

OPERATION MANUAL

SK135SR-7 SK140SR_{LC}-7

APPLICABLE No.

SK135SR-7 YY09045001~

SK140SR_{LC}-7 YY09045001~



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

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Destination : ANZ

Symbol mark comparison list

© In some machines in use, the symbol marks may have been changed according to the revision of the ISO standard.

Check your machine's symbol marks referring to the symbol mark comparison list below because some symbol marks in your machine and the symbol marks in the instruction manual may not be corresponding to each other.

















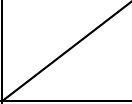


		Symbol in instruction manual	Symbol on machine
SWITCH DISPLAY	WIPER		
	WINDOW WASHER		
	CAMERA		
	BUZZER STOP		
	CLOCK		
	FUEL CONSUMPTION	L/H	
	ECO		
	MAINTENANCE TIME		
	BRIGHTNESS		
	HOME SCREEN CHANGE		
	RETURN		
	STARTING PASSWORD		
	LANGUAGE SWITCH		
	SETTING		
CABIN WORK LIGHT			
AUTOMATIC ENGINE SPEED REDUCTION			
















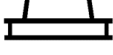





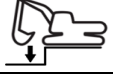


		Symbol in instruction manual	Symbol on machine
MAINTENANCE	FUEL FILTER		
	ENGINE OIL FILTER		
	HYDRAULIC OIL FILTER		
	AIR BREATHER FILTER		
	AIR CLEANER FILTER		
	COOLING WATER		
	TRANSMISSION OIL		
	GREASE		
	DECREASED ENGINE PERFORMANCE		
	AIR CONDITIONER	AUTO	AUTO
A/C AIR CONDITIONER		A/C	
OUTSIDE AIR INTRODUCTION			
INTERIOR AIR RECIRCULATION			
DEFROSTER			
FAN		FAN	
TEMP		TEMP	

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		Symbol in instruction manual	Symbol on machine
CAB	UNLOCK		
	START KEY OFF	OFF	
	START KEY ACCESSORY	ACC	
	START KEY ON	ON	
	START KEY START	START	
	ACCELERATOR LOW	LO	
	ACCELERATOR HIGH	HI	
	SLEWING LEFT		
	SLEWING RIGHT		
	EXIT		
GRIP	BOOST		
	CANCEL ANTI-INTERFERENCE		
	CABIN ANTI-INTERFERENCE		

		Symbol in instruction manual	Symbol on machine	
WORKING MODE	DIGGING			
	HAMMER			
	CRUSHER			
	THUMB BUCKET			
	PROCESSOR			
	TILT BUCKET			
	GRAPPLE			
	MAGNET			
	OTHER	HEAVY LIFT		
		OVERLOAD ALARM		
HEIGHT/DEPTH DISPLAY				
COUNTERWEIGHT REMOVAL				

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IMPORTANT INFORMATION

PREFACE

- This operating manual is provided for the safe and effective use of the machine.
- Before operating the machine, be sure to read this manual and understand this machine's operation, inspection and maintenance procedures fully. Make sure that you understand the performance of the machine and its attachments/equipment, and pay adequate attention to your surroundings.
- Improper use of the machine without due consideration for the advice in this manual could result in serious injury or death, or significant damage to the machine.



WARNING

Use of this machine and this manual

- Carelessness in operation, inspection, refueling, maintenance and repair of this machine may result in serious injury or death, or significant damage to the machine.
- If a license or other special qualification is required to operate a hydraulic excavator in the country where this machine is operated, any operators of the machine must meet the requirements and have an appropriate license or qualification that is both valid and current.
- Read and understand this manual thoroughly before operation, inspection, maintenance or repair of this machine.
 - Setup, maintenance in the event of machine faults, and waste disposal are defined as operation-related work.
 - Lubricant maintenance, inspection and repairs are defined as maintenance-related work.
 - Loading and unloading the machine is defined as transportation-related work.
- For machines equipped with attachments approved by KOBELCO, read all separate manuals for the special attachments as well as the items in this manual relating to attachments. Use of unapproved attachment/equipment voids KOBELCO's liability for the machine.
- Store this manual in the machine.
- In the event that this manual is lost or damaged or no longer legible, please order another manual from your KOBELCO authorized dealer.
- When transferring ownership of the machine, ensure that the new owner receives this manual.
- This manual provides instructions on the premise that genuine KOBELCO parts are used. Do not use non-genuine KOBELCO parts.
- We cannot predict all operation, inspection and maintenance hazards in any environment. Accordingly, the warnings displayed on the machine and written in this manual do not cover all possible safety-related matters. Therefore, when "operation, inspection, or maintenance" is performed using procedures or work methods not described in this manual, it is the responsibility of the user to conduct a risk assessment and take safety measures for himself and those around the user.

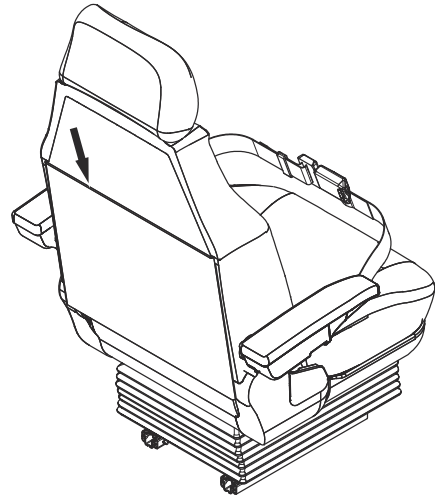
Even in such cases, do not perform any of the work or operations prohibited in this manual.

- Information, specifications and illustrations in this manual are based on information obtained when creating this manual. Specifications, torque, pressure, dimensions, adjustments, illustrations and other details may change without notice if improvements are required. The latest information can be obtained from your KOBELCO authorized dealer.
- Contact your KOBELCO authorized dealer if anything is unclear about the machine, if there are any faults or missing parts, or if you have noticed anything concerning.
- The machines we provide meet the rules and regulations and standards of the country in which the first owner will use the machine. If this machine is purchased in another country or is purchased from a person or company in another country, the safety specifications may no longer apply or the device may not meet the safety standards of the country in which you intend to use it. Contact your KOBELCO authorized dealer to confirm whether or not the specifications of this machine meet the rules and regulations and standards of the country in which it will be used.

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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 rear side of the operator's seat. 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

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 is extremely dangerous and may cause personal injury.

Before operating the machine or carrying out inspection and maintenance, read this manual and related manuals thoroughly and ensure that you understand all the machine's features and controls well.

- Only allow trained, experienced personnel to operate the machine and carry out inspection and maintenance on it.

Such individuals must have appropriate qualifications if required by governments or municipalities, and must strictly comply with all rules and regulations that apply to the work and work site.

Safety Warning Symbol



This safety warning symbol identifies important safety messages in this manual.

When you see this symbol, be alert, as your safety is involved. Carefully read the message that follows, and inform other operators.

The safety messages in this manual and on labels attached to the machine use the following signal words to differentiate the level of danger presented by particular hazards. The safety messages contain advice on avoiding these hazards.

The presence of any of the following three signal words "DANGER", "WARNING" and "CAUTION" indicate the existence of a hazard and identify the relative severity of the hazard.

"DANGER" is used to mark the most serious and dangerous hazards. "WARNING" is used for hazards of a less serious nature than those marked with "DANGER".



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



"WARNING" indicates a hazardous situation that carries a high risk of death or serious injury.



"CAUTION" indicates a hazardous situation that carries a risk of minor injury or moderate impairment.

In addition to the above signal words, the following words identify matters that must be observed for the protection of the machine and information that may be helpful to the operator.



"NOTICE" indicates important information that does not pose a threat of personal injury.
(For example: Messages related to property damage)



"NOTE" indicates information that may be helpful to the operator.

SAFETY LABELS

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

EXAMPLE OF SAFETY LABEL WITH TEXT

Safety labels with text are used to alert the operator and other nearby personnel of potentially hazardous situations.

On safety labels with text, a pictorial representation of the hazard appears at the top, with written information about how to avoid the hazard appearing underneath.



EXAMPLE OF PICTORIAL SAFETY LABEL

Pictorial safety labels are used to alert the operator and other nearby personnel of potentially hazardous situations.

On pictorial safety labels, a pictorial representation of the hazard appears at the top or on the left, with a second pictorial representing how to avoid the hazard appearing at the bottom or on the right.



SUMMARY OF THE MACHINE

APPLICABLE WORKS

Use this machine in the following applications:

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

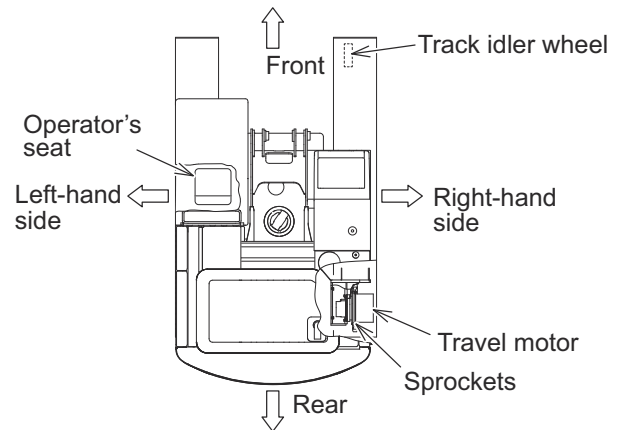
Never use the machine for any purpose other than the above applications.

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" in Chapter 3 and "OPTIONAL EQUIPMENT" in Chapter 8.

FRONT, REAR, RIGHT & LEFT OF THE MACHINE

This manual refers to the front, rear, right & left of this machine as seen when sitting in the operator's seat with the machine in the normal travel position. The normal travel position is when the idler wheels are positioned at the front under the cab and the drive sprockets are positioned at the rear.



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.

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:

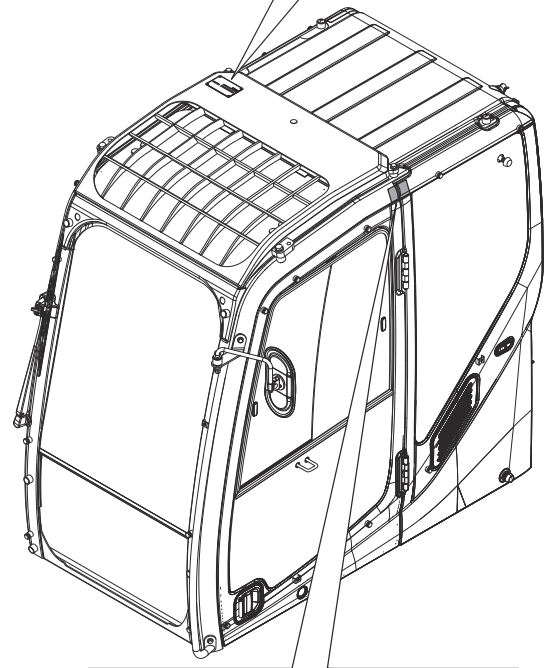
- Receive training in the proper operation of this machine;
- Understand the capabilities and limitations of this machine;
- Become familiar with the construction of this machine and the hazards involved based on training and experience;
- Confirm that the machine is properly maintained and is in good 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) and top guard. The ROPS and top guard, 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.

OPERATOR PROTECTIVE GUARDS CERTIFICATION	
This structure is tested and meets the requirements of TOP GUARD-LEVEL(II), ISO 10262:1998.	
PRODUCT IDENTIFICATION NUMBER	MACHINE MODEL
SERIAL No.	
WARNING -The modification and rework causing the deterioration of the strength are not allowed. -Don't use the parts other than the specified parts.	
PRODUCED BY KOBELCO CONSTRUCTION MACHINERY CO., LTD. TOKYO, JAPAN.	
YY20T0399P2	



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(II), ISO 10262:1998.	
PRODUCT IDENTIFICATION NUMBER	MACHINE MODEL
SERIAL No.	MAX. MASS(kg)
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 skylight is open, the cab doesn't comply with TOP GUARD Level (II).	
PRODUCED BY KOBELCO CONSTRUCTION MACHINERY CO., LTD. TOKYO, JAPAN.	
YY20T0399P3	

DO NOT MODIFY ENGINE

Never modify the engine. Any modification done to a certified engine will invalidate the certification.

Never modify the EGR, the sensors, or the turbocharger.

DO NOT MODIFY ENGINE AIR INTAKE AND EXHAUST SYSTEMS

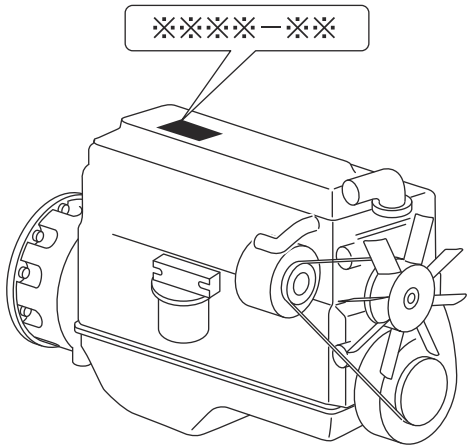
- Doing so may result in violation of the emissions control regulations of the country in which the machine is being used. Never modify the engine's air intake, exhaust or related systems.
- Other than the addition or improvement of filters on the engine's air intake system or similar modifications, any changes to the exhaust, fuel, electrical, cooling or similar systems may adversely affect the emission control system and degrade its performance.

ORDERING PARTS AND SERVICE

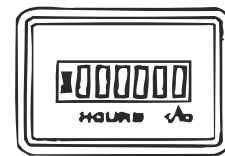
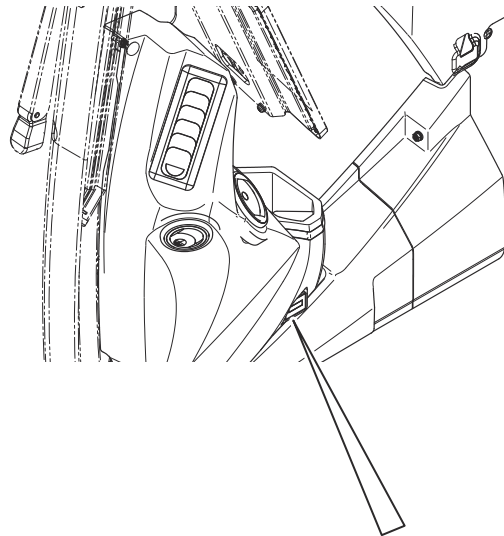
When ordering parts and service, have the machine serial number, the engine serial number and the current hours of operation available for your KOBELCO authorized dealer.

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.

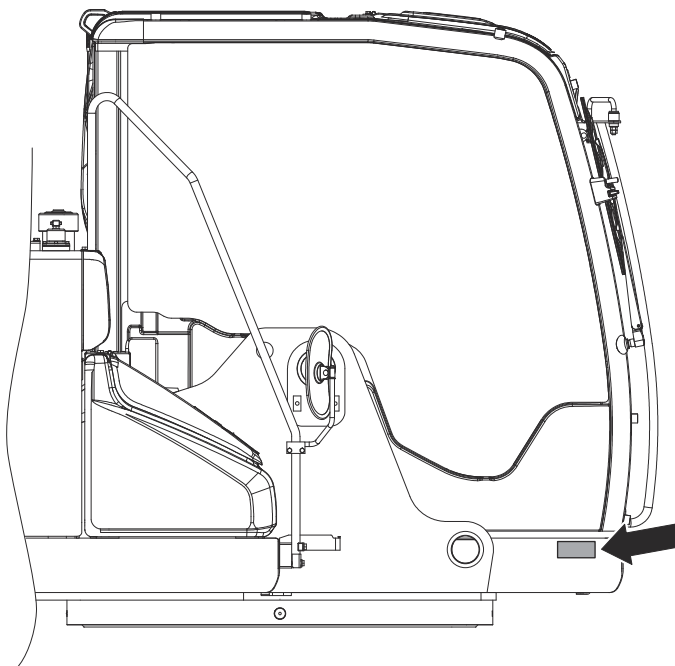
MACHINE TYPE	MACHINE SERIAL No.	ENGINE SERIAL No.	HOUR METER



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



HOUR METER



POSITION OF MACHINE SERIAL No. AND MACHINE TYPE

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.

NOTES

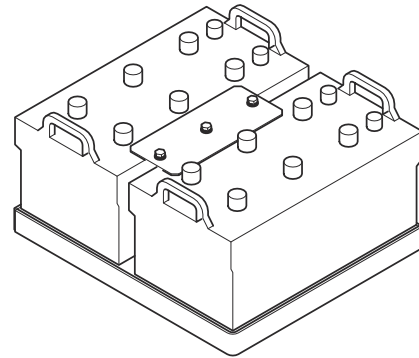
To illustrate details, some illustrations in this manual may show the machine or components with guards, doors, safety covers, and other items removed. When operating the machine, be sure to reinstall such covers and other items and operate the machine according to this manual. Failure to do so can cause a serious accident resulting in injury or death or damage to important machine components or other items.

Shapes and specifications of the machine shown in some illustrations may slightly differ from those of the machine.

If in doubt, contact your KOBELCO authorized dealer.

Example

This illustration shows the battery with the cover removed.



1 SAFETY INSTRUCTIONS

1.1 SAFETY LABELS & DECALS



Read operating manual.

Read, understand and abide by the safety notes and instructions in this manual. Improper use of the machine without due consideration for the advice in this manual could result in serious injury or death, or significant damage to the machine.

Safety messages

Safety labels are affixed to the machine to alert the operator and surrounding personnel of hazardous situations during operation, inspection or maintenance. This section contains descriptions of the locations of safety labels and the dangers involved.

Make sure to read and understand this manual and the precautions indicated by all labels attached to this machine.

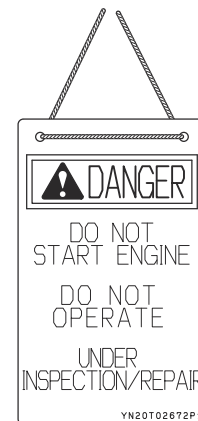
1.1.1 ALWAYS MAKE SURE ALL OF THE SAFETY LABELS ARE LEGIBLE AND NOT DAMAGED

- 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.

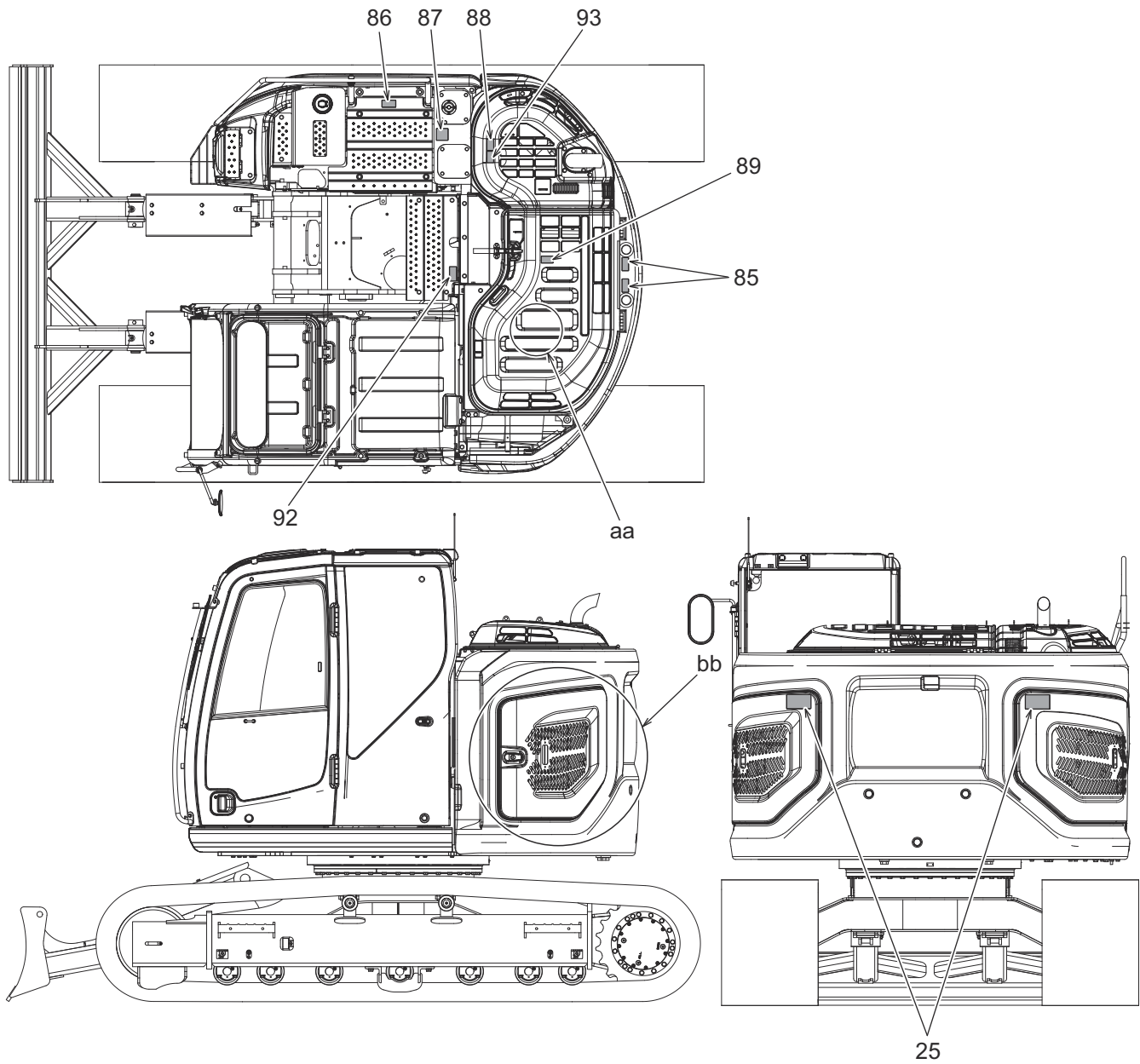
1.1.2 "DO NOT OPERATE" TAG

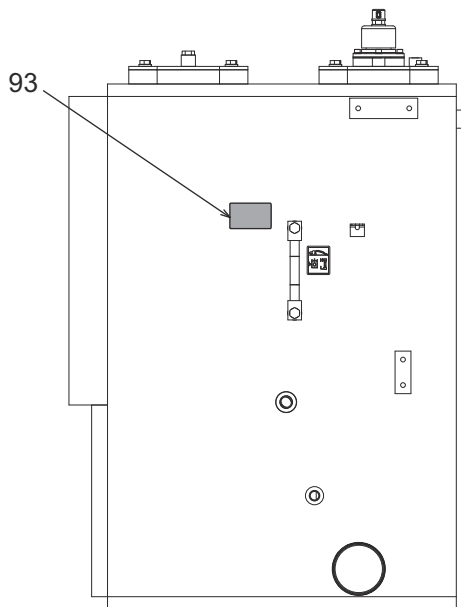
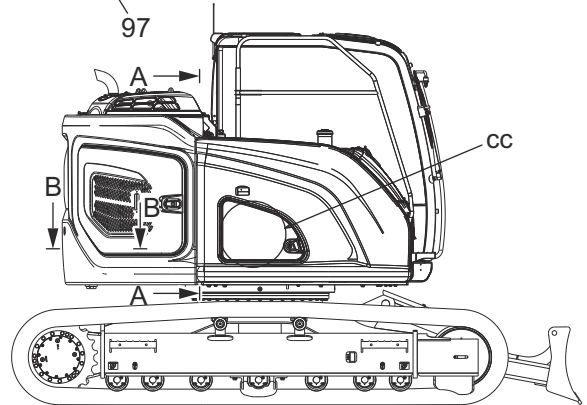
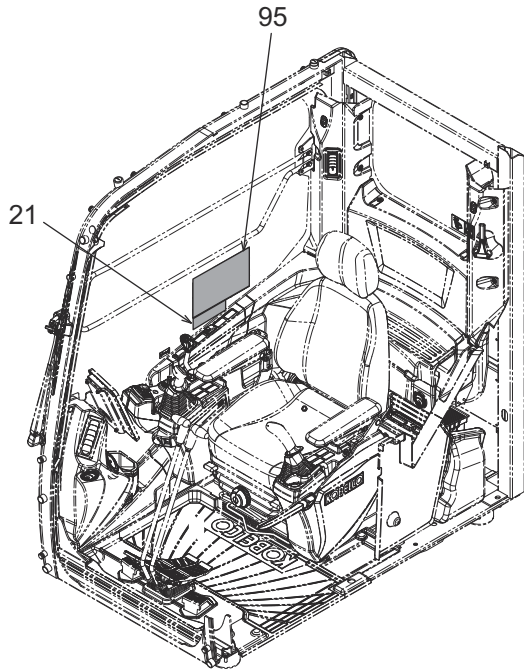
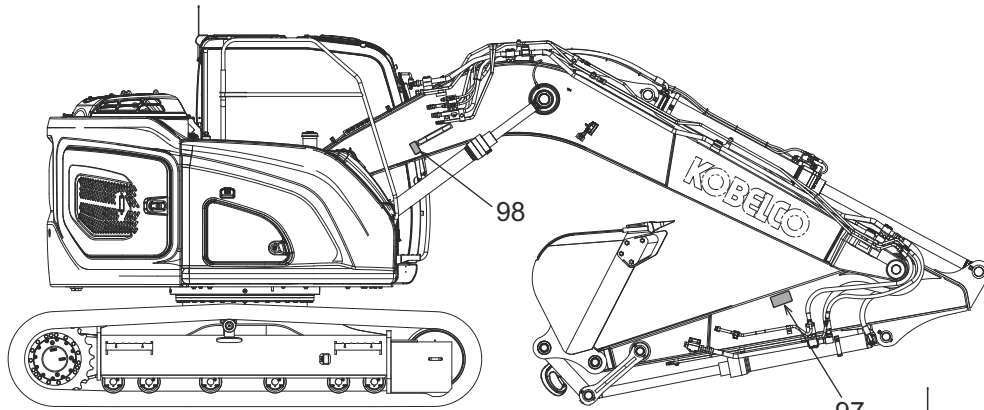
Part Number: YN20T02672P1

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.

