

OPERATION MANUAL

SK55SRX-7

APPLICABLE No.

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READ, UNDERSTAND AND FOLLOW ALL SAFETY PRECAUTIONS AND INSTRUCTIONS FOUND IN THIS MANUAL BEFORE OPERATING THE MACHINE.

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IMPORTANT INFORMATION

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IMPORTANT INFORMATION

PREFACE

- Read, understand and follow the safety messages and instructions in this manual and the safety messages on the machine. If these safety messages are not followed, serious injury or death could occur.
- Always be aware of your surroundings when operating this machine and understand the capabilities of this machine and the attachment/equipment.
- Always use caution to safely operate this machine.



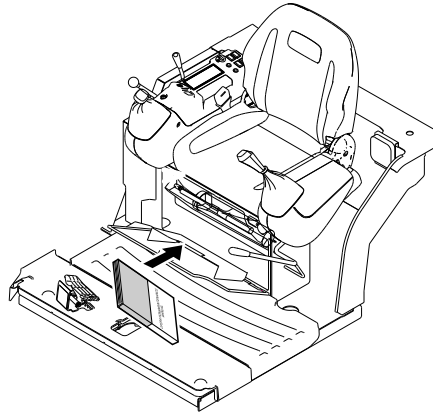
Use of this machine and this manual

- Improper operation, inspection, maintenance or repair of this machine may cause serious injury, death or damage to the machine.
- If a license or other special qualification is required to operate a hydraulic excavator in the country where this machine will be operated, all operators of this machine must meet those requirements and have a valid (not expired) license or qualification.
- Do not operate this machine for the first time or perform any inspection, maintenance or repair on this machine, until you have carefully read and understand the operation, inspection, maintenance, and repair information in this manual.
 - Operation related activities include setting up, rectifying malfunctions and the disposal of materials.
 - Maintenance related activities include lubrication, maintenance, inspection and repair work.
 - Transportation related activities include loading and unloading the machine.
- For machines equipped with KOBELCO approved attachments, read the section related to the specialized attachments in this manual and any additional manuals for the specialized attachment. Use of the unapproved attachment/equipment voids KOBELCO's liability for the machine.
- Do not remove this manual from this machine.
- If this manual is lost, damaged or unreadable, order a replacement from your KOBELCO authorized dealer.
- This manual is a part of this machine and should be transferred with the machine to new users or owners.
- Always use genuine KOBELCO parts. Do not use aftermarket or non-KOBELCO parts on your machine.
- Manufacturers cannot anticipate every possible scenario and potential hazard that may arise during operation, inspection and maintenance activities. Therefore, the warnings in this manual and on the product may not communicate all of the possible safety precautions for your situation. When performing any operation, inspection, maintenance and repair activities that are not contained in this manual, proceed at your own risk and do not perform any unsafe acts. You should also ensure the machine will not be damaged or create an unsafe condition by your actions. Always follow the safety procedures in this manual and for your worksite. Never perform any task or operation prohibited by this manual.
- If a tool, procedure, work method or operating technique not specifically recommended by KOBELCO is used, you must evaluate that it is safe for yourself and others to proceed. You should also ensure the machine will not be damaged or create an unsafe condition by the operation, maintenance and/or repair procedures you choose. Never perform any task or operation prohibited by this manual.
- The information, specification, and illustrations in this manual are based on information available at the time it was written. KOBELCO is committed to continuous improvement of the safety systems and features of its products, and may change the specifications, torques, pressures, measurements, adjustments, illustrations, and other content at anytime without any obligation to notify the users/owners of these changes. Your KOBELCO authorized dealer will have the most current information available.
- Should there be questions, errors, omissions or other issues that need to be communicated to the manufacturer, contact your KOBELCO authorized dealer.
- KOBELCO provides machines produced in accordance with regulations and standards of a country in which the machine is sold to the first owner. If you have a machine purchased in a foreign country or from a person or company in another country, your machine may lack safety devices or machine components or not meet a safety standard required in your country. Please contact your KOBELCO authorized dealer to ask whether your machine's specifications meet the regulations and the standards in your country.

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STORE OPERATION & MAINTENANCE MANUALS ON THE MACHINE

Always store all manuals for this machine and any attachments, including this manual and the related manuals, in the pocket located at the cover of the seat stand. Check the manuals are in this location as a part of your pre-start inspection. If the manuals are not present during your pre-start inspection, inform your supervisor and order replacement manuals from your KOBELCO authorized dealer.



SAFETY INFORMATION IN MESSAGES OR LABELS IN THIS MANUAL AND ON THE MACHINE

“Many accidents are the result of not following basic safety precautions and could have been avoided by recognizing potentially hazardous situations.”

Proper risk assessment can prevent many accidents from occurring. During operation, always pay attention to the potential hazards near the machine and at your worksite.

- Improper operation, inspection, maintenance and repair could cause serious injury, death or property damage. Before operating, inspecting and maintaining this machine, carefully read and understand this manual, the related manuals, and any attachment manuals that may be provided to you.
- Only allow trained and experienced personnel to operate, to inspect and to maintain this machine. These individuals must also comply with all applicable employment, industry, and governmental rules, standards, and regulations.



This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.

Many safety messages in this manual or on the labels on this machine contain signal words. Signal words are used to identify safety messages and property damage messages and designate a level of hazard seriousness. Many of these safety messages may also contain avoidance information to hazardous events.

The three signal words are DANGER, WARNING and CAUTION. Each alerts the viewer to the existence and relative seriousness of a hazard. They are reserved for personal injury hazards.

Safety signs identified by DANGER shall be used sparingly and only for those situations presenting the most serious hazards. Hazards identified by WARNING present a lesser degree of risk of injury or death than those identified by DANGER.



DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

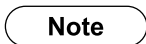


CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Other than the above-mentioned signal words, the following words identify important information which must be kept for the protection of the machine and may be helpful for the operator.



Notice indicates information considered important, but not hazard related .
(e.g., messages related to property damage)



Note indicates information that may be helpful for the operator.

SAFETY LABELS

Safety labels are affixed to machine to alert the operator and surrounding personnel of hazardous situations during operation, inspection or maintenance.

There are two types of "safety labels" on this machine. One is "SAFETY LABEL INCLUDING SIGNAL WORDS" and the other is "PICTORIAL ONLY SAFETY LABELS".

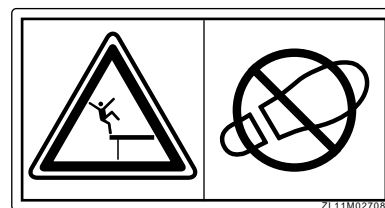
Example of the safety label including signal words



Example of a pictorial only safety label

The pictorial only safety label is used to alert the operator and surrounding personnel of potentially hazardous situations.

For pictorial only safety label, the hazard pictorial is in the upper or left box, and the avoidance information is in the lower or right box.



SUMMARY OF THE MACHINE

APPLICABLE WORKS

Use this machine in the following applications:

- Digging
- Trenching
- Loading
- Leveling
- Demolishing
- Breaker work

Never use the machine for any purpose other than the above applications.

If you use the attachment which KOBELCO did not supply, read, understand and follow the safety messages and instructions in the applicable manual described by the attachment manufacturer.

For details of work procedures, please refer to "MACHINE OPERATION" and "OPTIONAL EQUIPMENT".

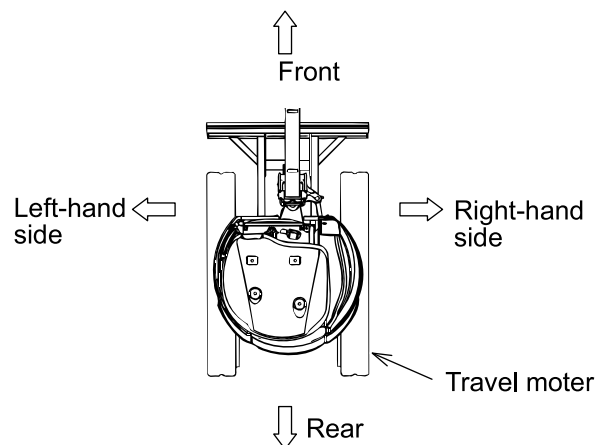
OPERATING CONDITION

This machine is intended to be operated in the ambient temperature of -20 degrees C to 40 degrees C (-4 degrees F to 104 degrees F) with the well-maintained condition.

Outside this temperature range, sufficient machine performance may not be obtained.

FRONT, REAR, RIGHT & LEFT OF THE MACHINE

In this manual, front/rear and left/right are determined by looking the forward direction from the operator's seat with the travel motors at the rear side.



BREAK-IN OPERATION

Prior to shipment, this machine was inspected and adjusted by KOBELCO. Future performance and service life of this machine depends on how the machine is operated during the break-in period.

Hour Meter	Load Status
Less than 10 hours	About 60%
Less than 100 hours	About 80%
100 hours and more	Full load

During the break-in period

- Always sufficiently warm-up the engine and the hydraulic oil.
- Do not operate with loads that exceed the recommended load status for each phase shown in the table or operate at high speeds.
- Do not perform a sudden start, sudden acceleration, or other sudden changes in engine speed.
- Avoid unnecessary sudden stops or sudden changes in driving direction.
- Do not operate the engine at high speed for extended periods of time.

QUALIFICATION FOR OPERATING THE MACHINE

If a license or other special qualification is required to operate a hydraulic excavator in the country where this machine will be operated, all operators of this machine must meet those requirements and have a valid (not expired) license or qualification.

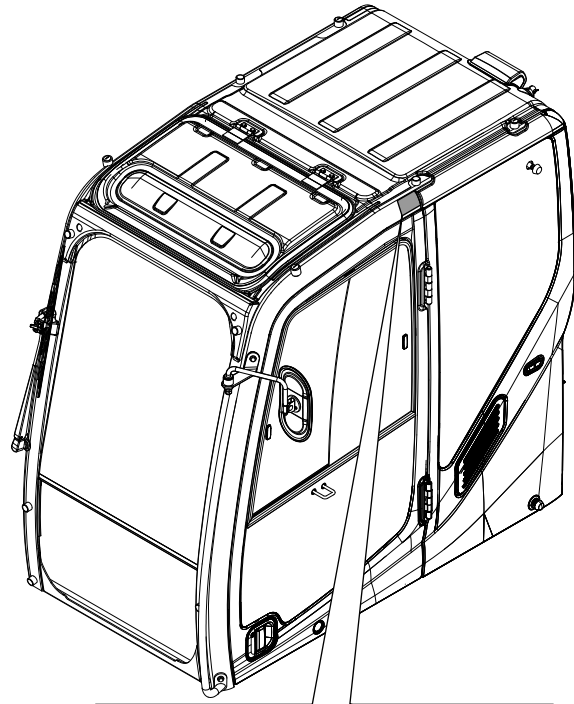
Instruct that only skilled trained operators may operate the machine. The operator shall:

- Receive training in the proper operation of this machine;
- Understand the capabilities and limitations of this machine;
- Become familiar with the construction of this machine and the hazards involved based on training and experience;
- Confirm that the machine is properly maintained and is in good condition;

Read and properly understand the warnings, instructions, and operating procedures in this manual.

CAB WITH ROPS (ROLL-OVER PROTECTIVE STRUCTURE)/ FALLING OBJECTS PROTECTIVE STRUCTURE

- The machine cab is equipped with ROPS (roll-over protective structure). The ROPS, fitting supports, and fastening elements on the machine are integral parts of the structure.
- When the machine is used at the work site where falling objects may hit the cab, always have the top guard installed and inspect them on a periodic basis to ensure the top guard have not been damaged. The impact from objects striking the top of the cab could result in a potential crush hazard and result in serious injury or death.
- Any damage to the protective structures or the cab caused by collision, corrosion or fire are required to be inspected carefully by appropriate personnel. All damaged parts must be replaced with genuine KOBELCO parts to ensure the protective structures will be restored to their original specifications. Before making any changes to the cab, replacing the whole structure, or replacing the ROPS or top guard, contact your KOBELCO authorized dealer.
- To prevent serious injury or death, do not attempt to weld, to drill, to straighten or to repair the protective structures. Never attach any devices to lift the cab on the protective structure. Any type of modification may affect the structural integrity of the protective system and result in a complete loss of protective capability. Consult your KOBELCO authorized dealer to determine this structure's limitations without voiding its certification. Failures to contact your KOBELCO authorized dealer may void your warranty.
- Pay attention to the operating mass. If the operating mass exceeds MAX. MASS (maximum operating mass) described on ROPS CERTIFICATION with the special attachment or others installed, it will cause insufficient function, resulting in serious injury or death, should the machine tips/rolls over.



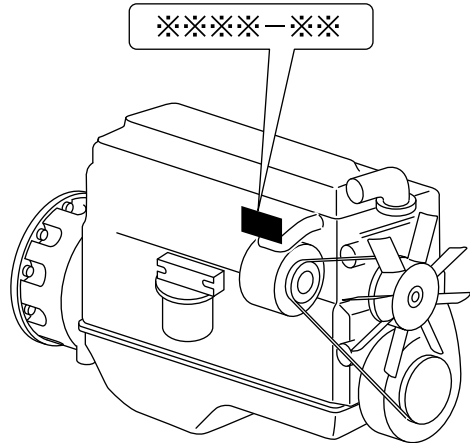
ROPS CERTIFICATION	
This structure is tested and meets the ROPS requirements of ISO 12117-2:2008.	
OPERATOR PROTECTIVE GUARDS CERTIFICATION	
This structure is tested and meets the requirements of TOP GUARD-LEVEL (I), ISO 10262:1998.	
PRODUCT IDENTIFICATION NUMBER	MACHINE MODEL
SERIAL NO.	MAX. MASS
WARNING -The modification and rework causing the deterioration of the strength are not allowed. -Don't use the parts other than the specified parts. -When the safeguard is open, the cab doesn't comply with TOP GUARD Level (I).	
PRODUCED BY KOBELCO CONSTRUCTION MACHINERY CO., LTD. TOKYO, JAPAN. YY20T01388P2	

ORDERING PARTS AND SERVICE

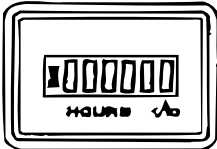
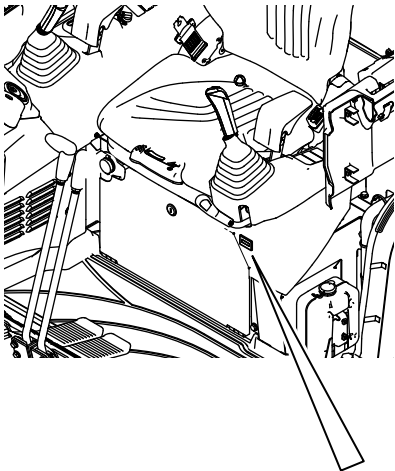
When ordering parts and service, have the machine serial number, the engine serial number and the current hours of operation available for your KOBELCO authorized dealer.

The machine serial number and the engine serial number are stamped in the locations shown below. For future reference, confirm and record these numbers in the spaces below.

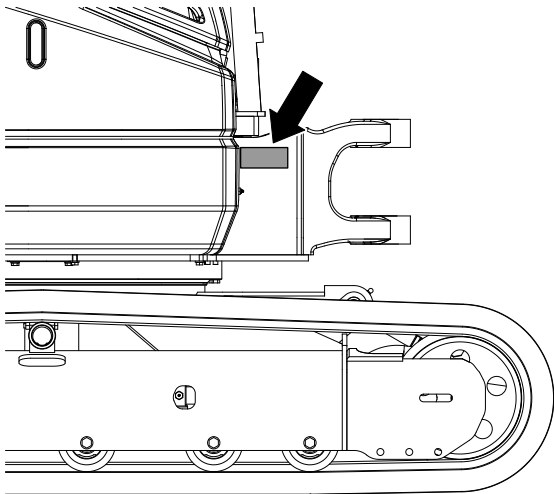
MACHINE TYPE	MACHINE SERIAL No.	ENGINE SERIAL No.	HOUR METER



ENGINE SERIAL No.
("*"means engine serial number)



HOUR METER



POSITION OF MACHINE SERIAL NUMBER

WARRANTY

This machine is warranted as per the standard warranty. In case of any failures are proved to be KOBELCO's responsibility, KOBELCO will repair or replace any parts or components for free of charge to the extent specified in the standard warranty. KOBELCO shall not be liable for any improper operation, maintenance, modification, and alteration etc., other than described in this manual.

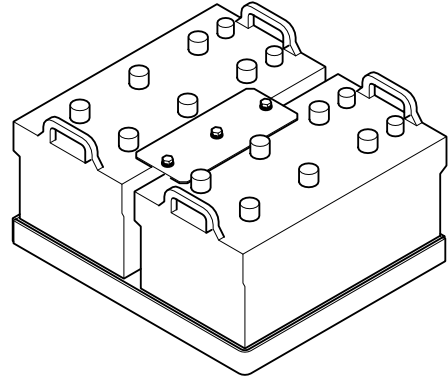
IMPORTANT NOTIFICATION

To show additional detail of parts and components or show motion of this machine, some illustrations may show the machine with safety related parts and components, including guards, doors, covers and shields, either removed or not in place. To prevent serious injury, death, or property damage, all of the safety related parts and components must be properly installed and secured, before starting this machine.

In addition, some illustrations may show features or functions that differ from your machine. questions, contact your KOBELCO authorized dealer.

Example

This illustration shows the battery with the cover removed.



1. SAFETY INSTRUCTIONS

1.1 SAFETY LABELS & DECALS



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

SAFETY MESSAGES

Several labels for specific safety messages are attached to this machine. The exact location and description of the hazards are reviewed in this section.

Please read and understand all safety messages in this manual and on the machine.

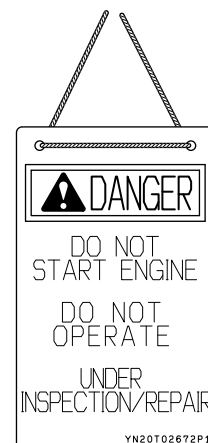
1.1.1 ALWAYS MAKE SURE ALL OF THE SAFETY LABELS ARE LEGIBLE AND NOT DAMAGED

- Clean the safety labels or replace the safety labels if you can not read the words or see the illustrations. To clean the safety labels, only use a cloth, water and soap. Do not use any solvent, gasoline or other harsh chemicals to clean the safety labels. Solvents, gasoline or harsh chemicals could loosen the adhesive that secures the safety labels and allow the label to fall off the machine.
- Always replace any safety label that is damaged or missing. If a safety label is attached to a part that is replaced, you will need to install a safety label on the replacement part. Your KOBELCO authorized dealer can provide new safety labels.
- Never remove any safety labels attached to this machine. For all other labels on the machine, clean and replace as needed in accordance with the instructions above.

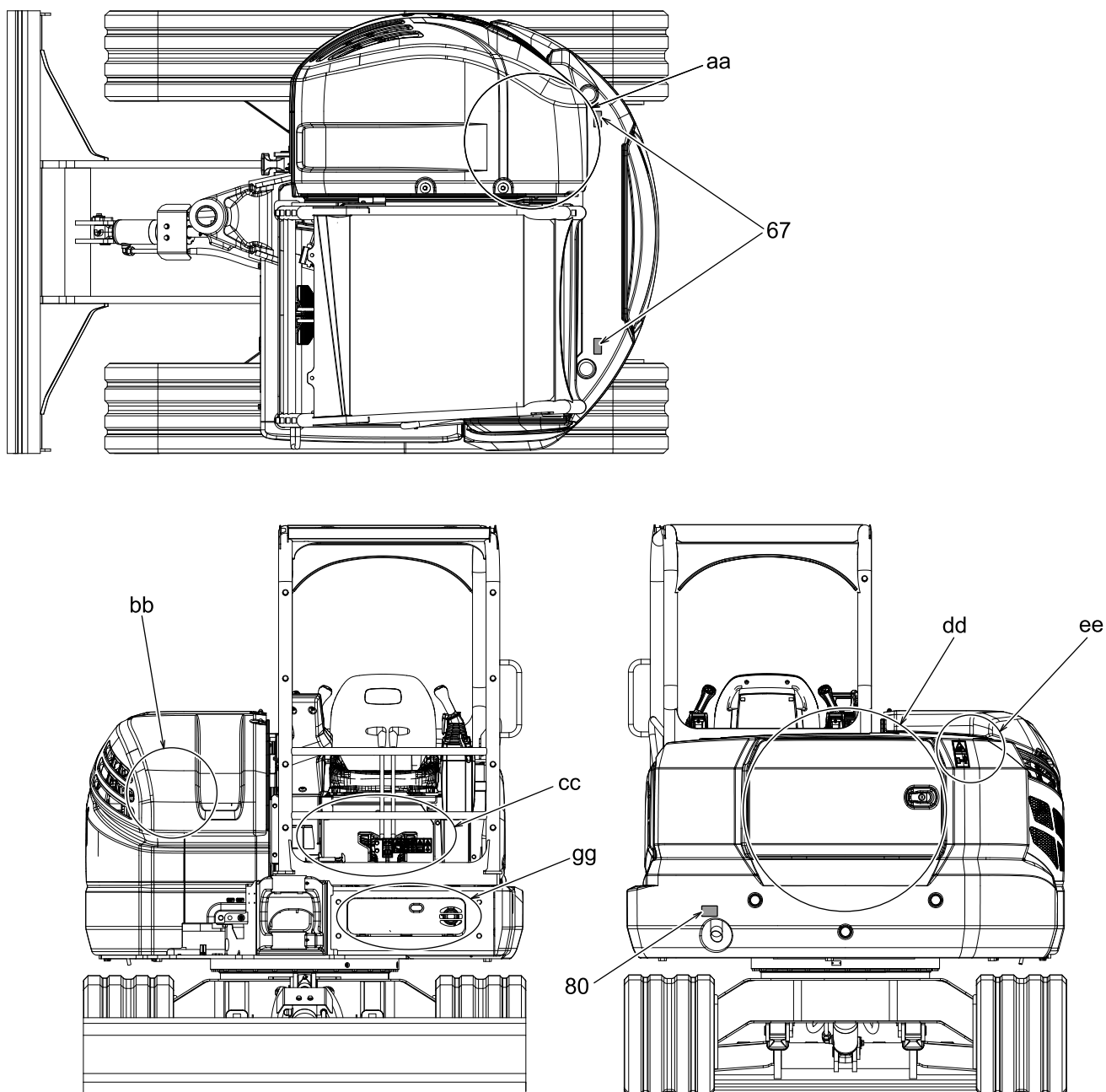
1.1.2 "DO NOT OPERATE" TAG

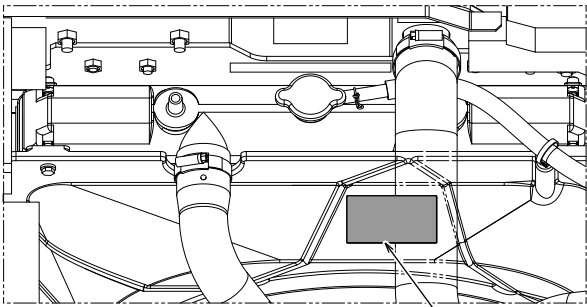
Part Number: YN20T02672P1

Use a temporary hang tag to communicate that the machine is out of service. You may need to use more than one temporary hang tag depending on the inspection and maintenance activities to be performed.

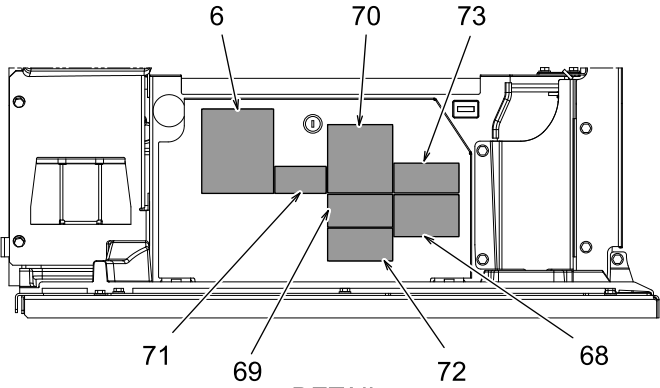


1.1.3 LOCATION OF SAFETY LABELS & DECALS

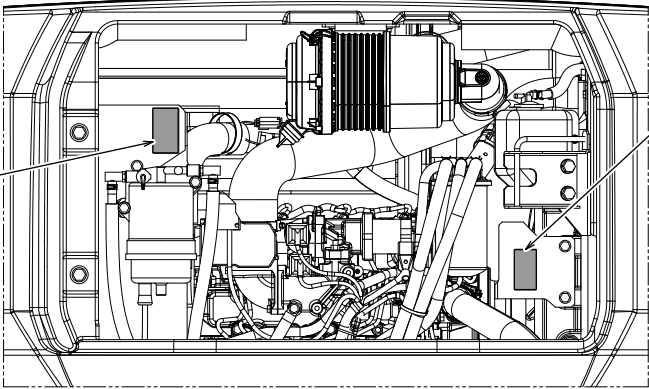




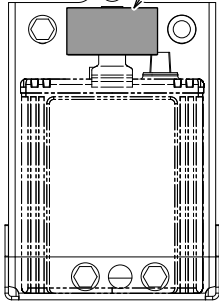
DETAIL aa
SHOWS INSIDE PANEL 77



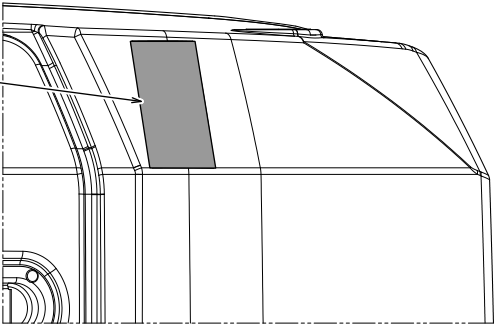
DETAIL cc 76



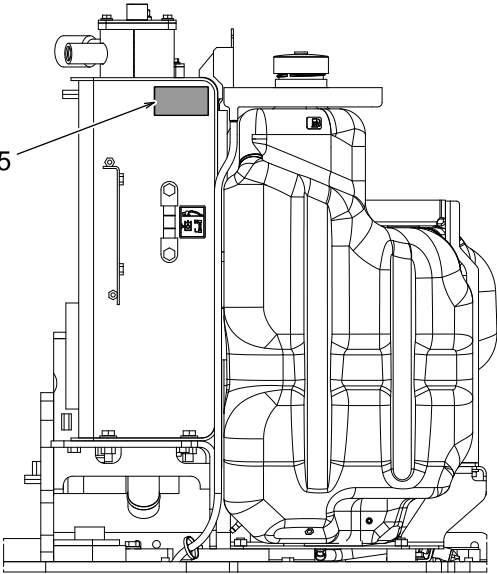
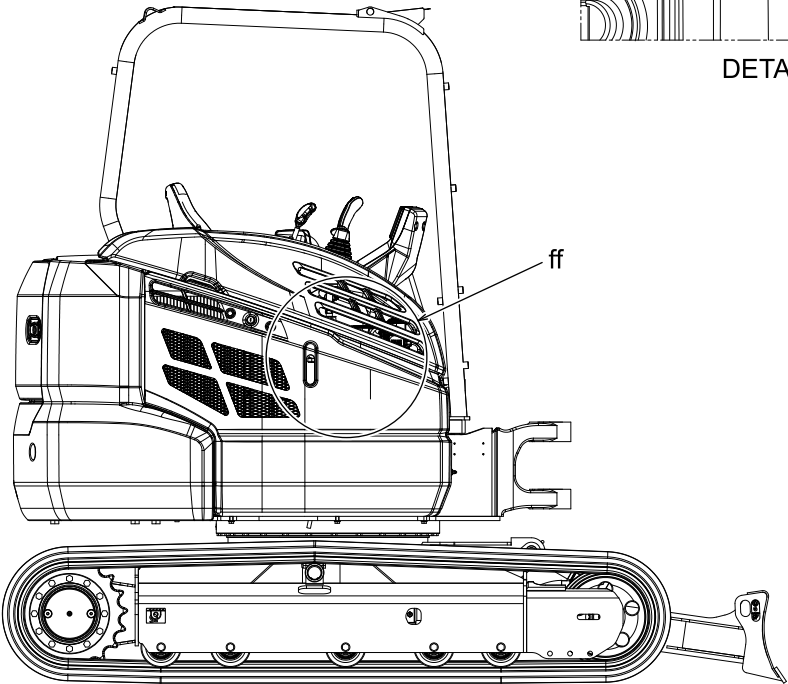
DETAIL dd
SHOWS INSIDE PANEL



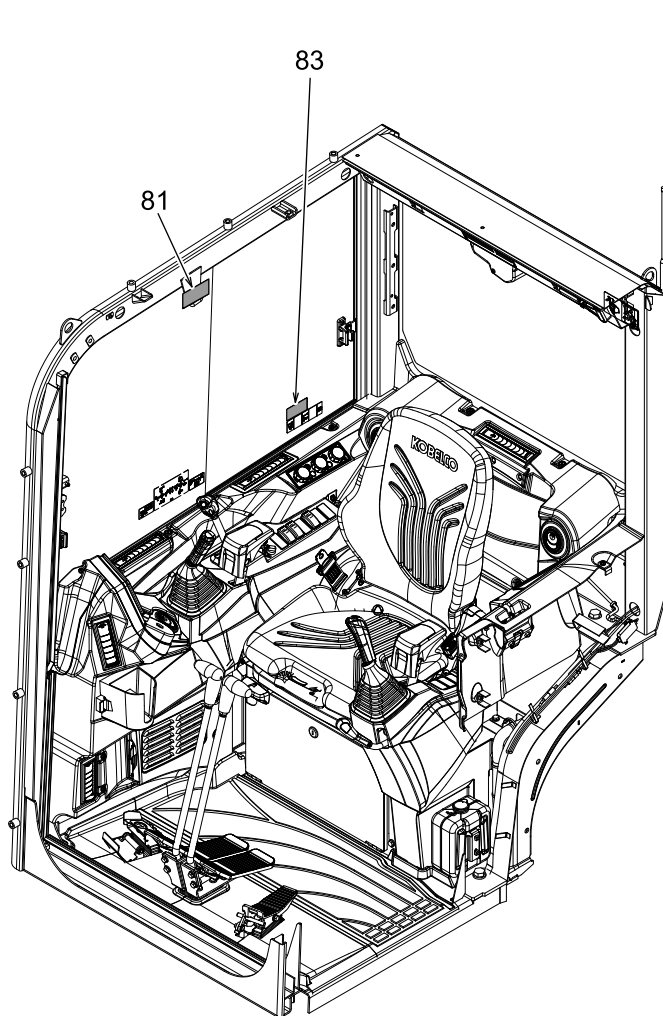
DETAIL bb



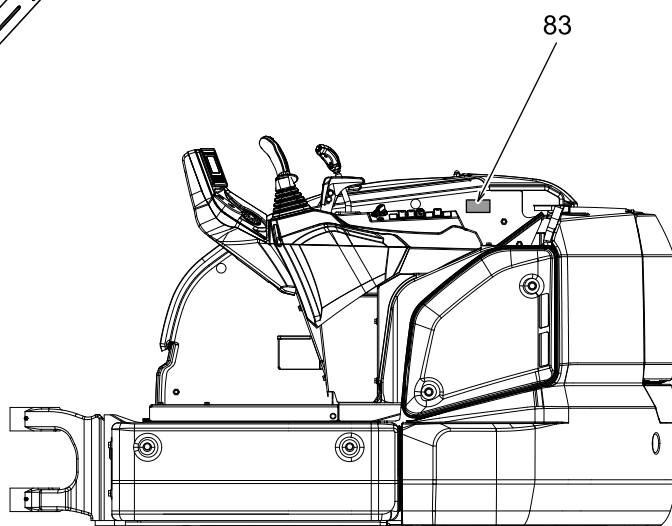
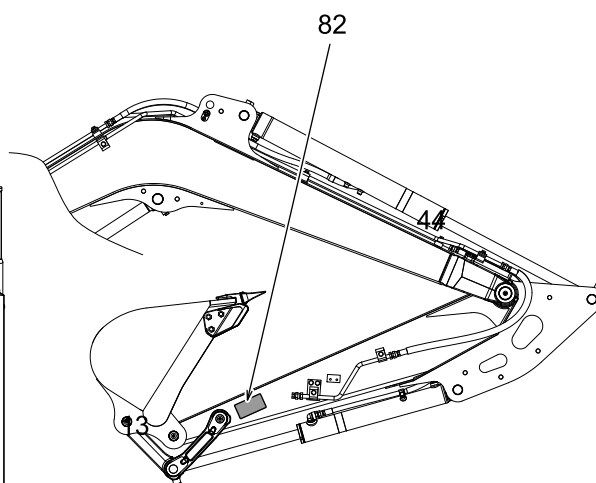
DETAIL ee



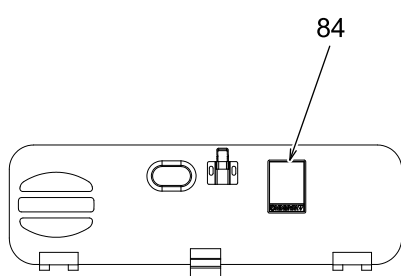
DETAIL ff



FOR CAB



FOR CANOPY



DETAIL gg
SHOWS BACKSIDE OF PANEL

1.1.4 SAFETY LABELS

HANDLING BATTERY

Location:6

Part Number:YN20T02746P1



DO NOT USE COUNTERWEIGHT LIFTING EYES

Location:67

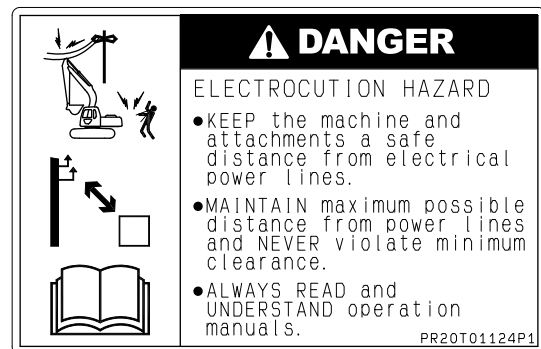
Part Number:PS20T01187P1



SAFETY PRECAUTIONS

Location:68

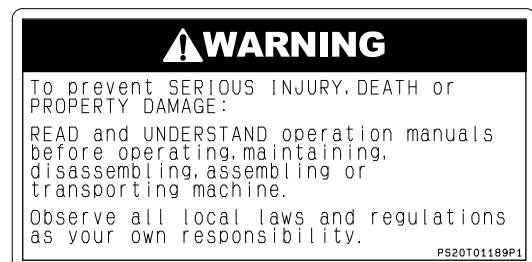
Part Number:PR20T01124P1



SAFETY PRECAUTIONS

Location:69

Part Number:PS20T01189P1

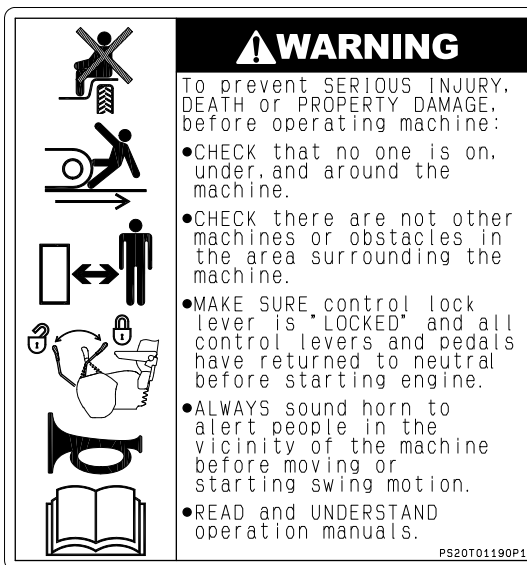


[1. SAFETY INSTRUCTIONS]

SAFETY PRECAUTIONS

Location:70

Part Number:PS20T01190P1



SAFETY PRECAUTIONS

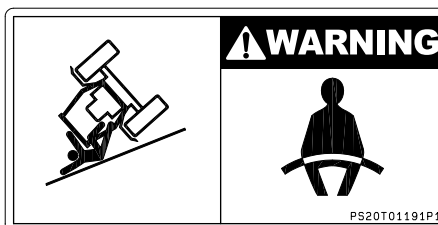
Location:71

Part Number:PS20T01191P1

PRECAUTIONS WHEN TIPPING OVER

When the machine tips over, the operator can be thrown out of the cab and crushed under the machine.

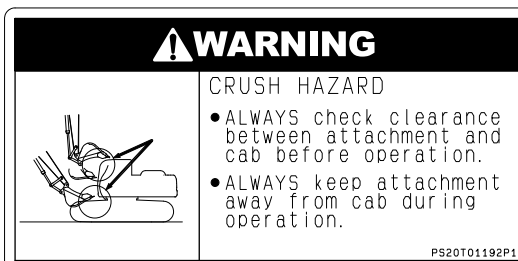
Be sure to fasten the seat belt during operation.



SAFETY PRECAUTIONS

Location:72

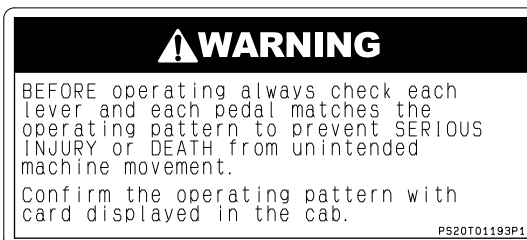
Part Number:PS20T01192P1



SAFETY PRECAUTIONS

Location:73

Part Number:PS20T01193P1



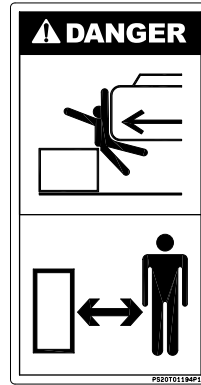
SWING

Location:74

Part Number:PS20T01194P1

Do not enter in the swing area.

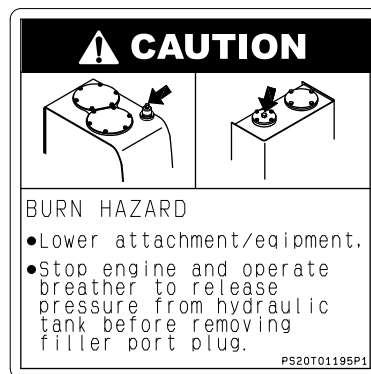
Stay away from the machine during operation to prevent you from contacting with or being crushed between machine components.



PRESSURIZED HOT OIL

Location:75

Part Number:PS20T01195P1



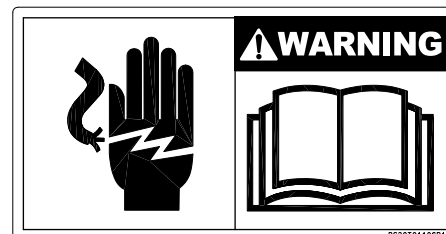
BATTERY CABLE

Location:76

Part Number:PS20T01196P1

Electric hazard may cause injury when mishandling the cable.

Read operator manual for safe and proper handling.



HOT COOLANT

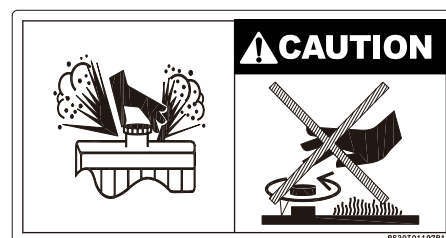
Location:77

Part Number:PS20T01197P1

Never loosen or open the radiator cap when coolant is hot. Stream of hot coolant will spout and could cause burns.

Before opening the radiator cap:

- Cool down the engine completely.
- Cover the radiator with cloth rag.
- Loosen the cap slowly to relieve pressure.



[1. SAFETY INSTRUCTIONS]

ENGINE ROTATING PARTS WARNING

Location:78

Part Number:PS20T01198P1



HOT PARTS

Location:79

Part Number:PS20T01199P1

Do not touch the engine until it cools down.

Because it could be high temperature and cause burns.



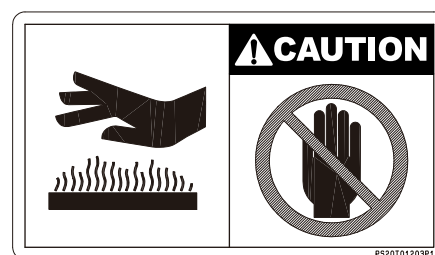
HOT PARTS

Location:80

Part Number:PS20T01203P1

Do not touch the engine until it cools down.

Because it could be high temperature and cause burns.

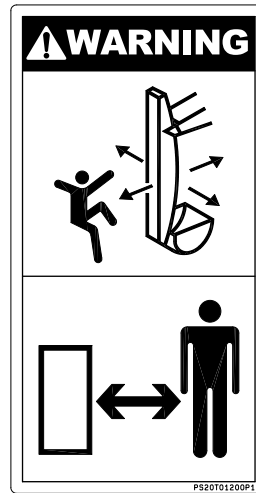


LOCK THE FRONT WINDOW AT THE OPENING POSITION

Location:81

Part Number:PS20T01188P1

Lock the front window at the opening position securely, or it may slip down and may personal injury.



KEEP CLEAR WORKING AREA

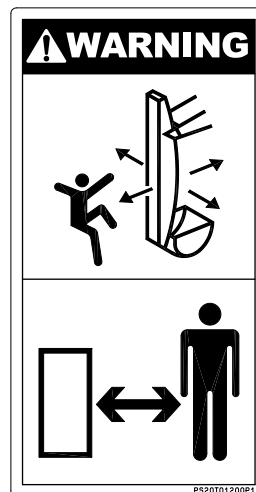
Location:82

Part Number:PS20T01200P1

Make sure the area is clear of obstacles and persons before beginning the operation of the machine.

Always look around before you start the swing operation.

Make sure everyone is cleared in your worksite. Sound horn before beginning swing operation.



PRECAUTIONS OF HANDLING QUICK HITCH

Location:83

Part Number:PS20T01201P1

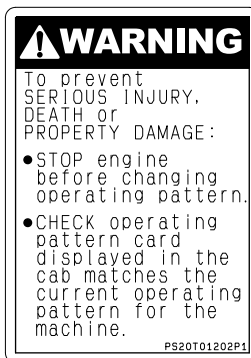


[1. SAFETY INSTRUCTIONS]

ROTARY MULTI CONTROL VALVE

Location:84

Part Number:PS20T01202P1



1.2 PRE-START SAFETY



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

1.2.1 OPERATION RULES

ALWAYS OBSERVE BASIC SAFETY RULES AND PRECAUTIONS

All operators are required to receive training before operating this machine.

If a license or other special qualification is required to operate a hydraulic excavator in the country where this machine will be operated, all operators of this machine must meet those requirements and have a valid (not expired) license or qualification.

- Follow all safety precautions and procedures described in this manual while operating, inspecting and maintaining this machine.
- Never operate this machine if you are under the influence of drugs or medicines (including those which may make you drowsy) or alcohol. If you are not alert, do not operate the machine.
- To prevent accidents, confirm all working procedures before starting work. If a signal person is needed, always agree on the hand signals and designate a signal person before starting work.
All personnel must know and understand all the signals. The operator shall respond to signals only from the appointed signal person, but shall obey a stop signal from anyone at any time. The signal person must stand in a clearly visible location when giving the signals.

ENSURE WORKSITE SAFETY

Understand your task and the potential hazards:

- Before operation, conduct a risk assessment with the site manager and confirm that all necessary safety precautions have been taken for the task. Always ask the site manager if there are any additional safety precautions or regulations for the task.

Know your working area:

- Visually survey the area around the working site before operating the machine.
Look for mud or other soft ground that could cause the machine to become stuck or unstable when operating the machine. The ground near cliffs, trenches and road shoulders may be too soft to operate the machine. Be aware that rain, blasting activities, earthquakes, or other events may cause the ground be soft. Use signs to identify soft shoulders and soft ground. If needed, use a signal person.
- Choose operating locations where landslide will not occur or where falling rocks or building debris will not land on the machine.
- Set up barricades to prevent unauthorized personnel and/or machines from entering the working site.
- If working near a road, use a signal person and signs to alert vehicles and pedestrians of potential hazards and falling objects.

KEEP AWAY OTHER PEOPLE FROM THE MACHINE AND ATTACHMENT / EQUIPMENT DURING OPERATION

To prevent serious injury or death:

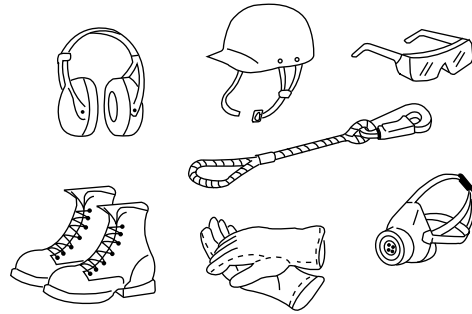
- Never allow anyone to stand on the machine, including the attachment /equipment and the upper structure, when operating.
- Never allow anyone to stand or to ride on a suspended load or the attachment/equipment.

1.2.2 PROTECTION TOOLS

PERSONAL PROTECTIVE EQUIPMENT

Wear fitted clothing and protective gears.

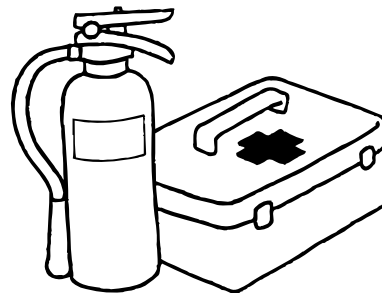
- Wear clothing not exposing your skin a lot.
- Always change any clothing that has become contaminated with oil, fuel or other flammable substances.
- Do not wear loose fitting clothing, jewelry or any accessory and restrain long hair that can get caught in moving parts or that can catch on controls and result in unintended movement of the machine or the attachment /equipment.
- Always wear the proper personal protective equipment for the task you will be performing. This may include a hard hat, safety shoes, safety glasses, face shield, respirator, and/or a reflective vest. Consult with your supervisor to confirm you have the proper personal protective equipment for the task.
- Use ear protection when operating in noisy areas. Prolonged exposure to loud noises can cause hearing damage and even total hearing loss.
- Inspect all personal protective equipment for damage prior to use. If any personal protective equipment is damaged, or past its expiration date, do not use the equipment and contact your supervisor to obtain a replacement before operating machine.
- Other personnel working in the vicinity of the machine, including the signal person, should also wear the proper personal protective equipment appropriate for the worksite and for the task. This may include a hard hat, safety shoes, safety glasses, face shield, respirator, gloves, ear protection, and/or a reflective vest. Consult with your supervisor to confirm that personnel working in the vicinity of the machine have the proper personal protective equipment for the worksite and the task.



PREPARE FOR EMERGENCY

In case of emergency, know where the fire extinguishers (type: ABC, ABE) and the first aid kit are located.

- Know how to use a fire extinguisher.
- Inspect and maintain the fire extinguishers in compliance with your local/national regulations.
- Determine what emergency communication devices are necessary for your location and have a list of important telephone numbers available.
- Periodically inspect the first aid kit. Replenish items and replace expired items as necessary.



1.2.3 ABNORMAL AND EMERGENCY CONDITION

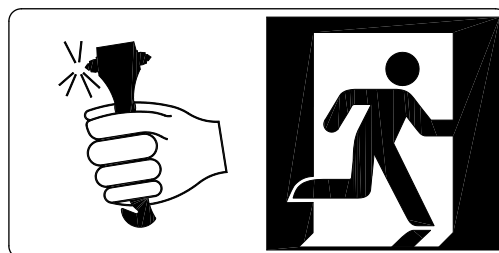
WHEN A FAILURE IS FOUND

When operating, inspecting or maintaining the machine, if there is an unusual noise, vibration, smell, instrument malfunction, smoke, oil leak, a warning light illuminates or a warning is on the multi-display, do not continue to operate the machine.

- Always park on a firm, level location, lower the attachment to the ground, pull the control lock lever to the locked (up) position, stop the engine, and remove the key.
- Contact your Supervisor.
- Contact your KOBELCO authorized dealer for repair.

EMERGENCY ESCAPE FROM THE CAB

If the normal operator's exit is blocked in an emergency, stop the engine, use the life hammer to break a window, and exit the cab.



IN THE EVENT OF A FIRE OR OTHER EMERGENCY

- Stop the engine.
- Use hand rails and steps to dismount machine. Do not jump from machine.

IN THE EVENT OF A THUNDERSTORM

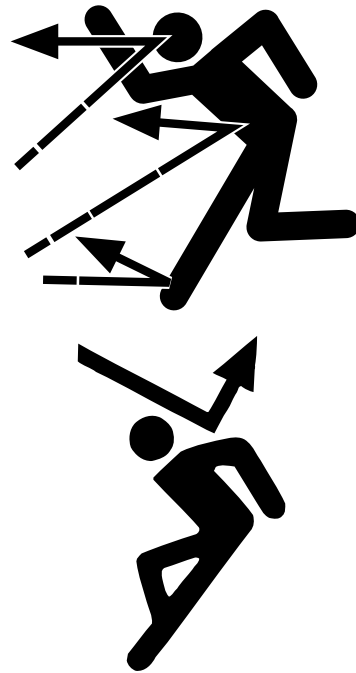
- Lower the attachment to the ground and if possible anchor the digging tool into the soil.
- Leave the cab and move away from the machine before the storm break out. Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.

1.2.4 POTENTIAL HAZARDS WHEN OPERATING

PAY ATTENTION TO FALLING MATERIALS AND FLYING DEBRIS

To prevent serious injury or death, confirm the appropriate cab guards are installed for your task and for the attachment /equipment prior to operation. If needed, contact your KOBELCO authorized dealer before starting work.

- Always use the front guard, and the top guard when performing building demolition work or operating at working sites (including mining or quarry sites) where falling material and flying debris may occur.
- If working with the hydraulic breaker or another attachment and if objects will not fall on the machine, only the front guard may be needed.
- When performing work that may result in falling material and flying debris, keep people a safe distance away from the work area.
- Always close the front window and doors before operating.



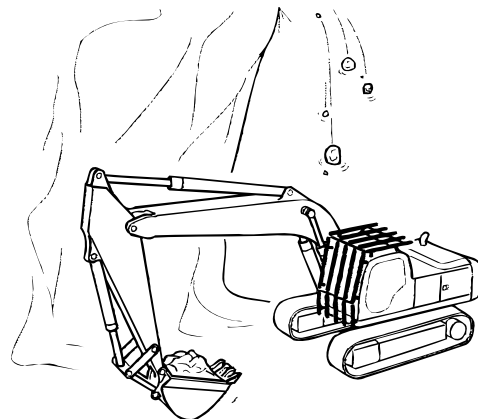
CHECK SAFETY RELATED GUARDS AND EQUIPMENT

- Check all safety related guards, covers, windows and mirrors are not damaged and secure prior to operation. If any damage or other issue is found, do not use the machine until the safety related parts and equipment has been replaced. Never attempt to repair safety related parts and equipment.
- Understand how the safety systems and the safety related equipment protects you as the operator and others around the machine.
- Never remove safety related parts and equipment from the machine.

LIMITED PROTECTION FROM OBJECTS FALLING ON THE CAB

When operating near areas where landslides may occur or where rocks or other debris may fall, be aware that the cab and the guards installed provide limited protection for the operator and may not prevent serious injury or death.

- Never weld, drill or modify the top guard or other protective structures. Any modification could weaken the structural integrity of these protective structures, resulting in serious injury or death in case of collision, falling objects or landslides.
- Do not install any cab lifting device to the top guard or other protective structures.
- If an accident occurs, do not try to straighten or repair the top guard or other protective structures. Contact your KOBELCO authorized dealer for functional verification or replacement of any of the protective structures.

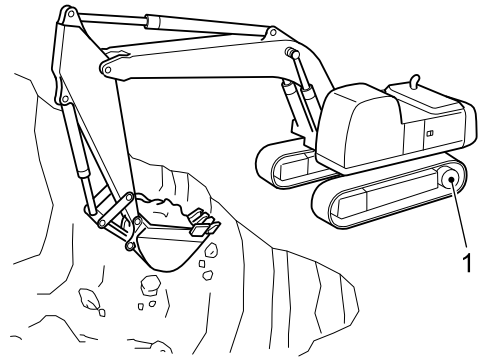


GROUND CONDITIONS

Always place tracks perpendicular (at a 90 degree angle) to the edge of a cliff or the road shoulder with the travel motors(1) positioned away from the edge to prevent the machine from falling over the edge.

Visually inspect for soft ground near the edge, especially either any raised ground or any wet ground following a rain.

Do not dig close to the machine or undercut the bank in front of the machine to prevent the machine from falling over the edge.

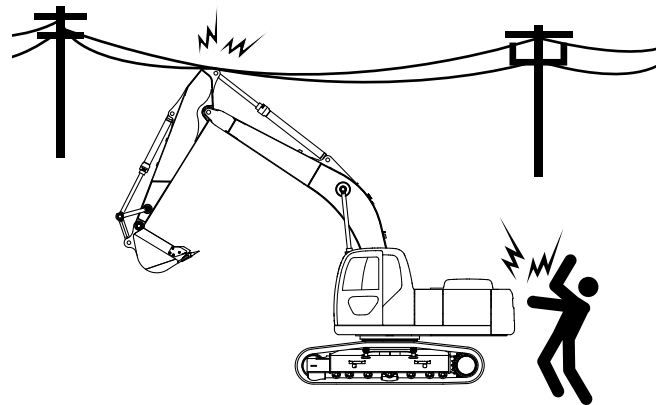


ELECTRICAL POWER LINES

Keep a safe distance from electrical power lines.

Never approach power lines with any part of the machine and its load unless all local and national required safety precautions have been taken. Electrocuting and death can result from arcing, touching or even being close to a machine that is in contact with or near an electrical source.

- Maintain the maximum possible distance from power lines and never violate the minimum clearance.
- Always contact the nearest electric utility and determine jointly what specific precautions must be taken to ensure safety.
- Consider all lines to be power lines and treat all power lines as energized even though it is known or believed that the power is shut off and the line is visibly grounded.
- Use a signal person to observe the approach of any part of the machine or load to the power line.
- Caution all ground personnel to stand clear of the machine and the load at all times.
- If the machine should come in contact with a live electrical source, do not leave the operator's seat. Do not allow anyone to approach or touch the machine.
- Observe the applicable rules or regulations for clearance distances for power lines and other electrical equipment for the country where the machine is operating. Always maintain the following clearances when operating near high voltage power lines.



The reference of the safe distances from high voltage cables are as follows.

LINE VOLTAGE(V)	MINIMUM DISTANCE m(feet)
0 to 50,000	3.0(10) or more
50,000 to 200,000	4.5(15) or more
200,000 to 350,000	6.0(20) or more
350,000 to 500,000	7.5(25) or more
500,000 to 750,000	10.5(35) or more
750,000 to 1,000,000	13.5(45) or more

USE WORK LIGHTS

- When operating in dark locations, turn on the work light. If necessary, use additional lighting devices to make the work areas bright enough to operate.
- Stop work if you have poor or limited visibility because of darkness, fog, rain, especially lightning, snow, or other causes.

[1. SAFETY INSTRUCTIONS]

OPERATING ON SOFT GROUND

When working on soft or wet ground, place logs or lumber horizontally beneath the crawler tracks to prevent the machine from becoming stuck.

Be aware frozen ground may become soft or wet as the ambient temperature rises during the day and could cause the machine to become unstable or stuck.

VISUALLY INSPECT GROUND CONDITIONS BEFORE OPERATING

The ground near cliffs, trenches and road shoulders may be too soft to operate the machine. Visually inspect for soft ground before travelling or working in these areas. Be aware that rain, blasting activities, earthquakes, or other events may cause the ground to be soft.

To prevent serious injury, death, and property damage, only travel or work on firm ground when the machine is close to sudden elevation changes, including cliffs, trenches and road shoulders. The weight of the machine or vibration from the machine may cause the ground to collapse and cause the machine to tip or roll over.

1.2.5 FIRE PREVENTION

FIRE CAUSED BY FLAMMABLE SUBSTANCES

Fuel, oil, electrolyte, windshield washer fluid and other chemicals are flammable.

To prevent serious injury or death from possible fire:

- Remove flammables such as leaves, wooden debris, paper waste, etc. from the areas of exhaust manifold, muffler, battery, and undercover, etc.
- Do not smoke or bring other ignition sources near areas where flammables are stored and/or handled.
- Refuel only after stopping the engine.
- Do not leave the machine when refueling or when refilling with oil.
- Try not to spill fuel on heated surfaces or on electrical parts. Clean any spills immediately.
- After refueling or refilling with oil, securely tighten the fuel and the oil caps and clean up any spills immediately.
- Store fuel and oil in designated areas and restrict access to only authorized personnel.
- Remove all flammable materials in the area before performing grinding or welding work.
- Do not weld or perform gas cutting on pipes and tubes which contain combustible liquids.
- Only use nonflammable oils to wash parts. Do not use flammable oils, such as diesel fuel or gasoline, to wash parts.



FIRE CAUSED BY THE ELECTRIC SYSTEM

Short-circuits in the electrical system may cause fire.

- Check all wiring harness connections are clean and secure.
- Inspect wiring harnesses, connectors, and clamps periodically. Repair, replace, or tighten connectors and clamps if any damage or loose connections are found.

FIRE CAUSED BY LEAK

Check all clamps, guards, protective cushions for the hoses and the tubes are secure.

During operation, machine vibration may cause loose hoses or loose tubes to be damaged from contact with other parts and leak high pressure oil or other fluids and result in a fire and serious injury or death.

If any issue is found, immediately tighten, repair or replace it.

Do not operate machine with damaged or bent hoses or tubes.

USE ANTI-EXPLOSION WORK LIGHTS

Use only work lights with anti-explosion specification to prevent serious injury or death.

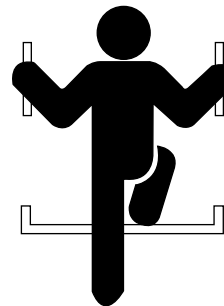
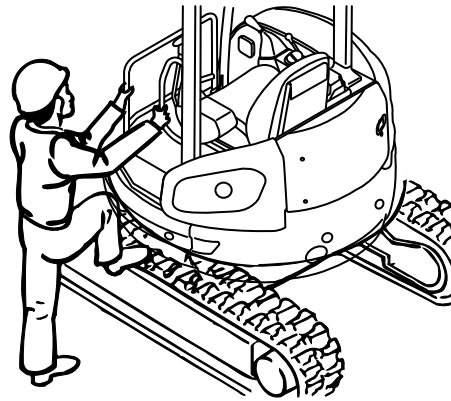
Lighting must meet the requirements for areas where explosive concentrations of vapors and dusts could exist to prevent a fire or explosion when performing inspection and maintenance activities.

1.2.6 GETTING ON AND OFF THE MACHINE

PRECAUTIONS OF GETTING ON AND OFF THE MACHINE

To prevent serious injury or death:

- Clean all slippery substances such as grease, oil, mud, ice, and others attached to the steps and handrails.
- Inspect the steps and handrails for damage or loose parts. Replace any damaged parts and tighten any loose bolts or nuts.
- Always use the steps and handrails to get on and off the machine.
- Always face the machine and maintain three points of contact with the steps and handrails.
- Do not use the control lock lever and control levers as hand holds.
- Do not have anything in your hands, including tools, when getting on and on and off the machine.
- Never jump on and off the machine or attempt to get on or off a moving machine.

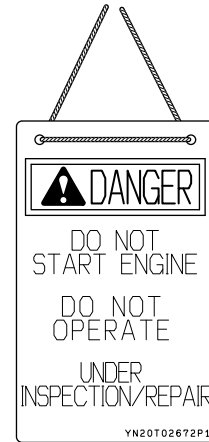


1.2.7 PRE-START UP INSPECTION ON THE MACHINE

Always perform a pre-startup inspection before operating this machine to check for any potential issues. For more information, refer to "EVERYDAY CHECK-UP" in Chapter 3 in this manual.

ATTACH A "DO NOT OPERATE" TAG

To prevent serious injury or death, never allow unauthorized personnel to start the engine or touch the control levers during inspection and maintenance activities. Always lower the attachment, pull the control lock lever up, stop the engine, and remove the key before performing inspection and maintenance. Use a temporary hang tag to communicate that the machine is out of service. You may need to use more than one temporary hang tag depending on the inspection and maintenance activities to be performed.

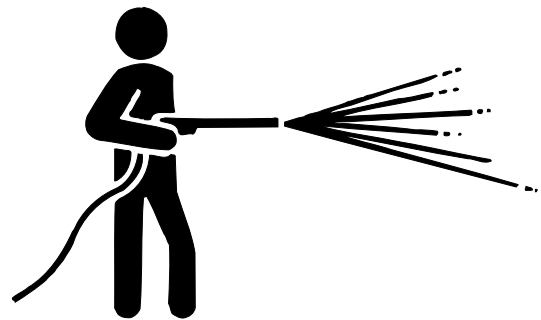


ALWAYS KEEP THE MACHINE CLEAN

Always keep the machine clean and free of scattered debris, and spilled lubricant and oil.

If electrical components or systems get wet, then equipment malfunction, short circuit, or fire may result in serious injury or death.

Never use pressurized water or steam to clean inside the operator cab or any electrical components, such as sensors and connectors.



KEEP INSIDE OF OPERATOR CAB CLEAN

- To prevent slippery pedals, always remove mud, grease, oil, and other substances from the soles of your shoes before entering the cab.
- Secure parts and tools inside the cab before operating.

To prevent fire:

- Do not bring explosive or flammable materials into the cab.
- Do not leave your cigarette lighter inside the cab.
If the cab temperature becomes too hot, the lighter may explode.
- After smoking, always put out your cigarette.
- Do not leave plastic bottles inside the cab or attach suction cups to the windows.
These items may act as lenses and could start a fire.

SEAT BELT INSPECTION

Check if seatbelt is cut or frayed and check if mounting hardware is damaged or loose before fastening the seatbelt. If an issue is found with the seatbelt or the mounting hardware, do not use machine until the issue has been repaired.

Replace seatbelts every 3 (three) years or more frequently if damaged or frayed.

1.3 SECURE VISIBILITY



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

1.3.1 BE AWARE OF YOUR SURROUNDINGS

When operating or traveling in the machine, the operator may not observe people and obstacles near the machine. To prevent serious injury, death or damage to the machine.

- Keep windows clean.
- Replace cracked or broken glass.
- Adjust the mirrors for maximum visibility around the machine before operating. If needed, clean the mirrors.
- Move the attachment /equipment as needed to improve visibility of the right side during machine travel.
- There are blind areas the mirror views. Confirm for safety around the machine before operating the machine.
- If needed, use a signal person. The operator should always be alert and follow the signals from the signal person. The operator shall respond to signals only from the appointed signal person, but shall obey a stop signal from anyone at any time.
- When operating in dark locations, turn on the work light. Additional lighting may be needed to illuminate the work area.
- Stop work if you have poor or limited visibility because of darkness, fog, rain, especially lightning, snow, or other causes.
- Never attach mirrors or other articles to the handrails. Over time, excessive vibration may weaken the handrail and cause it to fail.

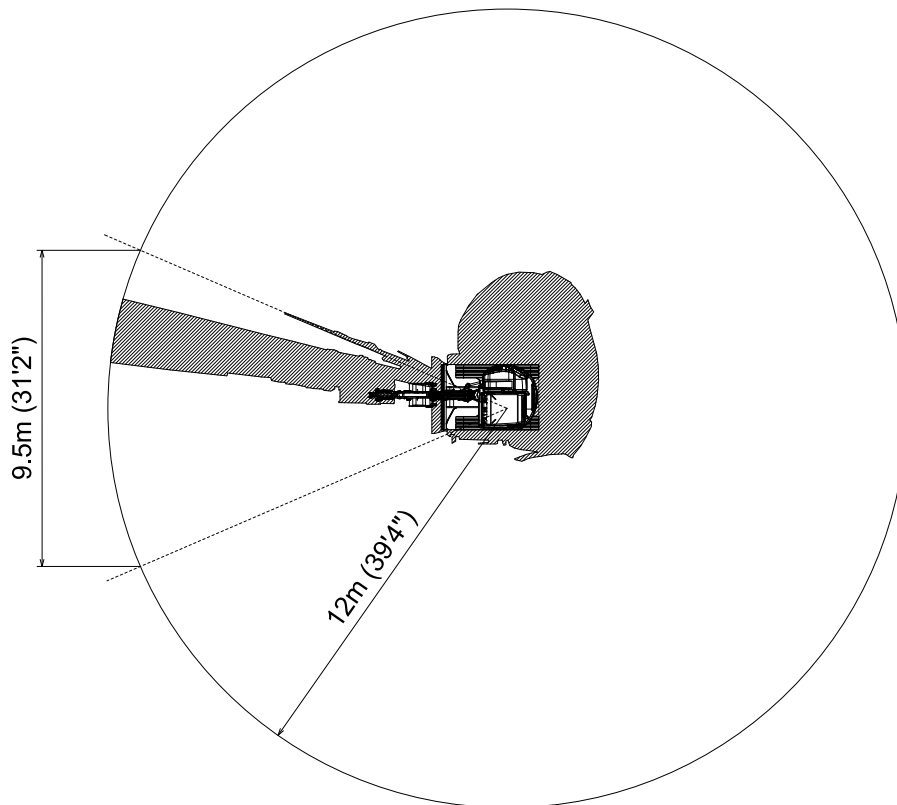
1.3.2 VISIBILITY MAP

- The following visibility map is a rough standard of areas (hatched areas) where the operator cannot see both directly and indirectly (through the mirrors and the cameras). The operator can use this map as a reference to improve field rules or enhance visibility by adding an auxiliary device.
- This machine complies with the visibility requirements stipulated in EN474-1.
- This map is not the same as the visibility requirements stipulated in EN474-1.
- This map was made according to the standard specification. Be cautious that the map may change according to the machine specification.

Note

This map is a rough standard at the ground surface within the radius of 12 m, centering the operator reference point (680 mm above and 20 mm forward from Seat Index Point) from near areas of the machine.

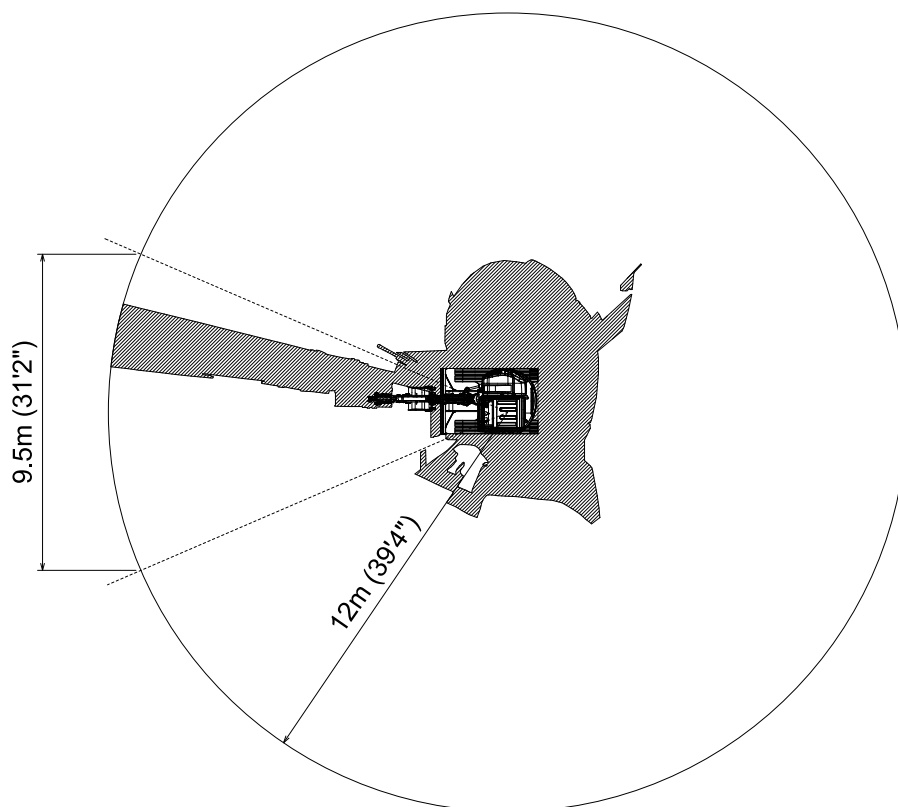
Direct visibilities (CANOPY SPECIFICATION)



Hatched area: blind spot

[1. SAFETY INSTRUCTIONS]

Direct visibilities (CAB SPECIFICATION)



Hatched area: blind spot

1.4 PRECAUTIONS FOR OPERATION



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

1.4.1 STARTING

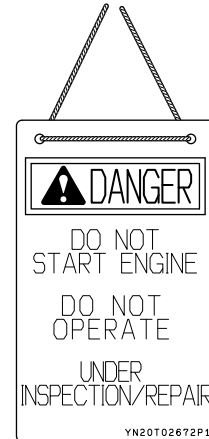
CHECK A "DO NOT OPERATE" TAG

Before starting the engine, check display of warning tags.

If warning tags are displayed, do not start the engine.

The warning tags are used to notify that the machine is in an inoperable condition.

Report this situation to a supervisor of the machine and do not start the engine until the warning tags are removed.



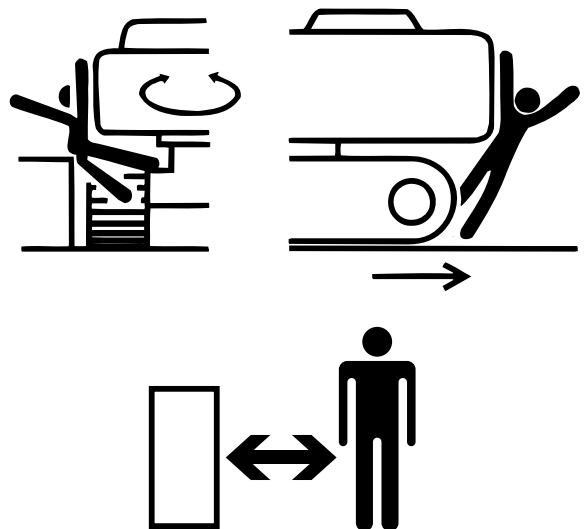
ONLY THE OPERATOR IS ALLOWED IN THE CAB

The operator is the only person that should be on or near the machine and in the cab. Do not allow any other personnel to be present in the cab or on the machine.

CHECK WORKING SITE AND SET UP BARRICADES

To prevent serious injury, death and property damage, before you start the engine and before you move the machine:

- Check that no one is on, under, and around the machine. Make sure that all personnel are clear of the machine and surrounding area.
- Check there are no other machines or obstacles in the area surrounding the machine.
- Set up barricades to prevent unauthorized personnel and / or machines from entering the working site.



PRE-OPERATION SAFETY CHECK

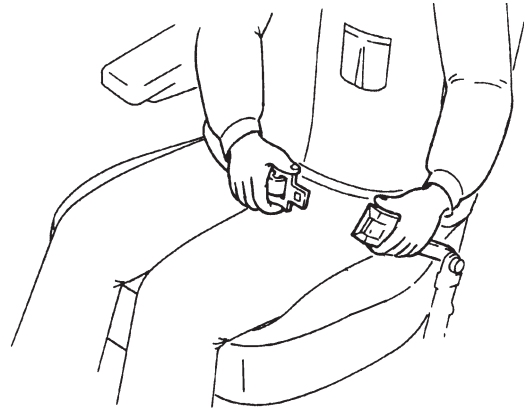
To prevent serious injury or death, before operating:

- Close and lock the doors and windows.
- Close and lock the access panels and doors.
- Adjust mirrors for maximum visibility around the machine. See "ADJUSTMENT OF MIRRORS" in Chapter 3 for additional information.

[1. SAFETY INSTRUCTIONS]

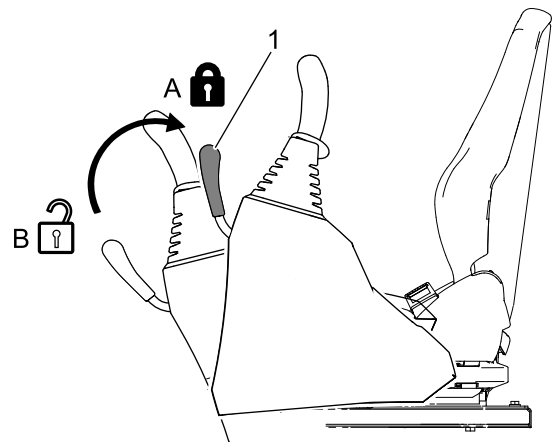
FASTEN YOUR SEATBELT

To prevent serious injury or death, always fasten your seatbelt before starting the machine and keep your seatbelt fastened during operation. Sit in operator's seat and adjust seat so you can properly operate all of the machine controls.



BEFORE STARTING ENGINE

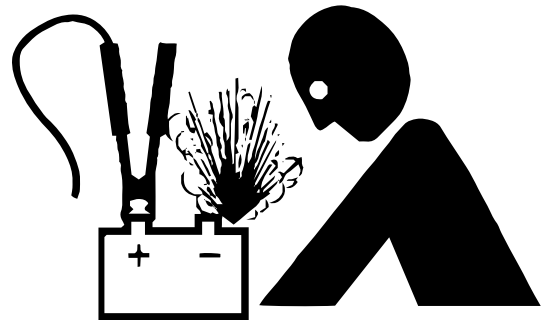
- Check the control lock lever is in the "LOCKED" (up) position. If not locked, incidental contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.
- Confirm that all control levers and pedals have returned to neutral.
- Sound horn to alert personnel near the machine.
- Always be seated in the operator's seat with your seatbelt fastened.



A: Locked Position

B: Unlocked Position

Only start the engine from the operator's seat. Never attempt to start the engine by connecting the starter terminals to the batteries.



WARM UP

To prevent serious injury or death, always allow the machine to warm up prior to operation, especially in cold weather. Do not start operation as soon as the engine is started. If not warmed up, there could be a delay between when the control levers are moved and when the machine or the attachment /equipment responds, resulting in unintended or unexpected movement of the machine or attachment /equipment. After starting the engine, check all gauges indicate properly.

CHECK CONTROL PATTERN BEFORE OPERATING

Before operation, always check the operation of each control lever and each pedal.

If the movement of the machine does not match selected control pattern which is shown on the card, stop the work and shut down the machine. The machine movement must match with the operating pattern.

If the machine movement does not match the card displayed in the cab, change the card so as to match the machine control pattern.

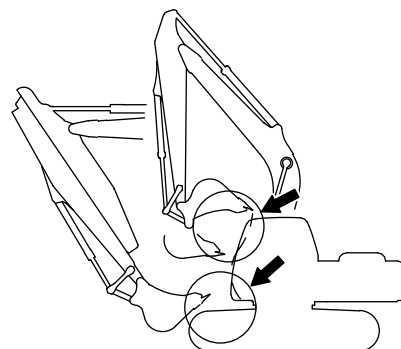
If any issue is found, do not operate machine until the issue had been corrected. If needed, contact your KOBELCO authorized dealer.

CHECK WARNING DEVICES

Make sure that the horn, the travel alarm, the swing flashers and all other warning devices are warning properly.

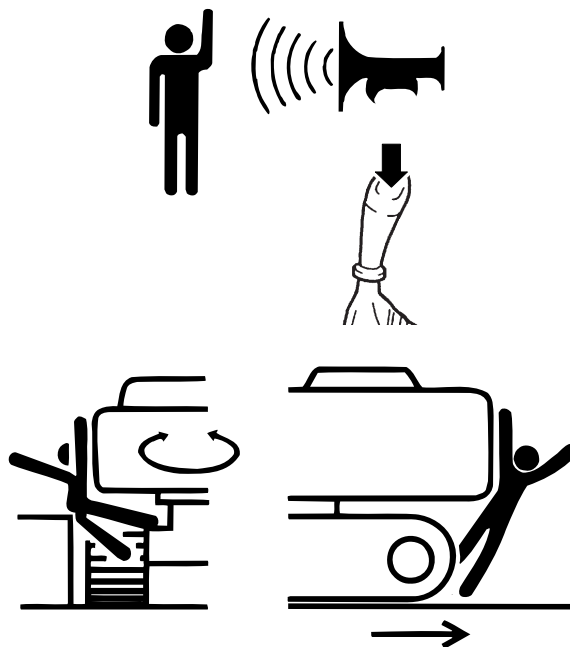
AVOID INTERFERENCE BETWEEN THE ATTACHMENT AND THE MACHINE

Check clearance between the attachment and the cab before starting operation because a certain kinds of attachment and a certain combination of the option and the machine may cause the contact of the attachment and the cab or some other parts of the machine.



PRECAUTIONS OF SWINGING / TRAVELING

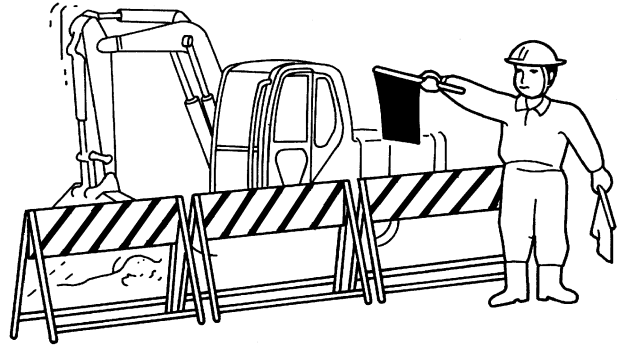
- Always sound the horn before starting the engine, traveling the machine, or swinging the upper structure to alert people in the vicinity of the machine.
- Always operate at a safe distance from other machines or obstacles in the vicinity of the machine.
- Place a signal person at poor visibility area.



[1. SAFETY INSTRUCTIONS]

WORKSITES IN URBAN AREAS

Set up barricades to prevent unauthorized personnel and/or vehicles from entering the worksite. If working near a road, use a signal person and signs to alert vehicles and pedestrians of potential hazards and falling objects. If needed, use a signal person to direct traffic. The operator should always be alert and follow the signals from the signal person. The operator shall respond to signals only from the appointed signal person, but shall obey a stop signal from anyone at any time.

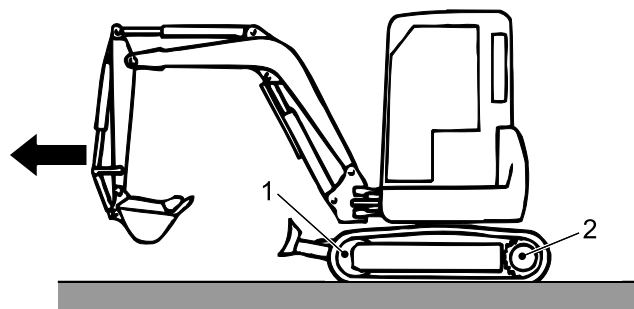


1.4.2 TRAVELING

ALWAYS CONFIRM DIRECTION OF TRAVEL

Before moving the machine, check the position of the undercarriage (tracks). The normal travel position is for the idler wheels(1) to the front under the cab and the travel motors(2) to the rear.

When the undercarriage (tracks) is reversed, the travel controls operate in the opposite directions compared to when the idler wheels(1) are in the front. Move the travel levers slowly and travel at a low speed.



1

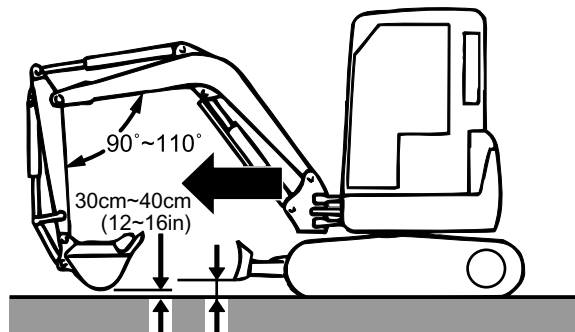
MOVE TRAVEL LEVERS IN A SLOW AND DELIBERATE MANNER

- Gradually increase speed. Moving the travel levers quickly will cause the machine to accelerate quickly and result in a sudden start or sudden acceleration.
- Do not move the travel levers from forward to reverse or vice versa rapidly.
- Do not perform an abrupt pivot turn or spin turn.
- Do not stop quickly by releasing your grip on the levers during travel.

PRECAUTIONS IN TRAVELING

Travel on a level and firm ground as much as possible.

- Move the attachment /equipment as needed to improve visibility of the right side during machine travel.
(The bucket at the height of 30 to 40 cm (12 to 16 inch) above the ground.)
- Travel slowly on a rough terrain.
- Do not go over obstacles. When going over obstacles inevitably, go slowly with the attachment positioned close to the ground as much as possible. Because the machine may tip/roll over.



TRAVELING ON FROZEN OR SNOW COVERED GROUND

Use extreme care when operating on frozen or snow covered ground.

- The ground may be extremely slippery and the machine can slide or skid.
- Do not perform abrupt start, stop, or movements or the machine could become unstable and tip or roll over.
- Snow can make elevation changes (e.g., road shoulders or steep banks) hard to perceive.
- Snow can cover obstacles or obstructions and make them difficult to recognize.
- During the day as ambient temperatures rise, frozen ground may thaw and become soft and cause the machine to become unstable or stuck.

TRAVEL ON WET OR LOW TRACTION SURFACES

Use caution when travelling on an incline over wet surfaces, including wood, steel, and piles of wet leaves and branches. The machine could slide or skid and result in serious injury, death or property damage.

