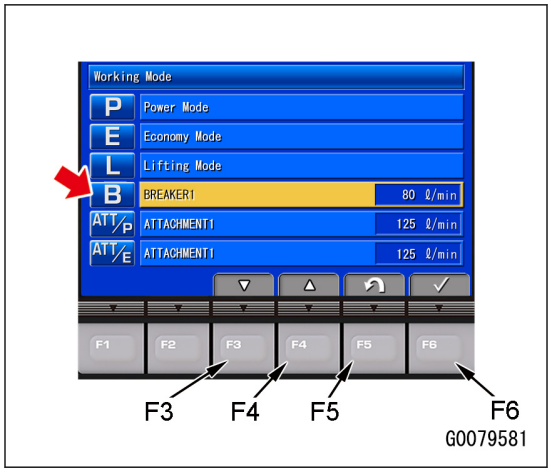
3. With “B” (Breaker mod) highlighted in yellow, do one of the 3 operations that follow to enter the selection.
   - Hold down the working mode selector switch (1).
   - Push the switch F6.
   - Keep it as it is for 5 seconds.

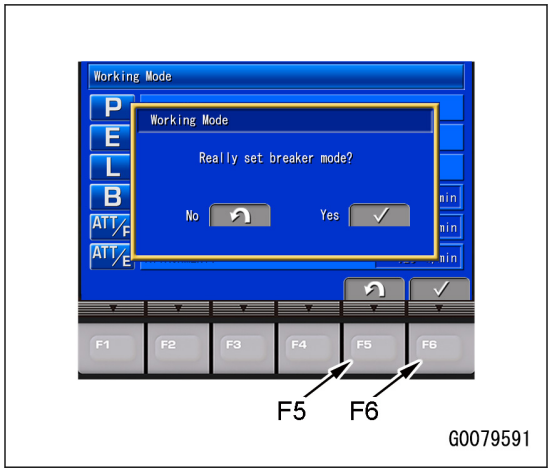
   REMARK

   When the switch F5 is pushed, the working mode does not change to the breaker mode and the screen goes back to the “Working Mode” screen.

   If you enter the selection of breaker mode, confirmation message is shown.

4. Push the switch F6 to enter the breaker mode.



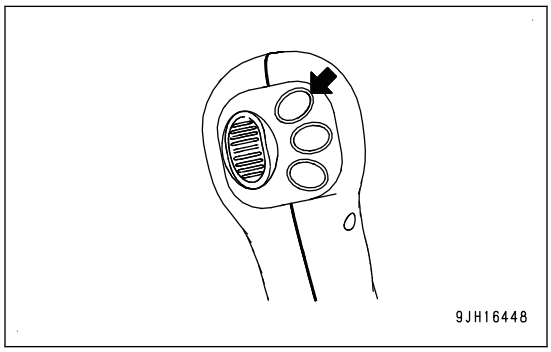


How to Operate Breaker

NOTICE

Use the breaker mode when you do breaker operations. If the breaker is used without using the breaker mode, the breaker will be damaged. Breaker operation is not available in P, E, L mode. Be very careful.

Operate the breaker operation switch.



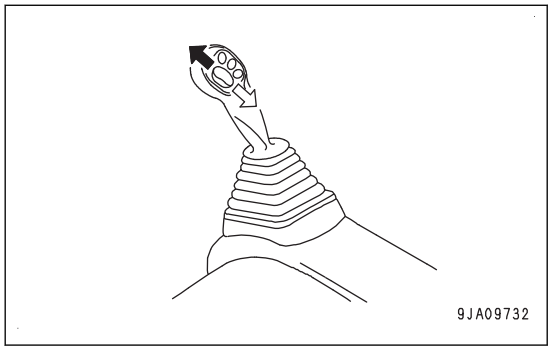
The breaker operates.

Check Points Before You Use General Attachment Such as Crusher Etc.

Check that the working mode is set to ATT/P or ATT/E.
For other precautions when you handle the attachment, obey the instruction manual from the attachment manufacturer and use the attachment correctly.

How to Operate General Attachment Such as Crusher Etc.

Operate the 1st-line attachment proportional switch.



The attachment operates.

Long-Term Storage

NOTICE

If you set the working mode to BREAKER/ATTACHMENT and operate the switch while no breaker and no general attachment are installed, the machine can overheat.

Specifications

Hydraulic Specifications

Flow rate

Attachment mode: 145ℓ/min

Breaker mode: 115ℓ/min

Cracking pressure of safety valve

When breaker is used: 17.2MPa {175kgf/cm^2, 2490PSI}

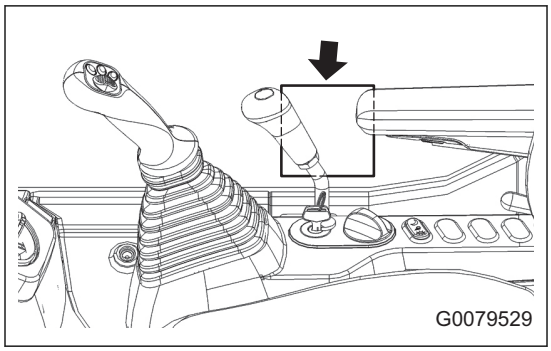
When one of other attachments is used: 19.6MPa {200kgf/cm^2, 2840PSI}

Handle Machine with Control Pattern Change-over Valve

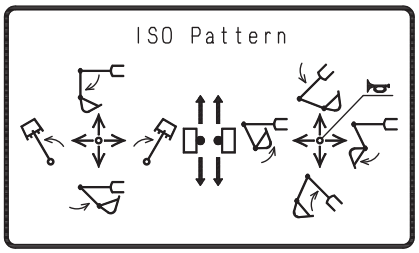
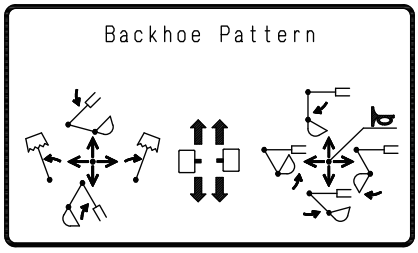
Control Patterns Other Than Standard Control Pattern

⚠ WARNING

- **When you operate the machine, make sure that the display of the control pattern card agrees with the operation of the machine to prevent personal injury by malfunction.**
  If it does not agree, replace it immediately with the correct control pattern card.
- **When you check the movement of the machine, be careful of the safety around the machine and operate it slowly.**
- **When you change the control pattern of the machine, stop the engine, make sure that the lock lever is in the LOCK position, and then change it.**



If your machine is the machine with pattern selector valve, you can freely select the operation pattern of the work equipment control lever.

ISO pattern	Backhoe pattern
	

If the control pattern is changed, replace the control pattern card with the one for the new control pattern.