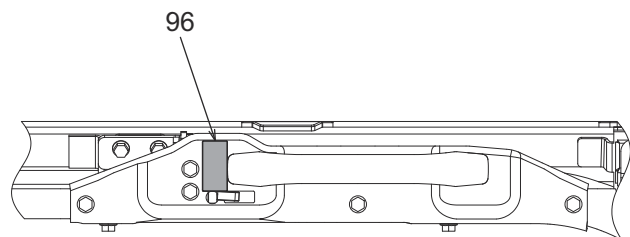
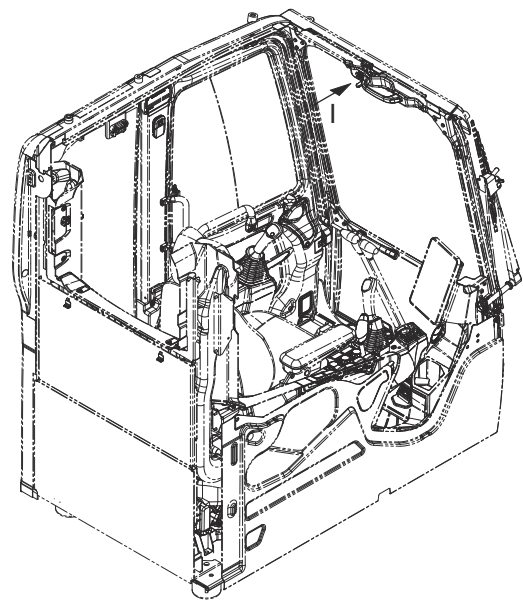


1.1.3 LOCATIONS OF SAFETY LABELS

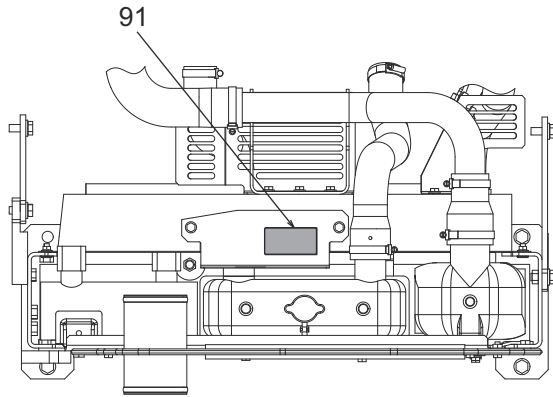




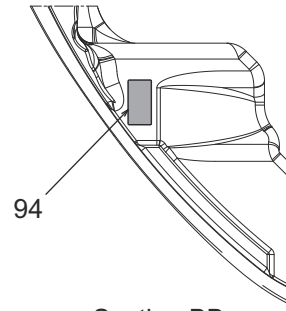
Section AA



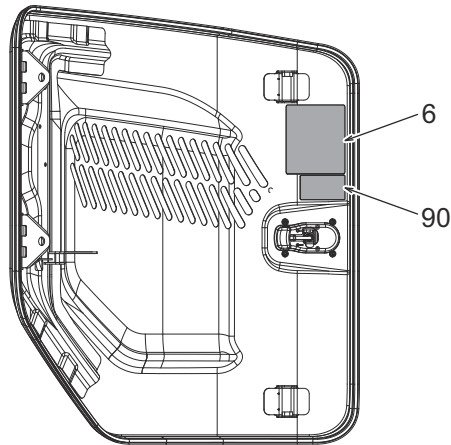
View I



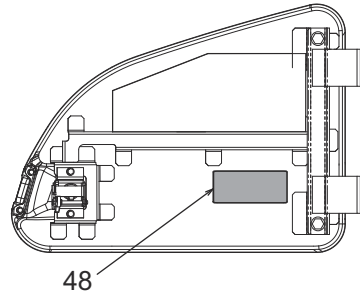
Details aa
Shows inside panel



Section BB



Details bb
Shows back of panel



Details cc
Shows back of panel

1.1.4 SAFETY LABELS & DECALS

HANDLING QUICK HITCH

Attached location: 21

Part number: YY20T01577P1



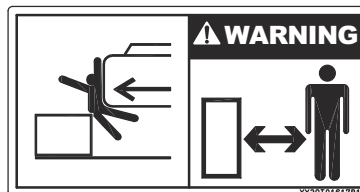
DO NOT ENTER SWING AREA

Attached location: 25

Part number: YY20T01617P1

Do not enter the swing area.

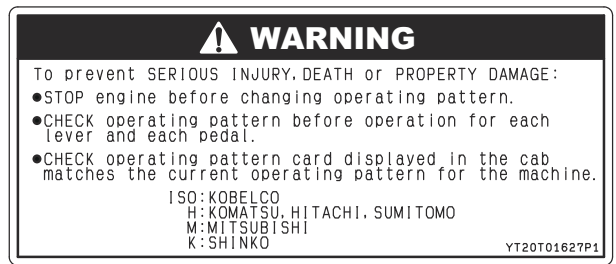
Stay away from the machine during swinging to avoid coming into contact with or being crushed between the upper structure.



MULTI-CONTROL VALVE

Attached location: 48

Part number: YT20T01627P1



DO NOT USE COUNTERWEIGHT LIFTING EYES TO LIFT MACHINE

Attached location: 85

Part number: PS20T01187P1



BEWARE OF FALLS

Attached location: 86

Part number: YN20T03087P1

There is a danger of falling when working on areas above ground.

- Stay clear of edges.
- Do not spill oil or grease. Wipe up any spilled fuel, grease, or water.
- Remove any slippery substances found on steps, handrails, crawlers, ladders and footholds, such as greases and oils, hydraulic oil, mud, ice and dirt.
- Do not leave any tools around the working area.
- Use extreme caution to avoid slipping when moving.
- Do not jump on or off the machine.
- Use steps and handrails to securely maintain three points of contact with the machine at all times while mounting or dismounting the machine.



PRECAUTIONS FOR MAINTENANCE OF HYDRAULIC OIL TANK

Attached location: 87

Part number: PS20T01195P1



1

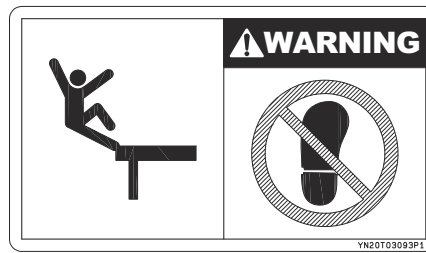
[1. SAFETY INSTRUCTIONS]

BEWARE OF FALLS

Attached location: 88

Part number: YN20T03093P1

There is a danger of falling when working on areas above ground. Do not climb onto this area.



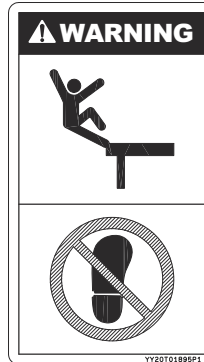
BEWARE OF FALLS

Attached location: 89

Part number: YY20T01895P1

There is a danger of falling when working on areas above ground. Do not climb onto this area.

- Stay clear of edges.
- Do not spill oil or grease. Wipe up any spilled fuel, grease, or water.
- Remove any slippery substances found on steps, handrails, crawlers, ladders and footholds, such as greases and oils, hydraulic oil, mud, ice and dirt.
- Do not leave any tools around the working area.
- Use extreme caution to avoid slipping when moving.
- Do not jump on or off the machine.
- Use steps and handrails to securely maintain three points of contact with the machine at all times while mounting or dismounting the machine.

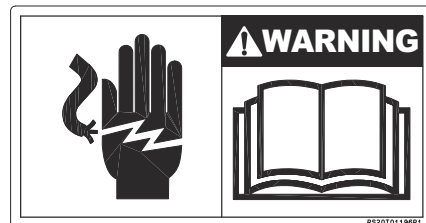


PRECAUTIONS WHEN HANDLING CABLES

Attached location: 90

Part number: PS20T01196P1

There is a risk of electric shock when handling cables.
Read this manual to handle the cables properly.



BEWARE OF HOT COOLANT

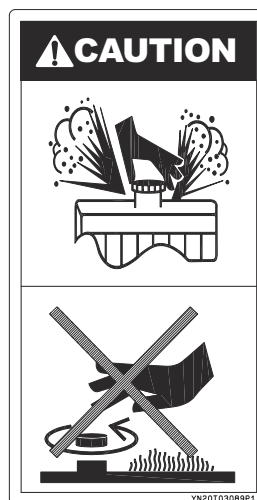
Attached location: 91

Part number: YN20T03089P1

Never loosen or open the radiator cap when coolant is hot. Steam from hot coolant could spray out and cause burns.

Before opening the radiator cap:

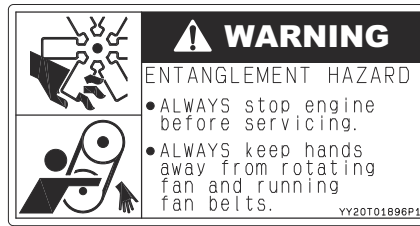
- Let the engine cool completely.
- Cover the radiator with a cloth rag.
- Loosen the radiator cap slowly to relieve pressure.



STOP ROTATING PARTS BEFORE INSPECTION & MAINTENANCE

Attached location: 92

Part number: YY20T01896P1

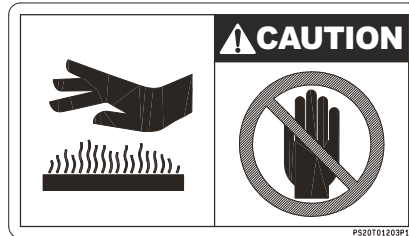


BEWARE OF HOT PARTS

Attached location: 93

Part number: PS20T01203P1

Do not touch the engine oil filter until it has cooled down.
It may be hot, and could cause burns.



BEWARE OF HOT PARTS

Attached location: 94

Part number: YY20T01902P1









1

[1. SAFETY INSTRUCTIONS]

SAFETY PRECAUTIONS

Attached location: 95

Part number: YY20T01894P1

 <p>⚠ DANGER</p> <p>ELECTROCUTION HAZARD</p> <ul style="list-style-type: none"> KEEP the machine and attachments a safe distance from electrical power lines. MAINTAIN maximum possible distance from power lines and NEVER violate minimum clearance. ALWAYS READ and UNDERSTAND operation manuals. 	 <p>⚠ WARNING</p> <p>To prevent SERIOUS INJURY, DEATH or PROPERTY DAMAGE, before operating machine:</p> <ul style="list-style-type: none"> CHECK that no one is on, under, and around the machine. CHECK there are not other machines or obstacles in the area surrounding the machine. MAKE SURE control lock lever is "LOCKED" and all control levers and pedals have returned to neutral before starting engine. ALWAYS sound horn to alert people in the vicinity of the machine before moving or starting swing motion. READ and UNDERSTAND operation manuals. 	<p>⚠ WARNING</p> <p>To prevent SERIOUS INJURY, DEATH or PROPERTY DAMAGE:</p> <p>READ and UNDERSTAND operation manuals before operating, maintaining, disassembling, assembling or transporting machine.</p> <p>Observe all local laws and regulations as your own responsibility.</p>
<p>⚠ WARNING</p> <p>BEFORE operating always check each lever and each pedal matches the operating pattern to prevent SERIOUS INJURY or DEATH from unintended machine movement.</p> <p>Confirm the operating pattern with card displayed in the cab.</p>	 	<p>⚠ WARNING</p> <p>CRUSH HAZARD</p> <ul style="list-style-type: none"> ALWAYS check clearance between attachment and cab before operation. ALWAYS keep the attachment away from the cab during operation.
 <p>⚠ WARNING</p> 	<p>⚠ WARNING</p> <p>FALL HAZARD</p> <p>ALWAYS set travel speed select switch to "LOW" when descending slopes or loading and unloading machine.</p>	<p>⚠ CAUTION</p> <p>Do not use auto-liding stop mode when lifting.</p> <p style="text-align: right;">YY20T01894P1</p>

PRECAUTIONS WHEN OPENING FRONT WINDOW


Attached location: 96

Part number: YN20T03095P1

Lock the front window at the opening position securely.

Otherwise, the glass of the opened front window may slip down and cause an injury.

⚠ WARNING

YN20T03095P1

BEWARE OF ATTACHMENTS/EQUIPMENT

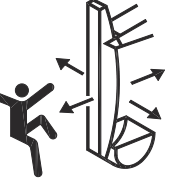
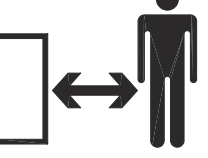
Attached location: 97

Part number: YN20T03096P1

Stay clear of the machine.

If not, there is a risk of injury from being hit by the operating machine of the machine.

⚠ WARNING

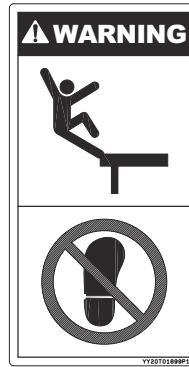
YN20T03096P1

BEWARE OF FALLS

Attached location: 98

Part number: YY20T01899P1

Do not put your feet on the handhold.



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:

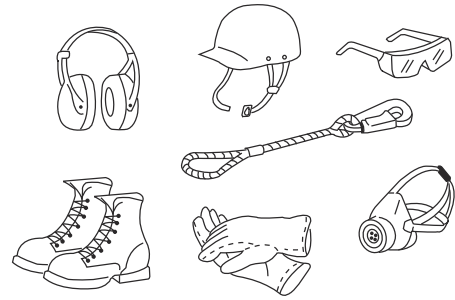
- Never allow anyone to stand on the machine, including the attachment /equipment and the upper structure, when operating.
- Never allow anyone to stand or to ride on a suspended load or the attachment/equipment.

1.2.2 PROTECTION TOOLS

PERSONAL PROTECTIVE EQUIPMENT

Wear fitted clothing and protective gears.

- Wear clothing not exposing your skin.
- 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.

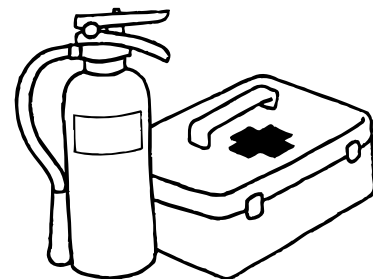


This may include a hard hat, safety shoes, safety glasses, face shield, respirator, gloves, ear protection, and/or a reflective vest. Consult with your supervisor to confirm that personnel working in the vicinity of the machine have the proper personal protective equipment for the worksite and the task.

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

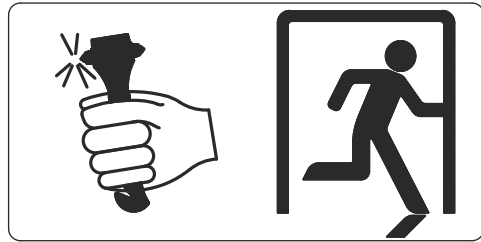
WHEN A FAILURE IS FOUND

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, stop the engine, pull the control lock lever to the locked position, 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. See "EMERGENCY ESCAPE FROM OPERATOR'S STATION" in Chapter 2.



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.

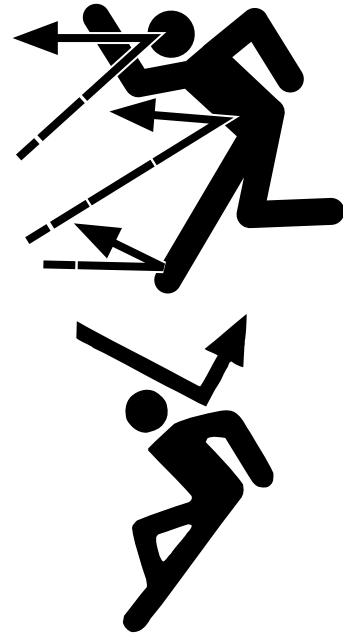
1.2.4 POTENTIAL HAZARDS WHEN OPERATING

PAY ATTENTION TO FALLING MATERIALS AND FLYING DEBRIS

Be sure to install the top guard and the front guard (option) when performing demolition, working in quarry or mining applications or any site in which falling materials and/or flying debris can be generated .

- If working with the hydraulic breaker or other attachments, be sure to install front guard.
- 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.

As for installing the front guard (option), contact your KOBELCO authorized dealer.



1

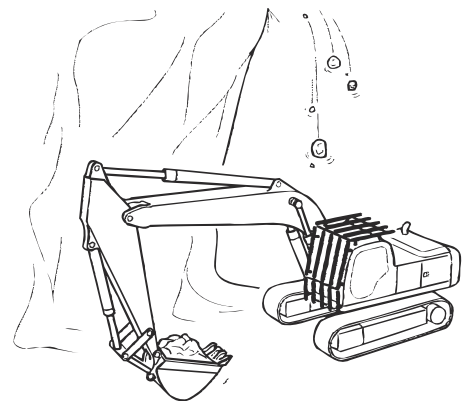
CHECK PROTECTIVE RELATED GUARDS AND EQUIPMENT

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

- The top guard is designed according to ISO10262 and should not allow loads up to 227 kg (500 lbs.) dropped from a height of 5.22 m (17 ft.) to penetrate the cab. During building demolition or other activities, the load, the distance of the drop, or both could produce forces that exceed the limits of the top guard and cause 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.



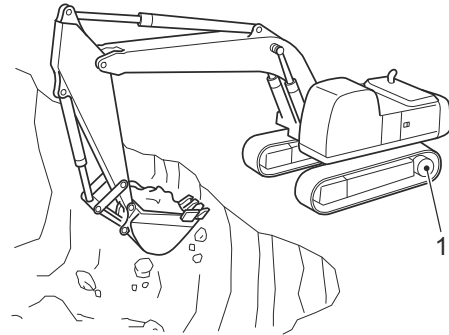
[1. SAFETY INSTRUCTIONS]

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.

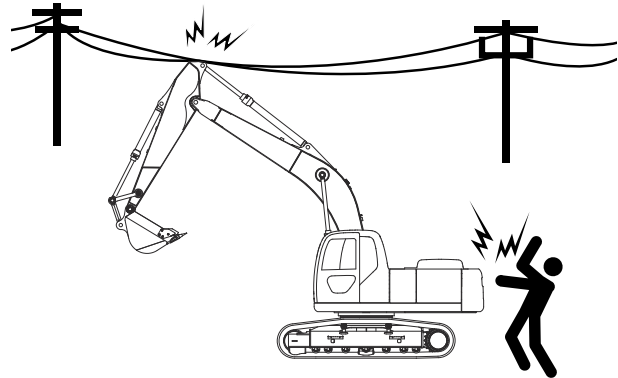


ELECTRICAL POWER LINES

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.

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, battery electrolyte, windshield washer fluid and other chemicals are flammable.

Strictly observe the following points.

- Remove dried leaves, wood chips, paper and other flammable material from around the engine exhaust manifold, muffler and battery, and from on top of the undercover.
- Do not bring sources of fire or smoke nearby.
- Refuel only after stopping the engine.
- Do not leave the machine unattended when refueling or refilling with oil.
- Avoid spilling fuel on surfaces that are at a high temperature or on any electrical parts. Wipe up any spilled fuel, grease and oil immediately.
- After refueling or refilling with oil, ensure the fuel and oil tank filler caps are securely fastened.
- Store fuel and oil in designated areas and restrict access to authorized personnel only.
- Move all flammable materials to a safe area before performing any grinding or welding work.
- Do not carry out any welding or flame cutting on pipes or tubes that contain flammable fluids.
- Use non-flammable cleaning solvents to clean parts and avoid using flammable substances such as diesel oil or gasoline.



FIRE CAUSED BY ELECTRICAL WIRING

Short circuits in the electrical system may cause fire.

- Make sure all electrical wiring harness connections are clean and secure.
- Inspect wiring harnesses, connectors, and cable clamps periodically; tighten any loosened connectors and wiring clamps; and repair or replace any damaged wiring.

FIRE CAUSED BY PIPE LEAKS

Check that all clamps, guards and protective cushions for hoses and tubes are secure. During operation, machine vibration may cause loose hoses or tubes to be damaged due to contact with other parts and cause high-pressure oil to be ejected, possibly leading to fire and accident that could result in injury or death.

If inspection reveals any problems, tighten, repair or replace the offending parts immediately. Do not operate machine with damaged or bent piping or hoses.

EXPLOSIONS FROM WORK LIGHTS

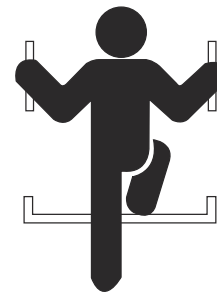
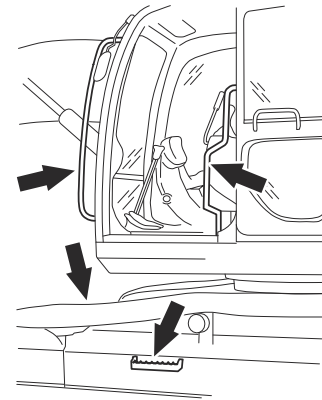
Use explosion-proof work lights when carrying out inspection and maintenance. Explosion-proof lighting devices must be adequately specified to prevent fire and explosion even when used in areas with high concentrations of explosive vapors and dust.

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 off the machine.
- Never jump on and off the machine or attempt to get on or off a moving machine.



1.2.7 PREVENT FALLS

PREVENT FALLS

- Always use appropriate equipment and fall protection.
- When there is a risk of falling, use suitable equipment to address the potential risks, including the use of lifting platforms, scaffolding, ladders, or auxiliary cranes if necessary.
- If work cannot be carried out using additional equipment or from the ground, the operator and assembly personnel must wear approved fall protection at all times.
- All fall protection systems must meet local, regional and national regulations for your country where the machine is located.
- Do not use defective or damaged personal protective equipment. Always obtain replacement personal protective equipment before starting the task.
- Clean all slippery substances such as grease, oil, hydraulic oil, mud, ice, and others attached to the steps, handrails, crawlers, ladders, and platforms.
- Inspect appearances and mounting portions of the steps, handrails, ladders, and platforms. Replace any damaged parts and tighten any loose bolts or nuts.
- Use the proper personal protective equipment, such as a full-body harness, if needed.
- Use extreme caution when walking on elevated surfaces to avoid slipping.
- Always use the steps, handrails, ladders and platforms to access locations above the ground level.
- Always face the machine and maintain three points of contact with the steps and handrails.
- Do not use control lock lever or control levers as hand hold.
- Do not have anything in your hands, including tools, when getting on and off the machine.
- Never jump on and off the machine, or attempt to get on and off a moving machine.
- Clean all spills, and store or secure tools in a strong place properly after working.



1.2.8 PRE-START UP INSPECTION ON THE MACHINE

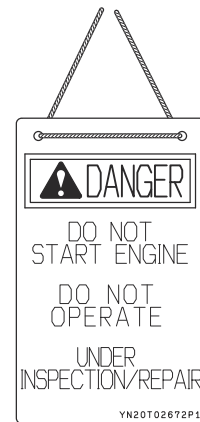
Always perform a pre-startup inspection before operating this machine to check for any potential issues.

For more information, refer to "EVERYDAY CHECK-UP" in Chapter 3 in the standard operation & maintenance 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 to the locked(up) position, 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.



CHECK THE MACHINE LOG BOOK

Check machine log book to check that periodic maintenance and inspections have been performed and all necessary repairs made.

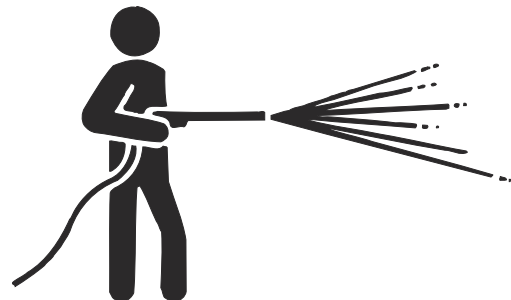
ALWAYS KEEP THE MACHINE CLEAN

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.

Also never wash the vent hole of covers or guards with high-pressure cleaning machine.



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.
- 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.
- Move the attachment /equipment as needed to improve visibility of the right side during machine travel.
- There are blind areas in the mirror and camera 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.
- Do not operate the machine without the monitor pictures of the rearview camera and the side camera being displayed.
- Do not remove or disassemble the rearview camera and the side camera systems.

The camera systems are installed on the base machine according to ISO 16001:2017. When removal or disassembly of them is required, contact your KOBELCO authorized dealer otherwise it may void the machine warranty provided with the machine.

MIRROR AND CAMERA LOCATION

Only use genuine KOBELCO mirrors, rearview camera system, and side camera system.

Regarding adjustment of the mirrors, the rearview and side cameras, see "ADJUSTMENT OF MIRRORS" in Chapter 3.

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 PRECAUTIONS WHEN STARTING

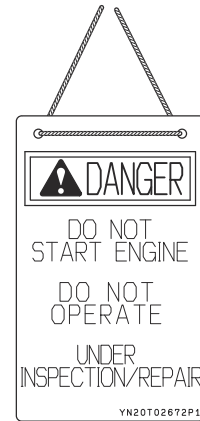
CHECK FOR "DO NOT OPERATE" TAGS

Before starting the engine, check whether a "DO NOT OPERATE" tag is displayed.

If a "DO NOT OPERATE" tag is displayed, do not start the engine.

"DO NOT OPERATE" tags are used for notification 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 "DO NOT OPERATE" tag is removed.



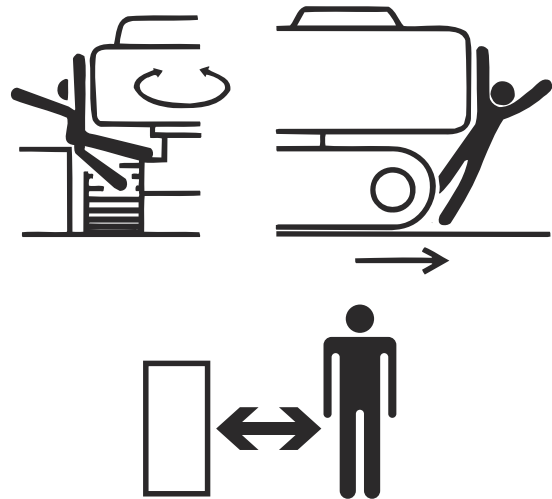
ONLY OPERATOR IS ALLOWED IN CAB

Only one person should be in the operator's seat operating the machine. Do not allow any other personnel to be present in the operator's station or on the machine.

CHECK SURROUNDINGS FOR SAFETY BEFORE OPERATING THE MACHINE

Check the following when starting the engine and before operating the machine.

- There is no one around, above or below the machine.
- There are no other machines or obstacles around the machine.
- Set up barricades to prevent unauthorized personnel and/or machines from entering the working site.



PRE-OPERATION SAFETY CHECK

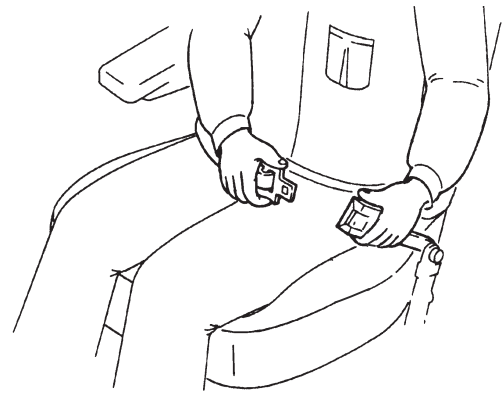
Check the following before commencing work.

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

FASTEN YOUR SEATBELT

To prevent serious accidents resulting in injury or death, always fasten your seatbelt before starting the machine and keep your seatbelt fastened during operation.

Sit in the operator's seat and adjust the seat so you can properly operate the pedals and switches.