[1. SAFETY INSTRUCTIONS]

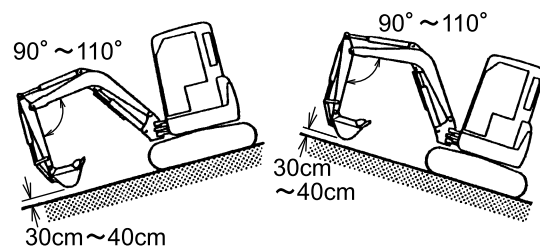
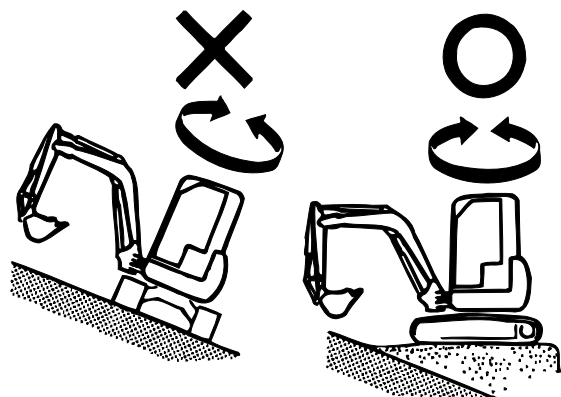
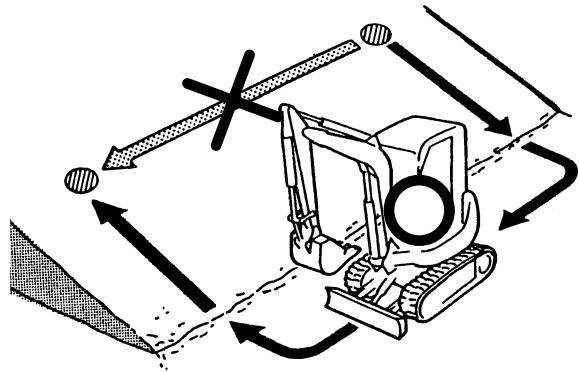
GOING UPWARD SLOPE OR DOWNWARD SLOPE



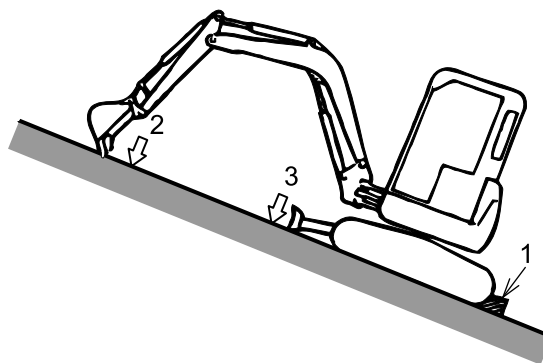
WARNING

PRECAUTION OF TRAVELING ON SLOPES

- Never turn or go across on a slope. Go down to a flat space and take a detour-route for safety.
 - When traveling, keep the bucket at a height of 30 to 40 cm (12 to 16 inch) above the ground. Do not go downward slope with the reverse travel.
 - When the machine becomes slipped or unstable, immediately lower the bucket and put on the brake.
 - There is a risk of the machine losing the balance to tip/roll over during swinging when operating on a slope. It is dangerous to swing downhill with the bucket filled with soil. Make an embankment for the machine to be as level as possible to swing on a slope.
 - The traveling up and down on a slope of 30 degree or more is not allowed because there is a risk of tipping/rolling over.
 - When parking on a slope is unavoidable, be sure to lower the bucket to the ground and chock the crawler tracks.
-
- The maximum gradability of this machine is 58% (30 degrees).
 - Operate the travel levers slowly when going downhill.
 - Use the low (1st) speed when going downhill and uphill.
 - When traveling on a slope, keep the bucket at a height of 30 to 40 cm (12 to 16 inch) above the ground and the low speed.
 - When the engine was stalled, put down the bucket on the ground and return every lever to the neutral position, and then start the engine again.



- When the machine cannot go uphill with the crawlers (travel motor) due to slip of the shoes, you can pull the arm to utilize the machine power for assistance.
- When parking or stopping the machine on a slope, be sure to lower bucket (2) and dozer (3) to the ground even if it is a short time, set all levers to the "neutral position", set the control lock lever to the "LOCKED" position, and then chock crawlers (1).



Downward slope/Upward slope

Notice

If the hydraulic oil is not warmed up, sufficient gradability may not be acquired. Warm up the machine sufficiently before going uphill.

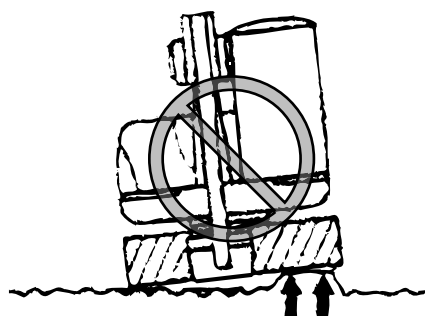
DOZER COLLISION

Be careful not to strike the dozer against large rocks, etc. It may cause a premature damage of the dozer or the cylinder.



OFFSET LOAD OF DOZER

If the machine is supported by the dozer, be sure to ground the dozer bottom evenly, avoiding an offset or concentrated load.



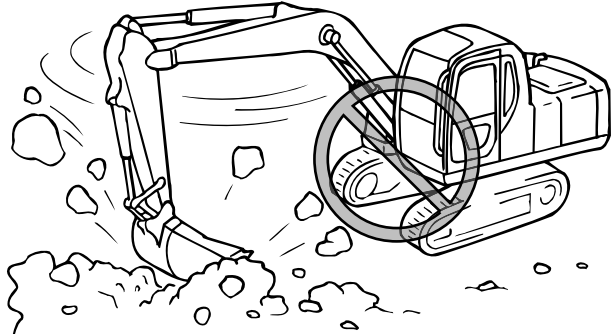
1.4.3 PROHIBITED OPERATIONS

Always follow the procedures in this manual when operating this machine. Abuse and misuse may result in serious injury, death, and property damage and reduce the life of the machine. Never attempt the following under any circumstances.

NEVER USE THE SWING POWER TO PERFORM WORK

Never apply swinging force (slewing force) to rock sliding work and side wall breaking work.

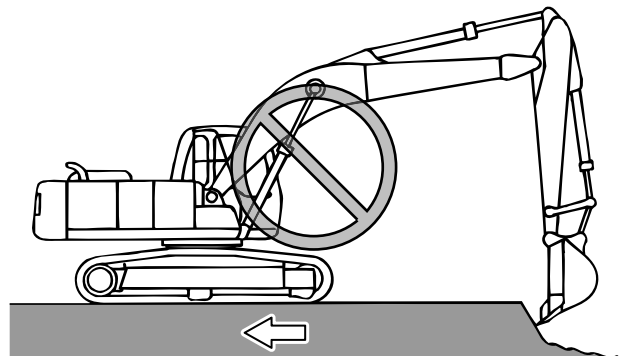
If the swing power is used to perform work, excessive force may be exerted on the machine and the attachment /equipment resulting in damage to the machine and the attachment /equipment and may reduce the life of the swing system.



NEVER USE THE TRAVEL POWER TO PERFORM WORK

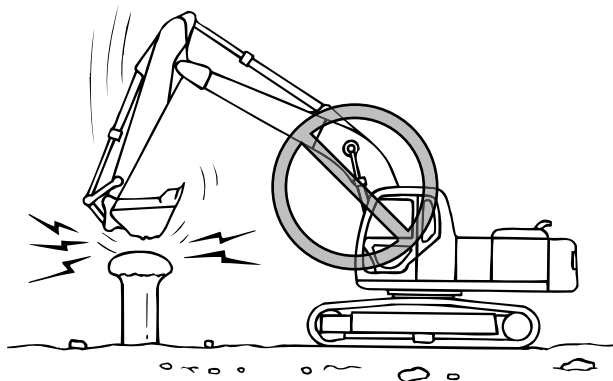
Do not use the travel power to perform digging or leveling work with the attachment in contact with the ground.

If the travel power is used to perform work, excessive force may be exerted on the machine and the attachment /equipment resulting in damage to the machine and the attachment /equipment.



DO NOT PERFORM "HAMMERING" OPERATIONS WITH THE BUCKET

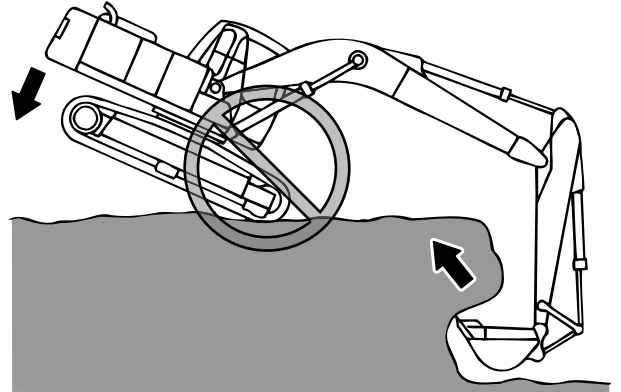
Never use the bucket for hammering and piling. It will cause severe damage to the machine and its components.



DO NOT USE MACHINE WEIGHT FOR DIGGING OPERATION

Do not use the machine weight to obtain power to dig. This could cause severe damage to the machine and its components.

Before digging the hard bedrock, crack the hard bedrock into pieces by another method and then dig it. It will not damage the machine and result in more economical way.



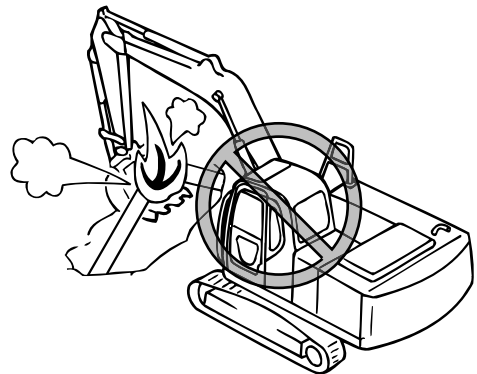
OPERATING ON A SLOPE

Use extreme caution when operating machine on a slope. The machine may become unstable and could tip or roll over.

- Place the crawlers parallel to the slope.
- Always swing the upper structure slowly when rotating it toward the downhill side with a load. The extra weight from the load may make the machine unstable.
- Be aware the weight of the upper structure could cause it to rotate when the machine stops on a slope.
- When the machine stops on the slope, lower the attachment to the ground on the downhill side of the machine and wedge the bucket into the ground if equipped.

CALL BEFORE YOU DIG

Confirm the local government or the public service company for locations of underground utilities of gas, water, phone, electrical power, and so forth before working in the area seemingly with these lines. Always inspect the worksite for evidence of unmarked utilities and piping and contact others if necessary.

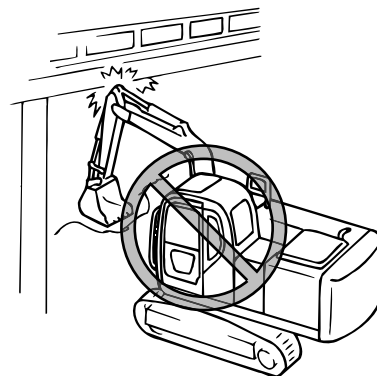


LIMITED MOVEMENT IN WORK AREA

Use extreme caution when working in areas that constrain or limit the movements of the machine, including tunnels, bridges, around electrical power lines, or inside structures, to prevent the machine or the attachment /equipment from contacting these obstacles during operation.

To prevent serious injury, death or property damage, always use a signal person to assist the operator with maneuvering in these areas and keep the machine and the attachment /equipment a safe distance from these obstacles.

The operator should always be alert and follow the signals from the signal person. The operator shall respond to signals only from the appointed signal person, but shall obey a stop signal from anyone at any time.



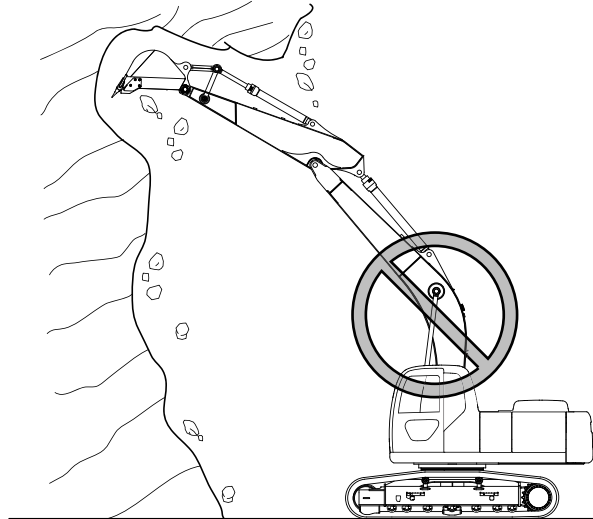
[1. SAFETY INSTRUCTIONS]

OPERATING UNDER CLIFF OR OVERHANG

Never undercut or dig beneath a cliff or overhang. It can cause rocks and debris to fall.

Be aware that the cab guard installed provide limited protection for the operator and may not prevent serious injury or death.

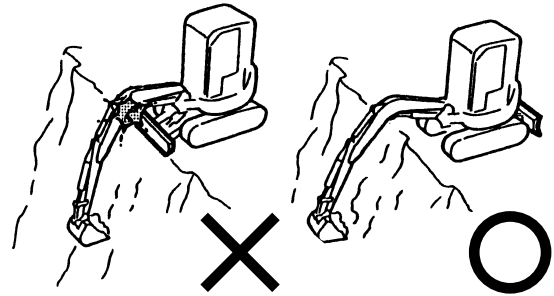
The cab top guard was designed conforming to ISO10262 and should not allow every possible loads to penetrate the cab.



DEEP EXCAVATION OPERATION

To prevent damage to the machine, during deep excavation or diagonal digging.

- When operating the machine with the dozer positioned at the front side, it can cause the dozer to contact the boom cylinder or the bucket. So pay attention to it.
- Do not allow the arm or the hydraulic piping to contact the side of the trench or hole.
- Do not allow the arm to contact the crawler shoe when operating with the arm below horizontal.



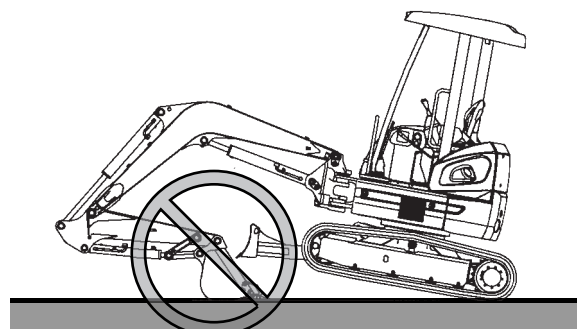
DO NOT LIFT OR MOVE PERSONNEL

Never lift or move personnel by using the attachment. The lifted personnel may fall off, causing severe accidents.



DO NOT LIFT UP THE MACHINE WITH ARM CYLINDER STROKE END

Never lift up the machine with arm cylinder stroke end. It may cause damage to the equipment/attachment and cylinder.



BUCKET/ARM IN OPERATION WITH DOZER POSITIONED AT FRONT

Be careful not to hit the dozer with the bucket when operating arm in or bucket in with the travel/transport position.



1

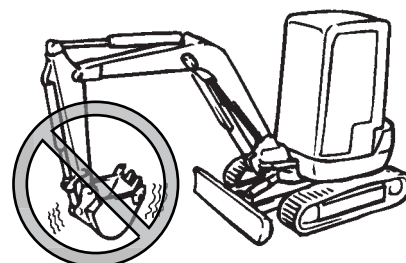
NO PERSONNEL ALLOWED UNDER THE BUCKET OR ATTACHMENT / EQUIPMENT

Never move a suspended load or the bucket over a person or above the driver's cab of a truck. The load could fall and cause serious injury or death.



REMOVING DIRT OF BUCKET

With the bucket in the retracted position, do not give impact on the bucket to remove soil. It may cause damage to the equipment/attachment and cylinders.



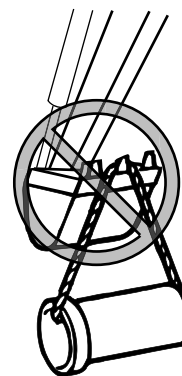
LIFTING WORK

This machine is designed for the application of digging, loading, and leveling using the bucket.

Furthermore, some machines are designed in consideration of works with a breaker, crusher, or others installed.

When lifting a load by using this machine, observe the laws and others of the country or area in which this machine is to be used.

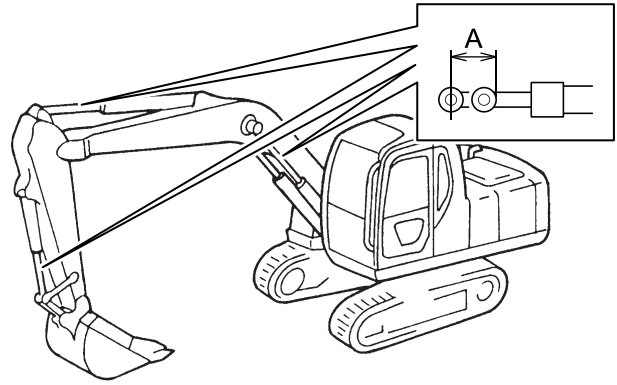
Even though lifting with this machine is allowed according to the laws of the country or area in which this machine is to be used, do not lift the load by using the teeth of the bucket, the breaker, the crusher, or others. It can cause the lifting tools to come off and result in falling off of the load, leading to serious accidents or death.



[1. SAFETY INSTRUCTIONS]

DO NOT OPERATE THE CYLINDERS TO THE STROKE END

Operate the bucket, boom and arm cylinders to leave some clearances (A) to the both stroke ends. If the cylinder is operated to the stroke end, it will generate an excessive load and cause damage to not only the cylinder but also the pin, boom and arm.



DO NOT OPERATE IN ENCLOSED SPACES

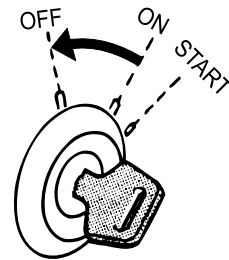
Do not operate the machine in enclosed spaces or, in any case, without appropriate ventilation.

PRECAUTIONS FOR POTENTIALLY EXPLOSIVE ENVIRONMENT

Do not operate the machine in a potentially explosive environment.

PRECAUTIONS FOR LEAVING THE OPERATOR'S SEAT

Do not leave the machine with the engine running.

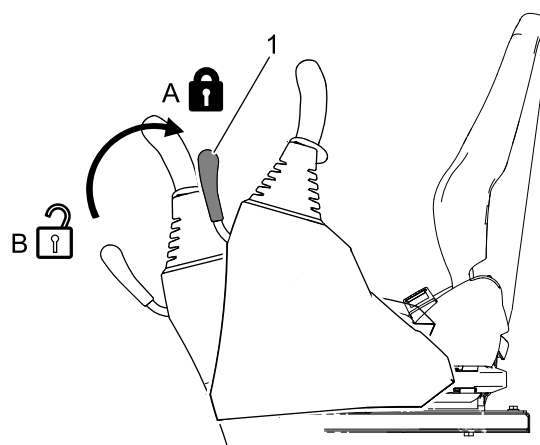
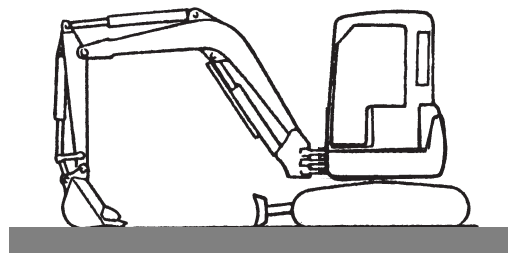


1.4.4 SAFETY CHECK ON THE PARKING MACHINE

There are risks of creeping, unexpected movement at the time of coming start if the machine is not parked properly. Park the machine following the safety parking procedures shown below.

ALWAYS PARK MACHINE PROPERLY

1. Travel machine to a safe location on firm, level ground.
2. Lower the attachment to the ground.
If equipped with a dozer blade, lower it to the ground.
3. Set the auto deceleration switch to the "OFF" position.
4. Turn engine throttle to the low idle position.
5. Pull the control lock lever(1) to the locked(up) position(A).
If not locked, accidental or unintended contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.
6. Turn the starter switch to the "OFF" position and remove the key.
Close and lock the windows and the cab door.
Check the windows, doors and all other machine access covers are locked and secured..

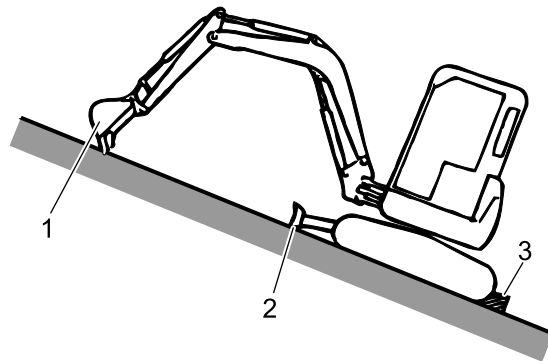


[1. SAFETY INSTRUCTIONS]

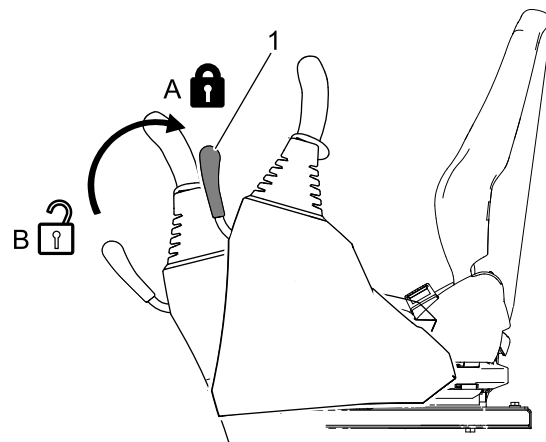
PARKING MACHINE ON SLOPE

If the machine must be parked on a slope.

1. The bucket (1) and dozer (2) into the ground so that the machine does not move.
2. Set the auto deceleration switch to the "OFF" position.
3. Turn engine throttle to the low idle position.



4. Pull the control lock lever(1) to the locked(up) position(A).
If not locked, accidental or unintended contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.



5. Turn the starter switch to the "OFF" position and remove the key.
Close and lock the windows and the cab door.
Check the windows, doors and all other machine access covers are locked and secured.
6. Block(3) the tracks in the front and the rear.

1.5 AT THE END OF EACH SHIFT

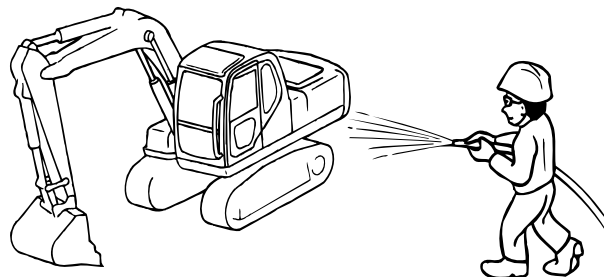


READ THE OPERATOR'S MANUAL

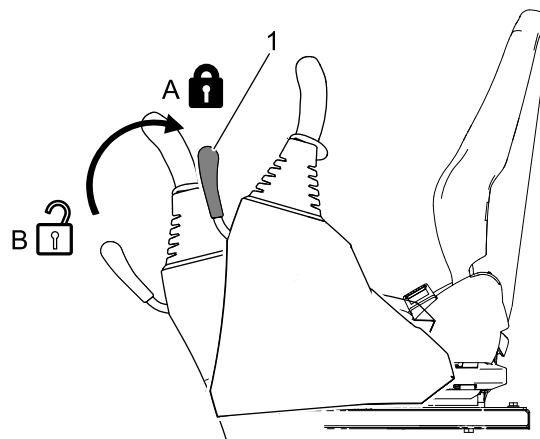
Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

Always make sure the machine is secure and ready to be used for the next shift or moved to another job site.

1. Park the machine on a firm, level ground.
2. Lower attachment to the ground.



3. Pull the control lock lever(1) to the locked(up) position(A) and check all control levers and pedals have returned to neutral.
4. Close and secure all windows in place to prevent water or moisture from damaging any electrical components.
5. Remove the key from the key switch and lock all doors and access panels.
6. Refill the fuel tank to the full mark to reduce air volume and condensation (moisture).
This will decrease the possibility of freezing in the fuel tank, rusting due to moisture and other potential issues.



7. Thoroughly clean and inspect the machine. If any issues are found, always lubricate, repair, or replace any machine parts and systems prior to restarting the machine. As needed, contact your KOBELCO authorized dealer.
8. If the machine is stored in cold climates, it may be necessary to remove the batteries from the machine and store them in a warm, well ventilated area. Re-install the batteries before the next start up. This helps prevent premature battery deterioration.

1.6 PRECAUTIONS OF INSPECTION & MAINTENANCE



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

1.6.1 PERIODIC INSPECTIONS

- Every year, the machine should be inspected by a qualified inspector or a registered inspection agency. If needed, contact your KOBELCO authorized dealer for that inspection.
- Every month inspect the machine for the following.

See chapter 4. "INSPECTION AND MAINTENANCE" for additional information about the monthly inspection & maintenance requirements for your machine.

Always keep all maintenance and all inspection records, including both the monthly and the yearly inspections, according to local codes and regulations of your country.

1.6.2 BEFORE INSPECTION & MAINTENANCE

READ OPERATION/MAINTENANCE PROCEDURES CAREFULLY

Improper maintenance could cause serious injury (crush or burn) and damage the machine.

Read and understand the maintenance procedures (preparation for safe work, proper tools, qualifications, important parts, supervisor designation and wear the appropriate personal protective equipment, etc.) described in the manuals before safely and carefully inspecting and performing maintenance on the machine.

CONFIRM JOB PROCEDURES

To prevent accidents, confirm all work procedures before starting.

USE A SIGNAL PERSON AND A FLAGMAN

Know and use the hand signals required for particular jobs and confirm who has the responsibility for signaling: All personnel must know and understand all the signals.

The operator shall respond to signals only from the appointed signal person, but shall obey a stop signal from anyone at any time.

The signal person must stand in a clearly visible location when giving the signals.

ORGANIZE AND CLEAN UP WORKING SITE

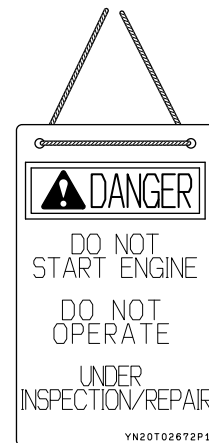
Inspecting and maintaining the machine at a messy working site may cause personal injury.

Clear obstacles, grease, oil, paint, debris, etc., from the working site.

ATTACH A "DO NOT OPERATE" TAG

To prevent serious injury or death:

- Never allow unauthorized personnel to start the engine or touch the control levers during inspection and maintenance activities.
- Always lower the attachment, pull the control lock lever up, stop the engine, and remove the key before performing maintenance.
- Use a temporary "DO NOT OPERATE" hang tag to communicate that the machine is out of service. You may need to use more than one temporary hang tag depending on the work to be performed.
- Always have an operator at the controls to shut down the machine if the machine needs to be running for maintenance activity or an inspection. The operator and the maintenance personnel must have a means of communication when performing these tasks.



USE PROPER TOOLS

To prevent serious injury or death, do not use of damaged tools or tools not intended for the task.

1.6.3 DURING INSPECTION & MAINTENANCE

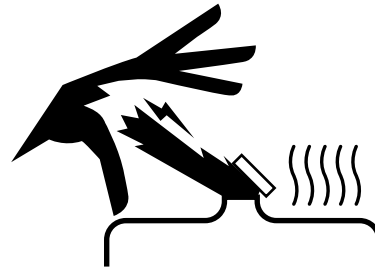
STOP ENGINE BEFORE PERFORMING INSPECTION AND MAINTENANCE

Always stop the engine and allow the engine and other components to cool before performing inspection or maintenance activities. Do not touch engine components when the engine is running or immediately after it has stopped to prevent serious injury or death. There are many hazards that can cause harm, including rotating parts, high voltage, high pressure fluids, and high temperature.

HOT FLUIDS

To prevent burn injuries.

- Do not remove the radiator cap immediately after stopping operation. Hot radiator fluid may cause burns. Wait until the radiator cap is cool to the touch, then slowly loosen to release the internal pressure. Then remove the cap.
- Do not remove the oil cap or plug immediately after stopping operation. Hot oil may cause burns. Wait until the oil cap or plug is cool to the touch, then slowly loosen it to release the internal pressure. Then remove the oil cap or plug.



HIGH PRESSURE OIL

Do not attempt to repair or tighten hydraulic hoses or fittings when the engine is running or when the hydraulic circuit is pressurized.

Pressure can be maintained in the hydraulic circuit long after the engine has been shut down.

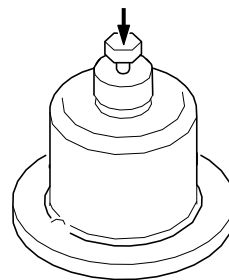
- Even though the hydraulic circuit has been left for a long time after engine stop, sometimes the pressure still remains inside the hydraulic circuit. Before refilling or draining the hydraulic oil, or inspecting or maintaining the machine, always release the pressure in the hydraulic lines by pressing the air breather of the hydraulic oil tank and loosening the connecting parts of the related hoses and connectors.

High pressure oil can penetrate the skin or eyes and cause injury, blindness or death. Fluid escaping from a small hole can be almost invisible.

- Always wear a face shield, protective glasses and gloves when inspecting for leaks.
- Always use a piece of cardboard or wood to inspect for suspected leaks.

If oil is injected into the skin, it must be removed within a few hours by a doctor familiar with this type of injury.

High pressure oil from even a pin hole leak can penetrate the skin or eyes and cause severe injury or blindness.



OK



HIGH PRESSURE FUEL IN THE FUEL LINES

During engine running, high pressure is generated inside the fuel lines of the engine.
After engine stop, wait 1 minute before starting inspection and maintenance.

HIGH PRESSURE OIL HOSE/PIPING

Leakage of oil or fuel from the hose or piping may cause a fire or malfunction of the machine. Stop working immediately whenever looseness of or leakage from the installation parts of the hoses or piping are found and tighten or repair them using proper repair procedures and tightening torque.

Consult with your KOBELCO authorized dealer if damage or deformation of the hoses or piping is found.

The hoses in below-mentioned conditions are required to be replaced.

- A damaged hose or hose with a deformed fitting.
- The sheathing material of the hose has scratches or cuttings, or exposes the wire reinforcement layer.
- A part of the sheathing material is swelled.
- A part of the hose shows a sign of twist or crush.

ELECTRIC SHOCK

Work on the machine's electrical equipment may only be carried out by skilled electrical personnel or trained personnel under the supervision of an electrician in accordance with electrical regulations for the country in which this machine is to be used.

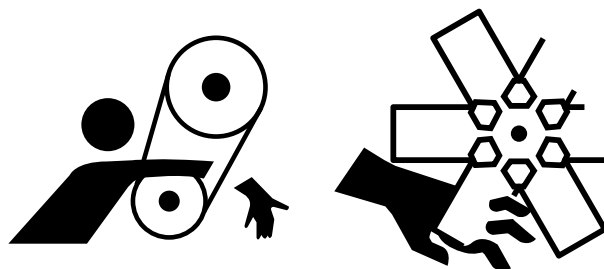
When working on energized equipment, always have another person positioned near the emergency-off or main switch and overvoltage release.

Contact your authorized KOBELCO dealer for assistance.

ROTATING PARTS

Stay clear of all rotating and moving parts.

- Wrapping or entanglement may result in serious injury or death. Keep hands, clothing and tools away from the rotating fan and running fan belts. Never operate machine without guarding in place.
- Do not drop or insert tools and others to the fan and belt. They will be blown away or damaged, resulting in serious personal injury or death.
- Always have an operator at the controls to shut down the machine if the machine needs to be running for maintenance activity or an inspection. The operator and the maintenance personnel must have a means of communication when performing these tasks.

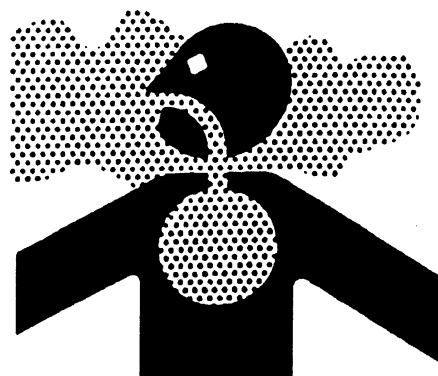


VENTILATION PRECAUTIONS

Never operate the engine in an enclosed area without adequate ventilation. Engine exhaust contains carbon monoxide. Inspecting and maintaining the machine indoors or in a place with poor ventilation could cause serious injury or death.

Adequate ventilation is needed when inspecting, maintaining or running the machine indoors. Fully ventilate the work area, especially when handling fuel, cleaning solvent or paint.

If the natural ventilation is poor, install ventilators, fans, exhaust extension pipes or other artificial venting devices.



[1. SAFETY INSTRUCTIONS]

CONNECTING, DISCONNECTING AND STORING ATTACHMENT / EQUIPMENT

To prevent serious injury or death:

- Always follow the instructions from your supervisor and the instructions in this manual when connecting or disconnecting the attachment /equipment.
- Secure the attachment /equipment to prevent them from falling over when stored.



SECURELY BLOCK THE MACHINE OR ANY COMPONENT THAT MAY FALL

To prevent serious injury or death, always support all the attachment /equipment when performing maintenance or inspecting underneath the machine or any raised attachment /equipment.

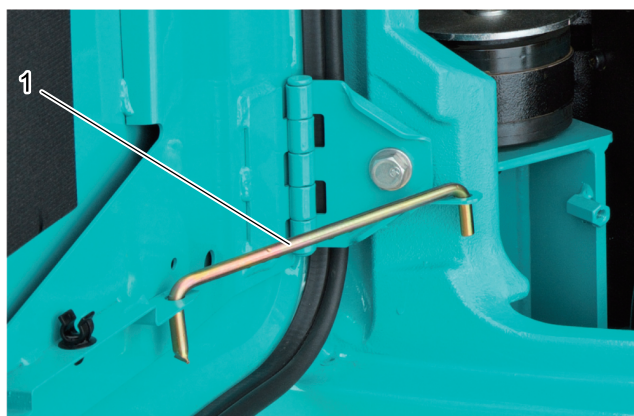
- Before performing maintenance or repairs under the machine, park the machine on firm level ground, lower the attachment to the ground, pull the control lock lever to the locked(up) position, stop engine, and remove the key.
- Securely block the tracks.
- If you must work beneath the raised machine or equipment, always use wood blocks, jack-stands or other rigid and stable supports to support them. Never get under the machine, the attachment /equipment, if they are not sufficiently supported.

This procedure is especially important when working on hydraulic cylinders.



LOCK THE ACCESS PANEL

To prevent serious injury, always secure the opened door panel with the stay(1) when maintaining the machine. If the door panel is not secure, it could move and you may be injured.



DO NOT DROP TOOLS OR PARTS

Falling tools or parts may cause damage to the machine or cause unintended movement of the machine and result in serious injury or death.

- Retrieve any tools that fall immediately.
- Always secure tools or parts that are near the machine and store tools properly after maintenance is complete.

USE CAUTION WHEN ADJUSTING THE CRAWLER TENSION

The crawler adjuster contains high pressure grease. If the tension is adjusted without following the prescribed procedure below, the grease fitting may fly off and discharge grease, resulting in serious injury. Always wear suitable protective gears.

- Always wear suitable protective gears.
- Do not put your face, arms, legs or body in front of the grease fitting. If grease contacts your skin, wash completely with soap and water to avoid skin inflammation.
- Loosen the grease fitting one turn to gradually relieve pressure. If grease does not come out after one turn of the grease fitting, there is a problem. Call your KOBELCO authorized dealer for assistance.
- Loosen the grease fitting slowly.
After relieving the grease pressure, see "ADJUSTING CRAWLER TENSION" in Chapter 4 for additional information about how to adjust the crawler tension.



1

DO NOT DISASSEMBLE THE RECOIL SPRING

Never attempt to disassemble the recoil spring. The recoil spring assembly acts as a shock absorber for the front idler and contains a powerful spring under tension. If it is disassembled, the spring will eject from the assembly and result in severe personal injury or death.

If there is an issue with the recoil spring assembly, contact your KOBELCO authorized dealer for repair.

BEFORE HAMMERING METAL PINS, TEETH OR BEARINGS

Always wear required personal protective equipment such as safety glasses when using hammers, as metal fragments or other objects can fly and cause serious personal injury.

Broken metal pieces may cause severe personal injury when hammering metal pins, teeth or bearings.

To avoid injury:

- Wear protective gears such as safety glasses, gloves, hardhat, protective shoes, etc.
- Confirm the work area is clear of personnel before using hammer.
- Use a piece of wood or similar material to absorb the direct impact of the hammer when removing metal pins, teeth or bearings.

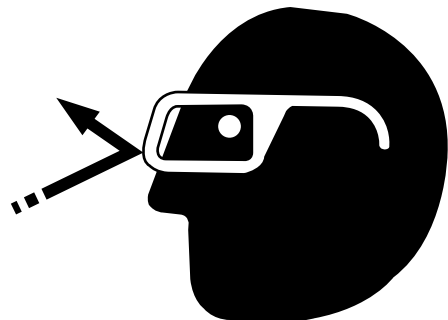
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To avoid injury:

- Wear protective gears such as safety glasses, gloves, hardhat, protective shoes, etc.
- Confirm the work area is clear of personnel before using hammer.
- Use a piece of wood or similar material to absorb the direct impact of the hammer when removing metal pins, teeth or bearings.



[1. SAFETY INSTRUCTIONS]

BE AWARE OF THE HAZARDS WITH THE REFRIGERANT AND THE AIR CONDITIONING SYSTEM

- Do not loosen the refrigerant circuit parts. If refrigerant gets in your eyes, it may cause loss of sight including potential blindness. Do not touch the refrigerant circuit parts. If refrigerant gets on your skin, it may cause frostbite.
- Do not inhale refrigerant gas; and
- Keep refrigerant gas away from heat sources.

Dispose of refrigerant according to local codes and regulations of each country.

If you need additional assistance, contact your KOBELCO authorized dealer about proper disposal of refrigerant. The temperature of the refrigerant gas compressed by the compressor becomes a high temperature. Until the temperature of the refrigerant gas goes down, do not touch the compressor, the hose, and the condenser by bare hand.

1.6.4 CAUTION IN HANDLING OF WELDING

NEVER USE HEAT NEAR HYDRAULIC EQUIPMENT, PIPING OR HOSES

When welding, soldering or using a torch, do not expose piping and hoses containing pressurized oil to heat. Heat may create the potential for exposure to flammable gas and result in a fire.

Always cover hydraulic equipment, piping, hoses and other flammable items with fire-proof blankets.

Keep a suitable fire extinguisher readily available.

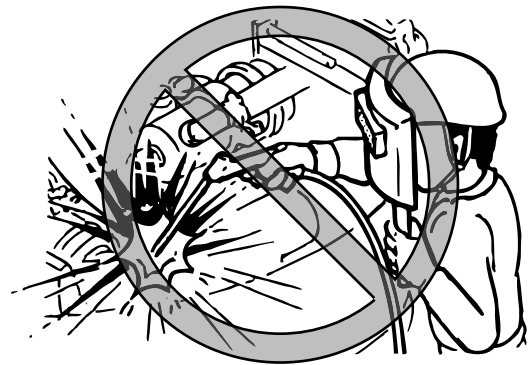


DO NOT HEAT PIPING WITH FLAMMABLE OIL

- Do not weld or perform gas cutting on pipes and tubes filled with flammable oil.
- Remove flammable oil from pipes and tubes using nonflammable solvent before welding and gas cutting.

DO NOT MODIFY MACHINE WITHOUT APPROVAL FROM KOBELCO

- Any and all modifications to this machine must be approved by KOBELCO.
- Unauthorized modification of the machine is not covered by the warranty provided with this machine.



GENERAL GUIDELINES FOR WELDING

Contact manufacturer, or authorized KOBELCO dealer before welding on machine. Welding could damage wires, electronic processors, hoses, and tubes. Any welding on structural parts (as undercarriage, upper frame, equipment parts,...) should only be done by the manufacturer, or authorized KOBELCO dealer. Welding performed by others will void the warranty for your machine.

Do not weld tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with a nonflammable solvent prior to welding or flame cutting.

To prevent serious injury or possible fire, welding work must be performed by a certified welder at a facility with welding devices suitable for the task.

[1. SAFETY INSTRUCTIONS]

BASIC PRECAUTIONS FOR WELDING AND GRINDING

- Always wear protective gears appropriate for welding.
- Perform work in a well-ventilated area.
- Keep a suitable fire extinguisher readily available.
- Before welding, select a location away from flammable items and have a fire extinguisher nearby. Ensure adequate ventilation.
- Turn the engine off and remove the key.
- Disconnect the negative (-) cable from its battery terminal. When the battery power-off switch is provided, set it to "OFF".
- Remove or adequately shield all components, hoses, tubes, and wires in the area.
- Ensure that the components are properly grounded in order to avoid unwanted arcs. Attach the welder ground cable directly to the area within 1 m (3 ft.) from the part to be welded and on the same parent material.
If the welder ground cable is attached to the area near electric parts/connectors, these electric parts/connectors may be damaged.
- Make sure neither the bearing nor the bearing seal is between the welder ground cable and the part to be welded.
- Do not attach the welder ground cable near the pin or cylinder. It will damage the plating on the pin or cylinder.
- Remove paint from any surface to be welded to avoid generating poisonous gas.
- After grinding or welding, confirm there is no smoke or fire near the work area.

1.6.5 AFTER COMPLETION OF MAINTENANCE

AFTER MAINTENANCE

Before returning machine to service, always confirm there are no leaks and the controls are functioning properly.

- Run the engine at low idle speed and check for oil or water leaks.
- Slowly operate each control lever and check that it is functioning properly.
- Then gradually increase the engine speed and check for oil or water leaks again.
- Manipulate each control lever again and check that it is functioning properly.
- Close the doors, guards, engine hood, etc.

PROPER WASTE DISPOSAL

- Drain used fluids from the machine into leak proof containers. Clearly mark the type of fluid on the containers.
- Never pour used oil or other fluids onto the ground, down a drain or into any body of water. Improper disposal can harm the environment.
Contact your local government or public service company to ask about proper disposal methods.
- Properly dispose of oil, fuel, engine coolant, urea water, refrigerant, solvents, filters, batteries and other harmful substances according to local, state and federal environmental regulations for the country in which the machine is located.



1.7 PRECAUTIONS FOR BATTERY



READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

1.7.1 HANDLING THE BATTERY

PREVENTION OF ELECTROLYTE BURNS

Wear safety glasses or face shield, and chemical resistant gloves and clothing when handling or servicing batteries.

Battery electrolyte contains dilute sulfuric acid. Electrolyte will damage eyes or skin on contact. If battery electrolyte contacts skin or eyes, flush affected areas immediately with a large amount of fresh water, then seek medical attention.

Wash hands after touching batteries and connectors.



BATTERY EXPLOSION PREVENTION

- Always keep cigarettes, flames and other ignition sources away from batteries.
Batteries give off hydrogen gases that can explode and cause serious injury or death.
- Always keep all battery caps tightly secured.



CHARGING THE BATTERY

See "USING JUMPER CABLES" in Chapter 3.

REPLACING THE BATTERY

See "CHECKING BATTERY VOLTAGE" in Chapter 4.

BATTERY DISPOSAL

Dispose of batteries according to local codes and regulations of each country.

If you need additional assistance, contact your KOBELCO authorized dealer about proper disposal of used batteries.

1.8 HANDLING OF THE ACCUMULATOR OR GAS SPRING



WARNING

READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

High pressured nitrogen gas is sealed inside the accumulator or gas spring.

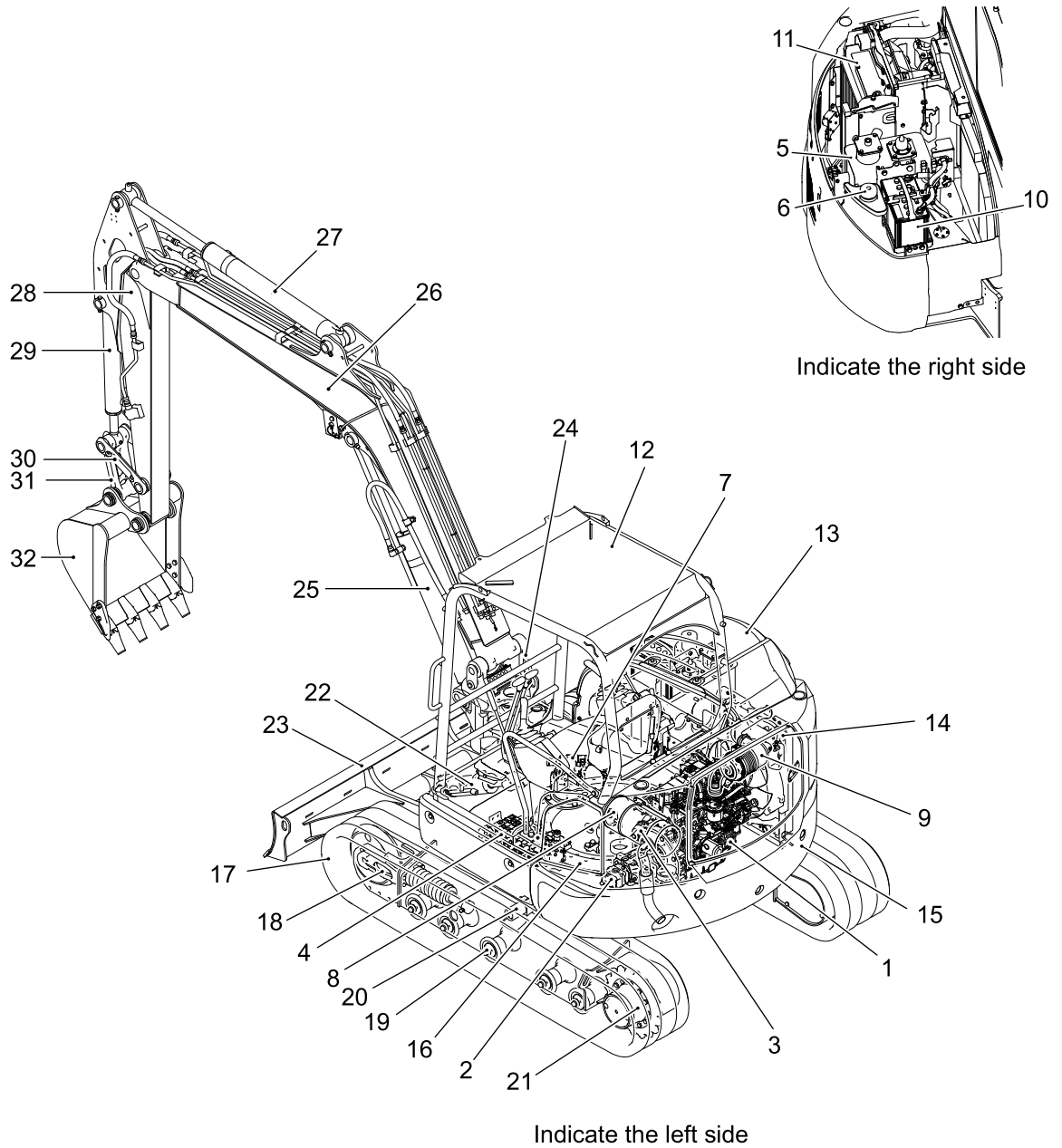
To prevent serious injury or death:

- Never attempt to disassemble accumulator or gas spring.
- Never drill or weld, or perform gas cutting on accumulator or gas spring.
- Keep fire and other ignition sources away from the accumulator or gas spring.
- Never throw accumulator or gas spring into fire.
- Ask your KOBELCO authorized dealer to vent the gas from the accumulator or to remove the gas spring before disposal.



2. MACHINE FAMILIARIZATION

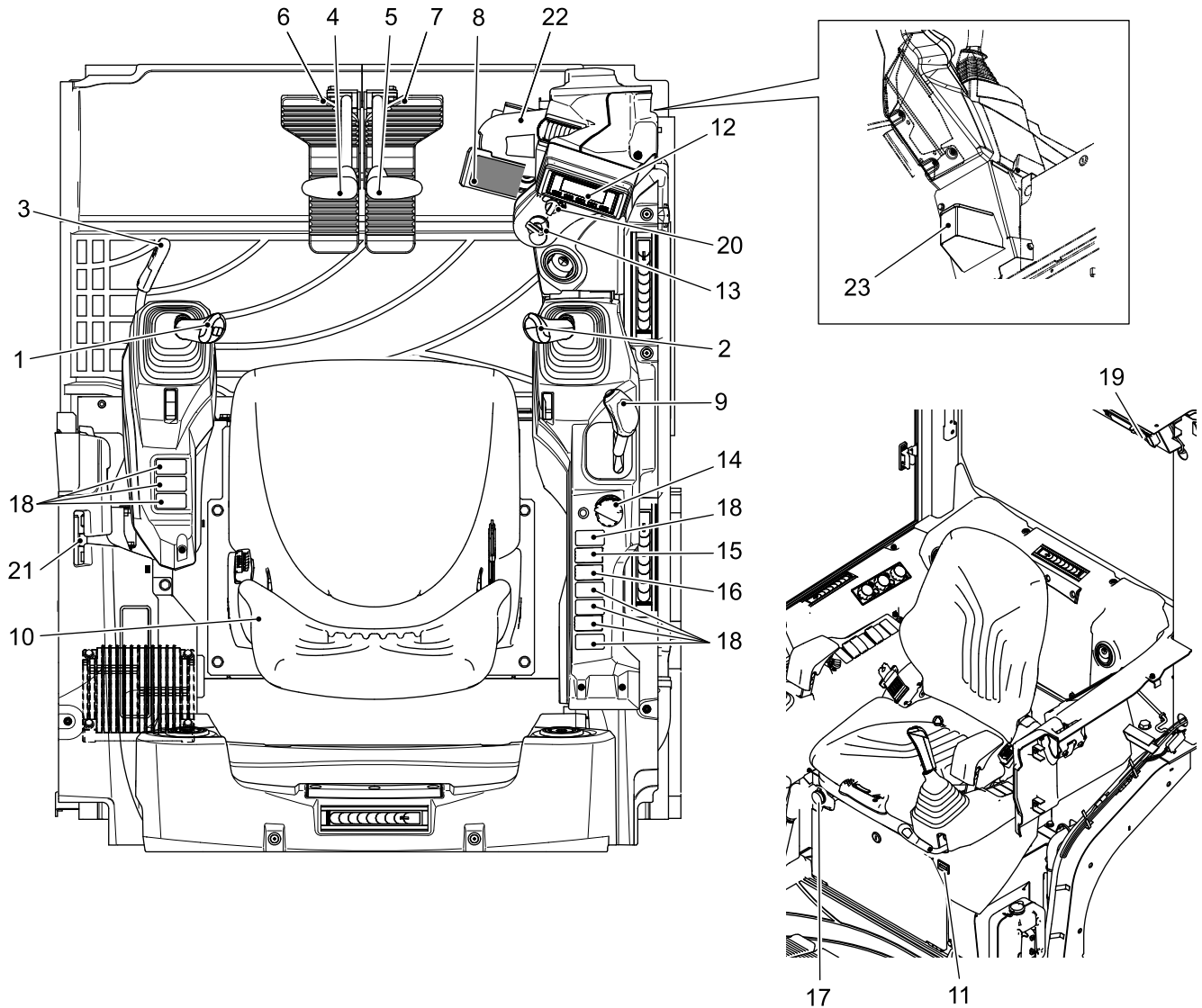
2.1 BASIC COMPONENTS OF THE MACHINE



[2. MACHINE FAMILIARIZATION]

Item	Name	Item	Name	Item	Name
1	Engine	12	Canopy / Cab	23	Dozer
2	Hydraulic pump	13	Right side cover	24	Boom swing cylinder
3	Diesel particulate filter (DPF)	14	Engine hood	25	Boom cylinder
4	Control valve	15	Counterweight	26	Boom
5	Hydraulic oil tank	16	Swing bearing	27	Arm cylinder
6	Fuel tank	17	Crawler	28	Arm
7	Swing motor	18	Idler assy	29	Bucket cylinder
8	Swivel joint	19	Lower Roller	30	Idler link
9	Air cleaner	20	Upper roller	31	Bucket link
10	Battery	21	Travel motor	32	Bucket
11	Radiator	22	Dozer cylinder		

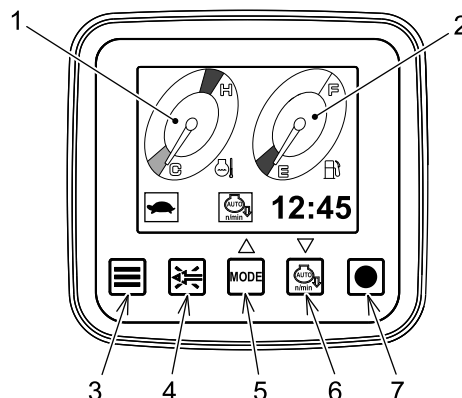
2.2 OPERATOR'S STATION NOMENCLATURE



Item	Name	Item	Name
1	Left control lever (with horn switch)	13	Starter switch
2	Right control lever	14	Engine throttle
3	Control lock lever	15	Working light
4	Left travel lever	16	Manual regeneration switch
5	Right travel lever	17	12V power supply
6	Left travel pedal	18	Cap (Optionally installed switch)
7	Right travel pedal	19	Life hammer (Cab)
8	Boom swing operation pedal	20	Wiper switch (Cab)
9	Dozer operation lever (with travel speed select switch)	21	Holder for Smart phone (Cab)
10	Operator's seat	22	Cup holder (Cab)
11	Hour meter	23	Cup holder (Canopy)
12	Color multi-display (Cluster gauge)		

2.3 COLOR MULTI-DISPLAY

The color multi-display is made up of gauges (fuel level and engine coolant temperature) and switch panels.



Item	Name	Item	Name
1	Engine coolant temperature meter	5	Work mode select switch (up arrow switch)
2	Fuel level meter	6	Automatic deceleration switch (down arrow switch)
3	Menu switch	7	Circle button switch
4	Buzzer stop switch		

CAUTION

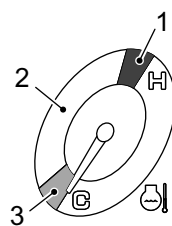
- When a warning is displayed on the multi-display, stop your work immediately and inspect and maintain the failure part.

For inspecting or maintaining, see "MAINTENANCE" in Chapter 4.

- The indications on the multi-display do not assure the condition of the machine.
- The visual checking should be carried out for the maintenance and inspection of the machine, without relying on the multi-display only.

2.3.1 ENGINE COOLANT TEMPERATURE METER

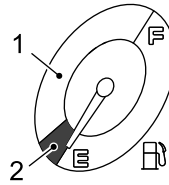
The meter indicates the temperature of the engine coolant. After turning the starter switch "ON", the engine coolant temperature meter is displayed on the multi-display. Water temperature is indicated with a pointer, and the water temperature is normal if it is within the white range. When the water temperature is low, it points the blue range. When it points the red range during operation, it shows overheat state. At that time, set the engine throttle to the low idle position, pull up the control lock lever to the locked(up) position, and do not perform any lever operations until the pointer is in the white range.



- (1) Red: Overheat
- (2) White: Normal
- (3) Blue: Low

2.3.2 FUEL LEVEL METER

The meter shows the amount of fuel in the fuel tank. After turning the starter switch "ON", the fuel level meter is displayed on the multi-display. The amount of fuel is indicated with a pointer, and when the fuel level is low, the pointer points E. When the fuel level is low, see "CHECKING FUEL LEVEL AND MAKING UP" in Chapter 3, and supply fuel.

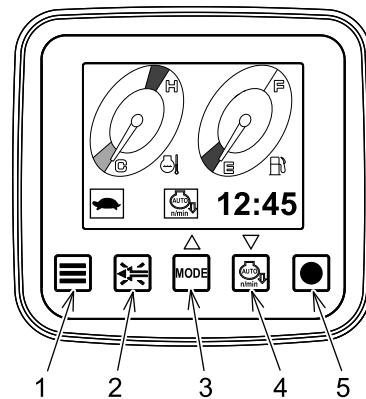


1. White: Operational
2. Red: Refill

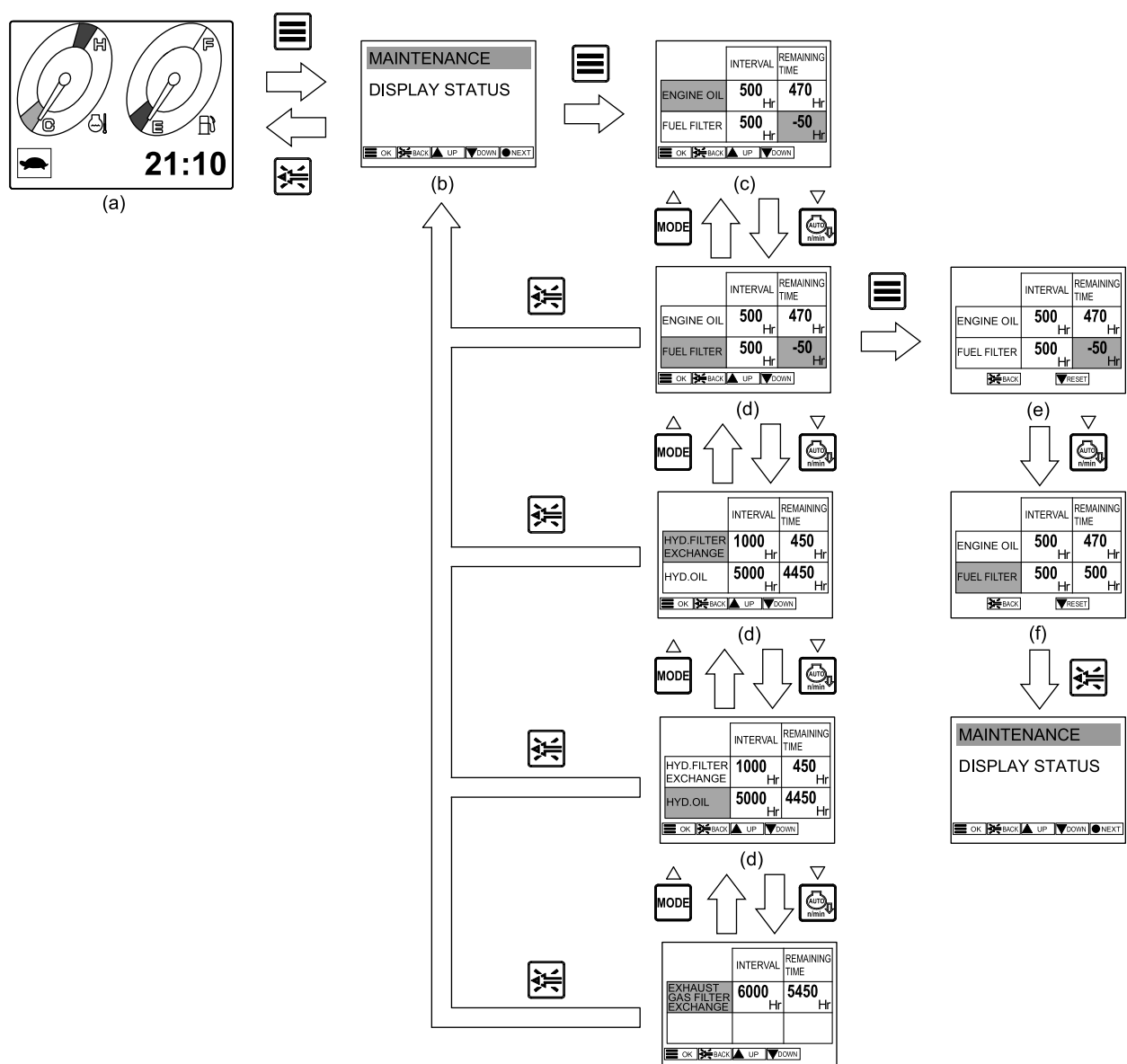
2.3.3 USER MENU

Maintenance information

1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



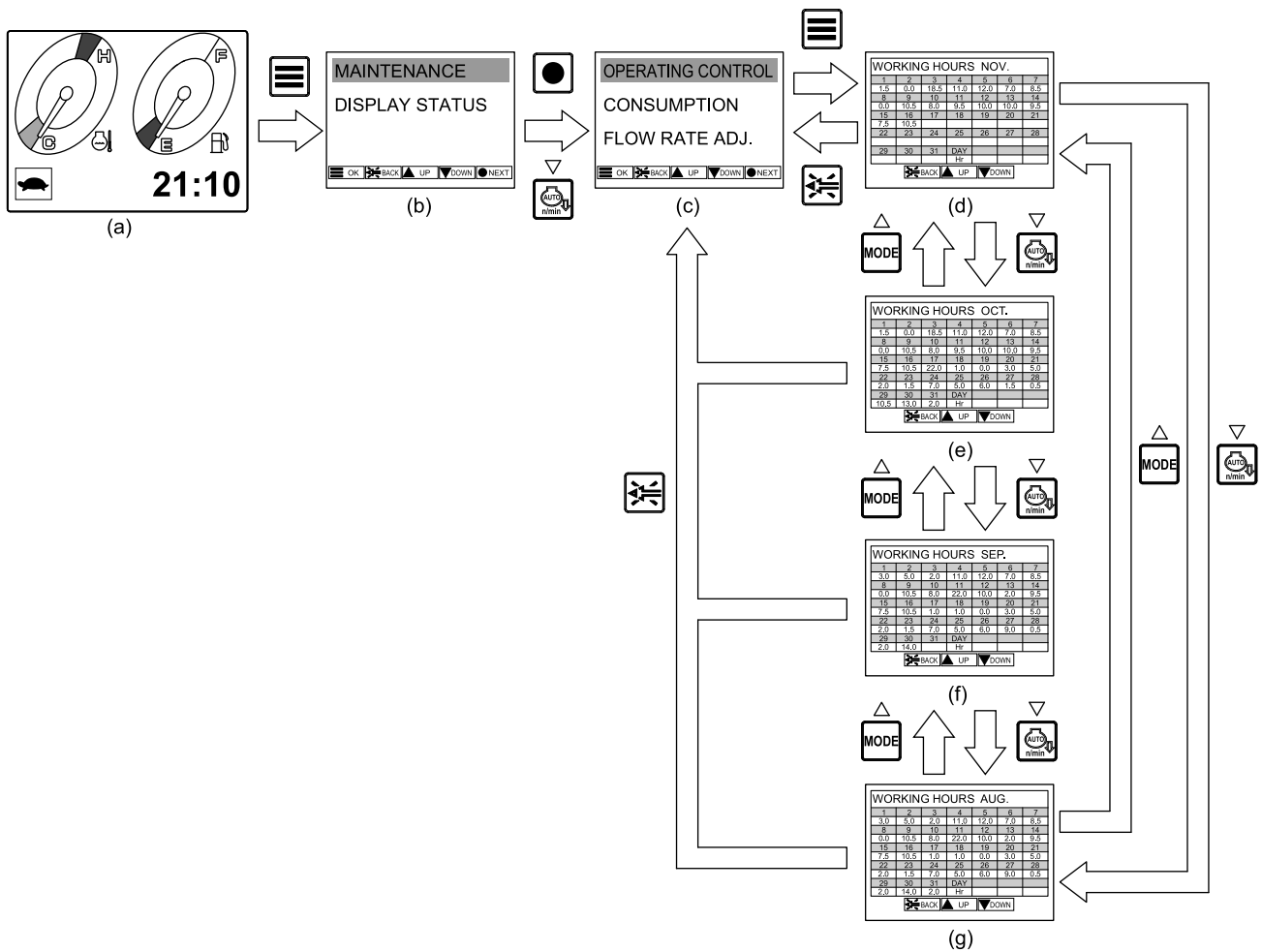
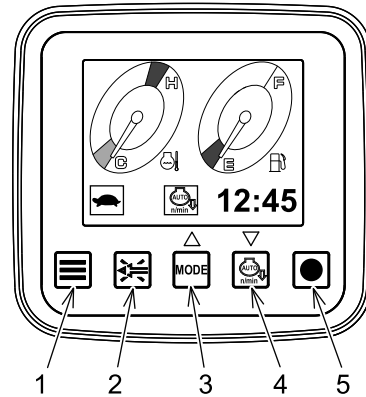
[2. MACHINE FAMILIARIZATION]



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using up and down arrow switches (3)(4), move the cursor to "MAINTENANCE" and then press menu switch (1) to enter the maintenance information.
3. Using up and down arrow switches (3)(4), move the cursor to any of the items of "ENGINE OIL", "FUEL FILTER", "HYD.FILTER EXCHANGE", "HYD.OIL", and "REPLACE EXHAUST GAS FILTER EXCHANGE". The item exceeding the exchange interval turns to red.
4. Press menu switch (1) to turn "REMAINING TIME" to blue.
5. Press down arrow switch (4) to reset "REMAINING TIME".
6. Press buzzer stop switch (2) to return to user menu screen (b).

Operating control

1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using circle button switch (5) and up and down arrow switches (3)(4), move the cursor to "OPERATING CONTROL". Press menu switch (1) to enter "OPERATING CONTROL". The operating control table displays the operating time of each day for the current month.
3. Press down arrow switch (4) to show the information of the previous month.
4. When the information of three months ago is displayed, press down arrow switch (4) to return to the current month.
5. Press buzzer stop switch (2) to return to user menu screen (c).

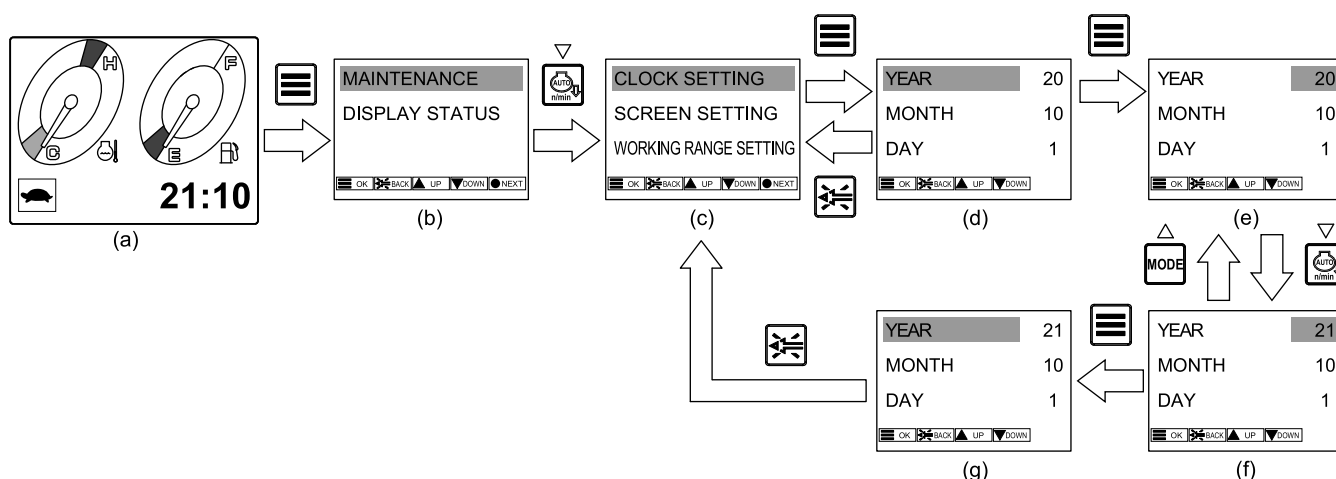
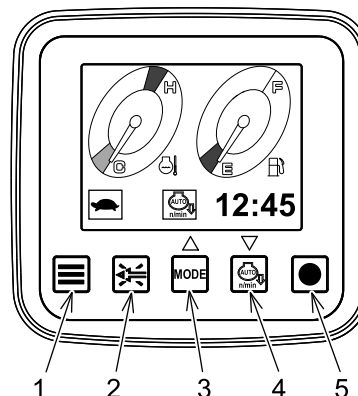
[2. MACHINE FAMILIARIZATION]

CAUTION

If you change the clock setting, the data of operating control information is cleared.

Clock setting

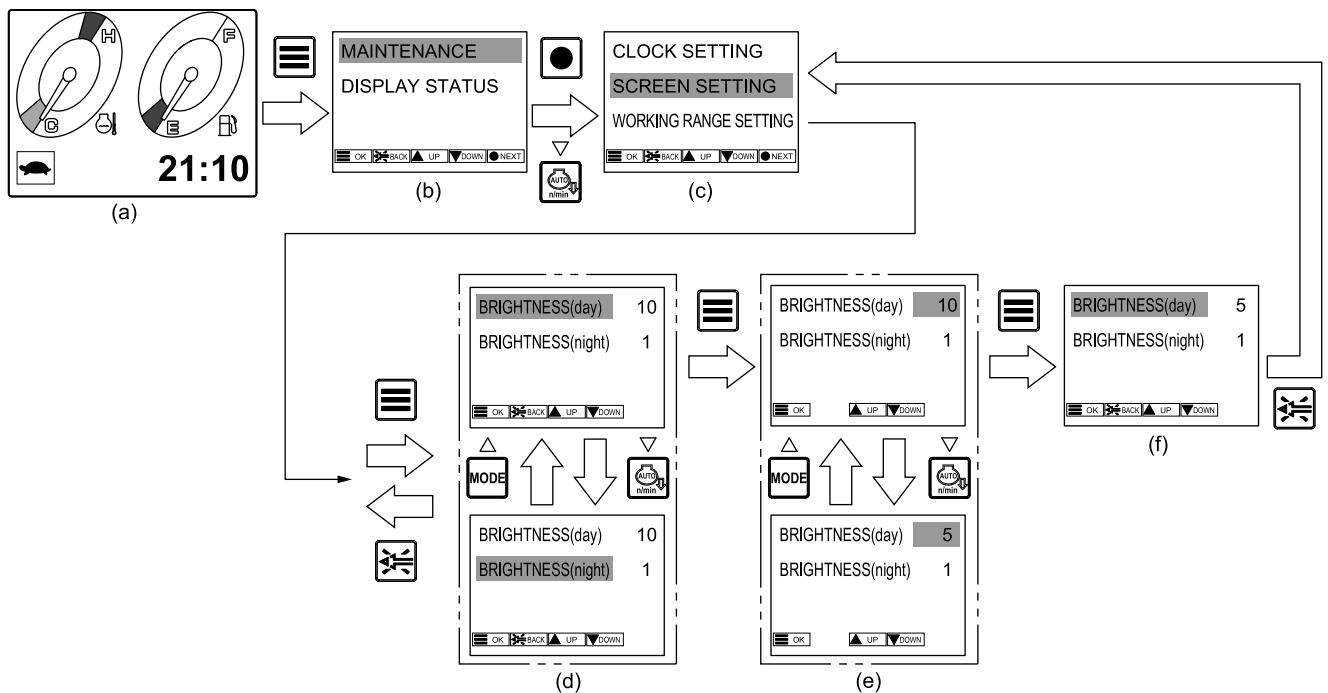
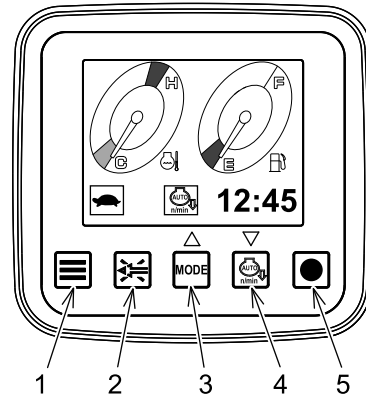
1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using up and down arrow switches (3)(4), move the cursor to "CLOCK SETTING". Press menu switch (1) to enter "CLOCK SETTING".
3. Using the up or down arrow switches (3)(4), move the cursor to any of "YEAR/MONTH/DAY/HOUR/MINUTE".
4. Press menu switch (1) to enter display (e). The background color of "value" turns blue.
5. Using up and down arrow switches (3)(4), select a desired value.
6. Press menu switch (1) to set the desired value. At this time, the background color of the value is cleared.
7. Press buzzer stop switch (2) to return to user menu screen (c).

Brightness adjustment

1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



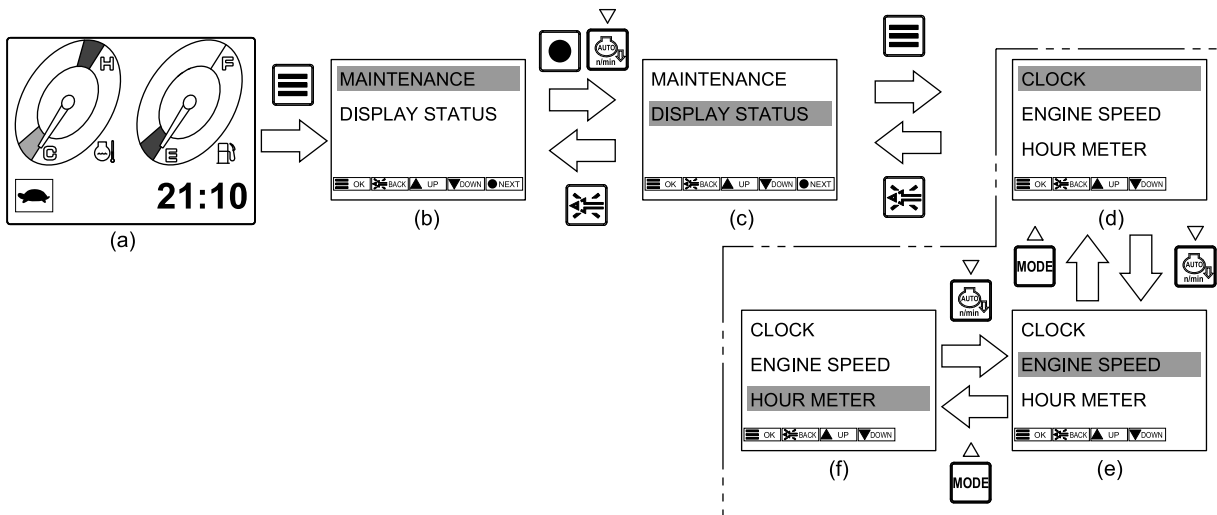
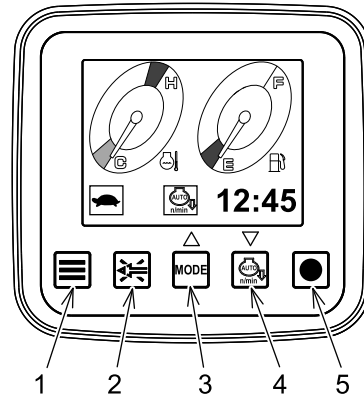
1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using circle button switch (5) and up and down arrow switches (3)(4), move the cursor to "SCREEN SETTING". Press menu switch (1) to enter SCREEN SETTING (d).
3. Using up and down arrow switches (3)(4), move the cursor to "BRIGHTNESS (day)" or "BRIGHTNESS (night)".
4. Press menu switch (1) to enter display (e). The background color of "value" turns blue.
5. Using up and down arrow switches (3)(4), select a desired value.
Adjustable range: 1 (Dark) to 10 (Bright)
* The default value is 10.
6. Press menu switch (1) to set the desired value. At this time, the background color of the value is cleared.
7. Press buzzer stop switch (2) to return to user menu screen (c).
8. When adjusting the brightness of another (night or day), repeat the steps from step 2.

[2. MACHINE FAMILIARIZATION]

Display status

The information displayed at the right lower area of the screen can be selected.

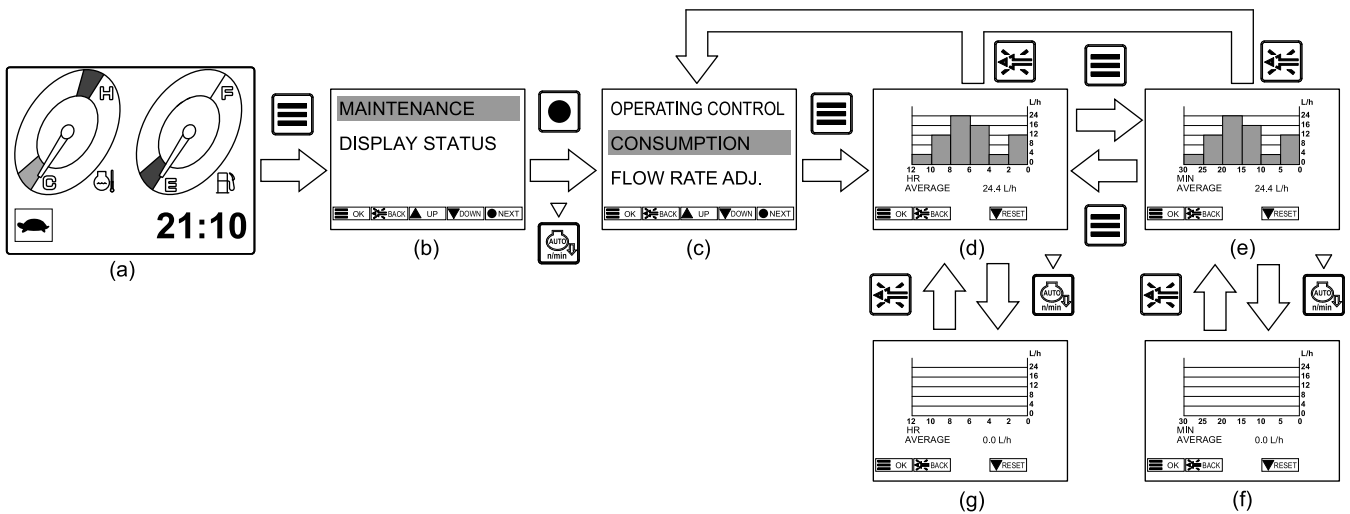
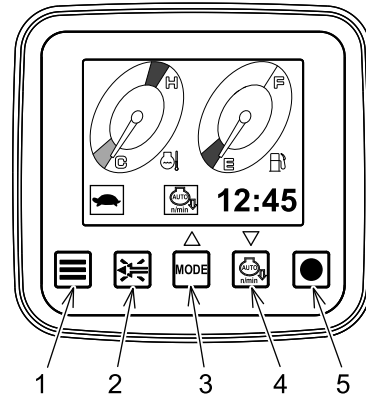
1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using circle button switch (5) and up and down arrow switches (3)(4), move the cursor to "DISPLAY STATUS". Press menu switch (1) to enter DISPLAY STATUS (d).
3. Using the up or down arrow switches (3)(4), move the cursor to "CLOCK", "ENGINE SPEED", or "HOUR METER".
4. Press buzzer stop switch (2) to set the selected item and return to user menu screen (c).

The consumption information can be displayed and reset.

1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using circle button switch (5) and up and down arrow switches (3)(4), move the cursor to "CONSUMPTION".
3. Press menu switch (1) to display CONSUMPTION (d).
4. Every time menu switch (1) is pressed, the information of last 12 minutes (d) and last 30 minutes (e) are displayed alternately.
5. Press down arrow switch (4) to reset CONSUMPTION.
6. Press buzzer stop switch (2) to return to user menu screen (c).

[2. MACHINE FAMILIARIZATION]

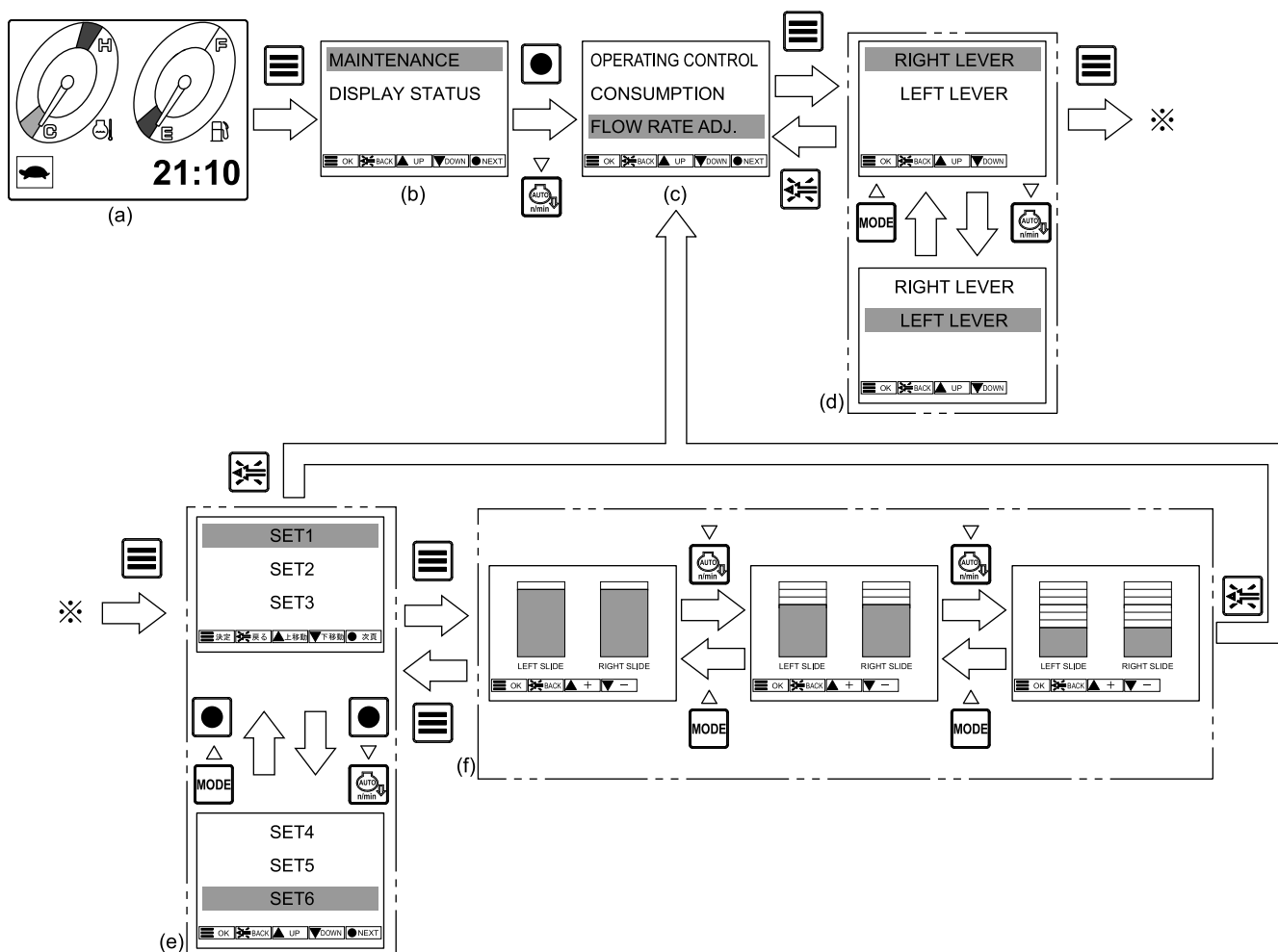
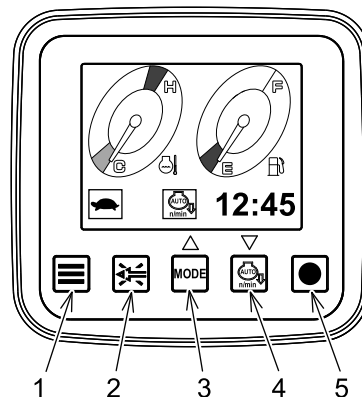
Flow rate adjustment

Notice

There is no flow adjustment function for each slide direction (left or right).