REMARK

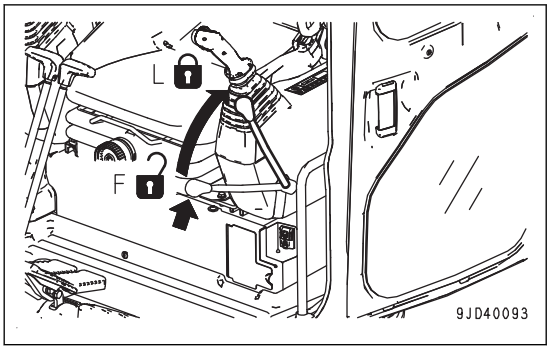
The control pattern cards can be replaced.

How to Change Control Pattern

⚠ WARNING

- **When you change the control pattern of the machine, let the machine be in the parked state, stop the engine, make sure that the lock lever is in the “LOCK” position, and then change it.**
- **When you operate the machine, make sure that the display of the control pattern card agrees with the operation of the machine to prevent personal injury by malfunction.**
  If it does not agree, replace it immediately with the correct control pattern card.
- **When you check the movement of the machine, be careful of the safety around the machine and operate it slowly.**

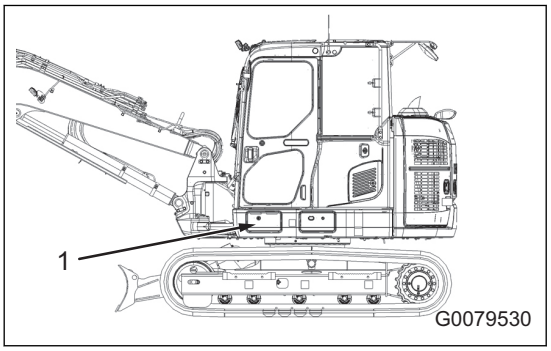
1. After you set the machine to the PARK posture, hold the red part on the top of the lock lever to operate the lever to the LOCK position (L), and stop the engine.



2. Open the inspection cover at the left of the machine.

   Open the inspection cover on the left side of the machine, and you can find the selector valve.

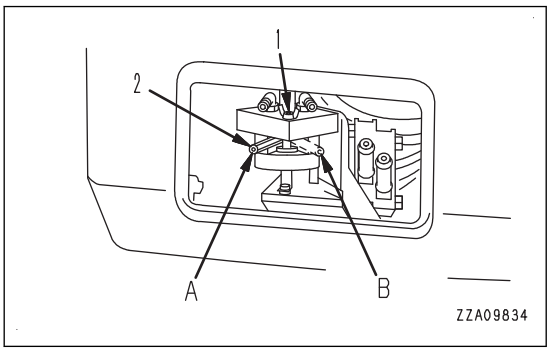
3. Change the patterns as follows.



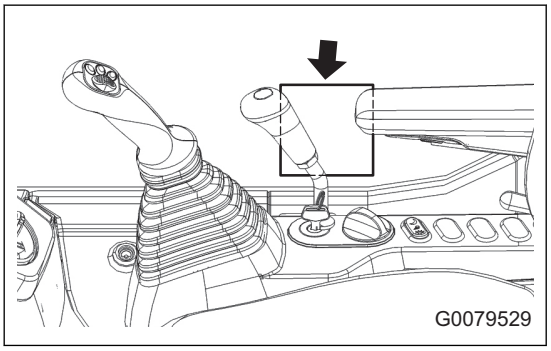
   1) Loosen the wing bolt (1).
   2) Use the special tool to change the lever (2) to a desired control pattern.

      (A): ISO pattern

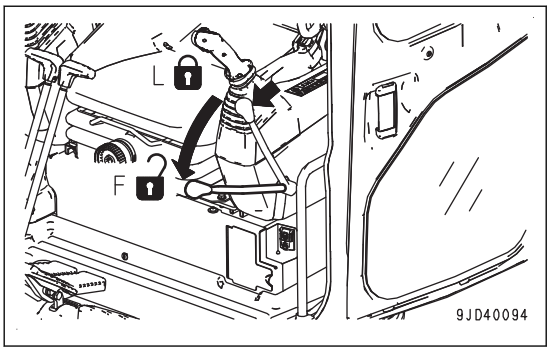
      (B): Backhoe pattern
   3) After the pattern is selected, tighten the wing bolt (1).



4. Replace the control pattern card (case-in type) that agrees with the selected pattern.



5. Start the engine. Hold the red part on the top of the lock lever, and then set it to the FREE position (F).
6. Operate the work equipment control levers slowly to check that the control pattern was changed.



Attachments and Options

⚠ WARNING

- **Make sure that you fully read and understand the attachment part and option part of the instruction manuals of the attachment and this Operation and Maintenance Manual.**
- **Installation of an attachment or option can be the safety issue. Consult your Komatsu distributor before the installation.**
- **If you install the attachment or option without consulting your Komatsu distributor, there is a danger that not only a safety issue but also an unwanted effect occurs on the machine operation and service life of the machine.**
- **We will not be responsible for personal injury, damage, or property damage caused by attachments or optional devices other than authorized products.**

Select Attachment

⚠ WARNING

There is a danger that the work equipment hits the cab or the machine body depending on the type or combination of work equipment.
When you use the work equipment that you have not used before, check that there is no interference with the machine in advance.

Table of Attachment

NOTICE

- **Be careful when the bucket is fully curled to the machine body, because it interferes with the body.**
- **When the boom is fully lowered during oblique digging, it interferes with the undercarriage. Operate the boom carefully.**

Categories of Use

Select the applicable attachment.

Name	Tooth mounting pin	Capacity m^3 {cu/yb}	Opening width (Body) mm {ft in}	Opening width (Side cutter) mm {ft in}	Use
Narrow bucket	Vertical	0.09 {0.12} (0.08 {0.1})	350 {1' 2"}	450 {1' 6"}	Narrow digging
Narrow bucket	Vertical	0.13 {0.17} (0.11 {0.14})	450 {1' 6"}	550 {1' 10"}	Narrow digging
Narrow bucket	Vertical	0.20 {0.26} (0.18 {0.24})	550 {1' 10"}	650 {2' 2"}	Narrow digging

Track Shoes Selection

Select the applicable track shoe in response to the operating conditions.

How to Select the Track Shoes

1. Check the ground to work in the Use column of the Categories of use table, and check the Classification column.

Categories of Use

Classification	Use	Caution when you use
A	Paved road surface	To protect the roadliner and the rubber shoes, be sure to obey “Handle Road Liners and Rubber Shoes (3-216)”.
B	Area with rocks, rivers Normal soil	On rough ground with large obstacle such as large boulders and fallen trees, operate the machine to travel with low speed (Lo).
C	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 high (Hi) speed only on a level ground. If you need to drive the machine over an obstacle, drive slowly at low speed (Lo).