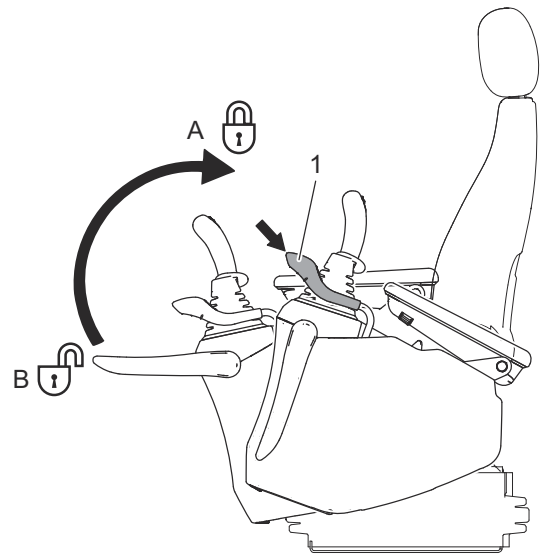


BEFORE STARTING ENGINE

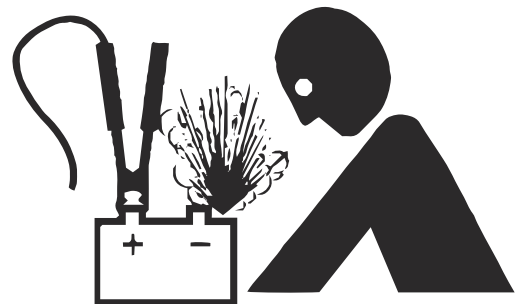
- Move control lock lever (1) to the "LOCKED" position. If not in the "LOCKED" position, accidental contact with the control levers may result in unexpected and unintended machine movement.
- Return all control levers to their neutral positions.
- Before starting the engine, sound the horn as a warning.

A: "LOCKED" position

B: "UNLOCKED" position



Do not start the engine by directly connecting the battery to the starter terminals. The machine may move unexpectedly, causing an accident resulting in injury or death, or damage to the electrical system.



WARMING-UP OPERATION

If the attachment/equipment is moved without sufficient warming-up operation, there may be a delay in the attachment's response to the control lever, resulting in unintended movement and causing an accident. Be sure to perform warming-up operation. The machine needs to be warmed up sufficiently, especially in cold weather.

PRECAUTIONS FOR SWITCHING ATTACHMENT MODE

Make sure that the attachment mode matches the attachment/equipment currently in use. If the attachment mode is set incorrectly, not only will the attachment/equipment fail to operate properly, but it may also lead to an accident resulting in injury or death or damage to the machine.

For information on the criteria for switching between attachment modes, see "SWITCHING ATTACHMENT MODE" in Chapter 3.

CHECK CONTROL PATTERN

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

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

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

If there are any problems, do not operate machine until the problems have been resolved. If needed, contact your KOBELCO authorized dealer.

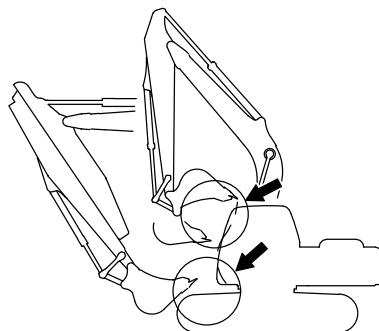
CHECK WARNING DEVICES

Make sure that any warning devices such as horns, travel alarms and swing flashers are operating properly.

BEWARE OF BUCKET INTERFERENCE

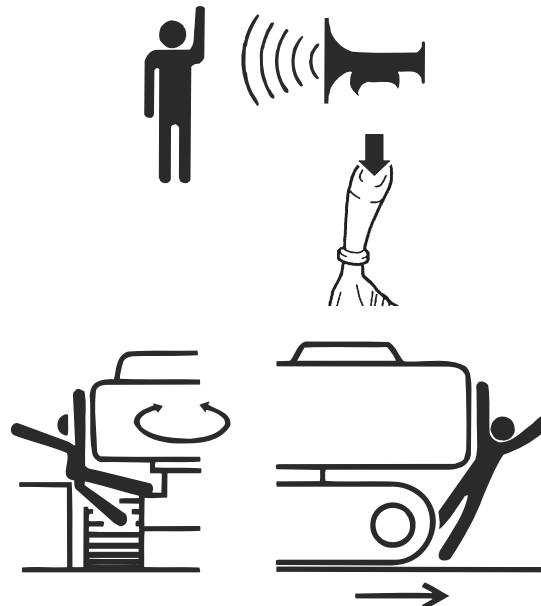
A combination of certain types of attachment and base machine options may result in interference between the attachment and the cab or some other part of the machine.

Check for interference before operation.



PRECAUTIONS FOR SWINGING/TRAVELING

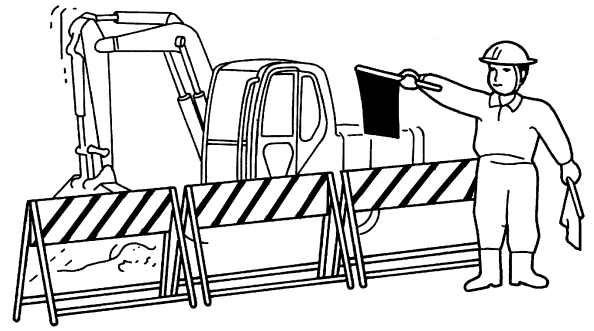
- Always sound the horn before starting the engine, traveling the machine, or swinging the upper structure to alert people in the area surrounding the machine.
- Always operate at a safe distance from other machines or obstacles in the area around the machine.
- Place a signal person where there is poor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



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.

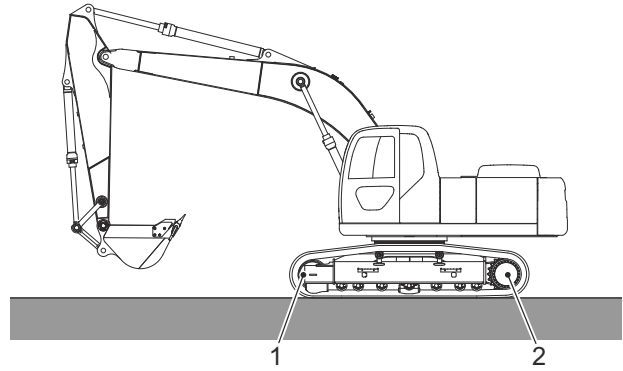


1.4.2 TRAVELING

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 drive sprockets(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.



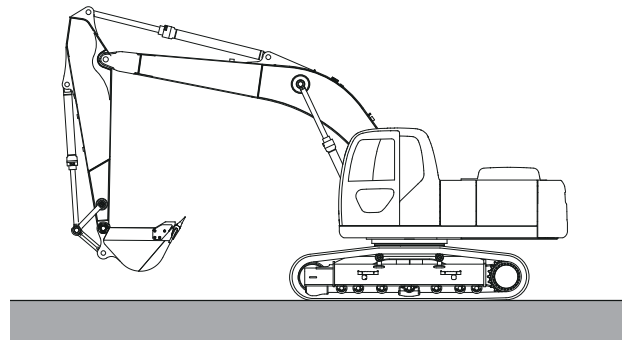
MOVE TRAVEL LEVERS IN A SLOW AND DELIBERATE MANNER

- 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 the levers during travel.

PRECAUTIONS IN TRAVELING

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

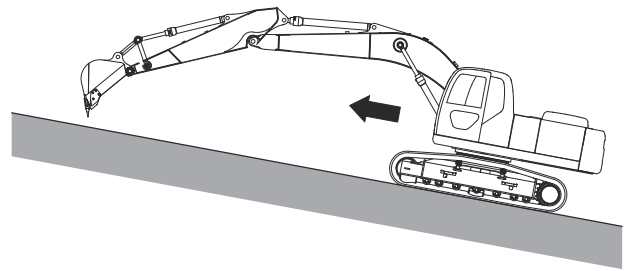
- Ensure operator has good visibility when traveling and is aware of any and all obstructions on the job site.
- Travel slowly on a rough terrain.
- Do not go over obstacles. When going over obstacles inevitably, go slowly with the attachment positioned close to the ground to avoid machine becoming unstable or tipping.



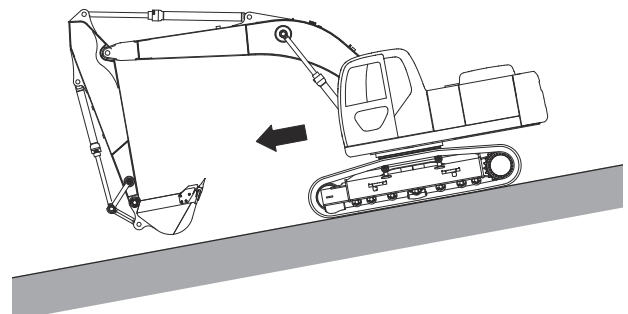
TRAVELING ON SLOPES

Traveling up and down slopes of 30 degrees or more is not allowed to avoid a risk of tipping/rolling over.

- Travel at a low speed when traveling up and down the slopes.
- When traveling up the slopes, extend the front attachment forward to avoid tipping/rolling over to the rearward.
- When traveling down the slopes, set the bucket in the position where it can reach the ground immediately to stop the machine from tipping or sliding.
- Travel carefully on wet ground, grass, grasses, fallen leaves, ice, and steel plates because the machine can slip easily.



Traveling up slope



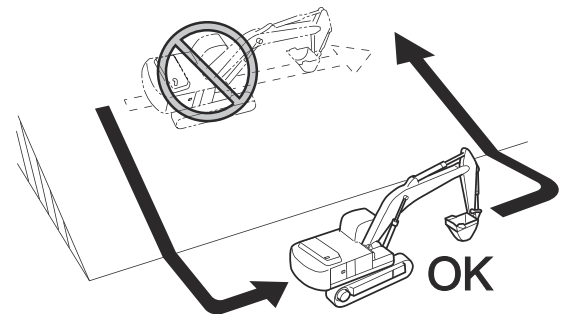
Traveling down slope

PRECAUTION OF TRAVELING ON SLOPES

The machine could tip or roll over, slide, or skid when travelling across slopes.

Be sure to travel off the slope, travel along flat area, then travel onto the slope at the desired location.

Never travel across the slopes.



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.

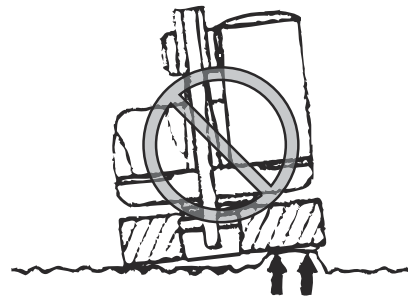
DOZER COLLISION

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.



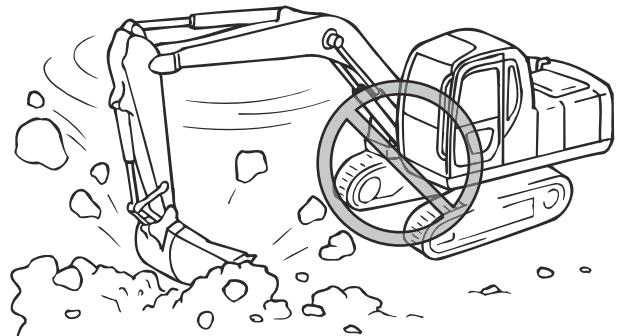
1.4.3 PROHIBITED OPERATIONS

Always follow the procedures in this manual when operating this machine. Abuse and misuse may result in serious injury, death, 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.

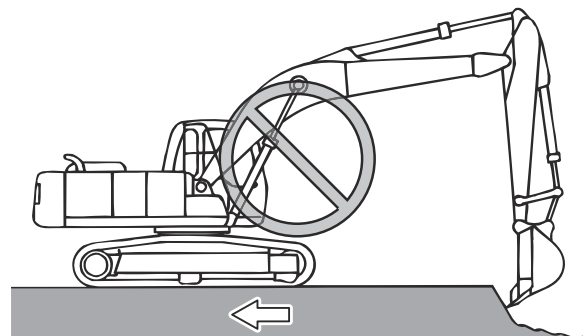
If the swing power is used to perform work, excessive force may be exerted on the machine and the attachment /equipment resulting in damage and may reduce the life of the swing system.



NEVER USE THE TRAVEL POWER TO PERFORM WORK

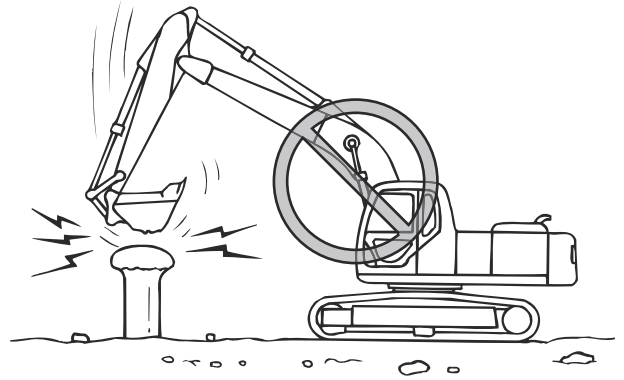
Do not use the travel power to perform digging or leveling work with the attachment in contact with the ground.

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



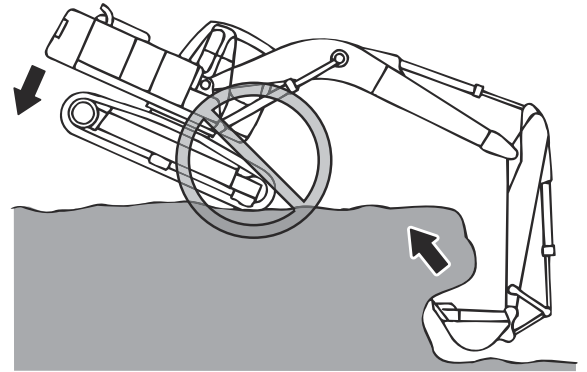
DO NOT PERFORM "HAMMERING" OPERATIONS WITH THE BUCKET

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 concrete or hard rock, use a breaker/hammer to break it up before digging. This will prevent damage to the machine and allow for easier loading.

**OPERATING ON A SLOPE**

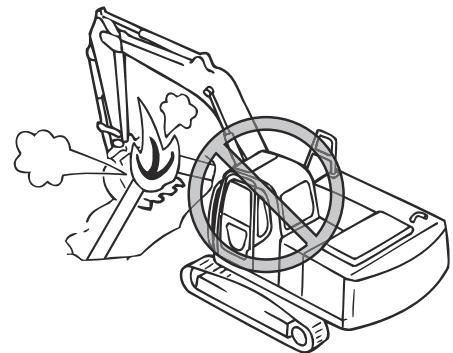
Use extreme caution when operating machine on a slope. The machine may become unstable and could tip or roll over.

- 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.

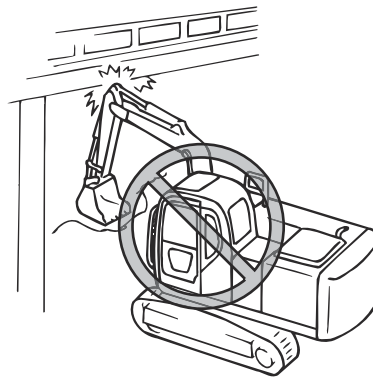


AVOIDING COLLISIONS WITH MACHINE

Use extreme caution when working in areas with height limitation, including tunnels, bridges, under electrical power lines, or inside buildings, to prevent the attachment/equipment from colliding. Personal injury or damage to the machine may result if the machine or attachment/equipment comes into contact with an obstacle.

To prevent serious injury and machine damage, keep the base machine and attachment/equipment at a safe distance from such obstacles at all times.

Place a signal person and follow the instructions.

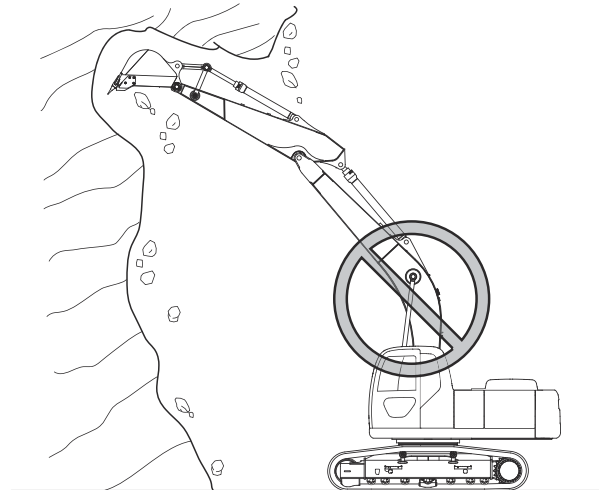


OPERATING UNDER CLIFF OR OVERHANG

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.

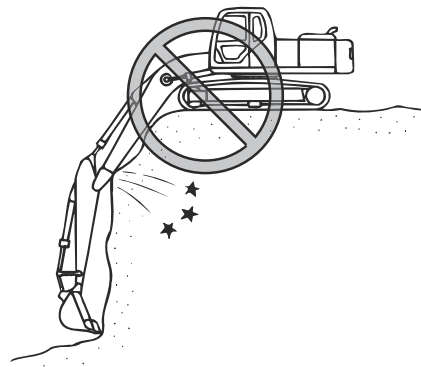
The cab top guard was designed conforming to ISO10262 and should not allow every possible loads to penetrate the cab.



DEEP EXCAVATION OPERATION

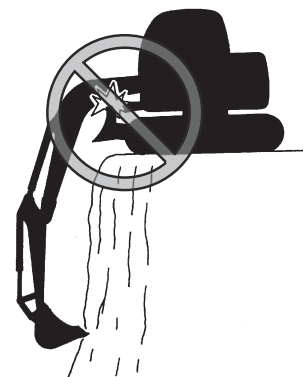
To prevent damage to the machine, during deep excavation or diagonal digging.

- 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.



PAY ATTENTION TO INTERFERENCE OF DOZER

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.



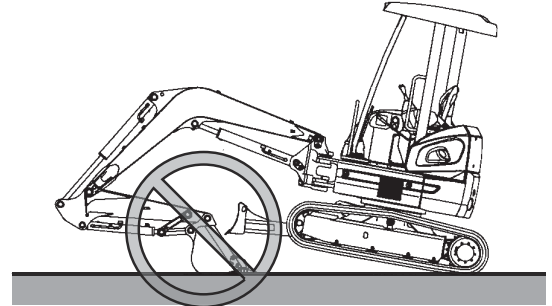
DO NOT LIFT OR MOVE PERSONNEL

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 fully extended. 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.



DO NOT MOVE BUCKET OVER PERSONS

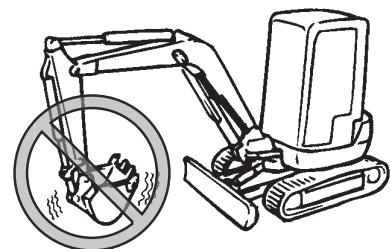
Do not move the bucket or attachment/equipment over persons.

Moving the bucket or attachment/equipment over persons or over the operator's seat of the dump truck can cause an accident resulting in injury or death or damage to the machine due to contact with fallen soil or the bucket.



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.



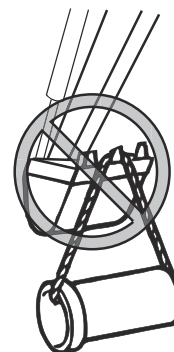
LIFTING WORK

This machine is designed for the application of digging, loading, and leveling using the bucket, or for use with a crusher, breaker/hammer, shear or other attachment.

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.

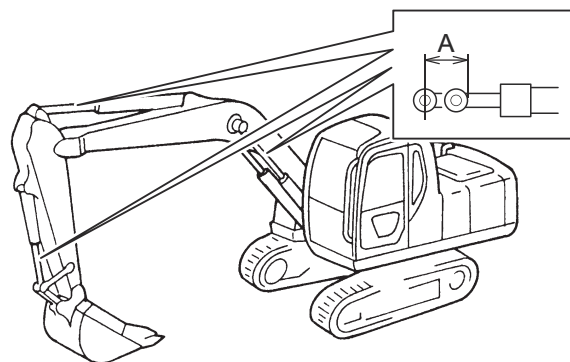
Even though lifting with this machine is allowed according to the laws of the country or area in which this machine is to be used, do not lift the load by using the teeth of the bucket, the breaker, the crusher, or others.

It can cause the lifting tools to come off and result in falling off of the load, leading to serious accidents or death. Always use a certified lifting device.



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

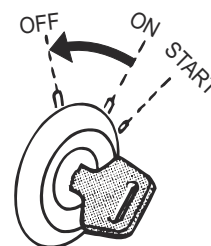
Do not operate the machine in enclosed spaces or, in any case, without appropriate ventilation.

PRECAUTIONS FOR POTENTIALLY EXPLOSIVE ENVIRONMENT

When using the machine in a potentially explosive environment, comply with local codes and regulations of each country.

PRECAUTIONS FOR LEAVING THE OPERATOR'S SEAT

Do not leave the machine with the engine running.



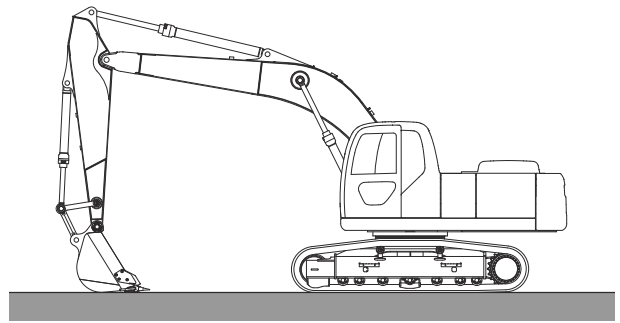
1.4.4 SAFETY CHECK ON THE PARKING MACHINE

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.

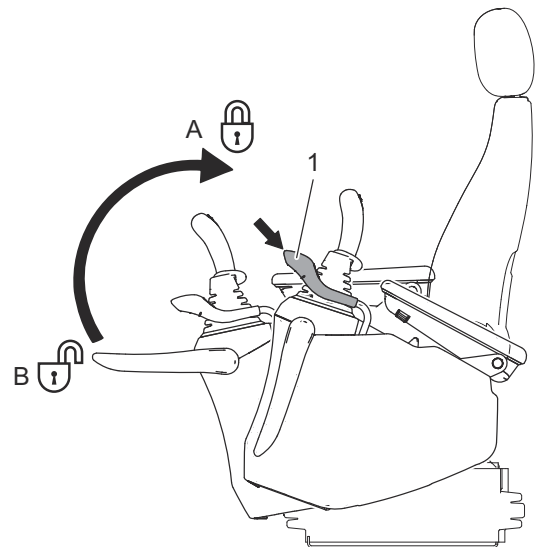
ALWAYS PARK MACHINE PROPERLY

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 acceleration switch to the "OFF" position.



1

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 engine throttle to the low idle position.
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.

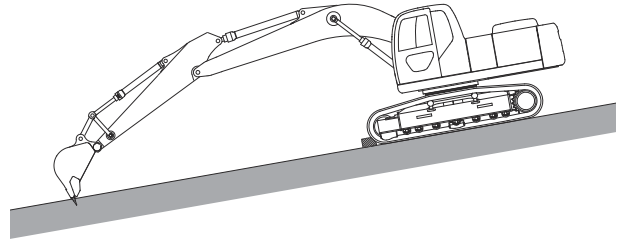


[1. SAFETY INSTRUCTIONS]

PARKING MACHINE ON SLOPE

If the machine must be parked on a slope, follow the procedure below.

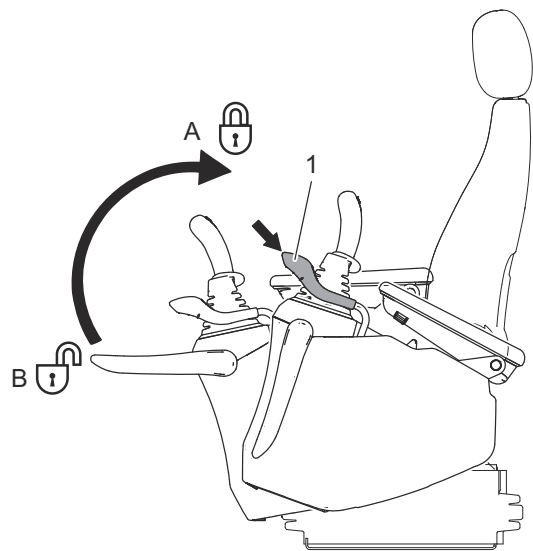
1. The undercarriage and the upper structure and the attachment /equipment must face downhill.
2. Lower the attachment into the ground. If equipped with a bucket, wedge the bucket into the ground.
If equipped with a dozer blade, lower it to the ground.
3. Set the auto acceleration switch to the "OFF" 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 engine throttle to the low idle position.
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 secure.
7. Block the tracks in the front and the rear.



1.5 AT THE END OF EACH SHIFT

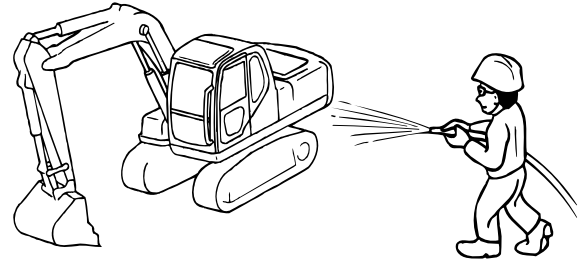


READ THE OPERATOR'S MANUAL

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.

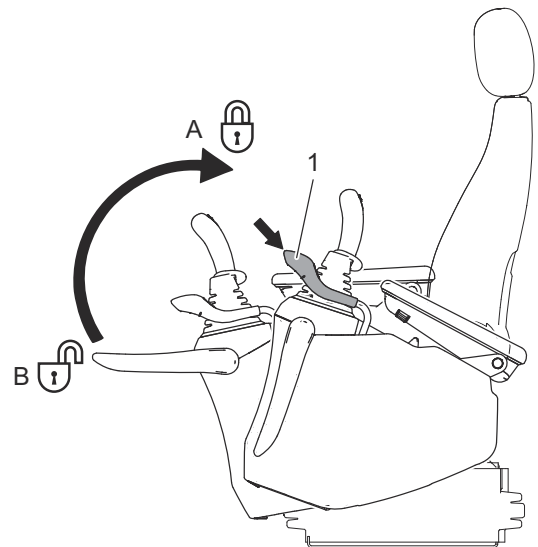
5. Remove the key from the key switch and lock all doors and access panels.

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



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.

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 WORK SITE

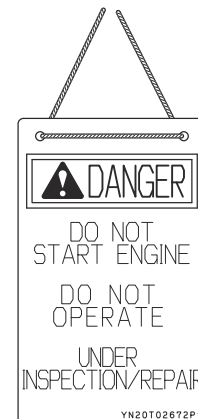
Inspecting and maintaining the machine at an unorganized and cluttered working site may cause personal injury.