The flow rate of option hydraulic circuit corresponding to the operation of the slide switches on the left and right control levers can be selected and set. You can select and set the flow rate individually between SET1 to SET6.

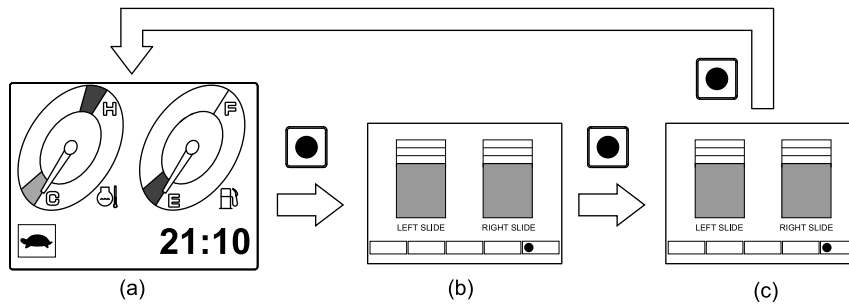
1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



1. Turn the starter switch "ON" to display main screen (a). Press menu switch (1) to enter user menu screen (b).
2. Using circle button switch (5) and up and down arrow switches (3)(4), move the cursor to "FLOW RATE ADJ.". Press menu switch (1) to enter screen (d).
3. Using up and down arrow switches (3)(4), select a desired lever (left or right) and then press menu switch (1).
4. Using circle button switch (5) and up and down arrow switches (3)(4), select a desired setting (from SET1 to SET6).

5. If performing only the flow rate setting and not performing adjustment, press buzzer stop switch (2) and return to user menu (c).
6. When performing the adjustment, press menu switch (1) to enter screen (f).
7. Using up and down arrow switches (3)(4), increase or decrease the flow rate.
When canceling the change, press buzzer stop switch (2) to return to screen (c).
8. Determine the flow rate set value by menu switch (1) and return to user menu screen (e).
9. Repeat the steps from step 2 to adjust the flow rate for the other lever.

Display of set flow rate

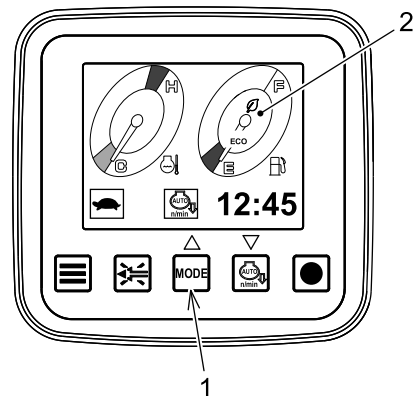


The currently-selected set value of the flow rate can be displayed from main screen (a).

1. Press circle button switch (5) to display screen (b) for the set value of the right lever.
2. Press circle button switch (5) again to display screen (c) for the set value of the left lever.
In case that the slide switch function is not equipped on the left lever, the screen returns to main screen (a).
3. Press circle button switch (5) again to return to main screen (a).

2.3.4 WORK MODE SELECT SWITCH

Press work mode select switch (1) to switch to ECO mode and display green mark (2) on the fuel level meter. The "ECO mode" focuses on a low fuel consumption operation.



2.3.5 AUTO DECELERATION SWITCH



WARNING

Loading/unloading the machine

When loading or unloading the machine on a trailer, turn the auto deceleration switch off.
If it is operated while the deceleration switch is on, the engine speed changes suddenly.

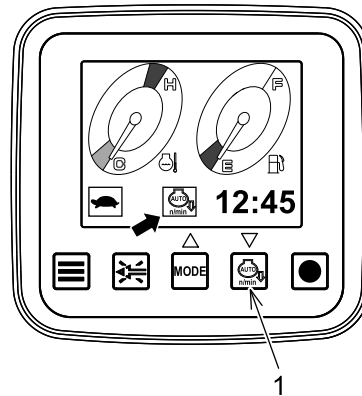
When switch (1) is pressed to turn on, the auto deceleration system activates.

It sets the engine speed to low under the following conditions.

- When the deceleration dial position is set at a higher value than the range of the idle speed.
- When the control levers and/or pedals are not operated for 4 seconds or more.

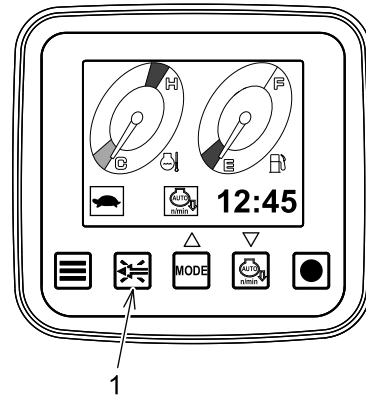
When the control levers and/or pedals are operated, the engine speed rises back to the set level of the deceleration dial gradually according to the amount of operation of the lever and/or pedals.

If the switch (1) is pressed to turn off during the auto deceleration operation, the engine speed rises back to the set level of the deceleration dial gradually.



2.3.6 BUZZER STOP SWITCH

In case where a warning is displayed on the multi-display (LCD), press buzzer stop switch (1) to stop the buzzer sounding as described in the tables below.



Items in the Warning Display Lists

Warning Level and Its Description

Level	Description
1	This is largely-concerned with the safety and machine movement. Stop the machine immediately and perform inspection and maintenance.
2	This notifies of the mode change of the machine.
3	This may lead to the failure of the machine. Immediately perform inspection and maintenance.
4	Difficulty may occur in working. Immediately perform inspection and maintenance.
5	This notifies of the machine status and maintenance.

Buzzer Sound Type














Buzzer sound type	Sounds
Type 1	Continuous
Type 2	Sound 0.2 seconds, stop 0.3 seconds
Type 3	Sound 0.5 seconds, stop 0.5 seconds

Priority Group A

Level	L.C.D. display	Machine condition	Buzzer Sounds				
			Auto stop	Manual stop	Type	Only starter key ON	Engine Running
1	IMPOSSIBLE TO DISPLAY MONITOR	The mechatro controller does not send data.	—	○	3	○	○
1	ENGINE IS ABOUT TO STOP ENGINE SYSTEM SENSOR ERROR	The engine controller judged the status as a disorder.	○ (5 sec)	—	1	○	○

[2. MACHINE FAMILIARIZATION]

Priority Group B

Level	L.C.D. display	Machine condition	Buzzer Sounds				
			Auto stop	Manual stop	Type	Only starter key ON	Engine Running
2	 SOOT IS DEPOSITED IN ENGINE  CONTINUE OPERATION	A certain quantity or more of soot is deposited in the engine.	—	○	2	○	○
2	 OPERATION UNDER LIMITED ENGINE POWER SOOT IS DEPOSITED IN ENGINE  DECREASE ENGINE SPEED	Soot is deposited in the engine and it should be burnt.	—	—	1	—	○
2	 OPERATION UNDER LIMITED ENGINE POWER SOOT IS DEPOSITED IN ENGINE  PULL UP SAFETY LOCK LEVER AND  PRESS MANUAL REGENERATION SW	Soot is deposited in the engine and it should be burnt.	—	—	1	—	○
3	 LOW ENGINE PRESSURE  STOP ENGINE CHECK ENGINE OIL LEVEL	The engine oil pressure is at the specified value or less.	—	○	2	○	○
3	 OVER HEAT  DO NOT WORK UNTIL ENGINE GETS COLD, WITHOUT STOPPING	The temperature of engine coolant is at the specified value or more.	—	○	3	○	○
3	 FUEL LEVEL INDICATION IS NOT CORRECT H091  PAY ATTENTION TO FUEL LEVEL	Disorder of the sensor, etc. occurs. The indications are the failure content and the error code.	—	○	3	○	○

2.3.7 WARNING DISPLAY SCREEN



WHEN WARNING IS DISPLAYED

If the warning is displayed on the screen, it can lead to severe trouble. Stop the operation immediately, investigate the causes, and take proper measures.

- The warning display has the order of priority (A and B) and when many troubles such as level 1 and 2 in priority (A) occurred at the same time, level 1 is displayed in priority to level 2.
- The start-up inspection should be performed by not only checking the screen but also by following the instructions of Chapter 4 "MAINTENANCE" in the operation manual.











WARNING CLASSIFICATION CHART (PRIORITY A)

Displays	Level	Warning Contents	Remedy
IMPOSSIBLE TO DISPLAY MONITOR	1	The mechatro controller does not send data.	Contact our dealer/distributor for inspection and maintenance.
ENGINE IS ABOUT TO STOP SYSTEM SENSOR ERROR	1	The engine controller judged the status as a disorder.	

WARNING CLASSIFICATION CHART (PRIORITY B)

Displays	Level	Warning Contents	Remedy
SOOT IS DEPOSITED IN ENGINE CONTINUE OPERATION	2	A certain quantity or more of soot is deposited in the engine.	Perform the heavy duty work as much as possible to rise the temperature in the engine.
OPERATION UNDER LIMITED ENGINE POWER SOOT IS DEPOSITED IN ENGINE DECREASE ENGINE SPEED	2	Soot is deposited in the engine and it should be burnt.	Lower the engine speed to low idling.
OPERATION UNDER LIMITED ENGINE POWER SOOT IS DEPOSITED IN ENGINE PULL UP SAFETY LOCK LEVER AND PRESS MANUAL REGENERATION SW	2	Soot is deposited in the engine and it should be burnt.	Pull up the safety lock lever and press the manual regeneration switch.
LOW ENGINE PRESSURE STOP ENGINE CHECK ENGINE OIL LEVEL	3	The engine oil pressure is at the specified value or less.	Immediately stop the engine and check the engine oil level. If the level is low, supply the specified engine oil or replace the old engine oil with the new specified engine oil by referring to "LUBRICANT, FUEL & COOLANT SPECIFICATIONS".
OVER HEAT DO NOT WORK UNTIL ENGINE GETS COLD, WITHOUT STOPPING	3	The temperature of engine coolant is at the specified value or more.	Stop the operation and set the engine speed to low idling to lower the coolant temperature and cool down the engine. After few minutes, if the warning is still displayed, stop the engine and check the coolant level, tension of the fan belt, and clogging of the radiator.
FUEL LEVEL INDICATION IS NOT CORRECT PAY ATTENTION TO FUEL LEVEL	3	Disorder of the sensor, etc. occurs. The indications are the failure content and the error code.	Contact our dealer/distributor for inspection and maintenance.
ENGINE IS BEING CLEANED AREA AROUND MUFFLER IS HOT	4	The engine is being cleaned (regeneration).	Continuation of the operation is possible. Use caution to the area around the muffler. That becomes a high temperature.
ENGINE IS BEING CLEANED AREA AROUND MUFFLER IS HOT /10	4	The engine is being cleaned (regeneration) by the manual regeneration.	Keep the status that the key switch is ON, the engine speed is at low idling, and the safety lock lever is pulled up. Wait until the indication disappears.
CHARGE ERROR TURN STARTER SWITCH OFF	4	Disorder of the battery occurs. (High voltage/ low voltage charge error) If the warning does not disappear after a while from the engine start, or if the warning appears while the engine is running, the battery is not charged properly.	Check the electric devices for working condition, and check the charging circuit.
LOW FUEL LEVEL SUPPLY FUEL	4	The fuel level is at the specified level or less.	Supply the specified fuel.

[2. MACHINE FAMILIARIZATION]

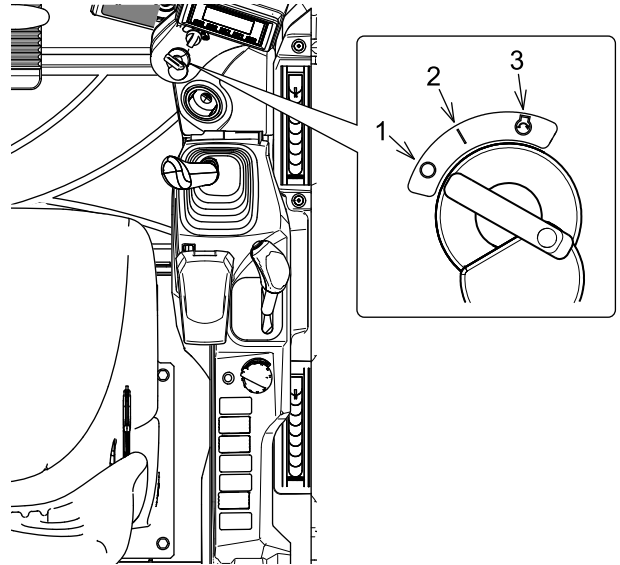
Displays	Level	Warning Contents	Remedy
 EXCHANGE ENGINE OIL	5	The remaining time for replacement of the engine oil reaches to 0.	Supply the specified new engine oil to the specified level.
 EXCHANGE FUEL FILTER	5	The remaining time for replacement of the fuel filter reaches to 0.	Replace the fuel filter with the specified new fuel filter.
 EXCHANGE HYD.OIL FILTER	5	The remaining time for replacement of the hydraulic oil filter reaches to 0.	Replace the hydraulic oil filter with the specified new hydraulic oil filter.
 EXCHANGE HYD.OIL	5	The remaining time for replacement of the hydraulic oil reaches to 0.	Replace the hydraulic oil with the specified new hydraulic oil.
 EXCHANGE EXHAUST GAS FILTER	5	The remaining time for replacement of the exhaust gas filter reaches to 0.	Contact our dealer/distributor near you for inspection and maintenance.
 REMAINING TIME UNTIL ENGINE OIL REPLACEMENT IS SHORT	5	The remaining time for replacement of the engine oil is little.	Contact our dealer/distributor near you for inspection and maintenance.
 REMAINING TIME UNTIL FUEL FILTER REPLACEMENT IS SHORT	5	The remaining time for replacement of the fuel filter is little.	Contact our dealer/distributor near you for inspection and maintenance.
 REMAINING TIME UNTIL HYD. OIL FILTER REPLACEMENT IS SHORT	5	The remaining time for replacement of the hydraulic oil filter is little.	Contact our dealer/distributor near you for inspection and maintenance.
 REMAINING TIME UNTIL HYD. OIL REPLACEMENT IS SHORT	5	The remaining time for replacement of the hydraulic oil is little.	Contact our dealer/distributor near you for inspection and maintenance.
 TIME UNTIL EXHAUST GAS FILTER REPLACEMENT IS SHORT	5	The remaining time for replacement of the exhaust gas filter is little.	Contact our dealer/distributor near you for inspection and maintenance.

2.4 HANDLING OF SWITCHES AND METERS

2.4.1 STARTER SWITCH

This switch is used to start or stop the engine.

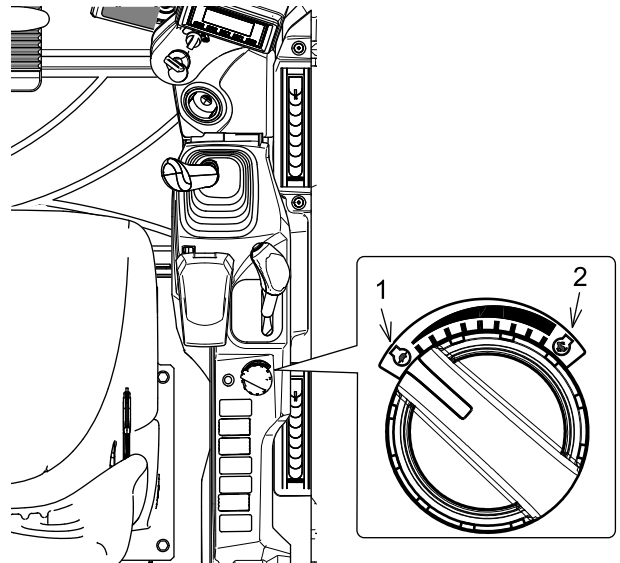
1. OFF (STOP):
At this position, you can insert or remove the starter key. Before restarting or stopping the engine, turn the starter key to the "OFF" position.
2. ON:
Electricity flows in all circuits. During operation, the starter key should be in this position.
3. START:
When starting the engine, turn the key to the "START" position. When the engine starts, release your hand from the starter switch. The starter key will return to the "ON" position by itself.



2.4.2 ENGINE THROTTLE

This dial adjusts the number of engine speed (output). This is a dial type rotary switch and a continuous adjustment type. If you release the dial at a rotated position, it stops at that position, and maintains assigned engine speed.

1. LO (Low idle)
The number of engine speed is minimum at the end of left rotation.
2. HI (High idle)
The number of engine speed is maximum at the end of right rotation.

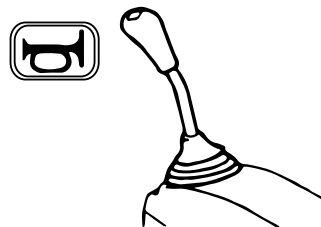


2.4.3 HORN SWITCH

CAUTION

Be sure to sound the horn before starting this machine to warn surrounding personnel.

The horn sounds while the switch located on the top of the left control lever grip is being pressed.

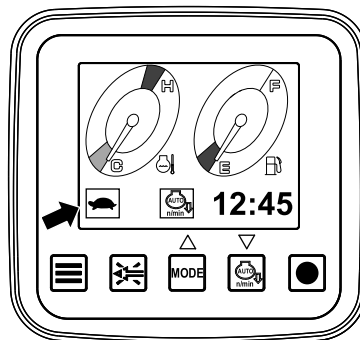
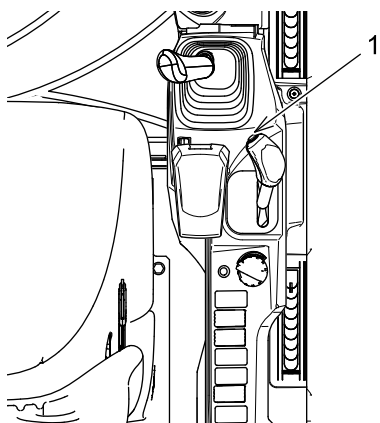


2.4.4 TRAVEL SPEED SELECT SWITCH

WARNING

ABOUT TRAVEL SPEED

The travel speed should be set to the LOW (1st) speed when the machine is traveling on a downhill, or being loaded to/unloaded from a trailer. A sudden change of the machine stability could cause personal injury.



Each time the engine is started, the travel speed is automatically set to the LOW 1st (turtle) speed. Press switch (1) on the dozer operation lever and then the travel speed changes to the HIGH (2nd) speed and the icon displayed on the multi-display changes to the HIGH (2nd) speed (rabbit).

LOW 1st speed: turtle



Set to LOW 1st speed when moving the machine on the rough or soft ground, slope, or in the narrow place, or when powerful tractive force is required.

HIGH 2nd speed: rabbit



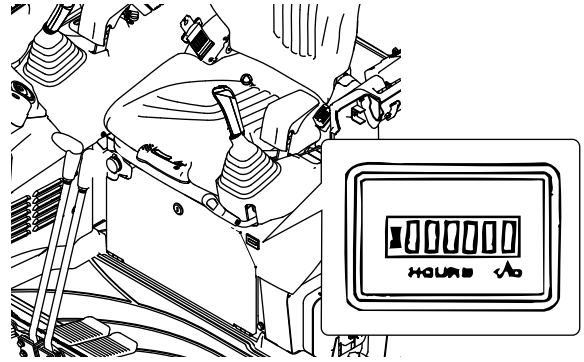
Set to HIGH 2nd speed when moving the machine on a level and firm ground.

Notice

The HIGH (2nd) speed is automatically switched to the LOW (1st) speed when the load of traveling becomes high and automatically returned to the HIGH (2nd) speed when the load is lowered.

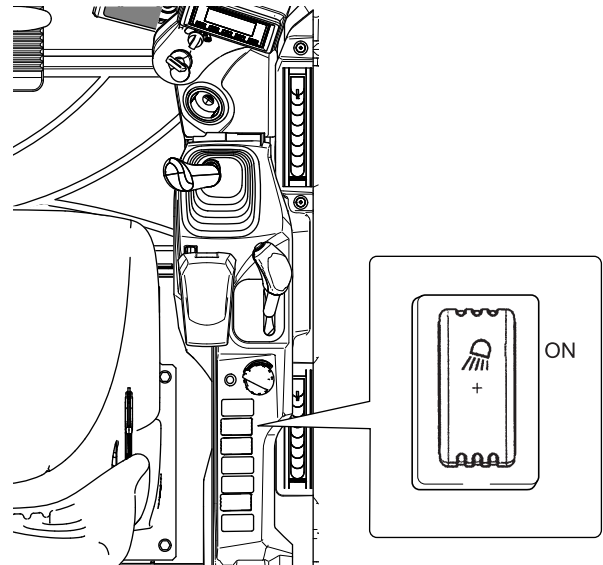
2.4.5 HOUR METER

This indicates the total time the engine has run. As long as the engine is running the hour meter continues to count, even if the machine is not traveling. While the engine is running, the operation indicator lamp on the meter blinks, indicating that the meter is counting. The meter counts 1 every hour, regardless of the engine speed. Use the count as the reference for inspection and maintenance.



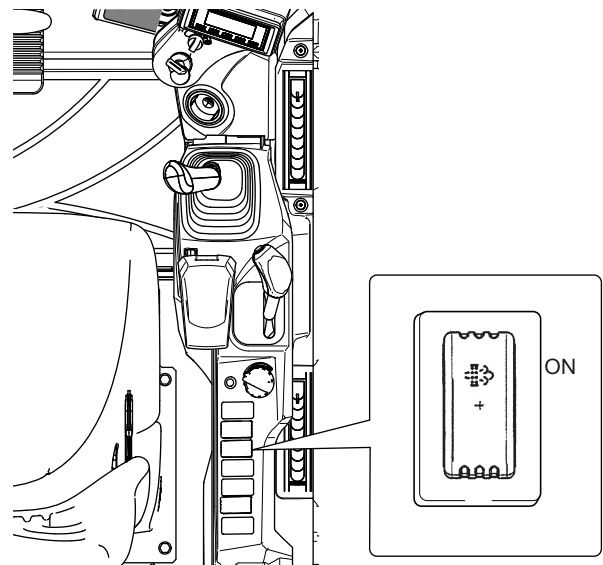
2.4.6 WORKING LIGHT

Push the switch to turn on the working light.
Push the no symbol mark side to turn off the working light.



2.4.7 DPF MANUAL REGENERATION SWITCH

When you press the DPF manual regeneration switch, DPF is regenerated.
For details, see "DIESEL PARTICULATE FILTER (DPF)" in Chapter 4.



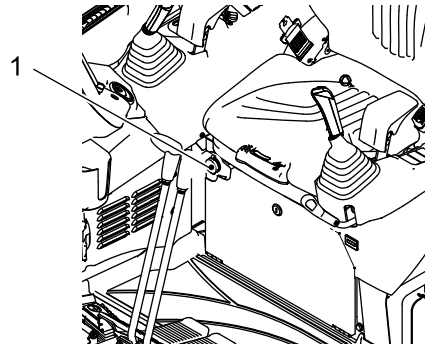
2.4.8 12 V POWER SUPPLY

Twelve volt power supply (1) is located at the lower side of the right control stand.

When using accessories such as a fan for general automobiles and other accessories that require the 12 V DC power supply, the 12 V power supply is required.

Remove the cover from the 12 V power supply, and insert a 12 V male socket. After using the accessory, put the cover back on.

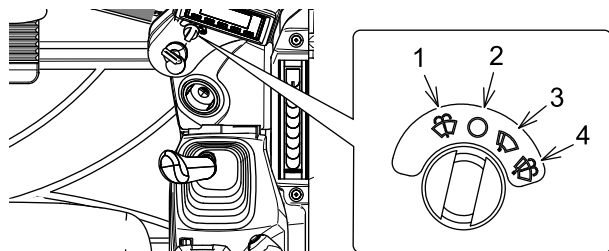
Maximum continuous output = 36 W



2.4.9 WIPER SWITCH (CAB SPEC.)

You can rotate this switch to move the wiper on the front windshield or to spray washer fluid.

1. WASH position (left side)
Washer fluid is sprayed.
2. OFF position
The wiper stops.
3. ON position
The wiper moves.
4. WASH position (right side)
Washer fluid is sprayed and the wiper moves.



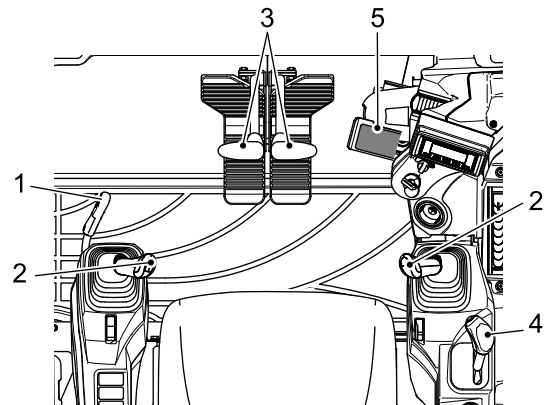
Notice

Do not use the washer function for more than 20 seconds or without washer fluid, which may cause damage to the motor equipped with the washer fluid reservoir.

2.5 HANDLING OF LEVERS AND PEDALS

2.5.1 LOCATION OF LEVERS AND PEDALS

- (1) Control Lock Lever
- (2) Operator Control Levers
- (3) Travel Levers
- (4) Dozer Operation Lever
- (5) Boom Swing Operation Pedal



2.5.2 CONTROL LOCK LEVER

The control lock lever is provided to prevent any unexpected operation due to unexpected contact with the left/right control levers or travel levers.

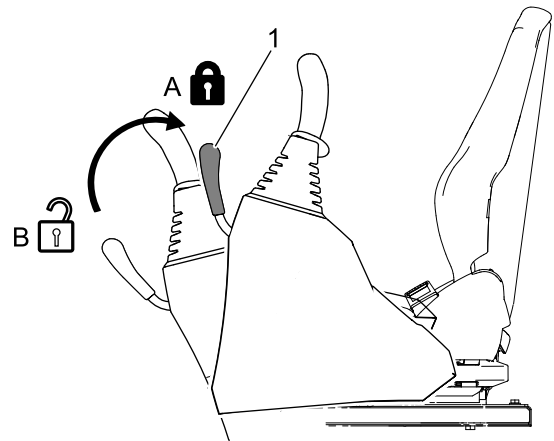


HANDLING OF CONTROL LOCK LEVER

- Do not stand up and move during operation, or unexpected contact with the control levers may cause a sudden movement of the machine. Raise the control lock lever securely to the "LOCKED" position before standing up or moving.
- Set the control lock lever to the "LOCKED" position securely, or it may not be locked. Make sure that the control lock lever is at the "LOCKED" position shown in the figure.
- When unlocking, do not touch other levers unintentionally. Touching other levers may cause danger due to unexpected machine movement.
- After completion of work or during transportation, be sure to set the control lock lever to the "LOCKED" position.
- Do not get on and off the machine holding the control lock lever.

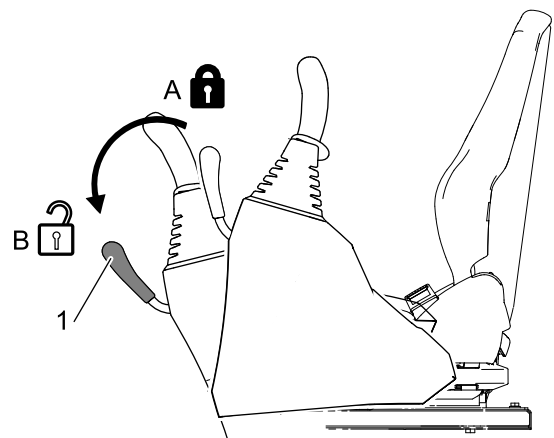
LOCKING HYDRAULIC SYSTEM

When the control lock lever is raised to "LOCKED" position (A), the operation control function is locked.



UNLOCKING HYDRAULIC SYSTEM

When the lever is lowered to the "UNLOCKED" position (B), the hydraulic system is unlocked.



2.5.3 OPERATOR CONTROL LEVERS



CONTROL OF LEVERS

- Before operation, be sure to pay attention to the safety of the surroundings and operate each lever slowly to fully make sure that the machine movement is in accordance with the control pattern indicated on the control pattern label in the cab.
- If you operate the machine while the control pattern label in the cab does not match the actual machine movement, it may cause severe personal injury.
- When the label does not match the actual machine movement, replace them with a proper one.
- When stopping swing operation, stop it earlier than your intended position by taking the swing distance after returning the swing lever to the neutral position into account.

The swing operation and the attachment/equipment are operated with the left and right control levers.

The left control lever is used for swing and arm operations.

The right control lever is used for boom and bucket operations.

Release the lever to return it to the neutral position and stop the attachment/equipment from moving. It is possible to perform various operations at the same time.

Left control lever

(1) Swing right

(2) Swing left

(3) Arm out

(4) Arm in

N (Neutral): Upper structure and arm are held in the position at that time

Right control lever

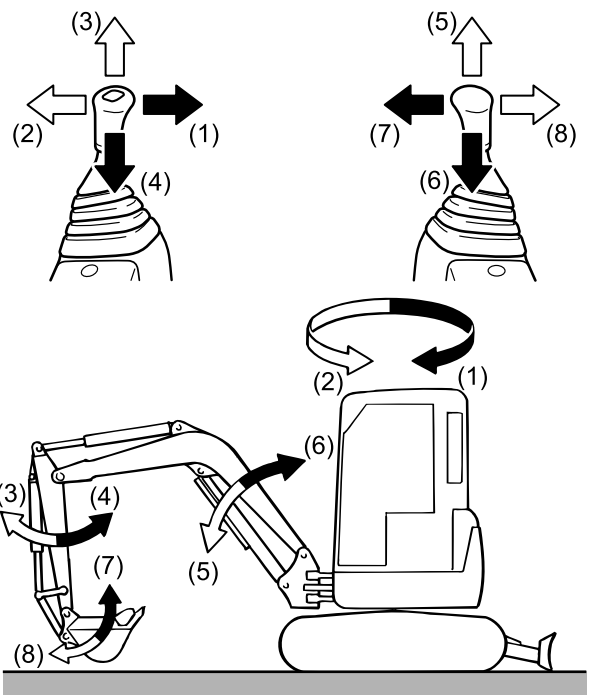
(5) Boom down

(6) Boom up

(7) Bucket in

(8) Bucket out

N (Neutral): Boom and bucket are held in the position at that time



2.5.4 TRAVEL LEVER



HANDLING OF THE TRAVEL LEVER

- During travel operation, pay attention to the control levers. There is a possibility of accident because the attachment is suddenly swung and moved by the unexpectedly touching and shifting the control lever.
- When operating the travel levers, check the crawler frame direction. When the travel motor is positioned on the front side, the traveling lever operation is reversed.

FRONT/REAR AND LEFT/RIGHT OF MACHINE

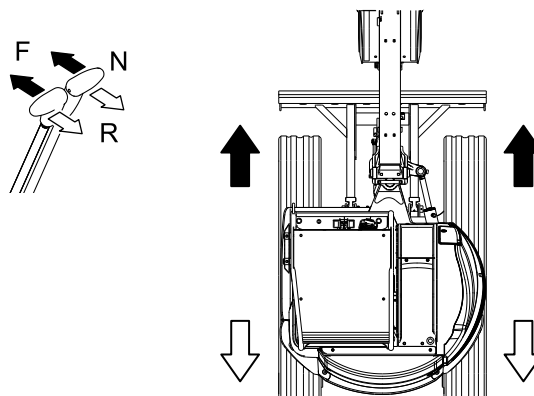
In this manual, front/rear and left/right are determined by looking the forward direction from the operator's seat with the travel motors at the rear side.

The manual levers and travel pedals are used for the travel operation of this machine.

F: Travel forward: Push the travel levers to the front

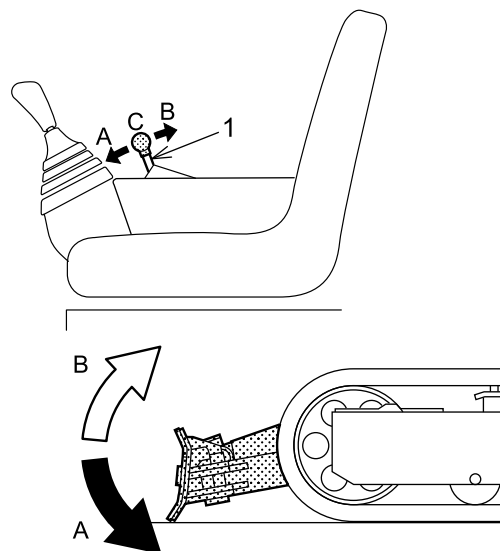
R: Travel backward: Pull the travel levers toward yourself

N: Neutral: The machine stops traveling.



2.5.5 DOZER OPERATION LEVER

The dozer is operated with dozer control lever (1) located on the right of the right control lever as shown in the right figure. If dozer control lever (1) is released, the lever returns to the neutral position and the dozer is held at the position at that time.



LEVER CONTROL	DOZER MOTION
PUSH LEVER FORWARD (A)	DOZER DOWN
PULL LEVER BACKWARD (B)	DOZER UP
NEUTRAL (C)	HOLD

2.5.6 BOOM SWING FOOT PEDAL

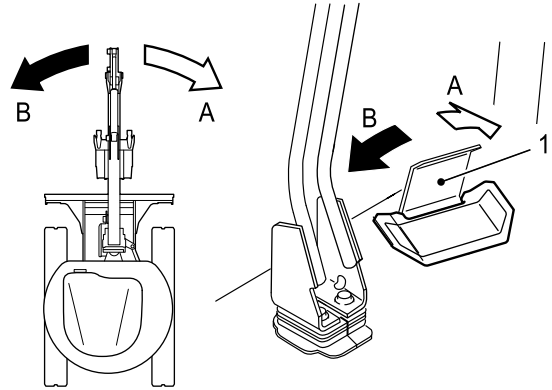
This pedal is used for boom swing operation.

WARNING

When you do not perform the boom swing operation, lock the pedal. If you touch the unlocked pedal accidentally, it may cause severe accident.

A: Right swing (Depress the right side)

B: Left swing (Depress the left side)



Notice

To lock the pedal, pull down cover (1) above the pedal toward yourself.

2.6 HANDLING OF FUSE BOX

2.6.1 ABOUT FUSE BOX

The fuses protect the wiring and electrical components from damage due to burn out due to excess current. If the electrical system does not work properly, check to replace any blown fuses with new ones. If there is a corroded fuse generating white powder on it, or if some looseness exists between a fuse and its fuse holder, replace it as well.

2.6.2 REPLACING FUSES

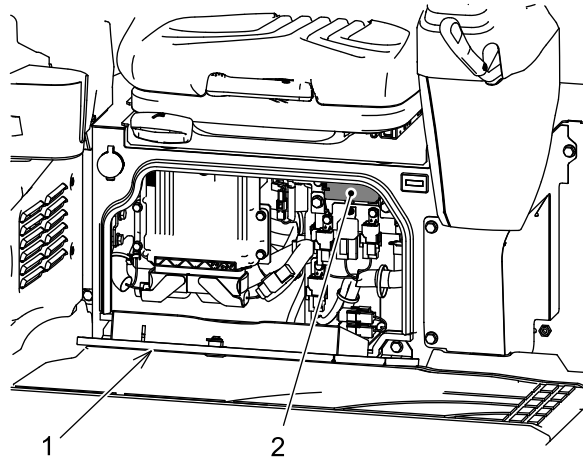
CAUTION

Make sure the starter switch is in the "OFF" position when replacing fuses.

Notice

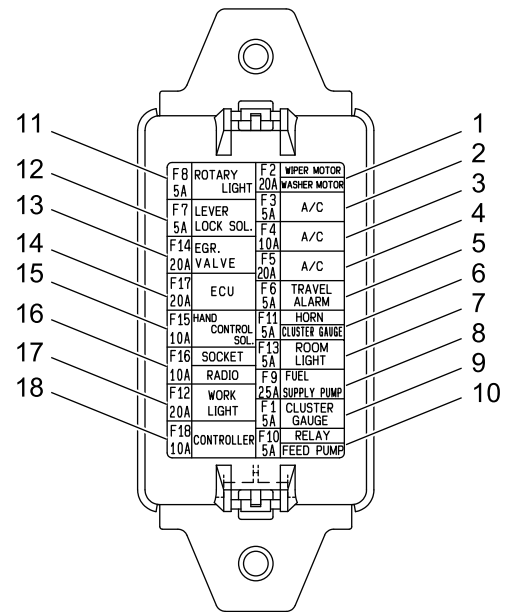
- A fuse must be replaced with a one of the same type and capacity of that of the blown fuses. The electrical system may be damaged if a different one is used.
If fuse replacement is frequently required, it may be due to a failure in the electrical system. Please contact KOBELCO authorized dealer/distributor.
-

1. Use the starter key to open cover (1).
2. Fuse box cover (2) can be locked. If it is locked, unlock to remove it.
3. If a fuse looks like the figure below (right), it is blown. Replace it with a spare fuse stored in the fuse box.
4. After fuse replacement, be sure to push the lock of the fuse box cover until it clicks.



2.6.3 FUSE CAPACITY AND CIRCUIT NAME

The following shows each fuse capacity and circuit name.



No.	Ca- pacity	Circuit Name	No.	Ca- pacity	Circuit Name
1	20A	Wiper motor, washer motor	10	5A	Relay, feed pump
2	5A	Air conditioner	11	5A	Rotary light
3	10A	Air conditioner	12	5A	Lever lock sol.
4	20A	Air conditioner	13	20A	EGR valve
5	5A	Travel alarm	14	20A	ECU
6	5A	Horn Cluster gauge	15	10A	Hand control sol.
7	5A	Room lamp	16	10A	Socket, Radio
8	25A	fuel pump	17	20A	Work light
9	5A	Cluster gauge	18	10A	Controller

2.7 HANDLING OF FUSIBLE LINK (FOR STARTER)

Notice

The fusible link is a fuse wiring of big size provided in a large capacity circuit.
As with normal fuses, it protects electrical components and wiring from burn out due to excess current.

In case the starter does not work when the starter switch is turned "ON", disconnection of the fusible link is suspected. Check and replace it as needed.

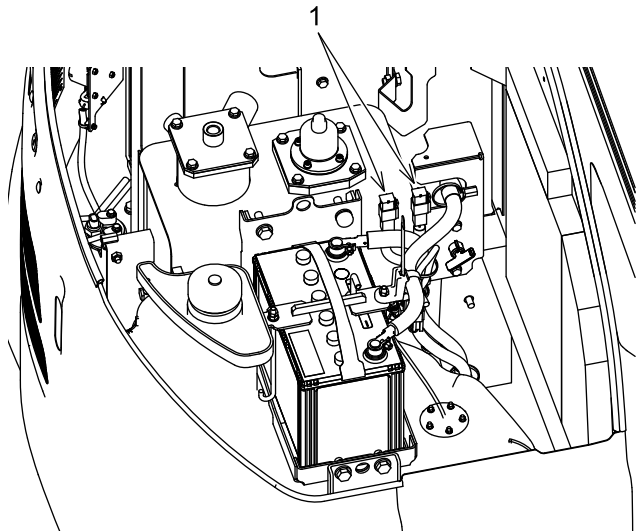
2.7.1 FUSIBLE LINK INSPECTION/REPLACEMENT

CAUTION

Remove the negative (-) terminal of the battery to shut down the flow of electricity to avoid electric shock and short circuit leading to damages of the component.

When the battery power-off switch is provided, set it to "OFF".

1. Use the starter key to open the side door at the right side cover and hold it with the stay.
2. Remove fusible link (1), and perform inspection or replace it with a new one.
3. Remove the supporting stay, and close the right side cover.

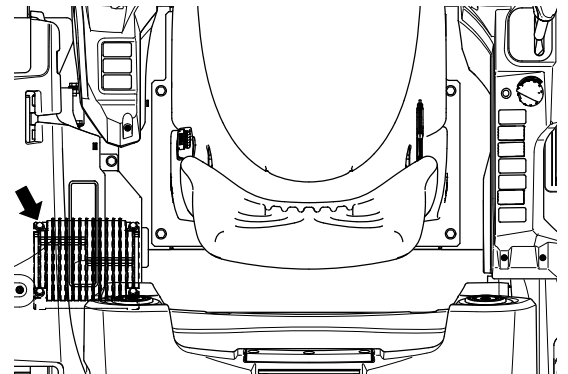
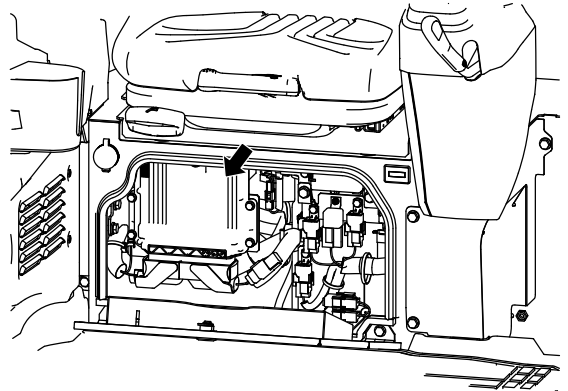


2.8 CONTROLLER

CAUTION

- Since the controller is equipped in the cab and the engine, do not splash water, dirt, or drinking water etc on it. It may cause failure of the machine.
- When the controller warning is displayed on the gauge cluster, contact your KOBELCO authorized dealer. For warning, see "WARNING DISPLAY SCREEN" in Chapter 2.

The controller controlling the machine and the engine is equipped in this machine.



2.9 HANDLING OF SEAT BELT



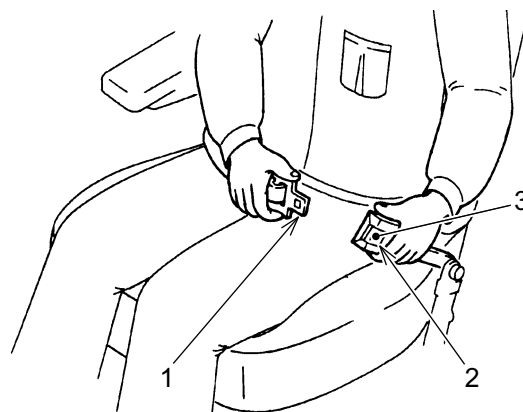
INSTALLATION OF SEAT BELT

- Be sure to fasten your seat belt during operation. If not followed, it can result in serious accidents or death caused by being heavily hit inside the cab or thrown out of the cab when the machine tips/rolls over.
- Check the mounting bolts installed to the seat for looseness and retighten the bolts if required.
- Change the seat belt every three years, even if there is no abnormality in the appearance. The manufacturing date is woven into the back side of the belt.

Since this seat belt is equipped with take-up motion, the adjustment of length is unnecessary.

2.9.1 HOW TO FASTEN SEAT BELT

1. Check that the seat belt is not twisted, and pull it out to a sufficient length.
2. Insert the seat belt into buckle (2) until it clicks. Release the seat belt, and the length is automatically adjusted and the buckle is locked.

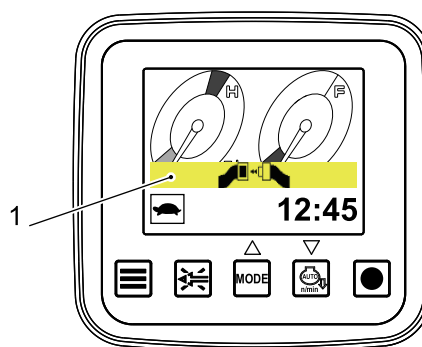


2.9.2 HOW TO UNFASTEN SEAT BELT

- Press the red button (3) of the buckle (2), and the belt (1) is unfastened.

2.9.3 SEAT BELT REMINDER

When the starter switch is turned to the ON position, instruction message (1) to fasten the seat belt blinks on the multi-display for a certain period and the alarm sounds simultaneously.



2.10 HANDLING OF OPERATOR'S SEAT

Adjust the operator's seat to the position at which you can operate the control levers and pedals easily.

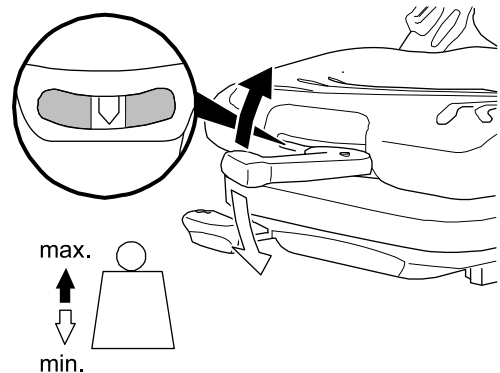
CAUTION

When adjusting the operator's seat, pay attention to hands in order not to be caught between the handle and seat stand.

2.10.1 WEIGHT ADJUSTMENT

The seat is adjusted for the driver's weight with the driver sitting on the seat.

1. Fold out the weight adjustment lever completely, hold it at the front and move it upwards or downwards (10 movements from minimum to maximum).
2. Before every new movement, bring the lever back to the starting position (audible locking sound).
3. The driver's weight has been set correctly, when the arrow is in the middle of the viewing window.

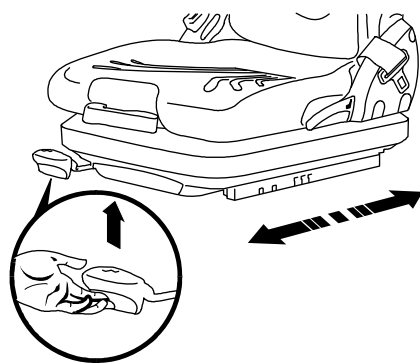


Notice

- To prevent damage to the health and material, the setting for the driver's weight must be checked and adjusted as necessary before the vehicle is driven.
- When the minimum/maximum has been reached, you can notice an empty movement in the handle.
- When you have set the weight, fold the lever completely into the locking.

2.10.2 FORE/AFT ADJUSTMENT

1. The fore/aft adjustment is released by lifting the locking lever.
2. After the adjustment, the locking lever must latch into the desired position with an audible click. It should not be possible to move the driver's seat into another position when it is locked.

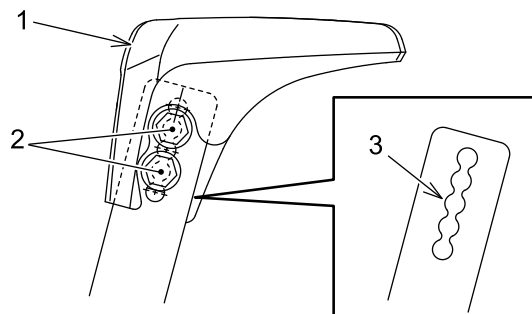


WARNING

- Do not operate the locking lever while driving.
- Only touch the lever at the indented grip, do not reach back under the lever.
- Do not lift the locking lever with your leg or calf.

2.10.3 HEIGHT ADJUSTMENT OF WRIST REST

1. Remove bolt (2) and adjust the height of support (1) according to hole (3) of the bracket.
2. Install bolts (2).
Tightening torque : $23 \pm 2.3 \text{ N} \cdot \text{m}$ ($17 \pm 1.7 \text{ lbf} \cdot \text{ft}$)



2.11 HANDLING PARTS INSIDE CAB



LEAVING OPERATOR'S SEAT

Do not leave the cab with the engine running.

When necessary to leave the operator's seat, be sure to lock the control lock lever and then stop the engine.

If the control lever is unexpectedly touched without the control lock lever locked, it may cause severe accident resulting in severe injury.

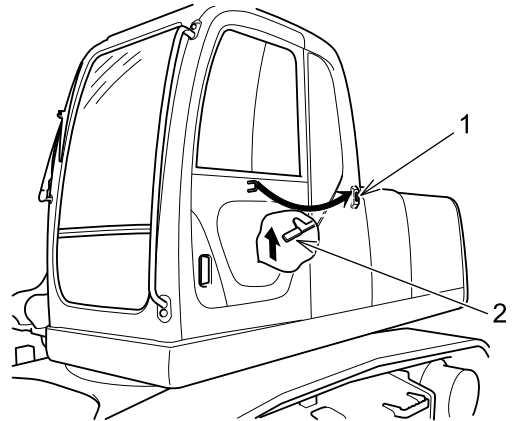
2.11.1 CAB DOOR LOCK



In operation, lock the door securely either open or close. If not locked, the door may open or close unexpectedly and this may cause danger and failure of the machine.

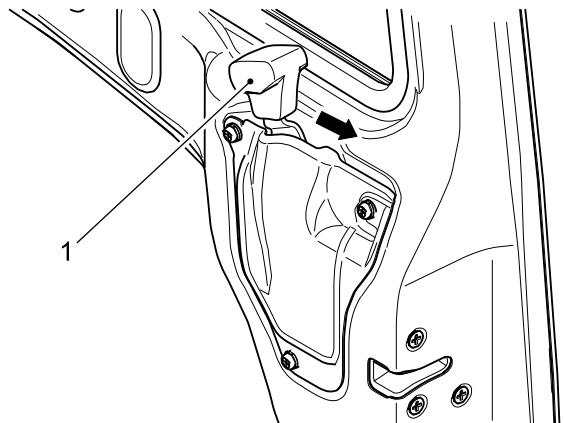
This procedure is used to securely lock the door in open position.

- Push the door against catch (1) and check that it is locked securely.
- To close the door, move lever (2) on the left side of the operator's seat to the direction of the arrow and then the catch is released.



2.11.2 OPENING DOOR FROM INSIDE OF CAB

- To open the door from the inside of the cab, move lever (1) to the direction of the arrow.



2.11.3 OPENING/CLOSING FRONT WINDOW (UPPER)



WARNING

OPENING/CLOSING FRONT WINDOW (UPPER)

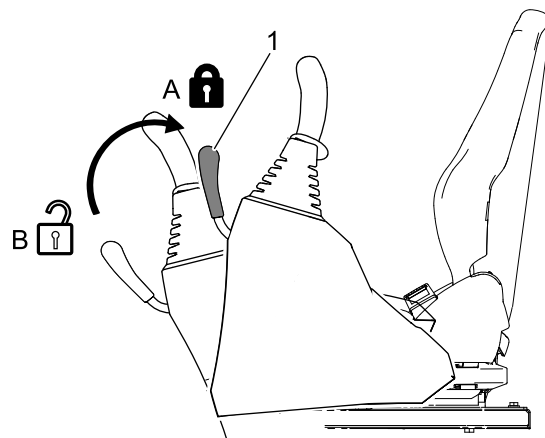
- Opening/closing the front window with the machine in a level position and lock the front window securely. If the lock is released in the forward tilting position of machine there is a possibility of falling of the front window.
- When closing the front window, the closing speed increases due to the weight of front window. Hold and close it by both hands securely.
- When opening/closing the front window in, pull up the control lock lever to the "LOCKED" position and stop the engine.



CAUTION

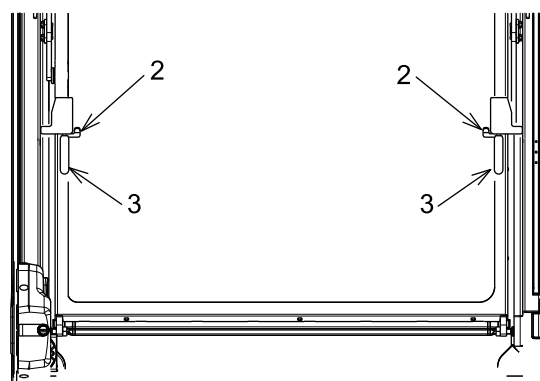
To prevent your hand from being caught between the windows, open and close the front window slowly. It is dangerous to work with the front window not or incompletely locked. Confirm that the front window is surely locked.

1. Move the machine to a level and firm place.
2. Put the bucket on the ground.
3. Stop the engine and move the control lock lever to the "LOCKED" position.



4. Push down lock lever (2) on the both sides of the upper front window to release the lock.
5. Hold the left and right handles, and pull up and move the front window (upper) to the end on the rear side of the roof until it is locked.

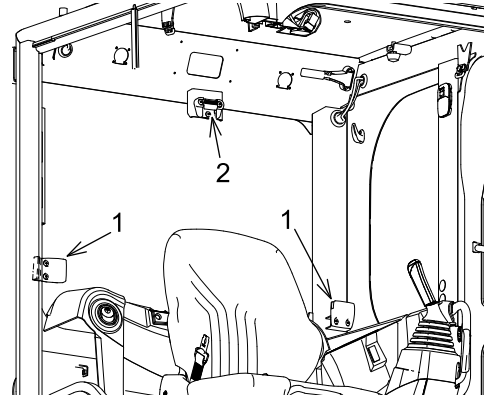
When closing front window



1. Hold handles (3) at the left and right parts of the front window (upper) and push lock lever (2) right to release the lock.
2. When the front window (upper) is returned to the original position, it is locked automatically. However, check that the window is securely locked.

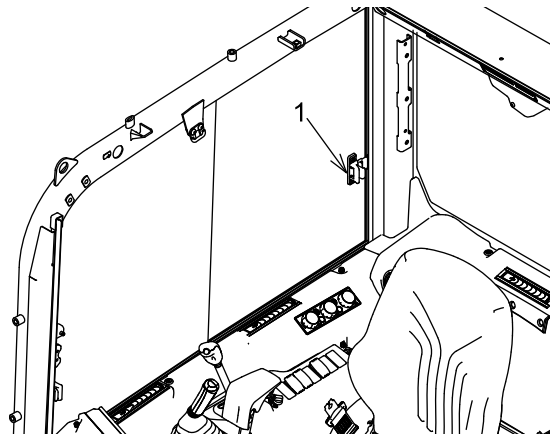
2.11.4 REMOVING FRONT WINDOW (LOWER)

1. After open the front window (upper) in the ceiling, hold the front window (lower) by hands and remove it from the window frame.
The removed front window (lower) should be stored in holder (1) on the back side of the cab for secure storage.
2. Insert the glass into right and left holders (1), and fix the glass with lock (2) on the upper window frame.



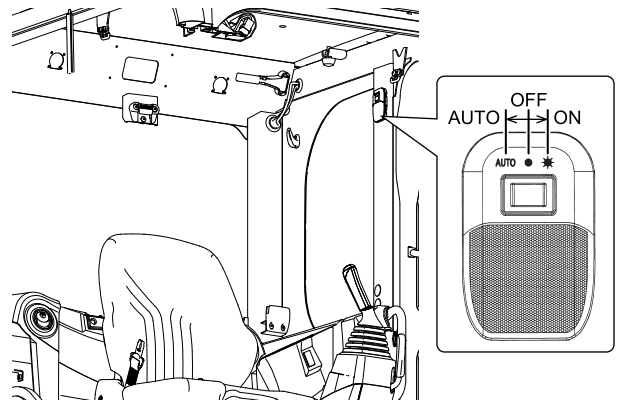
2.11.5 OPENING/CLOSING WINDOW ON RIGHT SIDE

1. Release lock (1) to open the window.
2. Move lock (1) to the "LOCKED" position to close the window.



2.11.6 ROOM LAMP

Operate switch (1) in accordance with the purpose.



Switch	Contents
AUTO	The room lamp turns on and off as the door opens and closes.
OFF	The room lamp does not turn on.
ON	The room lamp turns on.

2.12 EMERGENCY ESCAPE FROM OPERATOR'S STATION

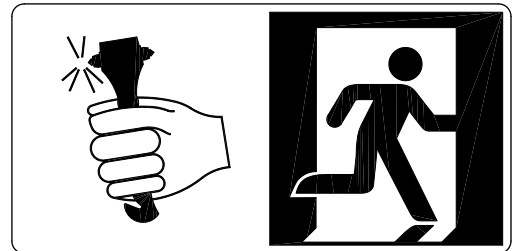
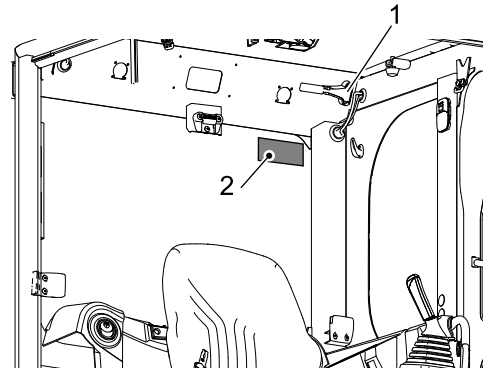
If it is impossible to open the cab door in an emergency, escape from the cab by the following way.

1. Open the front window and escape through the front window.

Notice

For how to open the front window, see "OPENING/CLOSING FRONT WINDOW" in Chapter 2.

2. If the front window cannot be opened, break the front or rear window glass by using hammer for emergency exit (1) placed on the left rear of the cab.



CAUTION

Pay attention to the broken pieces so as not to be injured when breaking the window glass.

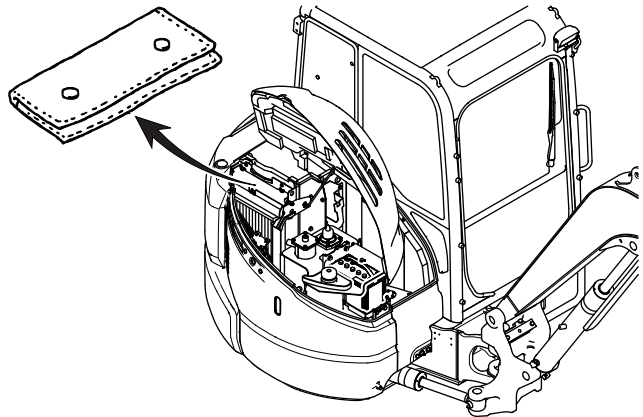
Notice

Label (2) indicating the emergency exit are affixed on the rear window.

2.13 OTHER ACCESSORIES

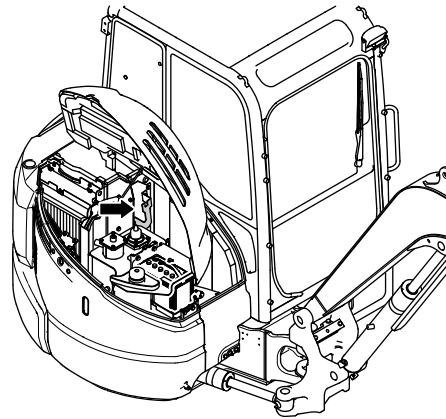
2.13.1 TOOLS

The tools are stored inside of the right side cover.



2.13.2 GREASE GUN HOLDER

The grease gun holder is located on the next to the hydraulic oil tank on the right rear of the machine. When the gun is not used, put it on this holder.



2.13.3 GUARD/SIDE DOOR (WITH LOCK)

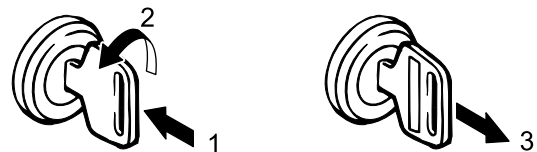


Be sure to stop the engine before opening the engine hood and side cover, etc.

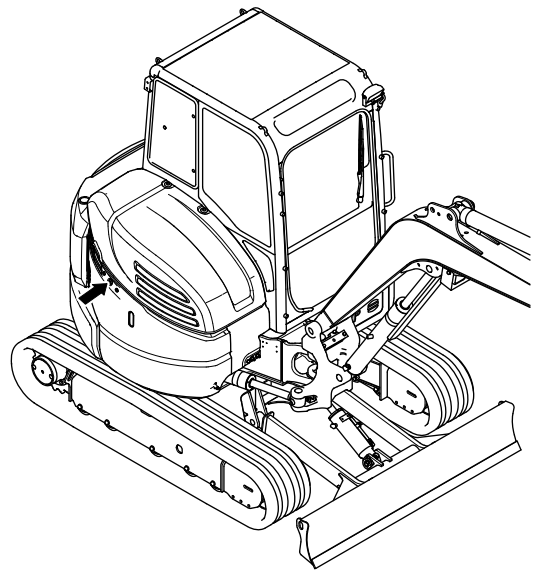
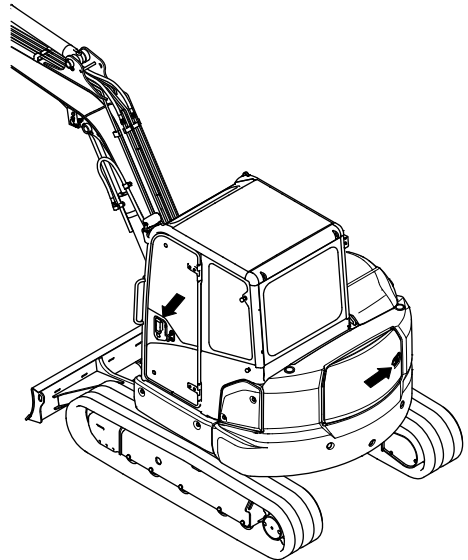
The engine hood, right side cover, and cab door covers are provided with the lock mechanism. To open/close them, use the starter key. When using the starter key, fully insert it and then turn it. If it is not fully inserted, it may be broken.

HOW TO UNLOCK AND OPEN GUARD AND SIDE DOOR

1. Insert the starter key into the keyway.



2. Turn the starter key counterclockwise and pull the door handle to open the door.
3. If the door is provided with a stay, support the door securely using the stay.



HOW TO LOCK GUARD AND SIDE DOOR

1. If a stay is provided, return the stay to the original position.
2. Close the door.
3. Turn the starter key clockwise and remove it.

2.14 ADJUSTING MIRROR

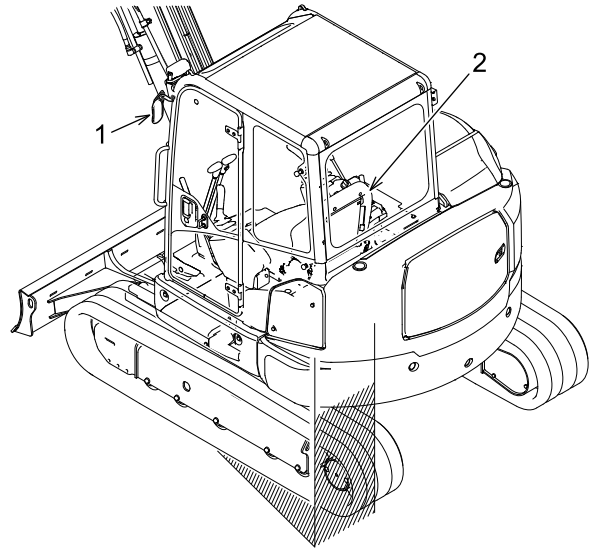


ADJUSTING MIRROR

Before any working, be sure to adjust the mirrors. If the mirror position is incorrectly adjusted, good visibility is not secured and it may result in severe personal injury, or machine damage.

Adjust mirror (1) so that the blind spot may reduce most from the operator's seat.

1. Mirror
2. Seat



3. MACHINE OPERATION

3.1 DAILY MAINTENANCE CHECKS

Before starting the engine, walk around the machine to check for any loose nuts and bolts, any oil, fuel or coolant leakage, and the condition of the attachment/equipment, body structure, and hydraulic system. Check for any looseness in the electrical wiring and for any accumulated material (leaves, dirt, etc.).



MACHINE FIRE PREVENTION

The deposit of flammable, fuel leakage and oil leakage in heated area around the engine, muffler and battery may cause fire of machine. Check the area sufficiently, and if the abnormality is found, repair it or contact your KOBELCO authorized dealer.

- Clean all slippery substances such as grease, oil, hydraulic oil, mud, ice, and others attached to the steps, handrails, crawlers, ladders, and platforms.
- Check the engine for any oil, fuel or coolant leakage. Repair as required.
- Check the area around the engine and radiator for any accumulated material and remove as required.
- Check the hydraulic devices, hydraulic oil tank, hoses and joints for oil leakage, and repair as required.
- Check the travel system, such as the crawler, front idlers and sprockets, for any damage or wear, and the bolts for looseness, and the rollers for oil leakage, and repair as required.
- Check the attachment/equipment, body structure, and cylinders for any cracking, damage or looseness, and repair as required.
- Check the doors, covers, steps and handrails for damage, and the bolts for looseness. Repair any damages and tighten loose bolts.
- Check the monitor for damage and replace it as required.
- Check the rearview mirrors for abnormality and replace it with a new one when it is broken. Clean the surface of the mirror and adjust the angle so that the operator can see the rear from the operator's seat.
- If the machine is equipped with the rearview camera and the side cameras, clean the lenses to display clear images from the rearview and side cameras to the monitor.
- Check the seat belts and the mounting hardware for the abnormality and if any damage is found, replace it with a new one.

3

3.1.1 SUPPORT STAY

The support stays are provided on the side doors and the engine hood. When opening the side doors and the engine hood, be sure to fix them with the stays

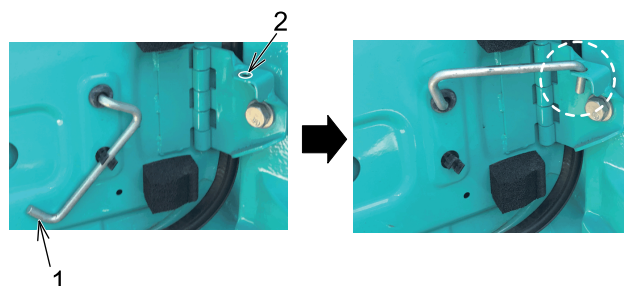


Before performing inspection or maintenance, be sure to fix the opened side doors and the opened engine hood with the support stays to prevent them from moving, resulting in personal injury.

Stay fixed by hole

Open the door, and put stay (1) into fixing hole (2) to fix the stay.

Before closing the door, remove the stay from the fixing hole, return it to the original position, and then close the door.

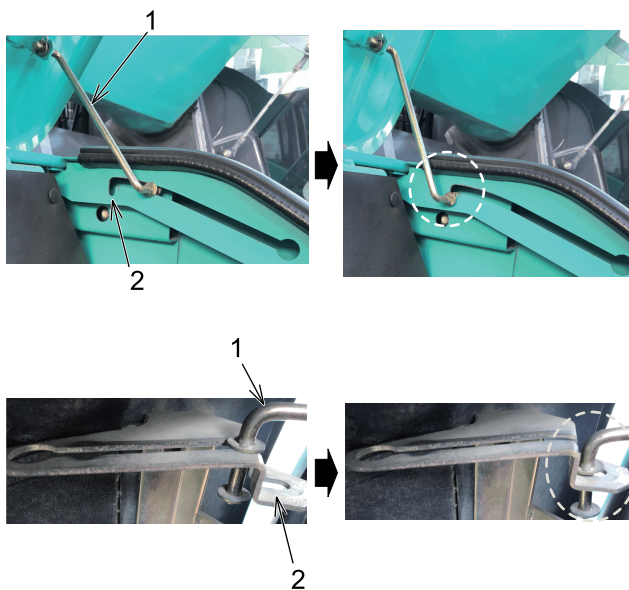


[3. MACHINE OPERATION]

Slide type stay

Open the door, slide stay (1) to fixing part (2) of the guide to fix the stay.

Before closing the door, remove the stay from fixing part (2) and then close the door.



3.2 CHECK BEFORE STARTING ENGINE

The following checkup should be performed once before the first engine startup in a day.

3.2.1 CHECKING COOLANT LEVEL AND REFILLING



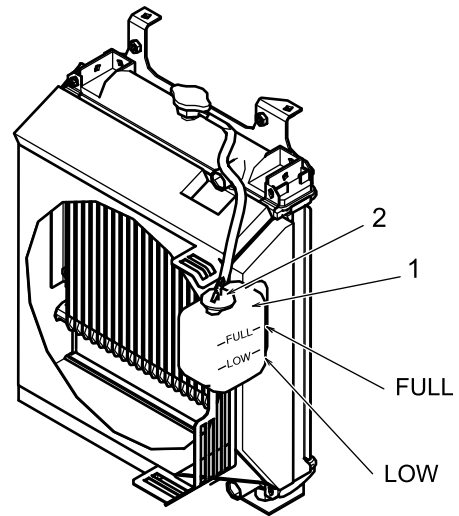
HANDLING OF RADIATOR

- Do not open the radiator cap if not required. Check the coolant of reserve tank (1) when the engine is cooled down.
- After the engine stops, the coolant is hot and the high pressure is accumulated in the radiator. Removing the radiator cap under this condition may cause burns. After the coolant cools down, turn the cap slowly to release the pressure.
- If the water level in the reserve tank drops frequently, immediately contact your KOBELCO authorized dealer.



If the warning is displayed on the multi-display when the engine is running or when the engine switch is turned ON, loosen the radiator cap and pour coolant to the neck of the radiator cap. Then contact your KOBELCO authorized dealer.

1. Use the starter key to open the engine hood on the rear side of the machine and hold it with the stay.
2. Check that the coolant level falls within the range of FULL (upper limit)-LOW (lower limit) of reserve tank (1). If the water level is low, remove the cap of filler port (2) of the reserve tank and pour coolant water to the FULL level.
If the reserve tank is empty, check it for water leaks and check the water level in the radiator. If the water level is low, fill the radiator with coolant and then fill the reserve tank with coolant. Then immediately contact your KOBELCO authorized dealer.
3. After supply, tighten the cap securely.
4. Release the support stay and close the engine hood.



3.2.2 CHECKING ENGINE OIL LEVEL OF ENGINE OIL PAN AND REFILLING



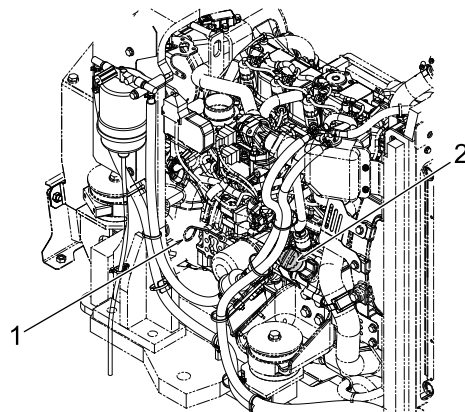
TEMPERATURE AFTER STOPPING ENGINE

Immediately after the engine is stopped, there is a possibility of getting burn with heated parts and oil. Start working after the temperature goes down.

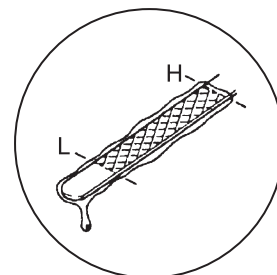
Notice

- Make sure the machine is in a level and firm condition when checking the engine oil level.
- Be sure to check the engine oil level before starting the engine.
- When checking the engine oil level after operation, wait approximately 30 minutes from engine stop before checking it.

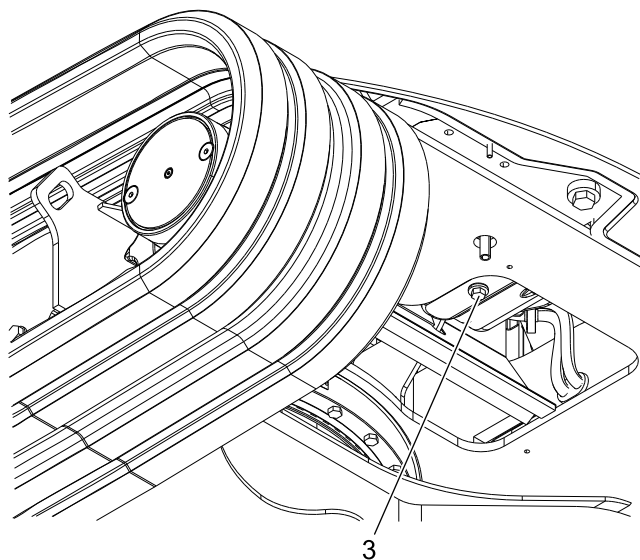
1. Open the engine hood with the starter key and hold it with the stay.
2. Pull out oil level gauge (1) and wipe off the oil with a waste cloth.
3. Insert oil level gauge (1) completely once again and pull it out.



4. When oil level gauge (1) indicates the oil level between "H" (upper limit) and "L" (lower limit), it is proper. When the oil level does not reach "L" level, refill the engine oil from oil filler cap (2). If the oil is significantly contaminated or deteriorated, change it ahead of the periodic replacement interval. For engine oils to use, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.



5. When the oil level is above the "FULL" level, loosen drain cock (3) to drain the excess engine oil and check the oil level once again.
6. Check that the oil level is proper and insert level gauge (1) securely.
7. Remove the support stay and close the engine hood.



3.2.3 CHECKING FUEL LEVEL AND REFUELING



WARNING

REFUELING

- Never use the oil other than diesel fuel as fuel. Check the fuel type again before refueling.
- Be sure to stop the engine before refueling.
- Do not overflow fuel while refueling. Wipe off spilled fuel completely.



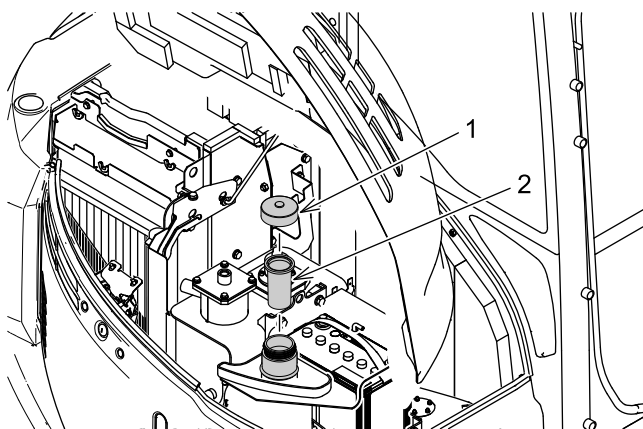
CAUTION

When getting on and off the machine, use the steps and handrails to prevent yourself from falling down or off from the machine.

Notice

- Be careful not to refuel the tank to a level more than necessary (to the top end of tank). There is a possibility of overflowing because the fuel expands as the outside air temperature rises.
- Be sure to use diesel fuel as fuel, which meets the standard of each country. To achieve a good fuel efficiency and exhaust gas property, the engine of this machine uses the electronically controlled fuel injector. Because this device requires high parts precision and high lubricating ability, when low viscosity fuel with low lubricating ability is used, the durability may decrease significantly.

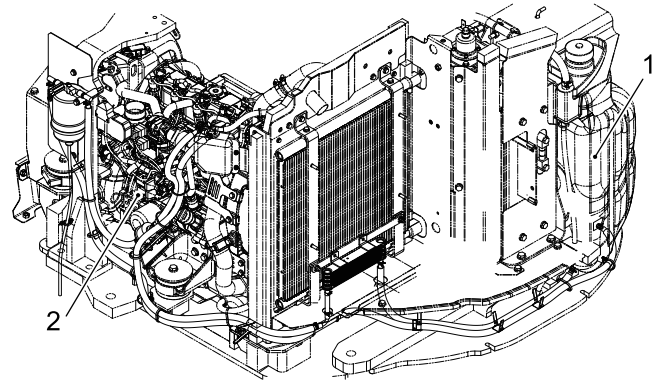
1. Check the multi-display for the fuel level.
After turning the starter switch ON, the fuel level meter is displayed. When the fuel level is low, the pointer points E.
2. Refuel only after stopping the engine.
3. Use the starter key to open the right side cover and hold it with the stay.
4. Turn filler cap (1) to open it.
5. Refuel the machine with strainer (2) attached to the filler port.
When dirt is adhered on strainer (2), take out strainer (2), wash it with light oil or clean it by air blowing, and then attach it to the filler port again.
Fuel tank capacity: See "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4
6. After refueling, tighten filler cap (1) securely.
7. Release the support stay and close the right side cover.



3.2.4 CHECKING FUEL LEAKAGE

Fuel leakage could be caused by a failure of drain plug, a crack of fuel system hoses, or looseness of hose clips.

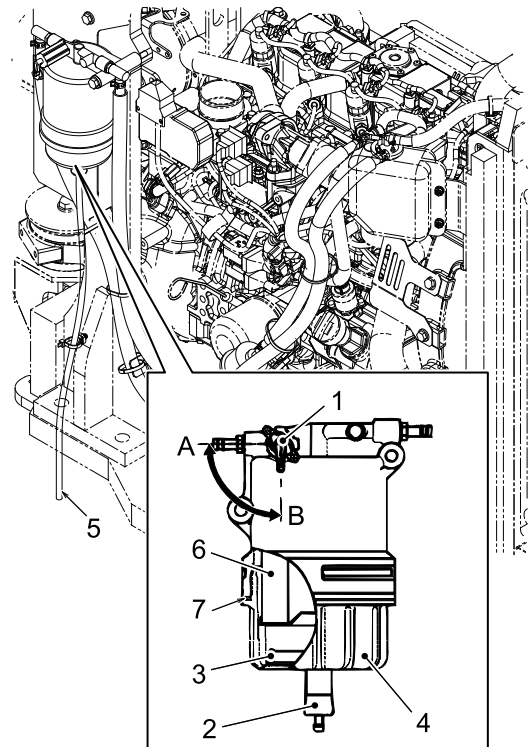
Check the fuel tank (1) and the surrounding of the engine (2). If a fuel leakage is detected, be sure to stop the engine and contact your KOBELCO authorized dealer.



3.2.5 DRAINING WATER SEPARATOR

If red ring (3) of the water separator is sunk to the bottom of cup (4), water does not enter. If red ring (3) floats, water enters under the ring. Drain the mixed water according to the following procedure.

1. Use the starter key to open the engine hood and hold it with the stay.
2. Place a drain oil container under drain hose (5).
3. Raise fuel shutoff valve (1) to "Close" position (A).
4. Loosen drain valve (2) to drain water accumulated in water separator (1) into the container.
5. After draining the water, tighten drain valve (2) securely.
Check the water drained to the container. If that is contaminated significantly, clean the element (6) and the inside of the case (4).
6. Lower fuel shutoff valve (1) to "Open" position (B).
7. Remove the support stay and close the engine hood.



3.2.6 CHECKING OIL LEVEL OF HYDRAULIC OIL TANK



WARNING

PRESSURE WITHIN HYDRAULIC OIL TANK

The inside of the hydraulic tank is dangerous because it is high temperature and pressurized.

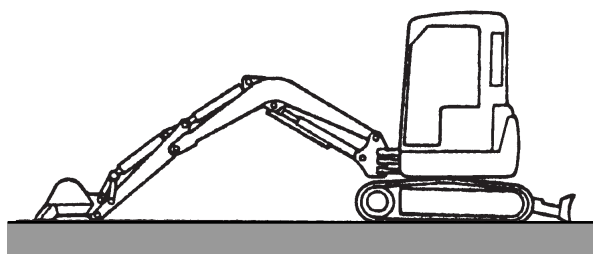
Before removing the filler port plug, stop the engine and then press the top of breather (1) to release the pressure in the hydraulic oil tank.

Notice

For refilling procedures of the hydraulic oil, see "5000 HOUR INSPECTION & MAINTENANCE PROCEDURES" in Chapter 4.

The hydraulic oil tank is on the right side.

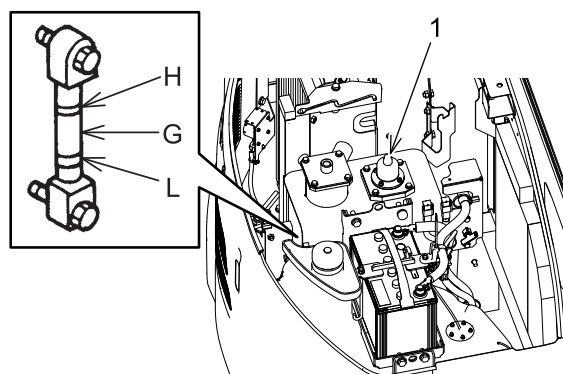
1. Move the machine to a level and firm place.
2. Retract the arm cylinder and bucket cylinder, and place the bucket and dozer on the ground.
3. Stop the engine and move the control lock lever to the "LOCKED" position.