2. Check the Classification column in List of shoe specifications and select an applicable shoe for the use.

List of Shoe Specifications

	Specifications	Classification
Standard	450mm {1ft 6in} Roadliner	A
Option	450mm {1ft 6in} Rubber shoe	A
Option	450mm {1ft 6in} Triple	B
Option	600mm {2ft} Triple	C

Precaution for Track Shoe Selection

- Category of use “C” has limitation of use, because it is wide shoe.
  Fully check the precautions for use and the condition to use, and then use an applicable shoe.
- When you select the shoe width, select the narrowest shoes possible to make the machine in the range where there is no problem in the machine flotation and ground contact pressure.
  If you use the wide shoe unnecessarily, load applied to the shoe can be larger. It can cause problems such as bending of the shoe, cracking of the link, damage of the pin, and looseness of the shoe bolts.

Recommended Attachment Operations

NOTICE

Select the optimum attachment model for the hydraulic excavator body.
The attachments and models ready for installation are different by the machine body. For the selection of the attachments or the models, consult your Komatsu distributor.

This manual gives the precautions which must be obeyed when you install an attachment and operate the hydraulic excavator.

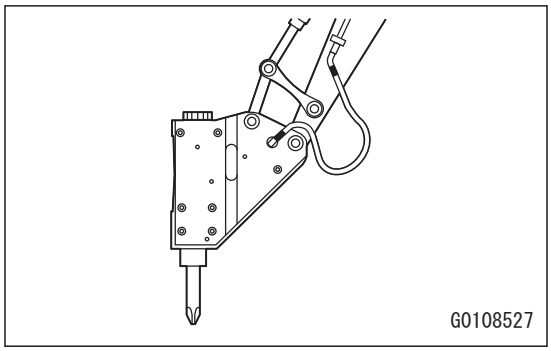
Hydraulic Breaker

Applicable Work

Major works applicable to the hydraulic breaker are as follows.

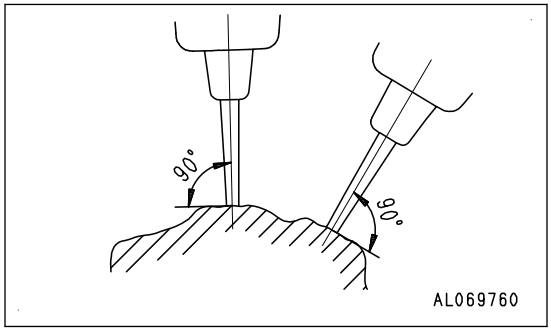
- Demolition work
- Crush rocks
- Road construction

This 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.



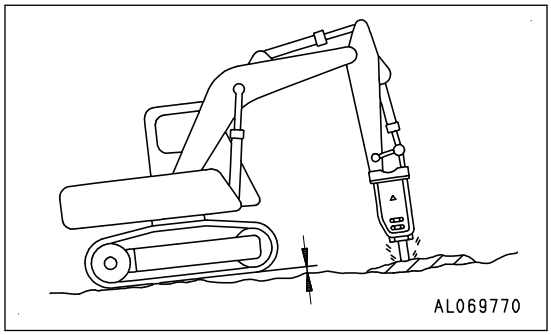
Precautions When You Do Break Operations

Do the hitting operation with the chisel to let the chisel be perpendicularly against the breaking surface.

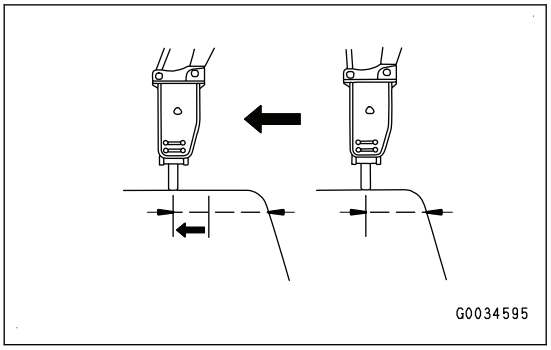


Push the chisel against the breaking surface, and make the machine be lifted approximately 5cm {0.2in} off the ground.

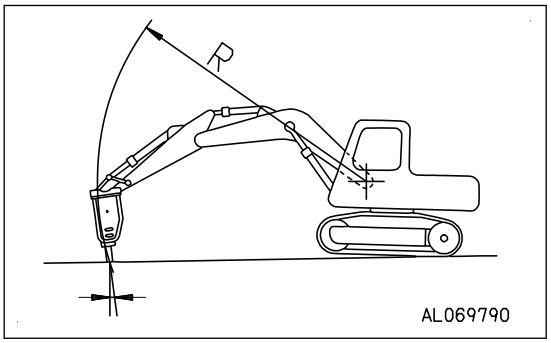
Do not make the machine be lifted further off the ground than necessary.



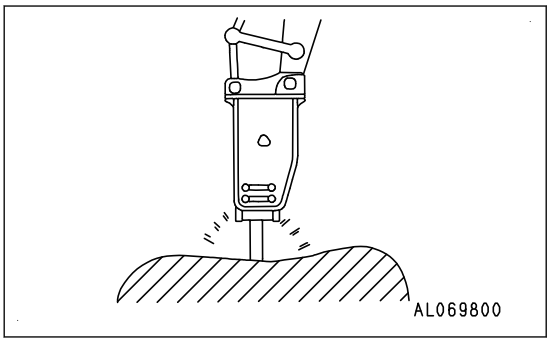
Hit the same surface continuously only 1 minute or less. When the chisel does not penetrate or break the surface by continuous hitting to the same surface for 1 minute, change the hitting point and scrape from the edge to break the surface.



When you change the position (R) of the breaker body from the machine, penetrating direction of the chisel gradually deviates from the direction of the breaker body. Adjust the direction with the bucket cylinder to let it keep the correct direction.



Always keep the chisel pushed against the breaking surface correctly not to strike at the air.

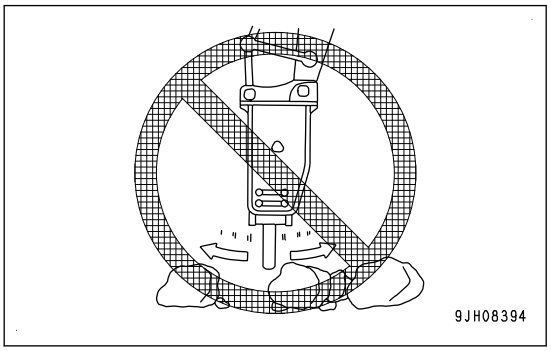


Prohibited Operations

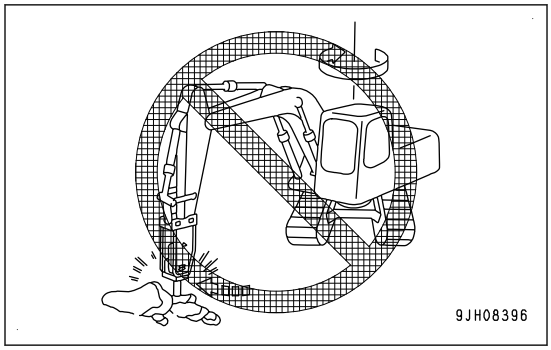
To increase the life of machine, and for the safety, do not use the machine as follows.