Clear obstacles, grease, oil, paint, debris, etc., from the work 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 to the locked(up) position, 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 activities or an inspections. The operator and the maintenance personnel must have a means of communication when performing these tasks.



If any issues are found, always contact your KOBELCO authorized dealer before repairing or replacing any machine parts and systems prior to restarting the machine.

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

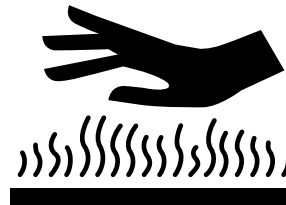
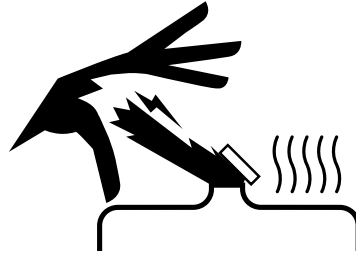
STOP ENGINE BEFORE PERFORMING INSPECTION AND MAINTENANCE

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.

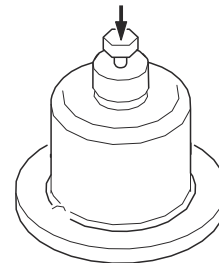


HIGH PRESSURE OIL

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 using the "Pressure Release" function as described in Chapter 2, or 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.

OK



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.

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.

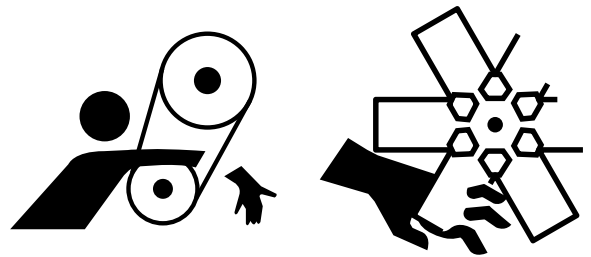
When working on energized equipment, always have another person positioned near the emergency-off or main switch and overvoltage release.

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 into the fan or fan belt area while machine is running. They may be ejected at high speed and cause 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.

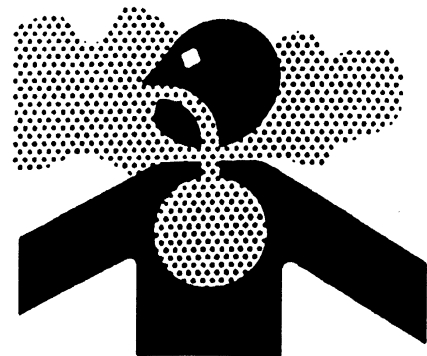


VENTILATION PRECAUTIONS

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.

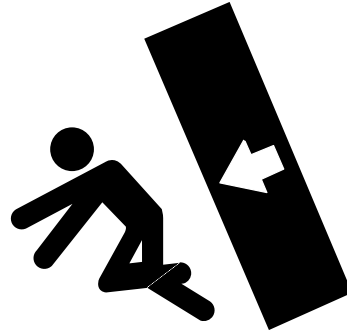
If the natural ventilation is poor, install ventilators, fans, exhaust extension pipes or other artificial venting devices.



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 lock rod(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 gear.
- 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 irritation.
- 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 may result in severe personal injury or death.

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

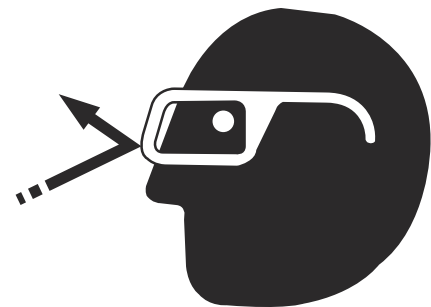
BEFORE HAMMERING METAL PINS, TEETH OR BEARINGS

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.



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.
- 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 PRECAUTIONS WHEN HANDLING OIL, GREASE AND OTHER MATERIALS

HANDLING OIL AND GREASE

- Draining hot oil or other fluids may cause burns. Allow time for machine to cool down before draining oil or other materials.
- Always wear safety glasses or face shield, long sleeves and gloves to prevent exposure to oil and other materials. Exposure may result in serious injury including, burns and inflammation.
- Do not drink oil or other materials. You may experience diarrhea, vomiting, serious injury or death.
- Always label containers used to collect oil and other materials and dispose of in accordance with national regulations.
- Keep oil and other materials out of the reach of children.
- If any oil, grease or other material comes in contact with your eyes, wash thoroughly with water and seek immediate medical attention.

PRECAUTIONS WHEN PAINTING

- Paint vapors are flammable and may explode. Keep all ignition sources away from paint and other flammable materials.
- Always ventilate the work area when painting. During painting and drying, the exhaust system should reduce potential exposures. If the ventilation is not adequate, install ventilators, fans, exhaust extension pipes or other ventilation devices as needed.
- When using paints, take care not to let paint touch your skin. Always wear appropriate personal protective equipment including a respirator fitted with appropriate cartridges or a supplied air respirator, safety glasses, protective gloves, hood, long sleeves, pants, closed toed shoes.
- If paint get into your eyes, wash your eyes with much water and see a doctor as soon as possible.
- If you feel bad by inhaling vapor or gas, exit to a clean-air place and see the doctor as required.
- In case of fire, use CO₂ gas or foam fire extinguisher.
- If paint is on your skin, wash with soap and water to remove. If you experience pain or irritation, seek medical attention.
- If paint spills, spread sawdust or absorbents around the perimeter to keep spill from spreading. Then use rags to blot paint. Rags and other waste soaked with paint may spontaneously catch fire if improperly discarded. Immediately place rags and other waste soaked with paint in a sealed, water-filled, metal container.
- After painting, wash your face, hands, and rinse your mouth before eating.
- Keep paint containers sealed and in a secure location out of the reach of children.
- Dispose of paint and solvents as industrial wastes in accordance with applicable regulations.

1.6.5 CAUTION WHEN 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.



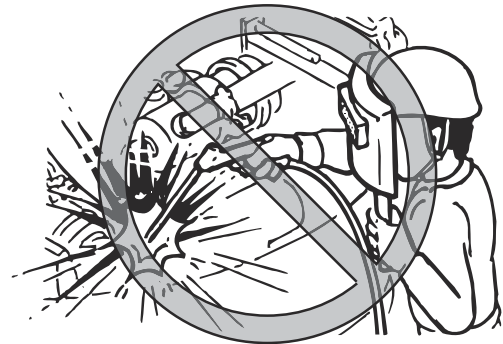
1

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.

BASIC PRECAUTIONS FOR WELDING AND GRINDING

- Always wear protective gears appropriate for welding.
- Perform work in a well-ventilated area.
- 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.

1.6.6 AFTER COMPLETION OF MAINTENANCE

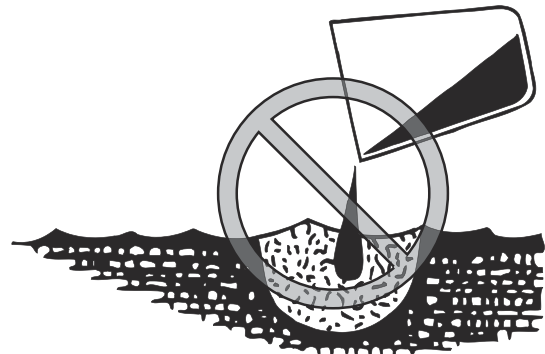
AFTER MAINTENANCE

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 ACCUMULATOR OR GAS SPRING



Read operating manual.

Read, understand and abide by the safety notes and instructions in this manual. Improper use of the machine without due consideration for the advice in this manual could result in serious injury or death, or significant damage to the machine.

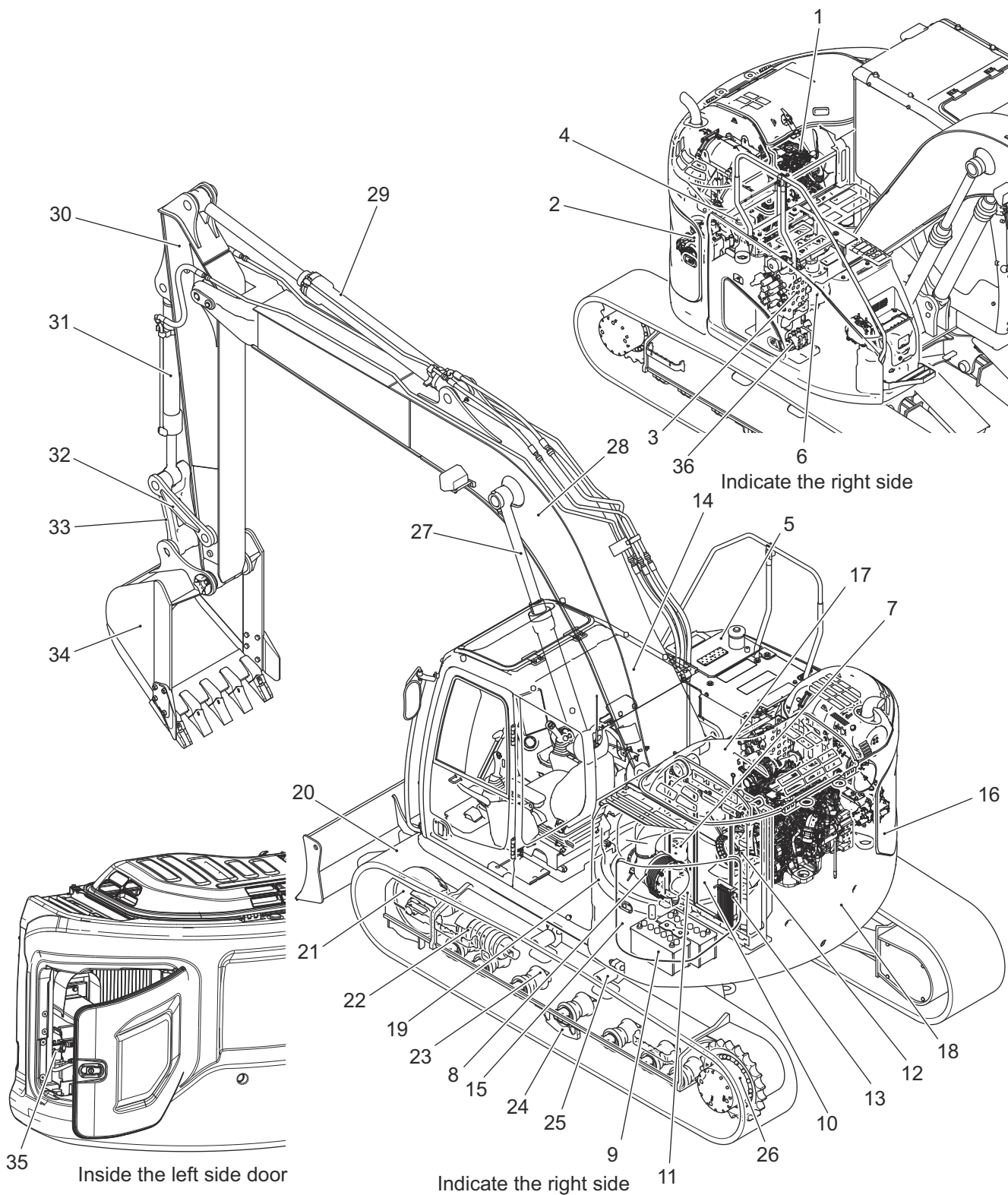
Highly pressurized nitrogen gas is sealed inside accumulators and gas springs. Improper handling may cause the units to rupture, resulting in serious personal injury. Strictly observe the following points.

- Never disassemble an accumulator or gas spring.
- Never drill, weld or fuse an accumulator or gas spring.
- Keep accumulators and gas springs away from sources of fire.
- Never throw an accumulator or gas spring into a fire.
- The sealed gas must be released from accumulators and gas springs before disposal. Contact your KOBELCO authorized dealer for assistance.



2 MACHINE FAMILIARIZATION

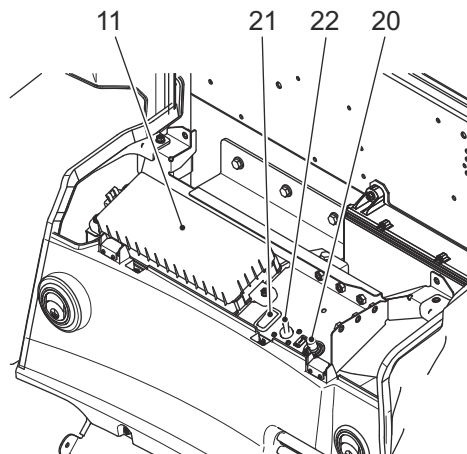
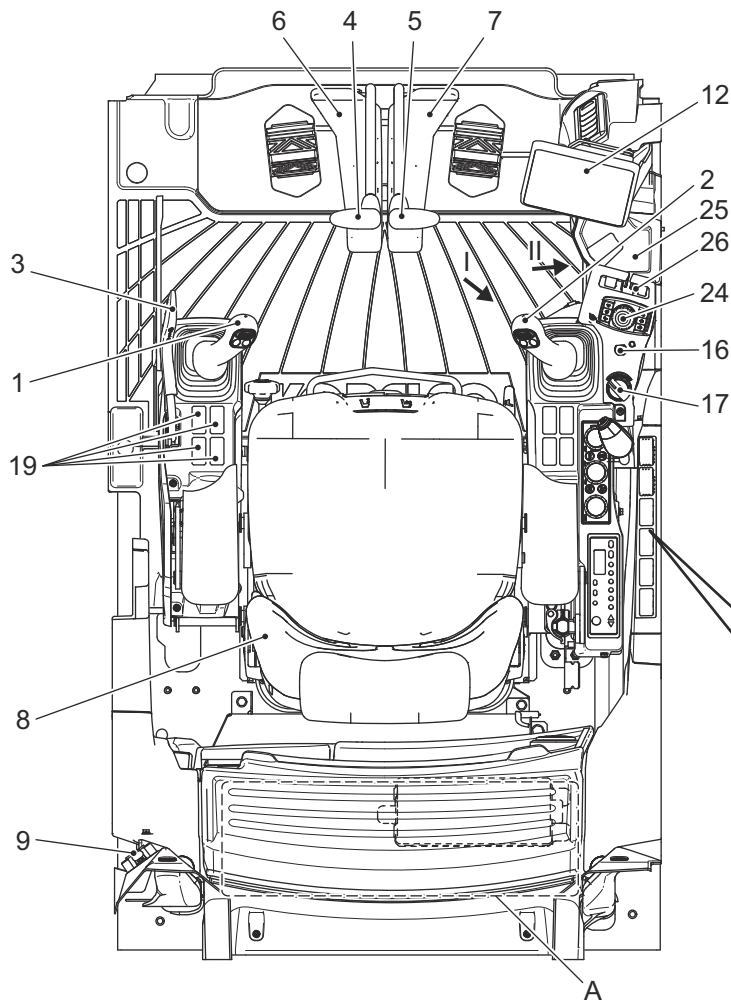
2.1 BASIC COMPONENTS OF THE MACHINE



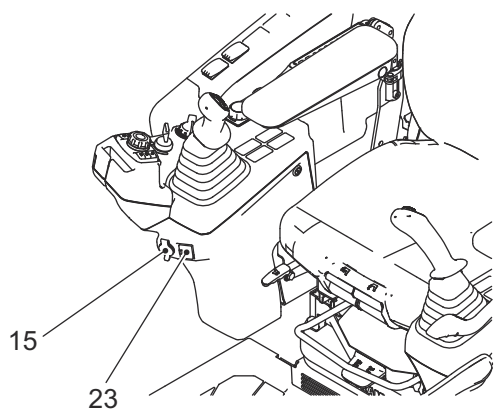
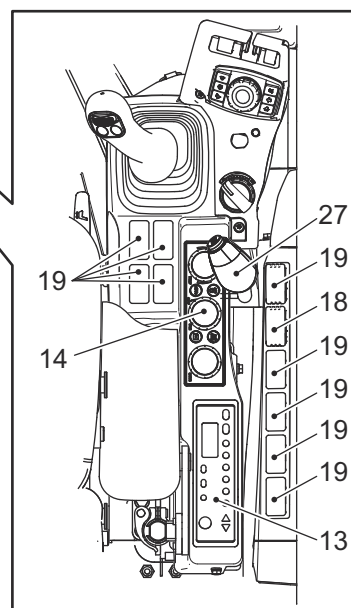
[2. MACHINE FAMILIARIZATION]

Item	Name	Item	Name	Item	Name
1	Engine	13	Fuel cooler	25	Upper roller
2	Hydraulic pump	14	Cab	26	Travel motor
3	Control valve	15	Left side door	27	Boom cylinder
4	Hydraulic oil tank	16	Right side door	28	Boom
5	Fuel tank	17	Engine hood	29	Arm cylinder
6	Swing motor	18	Counterweight	30	Arm
7	Swivel joint	19	Swing bearing	31	Bucket cylinder
8	Air cleaner	20	Crawler	32	Idler link
9	Battery	21	Front idler	33	Bucket link
10	Oil cooler	22	Crawler adjuster	34	Bucket
11	Radiator	23	Lower Roller	35	Battery power-off switch
12	Intercooler	24	Track guide	36	Rotary multi control valve

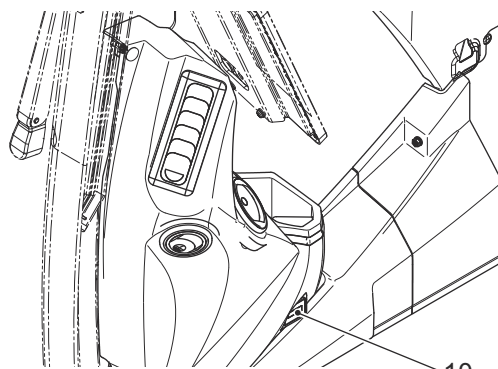
2.2 CAB NOMENCLATURE



Details A



View I



View II

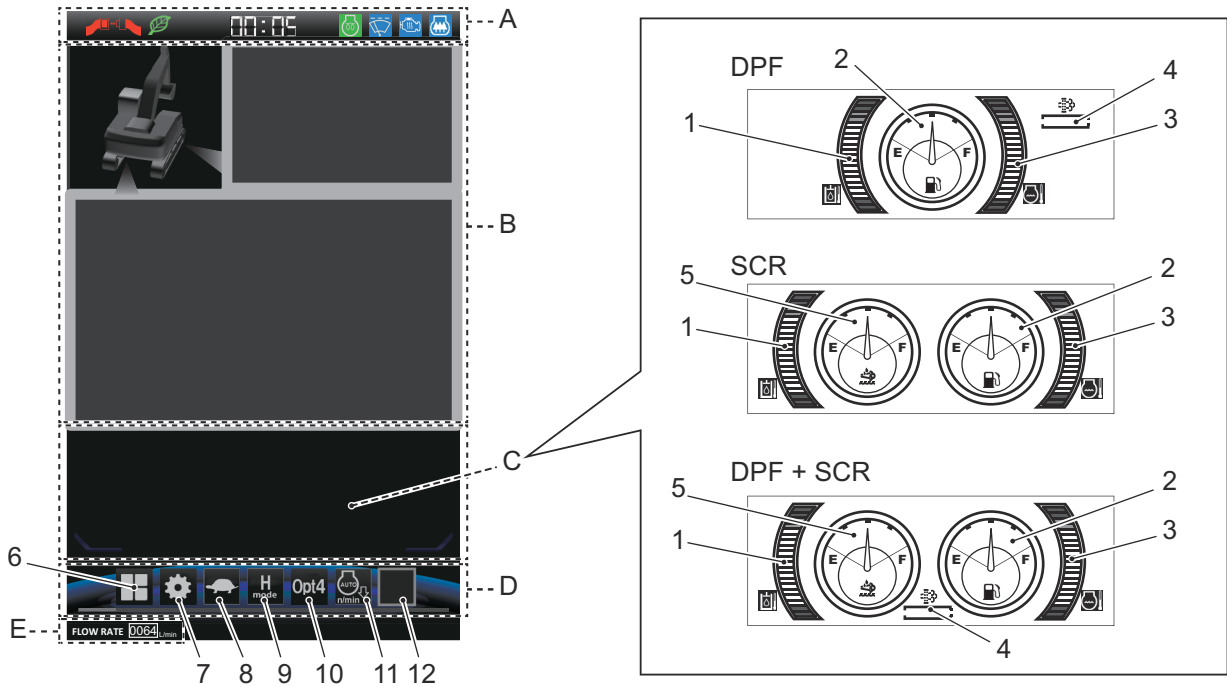
[2. MACHINE FAMILIARIZATION]

Item	Name	Item	Name
1	Left control lever (with horn switch)	15	12V power supply
2	Right control lever	16	Starter switch
3	Control lock lever	17	Engine throttle
4	Left travel lever	18	Working light switch (Boom and Deck)
5	Right travel lever	19	Cap (for option switches)
6	Left travel pedal	20	Emergency accel
7	Right travel pedal	21	Swing parking brake release switch
8	Operator's seat	22	KPSS release switch
9	Life hammer	23	USB port/external input terminal (AUX)
10	Hour meter	24	Switch box
11	Fuse and relay box	25	Cup holder
12	Monitor	26	Smartphone holder
13	Radio	27	Dozer control lever (Travel speed select switch)
14	HVAC control panel		

2.3 MONITOR

2.3.1 HOME SCREEN

Describe what is displayed on the home screen.



Symbol	Display	
A	Notification icons/clock	
B	Images from the rearview and side cameras are displayed.	
C	Meter	1 Hydraulic oil temperature
		2 Fuel level meter
		3 Engine coolant temperature meter
		4 Soot deposition meter
		5 DEF/AdBlue level gauge
D	Switch	6 Settings menu
		7 Switch settings
		8 Travel speed switching
		9 Work mode selection
		10 Attachment mode switching
		11 Auto acceleration ON/OFF switching
E	Set flow rate of front attachment Under light load, the flow rate is displayed as the set value.	12 Optional display area

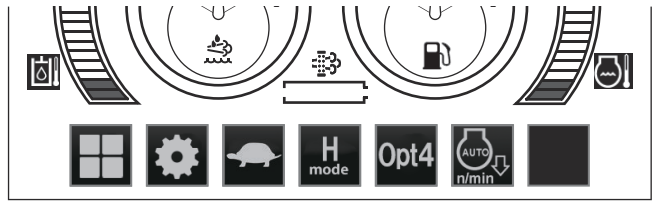
Notice

The display in part C differs depending on the type of exhaust gas cleaning device. Subsequent descriptions in this manual will use the DPF+SCR display.

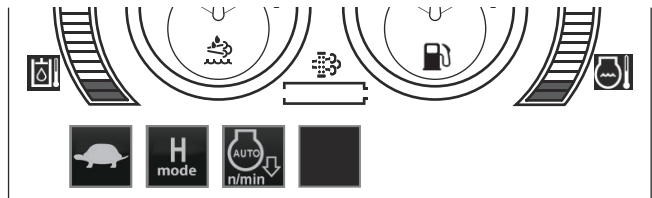
2.3.2 SWITCH DISPLAY

The switch displayed on the monitor changes as shown in the following figure, depending on whether the control lock lever is in the "LOCKED" or "UNLOCKED" position.







When pulling up the lever to the "LOCKED" position



When pushing the lever down to the "UNLOCKED" position



2.3.3 NOTIFICATION ICONS

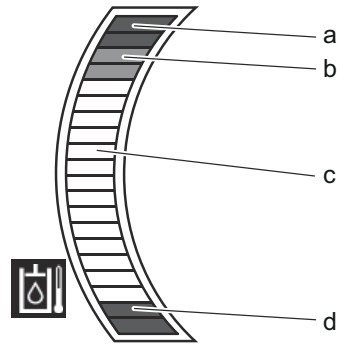
Display	Overview
	Seat belt display This is displayed for 5 seconds after the starter switch is turned "ON".
	Displayed when fuel consumption is low.
	Displayed while auto idle stop is enabled.
	Displayed while glow plugs are energized.
	Displayed during automatic warming-up.
	Displayed while the wipers are operating.

2.3.4 HYDRAULIC OIL TEMPERATURE METER

The meter shows the hydraulic oil temperature. After the starter switch is turned to the "ON" position, bars are displayed on the monitor.

As the hydraulic oil temperature rises, the bars increase.

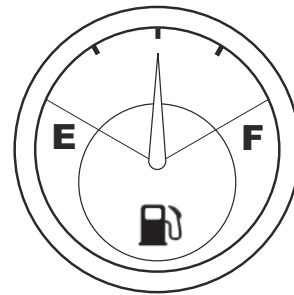
If the bars indicating a high temperature appear during operation, set the engine throttle to the low idle position, pull up the control lock lever to the locked(up) position, and do not perform any lever operations until the bars indicating a high temperature disappear and the bars are decreased to the normal temperature range(c).



Symbol	Color of bars	Temperature
a	Red	High temperature Warning sounds.
b	Orange	High temperature
c	White	Normal
d	Blue	Low temperature

2.3.5 FUEL LEVEL METER

The meter shows the amount of fuel in the fuel tank. After the starter switch is turned to the "ON" position, the fuel level meter is displayed on the monitor. The remaining amount of fuel is indicated with the pointer, and when the fuel level is low, the pointer indicates point E. When the fuel level is low, see "CHECKING FUEL LEVEL AND REFUELING" in Chapter 3 in the operation manual, and supply fuel.

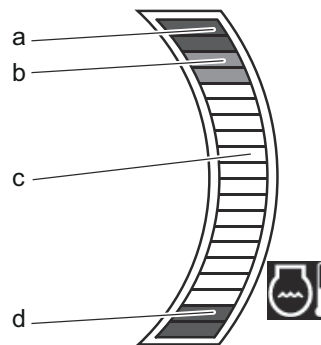


2.3.6 ENGINE COOLANT TEMPERATURE METER

The meter indicates the temperature of the engine coolant. After the starter switch is turned to the "ON" position, bars are displayed on the monitor.

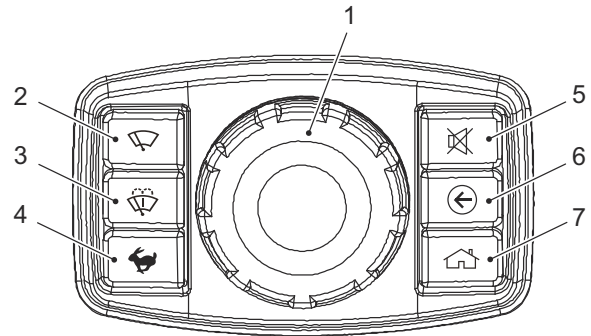
As the engine coolant temperature rises, the bars increase.