4. Check the oil level through sight level gauge (G) provided on the side of the hydraulic oil tank. If the reading falls within the range of "H" to "L", the oil level is normal.

The oil level varies depending on the oil temperature. Use the following rough standard at inspection.

- Before operation: Near the "L" level (oil temp. 10 to 30 degrees C (50 to 86 degrees F))
- During normal operation: Near the "H" level (oil temp. 50 to 80 degrees C (122 to 176 degrees F))



Notice

Do not supply oil to the "H" level or more.

If the hydraulic oil tank becomes full, it can cause damages to the tank and the components and spray of the hydraulic oil.

3.2.7 CHECKING FAN BELT



INSPECTING AND MAINTAINING THE BELT

Be sure to stop the engine before inspection and maintenance of the engine.

Inspecting and maintaining the running engine may cause severe injury by being caught in the rotating parts, such as the fan and the belt.



Replace the belt with a new one if cracking or breakage is found on the belt by the inspection, slip occurs excessively, or the belt cannot be adjusted to within the adjustment range. Keep the belt away from oils. The service life may be shortened if it slips by oil.

Notice

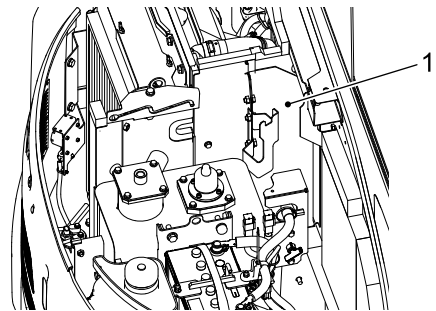
- When the belt is replaced by a new one, run engine at idle for 3 to 5 minutes and recheck and or adjust tension as necessary.
- After running the engine for about 2 hours, a new belt obtains a complete initial elongation.

Check the belts for wear and damage, and also for tension, and adjust them properly in order to maintain the maximum engine performance and the service life.

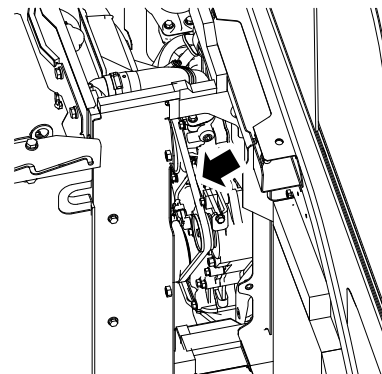
Notice

For adjustment procedures for each belt, see "ADJUSTING FAN BELT" in Chapter 4.

1. Use the starter key to open the right side cover and hold it with the stay.
2. Remove four bolts of cover (1) at the next to the hydraulic oil tank and then remove cover (1).



3. To check the belt tension, press on the center of the belt with the compression gauge. If the deflection falls within the range shown in the following table, it is normal.



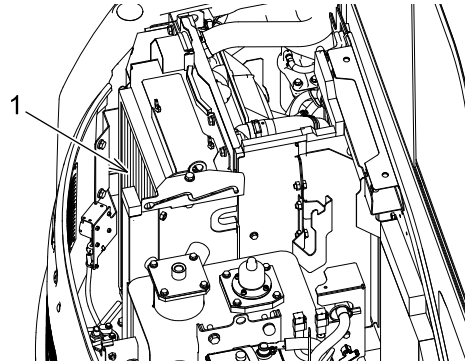
[3. MACHINE OPERATION]

Belt	New Belt Tension mm (inch)	At Inspection mm (inch)	Pushing Force N (lbf)
Fan	8 to 12 (0.32 to 0.47)	10 to 14 (0.39 to 0.55)	98 (22)

4. Install cover (1), remove the support stay, close the right side cover, and then lock it with the starter key.

3.2.8 CHECKING RADIATOR, OIL COOLER AND FILTER

1. Using starter key, unlock right side cover and open it.
2. By visual check, check mud, dust and leaves which contaminate filters (1).
3. When filter is contaminated heavily, refer to "250 HOUR (3-MONTH) INSPECTION MAINTENANCE PROCEDURE" for Inspection and maintenance.



3.2.9 ADJUSTMENT OF OPERATOR'S SEAT



ABOUT ADJUSTMENT OF OPERATOR'S SEAT

- Adjust the operator's seat before the operation or when the operator changes.
- When adjusting the operator's seat, pay attention to hands in order not to be caught between the handle and the seat stand.

Notice

For adjusting procedures of operator's seat, see "HANDLING OF OPERATOR'S SEAT" in Chapter 2.

Adjust the operator's seat in a way so that the operator can operate the control levers, pedals and switches freely, with his/her back contacting with the backrest of the operator's seat.



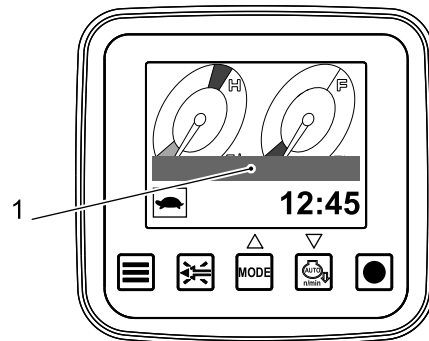
3.2.10 CHECKING MULTI-DISPLAY

Before starting the engine, check the display status of the multi-display on the gauge cluster.

CAUTION

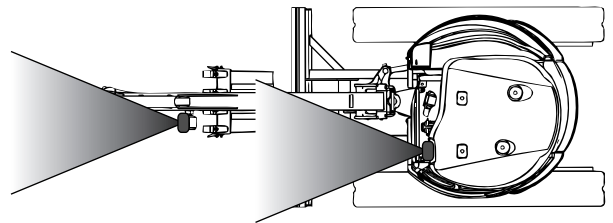
When the warning is displayed on the multi-display, ask your KOBELCO authorized dealer for inspection.

1. Make sure the pilot control shut-off lever is in the "LOCKED" position.
2. Make sure all control levers are in the "NEUTRAL" position.
3. Turn the key of the starter switch to the "ON" position.
4. Check that no warning (1) is displayed on the multi-display.



3.2.11 CHECKING WORKING LIGHT

While the starter key switch is in the "ON" position, press the working light switch to turn on the working lights on the boom and on the left side of the front (cab only). If they do not light, presumably light bulbs are burned out or electrical wire is broken. Contact your KOBELCO authorized dealer for repair.



3

3.2.12 CHECKING OF AIR CLEANER INLET

- Check that no mud, leaves, and snow, etc. are accumulated around the air cleaner inlet.
- When it is covered with snow, remove it.
- When washing the machine with high-pressure water for cleaning, be careful not to let the water enter the air cleaner inlet.

3.3 STARTING ENGINE



WHEN STARTING ENGINE

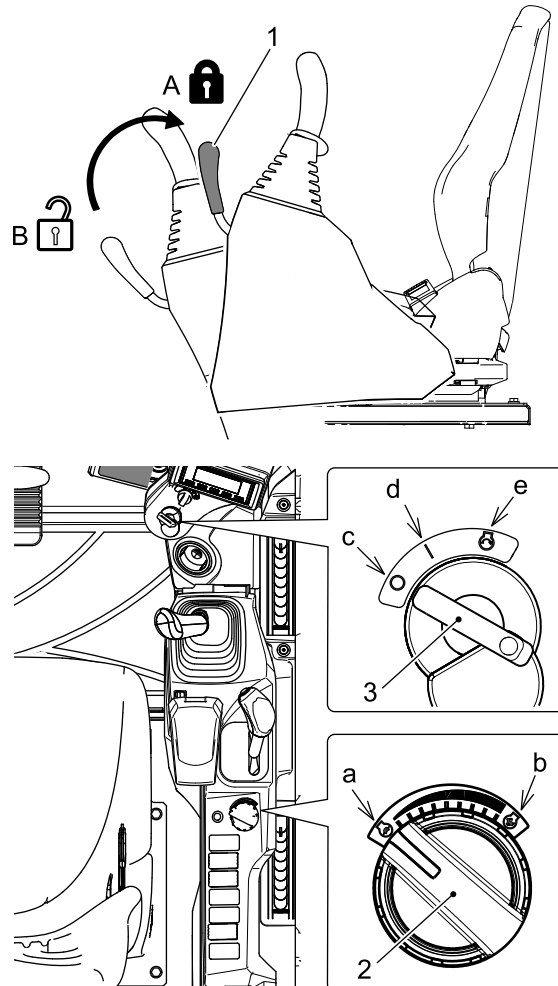
After making sure that no one is stayed and no obstruction is left around the machine, sound horn and start the engine.

Notice

- Do not hold the starter key switch in the START position for more than 15 seconds. If the engine does not start, return the starter key switch to the OFF position, wait 30 seconds, and then try it again.
- When starting engine, if warning is displayed on the multi-display, stop engine immediately and identify the cause, and then repair it if necessary.

3.3.1 START-UP UNDER NORMAL TEMPERATURE CONDITIONS

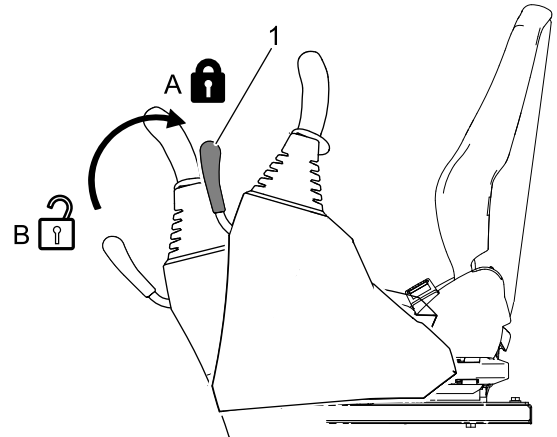
1. Make sure that control lock lever (1) is in the "LOCKED" position.
A: "LOCKED" position
B: "UNLOCKED" position
2. Make sure all control levers are set to the neutral positions.
3. Turn engine throttle (2) to the low idle position (a).
4. Turn the key of starter switch (3) to the "ON" position (d) and check the operation status of the multi-display.
5. Turn the key of starter switch (3) to the "START" position (e) to start the engine.
6. Release key (3) immediately after the engine starts. The starter key will return to the "ON" position (d) by itself.



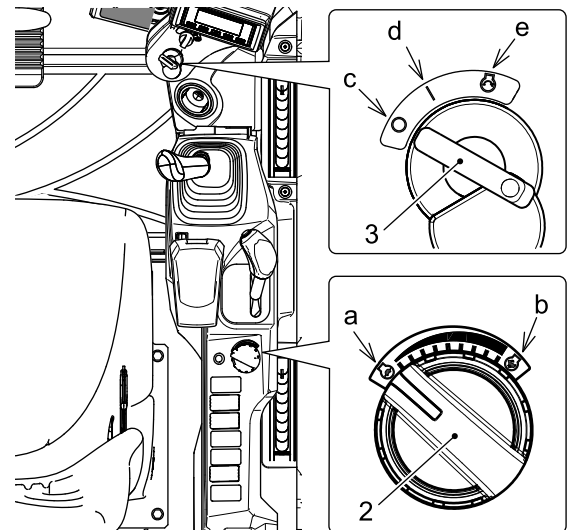
3.3.2 START UP IN COLD CONDITIONS

In cold weather, due to increase in oil viscosity and decrease in battery performance, starting the engine may be difficult.

1. Make sure that control lock lever (1) is in the "LOCKED" position.
A: "LOCKED" position
B: "UNLOCKED" position
2. Make sure all control levers are set to the neutral positions.



3. Turn engine throttle (2) to the low idle position (a).
4. Turn starter switch (3) to "ON" position (d) and hold it.
When the coolant temperature decreases to 5 degrees C (41 degrees F) or less, the glow plug is preheated automatically by the engine coolant temperature sensing.
The colder the coolant temperature becomes, the longer the preheating time becomes. When the coolant temperature is 0 degree C (31 degrees F), the preheating time is 5 seconds, and the longest is 15 seconds.
5. After the preheating, turn the key of starter switch (3) to "START" position (e) to start the engine.
6. Release your hand from key (3) immediately after the engine starts. The starter key will return to "ON" position (d) automatically.



3.3.3 USING JUMPER CABLES



STARTING ENGINE BY JUMPER CABLES

- Combustible gas (hydrogen gas) is generated in the battery. Do not allow sparks or flames to come in contact with the battery to avoid catching a fire and triggering an explosion.
- Do not allow the normal machine to come in contact with the disabled one to skip negative side cable connection.
- Wear protective glasses and rubber gloves when using jumper cables to start the engine.
- Never allow the positive and negative side clips of the jumper cables to come in contact with each other when connecting the jumper cables.
- Do not mistake positive (+) for negative (-) or vice versa in the jumper cable connection. When the negative jumper cable is finally connected to the upper structure of the disabled machine, it may generate sparks. Connect the jumper cable to a ground surface as far as possible from the battery.
- If the battery electrolyte is frozen, do not attempt to start the engine with another power supply.
- Wrong connection of the jumper cables may cause explosion of the battery.
- The starting system of this machine is 12 volts. Therefore the boost battery voltage in use should be 24 volts. The application of high voltage employed for a welding machine, etc. in engine start may cause damage to the electrical system.



- Use the battery of which the capacity is equivalent to that of the disabled machine for the normal machine.
- Select the jumper cables and clips with a proper size for the battery.
- Check the jumper cables and clips for damage and corrosion.
- Connect the clip securely.
- Check that the control lock lever is in the "LOCKED" position.
- Check that each control lever is returned to the neutral position.
- The starter switches on both the normal and disabled machines must be held in the "OFF" position until the cable connections are completed. Because when the power is connected, it may cause unexpected move of the machines and it is dangerous.

1. For the normal machine, put the attachment on the ground, return all control levers to the neutral position and then set the control lock lever to the "LOCKED" position.

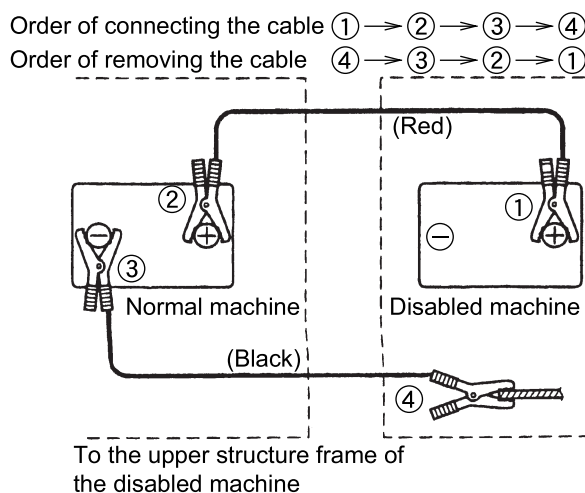
2. Set the starter switch to the "OFF" position for both the normal machine and the disabled machine.

3. Remove the terminal cover of the battery, and connect the jumper cable (red) clip to the positive (+) terminal on the battery of the disabled machine.

4. Connect the jumper cable (red) clip to the positive (+) terminal on the battery of the normal machine.

5. Connect the jumper cable (black) clip to the negative (-) terminal on the battery of the normal machine.

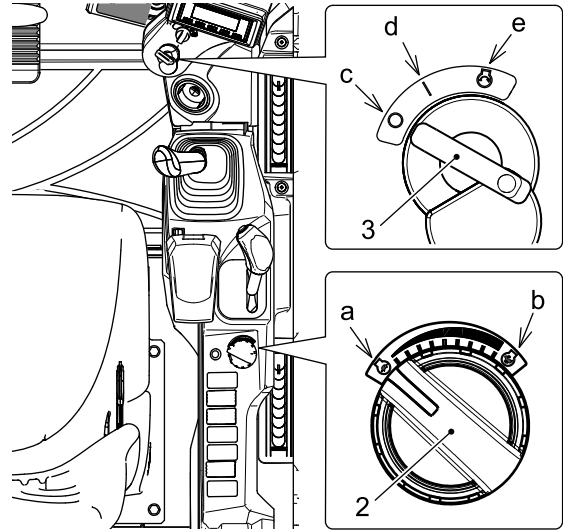
6. Finally, connect the clip of the other end of the negative (-) jumper cable (black) to the upper structure frame of the disabled machine.



7. Start the engine of the normal machine, and run it for about 10 minutes at high idle.
The battery of the disabled machine is partially charged.
8. Start the engine of the disabled machine.
9. Soon after the starting of the engine of the disabled machine, immediately remove the jumper cables in the reverse order of the connection.
10. Finally, check and repair the cause of the problem of the start/charging system on the disabled machine.

3.4 STOPPING MACHINE ENGINE

1. Place the attachment on the ground before stopping the engine.
2. Pull up the control lock lever to the "LOCKED" position.
3. Turn engine throttle (1) to the low idle position (a).
4. Turn starter key (2) to the "OFF" position (c) to stop the engine.
5. Remove starter key (2) and store it.



3.5 CHECK AFTER STARTING ENGINE

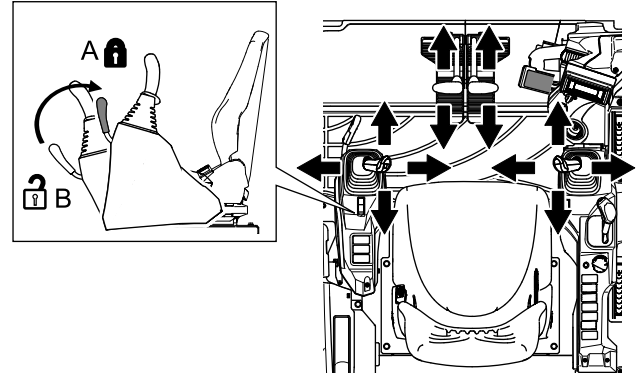
Before operation, be sure to inspect and check the machine after starting the engine. If any failures are found, contact your KOBELCO authorized dealer.

3.5.1 CHECK OF PILOT CONTROL LOCK LEVER

Check that the locking function of the control lock lever is proper.

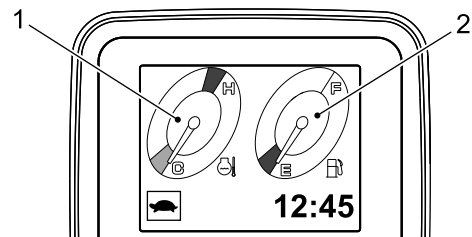
See "PILOT CONTROL LOCK LEVER" in Chapter 2.

1. Move the control lock lever to the "LOCKED" position.
2. Make sure that movement of the attachment, swing and travel, are disabled when the control lock lever is in the "LOCKED" position.



3.5.2 CHECK OF ENGINE AND MULTI-DISPLAY OPERATION

1. Check the engine for oil or water leakage the engine and the area around the engine.
2. Check that no warning is displayed on the multi-display and the pointer is at a proper position on engine coolant temperature meter (1) and fuel level meter (2).
3. Check that the exhaust sound, the color of exhaust gas and vibrations of the engine are normal.



CAUTION

- Inspection with the engine running shall be done by a person other than the operator and the operator shall stay seated during inspection.
- When the warning is displayed on the multi-display, ask your KOBELCO authorized dealer for inspection.

Notice

Color classification for identifying the exhaust gas state (After warming-up at no load)

Colorless or light blue: Normal (Perfect combustion)

Black: Abnormal (failure of exhaust gas cleaning device)

White: Abnormal (failure of exhaust gas cleaning device)

The smoke may look white in winter due to cold weather.

3.6 WARMING-UP



ABOUT WARMING-UP

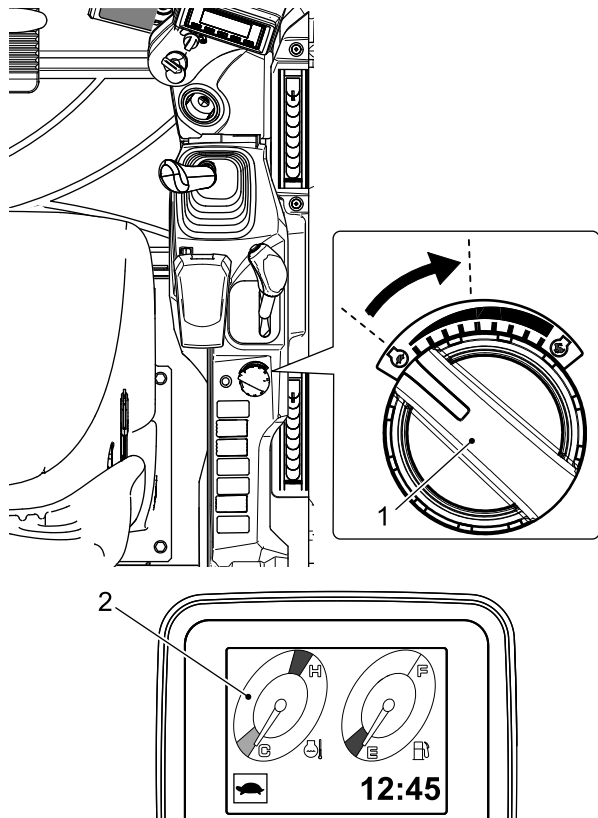
- If the attachment/equipment is operated without enough warming-up operation, the response of the attachment to the control lever is delayed and sometimes it moves in an unexpected manner for the operator. Therefore, be sure to perform the warm-up operation. Especially in cold weather, a sufficient warming-up operation is necessary.

3.6.1 ENGINE WARMING-UP

Notice

Avoid idling because it may cause poor engine performance and trouble.

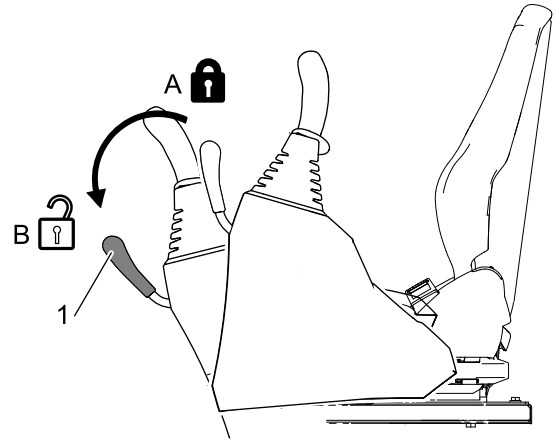
1. Run the engine for about 5 minutes with no load at middle speed by setting engine throttle (1) to the middle between the low idle and the full speed positions.
2. When the pointer of engine coolant temperature meter (2) moves and points somewhere in the white range, the warming-up operation of the engine is completed.



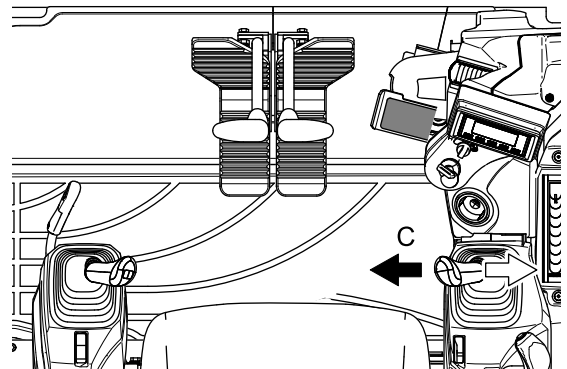
3.6.2 WARMING-UP HYDRAULIC OIL

Perform warming-up of the hydraulic oil after engine warming-up is completed.

1. Push control lock lever (1) down and forward and set it at the "UNLOCKED" position.
2. Raise the boom to the height where the bucket can be operated.

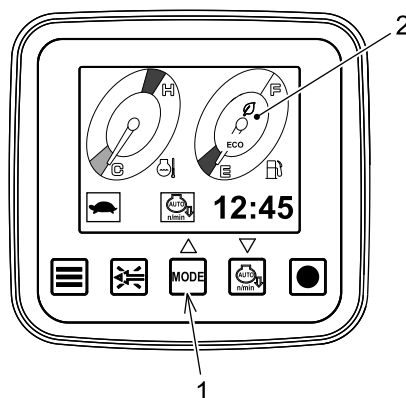


3. Move the right control lever slowly toward bucket digging side (C) to the stroke end position and perform relief operation for about 2 minutes.
4. After that, slowly extend and retract each cylinder several times and circulate the warm hydraulic oil in all operation circuits.
5. When the warming-up is not enough, perform the relief operation at bucket digging side (C) for another 2 minutes, and after that, extend and retract each cylinder several times, and circulate the warm hydraulic oil in all operation circuits.
6. Also perform swing and traveling operations slowly to circulate the warm hydraulic oil.



3.7 WORK MODE SELECT SWITCH

Press work mode select switch (1) to switch to ECO mode and display green mark (2) on the fuel level meter. The "ECO mode" focuses on a low fuel consumption operation.



3.8 MACHINE OPERATION

The machine operation procedures described below provide operators with basics which should be learned and understood, thoroughly. You can further improve your operational skill by thoroughly learning the performance and structure of this machine.

3.8.1 PRECAUTIONS OF MACHINE OPERATION



WHEN OPERATING MACHINE

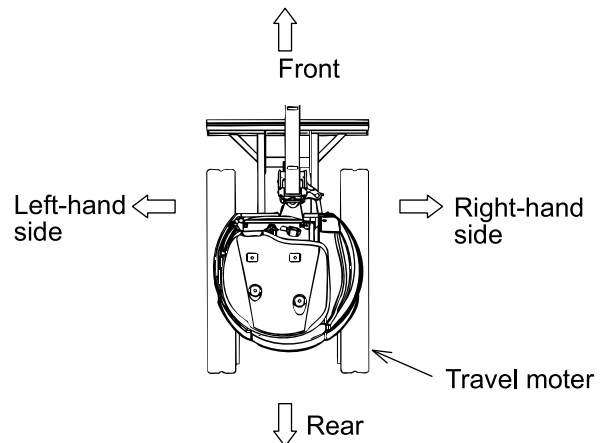
- When starting the machine, check the safety around the machine and sound the horn before starting the machine.
- Keep the area around the machine clear of people.
- When the control lever is operated during the auto deceleration operation, the engine speed increases abruptly. Operate the control lever carefully.



- The indications on the multi-display do not assure the condition of the devices. Daily maintenance should be performed not only by seeing the multi-display but also by following the procedures described in this manual.
- When abnormality was detected during operation, stop the machine immediately and take proper measures.
- The machine should not be operated until the failure is repaired. Operating the machine with the failure that has not been repaired may result in a serious accidents.

FRONT/REAR AND LEFT/RIGHT OF MACHINE

In this manual, front/rear and left/right are determined by looking the forward direction from the operator's seat with the travel motors at the rear side.



3.8.2 TRAVEL PROCEDURES



WARNING

ABOUT TRAVELING

- Confirm the travel motor position before traveling. When the travel motor is positioned at the front side, the machine moves reversely to travel lever operations.
The normal travel control can be performed when the travel motor is at the rear side of the machine and the front idler is at the front side of the machine.
- Sound the horn to warn the workers in the working site.



WARNING

ABOUT TRAVEL SPEED

During traveling, do not change the travel speed. Also, the travel speed should be set to the LOW (1st) speed when the machine is traveling on a downhill, or being loaded to/unloaded from a trailer. A sudden change of the machine stability could cause personal injury.

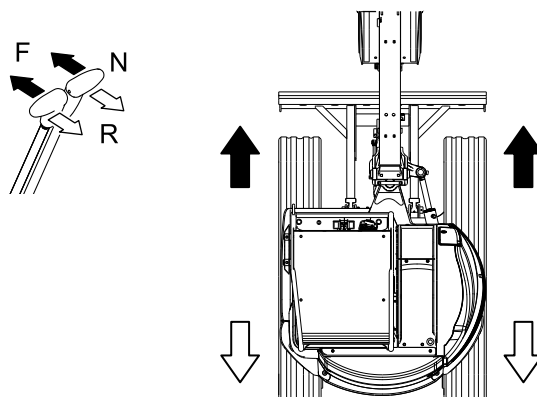
Before starting traveling operation move the control lock lever to "UNLOCKED position" and set the bucket at the height of 30 to 40 cm (12 to 16 inch) above the ground.

2. Pull the dozer control lever to raise the dozer.

F: Forward traveling

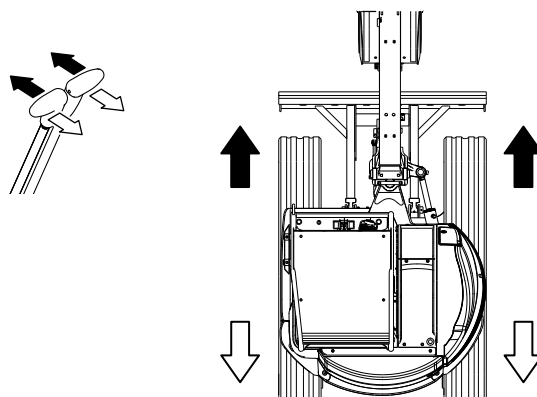
N: Neutral (Stop)

R: Backward traveling



Forward/Reverse traveling

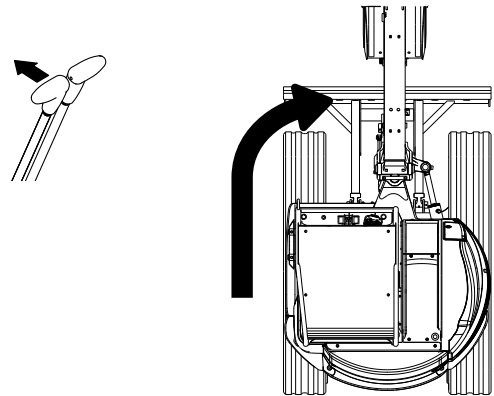
- Push (forward) or pull (backward) both the left and right travel levers simultaneously.
Both the forward and reverse travel speed can be changed by lever displacement.



Pivot turn

This operation drives only one crawler to turn the machine.

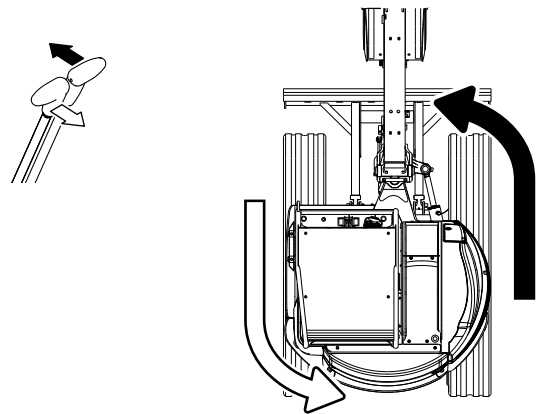
- Operate one of the two travel levers to make a pivot turn.



Spin turn

This drives the right and left crawlers in opposite direction each other to turn the machine on the spot.

- Push one of the two travel levers forward and pull the other lever backward simultaneously.



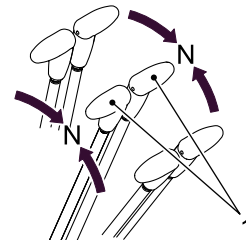
STOP TRAVELING



ABOUT STOP TRAVELING

Do not stop the machine suddenly, but stop it after slow down the speed as much as possible.

- Put both travel levers (1) in the "NEUTRAL (N)" position.
The machine stops traveling.

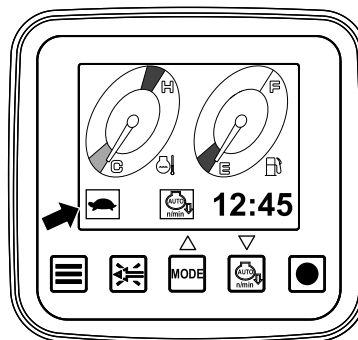
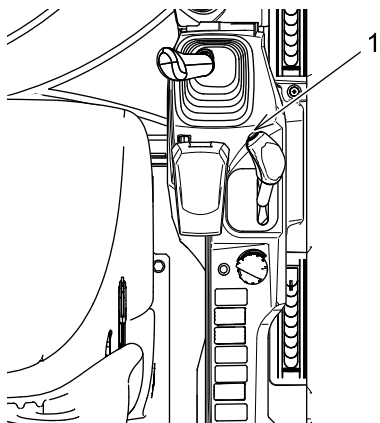


3.8.3 TRAVEL SPEED SELECT SWITCH



ABOUT TRAVEL SPEED

The travel speed should be set to the LOW (1st) speed when the machine is traveling on a downhill, or being loaded to/unloaded from a trailer. A sudden change of the machine stability could cause personal injury.



Each time the engine is started, the travel speed is automatically set to the LOW 1st (turtle) speed. Press switch (1) on the dozer operation lever and then the travel speed changes to the HIGH (2nd) speed and the icon displayed on the multi-display changes to the HIGH (2nd) speed (rabbit).

LOW 1st speed: turtle



Set to LOW 1st speed when moving the machine on the rough or soft ground, slope, or in the narrow place, or when powerful tractive force is required.

HIGH 2nd speed: rabbit



Set to HIGH 2nd speed when moving the machine on a level and firm ground.

Notice

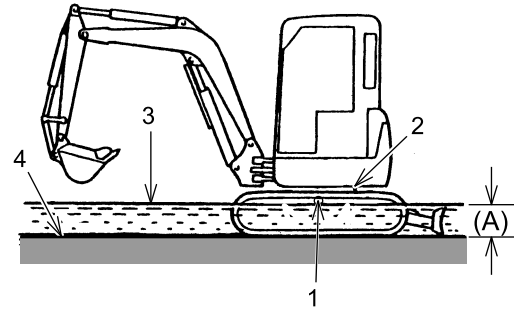
The HIGH (2nd) speed is automatically switched to the LOW (1st) speed when the load of traveling becomes high and automatically returned to the HIGH (2nd) speed when the load is lowered.

3.8.4 MACHINE OPERATION IN WATER OR ON SOFT GROUND

Notice

Take enough care not to immerse the swing bearing, swing pinion and swivel joint into water or soil. When the machine is sunk to the level of or above the swing bearing in the water or soil, the swing bearing and others may be worn abnormally if it is used without any treatment. Apply grease to the greasing points.

- If the bottom of a river is flat and it flows slowly, the machine can travel in the water up to the depth of the center of upper roller (A).
 1. Upper roller
 2. Swing bearing
 3. Water surface
 4. River bottom
- When crossing a river, carefully cross the river while checking the condition of the river bottom by the bucket, etc. Never enter the water over the depth of (A).
- On a soft ground, the machine may sink gradually. Pay attention to the travel system and the water depth all the time.
- After traveling in seawater, wash the machine carefully to remove salt.
- On parts soaked in the water for a long time, use a grease gun to apply grease securely, until the old grease comes out from the inside.



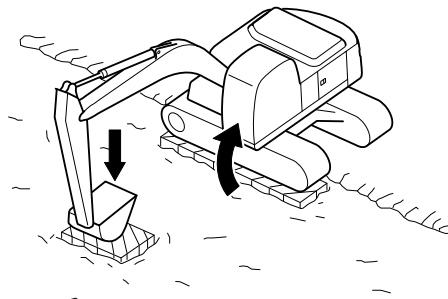
3.8.5 GETTING OUT OF SOFT GROUND

Avoid traveling on a soft ground if possible.

Be careful not to get stuck in mud. In case of being stuck in the mud, get out of it using the procedure below.

WHEN ONE SIDE OF MACHINE GETS STUCK IN SOFT GROUND

- When one side of the machine gets stuck in the soft ground, push the bottom of the bucket against a plank or others laid on the ground to lift up the stuck shoe, and put logs or lumbers beneath the crawler belt to escape from the soft ground.



Notice

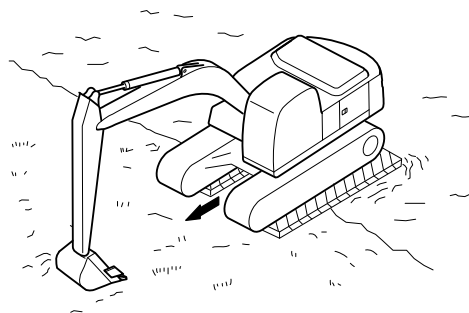
When using the boom and arm to lift up the machine, push the bottom of the bucket, not the teeth, against the ground.

WHEN BOTH SIDES OF MACHINE GET STUCK IN SOFT GROUND

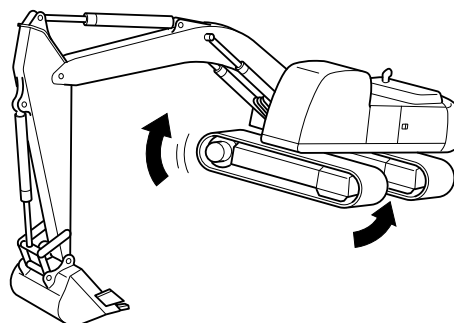
CAUTION

Operate the machine at the operator's seat. Keep the area around the machine clear of people.

- When both sides of the crawlers get stuck in the mud and the machine does not move due to slip, put logs or lumber as described above, lower the attachment to the front ground, pull the arm just like digging, push the travel levers forward, and pull out the machine.



- If the machine cannot travel due to highly tensed crawlers caused by clogged mud and gravel in the crawlers after traveling on the soft ground, lift each crawler off the ground by pushing the boom and arm against the ground and shake the mud or gravel off the crawler, and then get out of the soft ground. Gravel, or mud clogged in the crawler can be shaken off by lifting the crawler up and moving it forward and backward.



3.8.6 SWING AND ATTACHMENT/EQUIPMENT OPERATIONS

The following is the explanation of operation of the standard attachment/equipment. As to the machine equipped with a special attachment, read the operation manual of the special attachment, too.

The operation is explained according to the ISO pattern. As for the other operation patterns, see "MULTI-CONTROL VALVE" in "MACHINE FAMILIARIZATION" or "OPTIONAL EQUIPMENT".



ABOUT THE USE OF THIS MACHINE

To operate this machine, fully read the safety precautions of this manual and understand them thoroughly.



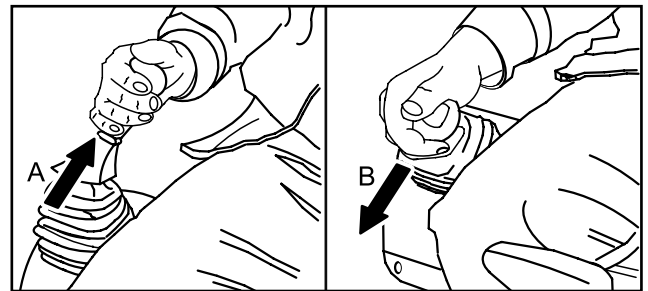
INTERFERENCE BY FRONT ATTACHMENT

Check clearance between the front attachment and the operator's station and other parts of the machine before starting operation because a certain kinds of front attachment and combination of the options installed on the base machine may cause the front attachment to interfere with the operator's station or other parts of the machine.

BOOM OPERATION

To operate the boom, move the right control lever forward and backward. Speed of the boom is controlled by the displacement of the control lever.

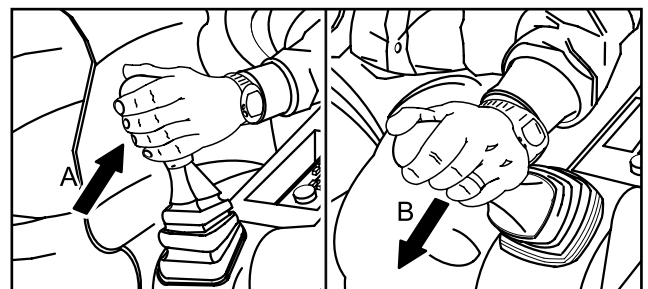
- A: Pull the right control lever backward to move the boom up.
- B: Push the right control lever forward to move the boom down.
- Return the right control lever to the neutral (center) position to stop the boom.



ARM OPERATION

To operate the arm, move the left control lever forward and backward. Speed of the arm is controlled by the displacement of the control lever.

- A: Pull the left control lever backward to move the arm closer to the cab (Arm in).
- B: Push the left control lever forward to move the arm forward and away from the cab (Arm out).
- Return the left control lever to the neutral (center) position to stop the arm.

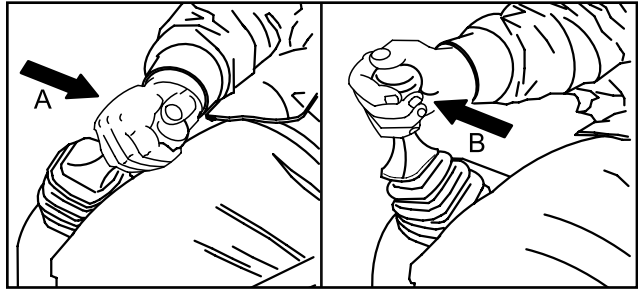


[3. MACHINE OPERATION]

BUCKET OPERATION

To operate the bucket, move the right control lever left and right. Speed of the bucket is controlled by the displacement of the control lever.

- A: Move the right control lever left to move the bucket to the digging side.
- B: Move the right control lever right to move the bucket to the dumping side.
- Return the right control lever to the neutral (center) position to stop the bucket.



SWING OPERATION

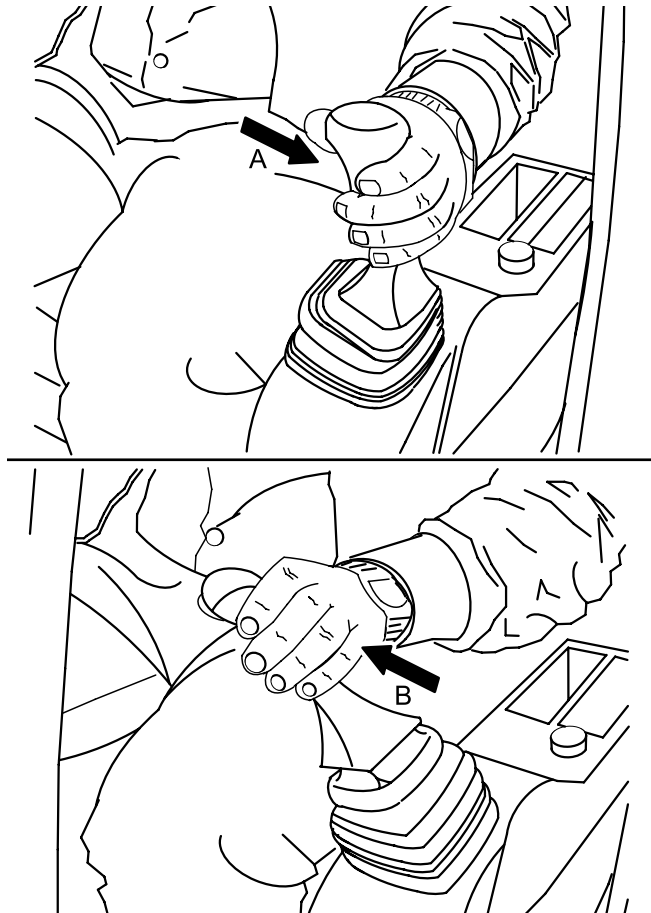


PRECAUTIONS TO PREVENT DANGER IN SWINGING

Make sure that the swing area and the surroundings are clear of obstacles and people before beginning operation. Sound the horn or send signals to warn people before starting to operate the machine.

To perform the swing operation, move the left control lever left and right. Speed of the swinging is controlled by the displacement of the control lever.

- A: Move the left control lever left to swing the machine left.
- B: Move the left control lever right to swing the machine right.
- Return the left control lever to the neutral (center) position to stop the swinging.

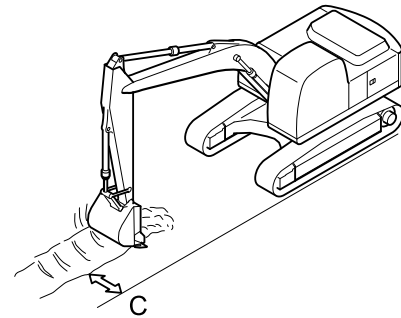
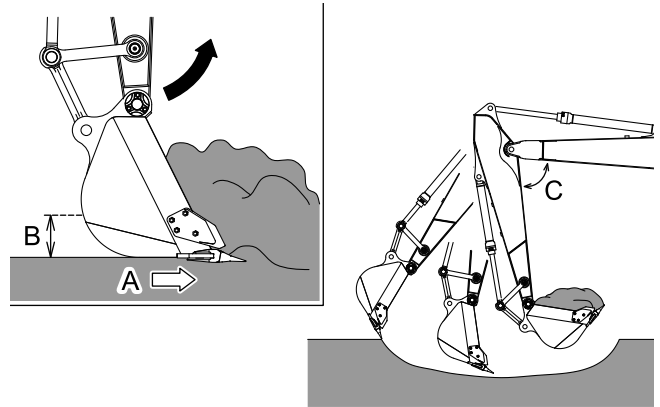


3.9 WORK PROCEDURES OF MACHINE

3.9.1 DIGGING WORK

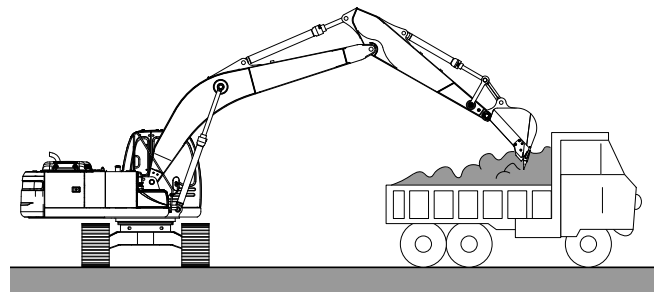
For digging work, mainly the arm crowding force is used, and the bucket scooping force may be used if necessary.

- When a strong digging force is required, dig slowly while keeping angle (C) between the boom and the arm at approximately 90 to 110 degrees. When lowering the boom, avoid rapid operations. Especially, urgent stop during boom "DOWN" has a great impact on the machine, resulting in adverse effects on parts.
- Point the bucket tooth tips to digging direction (A) as much as possible, and dig with the bucket positioned at shallow depth (B) by operating the arm and the bucket. This will reduce the digging resistance and damage to the tooth tips.
- If soil does not fall out easily, set the bucket in the bucket out position and move the bucket a few times by the control lever. Never extend and retract the bucket cylinder repeatedly with the boom cylinder and the arm cylinder fully extended or retracted to fall out the soil.
- When digging a wide trench, dig both sides of it first and dig the center last. To improve the efficiency, attach a bucket suitable for trenching and place the crawlers parallel (C) to the trench to dig.



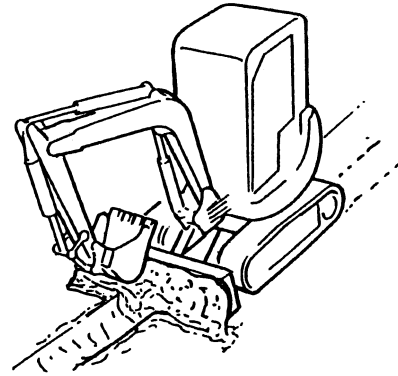
3.9.2 LOADING WORK

- Before performing loading and unloading, set a dump truck on a place where the dump truck can be easily seen from the operator with the smaller swing angle.



3.9.3 GROUND LEVELING WORK

1. For backfilling and leveling work after digging, use the dozer.
2. Scrape the embankment from the top surface. If the load on the machine is too much, adjust the dozer height by using the dozer control lever to move the dozer up and down.



3.9.4 SIDE DITCH DIGGING WORK



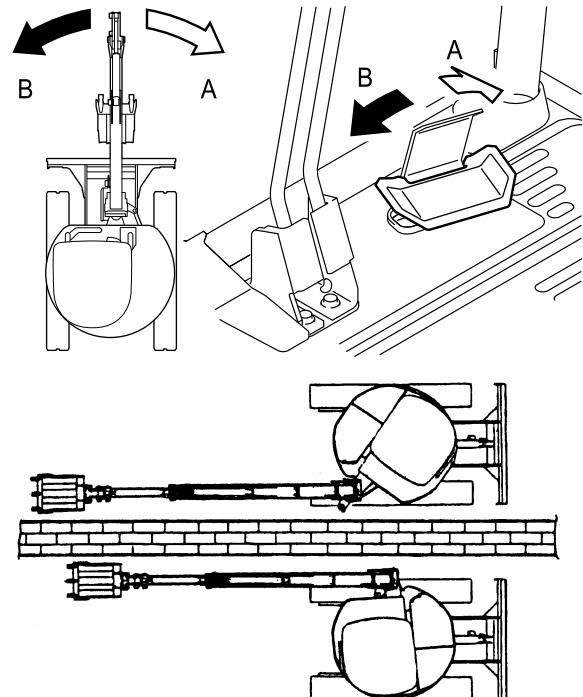
PAY ATTENTION TO SURROUNDINGS

As the boom swing operation especially has a wide working area, always pay attention to the surroundings when operating the attachment.

Depressing the left and right side of the boom swing foot pedal makes the boom swing to the left/right, allowing you to perform the side ditch digging in a narrow place. Depress the left and right side of the pedal to swing the boom to the left and right respectively. You can perform the side ditch digging as shown in the right figure.

A: Right swing

B: Left swing



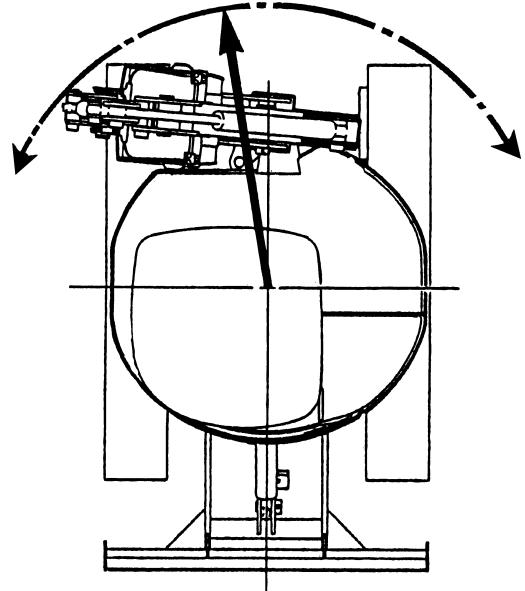
3.9.5 WORK IN NARROW PLACE

When working in a narrow place, the position as shown in the figure below enables swing in a relatively narrow place.

Notice

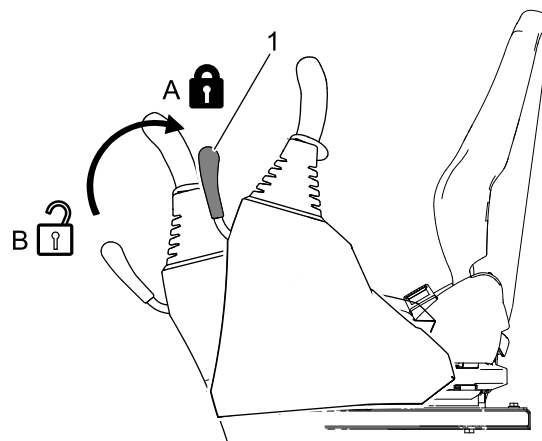
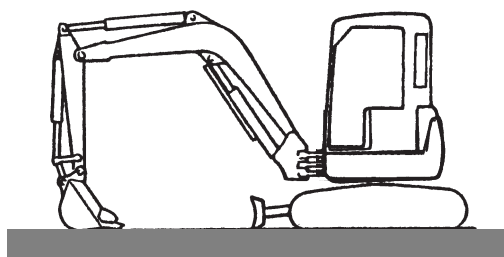
During swing, pay attention to the interference with the attachment.

1. Fully extend the arm and bucket cylinders, and fold the bucket.
2. Fully extend the boom cylinder.
3. Depress the right foot pedal to swing the boom.
4. Use the control lever to swing the machine.



3.10 ALWAYS PARK MACHINE PROPERLY

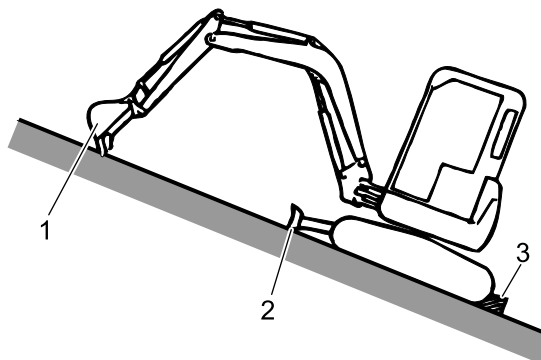
1. Travel machine to a safe location on firm, level ground.
2. Lower the attachment to the ground.
If equipped with a dozer blade, lower it to the ground.
3. Set the auto deceleration switch to the "OFF" position.
4. Turn engine throttle to the low idle position.
5. Pull the control lock lever(1) to the locked(up) position(A).
If not locked, accidental or unintended contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.
6. Turn the starter switch to the "OFF" position and remove the key.
Close and lock the windows and the cab door.
Check the windows, doors and all other machine access covers are locked and secured..



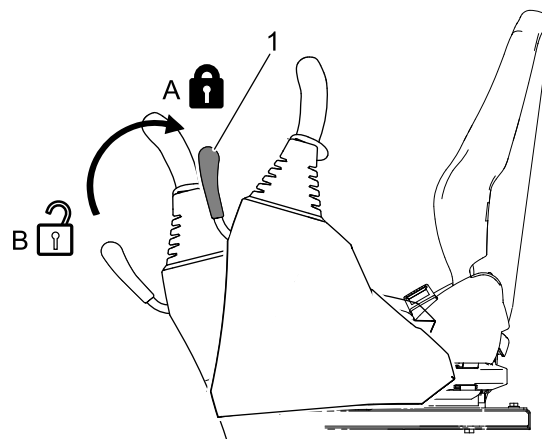
3.10.1 PARKING MACHINE ON SLOPE

If the machine must be parked on a slope.

1. The bucket (1) and dozer (2) into the ground so that the machine does not move.
2. Set the auto deceleration switch to the "OFF" position.
3. Turn engine throttle to the low idle position.



4. Pull the control lock lever(1) to the locked(up) position(A).
If not locked, accidental or unintended contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.
5. Turn the starter switch to the "OFF" position and remove the key.
Close and lock the windows and the cab door.
Check the windows, doors and all other machine access covers are locked and secured.
6. Block(3) the tracks in the front and the rear.



3.11 HANDLING OF RUBBER CRAWLER SHOES

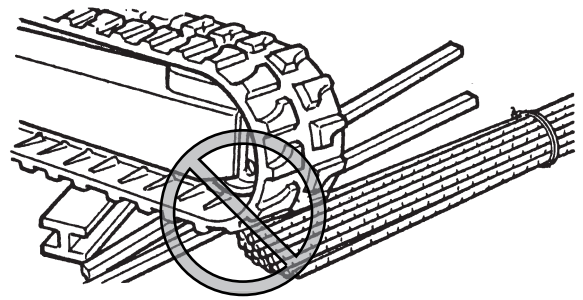
3.11.1 WARRANTY ON RUBBER CRAWLER SHOES

Our warranty does not cover damage caused by prohibited works, such as work in a site where the rubber track shoe may be cut by edges of steel plate/U-shaped gutter/blocks, and sharp edges of crushed stones/rocks and reinforcing steel bars/iron scraps.

3.11.2 PROHIBITIONS ON USE OF RUBBER CRAWLER SHOES

Avoid the following works.

Work and swing on a crushed-stone ground, rugged and hard bedrock, reinforcing steel bars, iron scraps or edge of steel plate will cause damage on rubber crawler shoes.

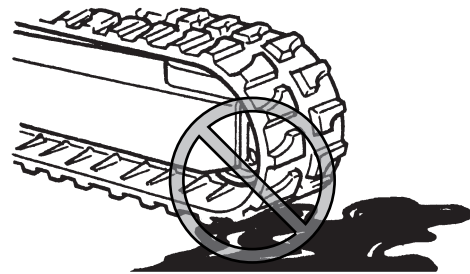


Where there are many stones of various sizes (for example, riverbed), the rubber track shoes may be damaged or easily come off due to biting of stones. If you perform dozing operation forcibly with skidding shoes, it will shorten the service life of the rubber crawler shoes.

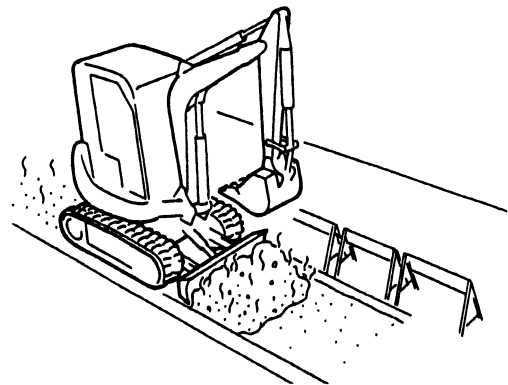


Prevent oil, fuel or chemical solvent from attaching the rubber crawler shoes.

If such substance is attached, wipe it off immediately. Do not travel over an oil puddle on the ground.



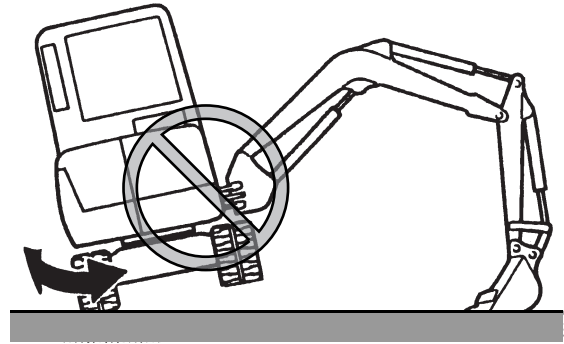
Do not enter a place with high temperature due to fire or steel plate under the blazing sun. Also, do not perform the leveling of asphalt.



When storing the machine for a long period (three months or longer), store it indoors away from direct sunlight and rain.

[3. MACHINE OPERATION]

If you move the machine with one crawler while the other is raised by the attachment, the rubber crawler shoe may come off or be damaged.



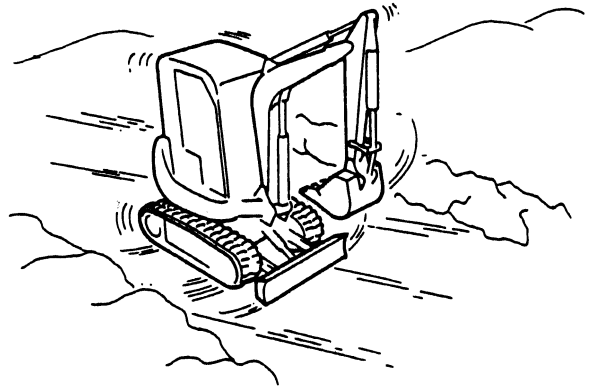
3.11.3 PRECAUTIONS FOR USE OF RUBBER CRAWLER SHOES

CAUTION

Use the rubber crawler shoes with a proper tension to prevent them from coming off.
If the tension is loose, it causes coming off of rubber crawler shoes under the conditions below.
Use extreme caution during the operation even when the tension is proper.

Note the followings during the work.

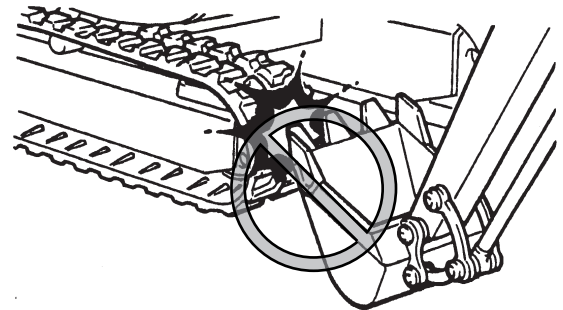
On a snow or icy road, rubber crawler shoes can skid very easily.
Do not use rubber crawler shoes on a snow or icy slope.



Avoid a spin turn on a concrete road.

Do not make an rapid turn, which causes early wear or damage to the rubber crawler shoes.

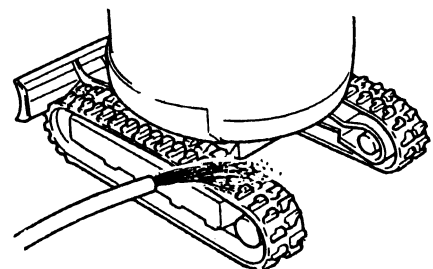
Be careful not to damage the rubber crawler shoes with the bucket during the work.



Do not operate the machine while rubbing the rubber crawler shoes against a concrete block or wall.

Slowly lower the machine which was raised using the attachment.

Work in a salty or corrosive environment affects the adhesive applied to core metal. Avoid such locations or wash the rubber crawler shoes after use.

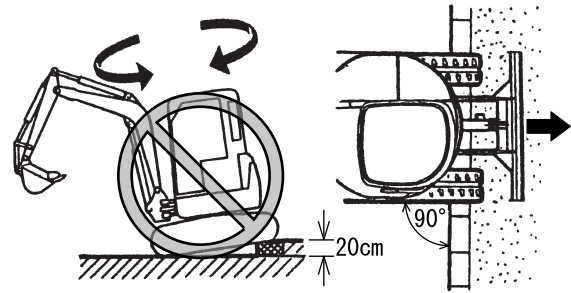


[3. MACHINE OPERATION]

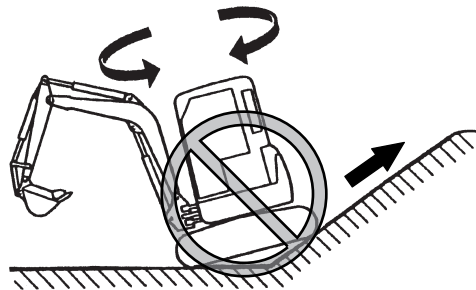
Use the rubber crawler shoes at a temperature between -25 to +55 degrees C because of physical properties of rubber.

Do not turn on an uneven surface (about 20 cm) such as curbs or rocks.

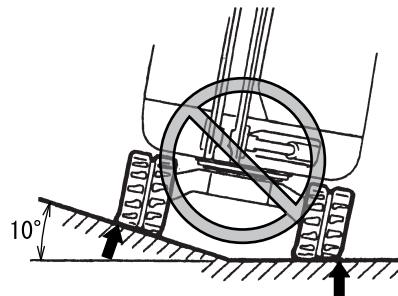
To travel across an uneven surface, go over it in the right angle.



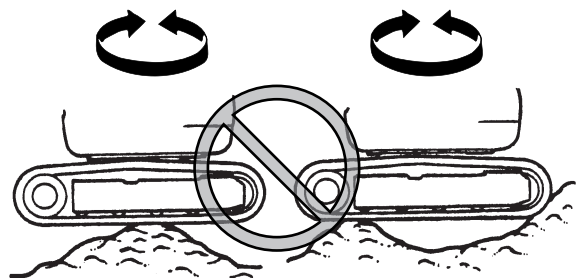
While climbing a slope in reverse, do not turn at the point of moving from the flat ground to the slope.



Traveling with one side of the machine on a slope or hillock causes damage on the rubber crawler shoes. Travel with the both sides on the same flat surface.



Do not turn with a position as shown in the figure. It causes coming off or damage of the rubber crawler shoes.



3.12 INSPECTION AND CHECK AFTER OPERATION

Check the engine coolant temperature, engine oil pressure and fuel level on the multi-display.

- If there is the engine coolant temperature or the engine oil pressure warning display, move the machine to a safe place and stop the engine immediately. Then repair the machine according to "INSPECTION AND MAINTENANCE CHART" in Chapter 4.
- Check oil and water leakage, the attachment/equipment, the exterior parts, and the travel system components. If leakage or damage is found, repair it immediately according to "INSPECTION AND MAINTENANCE CHART" in Chapter 4.
- Refuel the tank to the maximum. Refuel the tank to the maximum after finishing work for a day. Be careful not to refuel the tank to a level more than necessary (to the top end the tank). There is a possibility of overflowing because the fuel expands as the outside air temperature rises.
- Clean all slippery substances such as grease, oil, hydraulic oil, mud, and others attached to the steps, handrails, crawlers, ladders, and platforms.

3.13 MACHINE OPERATION IN ADVERSE CONDITIONS

3.13.1 OPERATION IN COLD CONDITION

CAUTION

When the ambient temperature is low, starting the engine may be difficult due to decrease of oil liquidity, and the radiator may be damaged due to coolant freezing.

FUEL/OIL

Use good low-viscosity fuel/oil for each device. For the optimum viscosity, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.

COOLANT

When operating or storing the machine in cold climates, the additive rate of the cooling system should match the expected minimum outdoor temperature.

If the coolant is frozen, it may cause damage to the radiator, cylinder block and cylinder head. When being shipped from the factory, "Long Life Coolant" is used to prevent rust and freezing of the cooling system.

When operating or storing the machine in extreme cold, check the coolant frequently to keep an appropriate concentration. For the concentration of coolant, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.

BATTERY

When the ambient temperature is low, the battery capacity may decrease and the battery electrolyte may freeze. Charge the battery full earlier than the specified interval and pay full attention to thermal insulation by covering the battery.

When leaving the machine outdoors overnight, it is recommended to remove the battery and store it in a warm room.

Measure the specific gravity of battery electrolyte after its temperature becomes almost the same as the outdoor temperature, instead of immediately after operation. The charging rate can be calculated roughly by measuring the specific gravity and using the table below.

Specific Gravity of Battery Electrolyte

Charging rate	Battery electrolyte temperature		
	-20 degrees C	0 degrees C	20 degrees C
100%	1.31	1.29	1.28
90%	1.29	1.28	1.26
80%	1.28	1.26	1.25
75%	1.27	1.25	1.24

AFTER OPERATION

To prevent malfunctions of the travel system components due to freezing of mud and water stuck to them, follow the precautions below.

- Remove mud and water stuck to the machine sufficiently. Especially, be sure to drain off the water from the travel system, and then park the machine on a dry and firm ground to prevent the travel system from freezing.
- Wipe the cylinder rod completely. If frozen mud or water is stuck to the cylinder rod surfaces, the seal may be damaged when retracting the cylinder. Retract each cylinder to the minimum size to minimize the exposed area of the rod.

For the storing position, see "PRECAUTIONS FOR LONG-TERM STORAGE" in Chapter 3.

3.13.2 OPERATION AT SEASHORE

After operation, wash the machine carefully to remove salt, and apply anti-rust treatments with oil and grease, if necessary.

3.13.3 OPERATION IN SANDY AND DUSTY AREAS

- Clean and change the air cleaner element earlier than the specified interval.
- Clean the radiator earlier than the specified interval to prevent the radiator core from being clogged with dust.
- Be careful to prevent dust entering when refueling, and refilling oils. Inspect the filter element earlier than the specified interval.
- Especially, clean the starter and alternator earlier than the specified interval to prevent deposit of dust on them.

3.14 PRECAUTIONS FOR LONG-TERM STORAGE

When storing the machine for a long period (one month or longer), maintain the machine with attention to the following points, to prevent decrease in function at the next operation.

3.14.1 WASHING MACHINE

Wash the machine thoroughly, inspect and maintain the travel system components and apply touch-up to the peeling paint and scratches. Apply grease to the greasing points.



DO not wash the inside of the cab.

When washing the machine, cover the CPU and the electric components to prevent water or steam from splashing on or contacting with them.

3.14.2 REFILLING OIL/GREASING

Check the level and contamination of the fuel and hydraulic oil. Refill the oil if the level is low, and replace the oil if the oil is contaminated.

- To prevent condensation in the fuel tank, supply new clean fuel fully to the upper limit.
- Apply a sufficient quantity of anti-rust oil to any parts which rust easily, especially to the exposed area of each cylinder piston rod.

3.14.3 BATTERY

- To compensate the self-discharge during storage, perform auxiliary charge at least once a month.
 - When the battery power-off switch is provided, confirm that the battery power-off switch is set to the "OFF" position to cut off the current.
 - Remove the negative (-) terminal from the battery, and remove the battery from the machine for storage. Be careful not to connect the negative (-) terminal of the battery to the body (ground terminal) with a tool when removing the battery. It will cause short circuit even when the battery power-off switch is set to "OFF".
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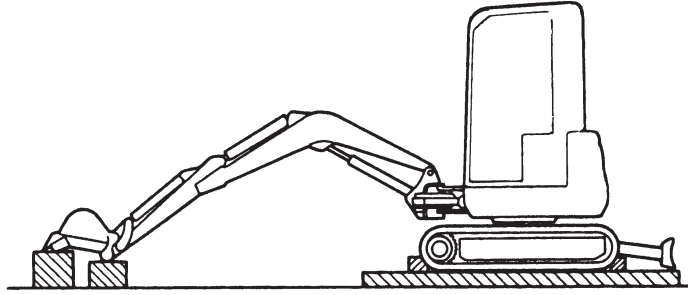
If the cover of the battery power-off switch is opened soon after the starter switch is turned OFF, the buzzer may start sounding. Do not turn "OFF" the battery power-off switch while the alarm buzzer is sounding. That may cause damages to electronic devices.

3.14.4 COOLANT

If there is a possibility of freezing, mix the antifreeze (non-amine type) into the radiator.

However, normally it is not necessary because long life coolant is already mixed at the time of shipment. See "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.

3.14.5 PREVENTION OF DUST AND MOISTURE



Store the machine in a dry indoor location. If you place the machine outside unavoidably, lay ladders on a flat ground and cover the machine with a sheet. Especially, cover the muffler, hydraulic oil tank breather, fuel tank cap, and swing motor level gauge.

To protect the exposed part of the rod, fully retract the arm and bucket cylinders, be sure to place the bucket on the ground and chock the crawlers.

3.14.6 PERIODICAL LUBRICATING OPERATION (DURING STORAGE)

Once a month, start the engine to move the machine and also perform lubricating operation to supply lubricant to every kind of parts of the machine. If the oil film shortage occurs on parts and rust is formed on parts, it may cause abnormal wear at the next operation.

- Check the engine oil level and coolant level before starting the engine. Refill engine oil or coolant if its level is low.
- Wipe off the anti-rust oil from the cylinder rods. After the lubricating operation, apply the anti-rust oil again.
- After starting the engine, fully warm-up the machine.
- If the machine is stored indoors, adequate ventilation is required during warming-up.

Lubricating operation

1. Slowly extend and retract each cylinder several times and circulate the hydraulic oil in all operation circuits.
2. Also perform swing and traveling slowly to circulate the hydraulic oil.

3.14.7 TREATMENT AFTER LONG-TERM STORAGE

When starting to use the machine after a long-term suspension, perform the following treatments.

- Loosen the plugs of the travel reduction unit and swing reduction unit and remove the dust and water which deposited during the long-term storage.
- Lubricant gets deteriorated while the machine is not in use. Use extreme caution when starting to use the machine at the next time.
- Check the deterioration of the hydraulic hoses carefully after the long-term storage. Replace the deteriorated hoses.
- Wipe off the anti-rust oil from the cylinder rods.
- Refill oil and grease to all necessary parts.
- Check the engine oil level and coolant level before starting the engine. Refill engine oil or coolant if its level is low.
- After starting the engine, fully warm-up the machine and repeat the traveling, swing and digging operations several times to prevent hydraulic oil film shortage.
- If the machine is stored indoors, adequate ventilation is required during warming-up.

4. INSPECTION AND MAINTENANCE

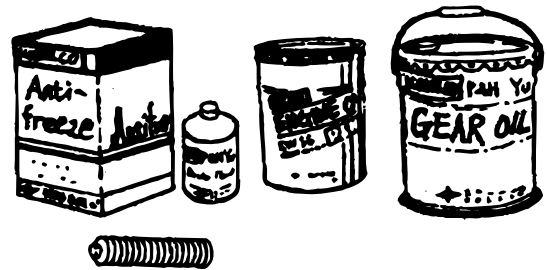
4.1 GENERAL



INSPECTION AND MAINTENANCE ON THE MACHINE

Thoroughly read and understand the safety precautions contained in this manual before performing any inspection or service procedures on systems or components of this machine.

- Regular inspection and maintenance enable this machine to achieve the full function and extend the service life of each part.
- The information contained in this chapter gives the proper procedures for performing inspection and maintenance functions for this machine. Use these procedures when performing inspection and maintenance as they will guide the technician step by step for each procedure. Also, see "INSPECTION AND MAINTENANCE CHART" for general service interval recommendations.
- As a general rule, the period of the lubrication and maintenance is determined by the hour meter. If the hour meter reading matches roughly with the calendar day, and if you would like to schedule them based on the calendar day, take whichever comes first. For items which do not have a certain service time, see "WHEN REQUIRED".



Notice

As a general rule, the period of the lubrication and maintenance is determined by the hour meter. If the hour meter reading matches roughly with the calendar day, and if you would like to schedule them based on the calendar day, take whichever comes first. For items which do not have a certain service time, see "WHEN REQUIRED".

- Use only specified oils, fluids, lubricants, filters and replacement parts to keep machine in optimum operating condition. Use the oils and greases with the specified viscosity depending on the ambient temperature. Store containers of oils, fluids and grease indoors in an appropriate location. To prevent dust and water intrusion, keep the containers of oil, fluid, and lubricant in a proper indoor place.

4.2 INSPECTING AND MAINTAINING MACHINE

4.2.1 PERIODIC INSPECTION AND MAINTENANCE

Regular inspection and maintenance enable this machine to achieve the full function and extend the service life of each part. Inspection and maintenance schedules are given in both the calendar time and the operation time. Take either schedule whichever comes first. For items which do not have a certain service time, see "WHEN REQUIRED". Also, operation in sites under severe work conditions or with a lot of dust and moisture may need more frequent lubrication and maintenance than the service times specified there.

4.2.2 PRECAUTIONS OF INSPECTION AND MAINTENANCE

Use inspection and maintenance procedures described in this manual. Park the machine on a level and firm ground before inspection and maintenance.

Notice

For the adjustment, disassembling and repair of the engine, reduction unit, hydraulic component and electronic devices (controller, etc.), contact your KOBECO authorized dealer.

STOP THE ENGINE BEFORE INSPECTION AND MAINTENANCE

Be sure to stop the engine before inspection and maintenance of the engine. Inspecting and maintaining the running engine may cause injury by being caught in the cooling fan or fan belts. When running the engine is unavoidable during the inspection or maintenance, it should be done by at least two persons with the condition that one person can stop the engine at any time and they are communicating with each other.

PUT THE WARNING TAGS

Put the tags "DO NOT START ENGINE!", "DO NOT OPERATE" and "UNDER INSPECTION/MAINTENANCE" on noticeable places such as around the operator's seat as well as the starter switch or control levers before inspection and maintenance.

USE OUR GENUINE PARTS

- For replacement of parts, grease and oil, be sure to use KOBELCO genuine parts. Use grease and oil with the specified viscosity depending on the ambient temperature.
- Store containers of greases and oils in a clean room to keep them away from dust and water.

KEEP OUT DUST

Attach a plug or cap to the lubrication hole of a removed hydraulic hose or hydraulic component to keep out foreign materials.

INSPECT DRAIN OIL AND FILTERS

When replacing oil or filter, check the drain oil or old filter for metallic powder or other foreign materials mixed. Contact the person in charge and take appropriate measures if any foreign materials are found.

HANDLING OF WASTE OIL AND ANTIFREEZE

Be sure to drain waste oil and antifreeze in containers and ask a public service company for disposal of them as the industrial waste.

CLEAN THE SEALING SURFACE

After removing the O-ring or gasket seal, clean the sealing surface to replace it with a new one. Apply thin oil to the O-ring or seal and attach it into the groove correctly.

DO NOT MIX OILS

Never mix different kinds of oil. When using another kind of oil, replace the total amount of old oil.

4.2.3 SUPPORT STAY

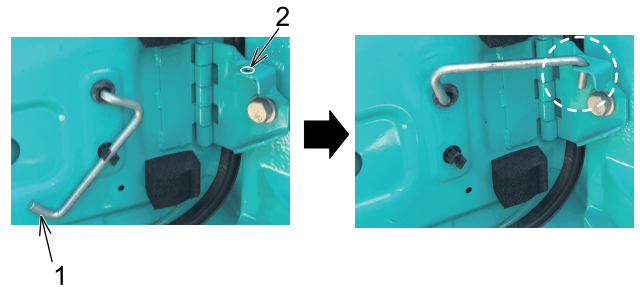
The support stays are provided on the side doors and the engine hood.
When opening the side doors and the engine hood, be sure to fix them with the stays

CAUTION

Before performing inspection or maintenance, be sure to fix the opened side doors and the opened engine hood with the support stays to prevent them from moving, resulting in personal injury.

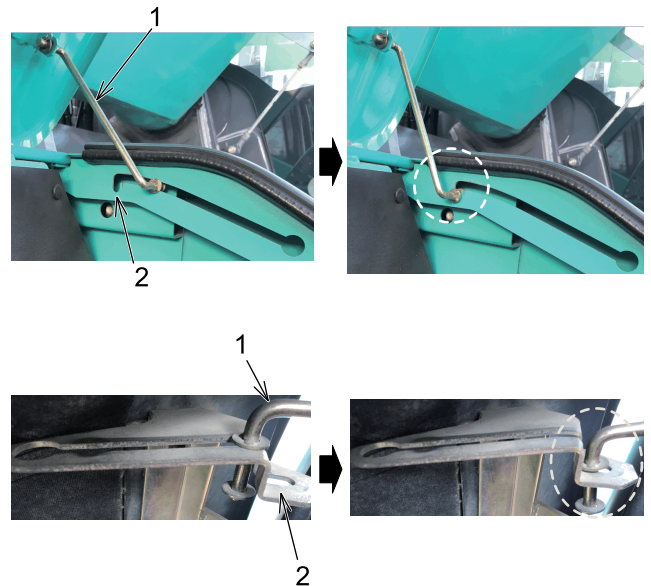
Stay fixed by hole

Open the door, and put stay (1) into fixing hole (2) to fix the stay.
Before closing the door, remove the stay from the fixing hole, return it to the original position, and then close the door.



Slide type stay

Open the door, slide stay (1) to fixing part (2) of the guide to fix the stay.
Before closing the door, remove the stay from fixing part (2) and then close the door.



4.2.4 GREASING TABLE LABEL

The greasing table label displayed on the machine indicates the following inspections and maintenances.

(a) Indicates the inspection and maintenance interval for the first 50 hrs. of operation of a new machine.

(b) Indicates the inspection and maintenance interval when using a breaker or crusher.

(c) Indicates the first one-time maintenance interval.

(1) Inspection and maintenance interval

(2) Greasing the boom and arm pins

(3) Greasing the pins around the bucket (front attachment)

(4) Greasing the dozer pins

(5) Adjusting the tension of the crawlers (greasing the idler adjusters)

(6) Greasing the swing bearing

(7) Changing the oil in the travel reduction unit

(8) Greasing the swing pinion

(9) Changing the hydraulic oil

(10) Cleaning the air conditioner filter

(11) Cleaning the suction strainer

(12) Changing the engine oil

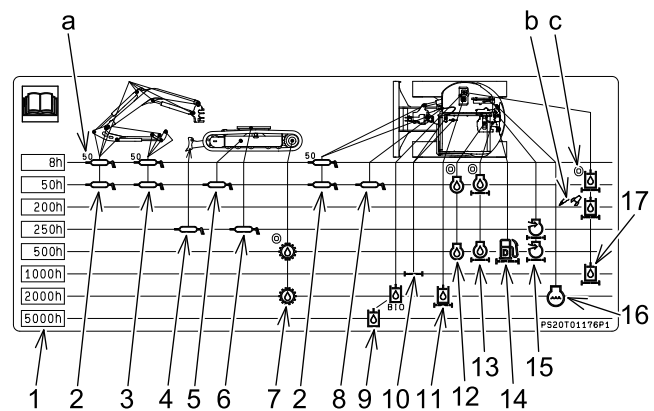
(13) Replacing the engine oil filter

(14) Replacing the fuel filter

(15) Replacing the air cleaner element

(16) Changing the coolant

(17) Replacing the return filter of the hydraulic oil



4.3 DIESEL PARTICULATE FILTER (DPF)

4.3.1 ABOUT DPF

DPF traps soot emitted from the engine using the filter to clean up exhaust gas.

When a certain amount of soot trapped on the filter is deposited, DPF enters the mode in which it burns the trapped soot. Burning soot in this mode to recover the filter function is called "regeneration".

Be sure to comply with the followings to prevent failure of DPF. (Time of deposition varies depending on the working conditions.) It is normal even though the exhaust sound changes during soot combustion.

Notice

When a certain amount of soot in the exhaust gas is deposited on the filter, DPF automatically burns the trapped soot according to the operating condition. For details, see "ABOUT AUTOMATIC REGENERATION". In some operating conditions, the automatic combustion may not be completed. At that time, the indication appears on the monitor to request the actuation of DPF manual regeneration. Pull up the control lock lever and press the DPF manual regeneration switch. This prevents abnormal deposit of soot and keeps the purification capacity of DPF in good condition at all times.

4.3.2 ABOUT AUTOMATIC REGENERATION

When a certain amount of soot is deposited on the DPF filter, the DPF enters the mode to burn the soot automatically.

At this time, the indication of regenerating is displayed on the multi-display, but normal operations are possible.



CAUTION

Immediately after the machine operation and during the regeneration, the temperature around the exhaust pipe and muffler and of the exhaust gas are very high. Putting any combustible materials close to these hot parts, could cause a fire. Touching hot exhaust gas may cause burns.

Notice

In some operating conditions, the automatic regeneration may not be completed. When the automatic regeneration is not performed and soot is deposited, the warning requesting the user to perform the manual regeneration is displayed on the monitor. In this case, perform the manual regeneration, referring "ABOUT MANUAL REGENERATION".