Do not operate all cylinders to the end of their strokes. Always spare approximately 5cm {0.2in}.

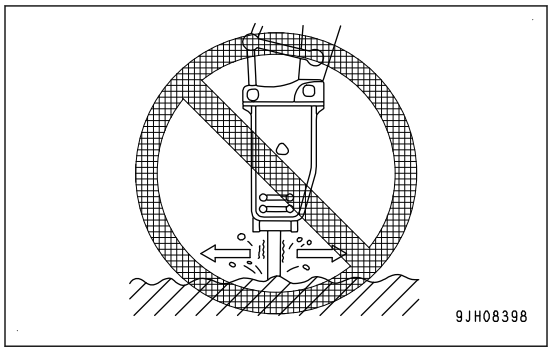
Do not do the scraping of rocks with the mounting part.



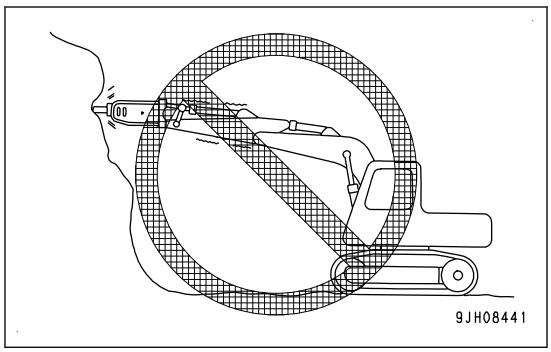
Do not do the work by swing force.



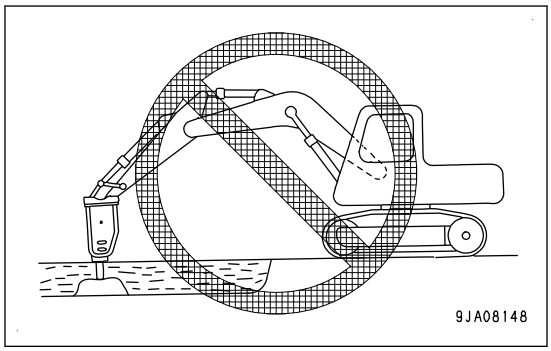
Do not move the chisel during the hitting.



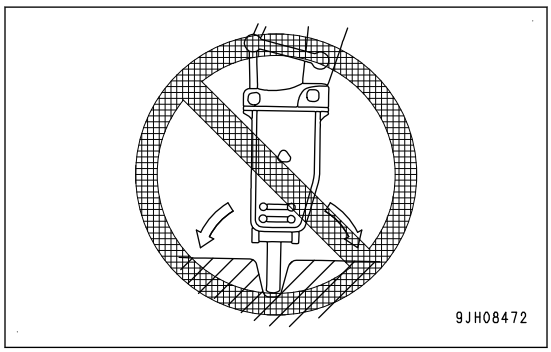
Do not hit horizontally or upward.



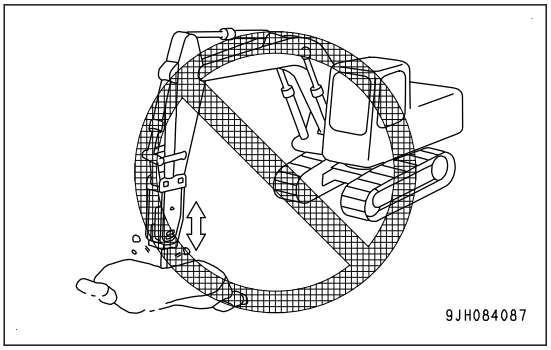
Do not do the work in water.



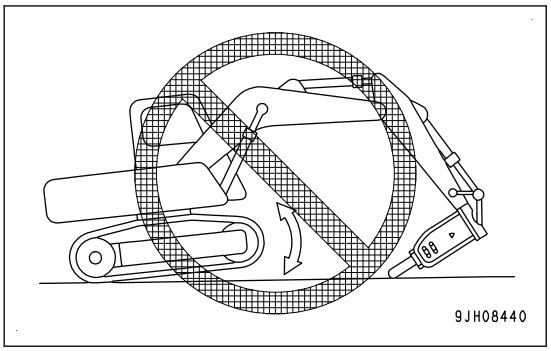
Do not twist the chisel while it is penetrated.



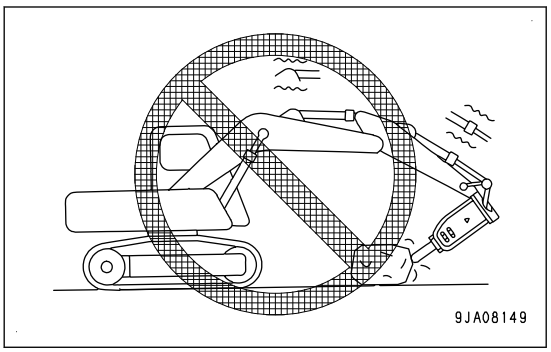
Do not do the pick work.



Do not extend the bucket cylinder rod fully to lift the machine off the ground. Do not do such work.



Do not do the hitting while the hydraulic cylinder is at the stroke end.



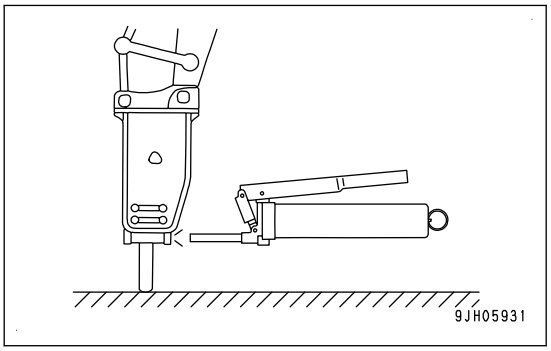
When You Supply Grease to Hydraulic Breaker, Do It in Correct Posture

NOTICE

If you lubricate the grease in an incorrect posture, the inside of breaker becomes packed with grease unnecessarily.
Dirt will enter the hydraulic circuit and can damage the hydraulic components while the breaker is in use.
Supply grease in a correct posture.