If the bars indicating a high temperature appear during operation, 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 bars indicating a high temperature disappear and the bars are decreased to the normal temperature range(c).



Symbol	Color of bars	Temperature
a	Red	Overheat Warning sounds. The engine speed becomes limited.
b	Orange	High temperature
c	White	Normal
d	Blue	Low temperature

2.3.7 SWITCH BOX



Item	Name	Function
1	Jog dial	Move the cursor on the monitor, switch between screens, etc.
2	Wiper switch	Operate the wipers.
3	Washer switch	Spray washer fluid onto the windshield.
4	Travel speed select switch	Toggle the travel speed.
5	Buzzer stop switch	Silence sounding buzzers.
6	Back button	Return to the previous screen on the monitor.
7	Home button	Return to the home screen on the monitor.

MONITOR OPERATION EXAMPLES

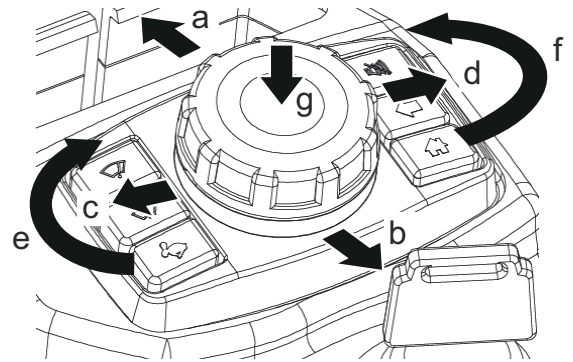
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



Cursor movement

<p>(c) Tilt the jog dial to the left (d) Tilt the jog dial to the right (e) Turn the jog dial clockwise (f) Turn the jog dial counterclockwise</p>	<p>(a) Tilt the jog dial forward (b) Tilt the jog dial backward</p>
	<p>(e) Turn the jog dial clockwise (f) Turn the jog dial counterclockwise</p>



Set procedure for adjustable values in each item

<p>To increase the value To significantly adjust values (a) Tilt the jog dial forward (d) Tilt the jog dial to the right To fine-tune values (e) Turn the jog dial clockwise</p>	<p>To decrease the value To significantly adjust values (b) Tilt the jog dial backward (c) Tilt the jog dial to the left To fine-tune values (f) Turn the jog dial counterclockwise</p>
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2.3.8 SETTING MENU SCREEN

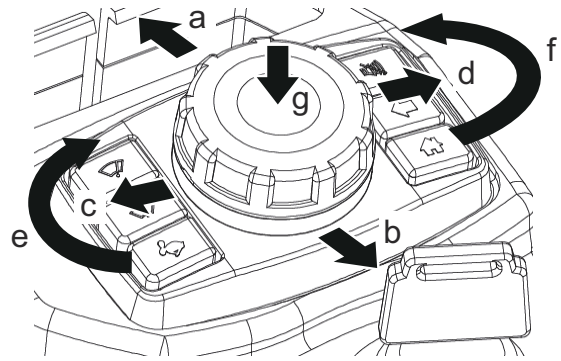
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

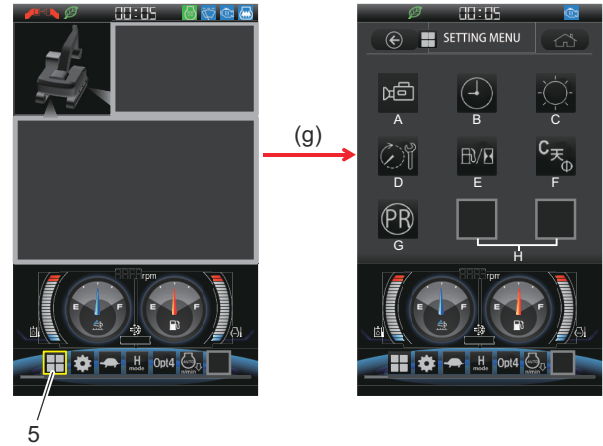
Move the cursor on the monitor, adjust values, etc.








Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Tilt and turn the jog dial to align the cursor with setting menu (5) on the monitor.
2. Push down (g) the jog dial to turn to the [SETTING MENU] screen.



Item	Icon	Setting details	Item	Icon	Setting details
A		PICTURE OF CAMERA	E		CONSUMPTION
B		CLOCK SETTING	F		SWITCHING LANGUAGE
C		SCREEN BRIGHTNESS	G		PRESSURE RELEASE
D		MAINTENANCE	H	-	Icons for optional attachments/equipment are available.

PICTURE OF CAMERA



Allows you to select the layout of the camera image displayed on the HOME SCREEN.

Camera image display layout

Layout 1	Layout 2	Layout 3
<p>(A) Rearview camera image (B) Right camera image</p>	<p>(A) Rearview camera image (B) Right camera image</p>	<p>Composite image of the right and rearview cameras</p>
Layout 4		
<p>Composite image of the left/right and rearview cameras</p>		



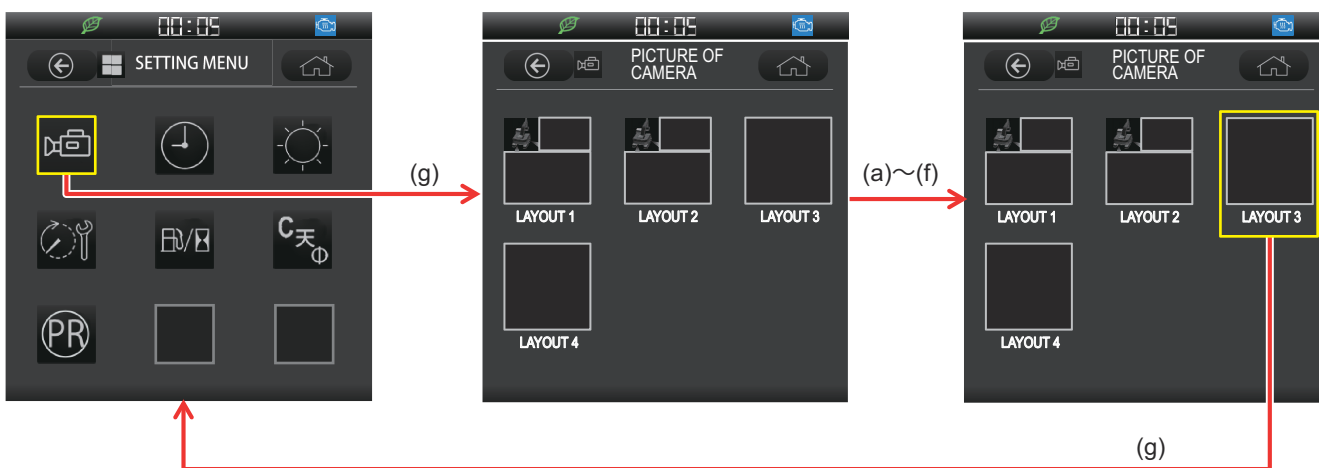
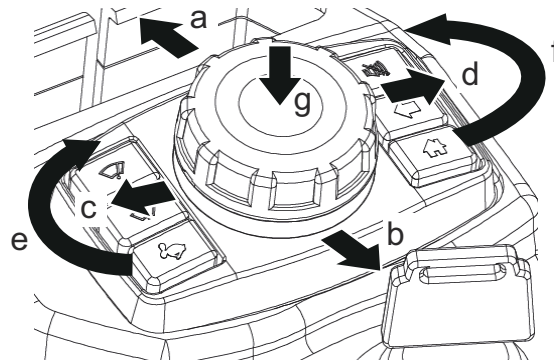
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Switch the monitor to the [SETTING MENU] screen.
2. Operate the jog dial to align the cursor with [PICTURE OF CAMERA] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to turn to the [PICTURE OF CAMERA] screen on the monitor.
4. Operate the jog dial to align the cursor with your preferred layout.
5. Push down (g) the jog dial to set to the selected layout and return to the [SETTING MENU] screen on the monitor.

CLOCK SETTING



You can set the clock.

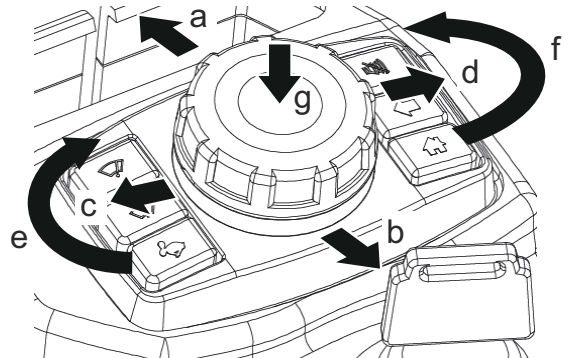
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



2



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [CLOCK SETTING] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to turn to the [CLOCK SETTING] screen.
4. Tilt or rotate the jog dial to align the cursor with the item you want to set.
5. Push down (g) the jog dial to enable the selected item to be adjusted.
6. Tilt and turn the jog dial to set the desired value.
7. Push down (g) the jog dial to set the value.
8. Tilt and turn the jog dial to align the cursor with [OK].
9. Push down (g) the jog dial to return to the [SETTING MENU] screen.

SCREEN BRIGHTNESS



You can adjust the screen brightness.

BRIGHTNESS(DAY)

Adjusts the screen brightness when the working light is turned off.

BRIGHTNESS(NIGHT)

Adjusts the screen brightness when the working light is turned on.

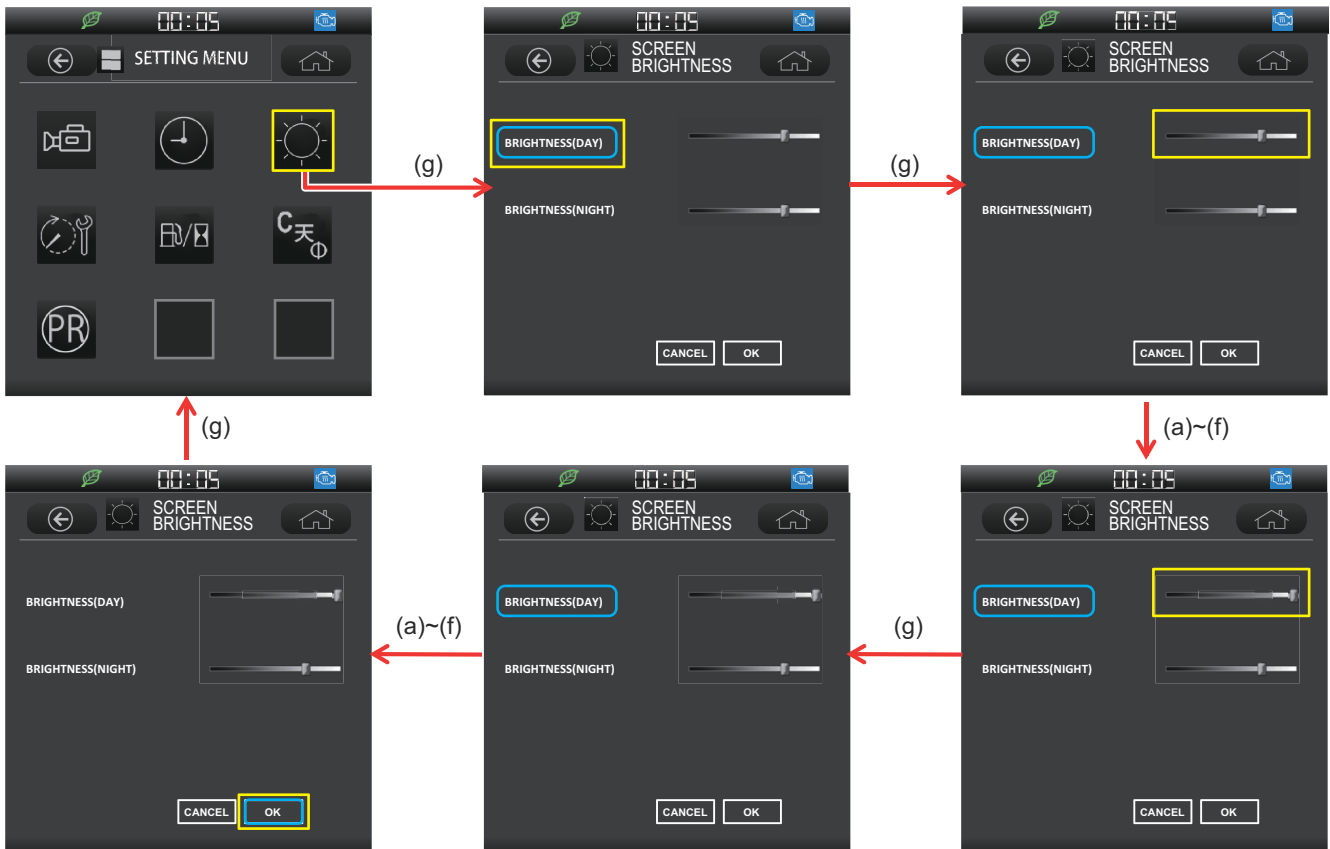
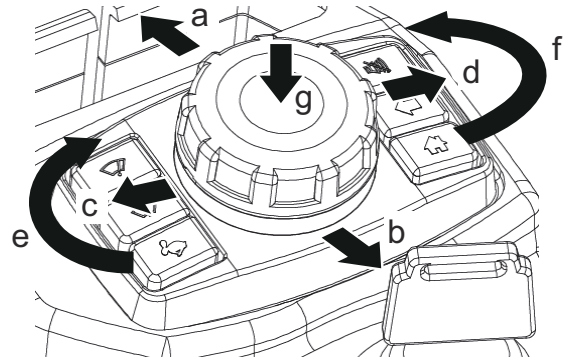
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [SCREEN BRIGHTNESS] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to turn to the [SCREEN BRIGHTNESS] screen.
4. Tilt or rotate the jog dial to align the cursor with the item you want to set.
5. Push down (g) the jog dial to enable the selected item to be adjusted.

6. Tilt and turn the jog dial and move the slider to the left and right to select the desired screen brightness.
7. Push down (g) the jog dial to set the screen brightness.
8. Tilt and turn the jog dial to align the cursor with [OK].
9. Push down (g) the jog dial to return to the [SETTING MENU] screen.

MAINTENANCE



Displays the remaining time until the scheduled filter/oil replacement interval. You can also set the next replacement interval.

When the replacement interval is reached, see Chapter 4 "INSPECTION AND MAINTENANCE" of the manual to perform inspection and maintenance.

If the replacement interval has passed

- A warning is displayed on the monitor.
- The remaining time indicator on the [MAINTENANCE] screen turns red.

Notice

You can make it so that a buzzer sounds if the replacement interval has passed, but this requires changing the machine settings.

Contact your KOBELCO authorized dealer if you need to change the machine settings.

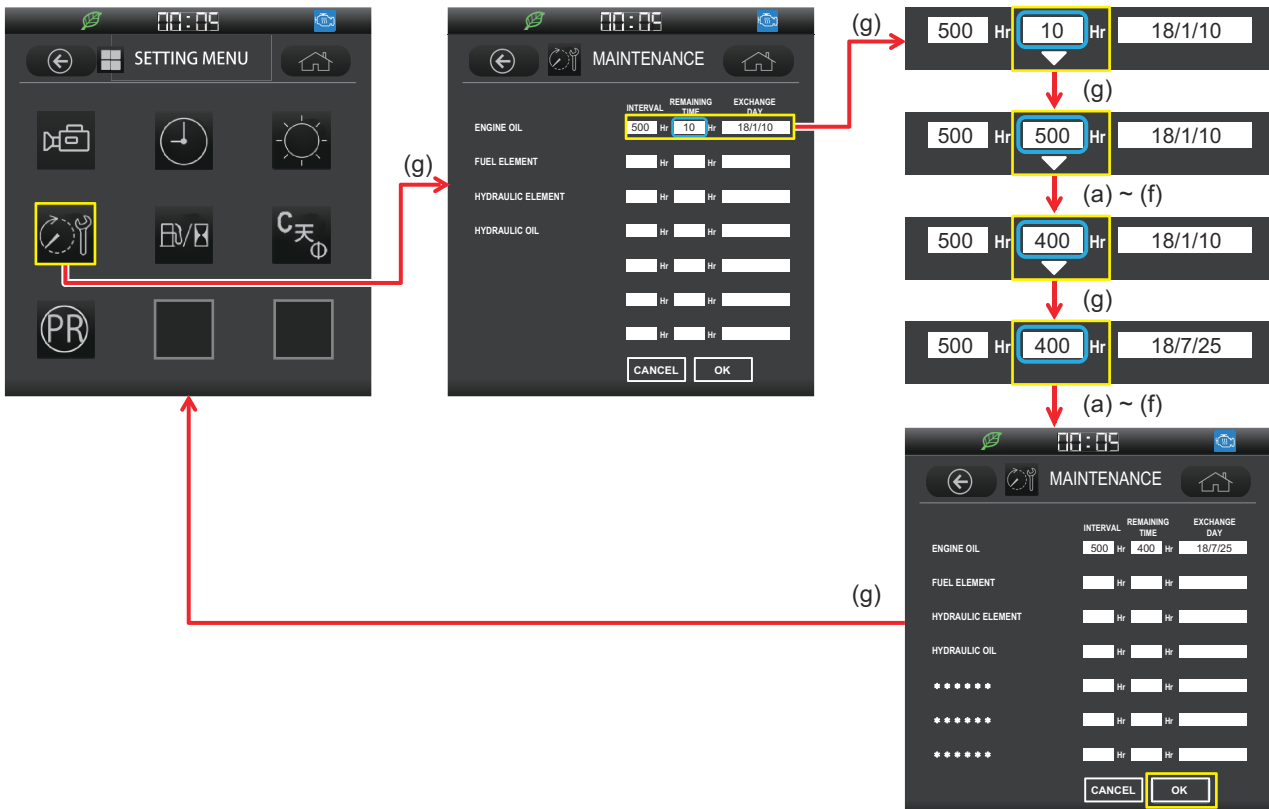
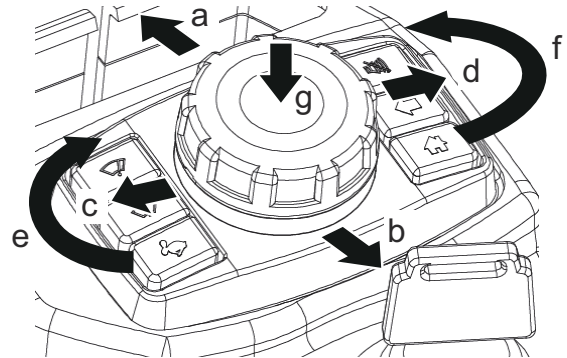
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [MAINTENANCE] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to turn to the [MAINTENANCE] screen.
4. Tilt or rotate the jog dial to align the cursor with [REMAINING TIME] of the item you want to set.
5. Push down (g) the jog dial to reset [REMAINING TIME], setting it to the same value as [INTERVAL], allowing you to adjust the selected item.
6. Tilt and turn the jog dial to set the desired value.
It will not be a value greater than [INTERVAL].
7. Push down (g) the jog dial to set the value.
At this time, [EXCHANGE DAY] is updated.
8. Tilt and turn the jog dial to align the cursor with [OK].
9. Push down (g) the jog dial to return to the [SETTING MENU] screen.

CONSUMPTION



You can set the consumption to be displayed on the monitor.

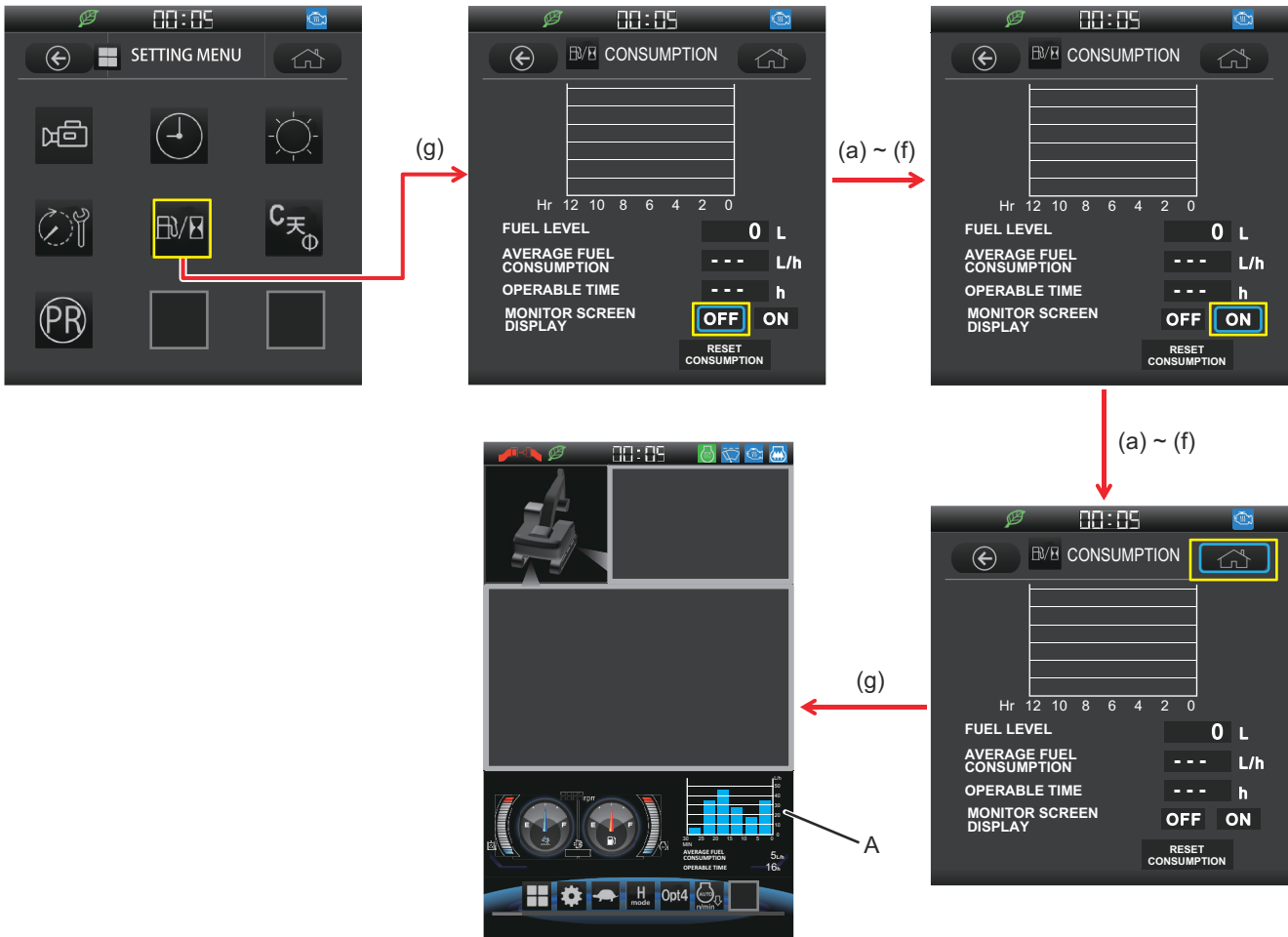
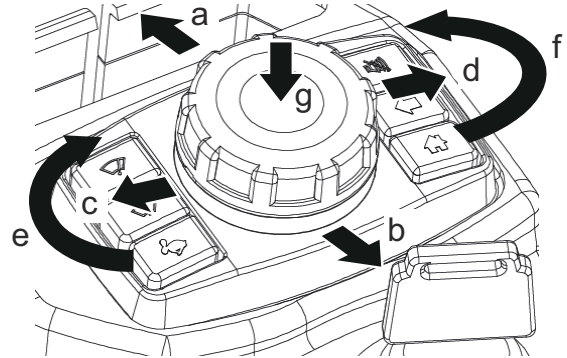
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [CONSUMPTION] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to switch to the [CONSUMPTION] screen on the monitor.
4. Tilt and turn the jog dial and move the cursor to [ON] for [MONITOR SCREEN DISPLAY].
5. Push down (g) the jog dial to switch to [ON].
6. Align the cursor with [HOME].
7. Push down (g) the jog dial to return to the home screen.
Fuel efficiency graph (A) is displayed on the home screen.

LANGUAGE SELECTION



You can set the language displayed on the monitor.

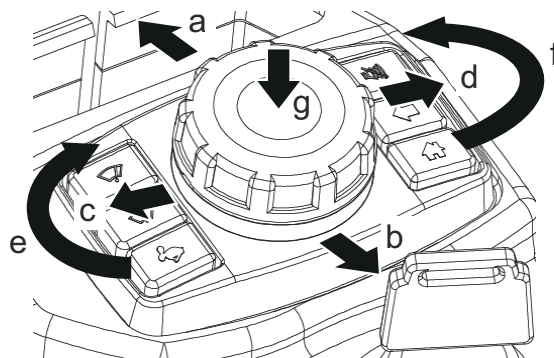
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

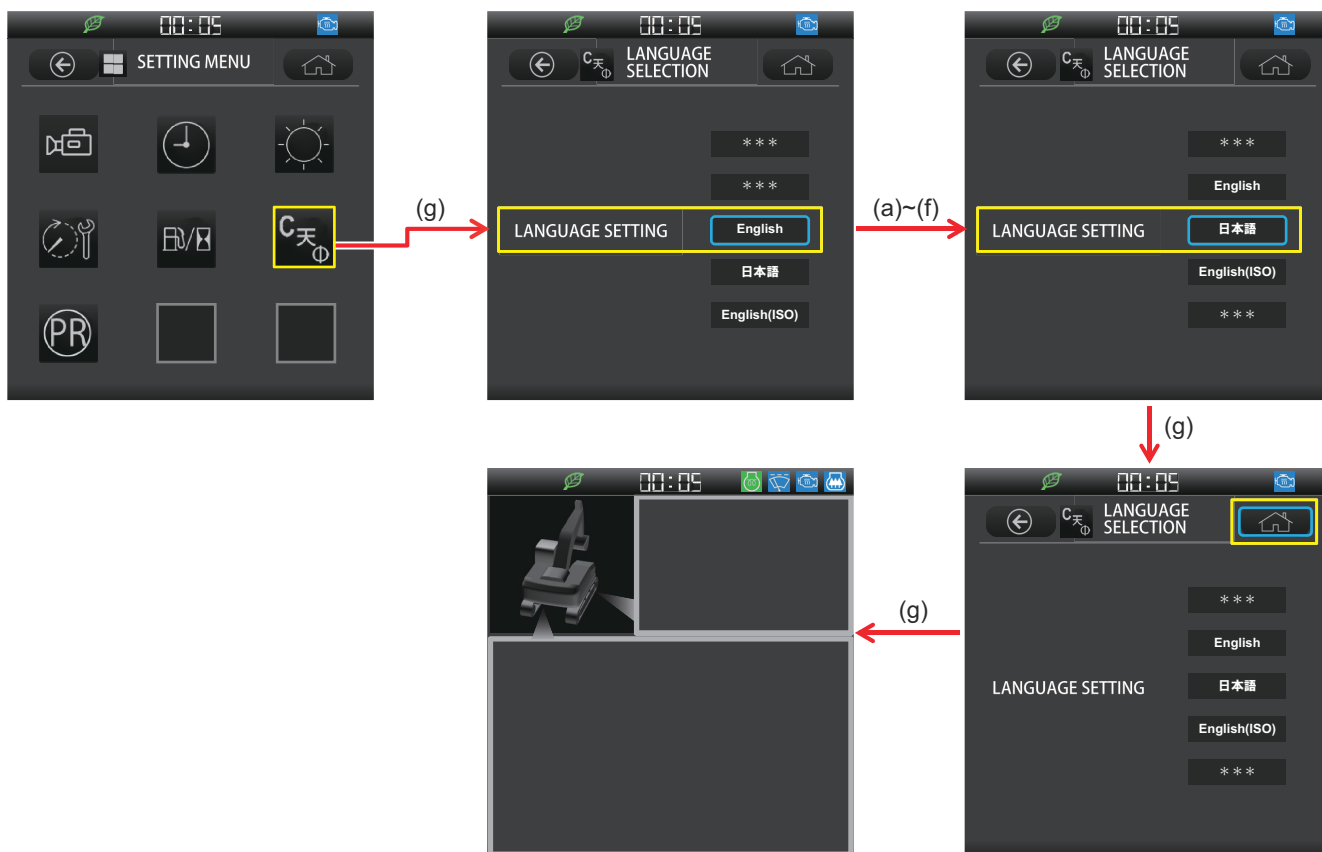
Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



2



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [LANGUAGE SELECTION] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to switch to the [LANGUAGE SELECTION] screen.
4. Tilt and turn the jog dial to move the cursor to [LANGUAGE SETTING].
5. Push down the jog dial (g) to enable language selection.
6. Tilt and turn the jog dial to select your desired language.
7. Push down (g) the jog dial to set the selected language.
8. Align the cursor with [HOME].
9. Push down (g) the jog dial to return to the [SETTING MENU] screen.