In the following operations, the automatic regeneration may be difficult to complete.

- At engine start, when the control lever is pulled up to the "LOCKED" position and most of the times the levers are not operated.
 - When many operations at a low speed of the engine are performed.
 - When the engine is started and stopped frequently
 - When the operation is performed in an extremely cold place
 - When there are many low-load operations
 - When the engine is operated and stopped while it is still not warm
-

Notice

- The above indication may be displayed also when the deposited amount of soot is low.
 - To maintain the condition inside the muffler proper, the automatic regeneration may be performed even when the soot deposition meter on the monitor indicate lower.
 - It takes about 30 to 40 minutes to complete the automatic regeneration.
-

4.3.3 ABOUT MANUAL REGENERATION

When this warning is displayed on the multi-display, perform the manual regeneration of DPF immediately.



Notice

- DPF starts the automatic regeneration when a certain amount of soot is deposited, but it may not be completed in some operating conditions.
When the automatic regeneration is not performed and soot is deposited, the above warning is displayed and the warning sounds. In that case, perform the manual regeneration in the following procedure.
- When too much soot is deposited, DPF failure occurs and the engine speed is restricted. To restore DPF, the machine needs to be maintained at our service factory.

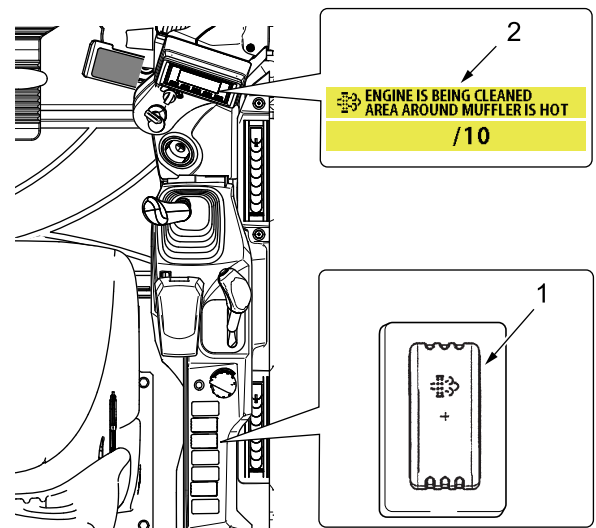
OPERATION METHOD

CAUTION

- Immediately after the machine operation and during the regeneration, the temperature around the exhaust pipe and muffler and of the exhaust gas are very high. Putting any combustible materials close to these hot parts, could cause a fire. Touching hot exhaust gas may cause burns.

1. Move the machine to a safe place.
2. Place the machine in the parking position and move the control lock lever to the "LOCKED" position.
3. Press DPF manual regeneration switch (1).
Indication of regenerating (2) is displayed on the multi-display. The engine speed is fixed and the machine enters the mode in which soot is burnt.

4. When indication (2) goes off, the manual regeneration is completed.
When the engine is stopped during the manual regeneration or when the control lock lever is set to the "UNLOCKED" position, the regeneration is paused.
In that case, perform the manual regeneration again.



Notice

- It takes about 25 to 30 minutes to complete the manual regeneration.
- Regeneration is performed by increasing the temperature inside the muffler to a certain level. Therefore, the process completes faster if it is performed immediately after operation, when the temperature inside the muffler is high.
- It may take more than 30 minutes for regeneration when the engine is cool because warming-up is needed before combustion.

4.3.4 INSPECTION AND MAINTENANCE

- Inspection interval: Every 3,000 hours
Inspect the external appearance of the DPF including the emission sensor and the differential pressure sensor.
For inspection and replacement, contact your KOBELCO authorized dealer.
- Replace DPF every 6,000 hours. For replacement, contact your KOBELCO authorized dealer.

4.3.5 PRECAUTIONS OF USING DPF

USE SPECIFIED FUEL ONLY

Notice

Use the specified fuel described in "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4 in the operation manual.

If you use fuel other than the specified fuel, it has an adverse effect on the engine and DPF, causing white smoke and malfunction.

USE SPECIFIED ENGINE OIL ONLY

Notice

Use the specified engine oil described in "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4 in the operation manual.

Use the specified engine oil to keep the DPF function normal for a long time.

PROHIBITION OF ENGINE PIPE DISASSEMBLY

























Notice

Do not remove the exhaust pipe or disassemble the muffler and parts around it. This may affect the performance of DPF adversely or break it.

4.4 FAILURE OF NO_x CONTROL SYSTEM

When the following warnings are displayed on the multi-display, the NO_x control system has a failure or an error.
When keep operating with the NO_x control system having a failure or an error, the engine output is restricted and, in the end, the machine becomes inoperable.
When these warnings are displayed, contact our service factory immediately.

[4. INSPECTION AND MAINTENANCE]

Level	Warning Display	Description	
Level 1	 ENGINE IS ABOUT TO STOP EX. GAS TREATMENT DEVICE ERROR  OPERATION UNDER LIMITED ENGINE POWER EXHAUST SYSTEM ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of NOx control system	Displayed with the warning sound when a device or sensor has a failure or an error.
	 OPERATION UNDER LIMITED ENGINE POWER INTAKE SYSTEM ERROR  OPERATION UNDER LIMITED ENGINE POWER ENGINE CONTROLLER ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of intake related parts	
	 OPERATION UNDER LIMITED ENGINE POWER ENGINE SYSTEM SENSOR ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of engine related sensor	
Level 2	 ENGINE IS ABOUT TO STOP EX. GAS TREATMENT DEVICE ERROR  OPERATION UNDER LIMITED ENGINE POWER EXHAUST SYSTEM ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of NOx control system	Displayed with the warning sound when a certain period of time has passed from Level 1. The engine output is restricted.
	 OPERATION UNDER LIMITED ENGINE POWER INTAKE SYSTEM ERROR  OPERATION UNDER LIMITED ENGINE POWER ENGINE CONTROLLER ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of intake related parts	
	 OPERATION UNDER LIMITED ENGINE POWER ENGINE SYSTEM SENSOR ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of engine related sensor	
Level 3	 ENGINE IS ABOUT TO STOP EX. GAS TREATMENT DEVICE ERROR  OPERATION UNDER LIMITED ENGINE POWER EXHAUST SYSTEM ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of NOx control system	Displayed with the continuous warning sound when a certain period of time has passed from Level 2. The engine output is further restricted than Level 2.
	 OPERATION UNDER LIMITED ENGINE POWER INTAKE SYSTEM ERROR  OPERATION UNDER LIMITED ENGINE POWER ENGINE CONTROLLER ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of intake related parts	
	 OPERATION UNDER LIMITED ENGINE POWER ENGINE SYSTEM SENSOR ERROR  MOVE MACHINE TO SAFETY PLACE AND STOP REPAIR IS NEEDED <div>P****</div>	Failure of engine related sensor	

Notice

When failure of the Failure of NOx control system occurs repeatedly, the warning level goes up. If another failure occurs in a short period after the failure of the Failure of NOx control system is corrected, the warning level starts from Level 3.

4.4.1 EMERGENCY EVACUATION MODE

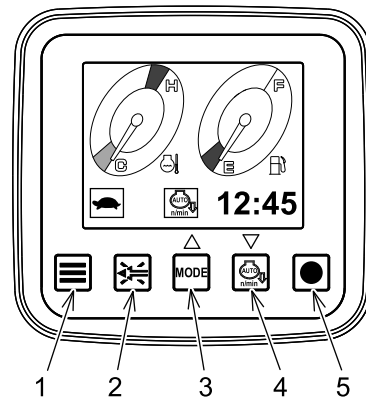
If the machine should be moved to somewhere emergency even though the machine is in a state of the third level of warning and under engine restriction due to failure of the NOx control system, simultaneously keep pressing switches (2) and (5) for 5 seconds to enter the emergency evacuation mode.

After entering the emergency evacuation mode, only a travel operation becomes possible as usual. But operations other than the travel operation remain under restriction.

CAUTION

- The emergency evacuation mode can be used for only total 30 minutes or up to 3 times. Use this mode only in a case of emergency and if the warnings are displayed, take proper measures immediately.
- When entering the emergency evacuation mode, surely and simultaneously keep pressing switches (2) and (5) for 5 seconds.
If not keep pressing switches (2) and (5) for 5 seconds securely, the machine will not enter the emergency evacuation mode.

1. Menu switch
2. Buzzer stop switch
3. Work mode select switch (up arrow switch)
4. Automatic deceleration switch (down arrow switch)
5. Circle button switch



4.5 LUBRICANT, FUEL & COOLANT SPECIFICATIONS

Regardless of the outdoor temperature, the following reduction units use the following oil:

- Swing reduction unit: Gear oil #90, API classification GL-4 class
- Travel reduction unit: Gear oil #90, API classification GL-4 class

Components	Type of Lubricant	Capacities (When changed)	Climate Zone										Specified Lubricant
			-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	°F	°C	
Hydraulic oil tank	Hydraulic oil	27.9 Liters (7.4 Gal) 59 Liters (15.6 Gal) (Hydraulic system)											(KOBELCO BRAND) Long life hydraulic oil KW5046 (20 L) P/No. KAPYN01T01066D3
Engine oil pan	Engine oil	[H level] 7.5 Liters (2.0 Gal) [L level] 3.0 Liters (0.8 Gal)											(KOBELCO BRAND) A.P.I CJ-4 ACEA E9, E6 JASO DH-2 P/No. KAPYN01T01077D1 (20 L)
Travel motor reduction unit	Gear oil	0.8 Liter X 2 (0.21 Gal X 2)											(KOBELCO BRAND) A.P.I classification for "service GL-4" P/No. KAPSP90020
Attachment pins	EP grease	20 places											(KOBELCO BRAND) Extreme pressure multipurpose grease Cartridge P/No.KAPG0420D1 (400g × 20 units) Pail can P/No.KAPG1601D1
Slewing ring gear		1 place											
Track tension Adjustment		2 places											
Operating lever (Pilot valve)		As required											
Swing gear		1 place											
Fuel tank	Diesel fuel	75 Liters (20 Gal)											ASTM D-975
													EN 590
Radiator (Reserve tank)	Engine coolant (Antifreeze)	4.1 L Total volume 8.5 L											(KOBELCO BRAND) [Do not mix and use different types of coolants.] P/No. KAPYN01T01110D1

Notice

- When oil leakage or damage of the lower roller, upper roller and front idler is recognized, contact your KOBELCO authorized dealer for repair.
- Be sure to use the specified fuel. To achieve a good fuel efficiency and exhaust gas property, the engine of this machine uses the electronically controlled fuel injector.
Because this device requires high parts precision and high lubricating ability, when low viscosity fuel with low lubricating ability is used, the durability may decrease significantly.

Notice

When replacing and refilling the long life hydraulic oil, use the oil specified by KOBELCO.

When non-specified hydraulic oil is used or mixed, the performance decreases and the replacement interval of hydraulic oil needs to be shortened.

Notice

This machine is intended to be operated in the ambient temperature of -20 degrees C to 40 degrees C (-4 degrees F to 104 degrees F) with the well-maintained condition.

Outside this temperature range, sufficient machine performance may not be obtained.

4.6 ABOUT USE OF BIO-OIL (BIODEGRADABLE HYDRAULIC OIL)

4.6.1 GREASE AND OIL FOR USE

Regarding greases and oils for use, ask your KOBELCO authorized dealer.

4.6.2 PRECAUTIONS FOR BIO-OIL

- When charging bio-oil to a machine using conventional mineral oil, perform flushing three times. Without flushing, the mineral oil in the circuit is not completely cleaned and the effect of biodegradability cannot be expected.
- Because the friction coefficient of bio-oil is smaller than that of mineral oil, the performance of parking brakes for swing and travel decrease.

4.6.3 REPLACEMENT INTERVAL OF BIO-OIL

Bio-oil should be replaced every 2,000 hours.

For replacing procedures, see "CHANGING HYDRAULIC OIL" in Chapter 4.

4.6.4 FLUSHING PROCEDURES OF BIO-OIL

1. Drain all mineral oil from the hydraulic oil tank.
2. Drain all mineral oil from the cylinders.
3. Charge new bio-oil in the hydraulic oil tank fully.
4. After starting the engine, operate each cylinder for 10 strokes respectively.

CAUTION

Rapid operation may burn the seal because of the air remained in the cylinder. During the first 4 strokes, operate the cylinder slowly with the engine speed at low idle to charge the hydraulic oil in the cylinder.

5. Idle the right and left travel motors for about 3 minutes respectively.
6. Perform the swing operation for 10 turns.
7. Drain all bio-oil from the hydraulic oil tank.
8. Drain all bio-oil from each cylinder.
9. Charge new bio-oil in the hydraulic oil tank and repeat the procedures 4 to 9 twice.
10. In the final state, analyze the hydraulic oil and check the remaining amount of mineral oil.

4.7 MAINTENANCE PARTS

Replace parts, such as filters and elements, during the periodical maintenance or before the end of the service life. The machine can be used economically if the maintenance parts are changed properly and timely.

The part numbers are subject to change without notice.

When placing an order of parts, ask your KOBELCO authorized dealer for the part numbers.

MAINTENANCE PARTS LIST

Item	Part Number	Part Name	Q'ty	Replacement Interval
Hydraulic oil tank	YR52V01004R300	Return filter element kit (STD, Breaker)	1	Replace at 50 hours for the first time, then every 1000 hours (every 200 hours with breaker specification)
Air breather	YN57V00002S010	Element	1	Replace every 1000 hours. Replacement every 1000 hours is just a rough guideline. If the machine is operated in very dusty conditions, replace the element earlier.
Air cleaner	PS11P00007S003	Element (Outer)	1	Replace every 6 times cleaning or every 1 year
	PS11P00003S001	Element (Inner)	1	Replace at the same time with the outer element (do not clean)
	PS11P00007S004	O-ring	1	When required
Engine oil filter	VV12915035153	Cartridge	1	Replace at 50 hours for the first time, then every 500 hours
Fuel filter	VV129A0055800	Cartridge	1	Replace every 500 hours
Water separator	VV129A0055730	Element	1	Replace every 500 hours
Air conditioner	PS50V01005P1	Fresh air filter	1	Replace after 10 times cleaning. When clogging is severe, clean or replace the filter.
	PS20M00021S014	Recirculation air filter	1	
Pilot line filter	YN50V00020F1	Pilot line filter	1	Clean every 2000 hours
Radiator	PM05P00013S002	Radiator cap	1	Replace every 1000 hours

4.8 ACCESSORY TOOLS

Name	Part Number	Remarks
Case	PW01T01005P1	Tool case
Filter wrench	YJ23H00001P1	For oil filter / fuel filter
Pipe wrench	PM01T01003P1	For grease fitting of idler adjuster
Grease gun	PS01T01034F1	

4.9 TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables Table "Metric coarse thread (Not plated)" and Table "Metric fine thread (Not plated)" indicate tightening torques applicable to cases where no special note is given.

Overtightening of bolts may result in a twist-off and a fracture under load.

Insufficient tightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

Tightening torque for metric coarse threads (not plated)

Unit : N·m (lbf·ft)

Size	Strength classification	4.8T		7T		10.9T	
	Use classification	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.4 (3.2±0.3)	3.7±0.4 (2.7±0.3)	9.7±1.0 (7.2±0.7)	8.1±0.8 (6.0±0.6)	17.4±1.7 (12.8±1.3)	14.7±1.5 (10.8±1.1)
M8	P=1.25	10.7±1.1 (7.9±0.8)	9.0±0.9 (6.6±0.7)	23±2.3 (17.0±1.7)	19.6±1.9 (14.5±1.4)	42±4.2 (31.0±3.1)	35±3.5 (25.8±2.6)
M10	P=1.5	21.5±2.1 (15.9±1.5)	18±1.8 (13.3±1.3)	46.5±4.6 (34.3±3.4)	39±3.9 (28.8±2.9)	84±8.4 (62.0±6.2)	70±7.0 (51.6±5.2)
M12	P=1.75	36.5±3.7 (26.9±2.7)	31±3.1 (22.9±2.3)	80±8.0 (59.0±5.9)	67±6.7 (49.4±4.9)	144±14 (106±10)	121±12 (89.2±8.9)
M14	P=2	58±5.8 (42.8±4.3)	49±4.9 (36.1±3.6)	126±13 (92.9±9.6)	106±11 (78.2±7.4)	230±23 (170±17)	192±19 (142±14)
M16	P=2	88±8.8 (64.9±6.5)	74±7.4 (54.6±5.5)	191±19 (141±14)	161±16 (119±12)	345±34 (254±25)	290±29 (214±21)
M18	P=2.5	122±12 (90.0±8.9)	103±10 (75.8±7.2)	265±26 (195±19)	225±22 (166±16)	480±48 (354±35)	400±40 (295±30)
M20	P=2.5	171±17 (126±13)	144±14 (106±10)	370±37 (293±27)	310±31 (228±23)	670±67 (494±49)	560±56 (413±41)
M22	P=2.5	230±23 (170±17)	192±19 (142±14)	500±50 (369±37)	420±42 (310±31)	900±90 (664±66)	755±75 (557±55)
M24	P=3	295±29 (218±21)	245±25 (181±18)	640±64 (472±47)	540±54 (398±40)	1150±115 (848±85)	970±97 (715±72)
M27	P=3	435±43 (321±32)	365±36 (269±26.6)	940±94 (693±69)	790±79 (583±58)	1700±170 (1250±125)	1420±142 (1047±105)
M30	P=3.5	590±59 (435±44)	495±49 (365±36)	1280±128 (994±94)	1080±108 (797±80)	2310±231 (1704±170)	1940±194 (1430±143)
M33	P=3.5	795±79 (586±58)	665±66 (491±49)	1730±173 (1276±128)	1450±145 (1070±107)	3110±311 (2290±229)	2600±260 (1918±192)
M36	P=4	1020±102 (752±75)	860±86 (634±63)	2230±223 (1645±164)	1870±187 (1379±138)	4010±401 (2960±296)	3360±336 (2480±248)

[4. INSPECTION AND MAINTENANCE]

Tightening torques for metric fine threads (not plated)

Unit : N·m (lbf·ft)

Size	Strength classification	4.8T		7T		10.9T	
	Use classification	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M8	P=1	11.3±1.1 (8.3±0.8)	9.5±0.9 (7.0±0.7)	24.5±2.4 (18.1±1.8)	20.5±2.1 (15.1±1.5)	44±4.4 (32.5±3.2)	37±3.7 (27.3±2.7)
M10	P=1.25	22.5±2.2 (16.6±1.6)	18.7±1.9 (13.8±1.4)	48.5±4.8 (35.8±3.5)	40.5±4.1 (29.9±3.0)	87±8.7 (64.2±6.4)	73±7.3 (53.8±5.4)
M12	P=1.25	39.5±3.9 (29.1±2.9)	33±3.3 (24.3±2.4)	86±8.6 (63.4±6.3)	72±7.2 (53.1±5.3)	154±15 (114±11)	129±13 (95.2±9.6)
M16	P=1.5	93±9.3 (68.6±6.9)	77±7.7 (56.8±5.7)	200±20 (148±15)	168±17 (124±13)	365±36 (269±27)	305±30 (225±22)
M20	P=1.5	186±19 (137±14)	155±15 (114±11)	405±40 (299±30)	335±34 (247±25)	725±73 (535±54)	605±60 (446±44)
M24	P=2	315±32 (232±24)	265±26 (195±19)	685±69 (505±51)	575±57 (424±42)	1240±124 (915±91)	1030±103 (760±76)
M30	P=2	640±64 (472±47)	530±53 (391±39)	1390±139 (1030±103)	1160±116 (856±86)	2500±250 (1840±184)	2080±208 (1530±153)
M33	P=2	850±85 (627±63)	710±71 (524±52)	1860±186 (1370±137)	1550±155 (1140±114)	3350±335 (2470±247)	2780±278 (2051±205)
M36	P=3	1070±107 (789±79)	890±89 (656±66)	2330±233 (1720±172)	1940±194 (1430±143)	4200±420 (3100±310)	3500±350 (2580±258)

4.10 TIGHTENING TORQUES FOR JOINTS & HYDRAULIC HOSES

IMPORTANT

These tightening torques are available in the case of tightening without lubricant.

ORS FITTING (O-RING SEAL TYPE)

Hose Mouth and Fitting Size	Wrench (mm)	Tightening torque N · m {lbt · ft}
1 to 14 UNS	30	137 ± 14 {101 ± 10}
	32	
1 to 3/16 to 12 UN	36	177 ± 18 {130 ± 13}
	41	206 ± 21 {152 ± 15}
1 to 7/16 to 12 UN	41	206 ± 21 {152 ± 15}
	46	

BYTE TYPE TUBE FITTING

Tube size O.D. x Thickness (mm)	Wrench (mm)	Tightening torque N · m {lbt · ft}
10 * 1.5	19	49 ± 9.8 {36 ± 7}
15 * 2.0	27	118 ± 12 {87 ± 9}
18 * 2.5	32	147 ± 15 {108 ± 18}
22 * 3.0	36	216 ± 22 {159 ± 16}
28 * 4.0	41	275 ± 27 {202 ± 20}
35 * 5.0	55	441 ± 44 {325 ± 33}

O-RING FITTING

Screw diameter (PF)	Wrench (mm)	Tightening torque N · m {lbt · ft}
1/8	14	17 ± 2 {12.5 ± 1.5}
1/4	19	36 ± 2 {27 ± 1.5}
3/8	22	74 ± 5 {54 ± 4}
1/2	27	108 ± 9.8 {80 ± 7}
3/4	36	162 ± 9.8 {119 ± 7}
1	41	255 ± 9.8 {188 ± 7}
1 to 1/4	50	392 ± 40 {289 ± 30}
1 to 1/2	55	485 ± 49 {358 ± 36}

HYDRAULIC HOSE

Screw diameter (PF)	Wrench (mm)	Tightening torque N·m {lbt·ft}
1/8	17	15 ± 2.0 {11 ± 1.5}
1/4	19	29 ± 4.9 {22 ± 4}
3/8	22	49 ± 4.9 {36 ± 4}
1/2	27	78 ± 4.9 {58 ± 4}
3/4	36	118 ± 9.8 {87 ± 7}
1	41	137 ± 15 {101 ± 11}
1 to 1/4	50	167 ± 15 {123 ± 11}

SPLIT FLANGE

Nominal Size	Tightening torque N·m {lbt·ft}			
	Working pressure 20.6 Mpa {210 kg/cm ² }	Bolt size (M)	Working pressure 41.2 Mpa {420 kg/cm ² }	Bolt size (M)
3/4	33.9 ± 5.6	10	39.5 ± 5.6	10
	{25 ± 4.1}		{29 ± 4.1}	
1	42.4 ± 5.6	10	62.2 ± 5.6	12
	{31 ± 4.1}		{46 ± 4.1}	
1 to 1/4	55.1 ± 7.1	10	93.3 ± 8.4	14
	{41 ± 5.2}		{69 ± 6.2}	
1 to 1/2	70.6 ± 8.4	12	169 ± 11	16
	{52 ± 6.2}		{125 ± 8.1}	
2	81.9 ± 8.4	12	282 ± 11	20
	{60 ± 6.2}		{208 ± 8.1}	

IMPORTANT

The tightening torques of the split flange are available in the case of tightening without lubricant.

4.11 INSPECTION AND MAINTENANCE CHART

The following charts show the recommended interval or the hour meter reading for each device for greasing, element replacement, and inspection and maintenance items.

Perform inspection and maintenance according to the calendar time or operation time shown by the hour meter, whichever comes first.

Symbols in the Table

 Indicates a required periodic inspection or maintenance with the hour meter interval.

⊙ Indicates a first one time maintenance interval.

○ Indicates a inspection or maintenance interval.

ENGINE (1/2)

Item/Interval		Irregular	Start-Up Inspection	8H	50H	100H	Every 1 Month or 250H	Every 3 Months or 500H	Every 6 Months or 1,000H	Every 12 Months or 2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Engine oil	Checking oil level		○									Engine oil	3.2.2
	Replacement			⊙ (First time)				○					4.17.1
Replacing oil filter				⊙ (First time)				○				Cartridge	4.17.1
Water separator	Draining		○									Cartridge	3.2.5
	Replacement							○					4.17.2
Fuel filter	Replacement							○				Cartridge	4.17.3
Diesel particulate filter	*Inspection									○ (3000H)			4.3.4
	*Replacement										○ (6000H)		
Checking air cleaner inlet			○										3.2.12
Air cleaner element	Inspection, cleaning						○					Outer element (Inner element is not cleaned)	4.16.3
	Replacement								○			Outer and inner elements	
Cleaning radiator coolant and cooling system	Checking water level		○										3.2.1
	Replacement, cleaning									○ (Or every 2 years)		LLC	4.19.1
Checking radiator hoses for cracking and damage							○						4.16.2
Cleaning radiator, oil cooler core, intercooler and filters							○						4.16.5
Fan belt	Inspection		○										3.2.7
	Adjustment			⊙ (First time)			○						4.16.1
Cleaning or replacing radiator cap / reserve tank cap	Cleaning						○						4.16.4
	Replacement								○				
Checking engine mounting bracket for tightening condition									○				4.18.3
Checking intake system rubber hose						○							4.15.2

[4. INSPECTION AND MAINTENANCE]

ENGINE (2/2)

Item/Interval	Irregular	Start-Up Inspection 8H	50H	Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Inspecting exhaust color, abnormal sound and odor		○									—
*Inspecting and adjusting valve clearance							○				—
*Adjusting intake and exhaust valves								○			—
*Inspecting, adjusting and cleaning fuel injection valves								○ (1500H)			—
*Inspecting and adjusting fuel injection timing								○ (1500H)			—
*Inspecting and adjusting starter and generator							○				—
*Inspection and cleaning of the EGR valve									○ (3000H)		—
*Inspection and cleaning of the EGR reed valve									○ (3000H)		—
*Inspection of the intake throttle valve									○ (3000H)		—
Checking each part for oil and fuel leakage		○									3.1
Checking each part for water leakage		○									3.1
Checking electrical system		○									3.1

Notice

Contact your KOBELCO authorized dealer for inspection and adjustment of the items marked with *.

FUEL SYSTEM

Item/Interval	Irregular	Start-Up Inspection 8H	50H	Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Fuel tank	Checking oil level	○									3.2.3
	Draining water and sediment		○								4.14.1
	Cleaning cap and strainer					○					4.17.5
Bleeding air from fuel piping	○										4.12.3

HYDRAULIC SYSTEM

Item/Interval			Irregular	Start-Up Inspection	8H	50H	Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Hydraulic oil tank	Hydraulic oil	Checking oil level		○									Hydraulic oil	3.2.6
		Replacement							○ (Breaker)		○	4.20.1		
	Suction strainer	Cleaning									○	Strainer	4.20.1	
	Replacing return filter				⊙ (First time)		○ 200H (Breaker)		○			Element	4.18.1	
	Replacing air breather element								○			Element	4.18.2	
Checking hydraulic components, pipes and hoses for oil leakage and damage				○										3.1
Cleaning pilot line filter										○				4.19.3

UPPER FRAME

Item/Interval			Irregular	Start-Up Inspection	8H	50H	Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Greasing to swing bearing								○					EPG lithium added extreme-pressure grease	4.16.7
Swing brake function				○										—
Greasing to control lever push rod and universal joint part									○				EPG lithium added extreme-pressure grease	4.17.6
Installing swing bearing Checking bolt for looseness									○					4.17.4
Checking body structure				○										3.1

LOWER FRAME

Item/Interval			Irregular	Start-Up Inspection	8H	50H	Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
Travel reduction unit oil	Checking oil level						○ (120H)						Gear oil SAE #90 GL-4	4.15.1
	Replacement								⊙ (First time)		○			4.19.2
Cleaning or replacing rubber crawler shoes			○											4.12.4 4.12.5
Adjusting tension of crawler						○								4.14.2
Checking upper roller and lower roller for oil leakage				○										3.1
Checking idler and travel reduction unit for oil leakage				○										3.1
Checking sprocket, idler, and roller for wear				○										3.1

[4. INSPECTION AND MAINTENANCE]

ATTACHMENT

Item/Interval	Irregular	Start-Up Inspection		Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
		8H (Until 50 H)	50H								
Greasing attachment (around bucket)		○ (Until 50 H)	○							EPG lithium added extreme-pressure grease	4.13.1
Greasing attachment		○ (Until 50 H)	○								4.13.1
Replacing bucket	○										4.12.6
Replacing tooth and side cutter	○										4.12.7
Checking attachment structure		○									3.1
Greasing dozer					○						4.16.6

ELECTRICITY

Item/Interval		Irregular	Start-Up Inspection		Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
			8H	50H								
Battery	Checking liquid level					○						4.16.8
	Measuring specific gravity					○						4.16.8
	Cleaning and grease application					○						4.16.8
	Measuring voltage							○				4.18.4
Electrical wiring			○									3.1
Check instruments, switches, and light warning devices for performance condition			○									3.2.10 3.2.11

OTHER DEVICES

Item/Interval		Irregular	Start-Up Inspection		Every 1 Month or 100H	Every 3 Months or 250H	Every 6 Months or 500H	Every 12 Months or 1,000H	2,000H	5,000H	Grease (Replacement Part)	Procedure Description Section
			8H	50H								
Checking and replacing wiper blades		○										4.12.1
Checking washer fluid		○										4.12.2
Checking external appearance of machine for deformation and damages			○									3.1
Checking bolts and nuts for looseness and coming off			○									3.1
Seatbelt	Inspection		○									2.9 3.1
	Replacement									○ (3 years)		

Notice

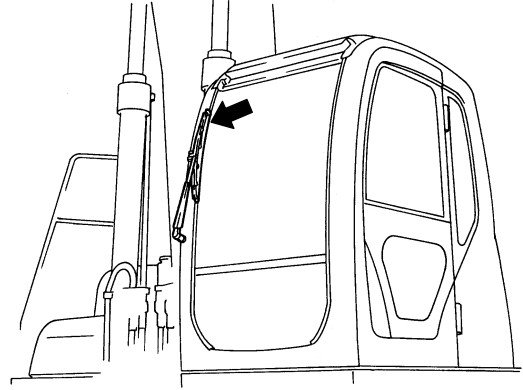
Contact your KOBELCO authorized dealer for replacement of seat belt.

4.12 MAINTENANCE WHEN REQUIRED

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before operating, inspecting or maintaining the machine.

4.12.1 CHECKING AND REPLACING WIPER BLADES

- Check the wiper blades and replace them if there is wear or damage.



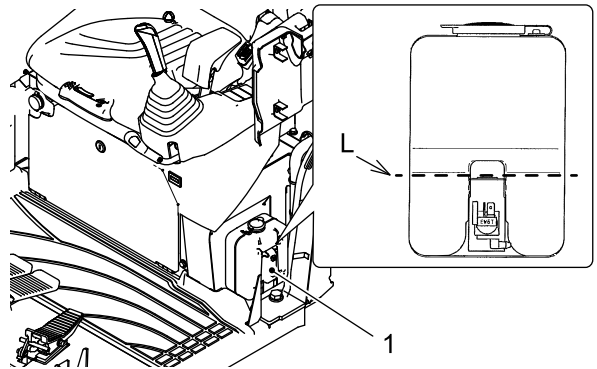
4.12.2 WASHER FLUID INSPECTION

Notice

If the washer is used when the washer tank is empty, the motor attached to the washer tank may be damaged.

The washer fluid reservoir is located on the left rear side in the cab.

1. Inspect the fluid level of washer tank (1).
2. When the washer fluid level becomes lower than (L), remove the cap and supply the washer fluid for automobiles.



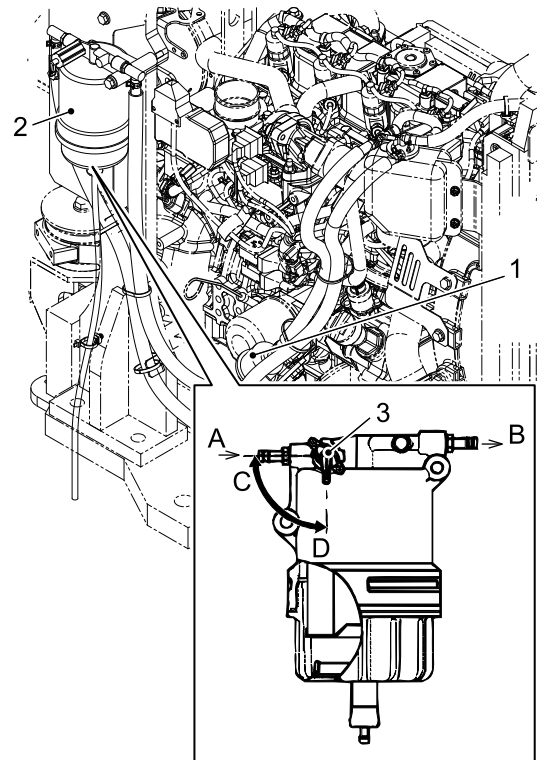
4.12.3 BLEEDING AIR FROM FUEL PIPING

If air enters or remains in the fuel system, the fuel cannot be sent to the fuel injection pump (1). When the fuel tank is emptied or when the fuel filter is replaced, be sure to bleed the remaining air.

Air Bleeding Procedure

1. Move the control lock lever to the "LOCKED" position and stop the engine.
2. Refill the fuel tank to the maximum.
3. Confirm that the fuel shutoff valve (3) of fuel filter (2) is set to "Open" position (D).
4. Turn the starter key to the "ON" position and wait for 15 to 20 seconds or more to send the fuel to the fuel system by the fuel supply pump (1).
(If the entire piping is emptied due to running out of fuel, turn the starter key to the "ON" position and wait for 60 seconds.)

- A. Fuel inlet
B. Fuel outlet
C. Close
D. Open



Notice

- Do not send oil while working the starter motor. It could heat the starter and might cause damage to the coil, the pinion gear, and the ring gear, etc.
 - Wait for 30 seconds or longer when using the starter again.
-

4.12.4 CHECKING RUBBER CRAWLER SHOES

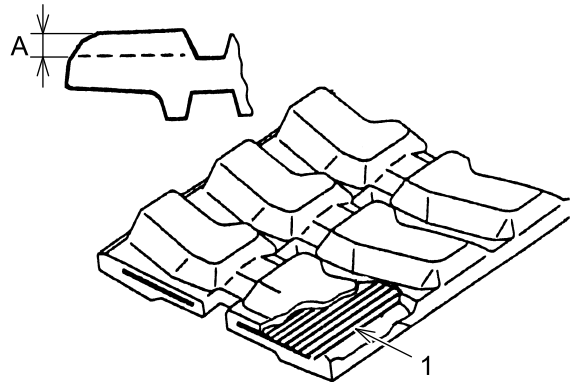
Repair or replacement of the rubber crawler shoes is required if the following conditions are observed. Contact your KOBELCO authorized dealer for repair or replacement.

Notice

Contact your KOBELCO authorized dealer for judgement of replacement or repair of the rubber track shoe.

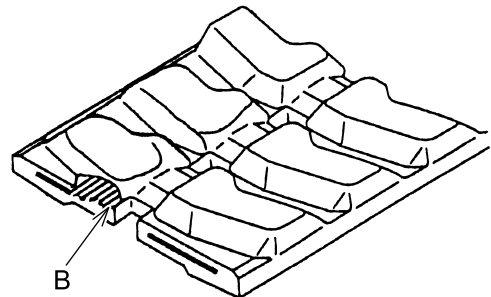
LUG HEIGHT

- As lug height (A) decreases due to wear, the tractive force is reduced. When (A) is 5 mm or less, replace the shoes with new ones.
- When lugs are worn and steel cord (1) inside the shoe is exposed across two links or more, replace the shoe with a new one.



BREAK OF STEEL CORD

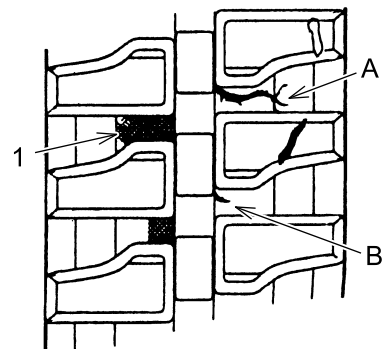
If lugs are worn and more than half of one steel cord (B) is broken, replace the shoe with a new one.



CRACK OF RUBBER CRAWLER SHOE

If crack (A) of 60 mm or longer occurs between lugs of the rubber crawler shoe, repair it.

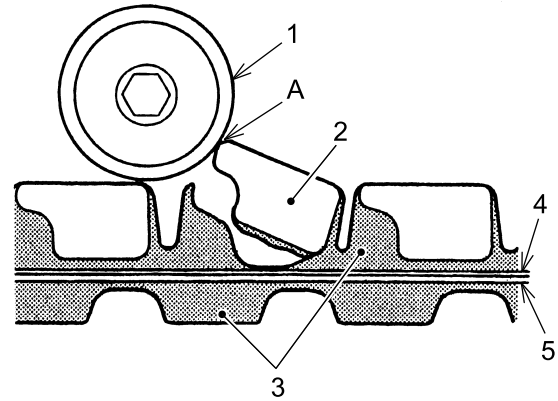
In addition, if a shorter crack (B) occurs and inner steel cord (1) is exposed, immediately repair it.



DETACHMENT OF CORE METAL OF RUBBER CRAWLER SHOE

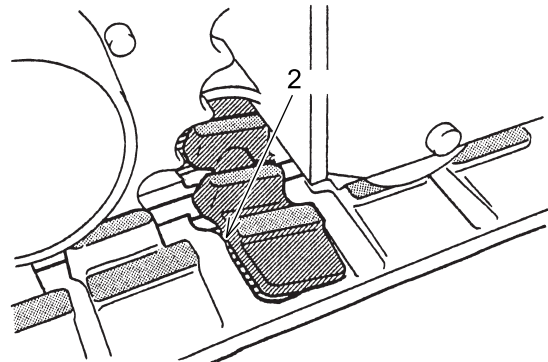
Even if no damage or wear is found on the lug side (outside) of the rubber crawler shoe, the core metal side (inside) can be worn by interference or rubbing with roller, idler, or sprocket in some usage condition, finally resulting in detachment of core metals.

- 1. Lower roller
- 2. Core metal
- 3. Rubber
- 4. Canvas
- 5. Steel cord
- A. Damage due to interference

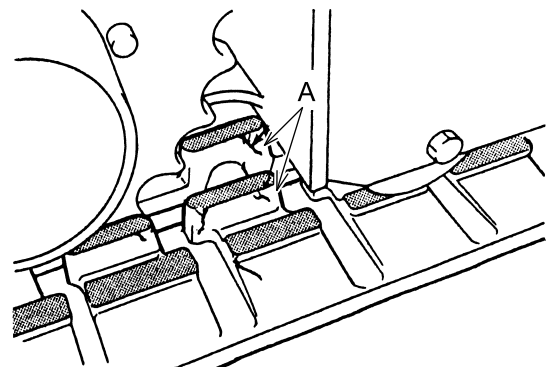


Notice

- Prohibited use of the rubber crawler shoe can easily cause detachment of core metals.
- Our warranty does not cover damage caused by prohibited use of the rubber crawler shoes or use of them with an improper shoe tension.
- If any one of the core metals (2) on a rubber crawler shoe is detached, replace it with a new one.



- Cracks (A) which occur where core metals contact with the roller do not need repair.



4.12.5 REPLACING RUBBER CRAWLER SHOES



REPLACING RUBBER CRAWLER SHOES

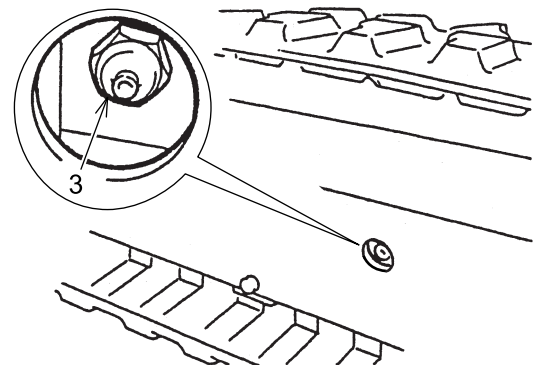
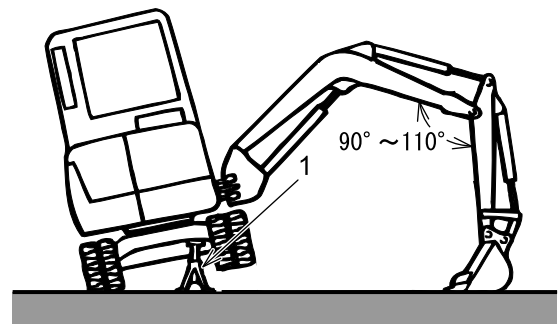
- Perform this work in pairs and the operator should move the machine according to signals of the partner. Lifting up the machine is needed to replace the rubber crawler shoe. It is dangerous for the machine to fall unintentionally when replacing it. Do not move anything other than the rubber crawler shoe to be replaced during the replacement work.
- Grease cylinder is under extreme high pressure. It is dangerous to loosen the grease nipple rapidly because grease will splash. Loosen the grease nipple gradually with your face kept away from around the grease nipple. The grease nipple can pop out due to the inner high pressure. Loosen it gradually within one turn.
- Make sure that the grease inside the grease cylinder is completely drained and then turn the sprocket before removing the rubber crawler shoe.
- It is very dangerous to splash the grease in other than the procedure described in "Removing rubber crawler shoe" in the next page. Contact your KOBELCO authorized dealer for repair if the rubber crawler shoe is not loosened.

Notice

Wash to remove any sand and soil around the crawlers before replacement, inspection and adjustment.

Removing rubber crawler shoe

1. Use the boom or arm to lower the bottom of the bucket to the ground to lift the machine body up. Be sure to perform the lever operation slowly.
2. Support the undercarriage with safety strut (1) or other means.
3. Loosen grease nipple (1) of the grease cylinder slowly to drain the grease.
4. Loosen grease nipple (1) gradually within one turn at most.

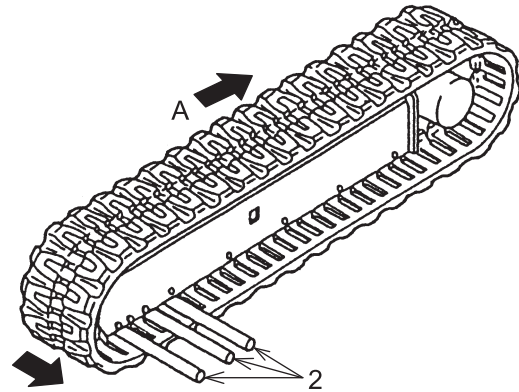


[4. INSPECTION AND MAINTENANCE]

- Put in iron pipes along the rubber crawler shoe and slowly rotate the sprocket in the reverse direction. If the rubber track shoe comes off from the iron pipes, slide it horizontally to remove it.

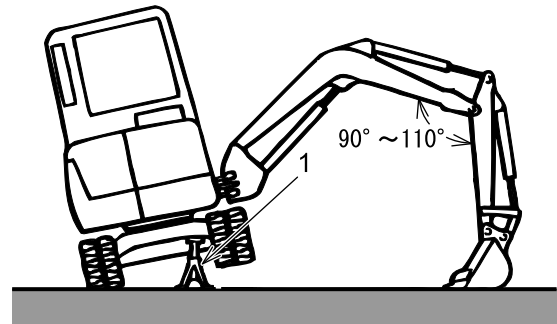
2. Iron pipe

A. Rotation direction



Installing rubber crawler shoe

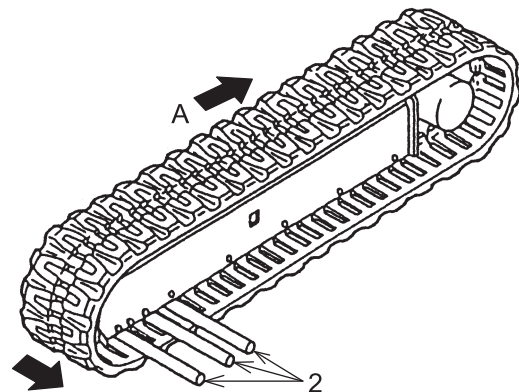
- Use the boom or arm to lower the bottom of the bucket to the ground to lift the machine body up. Be sure to perform the lever operation slowly.
- Support the undercarriage with safety strut (1).
- Mesh the rubber crawler shoe with the sprocket and place it on the idler.
- Rotate the sprocket in the reverse direction slowly to push the rubber crawler shoe and stop the rotation.



- Put in iron pipes along the rubber crawler shoe and slowly rotate the sprocket in the reverse direction again to place the rubber track shoe on the idler securely.

2. Iron pipe

A. Rotation direction



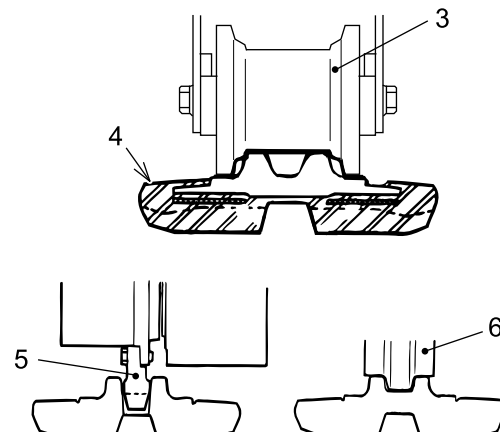
- Stop the rotation and check that the rubber crawler shoe is securely placed on the sprocket (5), idler (6) and lower roller (3).
- Check and adjust the tension of rubber crawler shoe (4), following "ADJUSTING CRAWLER TENSION".
- Place the machine on the ground after checking that tension and meshing between the rubber crawler shoe (4), sprocket (5) and idler (6) is sufficient.

3. Lower roller

4. Rubber crawler shoe

5. Sprocket

6. Idler



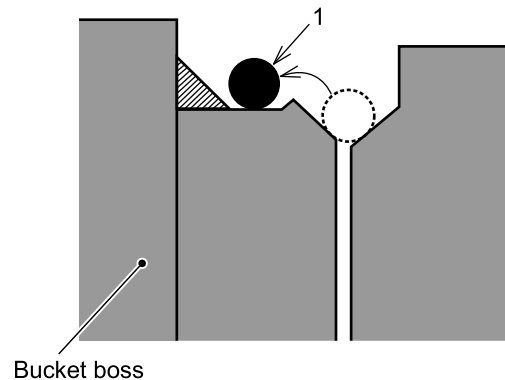
4.12.6 REPLACING BUCKET

CAUTION

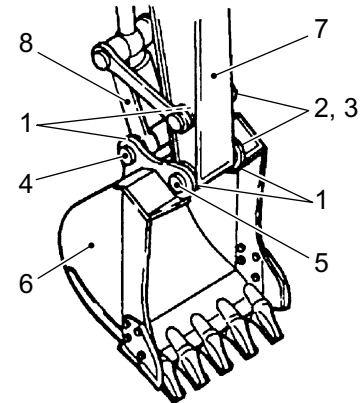
- Park the machine on a level and firm place before operation. When working with other workers, surely send and receive signals to each other and use extreme caution to ensure the safety.
- Never operate the front attachment abruptly because it is dangerous.
- When aligning the pin with a pin hole, never insert your fingers into the hole.
- Place the removed bucket in the stable condition.

REMOVING BUCKET

1. Put the bucket bottom on a level ground and stabilize it at the position where the load is not applied on the pins of bucket and arm.
2. Move O-ring (1) from the specified position to bucket boss (9).



3. Remove retaining ring (2) and pin (3) by using a flat-head screwdriver.
4. Remove pins (4) and (5) and bucket (6).
Use caution to prevent sand or mud from sticking to the removed pin. The both ends of pin holes of arm (7) and bucket link (8) have the dust seals. Be careful not to damage them.

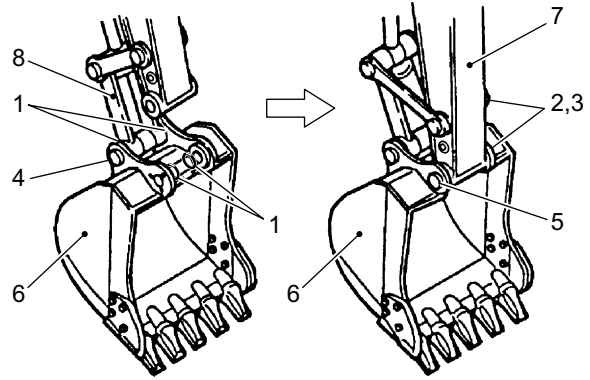


INSTALLING BUCKET

Notice

If O-ring (1) is cracked or has lost elasticity, replace it with a new one.

1. Clean each pin and pin hole and grease it sufficiently to make it slippery.
2. Move the bucket cylinder to align the pin holes of bucket (6) and bucket link (8) with each other, and then insert pin (4).
3. Raise the boom to slightly raise the bucket from the ground.
4. Move arm (7) to align the pin holes of bucket (6) and arm (7) with each other, and then insert pin (5).
5. Insert pin (3) and install retaining ring (2).
6. Fit O-ring (1) in place.
7. Apply grease to the grease nipples for each pin until the grease comes out through the gap between the pin and the hole.

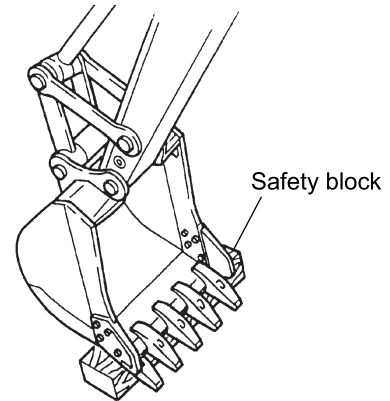


4.12.7 REPLACING TOOTH POINT AND SIDE CUTTER

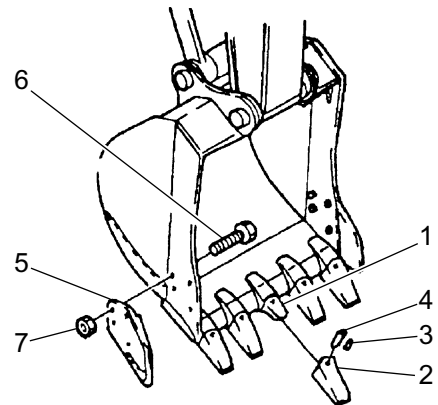
CAUTION

When replacing the tooth point or side cutter, apply a safety block to the bottom face of the bucket.

Check the bucket tooth points and side cutters for wear. The tooth point with holes or crackings should be replaced before adapter (1) begins to be worn. The side cutter with severe wear should be replaced soon after it is found. If the replacement is delayed, the body of the bucket will be damaged.



- (1) Adapter
- (2) Tooth point
- (3) Rubber lock pin
- (4) Locking pin
- (5) Side cutter
- (6) Bolt
- (7) Nut



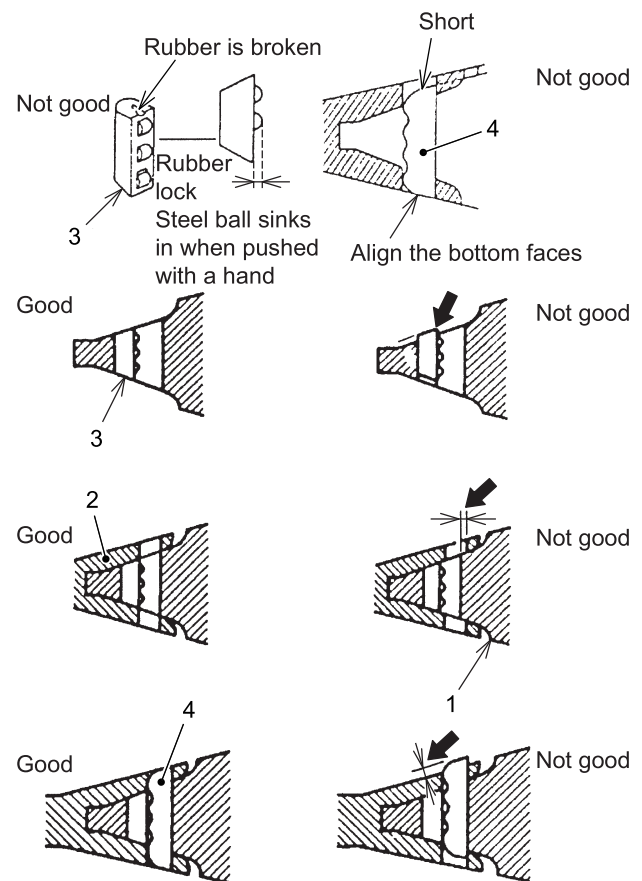
REPLACING TOOTH POINTS

CAUTION

When hammering, metal chips can fly. If it flies into your eye, it may result in severe injury. Wear protective gears such as protective glasses, hard hat and gloves.

[4. INSPECTION AND MAINTENANCE]

1. Using a punching tool and hammer, hammer out locking pin (4) in a way that will not break rubber rock pin (3).
2. Inspect removed locking pin (4) and rubber lock pin (3).
If the locking pin is too short or the rubber lock pin is in poor condition as shown in the figure, replace it with a new one.
3. Use a putty knife to clean the surface of adapter nose (1) and remove hardened soil.
4. Fit tooth point (2) onto adapter nose (1).
5. Push rubber lock pin (3) into the hole of adapter nose (1).
6. Hammer locking pin (4) until its surface is aligned with the point surface.

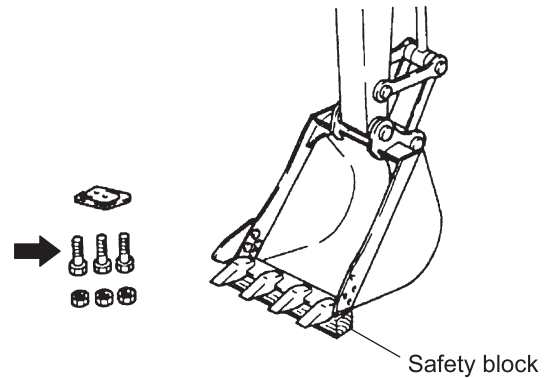
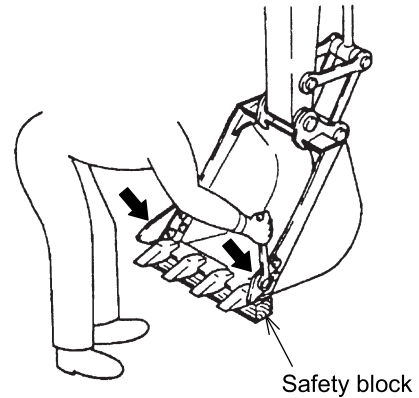


REPLACING SIDE CUTTERS

Notice

If the replacement is delayed, the body of the bucket will be damaged.
Early replacement is recommended.

1. After removing sand and soil sticking to around the mounting bolts, cut off the mounting bolts by gas cutting, and then remove the side cutters.
2. Clean the mounting surfaces and install new side cutters.
When replacing the side cutters, be sure to replace the bolts and nuts with new ones.
Tightening Torque: $279 \pm 29 \text{ N} \cdot \text{m}$ ($206 \pm 22 \text{ lbf} \cdot \text{ft}$)
3. After tightening the nuts, spot-weld them.



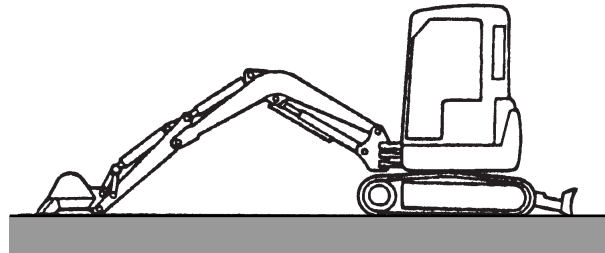
4.13 8 HOUR (DAILY) INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

See "EVERYDAY CHECK-UP", "CHECK BEFORE STARTING ENGINE" and "CHECK AFTER STARTING ENGINE" to perform a daily pre-operation inspection and maintenance (before operation and immediately after starting operation).

4.13.1 GREASING ATTACHMENT/EQUIPMENT

Before greasing the machine, set the machine in the greasing position as shown to the right, wipe all grease nipples, and then apply the grease until the grease comes out through the gap of the pin.

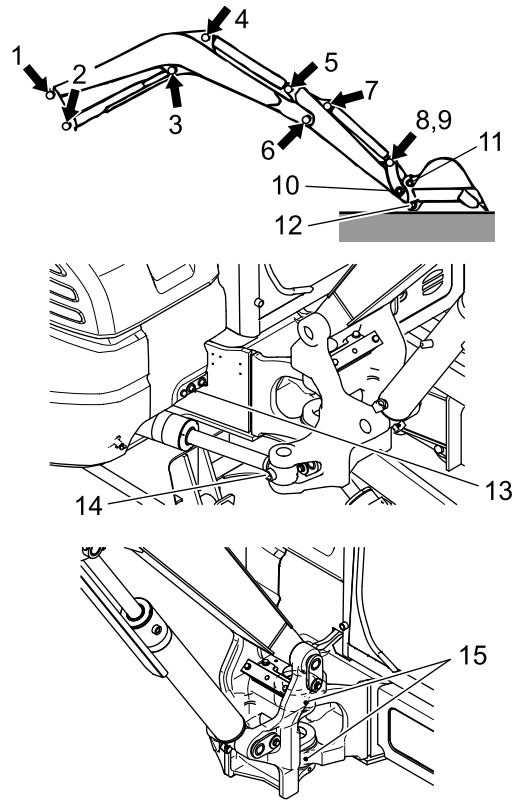


Notice

ATTENTION TO GREASING

- Grease greasing points every 8 hours during the first 50 hours of operation by a new machine. After that, grease them every 50 hours.
 - For digging work in the water, grease the submerged parts before and after the work every day.
 - After heavy duty work with a special attachment such as a nibbler (crusher) or a breaker, grease the machine every day.
 - Grease the machine before the work if it has not been used for one month or longer.
-

1. Use the grease gun to apply grease to the grease nipples.



No.	Parts to grease	Poi-nts	No.	Parts to grease	Poi-nts
1	Boom foot pin	1	9	Idler link pin	2
2	Boom cylinder foot pin	1	10	Arm and idler link connecting pin	1
3	Boom cylinder rod pin	1	11	Bucket link pin	1
4	Arm cylinder foot pin	1	12	Arm and bucket connecting pin	1
5	Arm cylinder rod pin	1	13	Swing cylinder foot pin	1
6	Boom and arm connecting pin	1	14	Swing cylinder rod pin	1
7	Bucket cylinder foot pin	1	15	Swing bracket and frame connecting pin	2
8	Bucket cylinder rod pin	1			

2. After applying grease, wipe off old grease which is pushed out.

4.14 50 HOUR INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "8 HOUR (DAILY) INSPECTION & MAINTENANCE PROCEDURES" in Chapter 4.

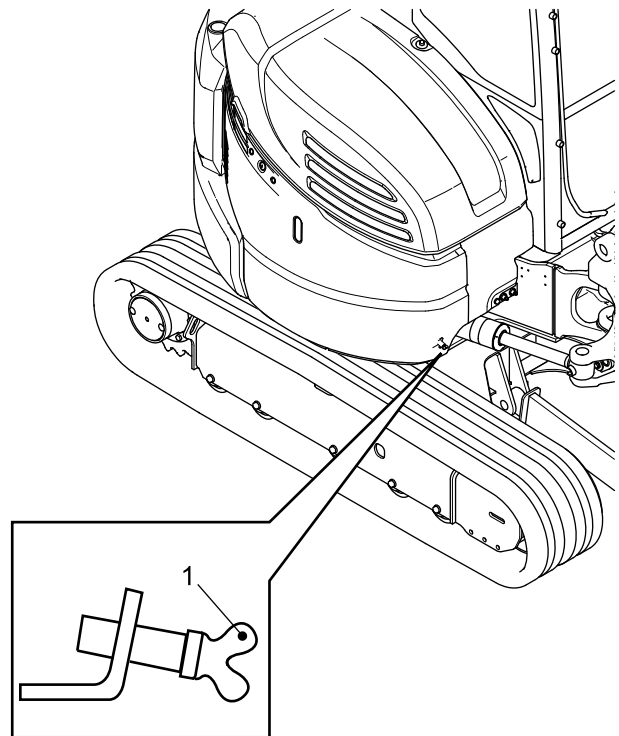
4.14.1 DRAINING WATER AND SEDIMENT IN FUEL TANK



HANDLING OF FUEL OIL

- Wipe off spilled fuel to prevent a fire.
- Make sure that there is no fuel leakage after performing work.

1. Swing the upper structure a little to a position where the drain valve under the fuel tank can be opened, place the bucket on the ground, stop the engine, and move the pilot control shut-off lever to the "LOCKED" position.
2. Place an empty container under drain valve (1) to catch the discharged fuel.
3. Open drain valve (1) and drain the water and sediment deposited on the bottom. Be careful not to be splashed by the flushed fuel.
4. Close drain valve (1) when the clean fuel is discharged.



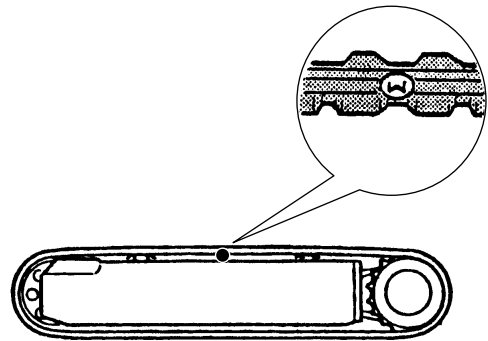
4.14.2 ADJUSTING CRAWLER TENSION

Notice

- Before inspecting and greasing the crawler, remove soil adhered to the crawler tracks completely by washing them.
- Crawler adjustment is necessary depending on the work condition at the working site. At a working site covered with many gravel and cobbles, loosen the crawler tension slightly, and on a firm ground, increase the tension slightly.

CHECKING CRAWLER TENSION

1. Move the rubber joint (M mark) of the rubber track shoe to the upper center between the axles.

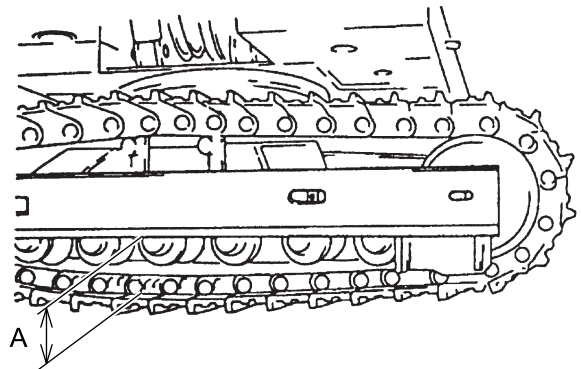


2. Measure the upper part of the shoe and the lower part of the track frame, while raising one of the crawlers up, for which tension is to be measured. In this case, hold the raised machine with a stand securely.

A: Proper tension

Rubber shoe: 75 to 85mm(3.0 to 3.3 inch)

Iron shoe: 110 to 130mm(4.3 to 5.1 inch)



CRAWLER TENSION ADJUSTMENT PROCEDURES

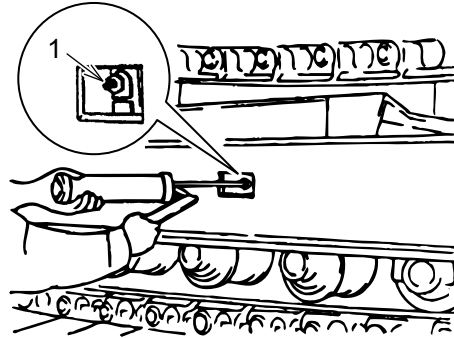


ABOUT CRAWLER FAILURE

When a the crawler tension cannot be adjusted, the crawler has a failure.

A strong force is applied to the spring of track spring. Grease in the cylinder is under high pressure. If the travel system is adjusted or disassembled in a wrong way, it is very dangerous and could cause severe personal injury.

1. Crawler tension is adjusted by applying grease to grease nipple (1) of the idler adjuster of lower frame with a grease gun.
2. In order to equalize the tension of the crawler, travel the machine forward and backward.
3. Check the amount of slack of the crawlers once again and readjust them as necessary.
4. Perform the same adjustment on another side crawler.



CRAWLER LOOSENING PROCEDURES



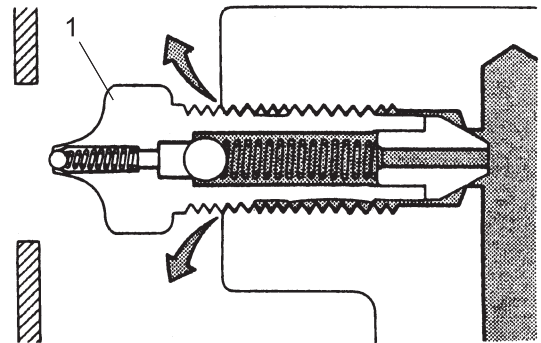
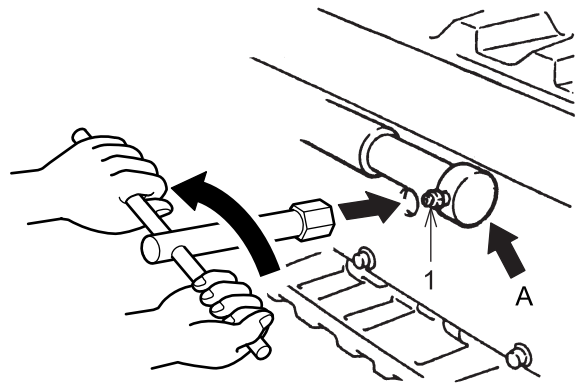
ABOUT HANDLING OF GREASE CYLINDER

Wear protective glasses.

Grease cylinder is under high pressure. If you loosen the grease nipple rapidly, high pressure grease will spout and may cause severe personal injury. Never position your body or face in front of the plug. Loosen the grease nipple gradually.

Do not loosen the grease nipple more than one turn because it can pop out due to the internal high pressure grease.

1. Place the machine on a level and firm place.
2. Loosen grease nipple (1) of the grease cylinder maximum one turn slowly to drain the grease. When the grease is not drained well, raise the crawler to be loosened and rotate the crawler slightly.
3. When the tension of crawler is adjusted properly, tighten grease nipple (1).
For the tightening torque, see "TIGHTENING TORQUES FOR BOLTS & NUTS (SPECIFIC POSITIONS)" in Chapter 4.



Details of A Section (Grease Discharge)

4.14.3 GREASING SWING PINION



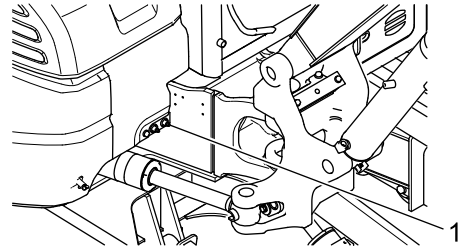
ABOUT GREASING SWING PINION

Do not swing the machine while greasing the swing pinion because it is dangerous.

Notice

During the first 50 hours of operation of a new machine, lubricate it every 8 hours.

- Inject grease of 50 g (about 20 times with grease gun) from grease nipple (1) of the swing pinion for each of four directions while swinging the machine by 90 degrees.



4.15 100 HOUR INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP and 50 HOUR INSPECTION & MAINTENANCE PROCEDURES".

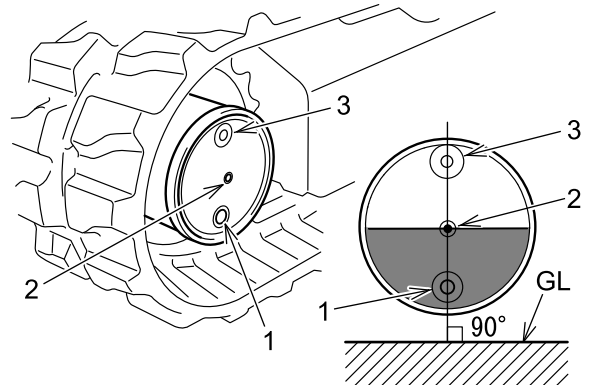
4.15.1 CHECKING OIL LEVEL OF TRAVEL REDUCTION UNIT



ABOUT CHECKING OIL LEVEL

- Wear protective glasses.
- Pressure may be generated inside the traveling devices. Slowly loosen the plug to release the internal pressure and then remove the plug. When the plug is loosened abruptly, the plug and oil may pop out and it is dangerous. Never position your body or face in front of the plug.
- Immediately after operation, the oil is hot and it may cause burns. Start working after the temperature goes down.

1. Move the machine to a level and firm place.
2. Stop the machine at a position in which drain plug (1) is positioned at the lower side and lower the bucket to the ground.
3. Stop the engine and move the control lock lever to the "LOCKED" position.
4. Remove level plug (2) and check the level and contamination of the gear oil.
If the oil level is up to the neck of the level plug, it is proper.
5. If the gear oil level is low, remove fill plug (3) and refill the specified gear oil.
For specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
6. Clean level plug (2), fill plug (3) with light oil and install it.
7. Check the other travel reduction unit in the same procedure.



4.15.2 CHECKING INTAKE SYSTEM RUBBER HOSE

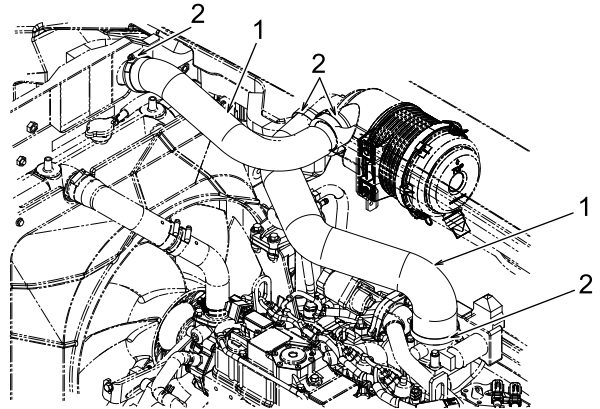


ABOUT HANDLING OF RUBBER HOSE

- Do not touch the hot parts. Contact with hot parts during operation or immediately after stopping operation may cause burns.
 - When replacing the rubber hoses, cover the inlet with a clean cloth to prevent dust from entering it.
-

CHECKING RUBBER SUCTION HOSE FOR AIR CLEANER

1. Check that rubber hose (1) is not damaged or deteriorated and band (2) is not loose.
2. Rubber hose (1) which is damaged or deteriorated should be replaced with a new one together with band (2).



4.16 250 HOUR (3-MONTH) INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP, and 50, and 120 HOUR INSPECTION & MAINTENANCE PROCEDURES".

4.16.1 ADJUSTING FAN BELT



INSPECTING AND MAINTAINING THE BELT

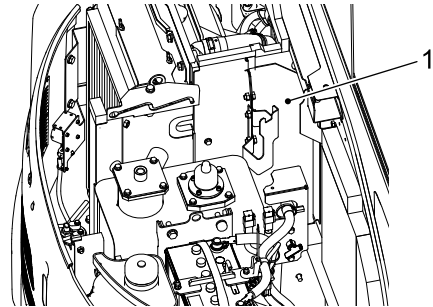
Be sure to stop the engine before inspection and maintenance of the engine.

Inspecting and maintaining the running engine may cause severe injury by being caught in the rotating parts, such as the fan and the belt.

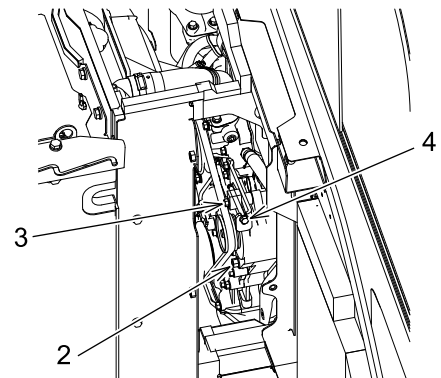
Notice

An improperly installed belt may not only decrease the performance of alternator but also damage the belt and the alternator.

1. Use the starter key to release the lock, open the right side cover of the machine and support it with the stay.
2. Remove four bolts of cover (1) at the next to the hydraulic oil tank and then remove cover (1).



3. Loosen adjusting bolt (3), adjust the fan belt to the specified tension, and tighten attaching nut (1) and adjusting bolt (2).
4. Adjust the fan belt to the specified tension by using adjusting bolt (4) and then tighten mounting nut (2) and adjusting bolt (3).
5. After adjustment, run the engine at low idle for about 5 minutes.
6. Stop the engine and check the fan belt tension.



Belt	New Belt Tension mm (inch)	At Inspection mm (inch)	Pushing Force N (lbf)
Fan	8 to 12 (0.32 to 0.47)	10 to 14(0.39 to 0.55)	98 (22)

7. Install cover (1), remove the support stay, close the side door, and then lock it with the starter key.

4.16.2 CHECKING RADIATOR HOSES

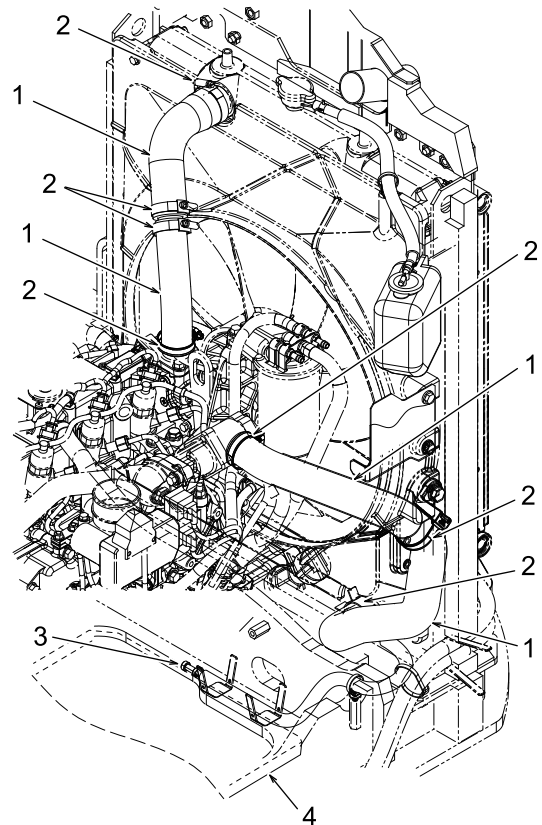


PAY ATTENTION TO DAMAGES OF RADIATOR HOSE

If you find cracks, permanent set, and water leakage on the hoses, replace the hoses immediately. Serious damages such as engine overheat can be prevented.

INSPECTING RADIATOR HOSES

1. Open the engine hood and right side cover with the starter key and hold it with the stay.
2. Check each hose for water leakage due to looseness of band (2) or cracking or permanent set of hose (1).
3. Tighten loosened band (2).
Replace hose (1) having cracks or permanent set.



REPLACING RADIATOR HOSES

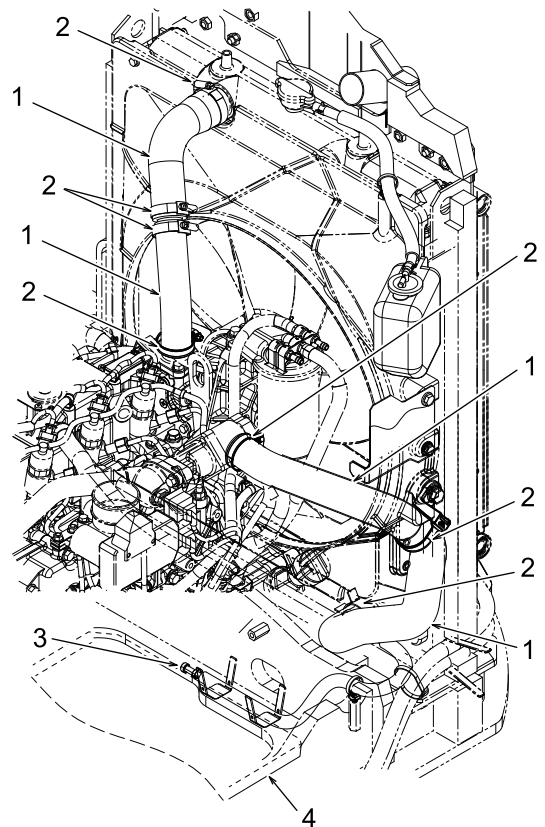


REPLACING RADIATOR HOSES

Inside the radiator, the high pressure steam occurs and it may cause personal injury. Do not loosen or remove the radiator cap when the coolant is under high pressure and high temperature.

- Stop the engine before removing the radiator cap.
- Allow enough time for the coolant to cool down before removing the radiator cap.

1. Loosen two bolts under the radiator, and remove the cover (4).
2. Loosen radiator cap slowly. After checking that the pressure is completely released, push the cap down, loosen it further, and then remove it.
3. Remove drain cock (3) and drain the coolant into a container until the coolant level of the radiator becomes lower than hose (1) to be replaced.
4. Loosen band (2), remove damaged hose (1), and replace it with a new hose.
5. Insert drain cock (3).
6. Refill the radiator with coolant and then fill the reserve tank with coolant.
7. After refilling, tighten the radiator cap securely.
8. Remove the support stay, and close the engine hood and right side cover.
9. Install the cover (4) on the specified position under the radiator.



4.16.3 INSPECTING, CLEANING, OR REPLACING AIR CLEANER ELEMENT

CAUTION

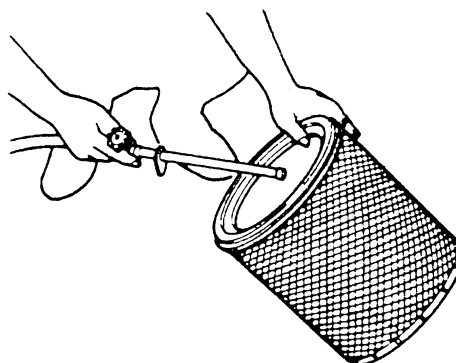
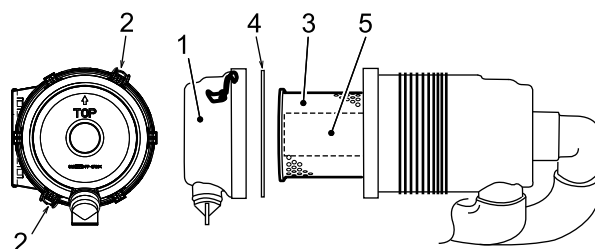
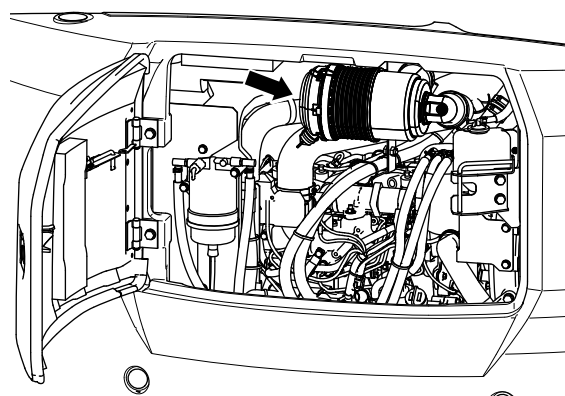
- Wear protective glasses or respirator when using compressed air.
- Before cleaning or replacing the air cleaner element, stop the engine.
- Do not remove the inner element except for replacing with a new one.
- When replacing the inner element, cover the inlet inside the air cleaner with a clean cloth or tape to prevent dust from entering it.

Notice

- Cleaning : Every 6 times or 250 hours
- Replacement : After cleaning 6 times or after one year

Cleaning and replacement of outer element

1. Open the engine hood with the starter key and hold it with the stay.
2. Remove clamp (2) from air cleaner cover (1) to open it.
3. Remove outer element (3), and clean inside the air cleaner.
If its specification is not having inner element (5), be careful not to allow foreign materials and dust to enter the air cleaner.
4. Install cover (1) temporarily to avoid foreign materials and dust.
5. From the inside of outer element (3), apply the compressed air of 0.7 MPa (102 psi) or less along the folds. Next, apply the compressed air from the outside along the folds, and then from the inside again.
Do not hit the outer element to solid objects or clean the outer element by hitting it.
6. After cleaning, check outer element (3), and if holes or ruptures are found, replace it with a new one.
7. Install outer element (3), and attach O-ring (4) to cover (1).



CAUTION

Install the cover with the O-ring attached to the air cleaner.
Without the O-ring, water gets into the air cleaner, causing failure of the engine.

8. Install cover (1) to the air cleaner with the arrow facing up, and fix it with clamp (2).
9. Remove the support stay and close the engine hood.

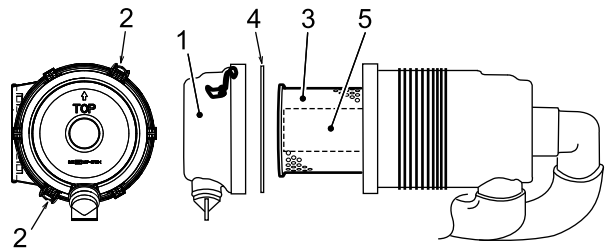
Replacement of inner element

CAUTION

- Do not reuse the inner element after cleaning it.
- Replace the inner element and the outer element at the same time.

When replacing the outer element, also replace the inner element.

1. Remove outer element (3), and clean inside the air cleaner.
2. Remove inner element (5).
3. Install new inner element (5) and outer element(3).
4. Install O-ring (4) to cover (1).



CAUTION

Install the cover with the O-ring attached to the air cleaner.
Without the O-ring, water gets into the air cleaner, causing failure of the engine.