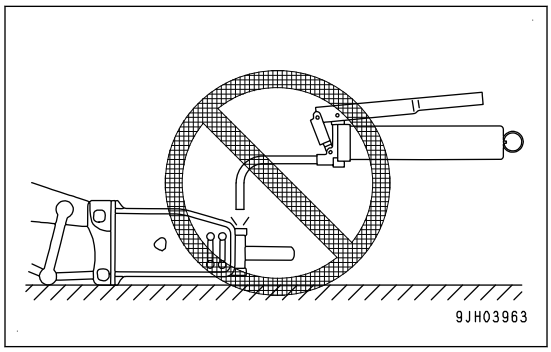
Supply grease in a correct posture as follows.

1. Lower the chisel to the ground perpendicularly.
2. Insert the grease pump perpendicularly to the lubrication point.

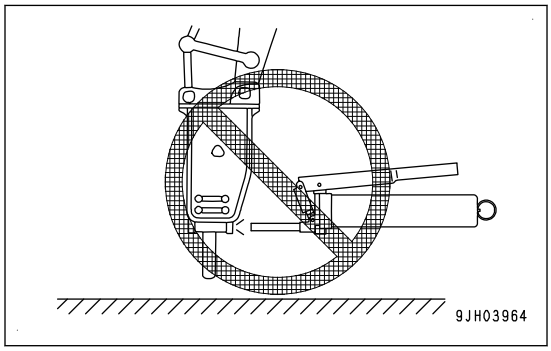


Incorrect Attitude

Do not lubricate it while the hydraulic breaker is lowered to the ground.



Do not lubricate it while the chisel is not lowered to the ground.



Breakers

⚠ WARNING

The work with a breaker installed is less safe than the work with a bucket. This is because the breaker is heavier than the bucket and because of its contents of work.
Obey the items that follow.

- **Avoid sudden operation. There is a danger that the machine falls over.**
- **Take protective measures to not let crushed pieces fall or scatter.**

Applicable Work

Main applicable works of the work equipment are as follows.

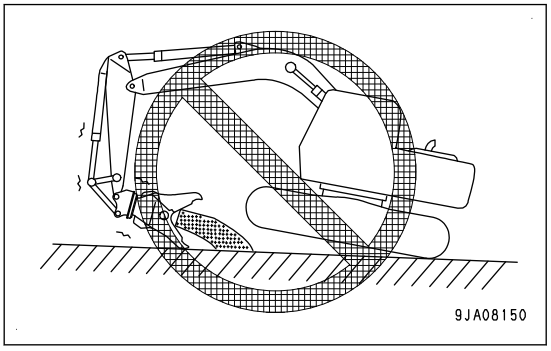
- Cutting reinforcing bars and steel frames
- Demolition of concrete structures

Prohibited Operations

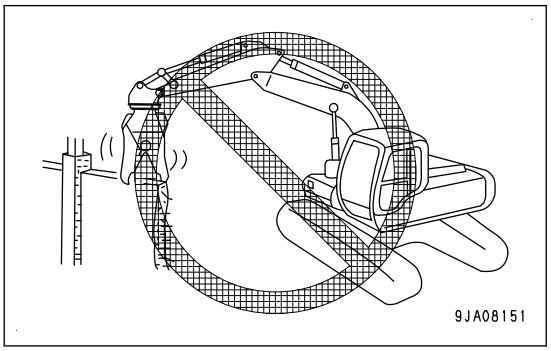
To increase the life of machine, and for the safety, do not use the machine as follows.

Do not operate all cylinders to the end of their strokes. Always spare approximately 5cm {2in}.

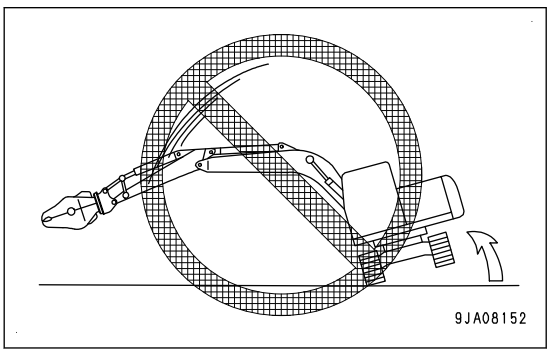
Do not do the work while a cylinder is at the stroke end.



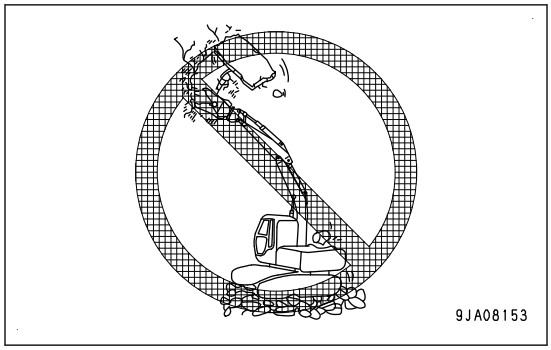
Do not do the work while the upper structure turns sideways against the tracks.



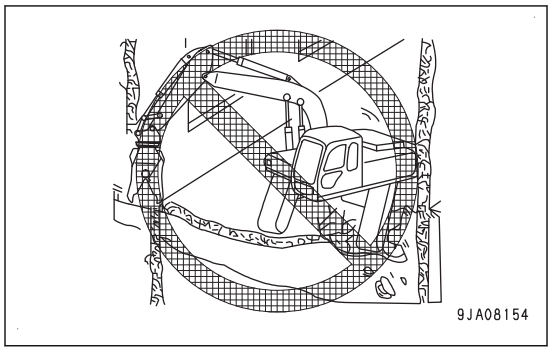
Do not suddenly lower or stop the work equipment.



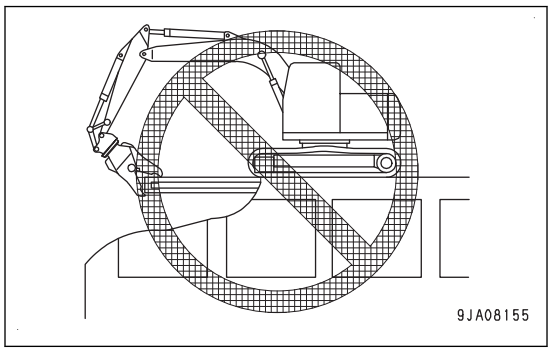
Do not do such work that can cause crushed pieces to drop onto the machine.



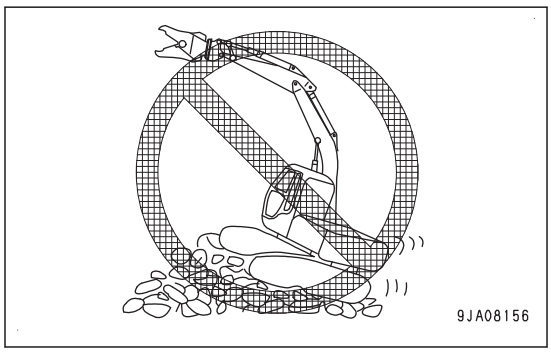
Do not do the work on a ground surface which cannot bear the machine weight or crushing shocks.