PRESSURE RELEASE



This is used to release the internal pressure within the hydraulic circuit.

For details, see "HYDRAULIC SYSTEM PRESSURE RELEASE" in Chapter 4 of the manual.

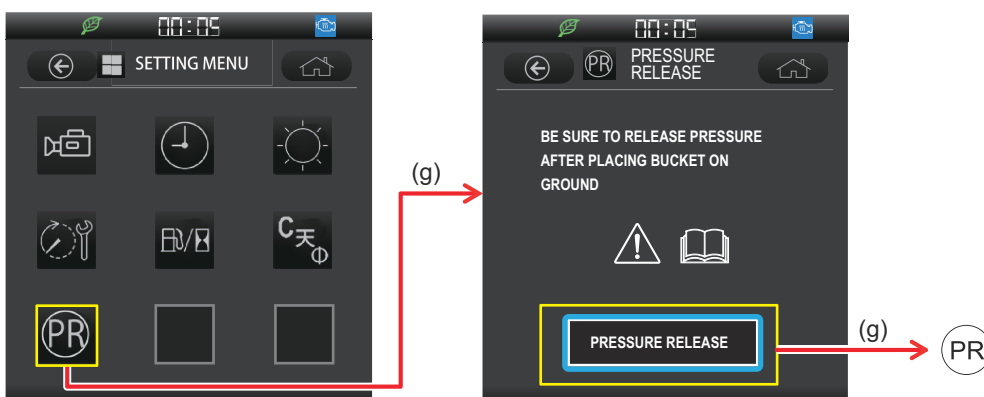
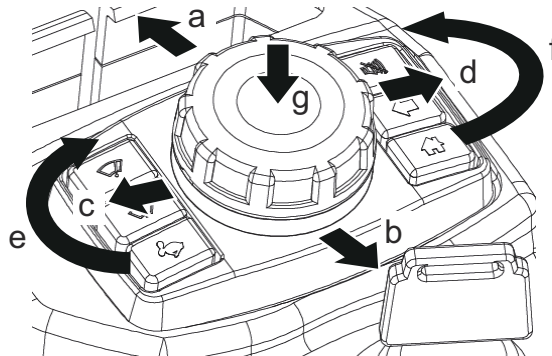
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Switch the monitor to the [SETTING MENU] screen.
2. Tilt and turn the jog dial and move the cursor to [PRESSURE RELEASE] on the [SETTING MENU] screen.
3. Push down (g) the jog dial to put the machine in pressure release mode.

Notice

Turn the key OFF and wait for five minutes or more until the internal pressure is completely released before you turn the key ON again.

If the key is turned ON immediately after it has been turned OFF, the internal pressure may not be released properly and the process may continue.

2.3.9 SWITCH SETTING SCREEN

Notice

Some settings cannot be selected without raising the control lock lever to the "LOCKED" position.

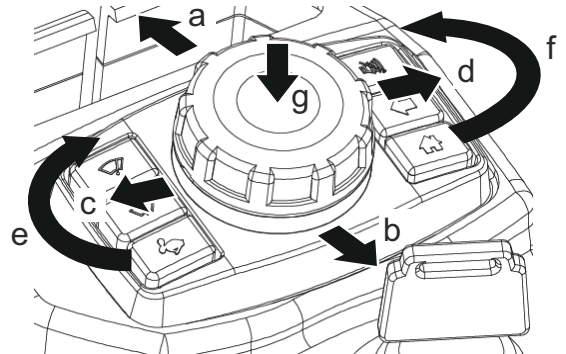
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

To move the cursor on the monitor and adjust the values and others.

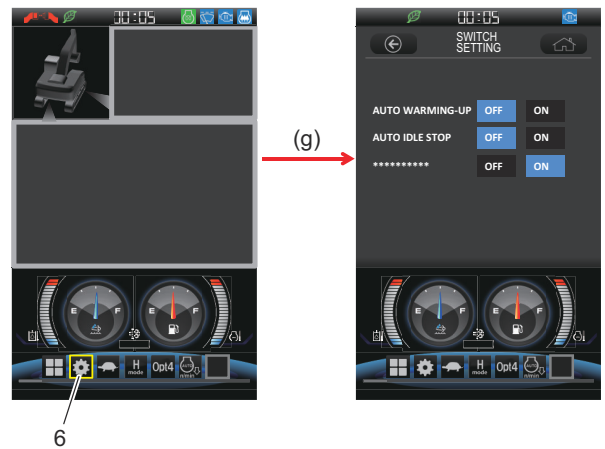
Pushing down (g) the jog dial

- To switch the screen to the selected setting screen.
- To determine the adjusted value and others.



2

1. Tilt and turn the jog dial to move the cursor to switch setting (6) on the monitor.
2. Push down (g) the jog dial to switch the monitor to the [SWITCH SETTING] screen.



AUTOMATIC WARMING-UP SETTINGS

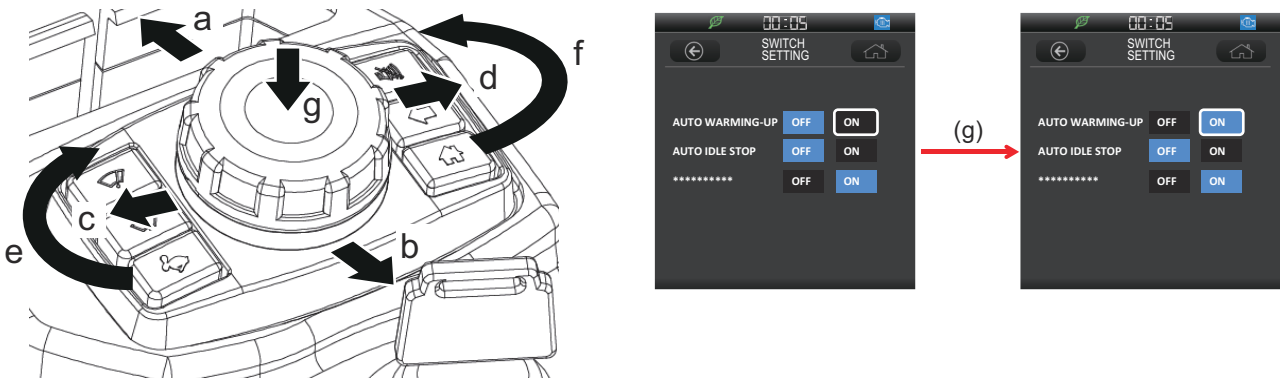
CAUTION

- Do not leave the operator's seat while automatic warming-up is active.
- During automatic warming-up, the attachment/equipment may move slowly toward the machine. This is not a failure.

Ensure there are no people or objects around, or entanglement or interference with the attachment/equipment may result.

Notice

Once [AUTO WARMING-UP] is set to [ON], there is no need to reconfigure it.



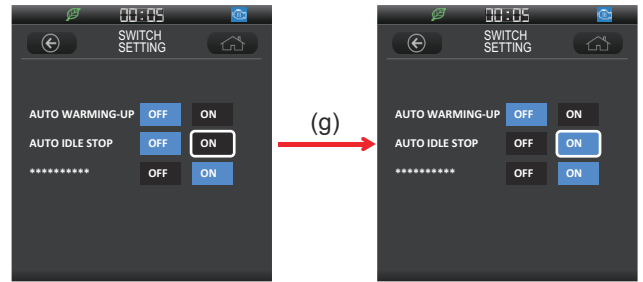
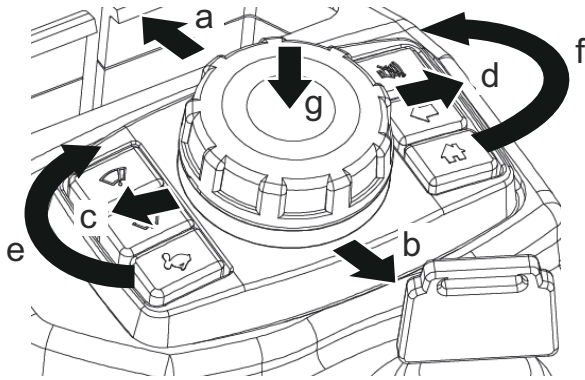
1. Tilt and turn the jog dial to align the cursor with [ON] for [AUTO WARM UP] on the monitor.
2. Push down (g) the jog dial to turn to [ON].
3. Store the change by turning the starter key switch "OFF" briefly.
4. Set the control lock lever to the "LOCKED" position.
5. When starting the engine from cold, automatic warming-up is activated and an icon is displayed on the monitor to show that the engine and hydraulic oil are warming up.
6. Once warming-up is complete, [WARMING-UP FINISHED] is displayed and there is a five-second buzzer to notify the operator.



Notice

- Turning the [AUTO WARMING-UP] setting [OFF] while the hydraulic oil is warming up will forcibly stop the warming-up process.
- While the hydraulic oil is warming-up, operating the control levers will temporarily interrupt the process. The warming-up is resumed if the control levers remain in their neutral positions for approximately 10 seconds.
- Automatic warming-up may start when the engine coolant temperature drops.

AUTO IDLE STOP SETTINGS



1. On the switch setting screen, move the cursor to "ON" for "AUTO IDLE STOP".
2. Select "AUTO IDLE STOP" to switch to "ON".
3. Store the change by turning the starter key switch "OFF" briefly.
4. When the starter key switch is turned "ON" again, the icon is displayed on the monitor.



Notice

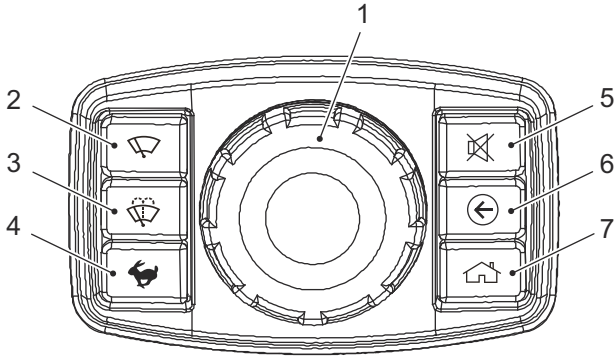
The auto idle stop time can be adjusted within the range of 30 to 999 seconds. Contact your KOBELCO authorized dealer for assistance changing the auto idle stop time.

2.3.10 TRAVEL SPEED SELECTION



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 (4) on the control panel and then the travel speed changes to the HIGH 2nd speed and the icon displayed on the monitor 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.

2.3.11 WORK MODE SELECTION

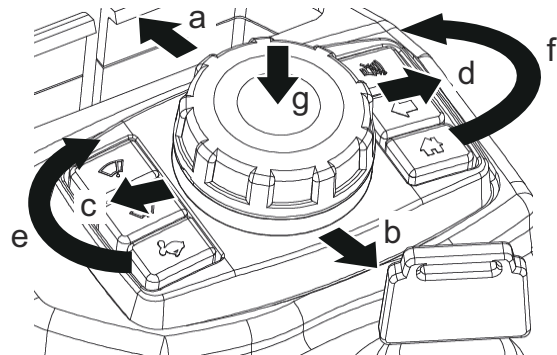
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

To move the cursor on the monitor and adjust the values and others.

Pushing down (g) the jog dial

- To switch the screen to the selected setting screen.
- To determine the adjusted value and others.



Select a proper work mode from three modes shown below according to the work condition and purpose.

Move the cursor to [work mode selection] (8) and push down (g) the jog dial to switch the mode.

S mode:

"S mode" is suitable for a standard digging work and loading operations. It provides good fuel consumption and is well-balanced with a workload.

ECO mode:

"ECO mode" focuses on reduced fuel consumption operation.

H mode:

"H mode" is suitable for a heavy digging work, which provides high speed and gives priority to a workload.



8

CAUTION

Before beginning the work, make sure the selected work mode is correct.

2.3.12 SWITCHING ATTACHMENT MODE

CAUTION








Always check that the selected mode is appropriate before starting work.

- Select an appropriate attachment mode for the front attachment installed on the machine. Performing work using an attachment mode unsuitable for the front attachment may damage the hydraulic components and front attachment.
- Always ground the attachment/equipment and ensure safety before changing the attachment mode.

Notice

Contact your KOBELCO authorized dealer if operability tuning is needed.

The attachment mode needs to be switched to suit the attachment/equipment currently in use.

Display	Attachment mode	Overview
	Bucket	Select this mode for digging work.
	Breaker	Select this mode when the attachment/equipment such as a breaker requires a single flow circuit.
	Nibbler (crusher)	Select this mode when the attachment/equipment such as a nibbler (crusher) requires a two-way circuit.
	Rotating grapple *	A mode designed for work with grapples and similar attachments.
	Processor *	A mode designed for work with processors and similar attachments.
	Thumb bucket *	A mode designed for work with thumb buckets and similar attachments.
	Rotary tilt *	A mode designed for work with rotary tilts and similar attachments.

*: Default settings are the same as for the nibbler (crusher) mode.

ATTACHMENT MODE SELECTION

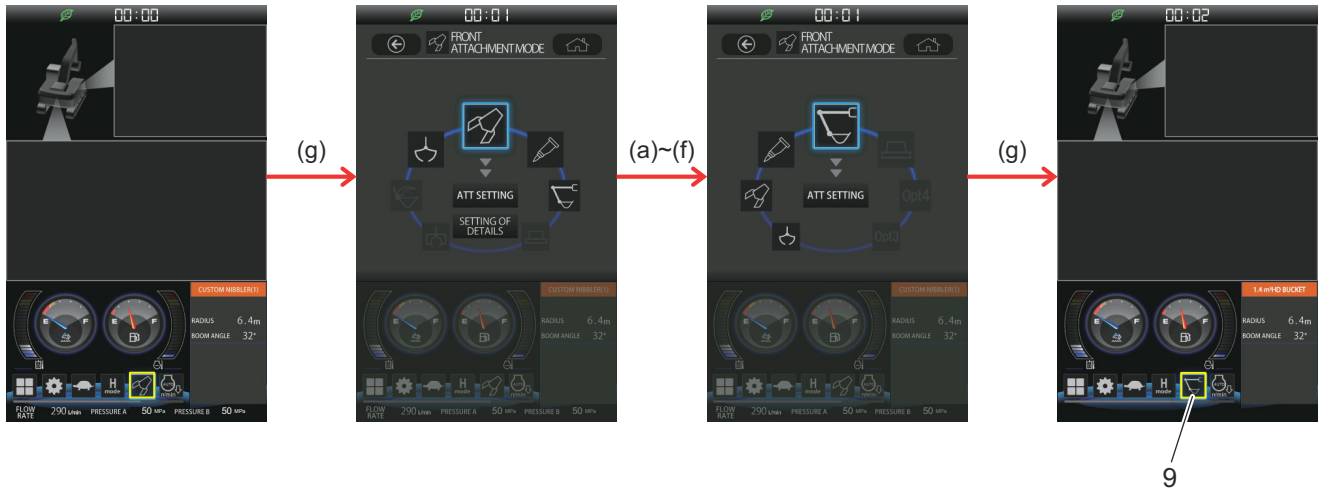
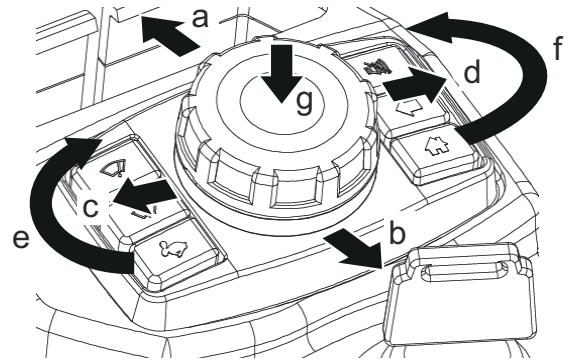
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

To move the cursor on the monitor and adjust the values and others.

Pushing down (g) the jog dial

- To switch the screen to the selected setting screen.
- To determine the adjusted value and others.



2

1. Tilt and turn the jog dial to move the cursor to attachment mode selection (9) on the monitor.
2. Push down (g) the jog dial to switch the monitor to the [FRONT ATTACHMENT MODE] screen.
3. Tilt and turn the jog dial to move the cursor to the icon of the front attachment being installed.
4. Push down (g) the jog dial to switch the icon of attachment mode selection (9) to the icon of the selected attachment.

SELECTING ATTACHMENT/EQUIPMENT SETTINGS (CUSTOM SETTINGS)

You can save up to five sets of flow rate and pressure set values for the attachment/equipment you use as "Custom" settings.

To select the "Custom" setting to apply or change the set values, follow the steps below.

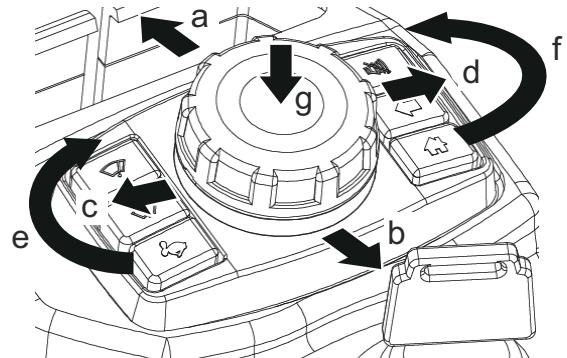
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pushing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Align the cursor with [ATT SETTING] for the selected icon.
2. Push down (g) the jog dial to switch the monitor to [ATT SETTING].
3. Operate the jog dial to align the cursor with your preferred custom setting.
4. Push down (g) the jog dial confirms the selection, and "SETTING IS COMPLETED" appears.
5. If you want to change the flow rate and pressure set values for the custom settings you have selected, perform "FLOW RATE ADJUSTMENT" and "PRESSURE ADJUSTMENT".

SETTING OF ATTACHMENT MODE DETAILS

Notice

Adjust them to a proper set value matching with an attachment to be used.

FLOW RATE ADJUSTMENT

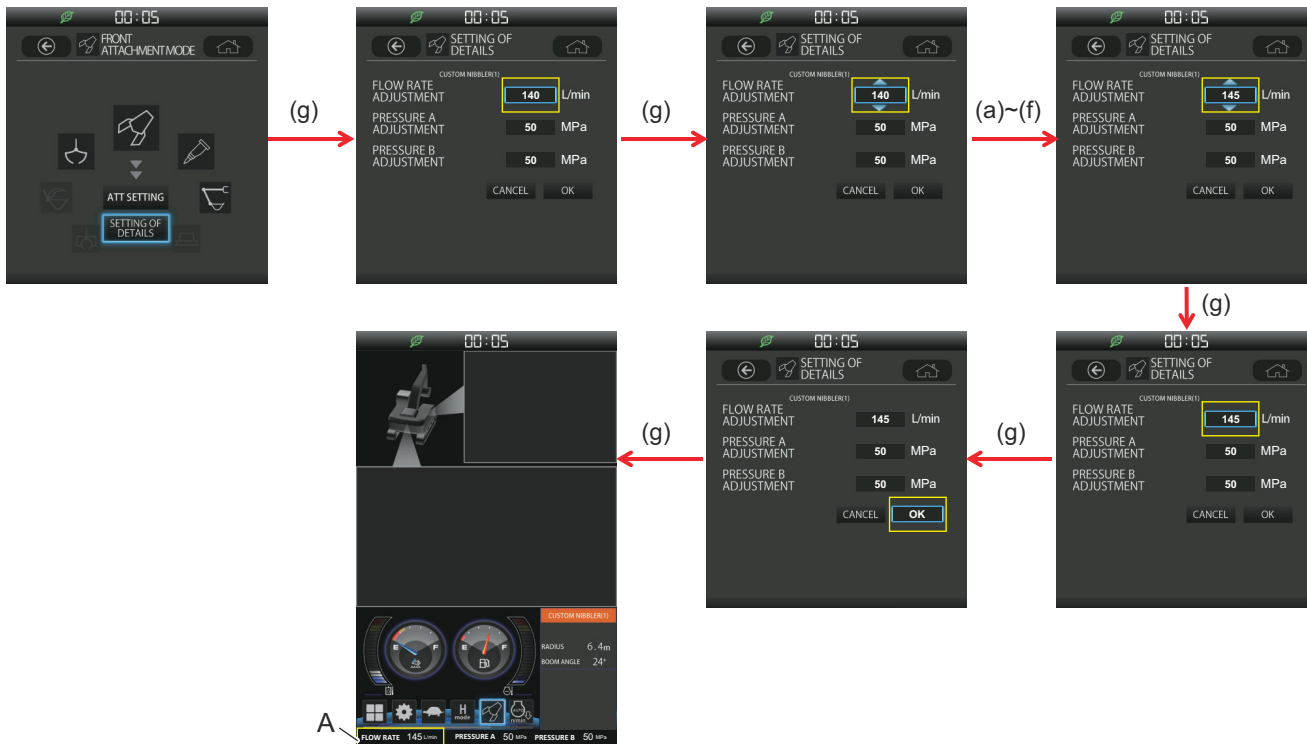
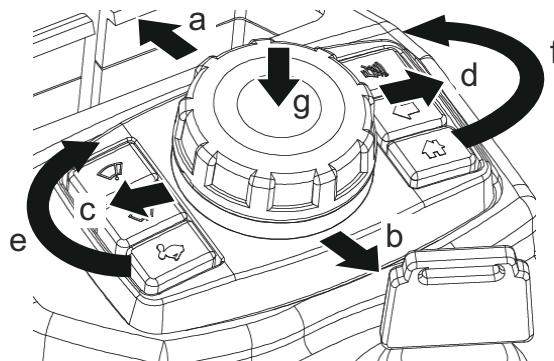
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

To move the cursor on the monitor and adjust the values and others.

Pushing down (g) the jog dial

- To switch the screen to the selected setting screen.
- To determine the adjusted value and others.



1. Move the cursor to [SETTING OF DETAIL] of the selected icon.
2. Push down (g) the jog dial to switch the monitor to the [SETTING OF DETAIL] screen.
3. Tilt and turn the jog dial to move the cursor to [FLOW RATE ADJUSTMENT].
4. Push down (g) the jog dial to enable the flow rate to be adjustable.
5. Tilt and turn the jog dial to a desired value.
6. Push down (g) the jog dial to set the desired flow rate.
7. Tilt and turn the jog dial to move the cursor to [OK].
8. Push down (g) the jog dial to return the monitor to the normal screen.
Set value (A) is displayed on the lower side of the screen.

PRESSURE ADJUSTMENT

The pressure of attachment/equipment can be adjusted by changing the [PRESSURE A ADJUSTMENT] or [PRESSURE B ADJUSTMENT] values. The high-pressure oil flowing to the right side of the attachment/equipment (as seen from inside the cab) is adjusted with [PRESSURE A ADJUSTMENT], and the high-pressure oil flowing to the left side is adjusted with [PRESSURE B ADJUSTMENT].

CAUTION

- Allow the hydraulic oil to warm up before making any adjustments. For the hydraulic oil warm-up operation, refer to "HYDRAULIC OIL WARMING-UP OPERATION" in Chapter 3 in the standard manual.
- Ensure that the stop valve on the arm is closed.
- Make adjustments at maximum engine speed.
- After making adjustments, ensure that the screen returns to the home screen before beginning work.

Notice

Some machine specifications only provide [PRESSURE B ADJUSTMENT].