5. Install cover (1) to the air cleaner with the arrow facing up, and fix it with clamp (2).
6. Remove the support stay and close the engine hood.

4.16.4 CLEANING OR REPLACING RADIATOR CAP



WARNING

HANDLING OF COOLANT AND CAP

Do not loosen or remove the reserve tank cap and the radiator cap when the coolant is under high pressure and high temperature.

High temperature steam and coolant will spray and could cause burns.

- When opening the cap, wait until the coolant cools down, and then slowly turn and open the radiator cap.
- The antifreeze is poisonous, so prevent it from contacting with skin. If the antifreeze gets into your eyes or on your skin, flush the eyes or skin with plenty of water, and seek medical attention.

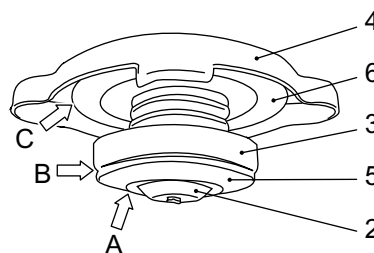
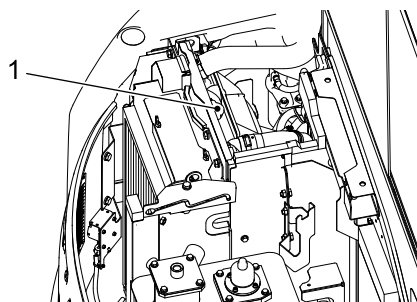


CAUTION

Securely close the cap after opening it.

Inspection/cleaning	Replacement
Every 250 hours	If damaged, or every 1 year

1. Open the engine hood and hold it with the stay.
2. Loosen radiator cap (1) slowly. After checking that the pressure is completely released, push the cap down, loosen it further, and then remove it.
3. Check the following points of the cap. If foreign materials are adhered, remove them and if any damages are found, replace the parts.
 - A: Contact surface between negative pressure valve (2) and gasket (5)
 - B: Both surfaces of pressure valve (3) and gasket (5)
 - C: Both surfaces of external lid (4) and gasket (6)
4. Close cap (1) and close the engine hood.



4.16.5 CLEANING RADIATOR, OIL COOLER CORE AND FILTER

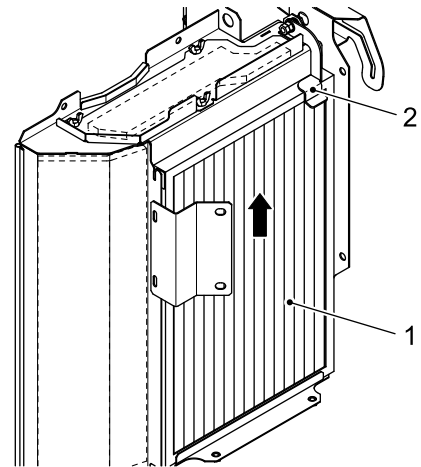
WARNING

Direct strike of compressed air, steam or high pressure water on the body can cause injury. Wear protective glasses, mask, and protective shoes, etc.

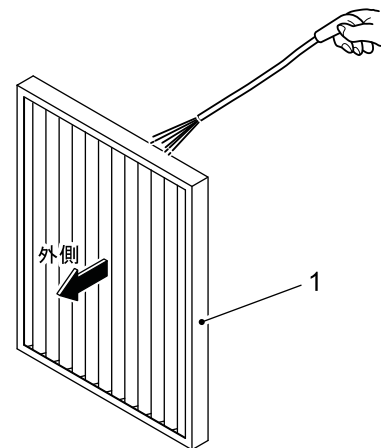
Notice

When using compressed air or high pressure water, keep a safe distance from the fin to prevent it from being damaged. If the fin is damaged, it may cause water leakage or overheating.

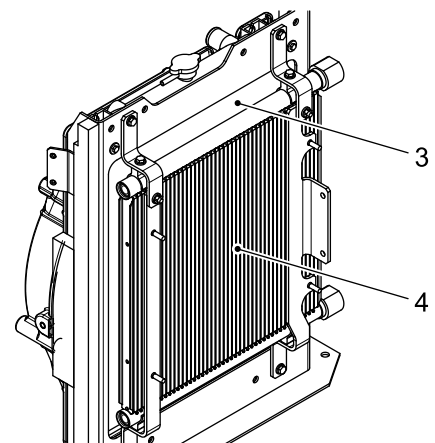
1. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.
2. Pull up stopper (2) to release the lock and pull out filter (1).



3. Clean filter (1) with compressed air (0.2 MPa) or water.



4. Check radiator (3) and oil cooler (4) to clean any mud, dust or leaves off.
5. Insert filter (1) into the original position and pull down stopper (2) to lock it.
6. Remove the support stay, and close the right side cover.



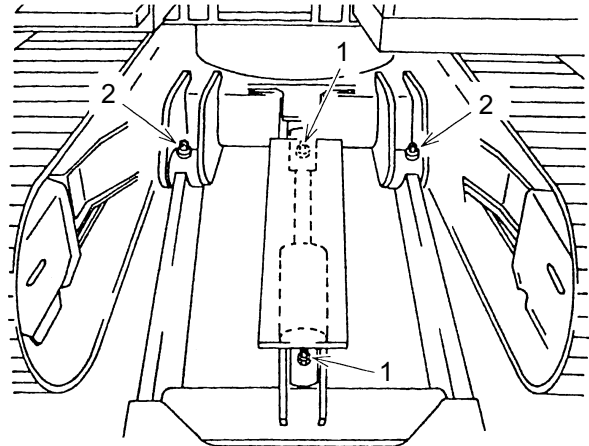
4.16.6 GREASING DOZER

Notice

ATTENTION TO GREASING

- For digging work in the water, grease the submerged parts before and after the work every day.
- After heavy duty work with a special attachment, grease the machine every day.
- Grease the machine before the work if it has not been used for one month or longer.

- Lubricate grease nipples (1) at the head and rod sides of the dozer cylinder and grease nipples (2) at the blade installation portions.



4.16.7 GREASING SWING BEARING

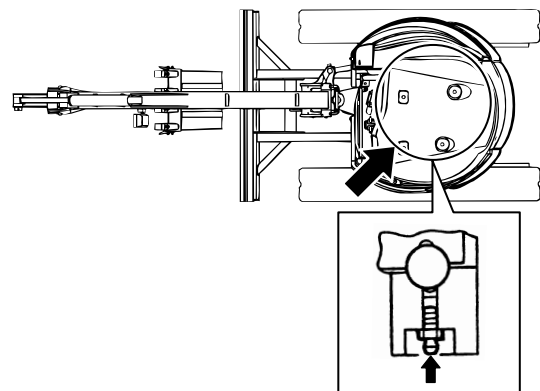


ABOUT GREASING SWING BEARING

Do not swing the machine while greasing the swing bearing because it is dangerous.

The grease nipple is at one location.

- Clean the grease nipple and swing the upper structure by every 90 degrees for greasing. Every time after swinging the upper structure, apply grease until the grease comes out through the seal of bearing.



4.16.8 INSPECTING AND MAINTAINING BATTERY



INSPECTING AND MAINTAINING BATTERY

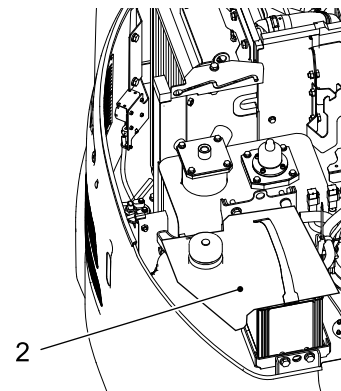
- Wear protective glasses, long-sleeve shirt and gloves when handling the batteries.
- Do not bring a fire near the battery because the combustible hydrogen gas generated by the battery can cause explosion.
- If the dilute sulfuric acid in the battery splashes onto your skin or into your eyes, it will cause burns or blindness. At such case, immediately wash the skin or eyes with sufficient clean water, and ask a special doctor to treat it as soon as possible.
- Before performing inspection and maintenance on the batteries, be sure to stop the engine.
- Confirm that the battery power-off switch is set to the OFF position to cut off the current.
- When removing the battery terminal, be sure to remove the ground side (negative terminal) first and conversely, when attaching the battery terminal, attach the ground side last.
- Do not put tools and hardware on the protective cover on the battery upper section. It may cause a short circuit resulting in a fire or explosion.

CHECKING BATTERY ELECTROLYTE LEVEL

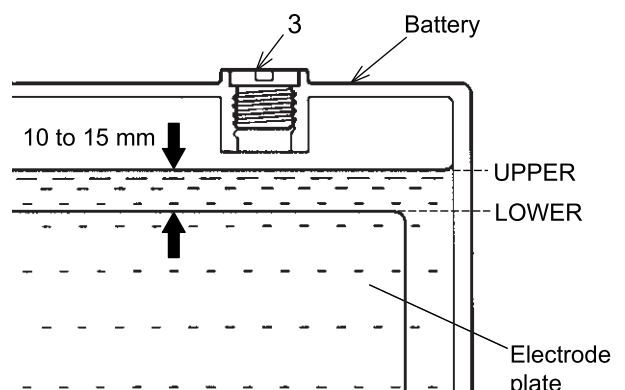
Notice

- Clean the battery terminals, and apply grease or commercial anti-rust lubricant spray.
- Do not dispose of the batteries by yourself but always ask a professional service company to dispose of it.
- If the batteries became old, do not attempt to use the old battery and a new battery together. The service life of the new battery may be shortened. When replacing the batteries, replace both at the same time.

1. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.
2. Lift up battery protection cover (2).



3. Remove cap (3), and if the level is below the specified level (10 to 15 mm above the electrode plate), supply distilled water to the specified level.
4. Clean the vent hole of the battery cap, and tighten cap (3) firmly.
5. Return battery protection cover (2) to the specified place over the batteries.
6. Remove the support stay, and close the right side cover.



SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

CAUTION

PRECAUTIONS IN COLD CLIMATES

- Be careful of retaining the temperature of the batteries. If the temperature is too low, they may freeze, and their electric capacity decrease significantly.
- Charge the batteries as soon as possible.

Notice

Measure the specific gravity of battery electrolyte after its temperature becomes almost the same as the outdoor temperature, instead of immediately after finishing operation.

- The specific gravity of the battery electrolyte varies according to the fluid temperature; therefore, retain the temperature within the range of use as shown in the following table. If the specific gravity is at the lower limit or below (small value), charging is necessary.

Specific Gravity of Battery Electrolyte

Charging rate	Battery electrolyte temperature		
	-20 degrees C (-4 degrees F)	0 degrees C (32 degrees F)	20 degrees C (68 degrees F)
100 %	1.31	1.29	1.28
90 %	1.29	1.28	1.26
80 %	1.28	1.26	1.25
75 %	1.27	1.25	1.24

4.17 500 HOUR (6-MONTH) INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP and 50, 100, 120, and 250 HOUR INSPECTION & MAINTENANCE PROCEDURES".

4.17.1 REPLACING ENGINE OIL AND ENGINE OIL FILTER



WARNING ABOUT HOT PARTS

- Contact with hot parts during operation or immediately after stopping operation may cause burns. Do not touch the hot parts.
- Immediately after operation, the oil and oil filter are hot. Start the replacement after the temperature goes down.

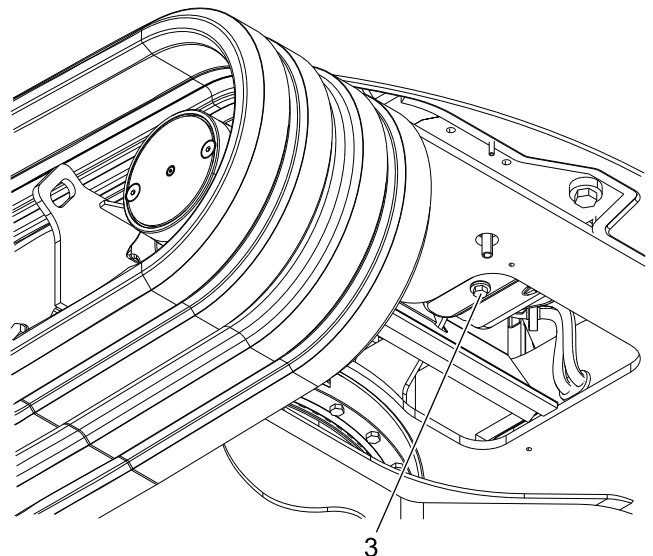


- Do not reuse the filter element, O-ring and packing.
- When replacing the O-ring or gasket, check the fitting condition at the mounting surface to prevent it from being twisted and broken.

Notice

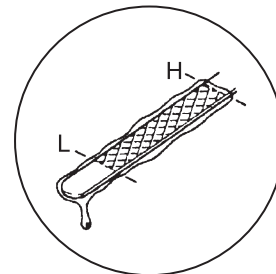
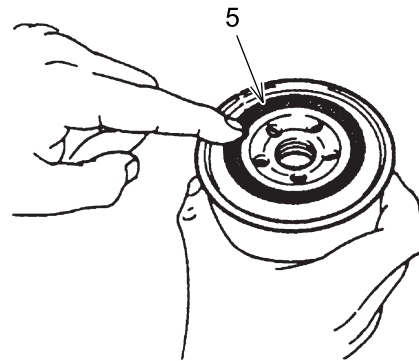
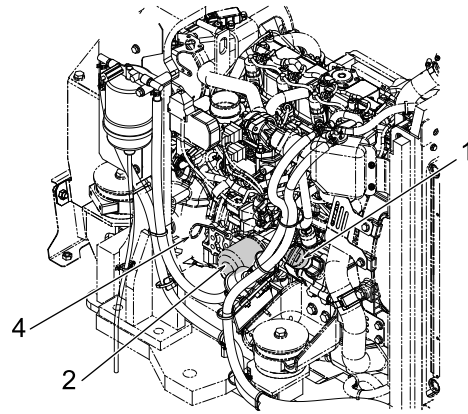
- Check drain engine oil, and if metal chips or powder is found in the oil, contact your KOBELCO authorized dealer/distributor.
- Change the engine oil after 50 hours of operation has been reached for the first time.
- When the engine oil is replaced, replace the engine oil filter as well.
- When the engine oil filter is replaced, run the engine at low idle for several minutes until the oil is filled in the filter.

1. Loosen the six bolts at the under cover just under the engine and remove the cover (3).
2. Place a container for drain oil under drain plug (3).
Container: 8L (2.1Gal) or more



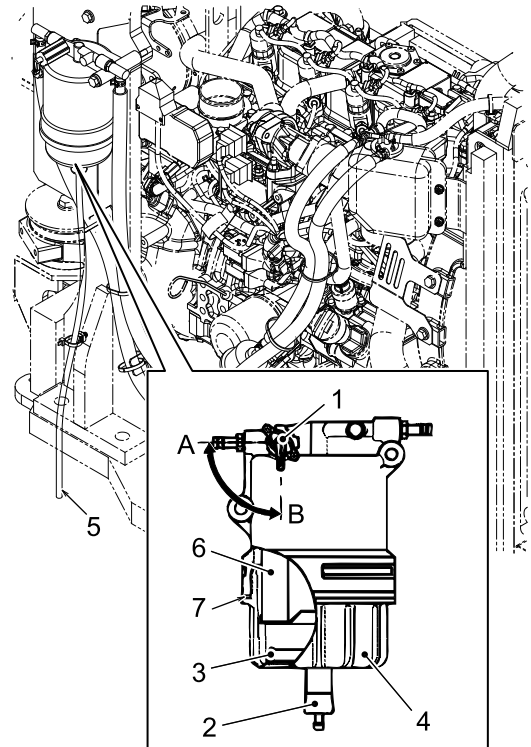
[4. INSPECTION AND MAINTENANCE]

3. Clean the area around oil filler cap (1), remove the cap and loosen drain plug (3) of the engine oil pan to drain the oil.
4. After draining the oil, tighten drain plug (3) and oil filler cap (1) securely.
Part number of Copper packing : VV22190220002
Tightening torque of drain plug : 53.9 to 63.7 N·m (39.8 to 50.0 lbf·ft)
Width across flats : 19 mm
5. Turn filter element (2) with a filter wrench and remove it.
6. Remove dirt and foreign materials from the mounting surface of the oil filter body.
7. Apply engine oil to the packing (5) of new filter element and install the filter element by turning it by hand until it does not turn any more.
8. Use the filter wrench to tighten the filter element about a two-thirds turn.
9. Remove the oil filler cap and refill the specified engine oil from the oil filler port, referring to "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
10. Use level gauge (4) to check the engine oil level. Refill the engine oil to the proper level, which is between upper limit (H) and lower limit (L).
11. Attach oil filler cap (1).
12. Start the engine, run the engine at low idle for several minutes and stop the engine. About 10 minutes later, check the engine oil level. If the level is low, refill the engine oil repeatedly to the proper level.
13. Make sure that there is no leakage from the mounting surface of the oil filter.
14. Attach the cover under the engine to the original position.



4.17.2 REPLACING WATER SEPARATOR

1. Use the starter key to open the engine hood and hold it with the stay.
2. Place a drain oil container under drain hose (5).
3. Raise fuel shutoff valve (1) to "Close" position (A).
4. Loosen drain valve (2) to drain water accumulated in water separator (1) into the container.
5. After draining the water, tighten drain valve (2) securely.
6. Turn cup (4) to the left and remove it.
7. Remove ring (3) and element (6) from cup (4).
8. Replace O-ring (7) with a new one. Install ring (3), element (6), and O-ring (7) to the inside of cup (4).
9. Install cup (4) to the bracket.
Tightening torque: 27 to 33 N·m (20 to 40 lbf·ft)
10. Set stop valve (1) to "OPEN" position (B).
11. Bleed air according to "BLEEDING AIR FROM FUEL PIPING" in Chapter 4.



4.17.3 REPLACING FUEL FILTER



WARNING

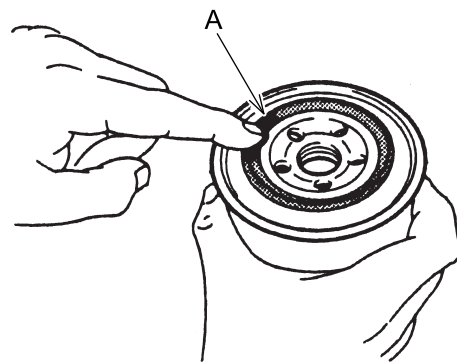
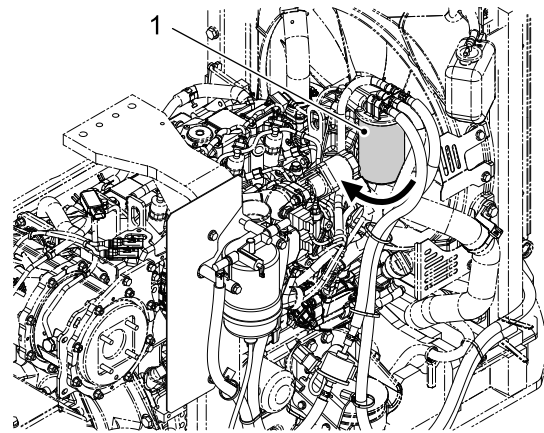
HANDLING OF FUEL

- Immediately after the engine is stopped, each of parts is heated. Before starting the work, wait until each part cools down.
- Wipe off spilled fuel to prevent a fire.

Notice

The fuel filter cannot be reused because it is a cartridge type.

1. Stop the engine, and open the engine hood.
2. By using the fuel filter wrench equipped with the machine, turn filter cartridge (1) to left to remove it.
3. Completely wipe off the sealing surface of the filter base to prevent dust and foreign materials from being seized.
4. Apply a thin film of clean light oil to packing (A) of a new filter cartridge, tighten it by hand, and then tighten an additional two-thirds of a turn.
5. Bleed the air according to "BLEEDING AIR FROM FUEL SYSTEM" in Chapter 4.
6. Start the engine, run it in idling for several minutes, and then check the filter mounting area for fuel leakage.

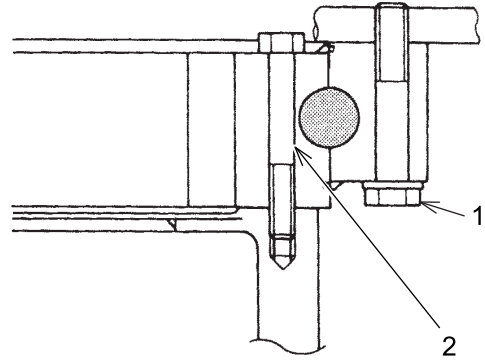


4.17.4 CHECKING SWING BEARING MOUNTING BOLT FOR LOOSENESS

Notice

Use a torque wrench when tightening the bolts of the swing bearing.

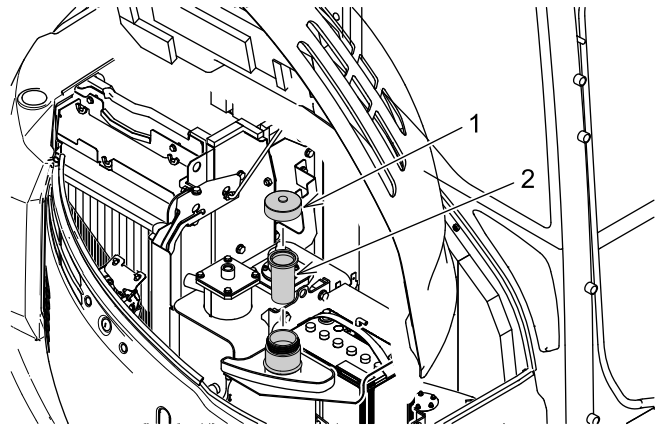
1. Check that bolts (1) and (2), which tighten the swing bearing are not loose.
2. When they are loose, remove bolts (1), and (2), apply the recommended thread locking agent (Loctite #262 or equivalent) and tighten them. Tighten diagonally positioned bolts alternately.



Mounting part	Tightening torque N·m (lbf·ft)
Inner race	115±12(85±8.9)
Outer race	96±10(71±7.4)

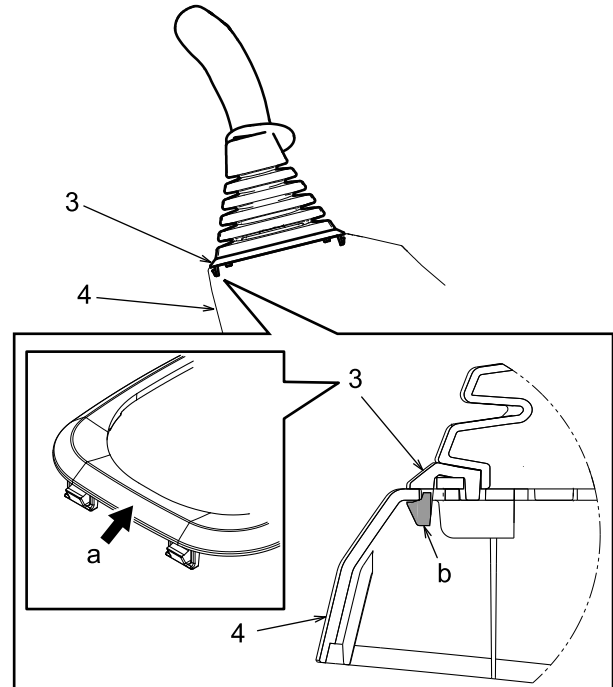
4.17.5 CLEANING FUEL TANK CAP AND STRAINER

1. Stop the engine.
2. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.
3. Turn filler cap (1) to open it.
4. Check the seal on filler cap (1), and replace it if damaged.
5. Wash strainer (2) with clean light oil, and install it. Replace it if damaged.
6. After refueling, tighten filler cap (1) securely.
7. Release the support stay and close the right side cover.

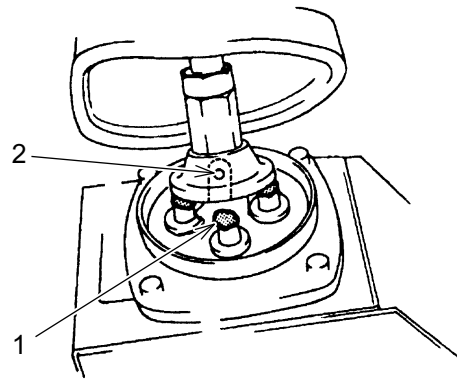


4.17.6 LUBRICATING PUSH ROD OF CONTROL LEVER

1. Push part "a" of boot (3), remove two front clicks (b) out of four clicks from plastic cover (4), and then remove boot (3).



2. Remove the rubber boot of the pilot valve and apply a small amount of grease to push rod (1) and top end (2) of the rotation sliding section.
3. After applying the grease, install the boot of the pilot valve and boot (3).



4.18 1000 HOUR (12-MONTH) INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP and 50, 100, 120, 250, and 500 HOUR INSPECTION & MAINTENANCE PROCEDURES".

4.18.1 REPLACING RETURN FILTER



WARNING PAY ATTENTION TO HOT PARTS

- The oil in the hydraulic oil tank is under high pressure and high temperature.
Before removing the cover, stop the engine first, press the breather, and release the pressure from the tank.
- Immediately after engine operation, the oil is hot and it may cause burns. Wait until the oil temperature cools down before attempting to change the hydraulic oil.

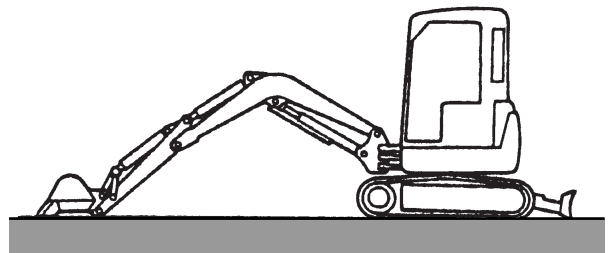
Notice

Hydraulic oil before filtration inside the filter contains dirt. When taking out the return filter, do not return the hydraulic oil remaining in the filter back to the tank.

Notice

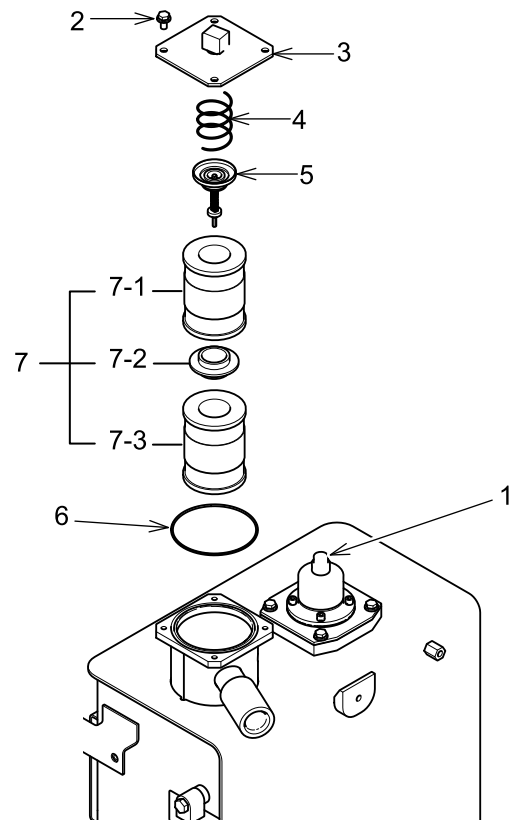
- As for the return filter element kit to be replaced, ask your KOBELCO authorized dealer for the part number and then place an order.
Replace the return filter after 50 hours of operation has been reached for the first time, and then every 1,000 hours.
For breaker specification, replace it every 200 hours.

1. Move the machine to a level and firm place.
2. Park the machine in the hydraulic oil level inspection position.
3. Stop the engine and move the control lock lever to the "LOCKED" position.
4. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.
5. Keep pressing air breather (1) on the top of the hydraulic oil tank until the pressure inside the hydraulic oil tank is released.



[4. INSPECTION AND MAINTENANCE]

6. Loosen bolts (2) on the upper surface of the tank, and then remove cover (3).
7. Take out spring (4), check valve (5) and element assembly (7) from the tank.
8. Replace O-ring (6) at the mounting surface of cover (3).
9. Assemble element kit (7) and insert it.
10. Install check valve (5) and spring (4).
11. Install cover (3).
Tightening torque: $23 \pm 2.3 \text{ N} \cdot \text{m}$ ($17.0 \pm 1.7 \text{ lbf} \cdot \text{ft}$)
12. Start the engine, set the machine in the hydraulic oil level check position by moving each control lever, and check the hydraulic oil level.



Notice

- Element (7-1) has the orientation in the upper and lower direction. Be sure to assemble it by directing the "TOP" printed surface upward.
 - Once joint (7-2) is installed, it becomes impossible to be disassembled, so be careful about it.
-

13. Release the support stay and close the right side cover.

4.18.2 REPLACING AIR BREATHER ELEMENT

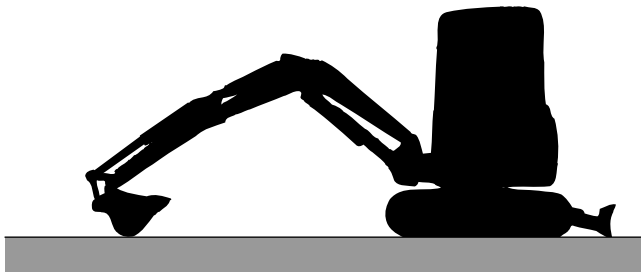
CAUTION

Immediately after engine operation, the oil is hot and it may cause in burns. Wait until the oil temperature cools down before attempting to change the element.

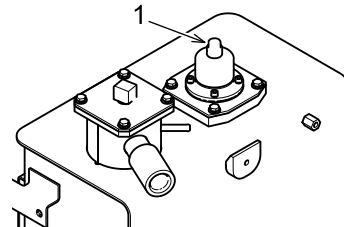
Notice

- To keep the hydraulic oil clean and to extend the service life of the hydraulic components, replace the filter element at regular intervals.
- Every 1000 hours replacement is a rough guideline. If the machine is operated in very sandy and dusty conditions, replace the oil filter earlier than the specified interval.

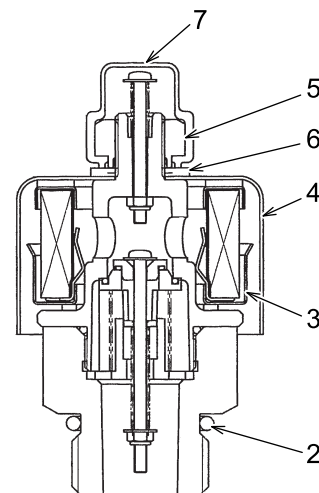
1. Park the machine on the level and firm ground, extend the bucket cylinder, retract the arm cylinder, lower the bucket to the ground, and place the dozer on the ground as shown to the right figure, and then stop the engine.



2. Move the control lock lever to the "LOCKED" position.
3. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.
4. Keep pressing air breather (1) on the top of the hydraulic oil tank until the pressure inside the hydraulic oil tank is released.



5. After removing breather cap (7), remove nut (5) and seal (5) in order.
6. Turn cover (4) in the counterclockwise direction, remove the cover, and then remove element (3).
7. Install new element (3) and install cover (4) aligning the groove.
8. Be sure to prevent water and dirt from entering the air intake and exhaust ports between cover (4) and body (1).
9. Install seal (6) on cover (4) and install nut (5).



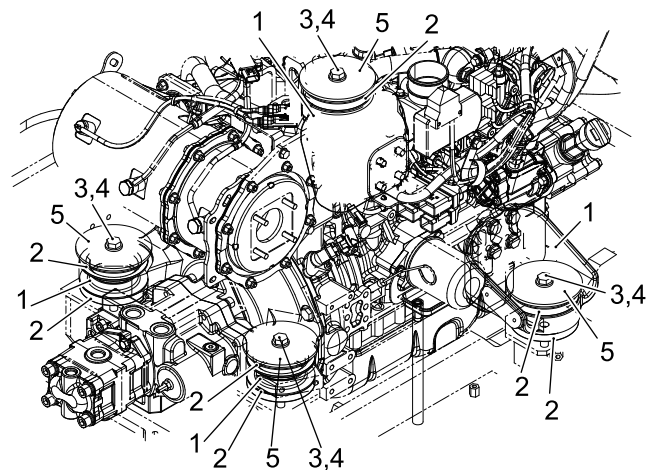
CAUTION

To avoid breakage of bolts, do not over-tighten nut (5).
Tightening Torque: 8 to 10N·m (5.9 to 7.4lbf·ft)

10. Install breather cap (7).
11. Release the support stay and close the right side cover.

4.18.3 CHECKING ENGINE MOUNTING BRACKET FOR TIGHTENING CONDITION

1. Check damage and deterioration of engine mounting bracket (1) and rubber mount (2) and looseness of mounting bolts (3) and nuts (4) and plate (5).
When engine mounting bracket (1) and rubber mount (2) are damaged or deteriorated, contact your KOBELCO authorized dealer for replacement.
2. When looseness is found, tighten mounting bolts (3) and nuts (4).
Tightening torque: $79.4 \pm 7.84 \text{ N} \cdot \text{m}$ ($58.6 \pm 5.78 \text{ lbf} \cdot \text{ft}$)



4.18.4 CHECKING BATTERY VOLTAGE

**WARNING****HANDLING OF BATTERY**

- Wear protective glasses, long-sleeve shirt and gloves when handling the batteries.
- Do not bring a fire near the battery because the combustible hydrogen gas generated by the battery can cause explosion.
- If the dilute sulfuric acid in the battery splashes onto your skin or into your eyes, it will cause burns or blindness. At such case, immediately wash the skin or eyes with sufficient clean water, and ask a special doctor to treat it as soon as possible.
- Before performing inspection and maintenance on the batteries, be sure to stop the engine and set the battery power-off switch to the "OFF" position.
- When removing the battery terminal be sure to remove the ground side (negative terminal) first and conversely, when attaching the battery terminal, attach the ground side last.
- Do not put tools and hardware on the protective cover on the battery upper section. It may cause a short circuit resulting in a fire or explosion.

**CAUTION**

If the cover of the battery power-off switch is opened soon after the starter switch is turned OFF, the buzzer may start sounding. Do not turn "OFF" the battery power-off switch while the alarm buzzer is sounding. That may cause damages to electronic devices.

Notice

- Clean the battery terminals and apply grease or commercial anti-rust lubricant spray.
 - Do not dispose of the battery by yourself but always ask a professional service company to dispose of it.
 - If the batteries became old, do not attempt to use the old battery and a new battery together. The service life of the new battery may be shortened. When replacing the batteries, replace the both at the same time.
1. Measure the voltage of batteries and when it does not reach the specified voltage, charge or replace the batteries.
 2. After replacement, the battery should be properly secured to the machine.

4.19 2000 HOUR INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP and 50, 100, 120, 250, 500, and 1000 HOUR INSPECTION & MAINTENANCE PROCEDURES".

4.19.1 REPLACING COOLANT



HANDLING OF COOLANT

Do not loosen or remove the radiator cap when the coolant is under high pressure and temperature.

High temperature steam and the coolant will spray and could cause burns.

- When opening the radiator cap, wait until the coolant cools down, and then slowly turn and open the radiator cap.
 - The antifreeze is poisonous, so prevent it from contacting with skin. If the antifreeze gets into your eyes or on your skin, flush the eyes or skin with plenty of water, and seek medical attention.
-



If air remains inside the coolant circuit, it will lead to damage of the machine. Perform the work according to the procedure and do not allow the air to remain inside the coolant circuit.

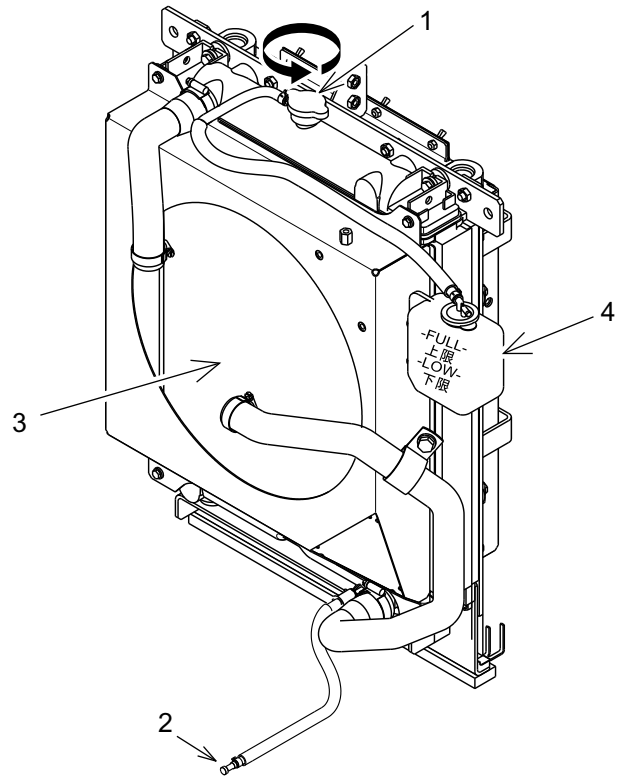
Notice

Use the KOBELCO genuine antifreeze at 50 % concentration. Use clean water such as tap water for the water to be mixed with the antifreeze.

- Use the specified antifreeze. If improper antifreeze is used, it will cause damage to the machine such as occurrence of rust inside the coolant circuit.
 - Do not mix and use different types of coolants.
 - Replace the coolant earlier than the specified interval when it is dirty and/or bubbling.
-

1. Move the machine to a level and firm place and lower the bucket and dozer to the ground.
2. Stop the engine and move the control lock lever to the "LOCKED" position.
3. Use the starter key to open the side door at the engine hood and right side cover of the machine, and hold it with the stay.

4. Loosen radiator cap (1) slowly. After checking that the pressure is completely released, push the cap down, loosen it further, and then remove it.
Here is the radiator filler opening.



5. Remove the under cover under the drain plug, and then remove drain plug (2) to drain the coolant into a container.
6. After draining the coolant, attach the drain plug and pour clean soft water and cleaning solution (radiator cleaner) from the coolant inlet.
7. Start the engine at a speed slightly higher than the low idling, raise the water temperature to more than 80 degrees C (176 degrees F) within the white range of the engine coolant temperature meter, and run the engine for about 10 minutes.
8. Stop the engine, remove the drain plug, and drain the water into a container. Pour clean soft water into radiator (3) with the drain plug removed to clean the radiator until the clear water is discharged.
9. Attach the drain plug, pour clean soft water mixed with "Long Life Coolant" (50% or more) to the neck of radiator cap (1), run the engine for a while, and bleed the air of the cooling system thoroughly.
10. After the engine is stopped and the coolant cools down, check the coolant level (the coolant level of reserve tank (4) should be between FULL and LOW). See "Checking Coolant Level for Shortage and Making Up" in Chapter 3.
11. Check for coolant leakage, attach the under cover, and close the engine hood and right side cover.

4.19.2 REPLACING OIL IN TRAVEL REDUCTION UNITS



WARNING

HANDLING OF OIL IMMEDIATELY AFTER OPERATION

- Wear protective glasses.
- Immediately after operation, the oil is hot and it may cause burns. Start working after the temperature goes down.
- Pressure may be generated inside the traveling devices. Slowly loosen the plug to release the internal pressure.

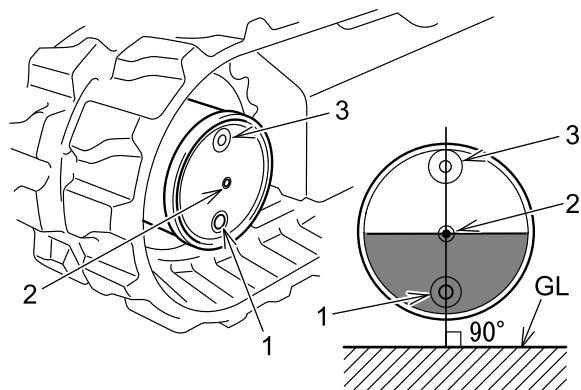
Notice

Replace the oil after 500 hours of operation has been reached for the first time.

Notice

- Check the drain oil, and if metal chips or powder is found in the oil, contact your KOBELCO authorized dealer.
- Dispose of the drain waste oil properly as industrial waste.

1. Move the machine to a level and firm place.
2. Stop the machine at a position in which drain plug (1) is positioned at the lower side and lower the bucket to the ground.
3. Stop the engine and move the control lock lever to the "LOCKED" position.
4. Place a container for drain oil under drain plug (1). For oil level, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
5. Remove drain plug (1) and level plug (2), fill plug (3) and drain oil in the container.
6. After draining the oil completely, clean drain plug (1) with light oil and attach it in place.
7. Refill the specified gear oil from the hole of fill plug (3) until the oil comes out. For the specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
8. Clean level plug (2), fill plug (3) with light oil and install it.
9. Similarly, replace the oil of the travel reduction unit on the other side.



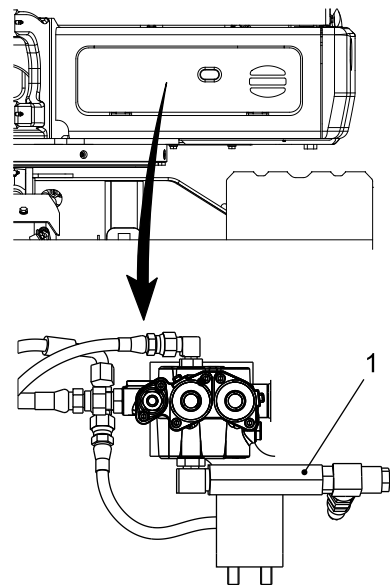
4.19.3 CLEANING PILOT LINE FILTER

CAUTION

Immediately after operation, hot hydraulic oil may spout and cause burns.
Wait until the oil temperature cools down before attempting to clean the pilot line filter.

Before performing the work, wait until the internal pressures of the hydraulic oil tank and the hydraulic system are released.

1. Open cover (5) on front of the machine.
2. Remove the hose and tee connected to inline filter (1) and then remove inline filter (1). Attach a plug to the lubrication hole to keep it away from foreign materials.
3. Clean inline filter (1) with light oil.
4. After cleaning, attach inline filter (1), tee and hose.
For the tightening torque, see "TORQUE SPECIFICATIONS FOR JOINTS & HYDRAULIC HOSES" in Chapter 4.



4.20 5000 HOUR INSPECTION & MAINTENANCE PROCEDURES

Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

Perform this section together with "EVERYDAY CHECK-UP and 50, 100, 120, 250, 500, 1000, and 2000 HOUR INSPECTION & MAINTENANCE PROCEDURES".

4.20.1 REPLACING HYDRAULIC OIL AND CLEANING SUCTION STRAINER



HANDLING OF HYDRAULIC OIL TANK AND OIL

- The oil in the hydraulic oil tank is under high temperature and high pressure and it is dangerous. Before removing the cover, stop the engine first, press the breather, and release the pressure from the tank.
- Immediately after engine operation, the oil is hot and it may cause burns. Wait until the oil temperature cools down before attempting to replace the hydraulic oil.

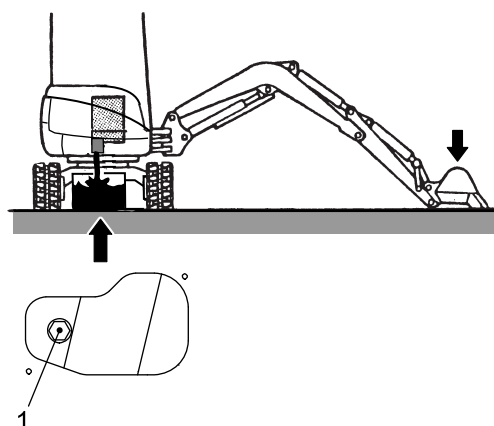
Notice

When the hydraulic breaker is installed, the deterioration of the hydraulic oil is faster than that of the normal bucket digging work. See "PERIODIC INSPECTION AND MAINTENANCE OF NIBBLER (CRUSHER) AND BREAKER" in chapter 7 to maintain the hydraulic oil.

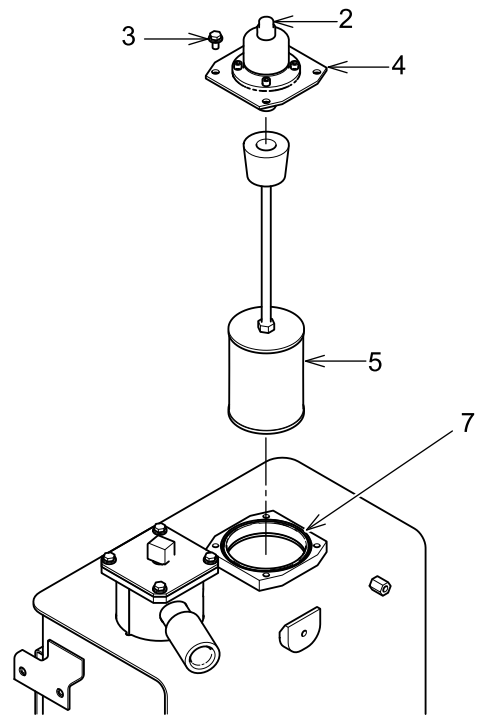
Notice

Dispose of the drain waste oil properly as industrial waste.

1. Move the machine to a level and firm place.
2. Swing the upper structure so that drain plug (1) on the bottom of hydraulic oil tank is positioned to the midpoint of right and left track crawler frames.
3. Retract the arm cylinder and bucket cylinder and place the bucket and dozer on the ground.
4. Stop the engine and move the control lock lever to the "LOCKED" position.
5. Remove the cover under the hydraulic oil tank.
6. Clean the surface around the cover to keep foreign materials away from the hydraulic oil tank.



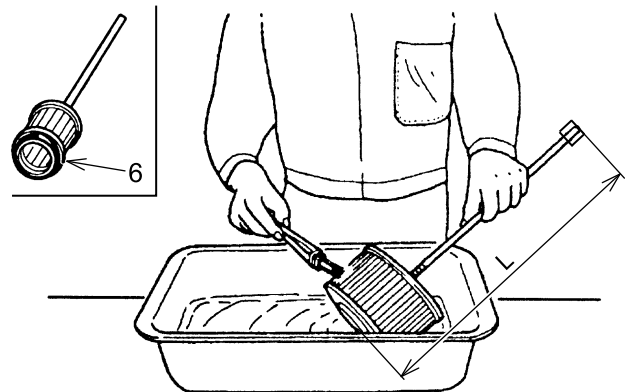
7. Remove breather cap (2) on the top of the hydraulic oil tank and keep pressing the valve until the pressure inside the hydraulic oil tank is released.
8. Remove bolt (3) and cover (4) on the tank upper surface.



Notice

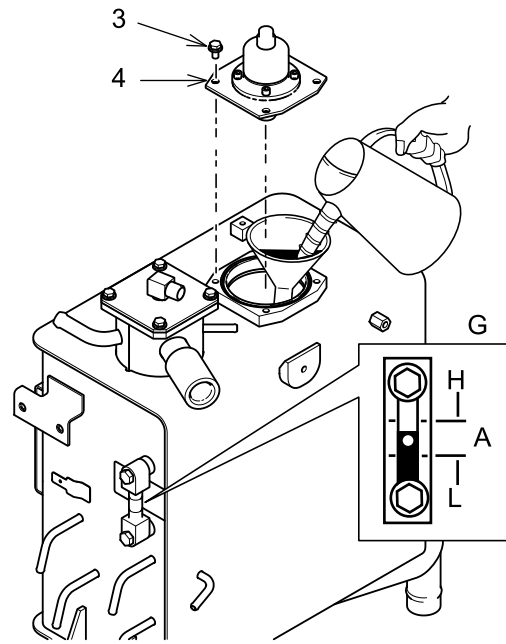
Do not drop bolts or others into the tank.

9. Place a container for drain oil under drain plug (1) on the bottom of the hydraulic oil tank.
10. Loosen drain plug (1) slowly and drain hydraulic oil completely.
11. Clean drain plug (1) and install it in place.
Tightening Torque: $108 \pm 10 \text{ N} \cdot \text{m}$ ($79.7 \pm 7.4 \text{ lbf} \cdot \text{ft}$)
12. Take out suction strainer (5).
13. Clean suction strainer (5) with light oil or cleaning solvent, dry it well and check it for damage. If damaged significantly, replace the strainer with a new one.
L: $538.5 \pm 1 \text{ mm}$ ($21.2 \pm 0.04 \text{ inch}$)
14. Check O-rings (6) and (7) on the bottom of the strainer, and if wear or damage is found, replace it with a new one.
15. Insert suction strainer (4) into the hydraulic oil tank.



[4. INSPECTION AND MAINTENANCE]

16. Refill hydraulic oil through filler port on the top of the hydraulic oil tank.
Pour the oil while checking the oil level with level gauge (G).
17. Attach filler port cover (4) with six bolts (3).
Tightening Torque: $23 \pm 2.3 \text{ N} \cdot \text{m}$ ($17 \pm 1.7 \text{ lbf} \cdot \text{ft}$)
18. Start the engine, run it at low idle for several (5 to 7) minutes. After that, extend and retract each cylinder and swing the machine.
19. Set the machine in the hydraulic oil level inspection again, stop the engine and check the oil level. If the oil level is low, refill the hydraulic oil.



4.21 MAINTENANCE OF MACHINES OPERATED UNDER SEVERE CONDITIONS

The machines operated under severe conditions generally mean the machines operated under the conditions described below.

- The machines operated in the environment in which dust and powder dust always exist.
- The machines operated under heavy loads consecutively for a long time.
- The machines whose engine is operated in low idle consecutively for a long time.
- The machines whose engine is in idle status most of the time.
- The machines whose engine starts and stops repeatedly and frequently.
- The machines that have failed before even though the standard maintenance have been performed steadily.

In case of maintaining the machines operated under severe conditions, measures such as shortening the maintenance interval need to be taken.

4.21.1 RECOMMENDED MAINTENANCE FOR MACHINES OPERATED UNDER SEVERE CONDITIONS

Notice

For the standard maintenance interval, see "INSPECTION AND MAINTENANCE CHART" in Chapter 4.

Item	Recommended maintenance
Inspecting engine oil level	Inspect it before starting operations
Changing engine oil	Every 250 hrs.
Replacing engine oil filter	Replace it at the same time of changing engine oil
Replacing fuel filter	Every 500 hrs.
Replacing fuel pre-filter/water separator	Every 250 hrs.
Replacing CCV filter (replacement type)	Every 500 hrs.
Replacing DPF	The service life of DPF may be shortened before reaching the standard replacement time. If the manual regeneration warning is displayed frequently, contact your KOBELCO authorized dealer.
Washing injector	Wash it with the dedicated fuel additive every 1000 hrs. or 12 months.
Washing engine combustion chamber	Wash it with the dedicated fuel additive every 1000 hrs. or 12 months.
Air cleaner element (outer)	Clean it before starting operations Every 250 hrs.
Air cleaner element (inner)	Replace it at the same time of replacing the outer element (Do not clean)
iNDr filter	Depending on the operation environment, clean it every 3 hrs. Keeping the spare part is recommended.

4.21.2 STARTING AND STOPPING ENGINE

Before starting operations, warm-up the machine.

When finishing operations, do not operate the lever for 5 minutes and change the engine speed to low idle, and then stop the engine.

4.21.3 HOW TO USE MACHINES

When often performing light-load operations with the engine running in low idle, change the engine speed to high idle periodically to perform heavy-load operations.

5. TRANSPORTATION

5.1 TRANSPORTATION

When transporting the machine, observe the transportation related regulations and transport the machine dealer.

5.1.1 STRICTLY OBSERVE TRANSPORTATION RELATED LAWS AND REGULATIONS

When performing transportation, contact the nearest KOBELCO branch or sales office.

- When transporting this machine with a trailer, etc., consider the width, height, length and mass of the machine. The transportation mass and dimension vary depending on the type of shoe and the specifications of the attachment.
- Refer to masses and dimensions described in "SPECIFICATIONS" and "OPTIONAL EQUIPMENT" in this manual to select the proper transportation method.
- Perform a previous inspection on the route such as limitations on width, height and mass (weight) of vehicles and traffic regulations, etc.



CONTROL PATTERNS OF THE CONTROL LEVERS

Before operation, be sure to pay attention to the surroundings and operate each control lever slowly and confirm that each motion is in accordance with the control pattern indicated on the label. When it is not matched, replace the label with the proper label matching with the actual motion.

In addition, see "PRECAUTIONS FOR OPERATIONS" in Chapter 1 for precautions regarding operations.

5.2 LOADING/UNLOADING THE MACHINE



Loading/unloading the machine

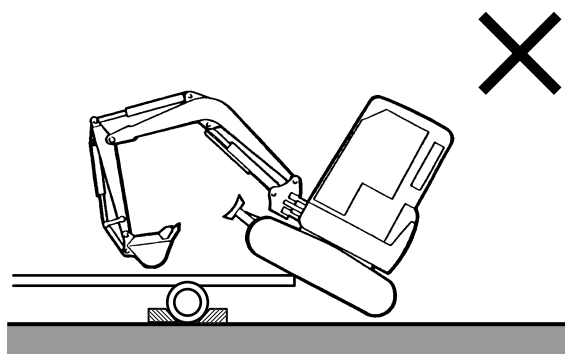
- Load/unload the machine on a level and hard ground.
 - Use ramps, platforms, and embankment with sufficient width, length, slope, rigidity, and strength.
 - Remove mud and dirt of the undercarriage to prevent the machine from skidding on the ramp. In addition, remove any deposit on the ramp including water, snow, ice, grease, and oil.
 - When loading or unloading the machine, set engine speed to LOW and travel speed select switch to LOW (1st) speed.
 - Do not use the attachment for loading and unloading the machine to avoid danger.
 - Use only the travel levers when the machine is on ramps.
 - When going over the ramp top to/from a trailer, the machine may lose balance due to an abrupt change in the center of gravity. Be sure to travel slowly.
 - Be sure to turn the auto deceleration switch to the "OFF" position. When the machine is operated with the auto acceleration turned to the "ON" position, the engine speed may change abruptly.
 - Do not make a turn on the ramp to avoid tipping. Make a turn after returning to the ground or the trailer bed.
 - Perform loading and unloading the machine according to the guidance of a signal person.
-

5.2.1 LOADING

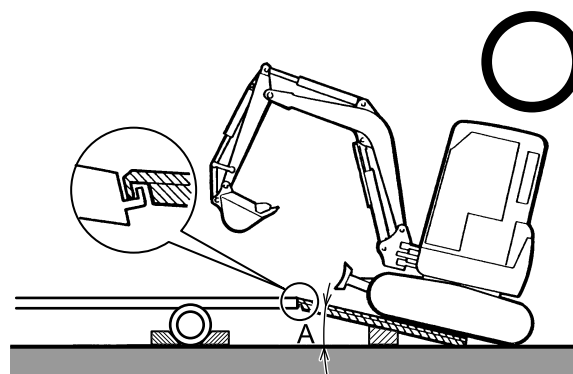
Use the following procedure.

WHEN USING A RAMP

1. Chock the trailer tires to prevent the trailer from moving.
2. Use a ramp with sufficient length, width, strength and gradient. Install the ramp so its angle (A) to the ground is 15 degrees or less.
3. Start the engine, and move down the control lock lever to the "UNLOCKED" position.
4. Press the travel speed select switch to set it to the LOW (1st) speed.
5. Make sure the machine position is aligned to the ramp before going up on the ramp, raise the dozer, and travel slowly.
6. When loading the machine with the attachment, going up to the trailer from the front of machine, and when loading the machine without the attachment, going up to the trailer from the back of machine.



Loading and unloading with attachment



Loading and unloading with ramps

CAUTION

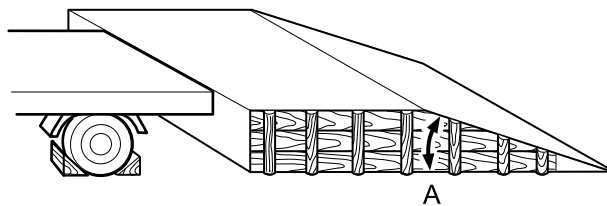
When this machine is traveling up or down the ramp, fold the arm and attachment and raise the boom to avoid interference with the ramp or trailer bed, as shown in the figure.

When the clearance between the ramp or the trailer bed is insufficient, the machine may abruptly lean to one side when it goes over the ramp top, and strike its arm or bucket cylinder against the trailer bed, ramp, or ground, resulting in damage to the cylinder.

7. Lower the attachment/equipment slowly.
8. Move the control lock lever to the "LOCKED" position.
9. Stop the engine and remove the starter key.
10. Lock the lock devices such as guards and doors.

WHEN USING PLATFORM OR EMBANKMENT

1. Make the embankment wide enough to the machine width. The angle (A) of the platform or embankment to the ground should be 15 degrees or less.
2. Check that the embankment is sufficiently sturdy to hold the machine weight.
3. The surface of the platform or embankment must be level to that of the trailer bed.
4. Park the trailer properly at the required position.



5.2.2 FIXING THE MACHINE

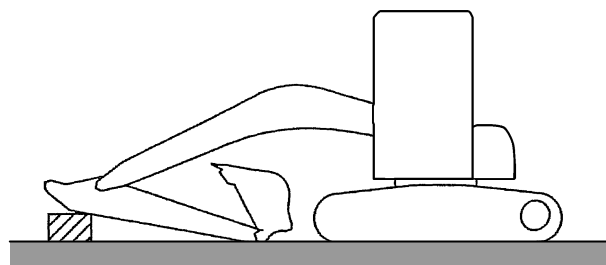
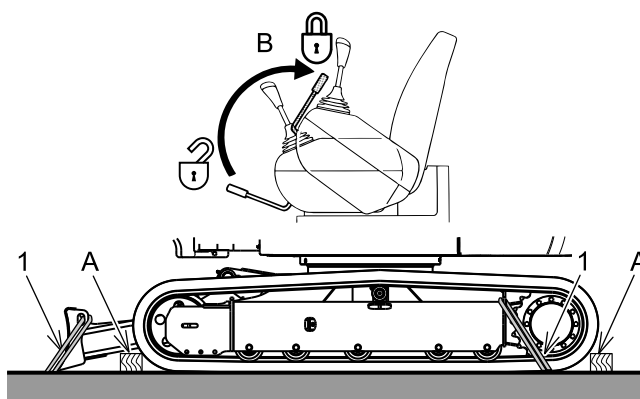
After loading the machine on the required position, fix the machine by the following procedures.

1. Lower the dozer.
2. Fully extend the bucket and arm cylinders and slowly lower the boom.

Notice

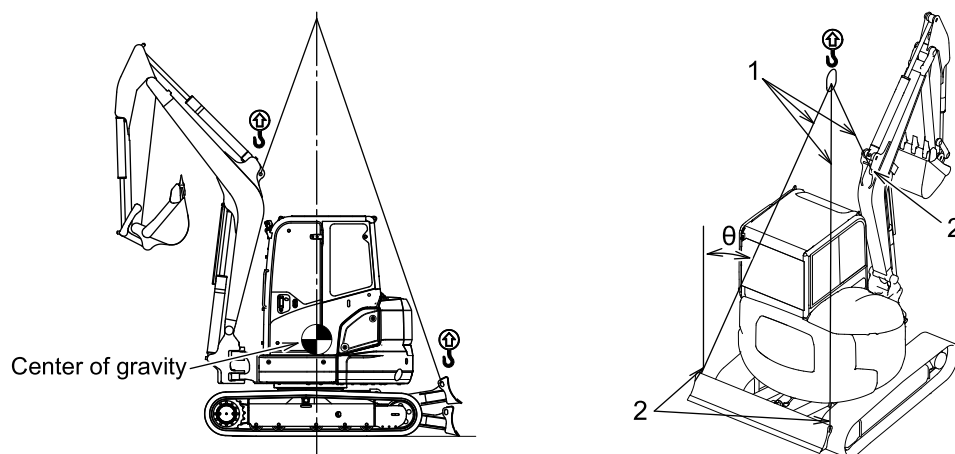
Place a wood block at the end of the bucket link to avoid contacting the ground and protect the bucket cylinder from being damaged during transportation.

3. Move the control lock lever to the "LOCKED" position.
4. Turn all switches "OFF" and remove the starter key. In case of the cab specification, close the door and lock it.
5. Chock the front and rear of the crawlers and fix the machine securely with proper wire ropes to prevent it from moving during transportation.
 1. Wire rope
 - A. Chock
 - B. "LOCKED" position



Apply a wood block to the arm to prevent damage

5.3 LIFTING MACHINE



Lifting tool

No.	Name	Q'ty	Remarks
1	Lifting tool	2	Chain of grade 8 or more is recommended
2	Lifting tool	2	D-Shackle of grade 6 or more is recommended
θ	28 degrees or less		

5.3.1 PREPARATION

- Before installing the lifting tools, set the machine position as shown in the illustration.
- Stop the engine and move the pilot control shut-off lever to the "LOCKED" position.
- Be sure to check the lifting points for failures such as deformation or cracks before performing a lifting work. If any failures are found, contact your KOBELCO authorized dealer for inspection.

5.3.2 SELECTION OF LIFTING TOOLS

- Check the lifting tools for failures every time after using them and if damages are found, do not use them.
- Regarding the machine weight and dimensions, refer to Chapter 6 "SPECIFICATIONS".
- Select the lifting tools with a proper strength according to the machine weight and the lifting angles (θ_1, θ_2).

5.3.3 INSTALLING LIFTING TOOLS

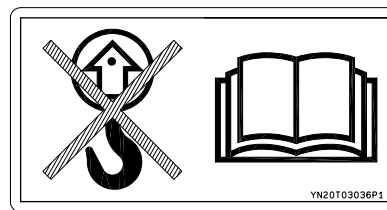
Note

The machine weight and the center of gravity may differ according to the installed attachment/equipment or options.

If they are unknown, ask your KOBELCO authorized dealer.

- The illustration shows the center of gravity of the machine with the standard bucket installed and without the options.
- Install lifting tools (1,2) to three lifting points as shown in the illustration.
- Install lifting tool (1) avoiding interference with the machine.
- Set the installation angles (θ) of lifting tools (1) so as not to exceed 28 degrees.
- If interference between lifting tools (1) and the machine is unavoidable, insert pads between the lifting tools and the machine.

Do not use the lifting holes near which the right label is attached for lifting the machine.



5.3.4 LIFTING MACHINE

- Before lifting the machine, check the center of gravity carefully.
- During the machine lifting operation, keep away from the area around and under the machine.
- Do not lift the machine with a person on the operator's seat or other places.
- Do not perform abrupt operations during lifting of the machine.

5.4 TOWING THE MACHINE

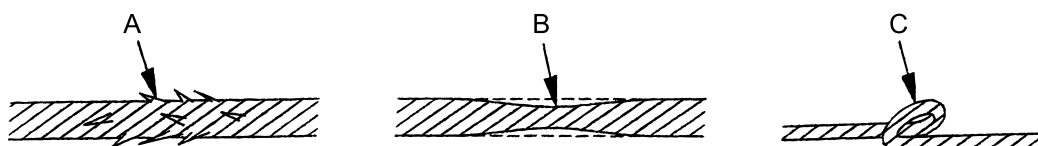


READ THE OPERATOR'S MANUAL

Read, understand and follow the safety messages and instructions in this manual. If these safety messages are not followed, serious injury or death could occur.

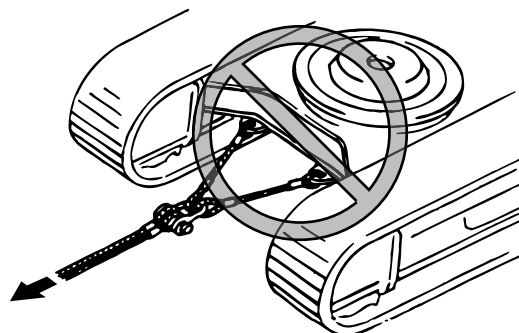
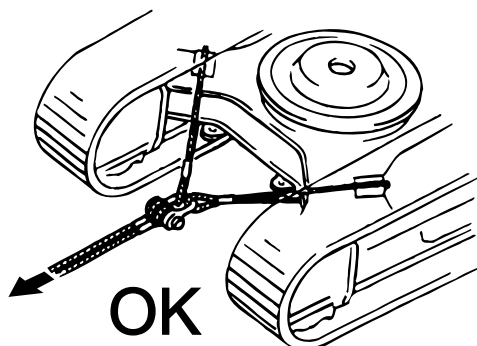
To prevent serious injury or death from improper towing methods.

- Always wear leather gloves when handling wire ropes.
- The allowable force of the crawler frame is the 100 % load of the machine total weight.
- Check the wire rope to be used for towing is strong enough to tow the weight of your machine.
- Never use a wire rope which has cut strands (A), reduced diameter (B), kinks (C) or other visible damage or the wire rope may break while towing.
- Never tow the machine across a slope.
- Never stand between the towing machine and the machine or object that is being towed.
- To prevent damage to the wire ropes, place pads between the wire ropes and edges of the lower frame.
- Do not shock load the wire ropes. Tow slowly and avoid sudden load changes to the wire ropes.
- Shackles must be used for towing.



5.4.1 TOWING METHOD OF THE MACHINE

- Only tow the machine if absolutely necessary, e.g. moving the machine to a safe location for repair.
- If the machine cannot travel under its own power, attach wire ropes that are strong enough to tow your machine to the positions on the lower frame as shown. Never use the lower frame holes for towing. Then tow the machine using another machine.
- Keep the wire ropes level and keep both machines in a straight line when towing as shown in the figure.
- In case of towing needing to disengage the travel motor brakes, chock both track crawlers securely to prevent the machine from moving uncontrollably before disengaging the travel motor brakes.

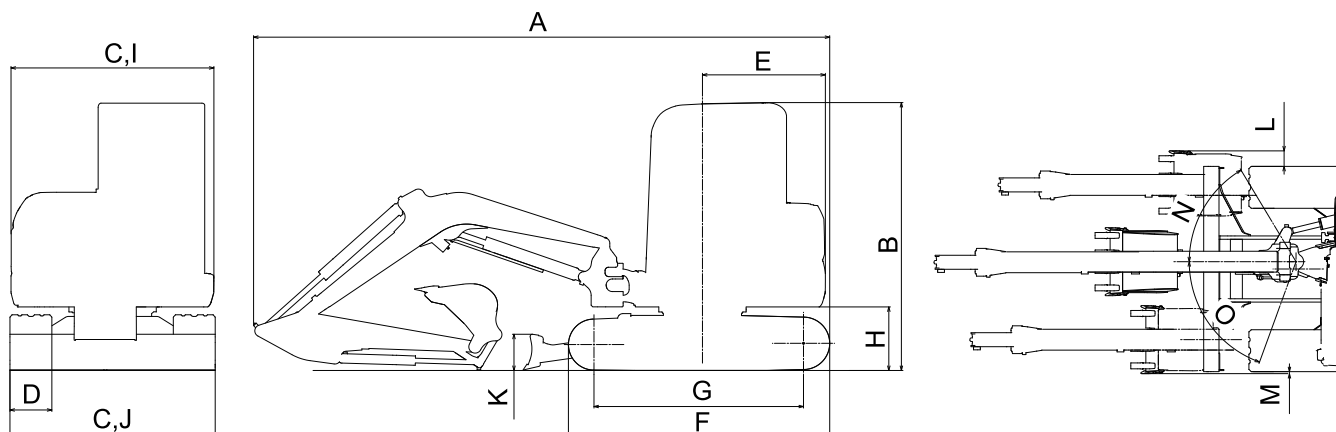


6. SPECIFICATION

6.1 GENERAL SPECIFICATIONS

6.1.1 CANOPY

	Item		Unit	Rubber track shoes	Iron track shoes
	Operating mass		kg (lbs)	5,090 (11,200)	5,300 (11,700)
	Bucket capacity {Previous name}		m ³ (cu·yd)	0.13 (0.17) {0.16 (0.21)}	
	Engine name		—	YANMAR 4TNV88C diesel engine	
	Engine rated power	ISO 9249 : With fan	kW/min ⁻¹ (hp/rpm))	27.7 / 2,400 (37.1 / 2,400)	
		ISO 14396 : Without fan		29.1 / 2,400 (39.0 / 2,400)	
A	Overall length		mm (ft.in.)	5,550 (18'3")	
B	Overall height		mm (ft.in.)	2,530 (8'4")	
C	Overall width		mm (ft.in.)	1,960 (6'5")	
D	Track shoe width		mm (inch)	400 (15.7")	
E	Tail swing radius		mm (ft.in.)	1,170 (3'10")	
F	Crawler overall length		mm (ft.in.)	2,500 (8'2")	
G	Tumbler center distance		mm (ft.in.)	2,000 (6'7")	1,920 (6'4")
H	Clearance height under upper structure (excluding lug height)		mm (inch)	605 (23.8")	
I	Overall width of upper structure		mm (ft.in.)	1,940 (6'4")	
J	Crawler overall width		mm (ft.in.)	1,960 (6'5")	
K	Blade height		mm (inch)	345 (13.6")	
L	Bucket overhang (right)		mm (inch)	150 (5.9")	
M	Bucket overhang (left)		mm (inch)	20 (0.98")	
N	Boom Swing Angle (right)		degree	59	
O	Boom Swing Angle (left)		degree	70	
	Ground contact pressure		kPa (psi)	29 (4.2)	31 (4.5)
	Swing speed		min ⁻¹ (rpm)	8.5 (8.5)	
	Travel speed (low/high)		km/h (mph)	2.4 / 4.5 (0.6 / 2.8)	
	Gradeability		% (deg)	58 (30)	



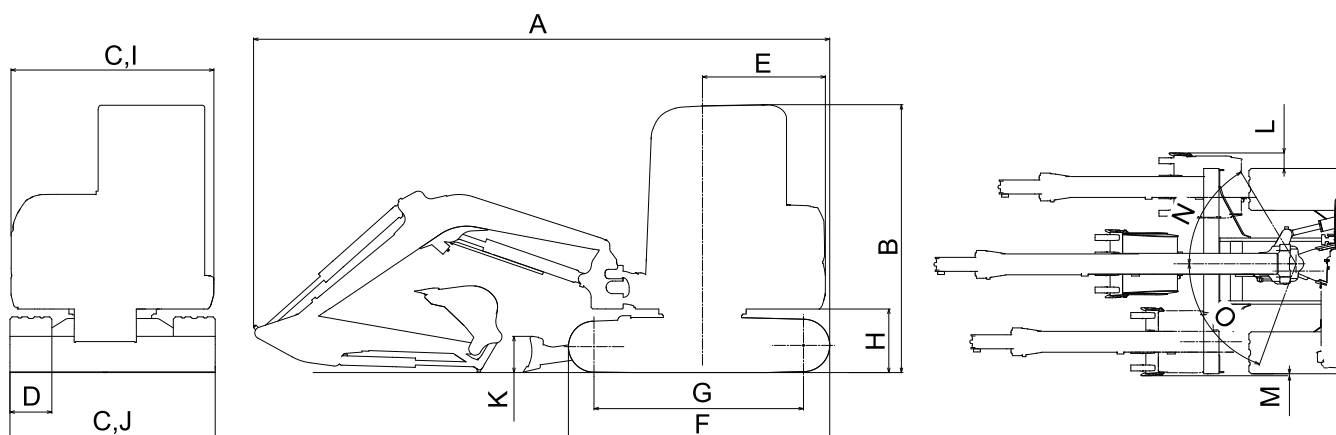
[6. SPECIFICATION]

Notice

- General specifications indicate the specifications of standard machine with the 1.69 m (5'6") arm.
-

6.1.2 CAB

	Item		Unit	Rubber track shoes	Iron track shoes
	Operating mass		kg (lbs)	5,240 (11,600)	5,450 (12,000)
	Bucket capacity {Previous name}		m ³ (cu·yd)	0.13 (0.17) {0.16 (0.21)}	
	Engine name		—	YANMAR 4TNV88C diesel engine	
	Engine rated power	ISO 9249 : With fan	kW/min ⁻¹ (hp/rpm))	27.7 / 2,400 (37.1 / 2,400)	
		ISO 14396 : Without fan		29.1 / 2,400 (39.0 / 2,400)	
A	Overall length		mm (ft.in.)	5,550 (18'3")	
B	Overall height		mm (ft.in.)	2,560 (8'5")	
C	Overall width		mm (ft.in.)	1,960 (6'5")	
D	Track shoe width		mm (inch)	400 (15.7")	
E	Tail swing radius		mm (ft.in.)	1,170 (3'10")	
F	Crawler overall length		mm (ft.in.)	2,500 (8'2")	
G	Tumbler center distance		mm (ft.in.)	2,000 (6'7")	1,920 (6'4")
H	Clearance height under upper structure (excluding lug height)		mm (inch)	605 (23.8")	
I	Overall width of upper structure		mm (ft.in.)	1,940 (6'4")	
J	Crawler overall width		mm (ft.in.)	1,960 (6'5")	
K	Blade height		mm (inch)	345 (13.6")	
L	Bucket overhang (right)		mm (inch)	150 (5.9")	
M	Bucket overhang (left)		mm (inch)	20 (0.98")	
N	Boom Swing Angle (right)		degree	59	
O	Boom Swing Angle (left)		degree	70	
	Ground contact pressure		kPa (psi)	30 (4.3)	32 (4.6)
	Swing speed		min ⁻¹ (rpm)	8.5 (8.5)	
	Travel speed (low/high)		km/h (mph)	2.4 / 4.5 (0.6 / 2.8)	
	Gradeability		% (deg)	58 (30)	



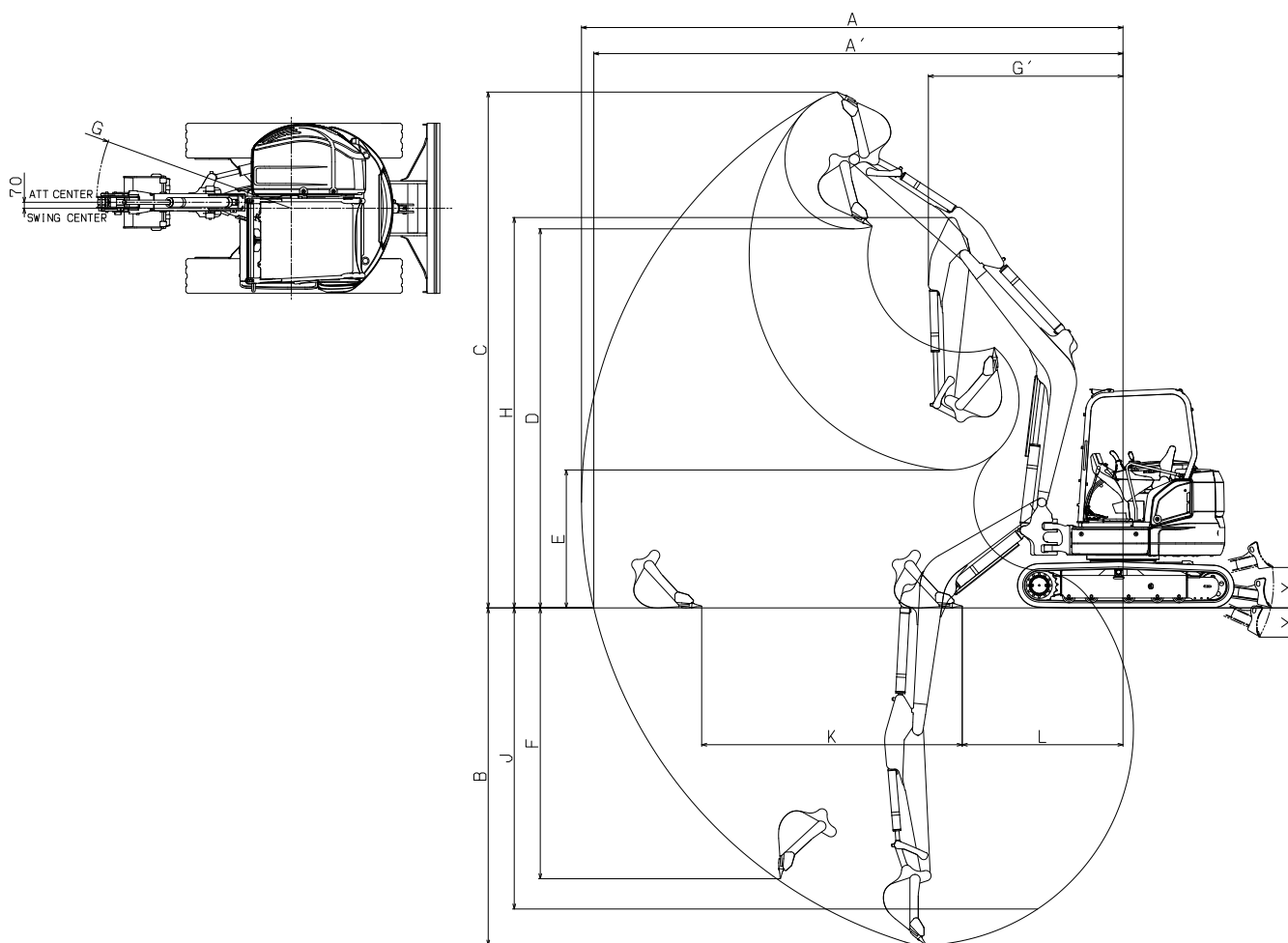
[6. SPECIFICATION]

Notice

- General specifications indicate the specifications of standard machine with the 1.69 m (5'6") arm.
-

6.2 WORKING RANGES

6.2.1 BACKHOE ATTACHMENT



Item / Types of Attachment			1.69 m {5'6"} arm 0.13 m ³ {0.17 cu·yd} Bucket
A	Maximum digging reach		6,270 {20'7"}
A'	Maximum digging reach at ground level		6,130 {20'1"}
B	Maximum digging depth		3,890 {12'9"}
C	Maximum digging height		6,020 {19'9"}
D	Maximum dumping height		4,440 {14'7"}
E	Minimum dumping height		1,600 {5'3"}
F	Vertical digging depth		3,230 {10'7"}
G	Minimum swing radius [at boom swing]		2,310 {7'7"} [1,900 {6'3"}]
G'	Minimum swing length		2,310 {7'7"}
H	Height at minimum swing radius		4,500 {14'9"}
J	Eight feet level digging depth		3,490 {11'5"}
K	Horizontal digging stroke at ground level	Stroke	2,960 {9'9"}
L		At minimum	1,930 {6'4"}
X	Go up and down quantity of dozer	Up	465 {18.31"}
Y		Down	335 {13.19"}

[6. SPECIFICATION]

Notice

The work ranges of canopy and cab is the same.

6.3 BUCKET TYPE

Bucket Capacity (m ³)(cu·yd) {Previous name}	Bucket Width (mm)		Number of Teeth	Mass (kg)
	With Side Cutter	Without Side Cutter		
0.080 (0.10) {0.086 (0.11)}	450	408	3	85
0.13 (0.17) {0.16 (0.21)}	650	608	4	113
0.15 (0.20) {0.18 (0.23)}	700	658	4	111

7. OPTIONAL EQUIPMENT

7.1 OPERATION OF HYDRAULIC NIBBLER (CRUSHER) AND BREAKER

7.1.1 SELECTION OF NIBBLER (CRUSHER) AND BREAKER

- When installing a nibbler (crusher) or a breaker, select a proper one for the machine stability and the working pressure.
Also, handle it by following precautions of handling specified by the manufacturer of the nibbler (crusher) or the breaker.
- Use of the unapproved attachment/equipment voids KOBELCO's liability for the machine.

7.1.2 INSTALLATION OF NIBBLER (CRUSHER) OR BREAKER

After installing the nibbler (crusher) or the breaker, check that there are no looseness of the installation portions, oil leakage from the piping, and abnormal sound before starting operation.

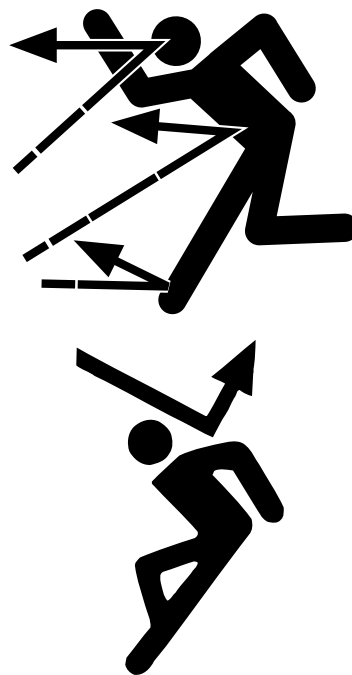
After removing the nibbler (crusher) and the breaker, plug the machine side piping at the arm end and the nibbler (crusher) or breaker piping to prevent foreign materials and water from entering the piping.

7.1.3 POTENTIAL HAZARDS WHEN OPERATING

PAY ATTENTION TO FALLING MATERIALS AND FLYING DEBRIS

To prevent serious injury or death, confirm the appropriate cab guards are installed for your task and for the attachment /equipment prior to operation. If needed, contact your KOBELCO authorized dealer before starting work.

- Always use the front guard, and the top guard when performing building demolition work or operating at working sites (including mining or quarry sites) where falling material and flying debris may occur.
- If working with the hydraulic breaker or another attachment and if objects will not fall on the machine, only the front guard may be needed.
- When performing work that may result in falling material and flying debris, keep people a safe distance away from the work area.
- Always close the front window and doors before operating.