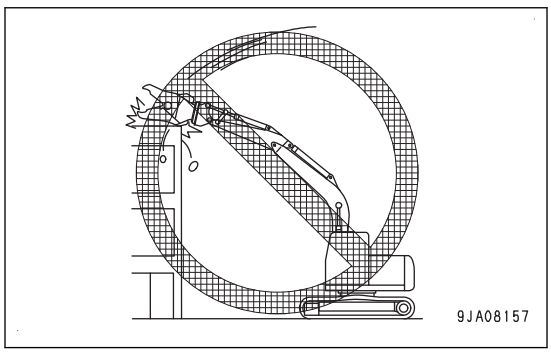
Do not demolish the structure below the machine.



Do not do the work while the machine is on the debris, etc. and inclined.

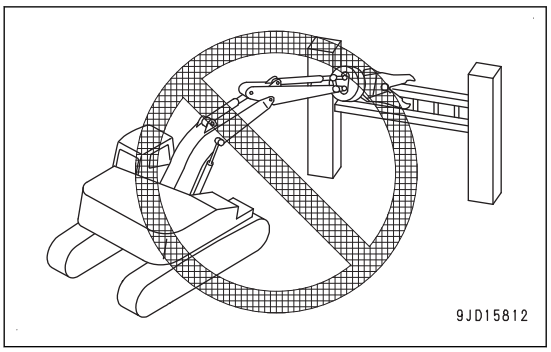


Do not do the work by the swing force or drop force.

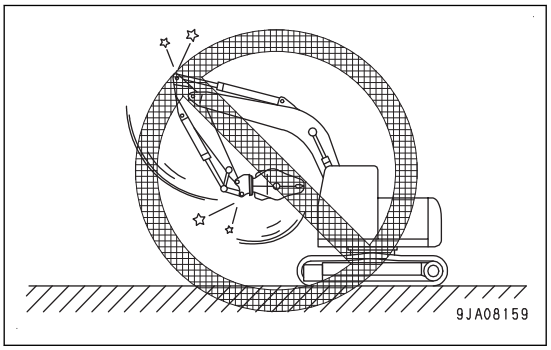


Do not do such work that the work equipment is at an angle against the object to be crushed.

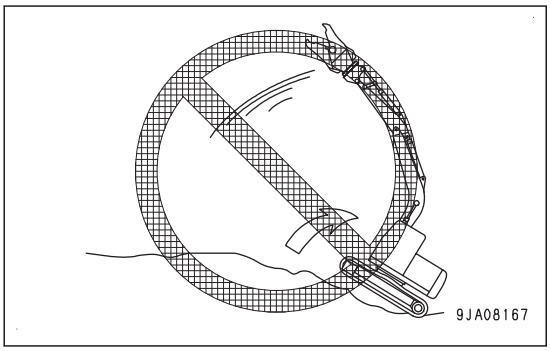
If the work equipment bites into the object to be crushed diagonally, an excessive force is applied to it and the machine is damaged.



Do not suddenly extend the bucket cylinder or arm cylinder.



Do not suddenly do the boom cylinder RAISE operation.



Replacement Parts

Defined Life Parts

- For using the machine safely for a long period, always perform periodic inspection of the defined life parts that have a particularly close relation to safety, such as hoses and the seat belt.
- 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 personal injury or death. Check if there is any abnormality in wear or deterioration on them before work and at the regular maintenance.
- Replace immediately the hose if any defect is found by checking. If any of the hose clamps show deterioration like deformation or cracking, replace the clamps at the same time as the hoses.
- Tighten all loose hoses and replace defective hoses, as required. When replacing hoses, always replace O-rings, gaskets, and other such parts at the same time.

Defined Life Parts List

<table>
<tr><th>No.</th><th colspan="2">Target Parts</th><th>Inspection /Replacement interval</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Fuel system</td><td>Fuel hose</td><td rowspan="2">Every 2 years or every 4000 hours, whichever comes sooner.</td></tr>
<tr><td>Spill hose</td></tr>
<tr><td>2</td><td>Engine lubrication system</td><td>Turbocharger lubrication hose
Engine oil filter hose</td><td rowspan="4">Replace if any of the damages were found when the daily check or periodical maintenance.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Work equipment hydraulic system</td><td>Main pump delivery hose</td></tr>
<tr><td>Main pump LS hose
Swing line hose
Travel line hose</td></tr>
<tr><td>External work equipment hose
• Boom foot connection hose
• Boom cylinder hose
• Arm connection hose
• Arm cylinder hose
• Bucket cylinder hose
• Attachment additional line hose
• Blade cylinder hose
• Boom swing cylinder hose</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Others</td><td>PPC accumulator
Attachment additional accumulator</td><td>Every 2 years or every 4000 hours, whichever comes sooner.</td></tr>
<tr><td>Seat belt</td><td>Every 3 years from start of usage or 5 years after manufacturing of seat belt, whichever comes sooner.</td></tr>
</table>

Consumable Parts

- Replace consumable parts such as the filter element or air cleaner element at the time of periodic maintenance or before the wear limit. Replace consumable parts to keep correct operations of the machine. Komatsu recommends the use of Komatsu genuine parts for replacement parts.
- As a result of our continuous efforts to improve product quality, the part number can be changed. When you make an order of the parts, tell your Komatsu distributor the machine serial number to check the latest part number.

Consumable Parts List

Parts in parentheses are to be replaced at the same time.

Item	Part number	Part name	Q'ty	Replacement interval
Air conditioner recirculation air filter (pollen removal filter) (option)	22P-979-3730	Filter	2	Every 250 hours
Engine oil filter	600-211-2111	Cartridge	1	Every 500 hours
Fuel prefilter	600-319-4110	Cartridge	1	
Hydraulic tank breather	421-60-35170	Element	1	Every 1000 hours
Hydraulic oil filter	22P-60-21161 (07000-12135)	Element (O-ring)	1 (1)	
Fuel main filter	600-319-3881	Cartridge	1	
Air conditioner RECIRC air filter	22B-979-2860	Filter	1	Every 1 year
Air conditioner FRESH air filter	17M-911-3530	Element	1	
Electrical intake air heater	6204-11-4850	Gasket	1	-
Air cleaner	600-185-2200	Element assembly	1	
Additional filter for breaker (option)	201-973-7481 (07000-12090)	Element assembly (O-ring)	1 (1)	
Bucket (vertical pin type)	20X-70-23161 (203-70-43212) (203-70-43220)	Tooth (Pin) (Pin)	3 (3) (3)	
Bucket (horizontal pin type)	20X-70-14160 (20X-70-00100)	Tooth (Pin assembly)	3 (3)	
Bucket (side cutter type)	201-70-74171 201-70-74181 (21W-70-21810) (01803-02228)	Side cutter (left) Side cutter (right) (Bolt) (Nut)	1 1 (6) (6)	