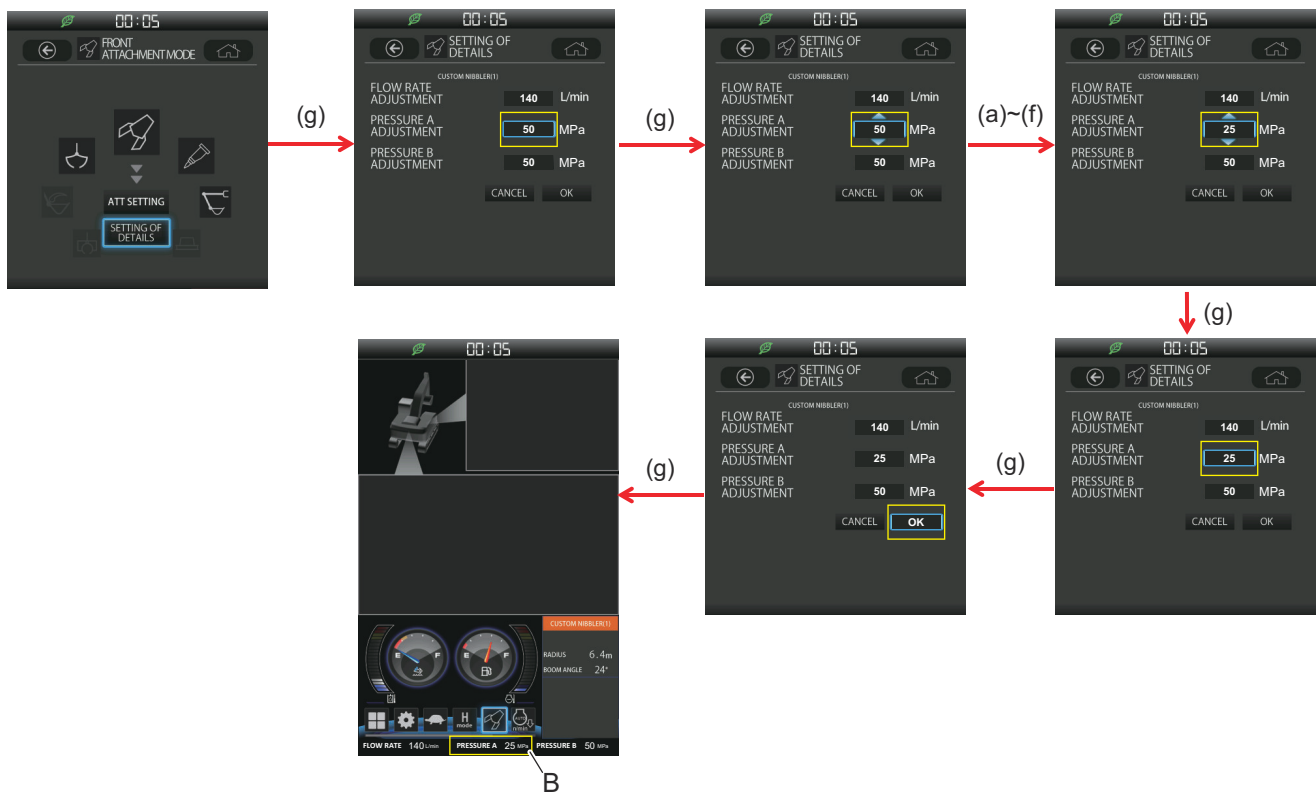
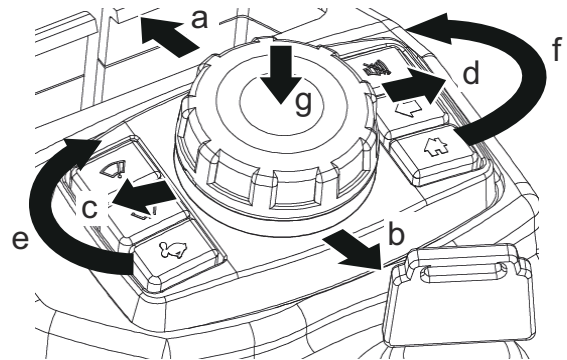
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

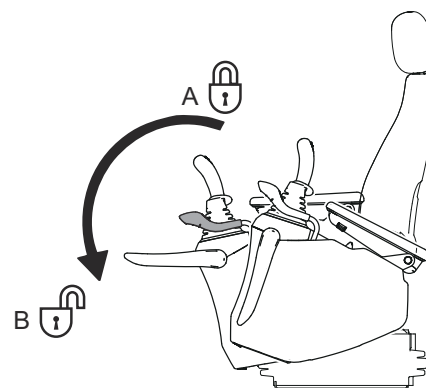
Pressing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



1. Align the cursor with [SETTING OF DETAILS] for the selected icon.
2. Push down (g) the jog dial to turn to the [SETTING OF DETAILS] screen on the monitor.

3. Tilt and turn the jog dial to align the cursor with [PRESSURE A ADJUSTMENT] or [PRESSURE B ADJUSTMENT].
4. Push down (g) the jog dial to enable adjustment of pressure.
5. Set the control lock lever to the "UNLOCKED" position (B).
6. Operate the target cylinder to allow pressure relief to take place.
"0" is displayed if no operation takes place.
7. Tilt and turn the jog dial to set the desired value.
8. Push down (g) the jog dial to set the pressure.
9. Tilt and turn the jog dial to align the cursor with [OK].
10. Push down (g) the jog dial to return to the home screen.
The adjusted value (B) is shown at the bottom of the screen.



2.3.13 AUTO ACCELERATION ON/OFF SWITCHING

The auto acceleration feature automatically reduces the engine speed after a certain period of inactivity, and then automatically restores it to its previous speed when operation resumes.



WARNING Loading/unloading the machine

When loading or unloading the machine on a trailer, turn the auto acceleration to [OFF].

The engine speed may change suddenly if loading/unloading is carried out with auto acceleration turned to [ON].

Notice

Auto acceleration lowers the engine speed under the following conditions.

- The engine throttle is not at low idle.
- The control levers and/or pedals are not operated for four seconds or more.

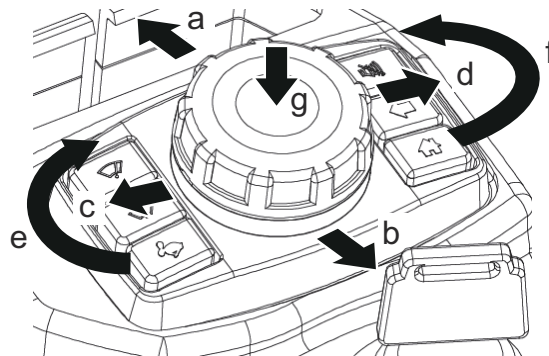
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

Move the cursor on the monitor, adjust values, etc.

Pressing down (g) the jog dial

- Switch the screen to the selected setting screen.
- Confirm adjusted values, etc.



[2. MACHINE FAMILIARIZATION]

Align the cursor with auto acceleration (9) and push down (g) on the jog dial to turn to [ON] and enable auto acceleration.

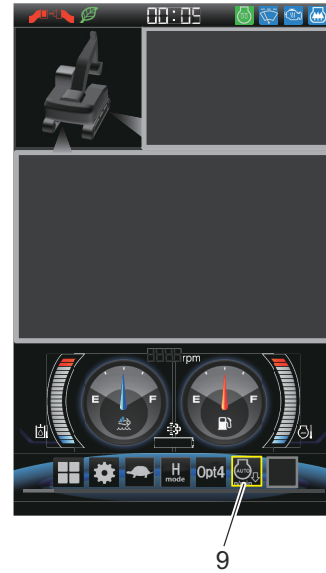
Push down (g) the jog dial again to turn to [OFF] and disable auto acceleration.

Auto acceleration lowers the engine speed under the following conditions.

- When the engine throttle position is set at a higher value than the range of the low speed.
- The control levers and/or pedals are not operated for four seconds or more.

When one or more of the control levers and/or pedals are moved, the engine speed gradually increases back to the set engine throttle level at a rate dependent on the amount of movement of the controls.

If auto acceleration is disabled while it is active, the engine speed will gradually increase back to the set engine throttle level.



Notice

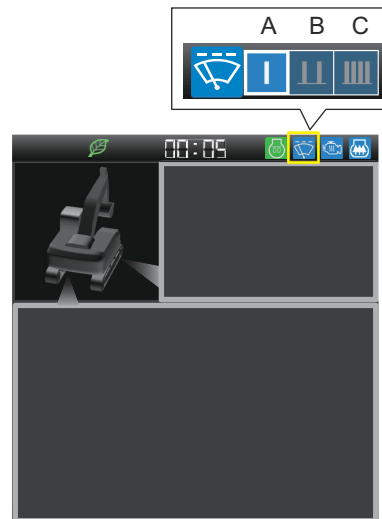
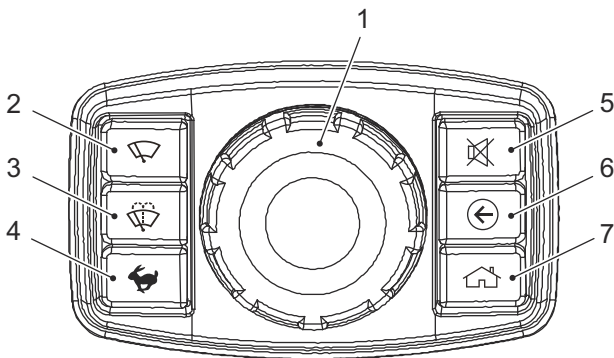
The settings are retained even if the machine is turned OFF and ON again.

2.3.14 WIPER SWITCH

To activate the windshield wipers, press wiper switch (2) on the switch box.

Press switch (2) to operate the windshield wipers.

Within ten seconds of pressing switch (2), operate jog dial (1) to select a function.



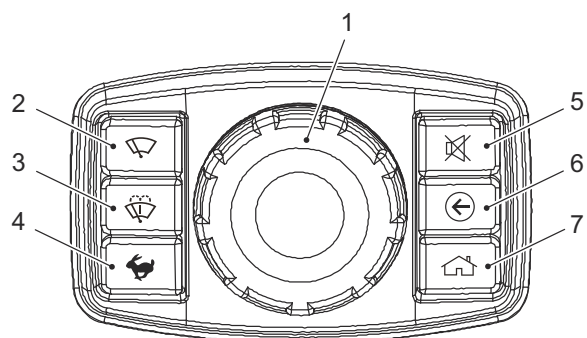
Symbol	Function
A	The wipers operate once.
B	The wipers operate intermittently.
C	The wipers operate continuously.

Press switch (2) again to stop the wipers.

2.3.15 WASHER SWITCH

While switch (3) is being pressed, the washer fluid is sprayed through the nozzle of front window.

The washer fluid reservoir is located under the floor plate inside the cab.

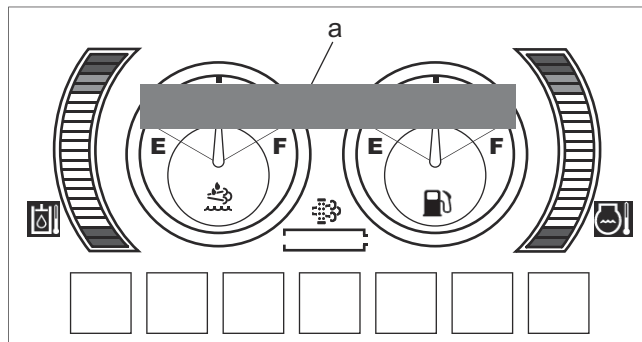
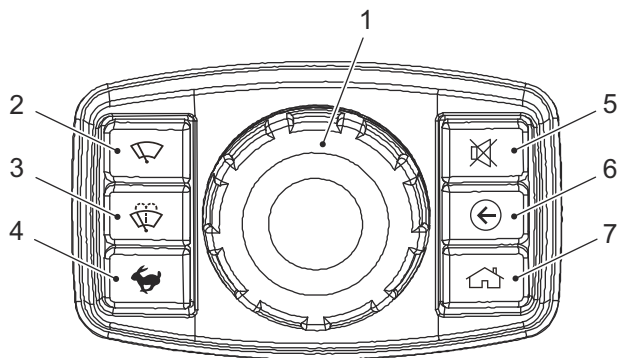


Notice

Make sure that the washer reservoir is filled with the washer fluid before operating the washer.

2.3.16 BUZZER STOP SWITCH

When warning (a) is displayed on the monitor and the buzzer sounds, press buzzer stop switch (5) to stop the buzzer of the items shown in the table.



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	Display contents	Description of warning	Buzzer				
			Automatic stop	Manual stop	Type	Starter key ON	Engine running
1	 CPU DATA COMMUNICATION ERROR	Mechatro Controller does not send data.	Unavailable	Available	3	○	○
1	 SWING BRAKE DISENGAGED	The swing parking brake release switch is switched to the "RELEASE LOCK" position.	Available (5 sec.)	Available	2	○	○
1	 ENGINE STOP	An emergency stop is performed due to low engine oil pressure.	Available (5 sec.)	Unavailable	1	○	—

Priority Group B

Level	Display	Warning Details	Buzzer				
			Auto Stop	Manual Stop	Type	Starter Key ON	Engine Running
1	 NIBBLER AND BREAKER SWITCHING FAILURE PARK AND REPAIR MACHINE	Displayed when the selector valve malfunctions.	Unavailable	Available	2	—	○
2	WARM FINISH WARM-UP	Displayed when automatic warming-up is done.	Available (5 seconds)	Unavailable	2	—	○
3	 LOW ENG OIL PRESS.	Displayed when the engine oil pressure reduces, and disconnection is detected.	Unavailable	Available	2	○	○
3	 COOLANT OVERHEATING	Displayed when the engine coolant temperature rises.	Unavailable	Available	3	○	○
3	 CLOGGED AIR FLTR	Displayed when the air cleaner element is clogged.	Unavailable	Available	3	○	○
3	I113	Self-diagnosis (failure on the pressure sensor, or the proportional valve, etc.)	Unavailable	Available	3	○	○

2.3.17 WARNING DISPLAY SCREEN






WARNING

Warning displays









If warnings are displayed on the monitor, it can lead to severe trouble. Stop the operation immediately, investigate the causes, and take proper measures.

- The warning display has an order of priority (A and B) and when trouble such as level 1 and 2 in priority (A) occur at the same time, level 1 is displayed in priority to level 2.
- Daily inspections should not consist of only checking a monitor screen, so be sure to perform inspections in accordance with the instructions in "INSPECTION AND MAINTENANCE".





Warning category list (Priority A)

Display	Level	Warning Details	Required Actions
 CPU DATA COMMUNICATION ERROR	1	Mechatro Controller does not send data.	Contact your KOBELCO authorized dealer for inspection/maintenance.
 SWING BRAKE DISENGAGED	1	The swing parking brake release switch is switched to the "RELEASE LOCK" position.	
 ENGINE STOP	1	An emergency stop is performed due to low engine oil pressure.	

Warning category list (Priority B)

Display	Level	Description of warning	Required action
 NIBBLER AND BREAKER SWITCHING FAILURE PARK AND REPAIR MACHINE	1	Displayed if the selector valve is not operating correctly.	The attachment installed on the hydraulic crusher machine and the breaker machine does not match the selected attachment mode. Reset the attachment mode selection switch to the correct work mode. Breaker mode: When using breaker Nibbler mode: When using hydraulic crusher machine If "SELECTOR FAULT" does not disappear even when the correct work mode is selected, contact your KOBELCO authorized dealer for inspection and maintenance.
WARM FINISH WARM-UP	2	Displayed when the automatic warming is complete.	The engine and hydraulic oil have been warmed up. Start the engine using the proper steps described in "STARTING ENGINE" in "3. MACHINE OPERATION."
 LOW ENG OIL PRESS.	3	<ul style="list-style-type: none"> Displayed when output reduction control is activated because the engine oil pressure is below the specified value. Displayed when an open circuit is detected. 	<ul style="list-style-type: none"> Immediately stop the engine and check the oil level and the area where the disconnection occurred. If this is not adequate, replace and refill using the specified engine oil as described in "LUBRICANT, FUEL & COOLANT SPECIFICATIONS." If the warning is displayed while the engine is not running, it may be due to a fault such as disconnected wiring. Contact your KOBELCO authorized dealer for repair.
 COOLANT OVERHEATING	3	Displayed if the coolant temperature is above the specified value.	Stop operations, set the engine speed to a low idle, reduce the coolant temperature and allow the engine to cool. If the warning does not disappear after a few minutes, switch off the engine and check the coolant level, fan belt tension and the radiator for clogging.
 CLOGGED AIR FLTR	3	Displayed if the intake air filter is clogged and engine output is reduced.	Inspect and clean the filter, and replace depending on the condition.
I113	3	Error codes are displayed in the event of a fault in the pressure sensor, proportional valve, etc.	Contact your KOBELCO authorized dealer for inspection and maintenance.
 CHARGE ERROR	4	The battery is faulty. (High / low voltage / charge failure) If the warning display does not disappear after the engine has been started, or if the warning displays during engine operation, the battery is not charging correctly.	Check the electrical component usage status and the charging circuit.
 LOW FUEL LEVEL	4	The fuel is below the specified quantity.	Be sure to refill with the specified fuel.
 HIGH HYD. OIL TEMP.	5	Displayed when the hydraulic oil temperature is abnormally high.	Stop work and contact your KOBELCO authorized dealer for inspection and maintenance.
WARM AUTO WARMING UP	5	Displayed when the automatic warming-up is in progress.	The automatic warming-up is in progress. Wait until the display indicates that warming-up is finished.
 CHANGE ENG OIL	5	Zero time remaining before engine oil change.	Refill with the specified amount of the specified new engine oil.

[2. MACHINE FAMILIARIZATION]

Display	Level	Description of warning	Required action
 LIFT UP LOCK LEVER BEFORE ENGINE START	5	Displayed when the starter switch is turned to the "START" position to start the engine while the lock lever is lowered.	Return the starter switch to the "ON" position and raise the safety lock lever to ensure safety. Turn the starter switch to the "START" position again and try to start the engine.
 CHANGE FUEL FLTR	5	Displayed when the time remaining to replace the fuel filter reaches zero.	Replace with a specified new fuel filter.
 CHANGE HYD. OIL FLTR	5	Displayed when the time remaining to replace the hydraulic oil filter reaches zero or when the filter is clogged.	Replace with a specified new hydraulic oil filter.
 CHANGE HYD. OIL	5	Displayed when the time remaining until hydraulic oil change is zero.	Change with specified new hydraulic oil.

2.3.18 DEVICE FOR DETECTING CLOGGING OF HYDRAULIC OIL FILTER

When the warning "CHANGING HYD. FILTER" appears on the monitor, replace the hydraulic oil filter. (For how to replace the filter, see "RETURN FILTER REPLACEMENT" in Chapter 4.)

Notice

During detection of hydraulic fluid clogging, the pump operating sound will increase for approximately three seconds while the control lever is in neutral position. This is not an abnormality.

1. To clear the warning, reset the return filter maintenance time on the monitor. (Default value: 1,000 hrs.)
(For how to set the maintenance time, see "MAINTENANCE" in Chapter 2.)
2. After completing step 1, the warning will be automatically cleared once you have been working for a while.



CHANGE HYD. OIL FLTR

2.4 HANDLING OF SWITCHES AND METERS

2.4.1 STARTER KEY SWITCH

This is the switch used to start and stop the engine.

1. OFF (Stop):

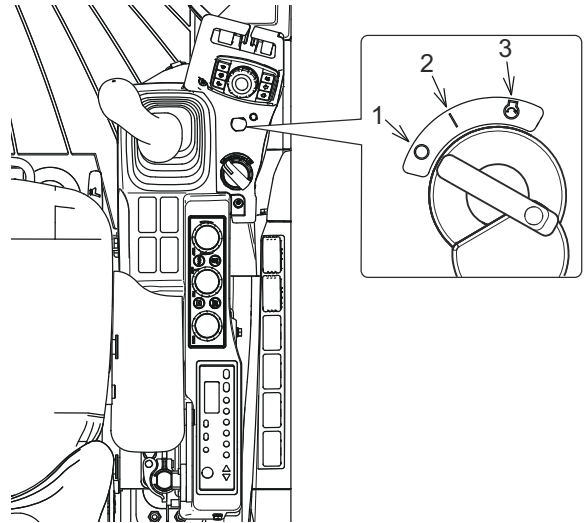
When the switch is in this position, the starter key can be inserted or removed. Before restarting or stopping the engine, turn the starter key to the "OFF" position.

2. ON (Power):

All electrical circuits are energized. During operation, the starter key switch should be in this position.

3. START:

Turn the key switch to the "START" position to start the engine. Once the engine has started, release the key immediately. The switch will automatically return to the "ON" position.



2.4.2 ENGINE THROTTLE

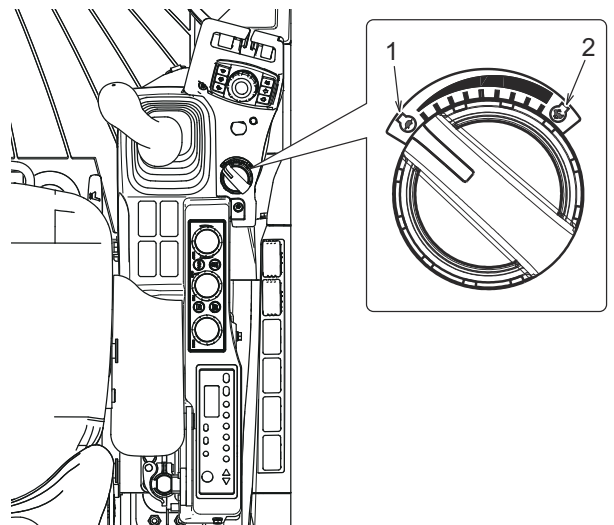
This dial adjusts the number of engine speed (output). This is a dial type rotary switch and a continuous adjustment type. If you release the dial at a rotated position, it stops at that position, and maintains assigned engine speed.

1. LO (Low idle)

The number of engine speed is minimum at the end of left rotation.

2. H (High idle)

The number of engine speed is maximum at the end of right rotation.



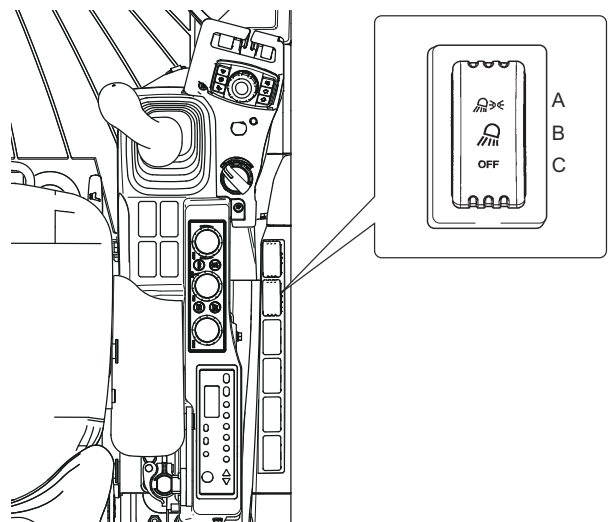
2.4.3 WORKING LIGHT SWITCH (BOOM, DECK, COUNTERWEIGHT)

Press the switch to turn on or off the working light.

A: Turn on the boom, deck and counterweight work lights.

B: Turn on the boom and deck work lights.

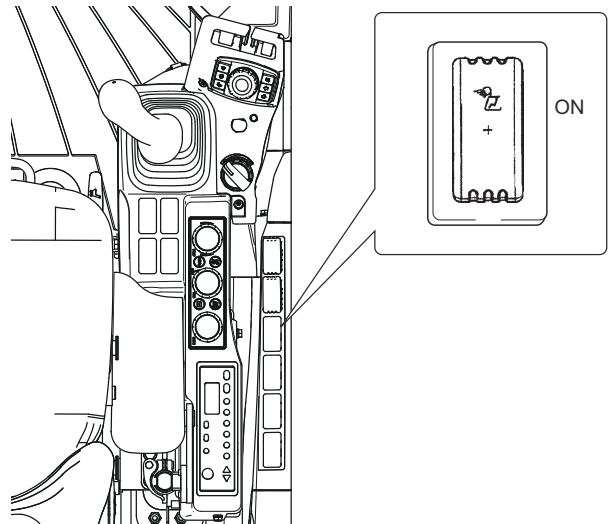
C: Turn off the boom, deck and counterweight work lights.



2.4.4 WORKING LIGHT SWITCH (CAB LIGHT)

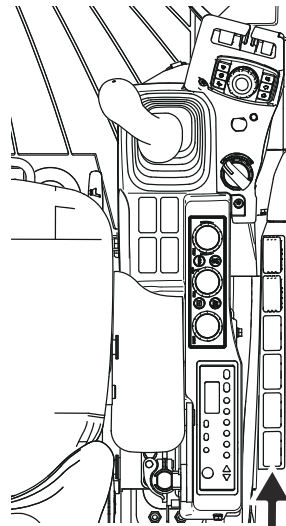
Push the switch to turn on the working light of the cab.

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



2.4.5 CAPS (FOR OPTION SWITCHES)

These are locations for installing optional switches.

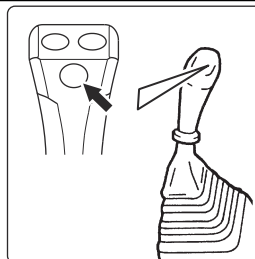


2.4.6 HORN SWITCH

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.

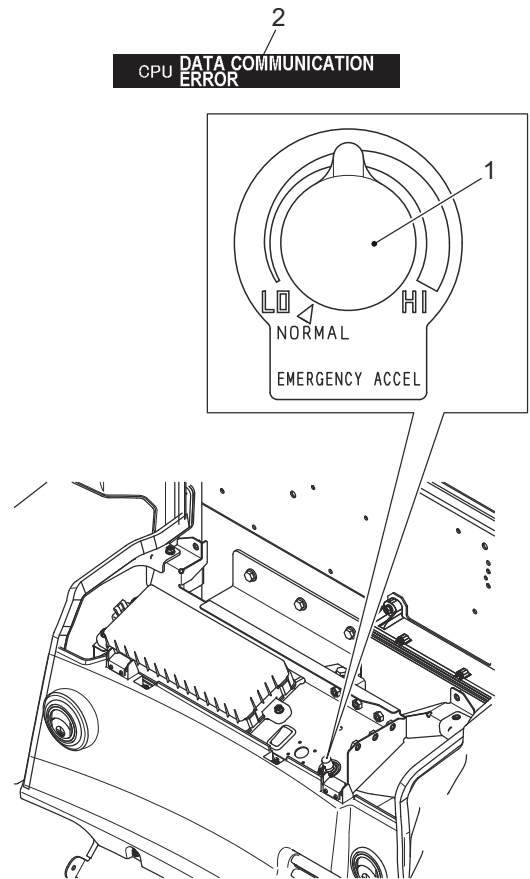


2.4.7 EMERGENCY ACCEL

This dial is used when the controller that controls this machine has trouble. When the engine speed cannot be adjusted with the engine throttle due to controller trouble, operate this emergency accel (1) to adjust the engine speed.

Under normal conditions, do not operate emergency accel (1).

When controller warning (2) is displayed on the monitor, contact your KOBELCO authorized dealer.



2

OPERATION PROCEDURES

When operating the emergency accel, follow the procedures below.



HOW TO HANDLE EMERGENCY ACCEL

Be sure to follow the procedures for the emergency accel. Because the engine speed may rise suddenly when the engine starts, and it is extremely dangerous.

1. Stop the engine, and set emergency accel (1) to "NORMAL".
2. Start the engine.
3. Turn emergency accel (1) to the HI side to adjust the engine speed.
4. When stopping the engine, set emergency accel (1) to "NORMAL".

2.4.8 SWING PARKING BRAKE RELEASE SWITCH



SWING PARKING BRAKE RELEASE SWITCH

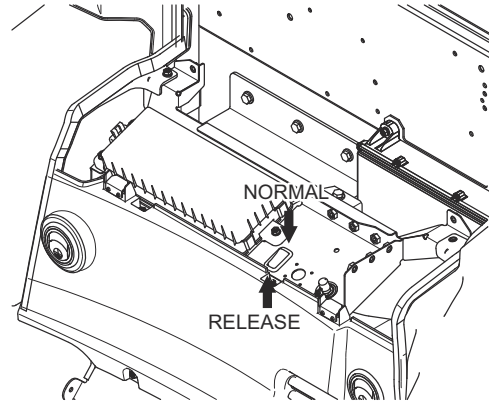
Do not operate the swing parking brake release switch on slopes and soft grounds.