CHECK SAFETY RELATED GUARDS AND EQUIPMENT

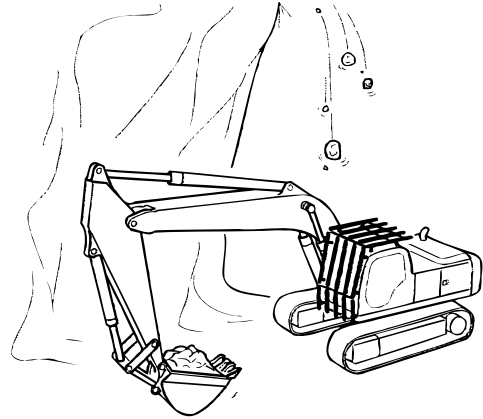
- Check all safety related guards, covers, windows and mirrors are not damaged and secure prior to operation. If any damage or other issue is found, do not use the machine until the safety related parts and equipment has been replaced. Never attempt to repair safety related parts and equipment.
- Understand how the safety systems and the safety related equipment protects you as the operator and others around the machine.
- Never remove safety related parts and equipment from the machine.

[7. OPTIONAL EQUIPMENT]

LIMITED PROTECTION FROM OBJECTS FALLING ON THE CAB

When operating near areas where landslides may occur or where rocks or other debris may fall, be aware that the cab and the guards installed provide limited protection for the operator and may not prevent serious injury or death.

- Never weld, drill or modify the top guard or other protective structures. Any modification could weaken the structural integrity of these protective structures, resulting in serious injury or death in case of collision, falling objects or landslides.
- Do not install any cab lifting device to the top guard or other protective structures.
- If an accident occurs, do not try to straighten or repair the top guard or other protective structures. Contact your KOBELCO authorized dealer for functional verification or replacement of any of the protective structures.



7.1.4 PRECAUTIONS IN USE OF BREAKER

DO NOT PRY AND BREAK FORCIBLY

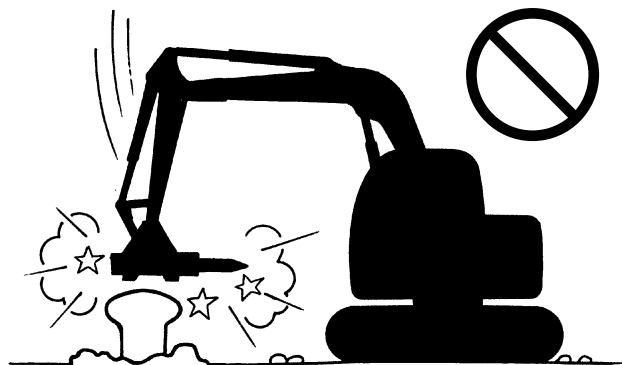
Do not break a rock or concrete by prying it with the breaker. Prying may cause damages to the boom, the arm, and the breaker.



DO NOT USE BREAKER FOR OTHER THAN INTENDED PURPOSE

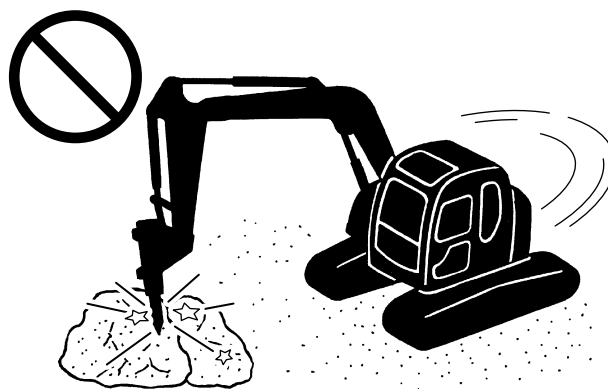
Do not break a rock or concrete by falling or hitting the breaker.

Hitting may cause damages to the boom, the arm, the breaker, and the base machine.



DO NOT MOVE DEBRIS

Do not use the breaker for moving debris and others. Especially, when pulling down rocks and others with the flank of the breaker by using the swinging force, it may cause damages to the boom, the arm, the breaker, and the base machine.

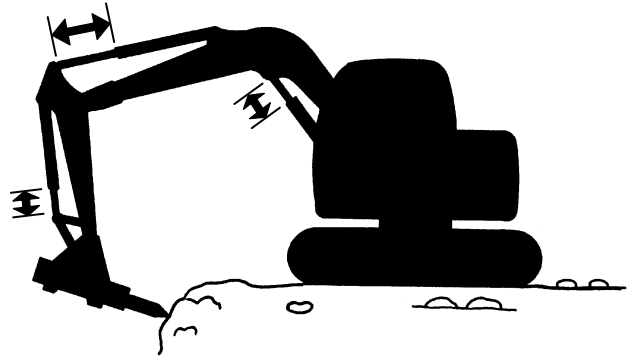


[7. OPTIONAL EQUIPMENT]

CYLINDER ROD AT STROKE END

Operate the cylinder rod with leaving some space to the stroke end.

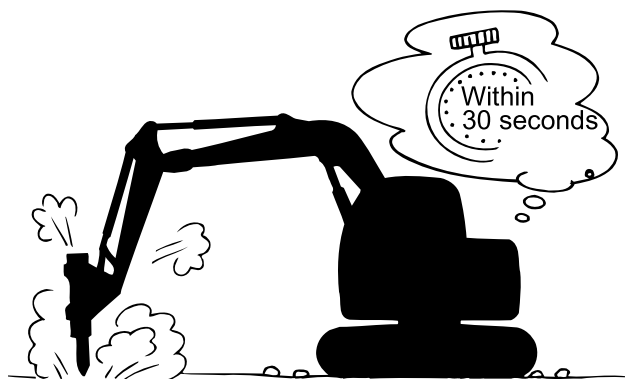
Operating the hydraulic cylinder at the stroke end during demolition work may cause excessive loads on the boom, the arm, and the base machine, resulting in damages.



CONTINUOUS USE FOR 30 SECONDS OR LONGER

If an object cannot be broken by hitting the same point for 30 seconds or more, change the target point.

Using the breaker continuously causes increase of the hydraulic oil temperature or abnormal wear of the breaker chisel.



NEVER PERFORM LIFTING WORK

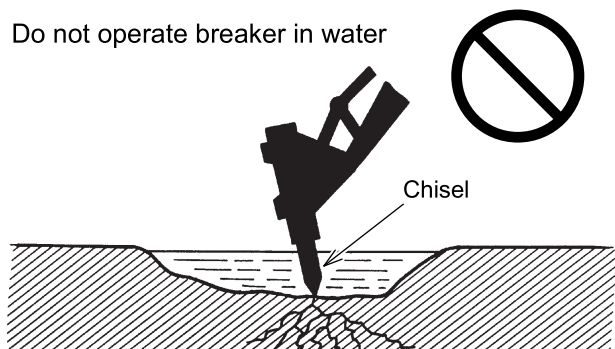
Never use the breaker for lifting work.



DO NOT OPERATE BREAKER IN WATER

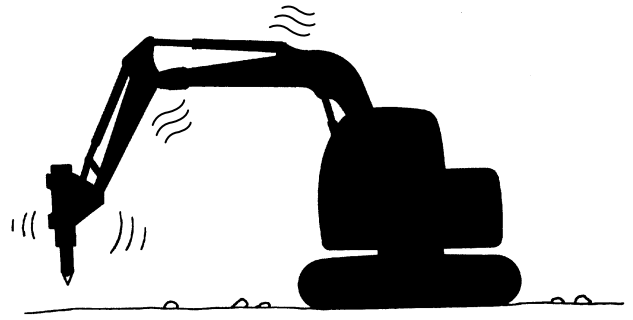
Do not operate the breaker in water.

Working in the water can cause rust on the breaker and damage the sealed portions. Consequently, rust, dirt, and water may enter the hydraulic oil and damage the hydraulic components of the base machine.



STOP WORKING WHEN HOSE SWINGS

When the hydraulic hose swings abnormally during breaker work, stop the work and immediately contact your KOBELCO authorized dealer. If you continue working, it may cause damages to the hydraulic components and piping.



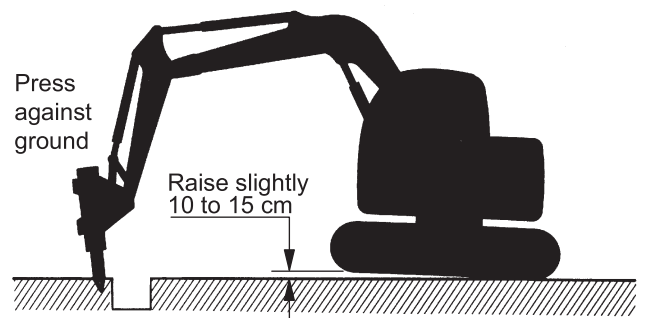
DO NOT OPERATE BREAKER WITHOUT WORK MATERIAL

Do not operate the breaker without contact. Operation without material under the tool causes increase of the hydraulic oil temperature and damages to the breaker.



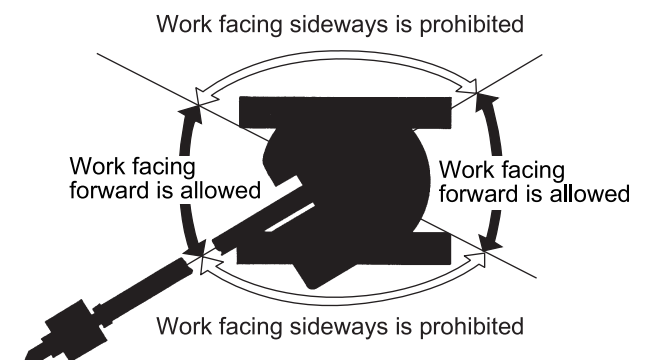
PAY ATTENTION TO LIFTING UP OF MACHINE

The lifting amount of the machine during breaker work shall be 10 to 15cm. If the lifting amount is large, it can cause damages to the boom and the arm.



PAY ATTENTION TO WORKING SIDEWAYS

Do not operate the breaker when the machine is facing sideways. It will cause excessive loads on the travel system, resulting in bending of the shoe plates and oil leakage from the roller.

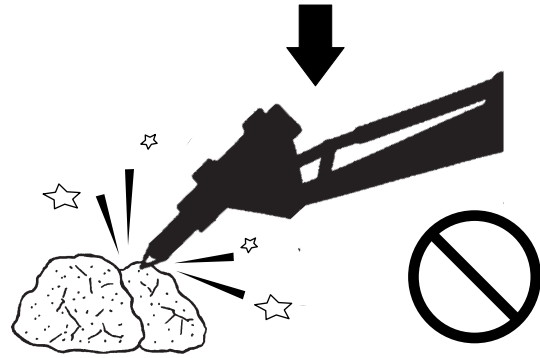


[7. OPTIONAL EQUIPMENT]

PAY ATTENTION TO DIRECTION OF BREAKER

The pushing direction of the breaker shall be in the same direction of the chisel axle. Apply the chisel perpendicularly to a surface to be broken during operation.

If you work in an unnatural posture, the sealed portions of the breaker may be damaged, causing foreign materials or water to enter the machine and resulting in damages to the hydraulic components.



DO NOT OPERATE BREAKER IN HORIZONTAL OR UPWARD DIRECTION

Do not operate the breaker in the horizontal or upward direction.

It will cause excessive loads on the boom, the arm and the base machine, resulting in damages.



PAY ATTENTION TO INTERFERENCE BETWEEN CHISEL AND BOOM

When the machine is in a position of holding the breaker inward, it may cause interference between the chisel and the boom. Be careful about operation.



7.1.5 PRECAUTIONS IN USE OF NIBBLER (CRUSHER)

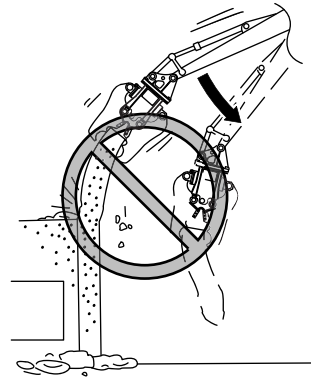
CAUTION

To protect the operator from flying debris and demolished structures, install the front guard and top guard on the cab before demolition.

DO NOT PRY OBJECT

Do not pry or pull down an object while holding it by the nibbler (crusher).

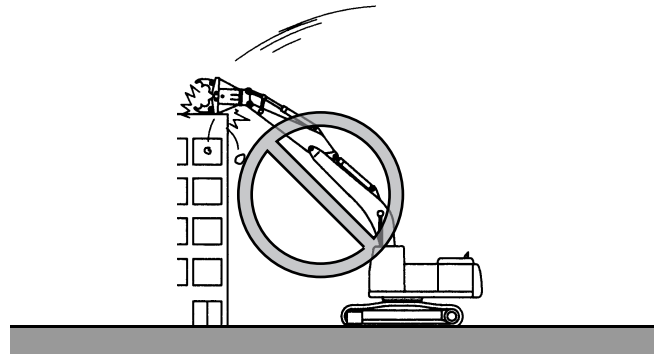
Prying may cause damages to the boom, the arm, and the nibbler (crusher).



DO NOT USE NIBBLER (CRUSHER) FOR OTHER THAN INTENDED PURPOSE

Do not fall or hit the nibbler (crusher) to an object.

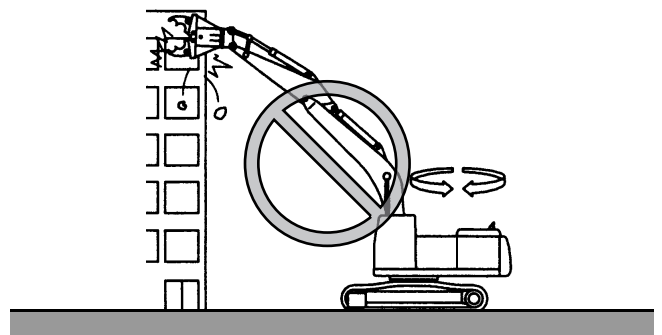
Hitting may damage the boom, the arm, the nibbler (crusher), and the base machine.



DO NOT SWING DURING NIBBLER (CRUSHER) WORK

Do not demolish or pull down an object by using the swinging force of the machine while holding the object by the nibbler (crusher).

It may cause damages to the boom, the arm, the nibbler (crusher), and the base machine.

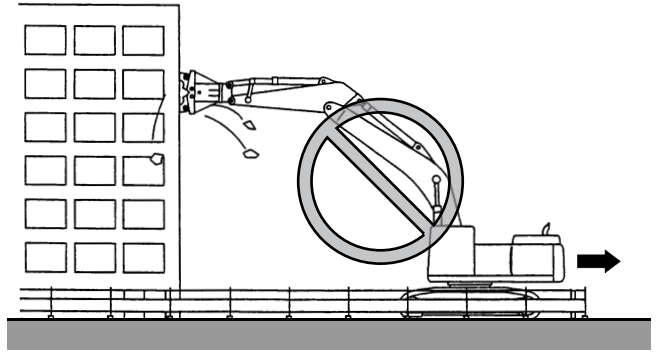


[7. OPTIONAL EQUIPMENT]

DO NOT TRAVEL DURING NIBBLER (CRUSHER) WORK

Do not demolish or pull down an object by traveling the machine while holding the object by the nibbler (crusher).

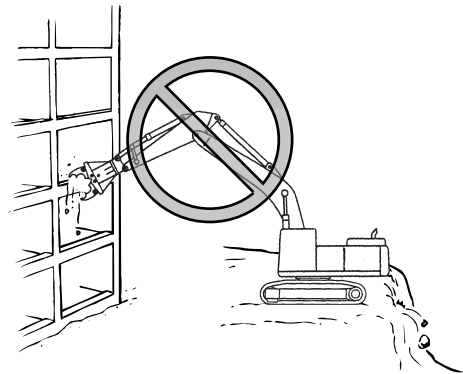
It may cause damages to the boom, the arm, the nibbler (crusher), and the base machine.



DO NOT WORK ON UNSTABLE PLACE

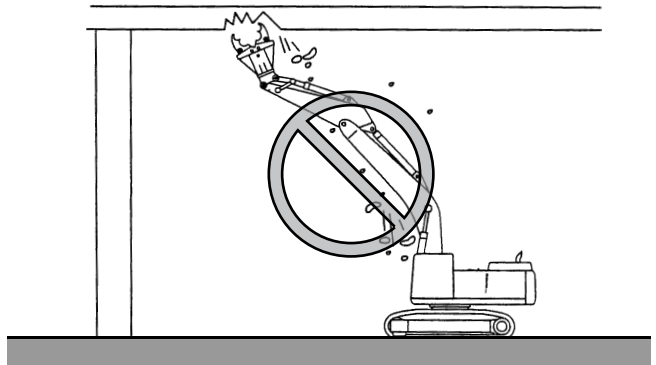
Do not perform work when the machine is on a weak ground or debris.

Working under unstable condition may cause the machine to tip over.



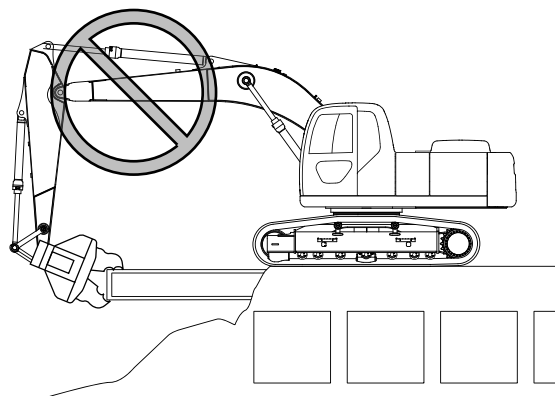
WATCH OUT FOR FALLING OBJECTS OVERHEAD

Operating the nibbler (crusher) over the machine can cause demolished structures to fall onto the machine.



PAY ATTENTION TO GROUND

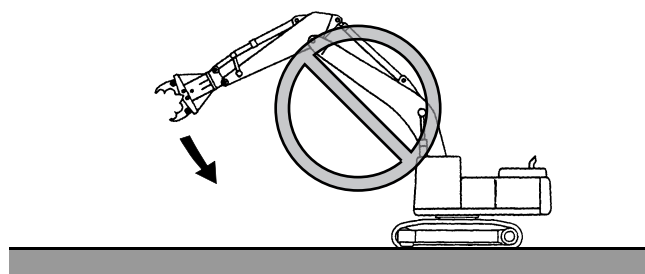
If an object under the machine is demolished, it causes the ground of the machine to be unstable, resulting in falling of the machine.



DO NOT OPERATE MACHINE ABRUPTLY

Do not operate or stop the boom, the arm, and the nibbler (crusher) abruptly.

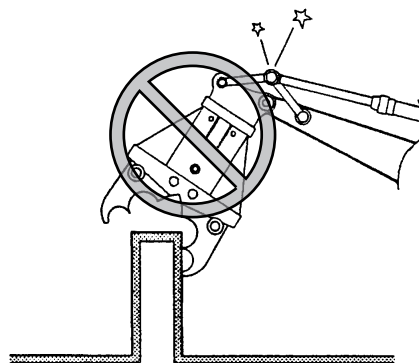
It can cause damages to each cylinder and the machine to tip over.



CYLINDER ROD AT STROKE END

Operate the cylinder rod with leaving some space to the stroke end.

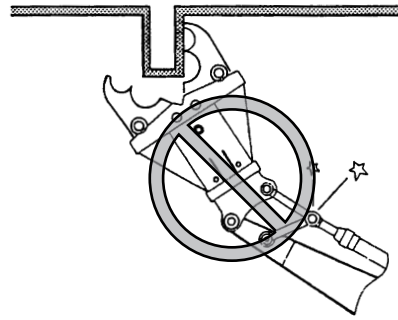
Operating the hydraulic cylinder at the stroke end during demolition work may cause excessive loads on the boom, the arm, the link portions, and the base machine, resulting in damages.



[7. OPTIONAL EQUIPMENT]

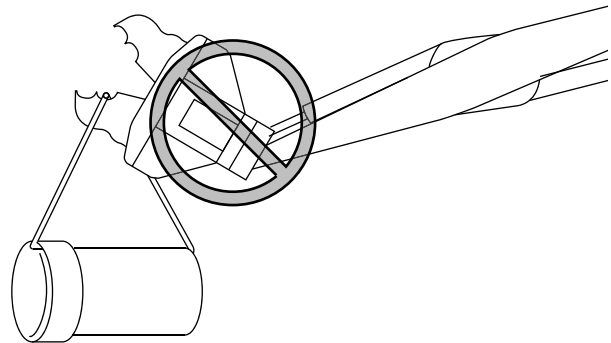
DO NOT HOLD OBJECT OBLIQUELY BY NIBBLER (CRUSHER)

Do not set the machine in a position or posture in which the nibbler (crusher) has to hold an object obliquely. It will cause excessive loads on the arm and the link portions, resulting in damages.



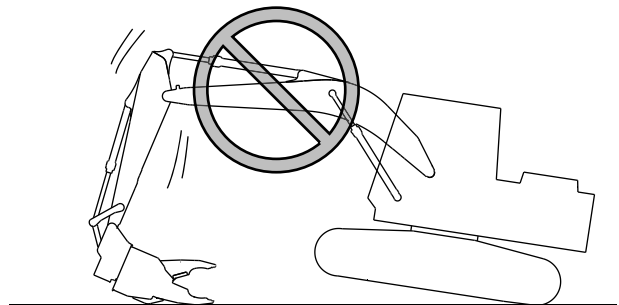
NEVER PERFORM LIFTING WORK

Never use the nibbler (crusher) for lifting work.



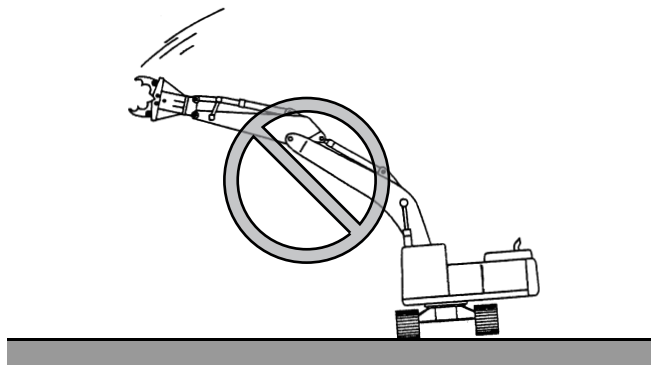
DO NOT LIFT BASE MACHINE

Do not lift up the base machine by pushing the nibbler (crusher) against the ground. It will cause damages to the boom, the arm, and the nibbler (crusher).



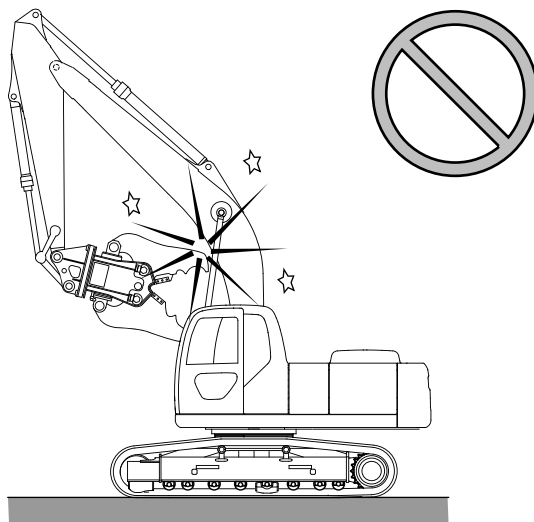
PAY ATTENTION TO WORKING SIDEWAYS

Operating the nibbler (crusher) while the machine is facing sideways causes the crawlers to be raised off the ground and the machine to become unstable. So operate the machine slowly.



PAY ATTENTION TO INTERFERENCE BETWEEN NIBBLER (CRUSHER) AND BOOM

When the machine is in a position of holding the nibbler (crusher) inward, it may cause interference between the nibbler (crusher) and the boom. Be careful about operation.



7.2 SWITCHING SELECTOR VALVE

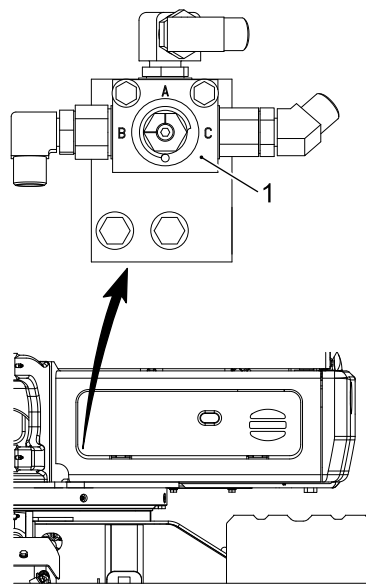
Be sure to switch selector valve (1) in accordance with the attachment installed.

Notice

- Incorrect selector valve switching results in poor function, which decreases work efficiency and speed, and sometimes causes damage to the machine. Be sure to switch the selector valve correctly.
- Switch the selector valve once or twice a month periodically.
- Before the switching work, stop the engine and place the attachment in stable condition on the ground.

1. Lower the attachment to the ground, set the control lock lever to the “LOCKED” position, and then stop the engine.
2. Open the cover at the front of the machine to access selector valve (1).
3. Turn valve to the position corresponding to the attachment specification.

Tools: Wrench: 24mm



BREAKER	OTHER THAN BREAKER
<p>TO ATT</p> <p>TO C/V</p>	<p>TO ATT</p> <p>TO C/V</p>

7.3 FLOW RATE ADJUSTMENT

Depending on the attachment being installed, the flow rate of service circuit needs to be changed.
For the setting procedure of flow rate, see "USER MENU" in Chapter 2.

CAUTION

The flow rate specification varies according to each breaker.

Using the breaker at a flow rate over that described in the specification may cause seizure or overheat of the breaker. Make sure to check the specification of each breaker and adjust the flow rate accordingly.

7.4 OPERATION



ATTACHMENT TO BE INSTALLED

The operation methods are explained based on the example of a nibbler (crusher) or breaker installed as a front attachment.

The explanation is based on a case that the opening/closing operation system or breaker operation system is connected to the nibbler (crusher) pipings.

Operation may differ depending on a manufacturer and specification of an attachment installed.

Check the operation manual for the manufacturer specification of the attachment before operation.



ABOUT USE OF PROPORTIONAL HAND CONTROL

Read, fully understand and follow all safety precautions and procedures in this manual before attempting any operation of the machine.

Notice

When using the nibbler or the breaker, see "SWITCHING SELECTOR VALVE" in Chapter 8.

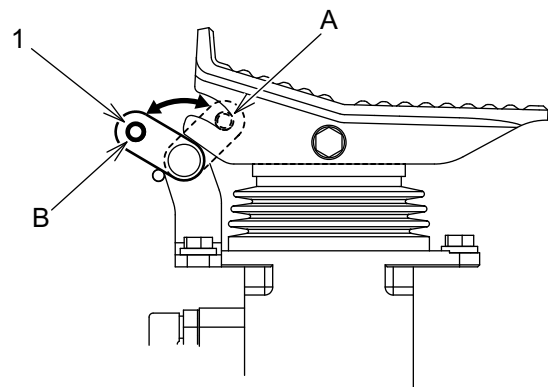
7.4.1 PEDAL LOCK DEVICE

This device is used to lock the pedal.

Move the pin (1) forward or backward to lock or unlock.

A: "LOCKED" position

B: "UNLOCKED" position



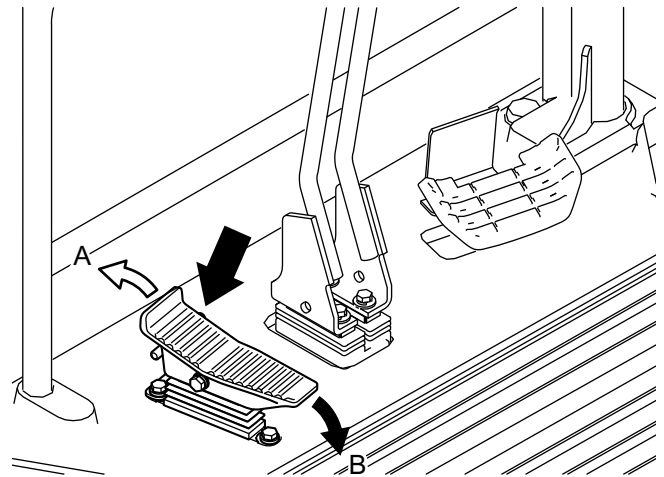
When you do not need to operate the breaker or nibbler, put the pedal lock device to the "LOCKED" position.

Putting your foot on the unlocked pedal or erroneous touch to it may cause sudden attachment movement, resulting in severe personal injury. Do not put your foot on the pedal, except when operating with pedals.

7.4.2 PEDAL OPERATIONS FOR HYDRAULIC BREAKER AND NIBBLER (CRUSHER) OPENING/CLOSING

Release the pedal lock device on the left front of the operator's seat to operate the pedal.

The table below shows that when the pedal is depressed, which side of the front attachment, left or right, the high pressure oil flows when it is seen from the inside of the cab.



Hydraulic breaker {specification using common hydraulic circuit of breaker and nibbler (crusher)}

Operation procedures	Oil flow
(B) Depress the rear part of pedal	Left piping
Pedal is in neutral position	Stops (does not flow)

Nibbler (crusher)

Operation procedures	Oil flow
(A) Depress the front part of pedal	Right piping
(B) Depress the rear part of pedal	Left piping

7.5 CONTROL OF PROPORTIONAL HAND CONTROL



ATTACHMENT TO BE INSTALLED

The operation methods are explained based on the example of a nibbler (crusher) or breaker installed as a front attachment.

The explanation is based on a case that the opening/closing operation system or breaker operation system is connected to the nibbler (crusher) pipings.

Operation may differ depending on a manufacturer and specification of an attachment installed.

Check the operation manual for the manufacturer specification of the attachment before operation.



ABOUT USE OF PROPORTIONAL HAND CONTROL

Read, fully understand and follow all safety precautions and procedures in this manual before attempting any operation of the machine.

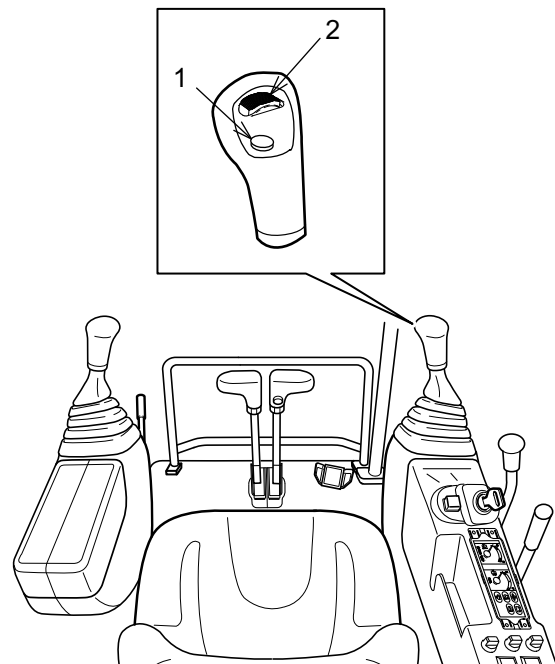
Notice

When using the nibbler (crusher) or the breaker, see "SWITCHING SELECTOR VALVE" in Chapter 8.

7.5.1 NIBBLER (CRUSHER) OPERATION

Slide switch (2) that is located on the right control lever to open or close the "nibbler (crusher)".

The table below shows that when switch (2) is slid, the left and right, which side of the front attachment the high pressure oil flows when seeing it from the inside of the cab.



Operation procedures	Oil flow
Sliding to the left	Left piping
Sliding to the right	Right piping



NIBBLER (CRUSHER) OPERATION

Do not touch breaker switch (button) (4) when operating the nibbler (crusher).

The nibbler (crusher) can move abruptly.

**PRECAUTIONS FOR LEAVING THE OPERATOR'S SEAT**

Do not leave the machine with the engine running.

Notice

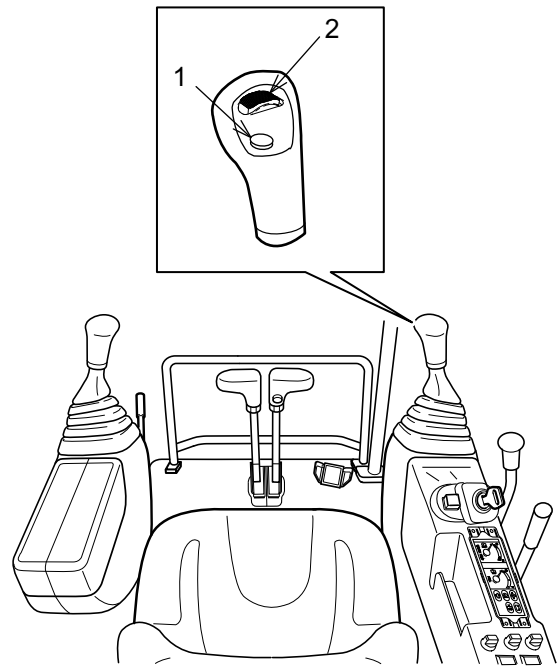
According to the slide distance of the nibbler (crusher) control switch, the hydraulic oil flow rate increases or decreases.

7.5.2 BREAKER OPERATION

To operate the breaker, press switch (1).

The table below shows that when switch (1) is slid, the left and right, which side of the front attachment the high pressure oil flows when seeing it from the inside of the cab.

Operate the breaker for 30 seconds, then release the switch.



Operation procedures	Oil flow
Press switch (1)	Left piping
Release switch (1)	Stops (does not flow)

Notice

The breaker can be operated by sliding nibbler control switch (2) to the left. However, use breaker control switch (button) (1) as much as possible.

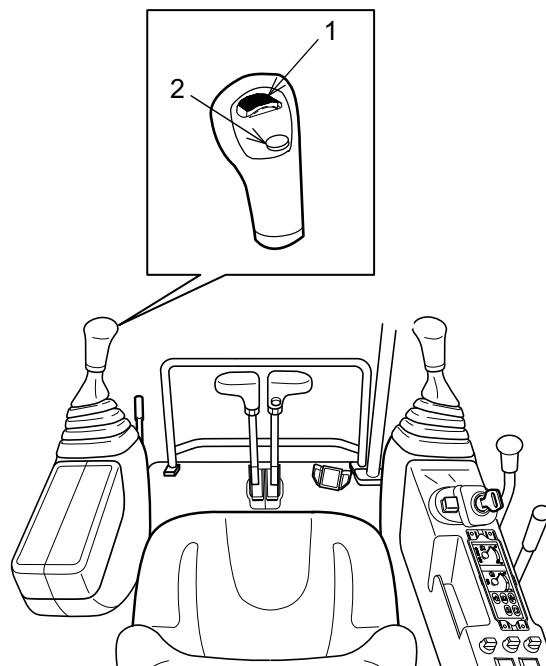
**PRECAUTIONS FOR LEAVING THE OPERATOR'S SEAT**

Do not leave the machine with the engine running.

7.5.3 ROTARY OPERATION

Slide the switch (1) that is located on left control lever to actuate.

The table below shows that when switch (1) is slid, the left and right, which side of the front attachment the high pressure oil flows when seeing it from the inside of the cab.



Operation procedures	Oil flow
Sliding to the left	Right piping
Sliding to the right	Left piping

7.6 PERIODIC INSPECTION AND MAINTENANCE OF NIBBLER (CRUSHER) AND BREAKER

7.6.1 PERIODIC INSPECTION AND MAINTENANCE CHART OF NIBBLER (CRUSHER) AND BREAKER

When this machine is used with the hydraulic breaker, the deterioration and contamination of hydraulic oil becomes faster than that of the normal bucket digging work because the machine is used under more severe conditions. Neglecting the maintenance could result in a failure of the base machine, hydraulic breaker, and hydraulic components. To extend the service life of hydraulic components, replace the hydraulic oil and the filter elements, at the following intervals.

As for the return filter element kit to be replaced, ask your KOBELCO authorized dealer for the part number and then place an order.

Item	Inspection and Maintenance Point	Replacement Interval (Hours)		
		First Time	Second Time	Periodic
Hydraulic oil	Hydraulic oil tank	—	—	1000
Return filter element kit	Hydraulic oil tank	50	200	200

7.7 PRECAUTIONS FROM BREAKER MANUFACTURERS

When installing the breaker, first fully read the precautions for using the breaker and precautions for each breaker. Installing an accumulator is sometimes required.
Consult your KOBELCO authorized dealer for details before starting installation.

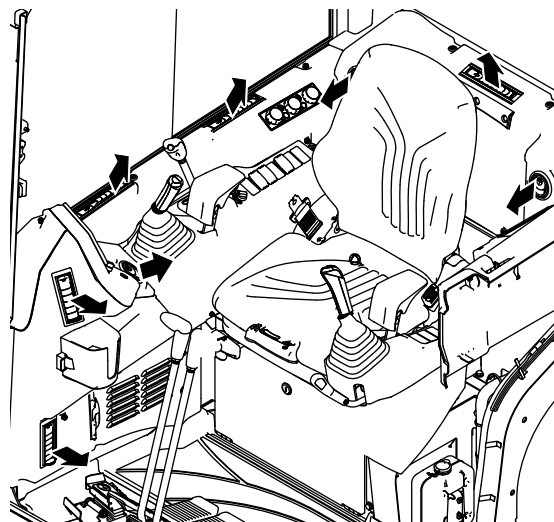
7.8 AIR CONDITIONER

The air conditioner can adjust the temperature inside the cab and dehumidify the cab.

The air conditioner is located under the cover at the back of the operator's seat and sends out warm and cool air in the cab.

7.8.1 GRILLE (AIR OUTLET)

Select air stream in preferable direction by hand.



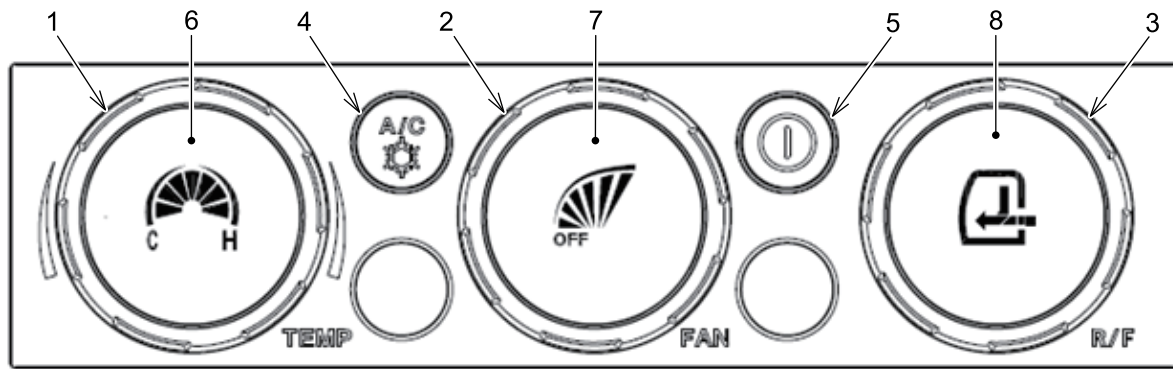
CAUTION

After replacing the parts, or charging or replacing refrigerant gas, break in the air conditioner.

When breaking in the air conditioner, be sure to set the engine speed to low speed.

Never start the air conditioner with the high engine speed. This might cause failure of the air conditioner.

7.8.2 AIR CONDITIONER CONTROL PANEL



Item	Name	Item	Name	Item	Name
1	Temperature adjustment setting dial	4	Compressor switch	7	(Fan speed/OFF) LCD display
2	Fan speed selector dial	5	Main power switch	8	(Recirculation and fresh air) LCD display
3	Recirculation and fresh air selector dial	6	(Temperature adjustment) LCD display		

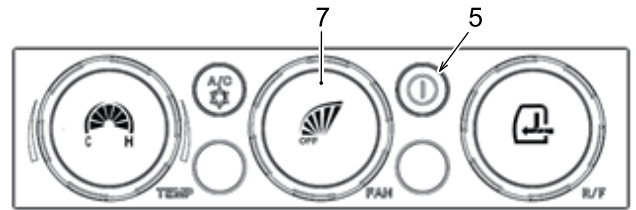
Notice

- The set temperature adjustment is displayed on (Temperature adjustment) LCD display (6), the blower fan speed or OFF is displayed on (Fan speed/OFF) LCD display (7), and the setting of recirculation and fresh air is displayed on (Recirculation and fresh air) LCD display (8).
- When each of switches (4 and 5) is selected, the indicator (amber) is turned on.
- Each of switches (4 and 5) and the display (TEMP, FAN, R/F, blue display for COOL, and red display for HOT) are equipped with night lighting. (COOL is displayed in blue, HOT is displayed in red, and others are displayed in white)

7.8.3 AIR CONDITIONER OPERATION PANEL

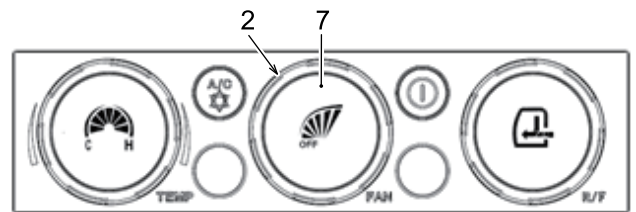
MAIN POWER SWITCH AND DISPLAY

- When the panel is OFF, "OFF" is displayed on (fan speed/OFF) LCD display (7).
- When the panel is OFF, press main power switch (5) to turn ON the panel and start the air conditioner control.
- The air conditioner operation turns OFF when the starter switch is turned OFF. If it is turned OFF with the main power switch, the status of the control panel just before turning OFF is sometimes not recalled when the starter switch is turned ON again.



FAN SPEED SELECTION AND DISPLAY

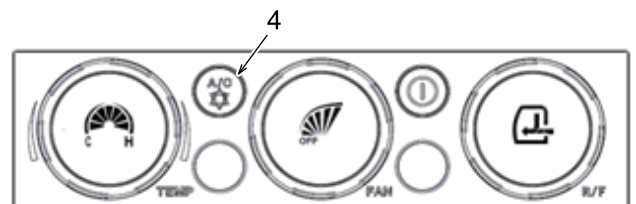
By operating fan speed selector dial (2) in UP (operation to the right) or DOWN (operation to the left) direction, (fan speed/OFF) LCD display (7) is changed as below.



Fan speed	Lo (Min.flow)	M1	M2	M3	M4	Hi (Max. flow)
LCD display						

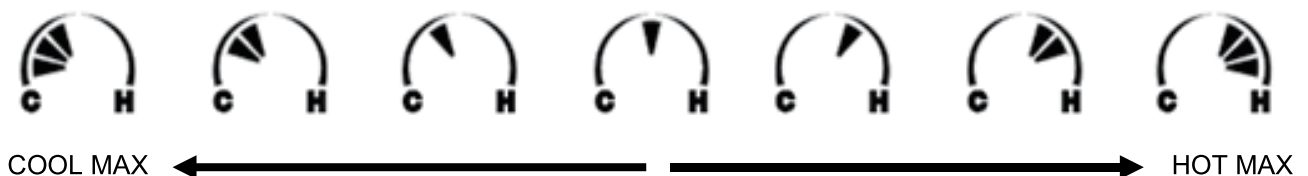
COMPRESSOR ON/OFF SWITCHING AND DISPLAY

With the indicator of compressor switch (4) turned OFF, if compressor switch (4) is pressed, the compressor is turned ON and the indicator of compressor switch (4) is turned ON. If it is pressed again, the compressor is turned OFF and the indicator of compressor switch (4) is turned OFF.



TEMPERATURE ADJUSTMENT SETTING SELECTION AND DISPLAY

By operating temperature adjustment setting dial (1) to the left (COOL side) or the right (HOT side), (Temperature adjustment) LCD display (6) is changed as below.





[7. OPTIONAL EQUIPMENT]

RECIRCULATION AND FRESH AIR SELECTION AND DISPLAY

- By turning recirculation and fresh air selector dial (3) to the right, the air becomes the recirculation air, and turning it to the left, the air becomes the fresh air.
- The suction mode currently selected is displayed at (Recirculation and fresh air) LCD display (8).



Suction mode	Air recirculation	Fresh air intake
LCD display		

7.8.4 HOW TO USE AIR CONDITIONER

Before turning the air conditioner on, close the doors of cab and windows to achieve the best performance.

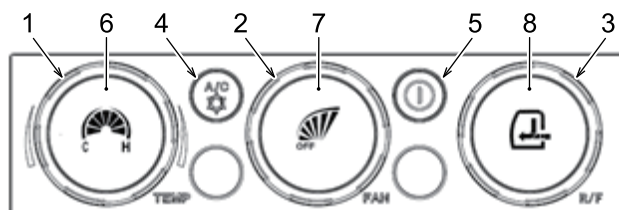
COOLING METHOD

Note

To avoid freezing of the evaporator, do not operate the air conditioner for a long time in the COOL-MAX set temperature with the LO airflow.

If it is frozen and cool air does not flow any longer, turn OFF compressor switch (4), set the temperature to a higher temperature, operate the air conditioner with the maximum fan speed "HI" for a while, and then turn compressor switch (4) "ON" again.

1. Press main power switch (5).
2. Operate fan speed selector dial (2) to the right and set the fan speed HI.
3. Operate temperature adjustment setting dial (1) and set a desired temperature.
4. Press compressor switch (4).
5. Turn recirculation and fresh air selector dial (3) to the right to select the recirculation air.

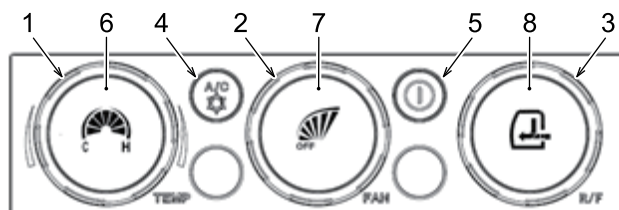


HEATING METHOD

Note

The engine coolant is used for heating and when the coolant is a high temperature, heating can be performed.

1. Press main power switch (5).
2. Operate fan speed selector dial (2) to the right and set the fan speed HI.
3. Operate temperature adjustment setting dial (1) and set a desired temperature.
4. Turn recirculation and fresh air selector dial (3) to the left to select the fresh air intake.

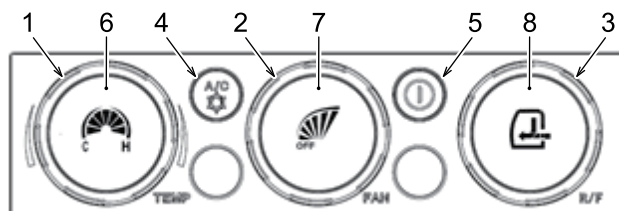


METHOD OF HEATING WITH DEHUMIDIFICATION AND DEMISTING

Note

When the outdoor temperature is 0 degree C or lower, the air conditioner (compressor) may not work.


1. Press main power switch (5).
2. Operate fan speed selector dial (2) and set a desired fan speed.
3. Operate temperature adjustment setting dial (1) and set a desired temperature.
4. Turn recirculation and fresh air selector dial (3) to the left to select the fresh air intake.
5. Press compressor switch (4) to operate the air conditioner (compressor).




7.8.5 SELF-DIAGNOSIS FUNCTION IN DISPLAY MONITOR

If there are problems in the motor valve/actuator, or the input circuit, they can be checked on the panel display.

<Display for detection of motor lock of motor valve>


Error location	Error display	
Flow adjusting valve	<ul style="list-style-type: none"> (Display of temperature adjustment setting on (Temperature adjustment) LCD blinks. 	

<Display for detection of motor actuator disconnection/short circuit and motor lock>

Error location	Error display	
Switching recirculation air and fresh air	<ul style="list-style-type: none"> Display of recirculation and fresh air setting on (Recirculation and fresh air) LCD blinks. 	

If there are problems in the evaporator sensor such as disconnection/short circuit, or problems in the input circuit, they can be checked on the panel display.




<Display for detection of disconnection/short circuit of evaporator sensor>

Error location	Error display	
Evaporator sensor	<ul style="list-style-type: none"> Compressor switch indicator blinks. 	

Error detection of each sensor by monitor mode function

- With the panel turned ON, if the compressor switch and the main power switch are pressed simultaneously for 1 second or more, the display is switched to the monitor mode. To return to the previous display, perform the same operation.
- The normal status, disconnection, and short circuit of the evaporator sensor are shown as segment display.

<LCD display and error display at monitor mode>

Display No.		Control data to be displayed	Short circuit display	Disconnection display
No.	Fan speed displayed as bar			
0		AD value of evaporator sensor		

7.8.6 HANDLING AT IN-SEASON/OFF-SEASON

IN-SEASON

To use the air conditioner for a long time comfortably, contact your KOBELCO authorized dealer for inspection and maintenance of the air conditioner at the beginning of in-season of cooling.

OFF-SEASON

During off-season, operate the air conditioner at least once a week for several minutes.

The oil shortage at each part of the compressor will be prevented by operating the air conditioner and it will always be kept in the best condition.

7.8.7 INSPECTION & MAINTENANCE CHART

Have a regular inspection and maintenance of the air conditioner so that it can be used in better condition for a longer time.

Item/Interval		Start-up Inspection	Every 1 month or 100 hr	Every 6 months or 500 hr	Replacement period
Cooling medium volume	Inspection			O	
Air conditioning compressor belt	Inspection, adjustment	O			2 years
Condenser	Inspection, cleaning	O	O		
Filter	Inspection, cleaning	O			
	Replacement				2 years
Piping	Inspection			O	
Receiver dryer	Replacement				2 years

7.8.8 INSPECTION AND ADJUSTMENT OF AIR CONDITIONING COMPRESSOR BELT



INSPECTING AND MAINTAINING THE BELT

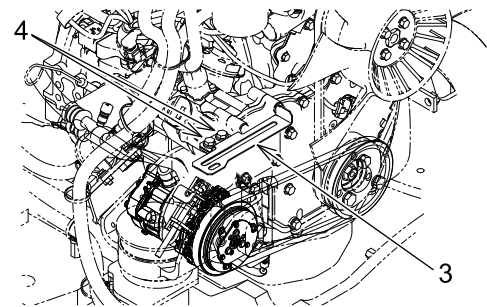
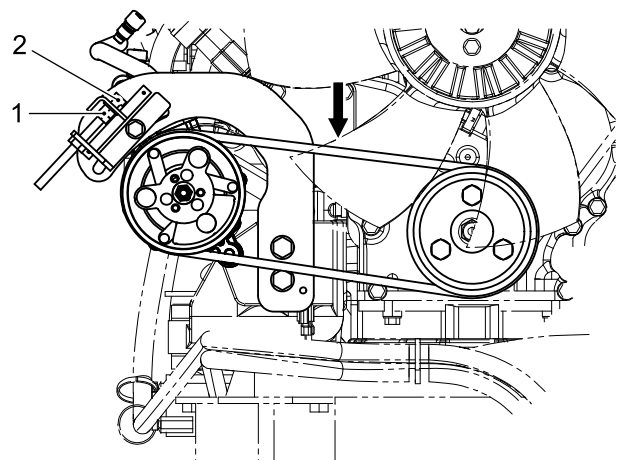
Be sure to stop the engine before inspection and maintenance of the engine.

Inspecting and maintaining the running engine may cause severe injury by being caught in the rotating parts, such as the fan and the belt.

Notice

An improperly installed belt may not only decrease the performance of compressor but also damage the belt and the compressor.

1. Move the control lock lever to the "LOCKED" position, and then stop the engine.
2. Use the starter key to open the engine hood on the rear side of the machine and hold it with the stay.
3. If the belt deflection is 5.4 mm (0.2 inch) when applying a force of 16 N·m to the center between pulleys, it is normal.
4. When adjusting the belt tension, remove belt guard (3), loosen double nut (1) of the idle pulley, and then turn adjusting bolt (2).
5. Tighten double nut (1).
Tightening torque: $23 \pm 2.3 \text{ N} \cdot \text{m}$ ($17 \pm 1.7 \text{ lbf} \cdot \text{ft}$)
6. After adjustment, run the engine at low idling for about 5 minutes before checking the belt tension again.
7. Install belt guard (3) and tighten bolts (4).
Tightening torque : $23 \pm 2.3 \text{ N} \cdot \text{m}$ ($17 \pm 1.7 \text{ lbf} \cdot \text{ft}$)



7.8.9 CLEANING OR REPLACING AIR CONDITIONER FILTERS



CLEANING OR REPLACING AIR CONDITIONER FILTERS

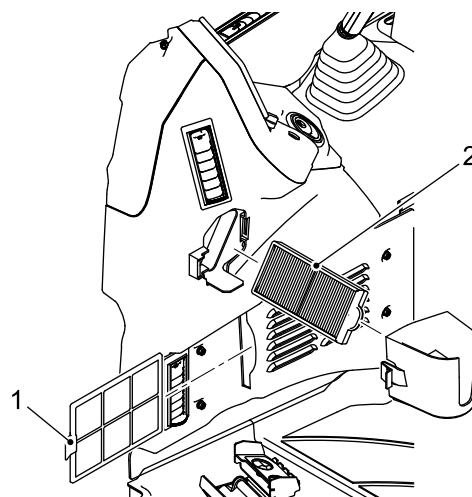
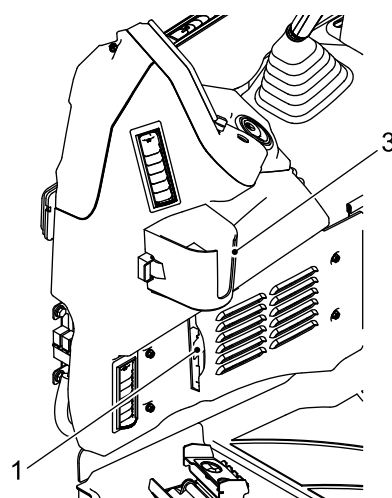
Compressed air may cause flying debris and it may cause accident resulting in injury or death.
Wear protective glasses, respirator, and other protective gears when cleaning the filters of air conditioner.

Notice

The maintenance time shows the reference value. Clean them earlier than the specified time in case the machine is being used in dusty area.

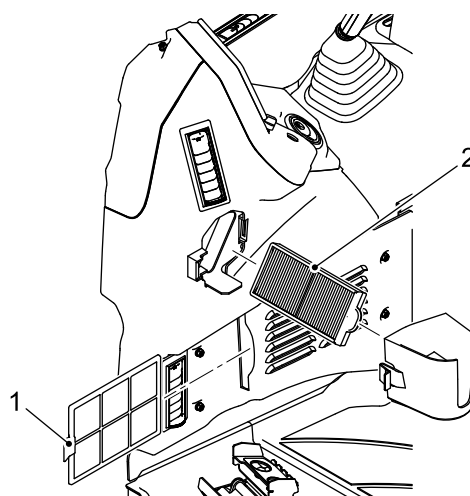
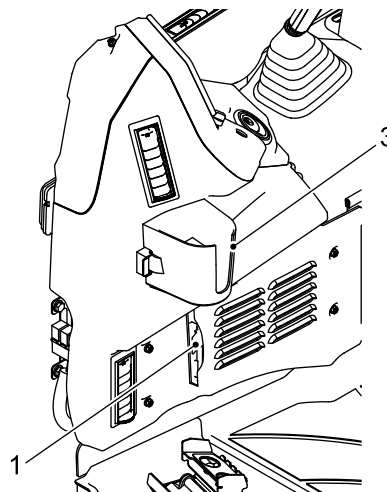
CLEANING OR REPLACING AIR CONDITIONER FRESH AIR FILTER

1. Hold the handle grip of fresh air filter (1) at the right side in the cab and pull it out straight.
2. Clean the recirculation/fresh air filters by blowing compressed air (0.2 MPa (29psi) or less) to them.
3. Install the cleaned or replacement filters in the reverse order of removal.



CLEANING OR REPLACING OF AIR CONDITIONER RECIRCULATION AIR FILTER

1. Remove cup holder (3).
2. Hold the handle grip of circulation air filter (2) and pull it out straight.
3. Clean the recirculation / fresh air filters by blowing compressed air (0.2 MPa (29psi) or less) to them.
4. Install the cleaned or replacement filters in the reverse order of removal.



7.8.10 CHECKING AIR CONDITIONER REFRIGERANT



WARNING

REFRIGERANT

- Do not loosen the parts in the refrigerant circuit because there is a hazard of losing sight by getting coolant in your eyes and getting frostbite on your hands by touching it.
- Inhalation of the refrigerant may result in fatal injury. Also, do not bring a fire near the area where refrigerant gas is generated.

Notice

- When charging or replacing the refrigerant, confirm the type of refrigerant and use the specified refrigerant. (Refrigerant type: R-134a Quantity: 650 g \pm 50 g (1.43 lbs \pm 0.11 lbs))
The use of unspecified refrigerant may cause damage of the components.
- Operate the air conditioner at least once every week for several minutes to rotate the compressor regardless of the season. This can prevent refrigerant gas from leaking through the compressor seal.
- If an oil stain is found around a pipe joint, it is a sign of gas leakage. Contact your KOBELCO authorized dealer for inspection.

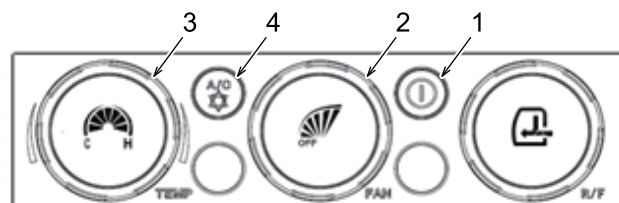
Notice

Be sure to follow the following regulations to protect the global environment.

- Do not release the refrigerant is sealed in this product to the atmosphere without care.
- Collect the sealed refrigerant from the unit when disposing of this product.

1. Start the engine, and set the engine speed to the middle speed position of the engine throttle.
2. Fully open the windows of the cab and the doors.
3. Set the air conditioner as shown in the following.

- (1) Auto Control Switch: ON
- (2) Fan Speed Selector Switch: HI
- (3) Temperature Setting Switch: MAX COLD
- (4) Air Conditioner Switch: ON



4. Use the starter key to open the side door at the right side cover of the machine, and hold it with the stay.

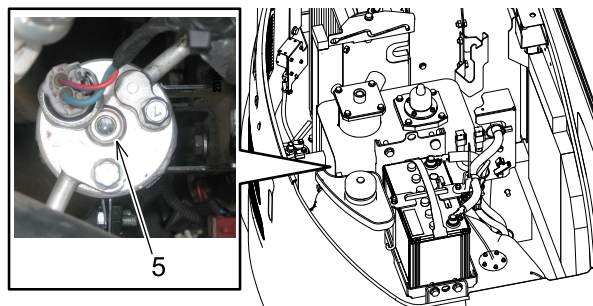
[7. OPTIONAL EQUIPMENT]


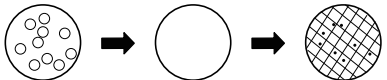

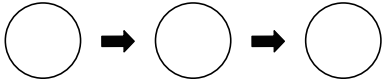

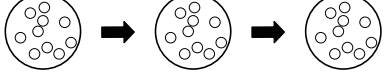
5. Check the amount of the refrigerant by seeing sight glass (inspection window) (5).

A: The amount of refrigerant is proper.

B: The refrigerant is over charged. This will make both high and low pressures rise and have an adverse effect on the pressure switch operation and the air conditioning system.

C: The refrigerant is insufficient. Contact your KOBELCO authorized dealer for charging.
6. Release the support stay and close the right side cover.



Refrigerant Amount	Condition of Sight Glass
A Proper 	 After turning ON the main power switch, a little bubbles are visible. Then it becomes transparent and later light opaque white.
B When over-charged 	 After turning ON the main power switch, no bubbles are visible.
C When insufficiently-charged 	 After turning ON the main power switch, bubbles are seen continuously.



With bubbles: Both gas and liquid refrigerant are mixed.



No bubbles: All refrigerant has become liquid and transparent.



Opaque white color : Oil and refrigerant are separated, showing light opaque white color.

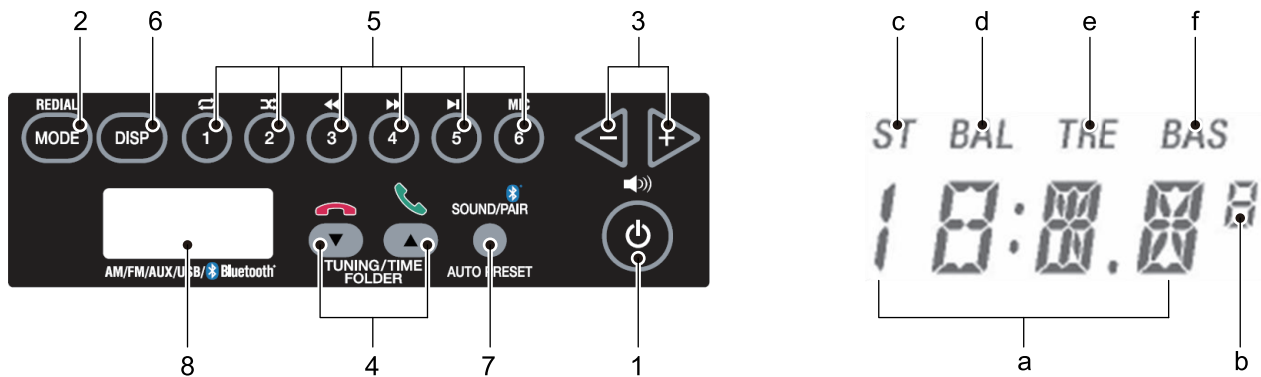
7.9 HANDLING OF RADIO

CAUTION

Do not operate the radio during operation.

Lower the attachment to the ground, pull up the control lock lever to the "LOCKED" position, and then operate the radio.

7.9.1 NAME OF EACH PART



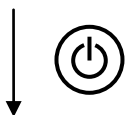
Item	Name	Function
1	[PWR] Key	Turns the power of the radio ON/OFF. In each explanation, "ON" is described as "OnAir".
2	[MODE] Key	Switches the band (AM/FM1/FM2) and the radio (AM/FM1/FM2), AUX, USB, and BT(Bluetooth). If pressed and hold, redial is performed.
3	[VOL+] [VOL-] Key	Adjusts the volume.
4	[UP] [DOWN] Key	Switches the frequency, adjusts steps at the sound adjustment, and adjusts the clock. Also, when a call is received, press [UP] to start conversation, and press [DOWN] to finish the conversation.
5	[PRESET] Key (1 to 6)	Recalls and registers preset frequency. Also, in use of BT(Bluetooth)/USB, performs repeat, random, track forward/backward, and pause.
6	[DISP] Key	Switches the display (frequency/clock).
7	[SOUND PAIR] Key	Adjusts the sound (balance/bass/treble) and performs pairing.
8	LCD Display	Displays the frequency and the clock.
a	Segment (Large)	Displays the letter/value information such as the name of the source, the frequency, and the clock.
b	Segment (Small)	Displays the frequency at the step of FM50kHz.
c	ST Pict	Turns on if stereo sound is received with FM1/FM2 selected.
d	BAL Pict	Turns on at balance adjustment in sound adjustment.
e	TRE Pict	Turns on at treble adjustment in sound adjustment.
f	BAS Pict	Turns on at bass adjustment in sound adjustment.

7.9.2 ON-AIR (NORMAL CONDITION)

With the radio component in the OFF condition, press [PWR] key to turn the radio ON (on-air condition). Then the frequency selected now starts to be received.



OFF (clock display)
{Colon blinks (ON: 700 ms, OFF: 300 ms)}



After 1 sec.



ON (on-air): Band name display

In this condition, press [DISP] key to switch the frequency display and the time display.

If the source is AUX, the AUX display and the clock display are switched.

(When the clock display is switched to the frequency display, the band name is displayed for 1 sec. and then the display is changed to the frequency display.)

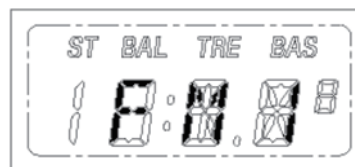


Frequency display



Clock display
{Colon blinks (ON: 700 ms, OFF: 300 ms)}

After 1 sec.



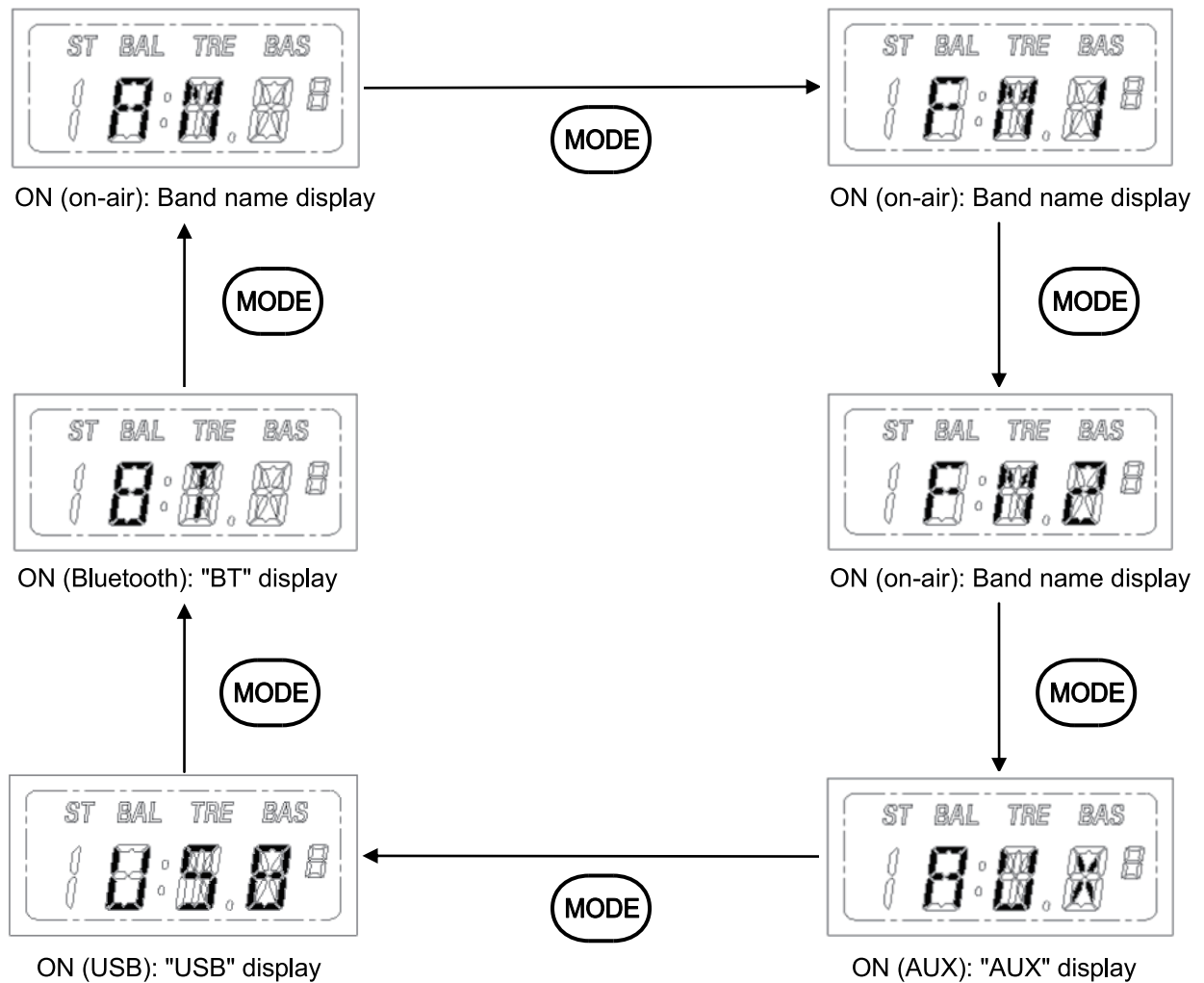
ON (on-air): Band name display

7.9.3 SWITCHING SOURCE

With the radio component in the on-air (normal) condition, press [MODE] key to switch the source.
After the source is switched, each source works as follows.

- AM/FM: Receives the frequency received at the previous time by the selected band.
- AUX: Outputs the sound of the device connected to the AUX terminal from the speakers of this radio component.
- USB: Plays the mp3 file inside the USB memory connected to the USB terminal and outputs the sound from the speakers of the radio component.
- BT: Outputs the sound of the device connected though Bluetooth (A2DP) from the speakers of this radio component.

The sources are switched in the order of AM→FM1→FM2→AUX→USB→BT→AM.



7.9.4 FM/AM

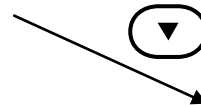
FREQUENCY ADJUSTMENT (1 STEP UP OR 1 STEP DOWN)

With the radio component in the on-air (normal) condition, press [UP] key to increase the frequency by 1 step. Also, press [DOWN] key to decrease the frequency by 1 step.

(In case that selected band is FM1/FM2)



Frequency display
(When stereo sound is received, "ST" pict turns on)



Frequency display
(When stereo sound is not received, "ST" pict turns off)

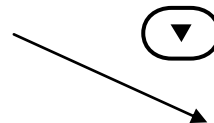
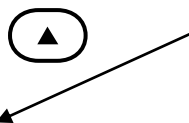


Frequency display
(When stereo sound is not received, "ST" pict turns off)

(In case that selected band is AM)



Frequency display
(When AM is selected, "ST" pict always turns on)



Frequency display
(When AM is selected, "ST" pict always turns on)



Frequency display
(When AM is selected, "ST" pict always turns on)

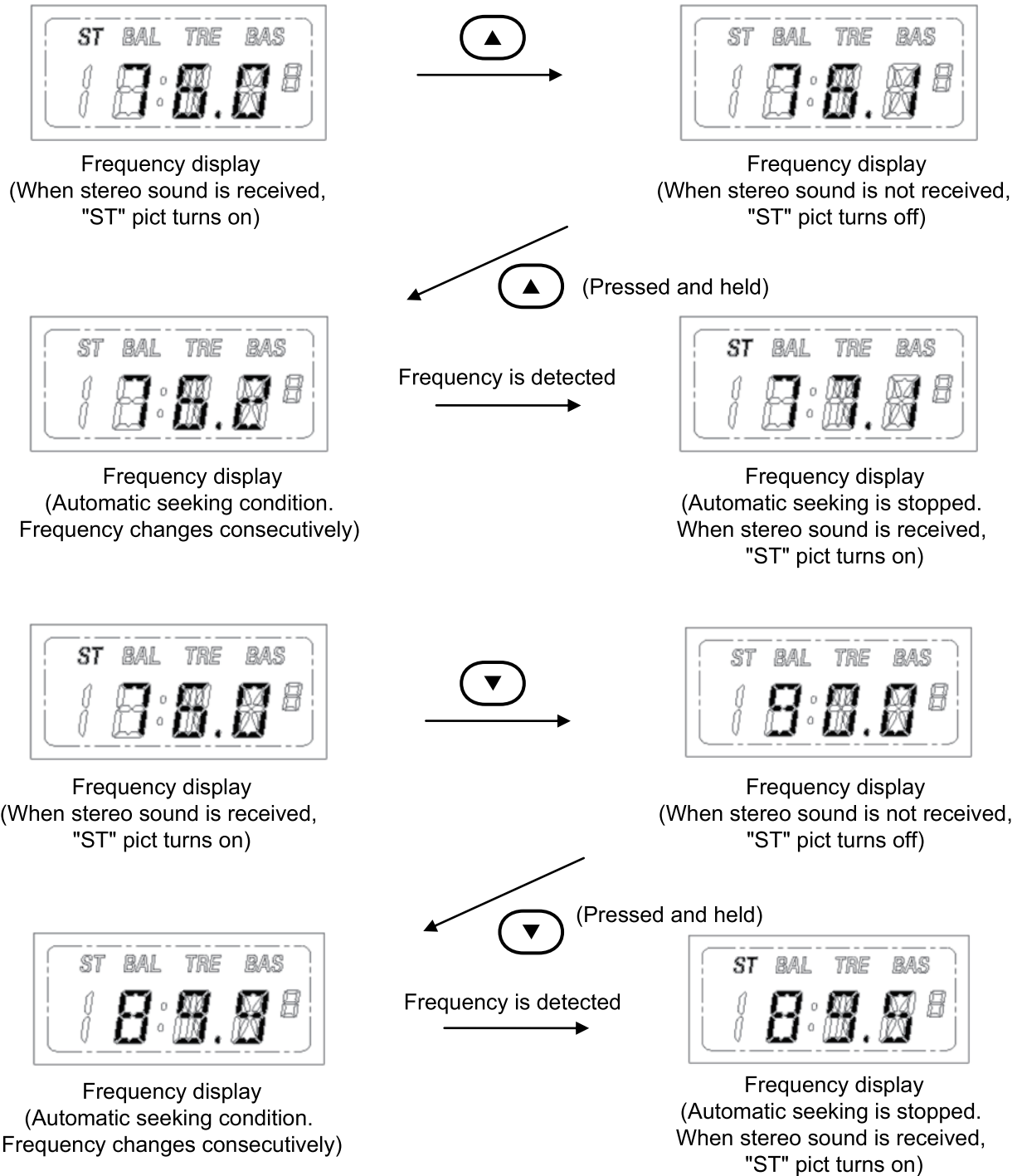
FREQUENCY ADJUSTMENT (AUTOMATIC SEEKING)

With the radio component in the on-air (normal) condition, press and hold [UP] key to increase the frequency by 1 step consecutively.

Also, press and hold [DOWN] key to decrease the frequency by 1 step consecutively.

When the well-received frequency is detected, the auto seeking operation stops and the radio becomes the on-air condition.

(In case that selected band is FM1)



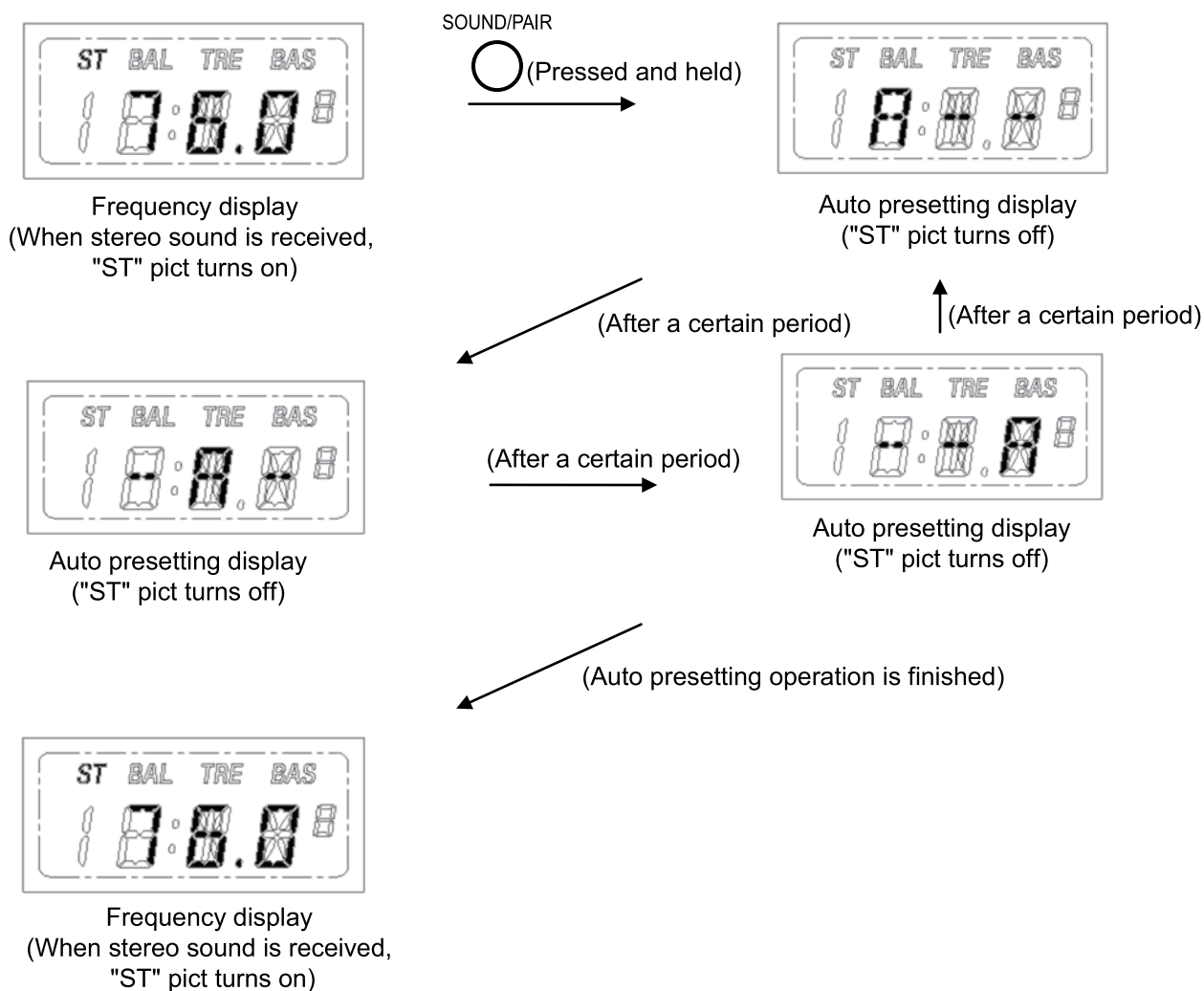
FREQUENCY ADJUSTMENT (AUTOMATIC PRESETTING)

With the radio component in the on-air (normal) condition, press and hold [SOUND/PAIR] key to start the automatic presetting function of which the well-received frequency is detected and stored in the preset memories of 1 to 6 automatically.

In the presetting function, the frequencies are set to the preset memories of 1 to 6 in the order of strongly received radio waves.

During operation of the automatic presetting function, the following automatic presetting display (the display position of "A" is renewed at every certain period) is displayed and when the operation is finished (with 2 beep sounds), this display is turned off and the frequency stored in preset 1 is on-aired.

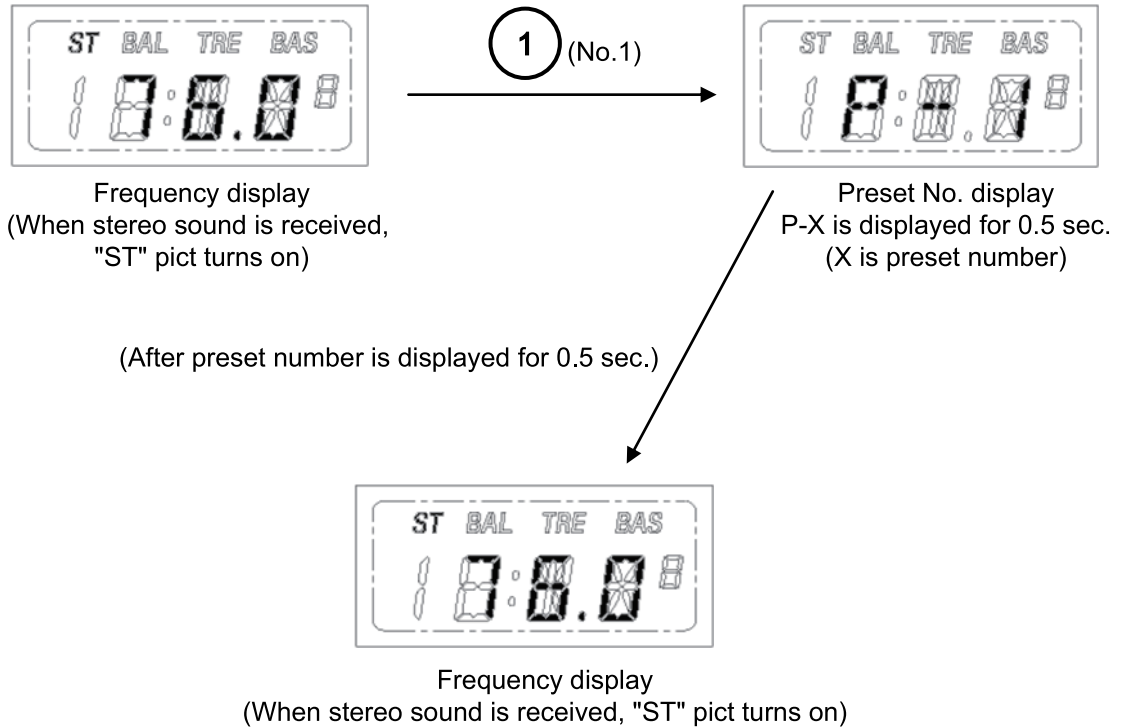
(In case that selected band is FM1)



RECALLING PRESET FREQUENCY

With the radio component in the on-air (normal) condition, press any of [PRESET] key (1 to 6) to recall the frequency stored in that preset number and on-air it.