Recommended Fuel, Coolant, and Lubricant

NOTICE

- **Komatsu genuine oils are conditioned to keep the reliability and durability of Komatsu construction equipment and components.**
  To keep your machine in the best condition for long period of time, obey the instructions given in this Operation and Maintenance Manual.
- **If you do not obey the instructions when you use the machine, it can cause decreased service life or too much wear of the engine, power train, cooling system, and/or other components.**
- **Commercially available lubricant additives have unwanted effects for the machine in some cases. Komatsu does not recommend the commercially available lubricant additive.**
- **Komatsu recommends the use of Komatsu genuine engine oil for KDPF. The use of oil other than Komatsu genuine engine oil for KDPF will have unwanted effects to the engine components such as reduced lubrication function by deterioration of the engine oil. This can cause failure, decrease of the service life, degradation in performance, or increase of fuel consumption of the machine.**
- **Use the fuels, oils, and lubricants which are recommended in response to the ambient temperature.**
- **To operate the machine when the temperature is -20℃ {-4℉} or below, auxiliary devices are needed. Consult your Komatsu distributor.**

NOTICE

Be sure to use the ultra-low sulphur diesel fuel.

To get good fuel consumption characteristics and exhaust gas characteristics, an electronically controlled high-pressure fuel injection device and emission gas control system are used for the engine of this machine. The high-pressure fuel injection device requires high precision parts and lubrication. If low viscosity fuel is used, its durability can decrease significantly. Also, if fuel with high sulphur content is used, it can deteriorate the engine parts, and can cause failures, decrease of the service life, and degradation in performance.



The ASTM D975 diesel fuel can contain 5% or less of biofuel.

The EN590 diesel fuel can contain 7% or less of biofuel.

NOTICE

When you use biofuel other than the diesel fuel previously stated and its mixing ratio is up to 20%, obey the precautions that follow.

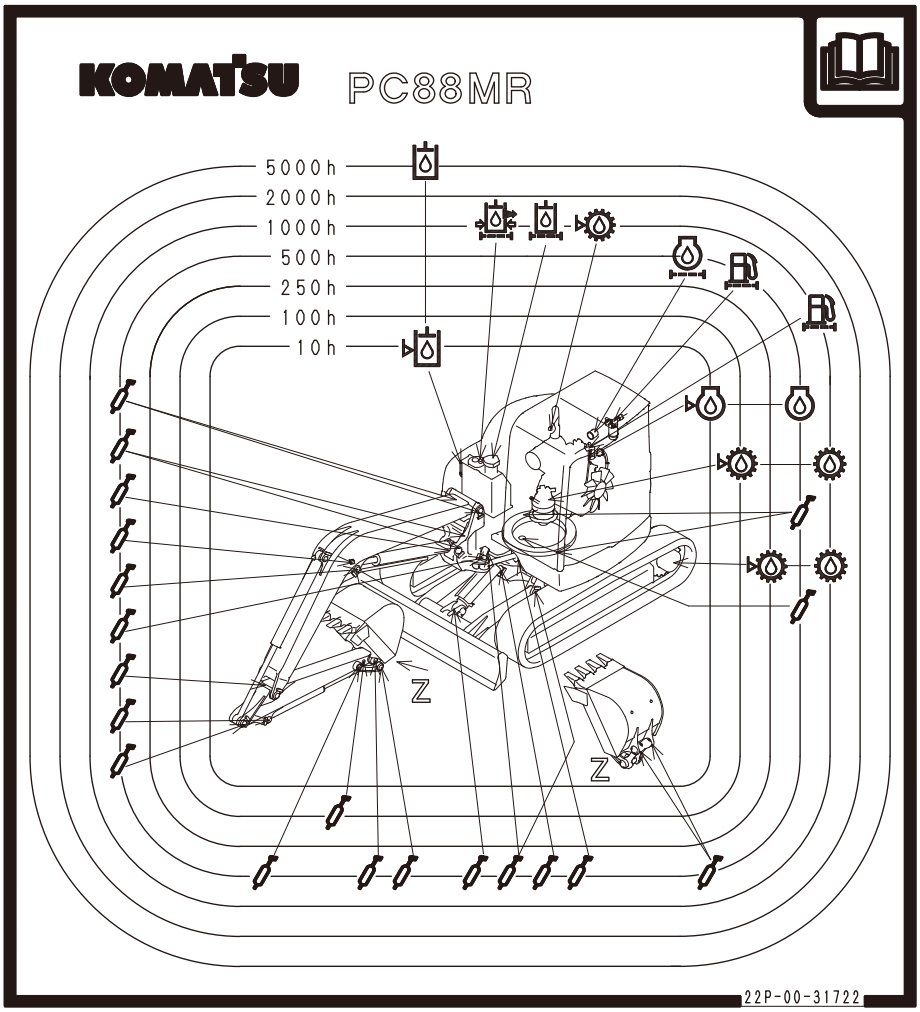
- **It is necessary to consult with the local regulatory authorities of engine exhaust gas regulation whether the biofuel can be used or not.**
- **The fuel can possibly leak because of the deterioration of rubber material of the fuel hose.**
  Replace it with the fuel hose applicable for biofuel. Consult your Komatsu distributor for replacement of the fuel hose.
- **Biofuel cannot be stored for a long time because it is easy to deteriorate and change in quality.**
  Use the fuel in the storage tank or the fuel tank of the machine within 6 months.
  If the deteriorated and altered biofuel is used, it can cause bad effects on the engine parts.
  When you store the machine which uses the diesel fuel mixed with the biofuel for more than 3 months, do the procedure that follows.
  - **Replace it with pure diesel fuel or the new diesel fuel mixed with the biofuel at the lowest possible mixing ratio.**
  - **After you change the fuel, run the engine for a minimum of 30 minutes before you store the machine.**
- **Because the biofuel dissolves the materials stuck to the fuel tank and fuel line, the fuel filter can be clogged with them.**
  When you change the diesel fuel to the biofuel, replace the fuel main filter cartridge and fuel prefilter cartridge with new ones. When you replace the fuel main filter cartridge and fuel prefilter cartridge, make the replacement interval half the normal time until the second replacement after you change the diesel fuel to the biofuel.
- **Because the biofuel absorbs moisture easily, it can possibly cause a growth of microorganism.**
  When the microorganism grows in the biofuel, it can cause corrosion of the fuel system and the clogging of the fuel filter.
  Drain the water from the fuel tank before you start the operation.
  When you complete the operation, fill the fuel tank to reduce the air layer.
- **If the biofuel is used in the conditions of the specific operation, the fuel can possibly get mixed into the engine oil.**
  The fuel level in the engine oil must not exceed 5%. Deteriorated engine oil can cause unwanted effects on the engine parts such as a reduction of lubricating function. It is recommended to take a sample of the oil on a periodic basis.
- **The characteristics of the biofuel change when outside air temperature is low. The fuel filter can be clogged and the fuel in the fuel tank can solidify. Store the biofuel in the warm building or in the storage tank.**

NOTICE

Use the paraffin-based fuel which agrees with EN15940:2016 and ASTM D975.
As long as the fuel agrees with EN15940:2016 and ASTM D975, its mixing ratio can be up to 100%.