{In case that selected band is FM1 (76.0 MHz has already been stored in preset No.1)}

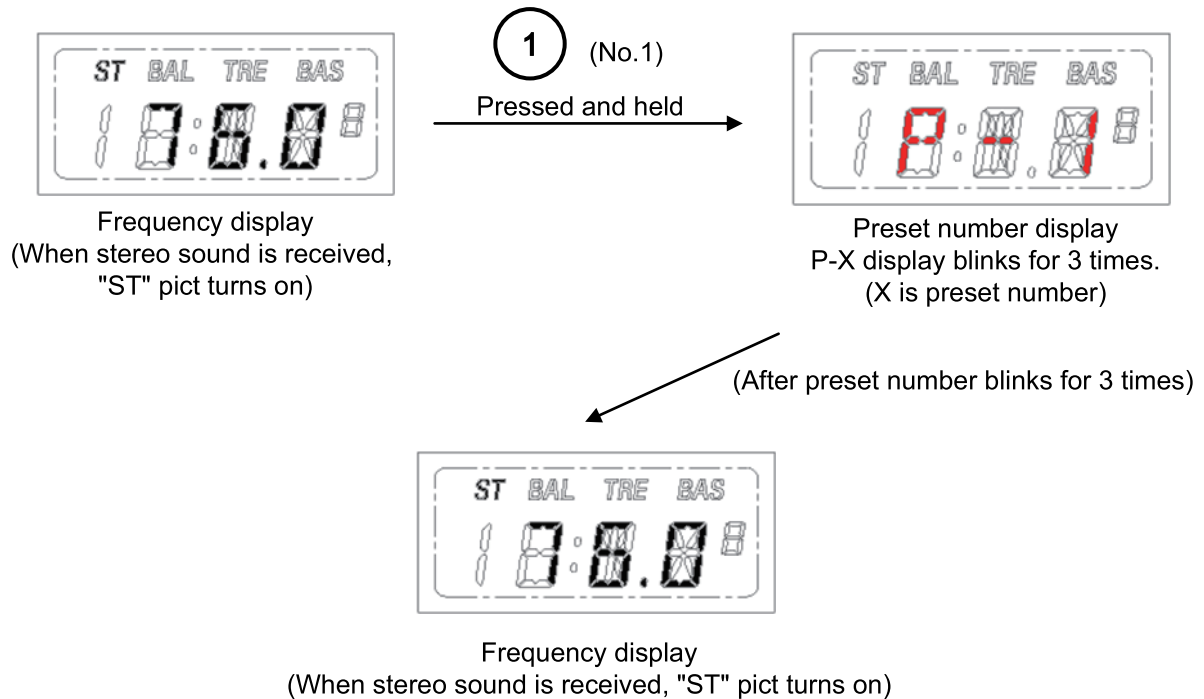


PRESET MEMORY

If any one of [PRESET] keys (1 to 6) is pressed and held under the on-air (normal) condition, the frequency received now is stored to that preset number.

At this time, the preset number display blinks 3 times and then the frequency display turns on.

(In case that selected band is FM1)



7.9.5 BLUETOOTH AUDIO FUNCTION, AND USB PORT/EXTERNAL INPUT TERMINAL

Using the Bluetooth Audio function, and USB port/external input terminal (AUX) of this machine, you can listen to music from a cell phone and external sound device.

Notice

Bluetooth Audio

- The Bluetooth Audio function of this machine does not guarantee wireless connection with all types of devices supporting Bluetooth. Devices like cell phones, etc. to be connected need to meet the Bluetooth standard determined by SIG and to be certified. Even if devices to be connected meet the Bluetooth standard, some devices may have connection problems, display/operation differences, or skipping sound.
- For the use of Bluetooth, follow the instruction manual of each device.
- Bluetooth in this machine may adversely affect some medical electric devices such as a cardiac pacemaker. When using Bluetooth Audio near medical electric devices, be very careful and ask applicable medical electric device manufacturers beforehand for use of Bluetooth.

USB PORT/EXTERNAL INPUT TERMINAL (AUX)

- USB port and external input terminal in this machine do not guarantee connection with all types of USB terminal and AUX terminal. Also, when each terminal does not match the inlet of this machine, a connection is not available.
- For use of external sound devices and USB memories, follow the manuals for them respectively.

File System Condition

Item		Contents	
File system		FAT16/32, no distinction between upper and lower case letters	
Number of files		Root folder	Sub folder
	FAT16	512	65534
	FAT32	65535	65534
Number of layers		16 layers, full pass including file name is within 260 letters	
Sort order		Plays in UNICODE order	
Supported file format		MP3 / WMA / AAC	

[7. OPTIONAL EQUIPMENT]

Supported format

Item		MP3	WMA	AAC
Supported format		MPEG 1/2, 2.5 Layer1, 2 and 3	WMA Ver.9 Standard (DRM is not supported)	MPEG4 AAC-LC (DRM is not supported)
Sampling rate	8k	Yes	Yes	
	16k	Yes	Yes	
	32k	Yes	Yes	
	11.025k	Yes	Yes	
	22.05k	Yes	Yes	
	44.1k	Yes	Yes	Yes
	12k	Yes		
	24k	Yes		
	48k	Yes	Yes	
Bit rate		Compatible with 8 to 320 kbps VBR	Compatible with 5 to 384 kbps VBR	Compatible with 64 to 320 kbps VBR
TAG information		Compatible with ID3TAG (V1.0/V1.1/V2.2/V2.3/V2.4)	Compatible with WMATAG	Compatible with AACTAG
Extension		mp3	asf, wma	m4a, 3gp, mp4

- When the file data is constructed with a format other than the supported formats, or when the data header part is broken, the track is skipped to the next track.
- The supported files of AAC are that encoded with iTunes (version confirmed for support: 4.*, 5.*, 6.*, 7.0-7.5). The AAC files encoded with other software may cause failures such as skipping to the next track during playing.

Basic specification of Bluetooth

Item	Contents
Bluetooth version	3.0
Field intensity	Class 2
Maximum number of devices for pairing registration	16 units
Supported profile	A2DP / AVRCP / HFP / HSP / SPP

RESUMING

With a USB file being played, if source change, SRC OFF, or ACC OFF is performed and then the USB is selected again, the part played before starts playing.

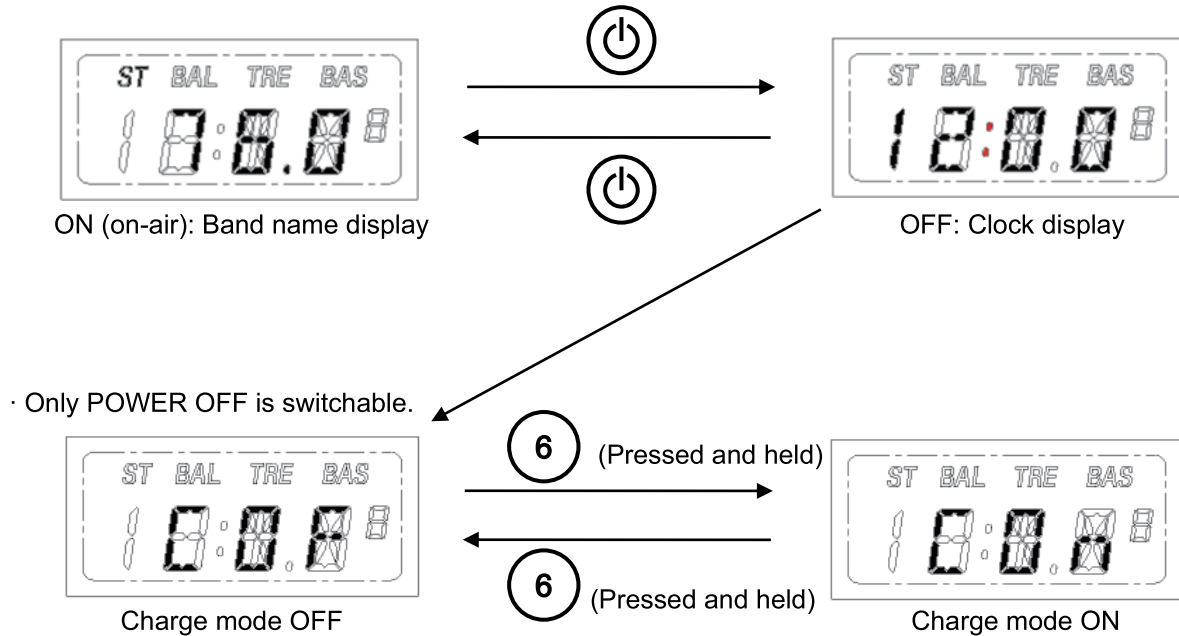
If the same USB memory is pulled out and inserted, the part played before starts playing.

If the USB memory is pulled out during playing, sometimes resuming becomes impossible.

If a different USB memory is inserted between the insertions of the same memory, resuming becomes impossible.

USB CHARGE

- A USB device connected to the USB (mobile phone or audio device) can be charged.
- In the USB charge, normal mode and charge dedicated mode are available, and at the charge dedicated mode, USB communication becomes impossible.
(When the USB communication is impossible, playing audio files is impossible.)



* In the charge mode, the setting is obtained after POWER ON.

7.9.6 PAIRING (REGISTRATION OF DEVICES)

Bluetooth devices need prior registration of devices to be connected by each other. This registration is called "pairing".

The pairing is required between this radio component and a mobile phone or other Bluetooth device.

With the OnAir (normal) condition, push the [MODE] key and switch the band to Bluetooth condition.

With the band selecting Bluetooth, press and hold [SOUND/PAIR] to display "WA" and start the preparation of the pairing.

After the preparation of this radio component is finished, "PA" is displayed, and this radio component enters the pairing waiting condition.

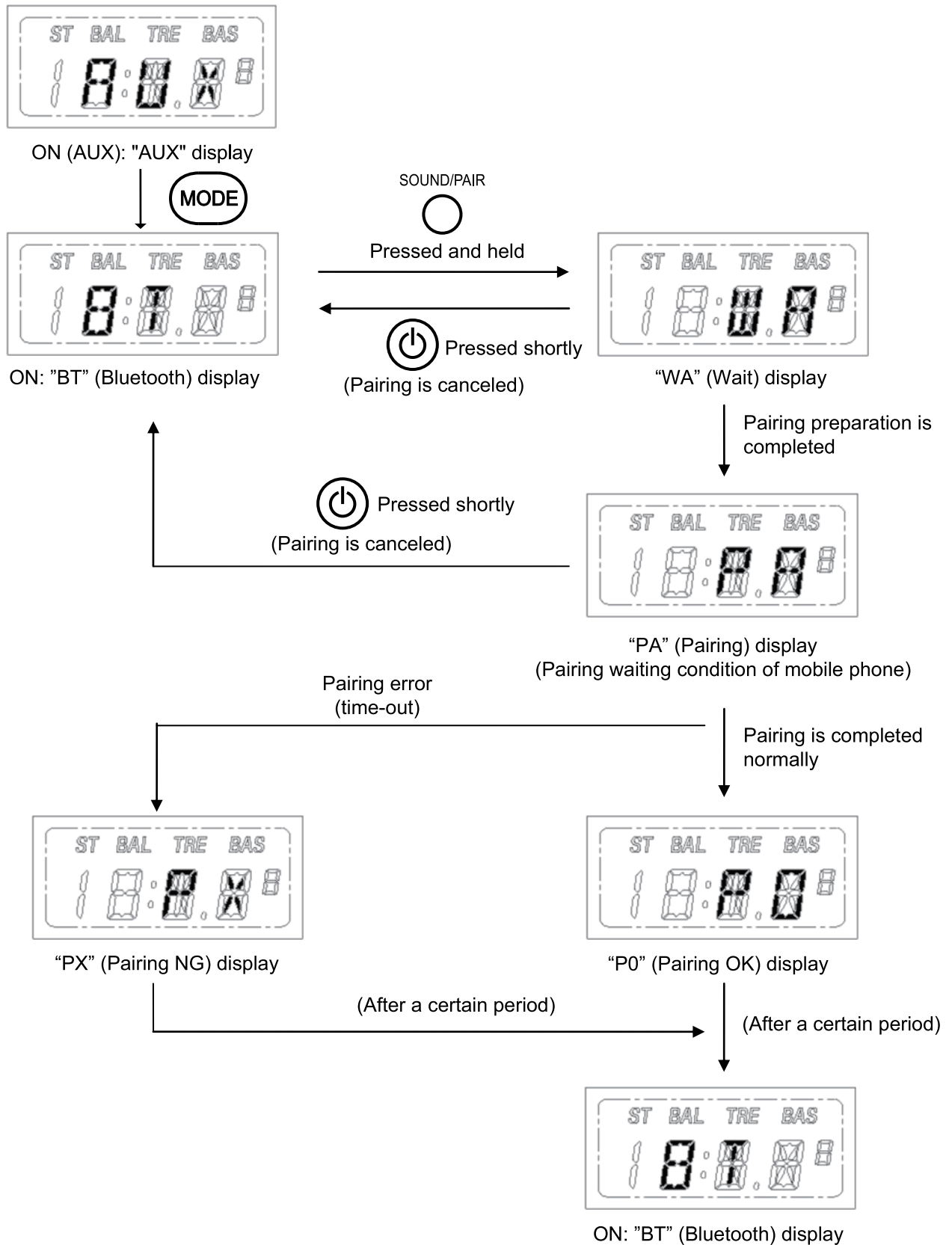
If a device is searched from the Bluetooth device to be connected to this radio component, the screen of that Bluetooth device displays "BT-****" (* is 4 digits of English letters and numbers). The pairing operation shall be performed from the Bluetooth device to be connected.

If the pairing is performed normally, "P0" is displayed and the pairing is finished normally.

When the pairing is not completed within the limited time (180 sec.) or error occurs, "PX" is displayed and the radio component returns to the Bluetooth ON condition.

During the pairing operation, by pressing [PWR] key, the pairing is canceled.

* Some mobile phones need entering of a pass key. Enter "0000" as a pass key.



7.9.7 TELEPHONE FUNCTION

Before using this function, perform pairing (registration of a device).

CONVERSATION

If the mobile phone connected through Bluetooth receives a phone call, regardless of the band selected at that time, "CL" is displayed and blinked and the ringtone is output from the speakers.

Even when this radio component is OFF, it automatically turns ON when receiving a phone call, and then displays and blinks "CL", and outputs the ringtone.

With the radio component receiving a phone call, press [UP] key to answer the phone call.

If the telephone number for which incoming call rejection has been performed is received, the radio component does not enter the communication status but changes to the band selected before receiving the phone call.

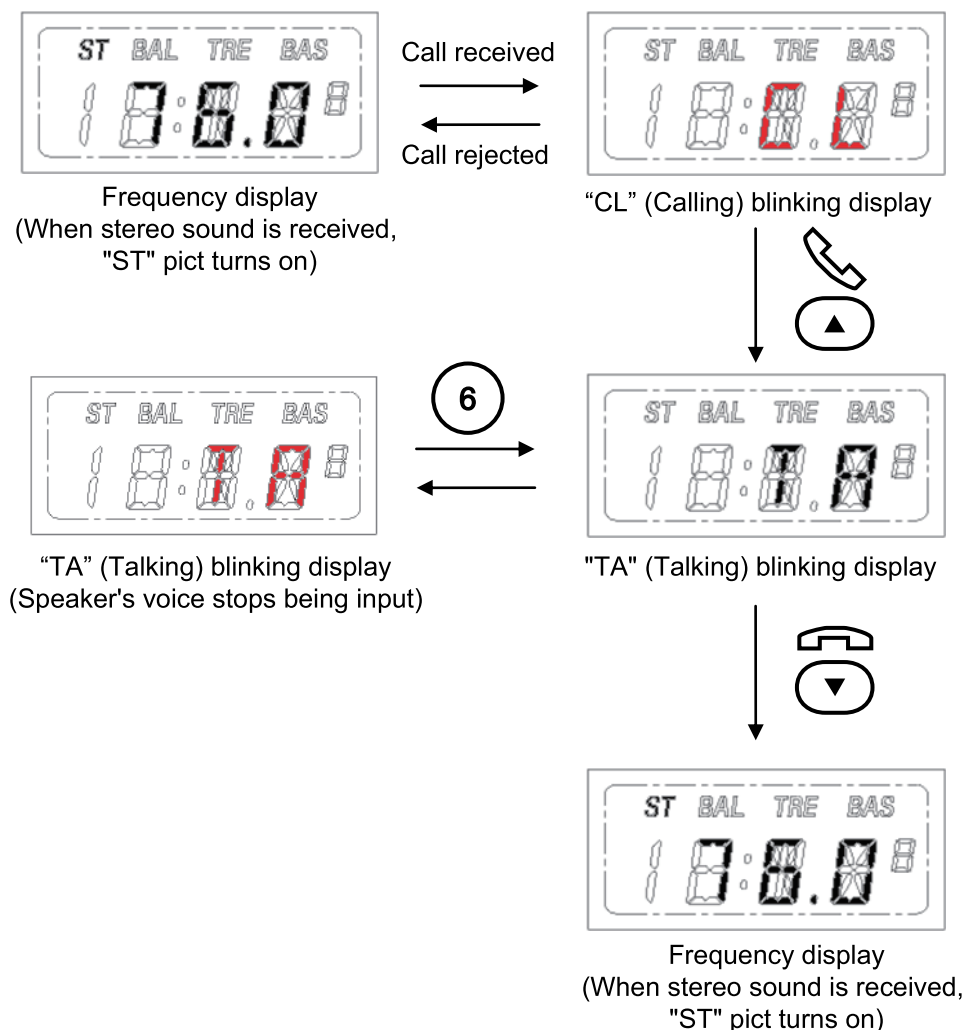
During the telephone conversation, by pressing [DOWN] key, the conversation is finished and the radio component changes to the status before receiving the phone call.

Moreover, by pressing [PRESET 6] key, the microphone can be turned OFF/ON.

When the microphone is turned OFF, input of the speaker's voice is stopped.

The previous turning OFF of the microphone is not stored. It is canceled by every time.

(In case that selected band is FM1)



REDIALING

Regardless of the band selected now, by pressing and holding [MODE] key, "RE" is displayed for 3 sec. and after redialing is started, "DL" is displayed and blinked, and the ringtone is output from the speakers.

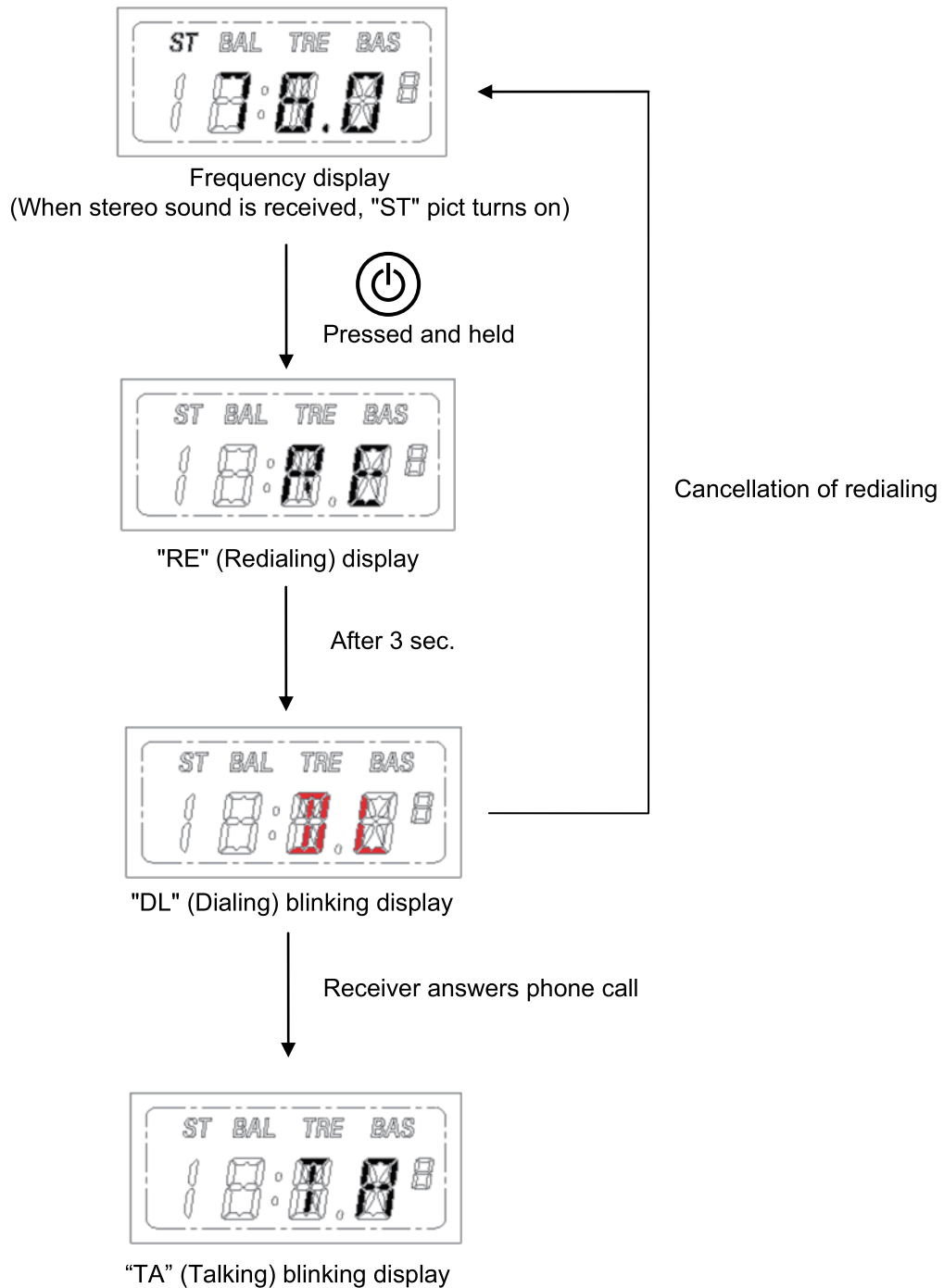
Even when this radio component is OFF, it automatically turns ON when performing redialing and enters the redialing process.

While making a phone call, if it is canceled, the radio component returns to the status before making the phone call.

The redialing function redials the telephone number received last time, after ACC ON.

If a phone call is received for a short time, some mobile phones cannot be applied to redialing.

(In case that selected band is FM1)



7.9.8 FILE PLAYING FUNCTION

Before using this function, pairing (registration of a device) shall be done.

TRACK FORWARD/BACKWARD (USB/BT-AUDIO)

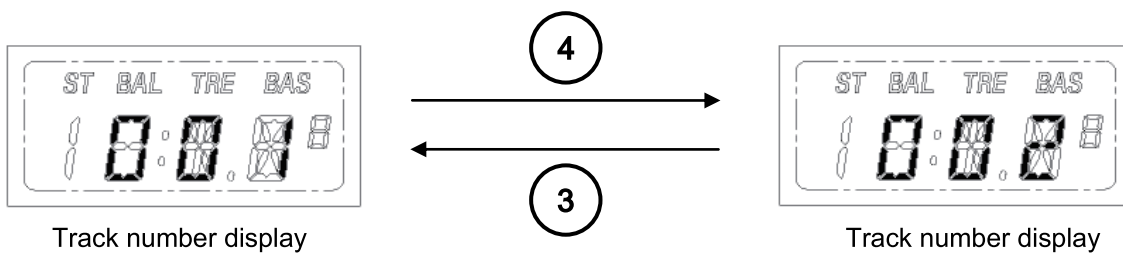
While a USB memory or BT-Audio is being played, press [PRESET 3] or [PRESET 4] to change the track forward/backward.

If moving track backward is operated after less than 1 sec. from the start of playing the track, the track moves to the previous track, however, in case of 1 sec. or more from the start, the playing part moves to the beginning of the same track.

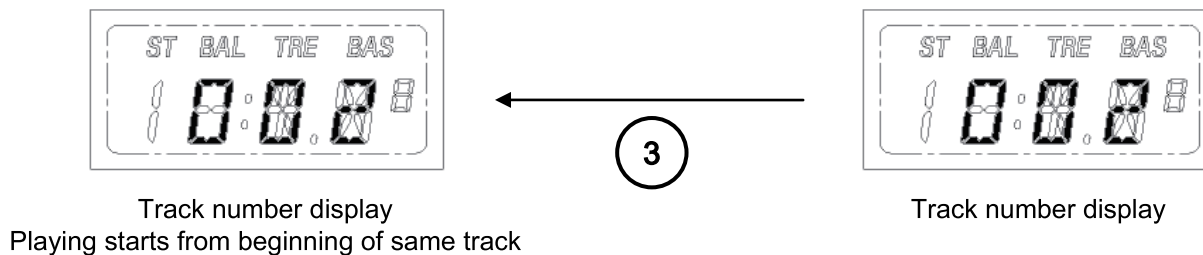
(However, the playing time is not displayed.)

(In case of USB)

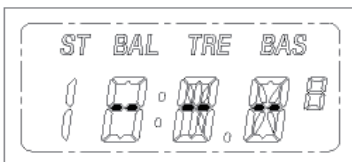
- In case of less than 1 sec.



- In case of 1 sec. or more



File number of 1000 or after is displayed as “---”



(In case of BT-Audio)

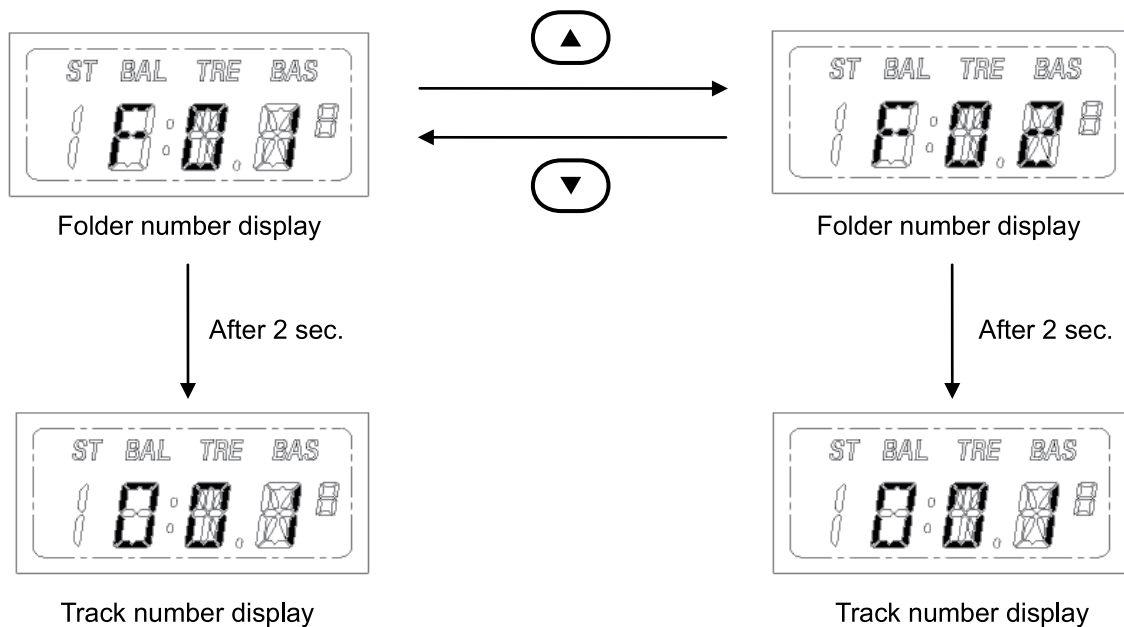
Due to the Bluetooth device limitation, the track number cannot be displayed.

FOLDER FORWARD/BACKWARD (USB)

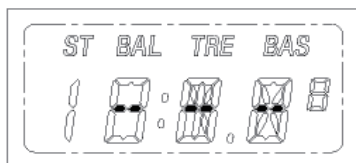
A folder in the USB memory can be changed to another one to play MP3 files.

The numbers are also allocated to folders not including tracks capable of playing, so that during changing the folder forward/backward, sometimes the number is skipped.

Moreover, the root is F00.



Folder number of 100 or after is displayed as "---"



(In case of iPhone/iPod)

An album can be changed forward/backward.

However, depending on the type of the iPhone/iPod connected, the track change may occur.

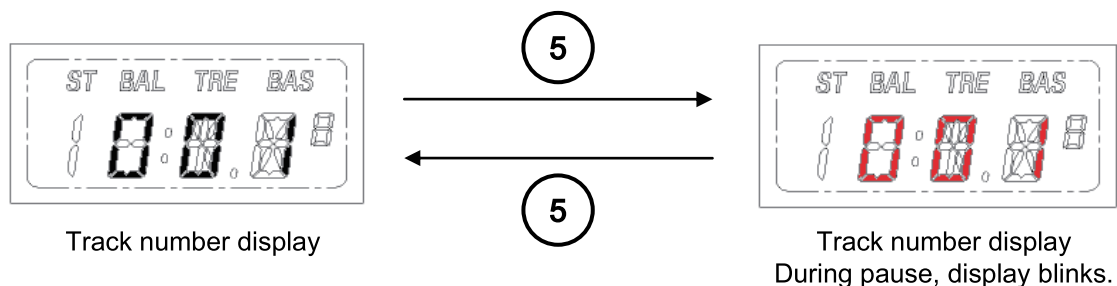
(Depending on the type of the iPhone/iPod)

[7. OPTIONAL EQUIPMENT]

PAUSE (USB AND BT-AUDIO)

While the USB memory or BT-Audio is being played, press [PRESET 5] to pause the track.
By pressing [PRESET 5] again, the track starts playing.

(In case of USB)



(In case of BT-Audio)

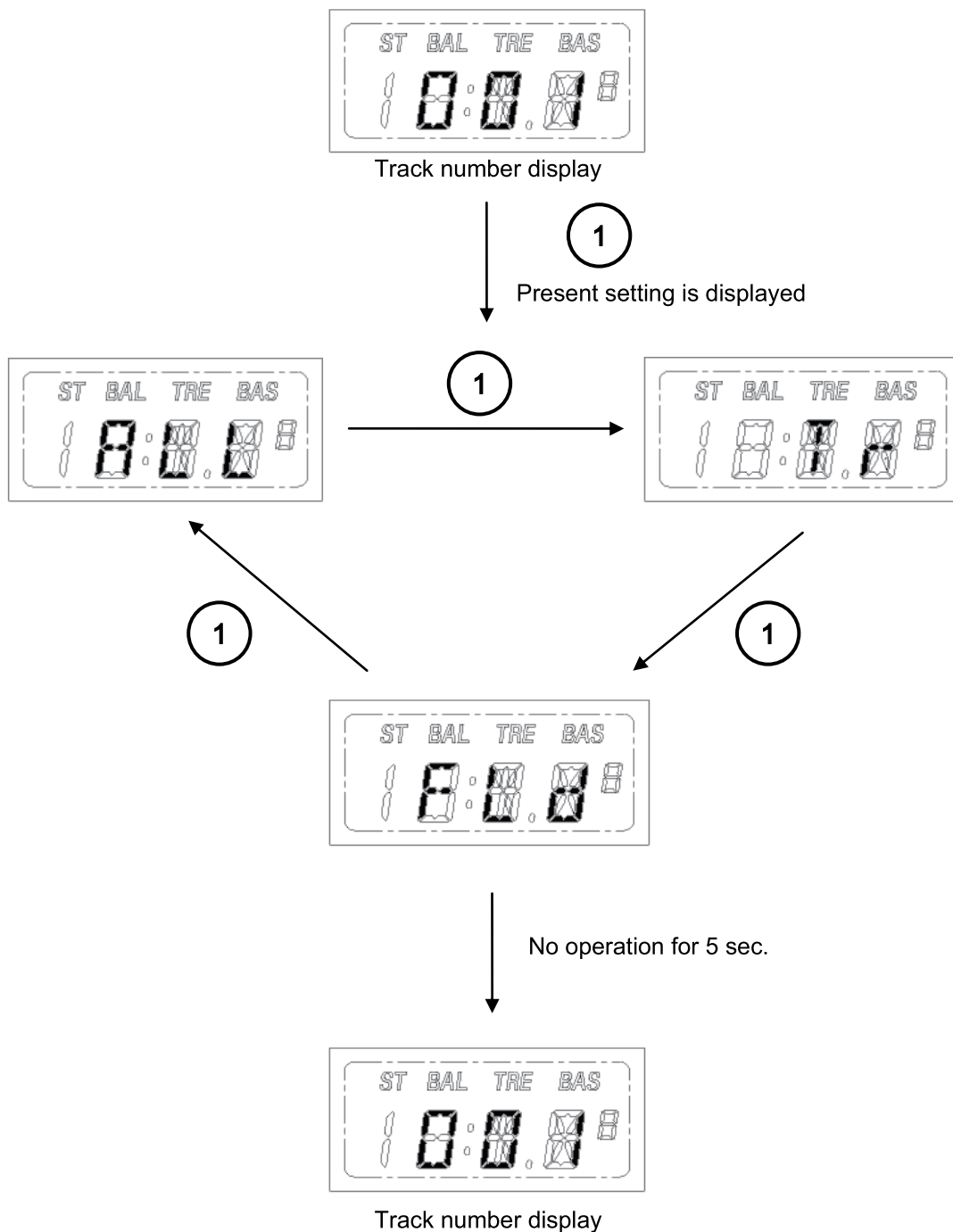
Due to the Bluetooth device limitation, during pause, the display does not blink.

REPEAT (USB)

While the USB memory is being played, press [PRESET 1] to display the present setting.
Then, by pressing [PRESET 1], the setting is changed.

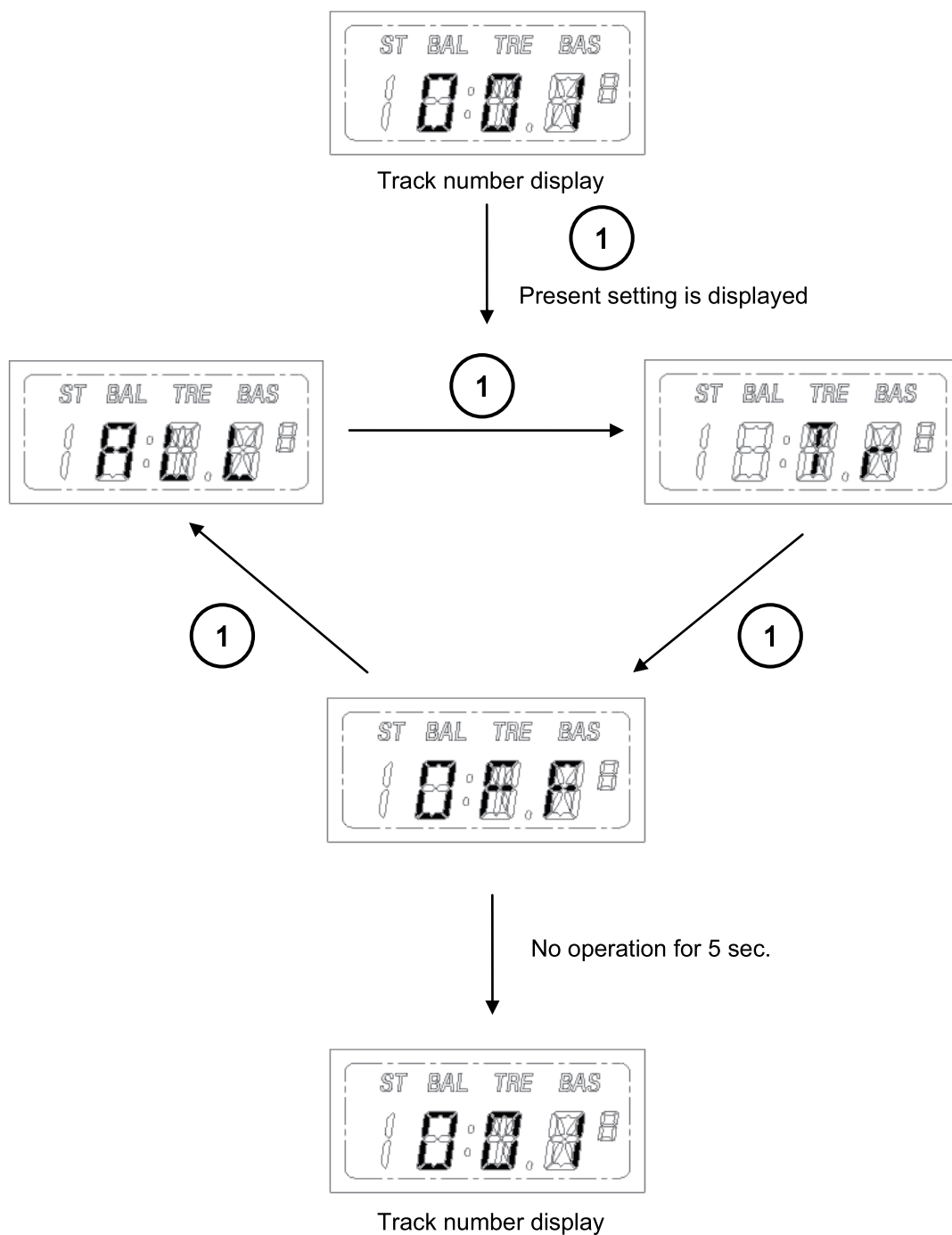
As for the setting of repeat and random, the last setting is effective.

(In case of USB memory)



[7. OPTIONAL EQUIPMENT]

(In case of iPhone/iPod)



According to the iPhone/iPod, the order of change is different.
Also, the display and the actual setting may be different.

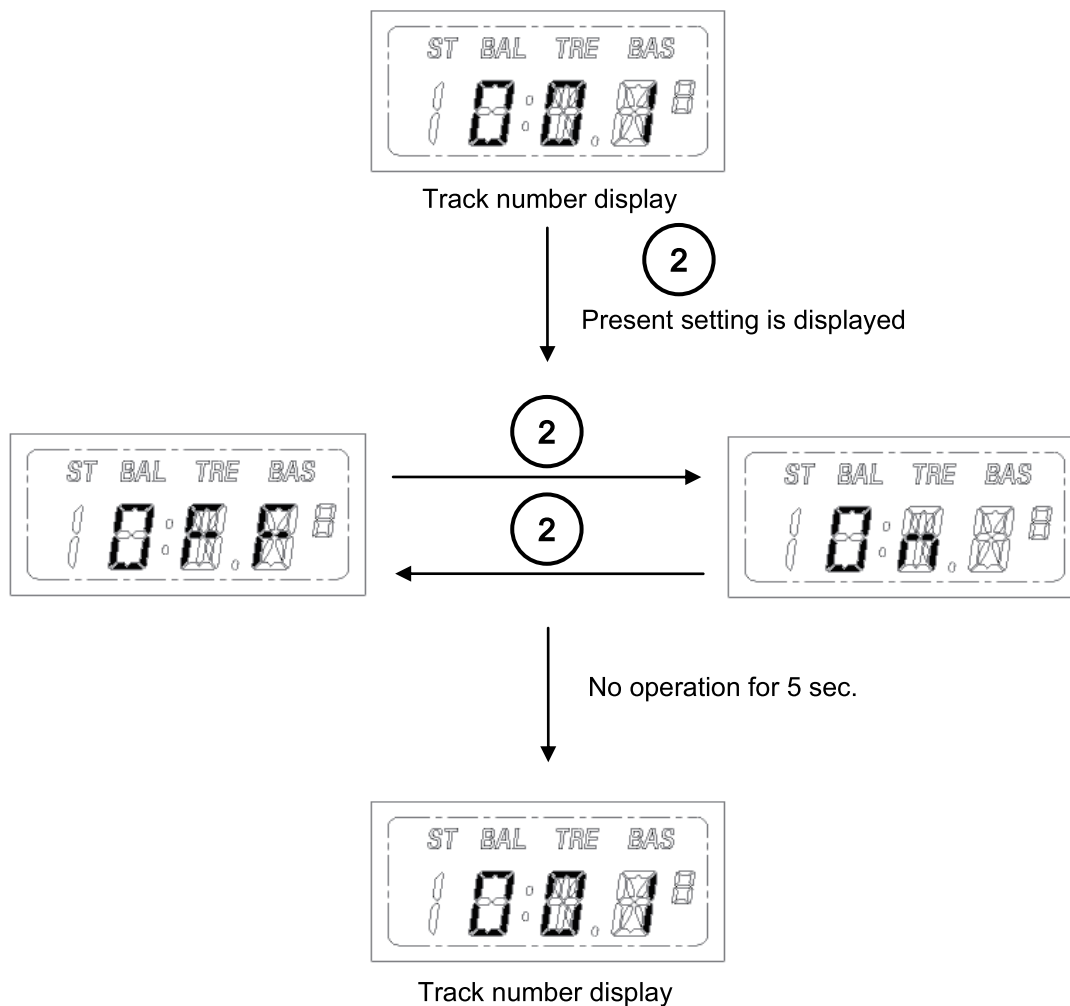
RANDOM (USB)

While the USB memory is being played, press [PRESET 2] to display the present setting.
Then, by pressing [PRESET 2], the setting is changed.

The range of the track being played ± 128 track files in the sorted order is played randomly.

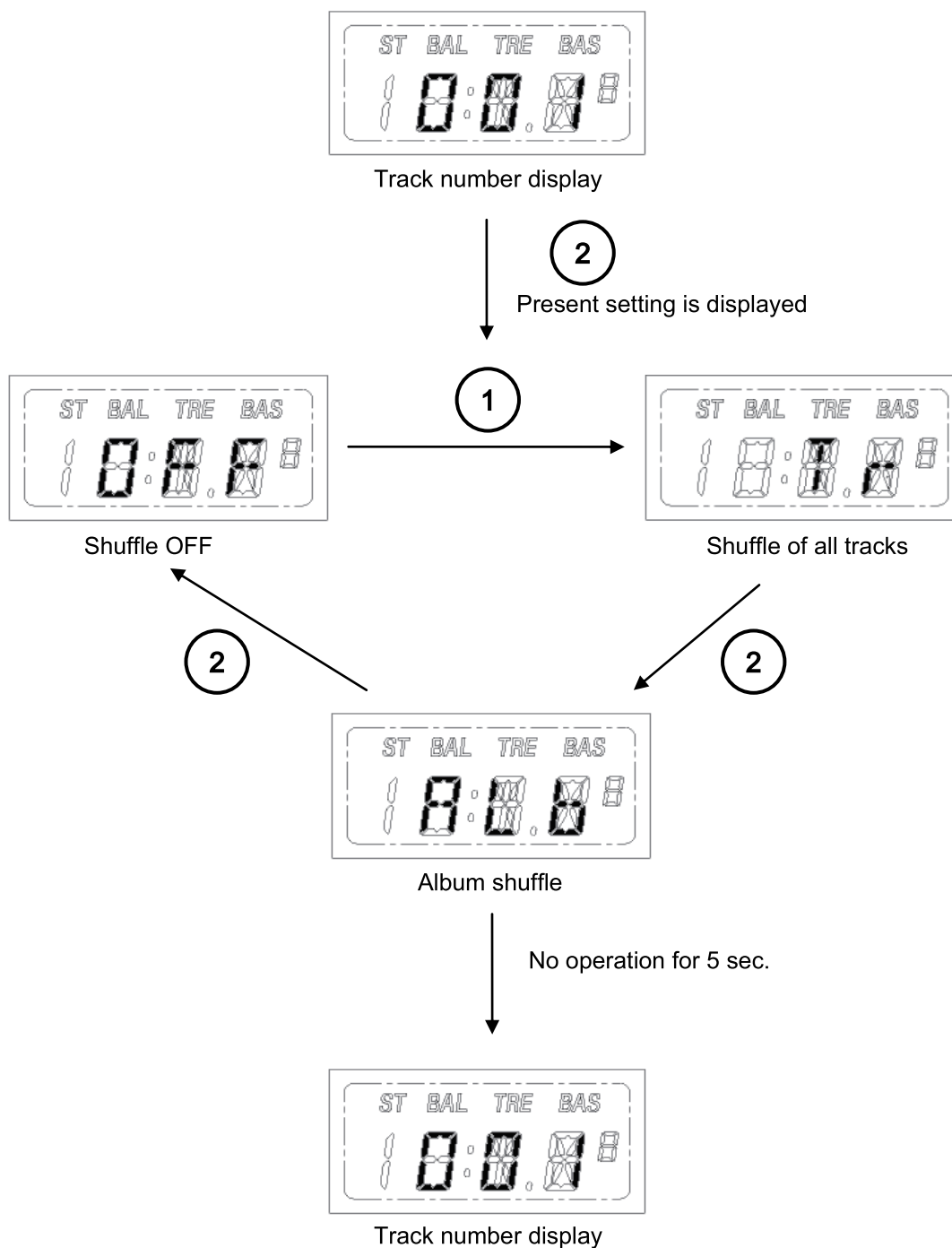
As for the setting of repeat and random, the last setting is effective.

(In case of USB memory)



[7. OPTIONAL EQUIPMENT]

(In case of iPhone/iPod)



Depending on the type of the iPhone/iPod connected, the album shuffle is not available.
(Depending on the type of the iPhone/iPod)

7.9.9 VOLUME CONTROL

If [VOL +] key is pressed under the on-air (normal) condition, the volume level is increased by 1 step.

The setting range is 0 to 32 steps.

Pressing and holding the key makes the volume increase consecutively.

By pressing [VOL -] key, the volume level is decreased by 1 step.

Pressing and holding the key makes the volume decrease consecutively.

Approximately 1.0 sec. after the finish of the operation, the display returns to the on-air condition.

As for the volume level, at the status of radio (AM/FM1/FM2), AUX, USB, and Bluetooth Audio, it is controlled respectively.

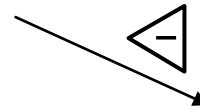
{As for "SOUND ADJUSTMENT" (TRE, BAS, BAL) described below, the radio, AUX, USB, and Bluetooth Audio are set commonly.}

{In case that selected band is FM1 (sound level of 11)}



Frequency display

(When stereo sound is received, "ST" pict turns on)



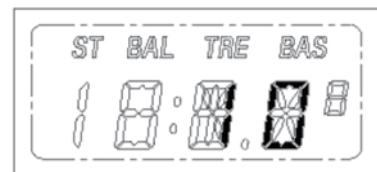
Volume level display



(Pressed and held)



Volume level display



Volume level display



(Pressed and held)



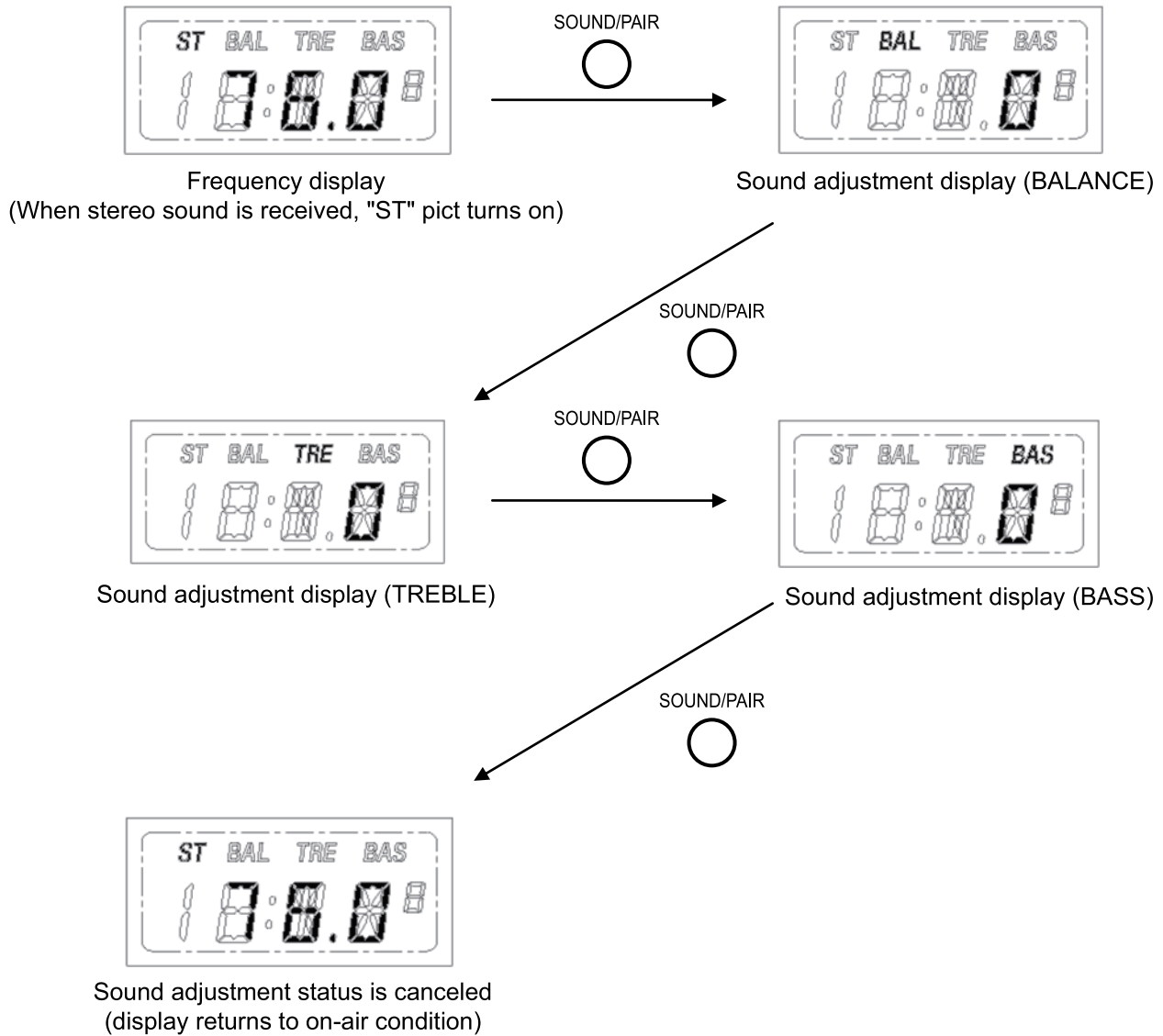
Volume level display

7.9.10 SOUND ADJUSTMENT

SOUND ADJUSTMENT

With the radio component in the on-air (normal) condition, press [SOUND/PAIR] key to enter the sound adjustment. By pressing [SOUND/PAIR] key repeatedly, the adjustment item is switched through BAL→TRE→BAS. With the radio component in the BAS condition, by pressing [SOUND/PAIR] key, the sound adjustment status is canceled and the display returns to the on-air condition.

(In case that selected band is FM1)

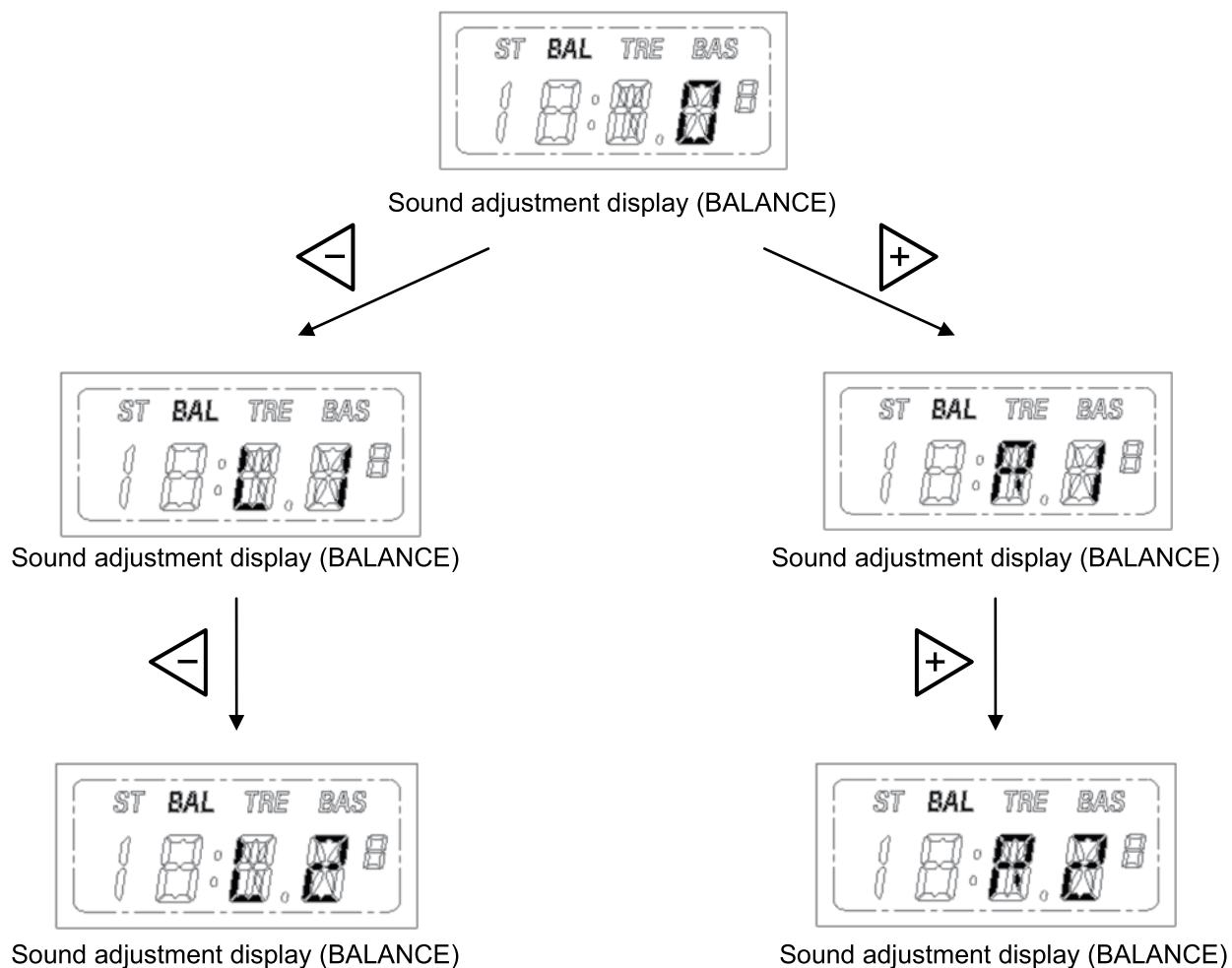


SOUND ADJUSTMENT (BALANCE)

With the radio component in the sound adjustment (balance) condition, press [UP] key to increase the speaker output by 1 step towards the R output.

Press [DOWN] key to increase the speaker output by 1 step towards the L output.

The setting range is L7 to R7 regarding 0 as the center. (L7 - 0 - R7)



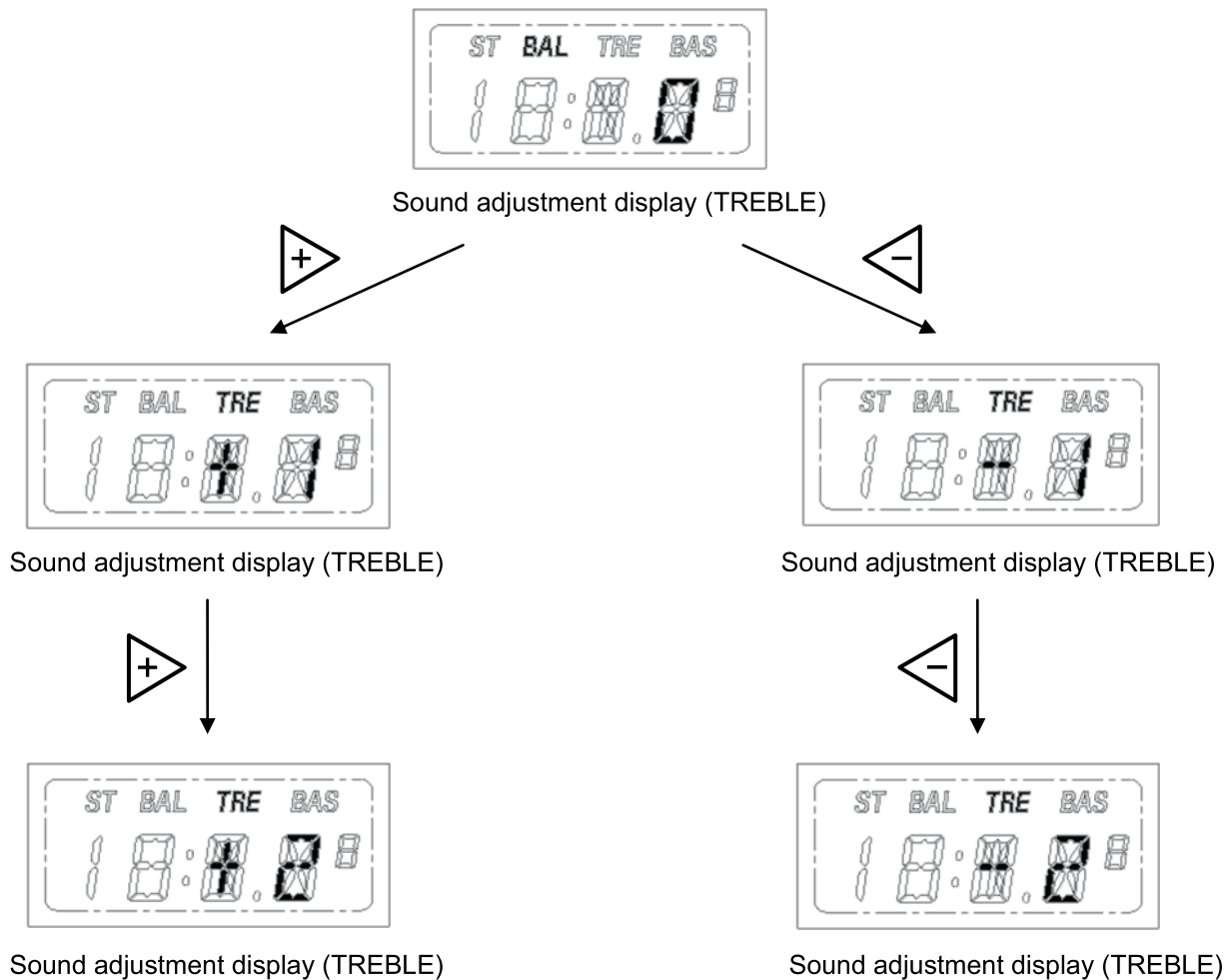
[7. OPTIONAL EQUIPMENT]

SOUND ADJUSTMENT (TREBLE)

With the radio component in the sound adjustment (treble) condition, press [UP] key to increase the treble level by 1 step.

Press [DOWN] key to decrease the treble level by 1 step.

The setting range is -7 to +7 regarding 0 as the center. (-7 - 0 - +7)

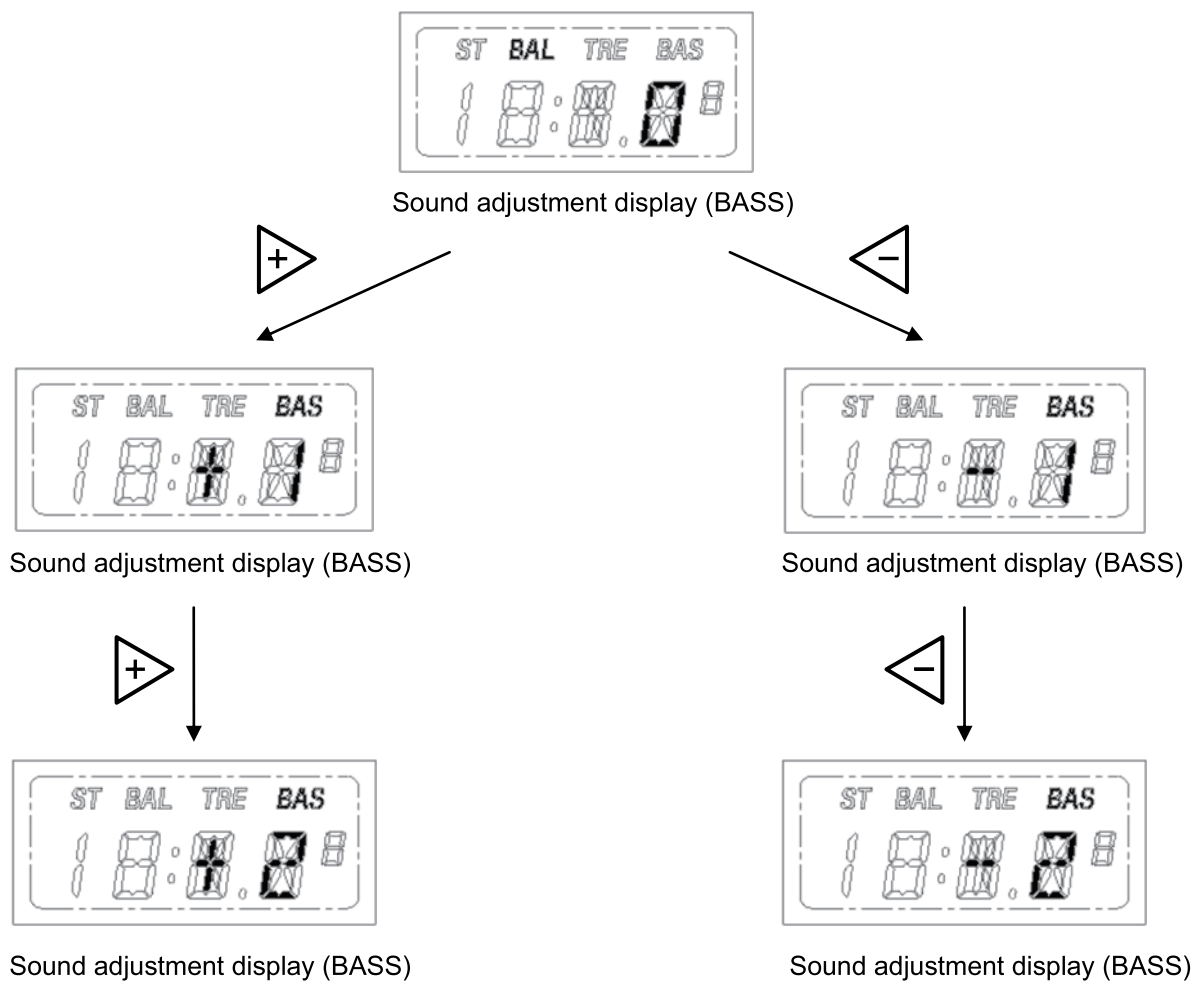


SOUND ADJUSTMENT (BASS)

With the radio component in the sound adjustment (bass) condition, press [UP] key to increase the bass level by 1 step.

Press [DOWN] key to decrease the bass level by 1 step.

The setting range is -7 to +7 regarding 0 as the center. (-7 - 0 to - 7)



7.9.11 CLOCK ADJUSTMENT

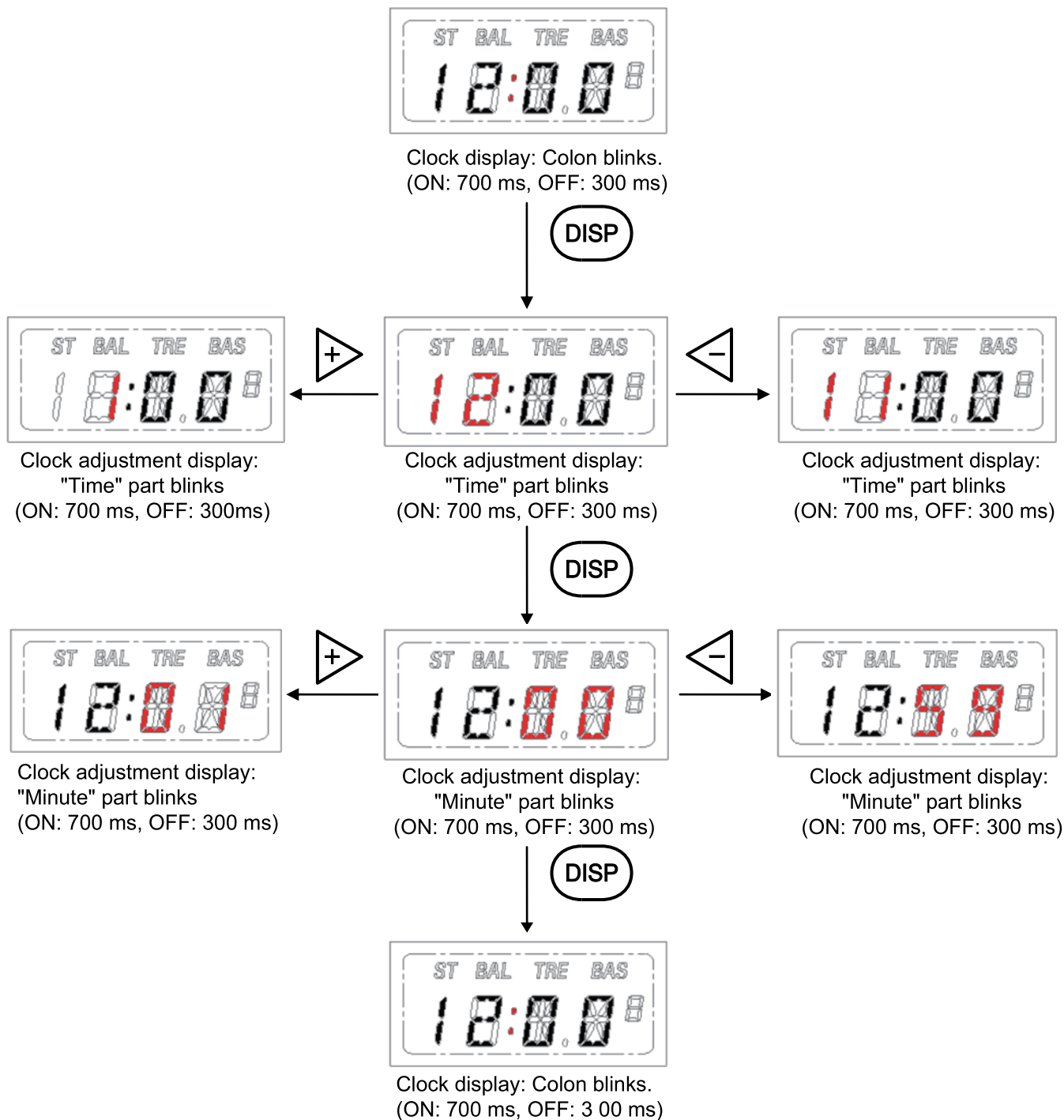
With the radio component in the clock display condition, press [DISP] key to enter the clock adjustment.

In the clock adjustment, by pressing [DISP] key, the adjustment target changes from time to minute (the adjustment target blinks). Then press [UP] or [DOWN] key to adjust time and minute respectively.

With the radio component in the minute adjustment condition, by pressing [DISP] key, the clock adjustment status is canceled.

(From this time, the second counting starts internally.)

* The clock display is 12 hours display.



7.10 QUICK HITCH



HANDLING QUICK HITCH

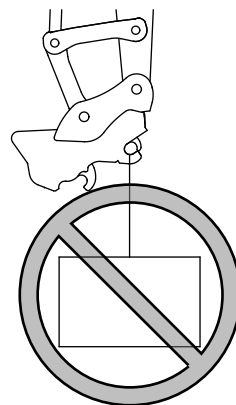
Regarding a quick hitch to be installed, use the quick hitch having an automatic mechanical locking mechanism such as a lock pin that will ensure the lock.

Because when the hydraulic pipes or electric wires are damaged, the hydraulic holding power will be lost, resulting in falling off of the front attachment.

7.10.1 PROHIBITED WORKS

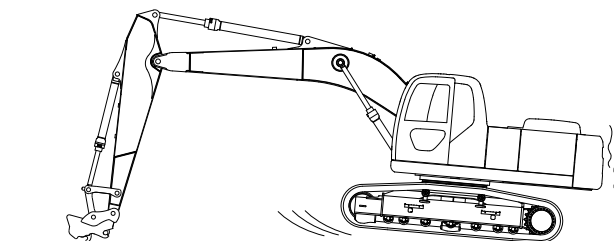
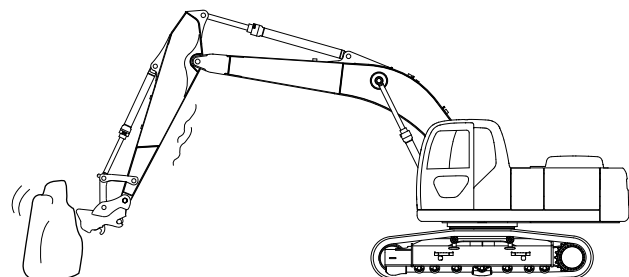
DO NOT PERFORM LIFTING WORK

Never perform any lifting work using the quick hitch. A lifted load may fall and cause serious accidents.



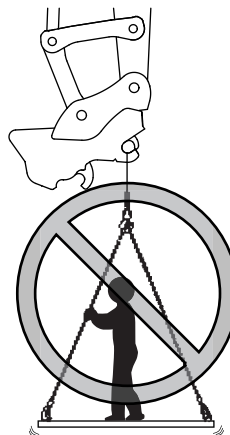
DO NOT WORK WITHOUT FRONT ATTACHMENT

Do not lift a load or the machine, when the front attachment is not installed. It may cause damage to the quick hitch.



DO NOT LIFT OR MOVE PERSONNEL

Never lift or move personnel by using the quick hitch.
The lifted personnel may fall off, causing severe accidents.



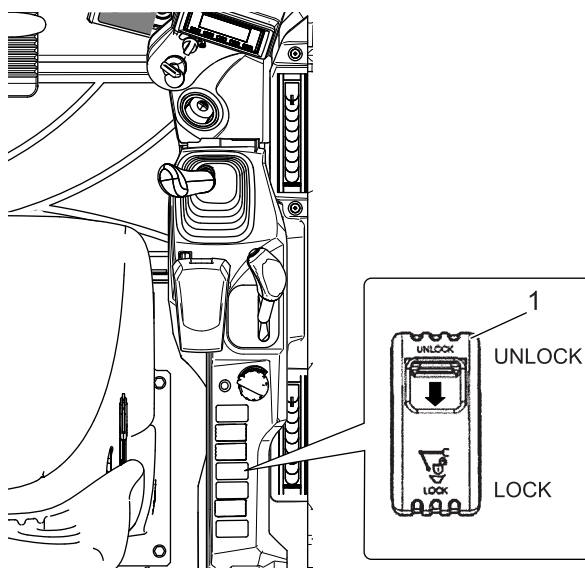
7.10.2 QUICK HITCH OPERATION SWITCH

Use this switch to install and remove the front attachment from the quick hitch.

Move sliding portion (1) of the switch to the direction of the arrow shown in the figure and then push the "LOCK" or "UNLOCK" side to switch the function.
If you release the switch, the switch automatically returns to the neutral position.

When the front attachment is installed, check that the operation switch is in the neutral position before starting the engine.

The table below shows that when the switch is slid left or right, which side of the front attachment the high pressure oil flows when seeing it from the inside of the cab.



Operation procedures	Oil flow
LOCK side	Left piping
UNLOCK side	Right piping

Notice

The alarm sound keeps going off while the "UNLOCK" or "LOCK" side of the quick hitch operation switch is being pushed.

7.10.3 PRECAUTIONS FOR USE

CHECK OPERATION & MAINTENANCE MANUAL OF QUICK HITCH

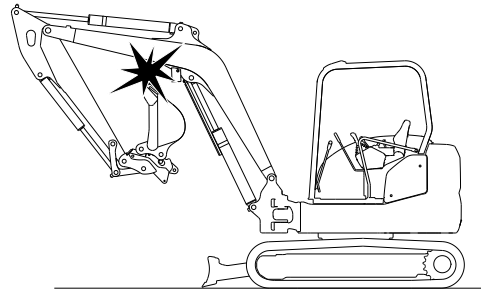
Before installing the quick hitch, carefully read the operation & maintenance manual of the quick hitch.

CHECK EFFECTS TO OPERATING RANGE AND LIFTING CAPACITIES

When the quick hitch is installed, the operating range and the lifting capacities will be changed. Also, according to the installed quick hitch or front attachment, it may interfere with the attachment/equipment or the base machine. Before starting work, check the operating range, and make sure that the total loads including the weight of the quick hitch, the front attachment, and a load to be handled do not exceed the maximum load described in the rated lift capacity chart inside the cab.

INTERFERENCE BY THE FRONT ATTACHMENT

When the quick hitch is installed, the operating range is different from when a usual front attachment is installed. Check for interference before operation.



HANDLING THE QUICK HITCH OPERATION SWITCH

When the front attachment is installed, make sure that the operation switch is in the "LOCK" side before starting the engine.

INSPECTION BEFORE OPERATION

Before operating the machine, check the installation part for engagement and looseness, and the pipes for oil leakage.

7.11 MULTI-CONTROL VALVE (ISO & BHL PATTERN)



SWITCHING THE MULTI-CONTROL VALVE

When switching the multi-control valve, be sure to stop the engine.

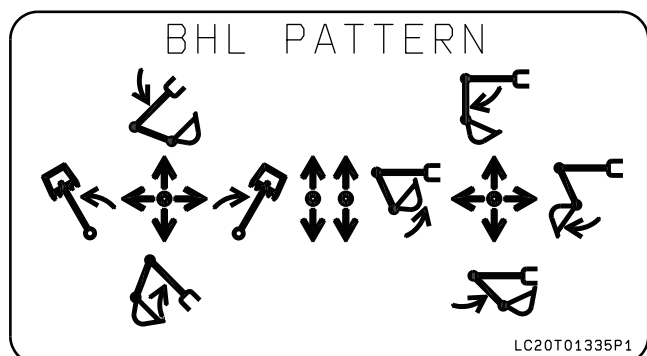
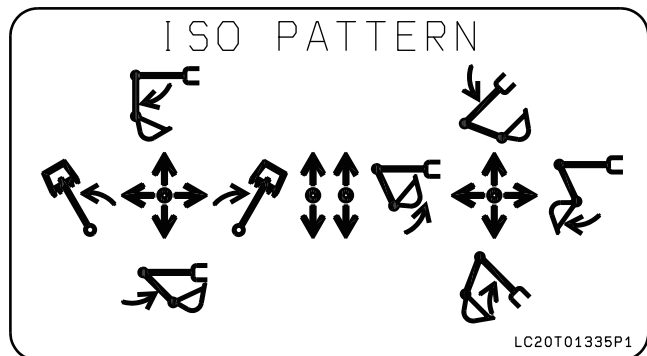
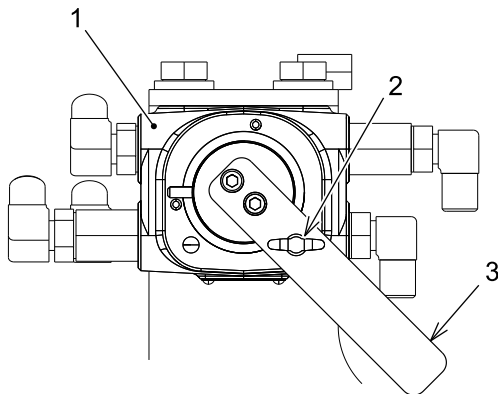


CHECKING THE CONTROL LEVER PATTERN

- If you do not check the control lever pattern before operation, it is dangerous because it may cause an unexpected machine movement. Be sure to check the movement of the machine at each control lever position before operation.
- If you operate the machine while the control pattern label in the cab does not match the actual machine movement, it could cause severe personal injury.
- Replace the control pattern label with a one matching the actual machine movement, or change the lever pattern of the rotary multi-control valve to match the control pattern label in the cab.



With the engine stopped, turn the lever to each control pattern position and then be sure to return it to the original control pattern position. Perform this procedure at least once in 500 hours in order to prevent sticking of the valve.



The control pattern of this machine can easily be switched between two types (ISO/BHL) by the lever of the rotary multi-control valve.

1. Set the machine in the parking position, stop the engine, and move the pilot control shut-off lever to the "LOCKED" position.
2. Open cover in the right side of the machine to access rotary multi-control valve (1).
3. Remove wing bolt (2), and switch lever (3) to the position of the desired control pattern.

4. Tighten wing bolt (2) to fix lever (3) after setting the control pattern. Firmly tighten wing bolt (2) by your fingers without tools.
5. Close cover.
6. Operate the attachment to make sure that the desired control lever pattern is selected.

8. SPECIAL PROCEDURES

8.1 SPECIAL PROCEDURES AT ENGINE FAILURE

- This chapter describes how to release the brakes of the travel motor and how to lower the attachment to the ground.
- These operations should be performed only by an experienced and trained operator who fully reads and understands this manual.

8.2 LOWERING ATTACHMENT OF DISABLED MACHINE



ABOUT LOWERING THE ATTACHMENT TO THE GROUND

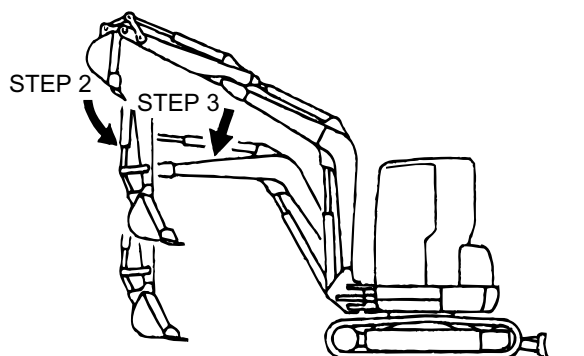
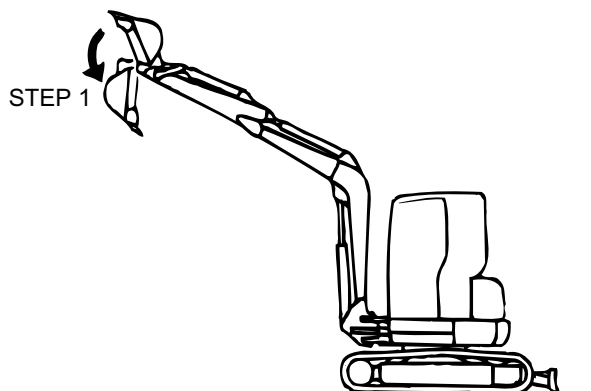
- The following procedure should be used only in case of machine failure. Always use extreme caution during operations. Keep other persons away from the bucket, attachment and boom.
- The bucket or attachment can move unexpectedly during operations due to weight of the bucket, attachment, arm or boom.
- Keep away from the space under the bucket or attachment when lowering the bucket or attachment.



In cases where the machine fails and the engine stops, lower the attachment by using the procedure described below.

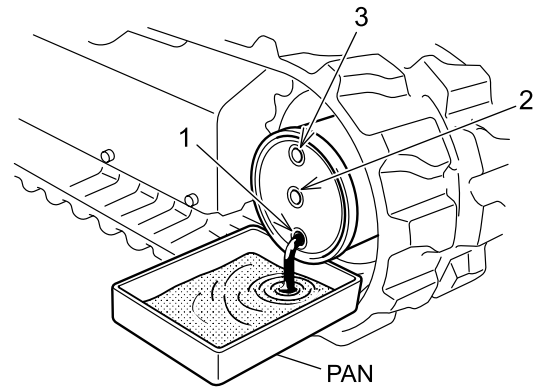
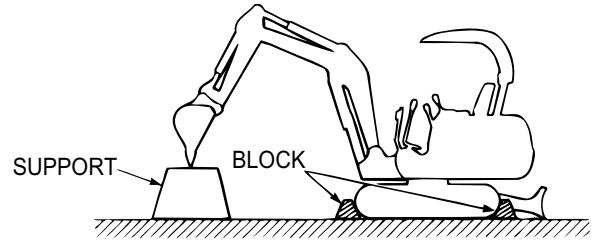
The steps 1 to 6 should be completed in five minutes after the engine stops because the accumulator pressure gradually falls to disable the operation of lowering the attachment.

1. Move the control lock lever to the "LOCKED" position.
2. Turn the starter key switch to the "OFF" position.
3. Make sure all control levers are set to their "NEUTRAL" positions.
4. Turn the starter key switch to the "ON" position.
5. Move the pilot control shut-off lever to the "UNLOCKED" position.
6. Use the left and right control levers to lower the attachment slowly until it touches the ground.
STEP 1 : Bucket down
STEP 2 : Arm down
STEP 3 : Boom down
7. Contact your KOBELCO authorized dealer for repair.

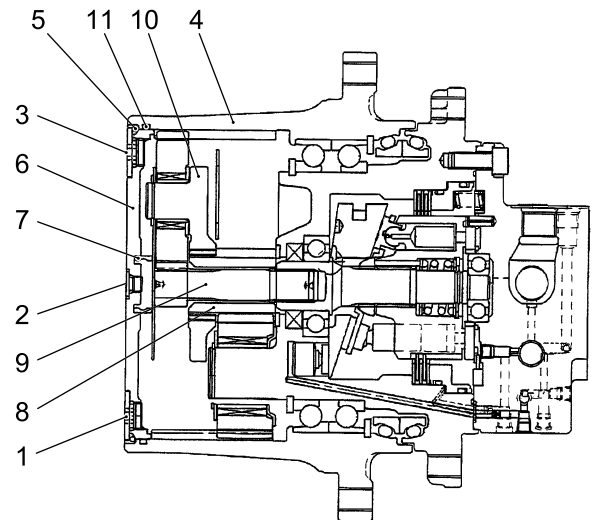


8.3 RELEASING TRAVEL MOTOR BRAKES

1. Chock at front and rear of each crawler to prevent the machine from moving before releasing brakes.
2. See "LOWERING ATTACHMENT OF DISABLED MACHINE" in Chapter 9 to lower the attachment to the ground.
3. Turn the starter key switch "OFF" to stop the engine.
4. Remove drain plug (1), level plug (2) and fill plug (3) to drain oil in a container.



5. Put a flat-head screwdriver into the cutout of body (4) to remove snap ring (5).
6. Remove cover (6) and slide ring (7).
7. Remove O-ring (11), carrier kit (10), S1 gear (8) and S2 gear (9).



CAUTION

- Be careful not to damage the lip of cover (6). It might cause oil leaks.
- Be careful not to damage removed parts during storage.

8. Install O-ring (11), cover (6) and snap ring (5) on body (4), and attach drain plug (1), level plug (2) and fill plug (3).
9. See "CHANGE OIL IN TRAVEL REDUCTION UNITS" in Chapter 4 to fill oil in the travel reduction units.
10. Move the machine to a safe place and repair it.
11. After completing repair, reinstall the removed parts in the reverse procedure.
See Chapter 4 "CHANGE OIL IN TRAVEL REDUCTION UNITS" to fill oil in the travel reduction units.