Lubrication Chart

- The lubrication chart uses the symbols to show the lubrication points and types of lubricant by each lubrication interval.
  Keep this chart in the magazine box in the cab to allow the personnel to refer to it as needed for lubrication.
- Even if the same symbol is used in the chart, the recommended genuine oil can be different by the lubrication points and the ambient temperature. For details, follow “How to Use Fuel, Coolant and Lubricants by Ambient Temperature (7-8)”.
- For the detail of Lubrication, see “Maintenance Schedule (4-14)”.



The symbols used in the lubrication chart are explained as follows.

Symbol	Description of the symbol	Symbol	Description of the symbol
	Read the Operation and Maintenance Manual.		Supply grease
	Change engine oil		Check oil level in engine oil pan
	Change hydraulic oil		Check oil level in hydraulic tank
	Change power train oil		Check power train oil level
	Replace engine oil filter		Replace hydraulic oil filter
	Replace hydraulic tank breather element		Replace fuel filter

How to Use Fuel, Coolant and Lubricants by Ambient Temperature

Reservoir	Fluid type	Recommended Komatsu Fluids	Ambient temperature (℃ {℉})	
			Min.	Max.
Engine oil pan	Engine oil for KDPF used in cold terrain (Oil Change interval 250 hours) (Note. 1)	EOS0W40-LA (KES)	-30 {-22}	40 {104}
	Engine oil for KDPF (Oil Change interval 500 hours)	EO10W30-LA (KES)	-20 {-4}	40 {104}
		EO15W40-LA (KES)	-15 {5}	50 {122}
Swing machinery Case Final drive case	Power train oil (Note.2)	TO30 (KES)	-30 {-22}	50 {122}
PTO gear case		TO10 (KES)	-40 {-40}	40 {104}
		TO30 (KES)	0 {32}	50 {122}
Hydraulic System	Power train oil	TO10 (KES)	-20 {-4}	50 {122}
	Hydraulic oil	HO46-HM (KES)	-20 {-4}	50 {122}
Grease fitting	Hyper grease (Note.3)	G2-TE (KES)	-20 {-4}	50 {122}
	Lithium EP grease	G2-LI (KES)	-20 {-4}	40 {104}
Cooling system	Non-Amine Engine Coolant AF-NAC (Note.4)	AF-NAC (KES)	-30 {-22}	50 {122}
Fuel tank	Diesel fuel	ASTM D975 No.1-D S15	-30 {-22}	20 {68}
		ASTM D975 No.2-D S15	0 {32}	50 {122}

KES

Abbreviation for Komatsu Engineering Standard

ASTM

Abbreviation for American Society of Testing and Material

Reservoir	Specified capacity (ℓ {US gal})	Refill capacity (ℓ {US gal})
Engine oil pan	11.5 {3.04}	10.5 {2.77}
Swing machinery case	2.8 {0.74}	2.8 {0.74}
Final drive case (each of right and left)	1.1 {0.29}	1.1 {0.29}
PTO gear case	0.5 {0.13}	0.5 {0.13}
Hydraulic oil system	113 {29.9}	56 {14.8}
Cooling system	16 {4.23}	-
Fuel tank	125 {33}	-

REMARK

Specified capacity is the total quantity of fluid that includes the fluid in the tank and the piping. Refill capacity means the amount of fluid needed to refill the system during inspection and maintenance.

Note 1: KDPF engine oil for cold district is deteriorated easily than that for normal area (replace every 500 hours), so replace oil and filter cartridge every 250 hours. Consult your Komatsu distributor to change the maintenance interval of the machine monitor.

Note 2: Power train oil has different performance from engine oil. Be sure to use the recommended oils.

Note 3: Hyper grease (G2-TE) has high performance. When it is necessary to make the lubricating performance of grease better to prevent squeaking of pins and bushings, the use of G2-TE is recommended.

- When it is necessary to make the lubricating performance of grease better to prevent creaks of pins and bushings.
- When it is necessary to prevent outside staining with black grease.

Note 4: Coolant

1. Komatsu genuine Non-Amine Engine Coolant (AF-NAC) has the important function to prevent corrosion of the cooling system as well as antifreeze. Even in the areas where freezing is not an issue, use this coolant continuously.
   Komatsu machines are supplied with Non-Amine Engine Coolant (AF-NAC). Non-Amine Engine Coolant (AF-NAC) has excellent anti-corrosion, antifreeze and cooling properties and can be used continuously for every 3 years or every 6000 hours whichever occurs first in the below listed conditions (If other coolant than Komatsu approved non-Amine (AF-NAC) is used for refill or top off, the change interval is every 2 years or every 4000 hours whichever occurs first)
   Conditions to meet every 2 years or 4000 hours to extended coolant life:
   - Must pass coolant test/analysis at 4000 hours, the test interval is a precautionary procedure intended to prevent cooling and engine system damage
   - All maintenance top offs and refills were done with Komatsu approved non-Amine (AF-NAC) coolant

   For more information (e.g. test method) on the Coolant test/Analysis, consult an authorized Komatsu Distributor.
   Komatsu recommends the use of Non-Amine Engine Coolant (AF-NAC). It can cause dangerous failure such as the corrosion of the cooling system or engine.
2. Use the diluted Non-Amine Engine Coolant (AF-NAC).
   The supplied Non-Amine Engine Coolant (AF-NAC) is mixed with pure water. Do not mix water with the Non-Amine Engine Coolant.

Coolant Density Table

Min. atmospheric temperature (℃ {℉})	-10 {14} or more	-15 {5}	-20 {-4}	-25 {-13}	-30 {-22}	-35 {-31}	-40 {-40}	-45 {-49}	-50 {-58}
Density (%)	30	36	41	46	50	54	58	61	64

Recommended Brands and Qualities Other Than Komatsu Genuine Oils

For locally available oil other than Komatsu genuine oil, consult your Komatsu distributor.

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