The upper structure may turn unexpectedly and it is significantly dangerous.

This switch is used only when the swing parking brake cannot be released due to trouble. Set this switch to "RELEASE" to release the brake.

Generally, the switch should be on "NORMAL".

When trouble is found in the swing parking brake systems, contact your KOBELCO authorized dealer promptly.



2.4.9 KPSS RELEASE SWITCH OR KPSS RELEASE CONNECTOR

If a failure occurs in the controller controlling the machine, the warning shown below is displayed on the monitor.

CPU

CAUTION

When the warning shown above is displayed on the monitor, immediately contact your KOBELCO authorized dealer.

If the machine cannot be operated due to a failure of the controller and needs to be moved, or the machine position needs to be changed, release the KPSS to temporarily operate the machine.

CAUTION

- Release the KPSS only when a controller failure occurs and temporal operation of the machine is required.
- In cases other than described above, do not release the KPSS.
- In some cases, the machine may not be operated even though the KPSS is released, according to the cause of failure.

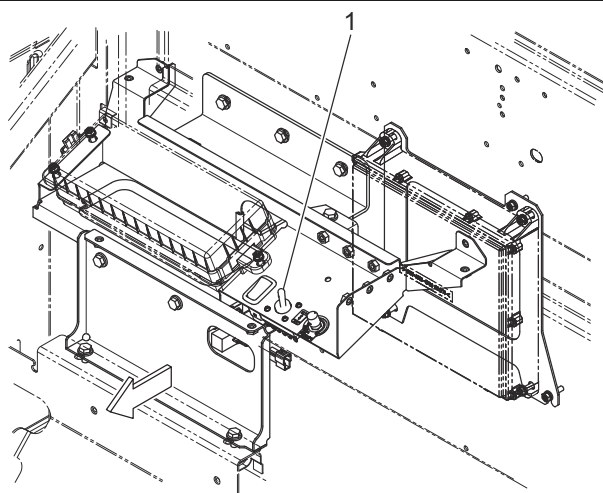
Notice

After the KPSS is released, the speed of the machine at operation is limited.

Some machines are equipped with the KPSS release switch, and some machines are equipped with the KPSS release connector.

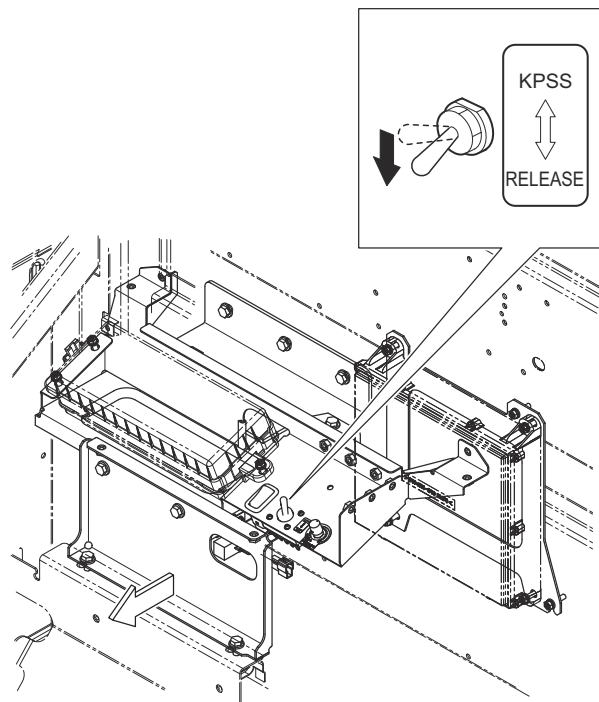
KPSS release switch (1) is installed behind the operator's seat. If this switch is not installed, the KPSS release connector is installed.

The releasing procedure is different in each device.



RELEASING KPSS BY KPSS RELEASE SWITCH

1. Push the KPSS release switch to the "RELEASE" side.
2. Move the machine or change the machine position.

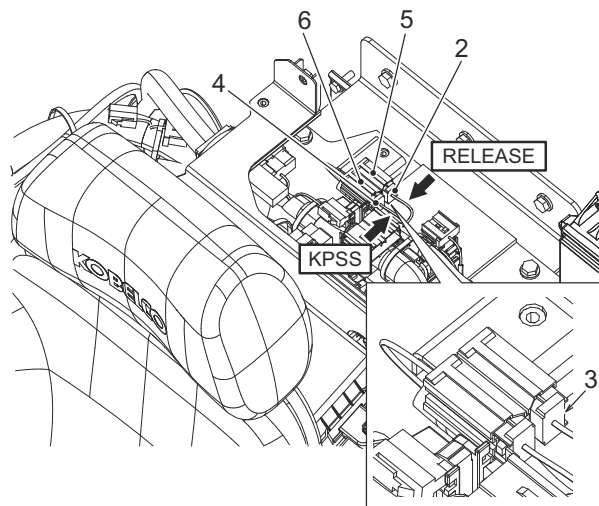


RELEASING KPSS BY KPSS RELEASE CONNECTOR

Replace the "KPSS release connector" according to the following procedure.

The KPSS release connector can be found if the cover at the rear side of the seat is removed.

1. Pull out connector (2) with the "RELEASE" tag while pushing click (3).
2. Similarly, pull out connector (4) with the "KPSS" tag while pushing the click, and insert it into cap (5) until it clicks.
3. Insert connector (2) with the "RELEASE" tag, which was pulled out in step 1, into connector (6) until it clicks.
4. Move the machine or change the machine position.

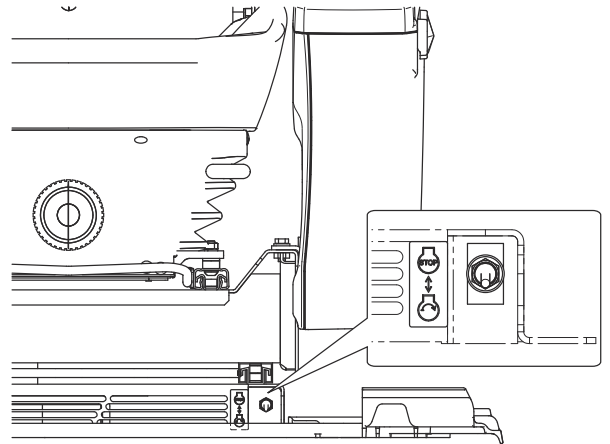


2.4.10 ENGINE STOP SWITCH

Notice

Do not use this switch to stop the engine under normal conditions.

When the engine does not stop due to trouble and damage of the machine even when turning the starter switch "OFF", lift up the switch near the lower left side of the seat to stop the engine. When not using this switch, always keep the switch down.



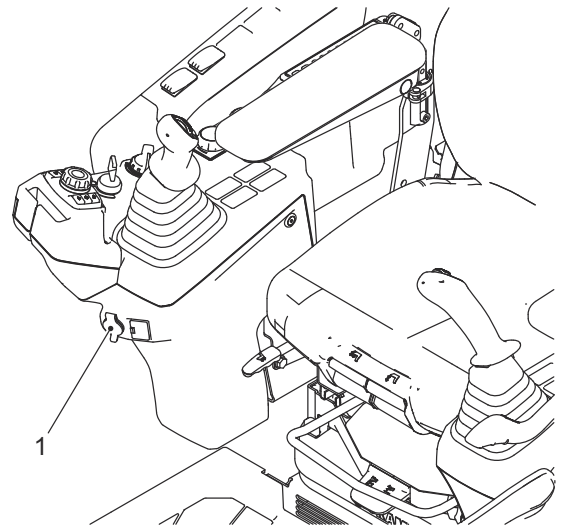
2

2.4.11 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



2.4.12 USB PORT/EXTERNAL INPUT TERMINAL (AUX)

Notice

- This part does not guarantee connection with all types of AUX terminals. Also, when each terminal does not match the inlet of this machine, connection is not available.
- For use of external sound devices, follow the manuals for them respectively.

Using the external input terminal (AUX), you can listen to music from a cell phone and external sound device.

The USB port and the external input terminal are located at the lower side of the right control stand inside the cab. When using them, open cap (1), and connect each cable (sold separately). When they are is not used, close cap (1).

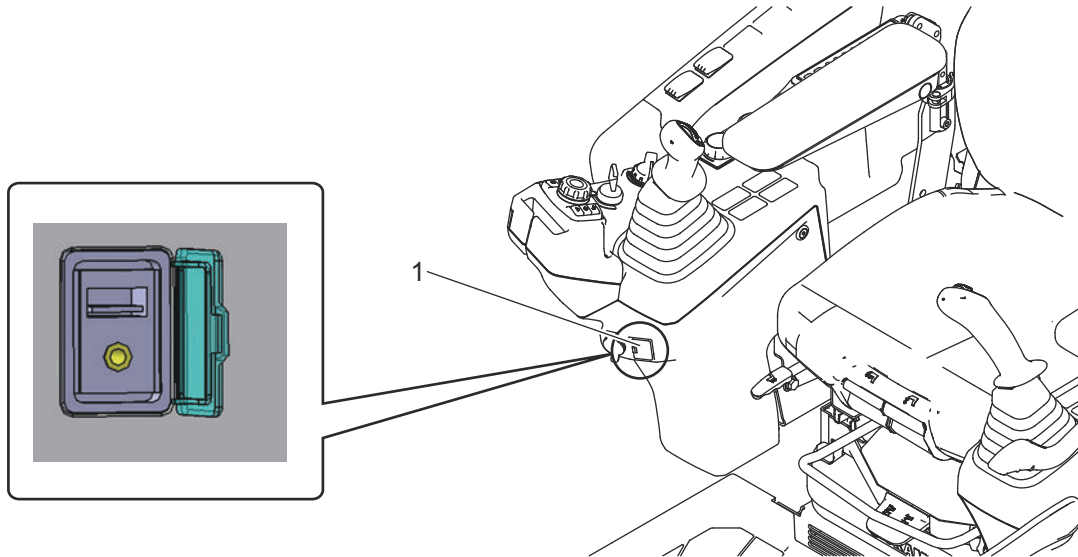
USB PORT

Charging is possible by connecting your cable to the USB connector (type A).

* Charging of all devices is not guaranteed.

EXTERNAL INPUT TERMINAL (AUX)

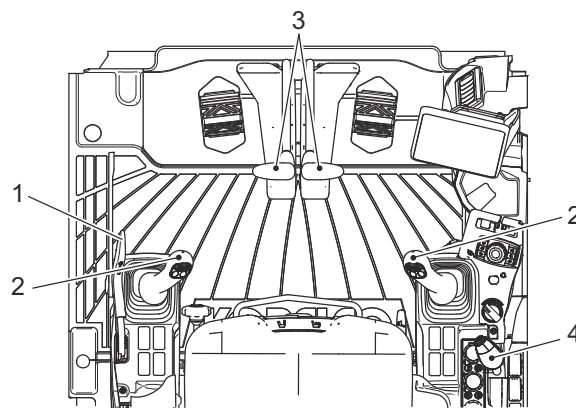
Connect a digital audio player, etc. to listen to music from the machine's speakers. For connection cables, see "HANDLING OF RADIO" in Chapter 2.



2.5 HANDLING OF CONTROL LEVERS AND PEDALS

2.5.1 LOCATION OF LEVERS AND PEDALS

- (1) Control Lock Lever
- (2) Operator Control Levers
- (3) Travel Levers
- (4) Operator Control Lever for Dozer



2.5.2 CONTROL LOCK LEVER

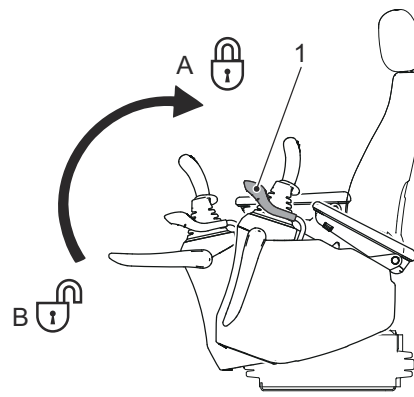


Control lock lever handling

- Do not stand up or move around while operating the machine, or inadvertent contact with the control levers may cause unexpected movement of the machine. If it is necessary to leave the operator's seat, make sure that the control lock lever is securely set to the "LOCKED" position.
- Failure to securely set the control lock lever in the "LOCKED" position could result in the controls not being locked. Check that the lever is in the "LOCKED" position shown in the figure.
- Be careful not to touch other levers inadvertently when releasing the lock. Touching other levers may cause danger due to unexpected machine movement.
- After completion of work or during transportation, always set the control lock lever to the "LOCKED" position.
- Do not hold the control lock lever while climbing in or out of the machine.

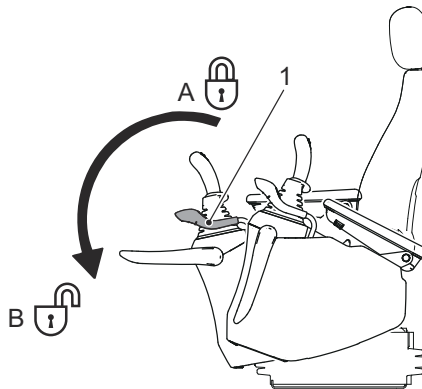
LOCKING HYDRAULIC SYSTEM

When the control lock lever is set to "LOCKED" position (A), the machine's operation functions are locked.



UNLOCKING HYDRAULIC SYSTEM

Set the control lock lever to "UNLOCKED" position (B) to unlock the machine operation function.



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

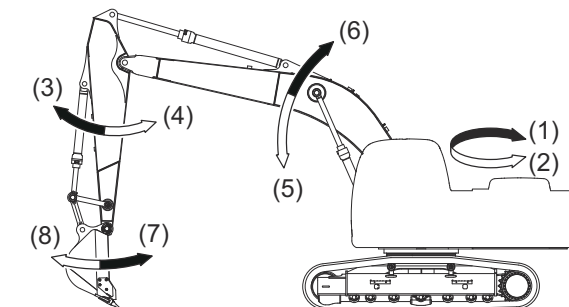
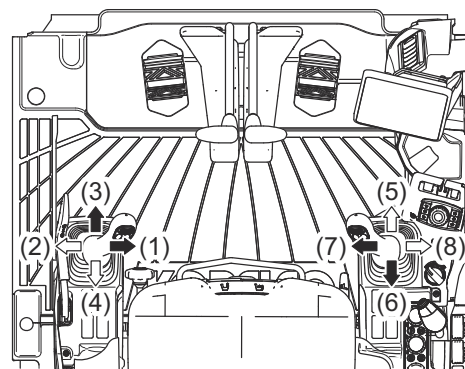
- (1) Swing right
- (2) Swing left
- (3) Arm out
- (4) Arm in

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 & PEDAL



HANDLING OF THE TRAVEL LEVER & PEDAL

- 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.
- If you put your foot on a pedal during work, there is a possibility of severe injury because the machine will start abruptly if the pedal is depressed unintentionally. Do not put your foot on a pedal, except for driving or turning with pedals.
- Pay attention when driving and operating with pedals.

FRONT/REAR AND LEFT/RIGHT OF MACHINE

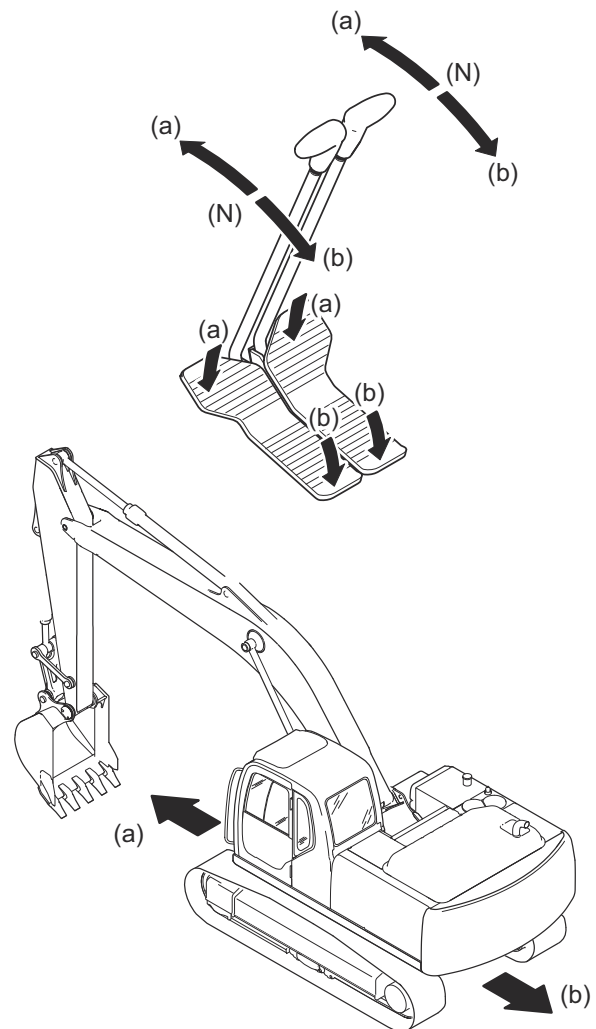
In this manual, front/rear and left/right are determined by looking the forward direction from the operator's seat with the travel motors at the rear side.

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

(a) Travel forward: Push the travel levers to the front (Depress the front of travel pedals)

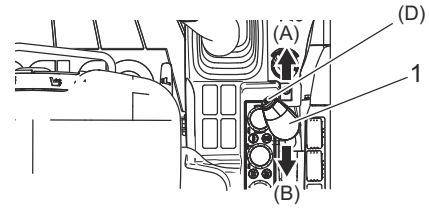
(b) Travel backward: Pull the travel levers toward yourself (Depress the back of travel pedals)

(N) Neutral: The machine stops traveling.



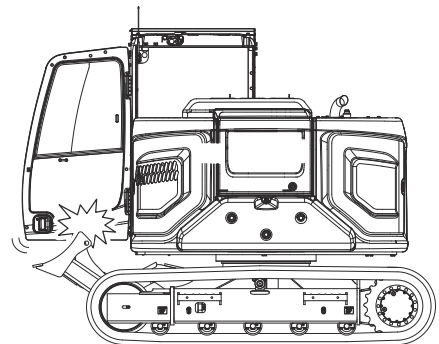
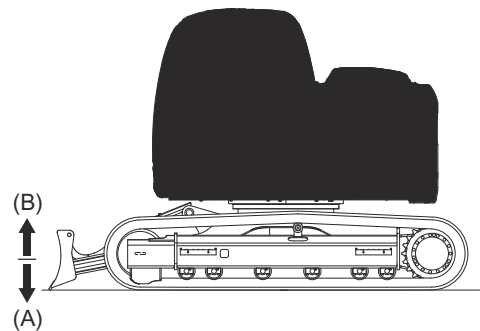
2.5.5 DOZER OPERATION LEVER

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
TRAVEL SPEED SELECT SWITCH (D)	Changes travel speed to LOW (1st) or HIGH (2nd)

2



CAUTION

In case of dozer machines, when setting the upper structure laterally with the dozer raised uppermost, it can cause the open door to interfere with the dozer depending on the specifications.

2.6 HANDLING OF FUSE & RELAY BOX

2.6.1 ABOUT FUSE & RELAY BOX

The fuses protect the wiring and electrical components from damage of burning 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

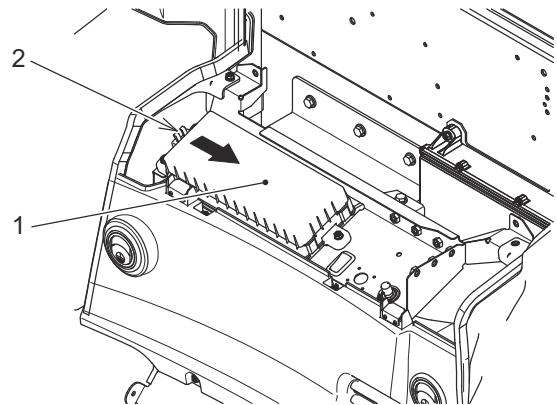
Make sure the starter switch is in the "OFF" position when replacing fuses.

Notice

- The spare fuses are stored in the fuse & relay box.
- 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.

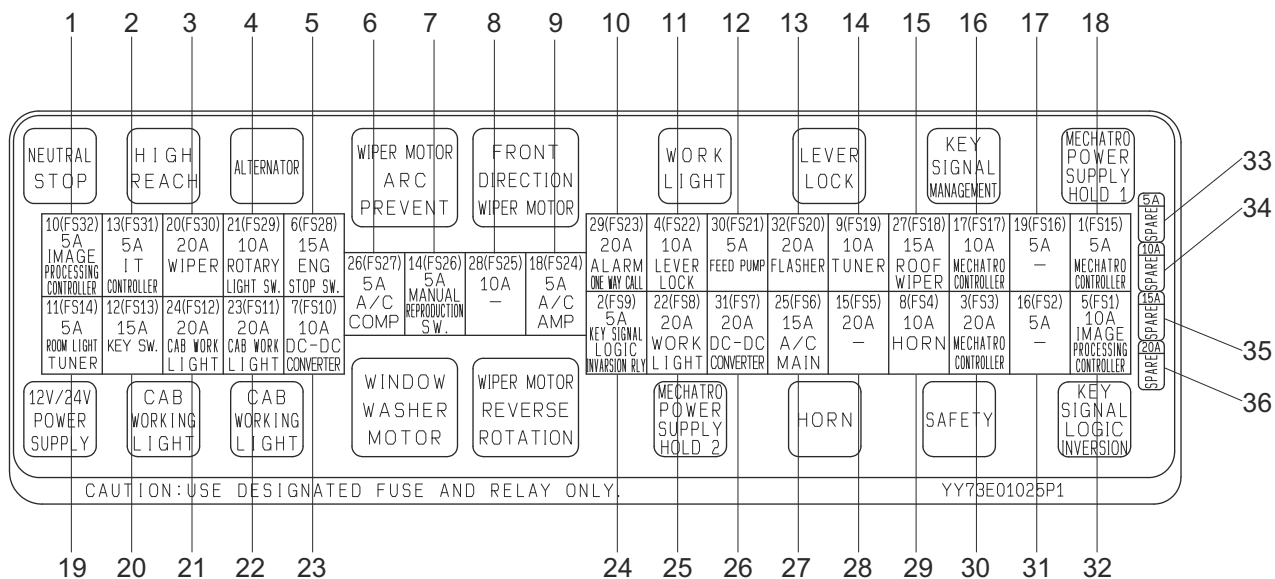
If fuse replacement is frequently required, it may be due to a failure in the electrical system. Please contact KOBELCO authorized dealer/distributor.

1. To remove the fuse box cover at the rear side of the operator's seat, push lock part (2) of cover (1) inward and release the lock and then lift the cover.
2. When replacing the fuse, use a fuse extractor to remove it from the fuse box.
3. After replacing the fuse, install the cover securely.



2.6.3 FUSE CAPACITY AND CIRCUIT NAME

The following shows each fuse capacity and circuit name.



Item	Capacity	Circuit Name	Item	Capacity	Circuit Name
1	5A	Image processing controller	19	5A	Room lamp, tuner
2	5A	IT controller	20	15A	Key switch
3	20A	Wiper	21	20A	Cab working light
4	10A	Rotary light switch	22	20A	Cab working light
5	15A	Engine stop switch	23	10A	DC-DC converter
6	5A	Air conditioner	24	5A	Key signal logic inversion relay
7	5A	Manual regeneration switch	25	20A	Working light
8	10A	-	26	20A	DC-DC converter
9	5A	Air con. Amp.	27	15A	Air conditioner
10	20A	Travel alarm	28	20A	-
11	10A	Lever lock	29	10A	Horn
12	5A	Feed pump	30	20A	Mechatro controller
13	20A	Flasher	31	5A	-
14	10A	Tuner radio	32	10A	Image processing controller
15	15A	Skylight wiper	33	5A	Spare fuse
16	10A	Mechatro controller	34	10A	Spare fuse
17	5A	-	35	15A	Spare fuse
18	5A	Mechatro controller	36	20A	Spare fuse



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.

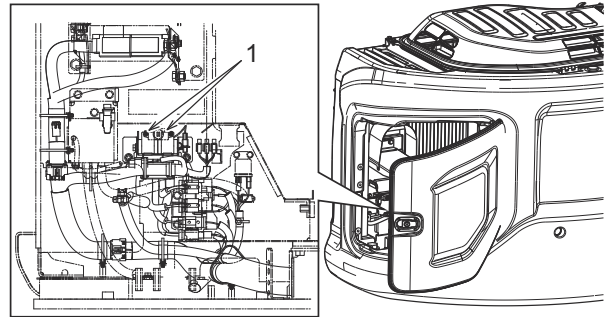
2.7.1 FUSIBLE LINK INSPECTION/REPLACEMENT

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 left side of the machine 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 side door.

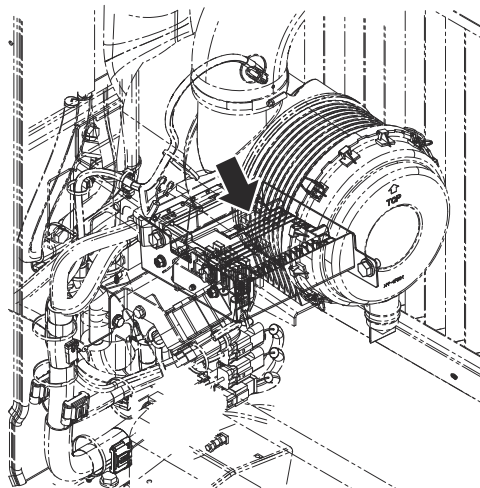
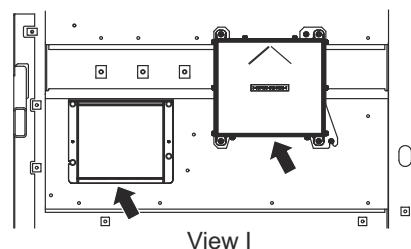
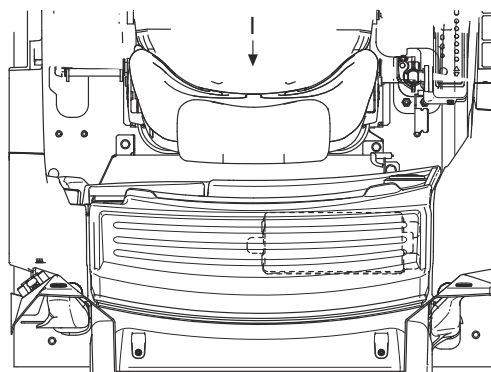


2.8 CONTROLLER

CAUTION

- Avoid getting water, dirt or drinking water on the controller. This may lead to machine failure.
- Contact your KOBELCO authorized dealer if a controller warning is displayed on the monitor.
For warnings, see "WARNING DISPLAY SCREEN" in Chapter 2.

The controller that controls the machine, engine, etc., is attached to this machine.



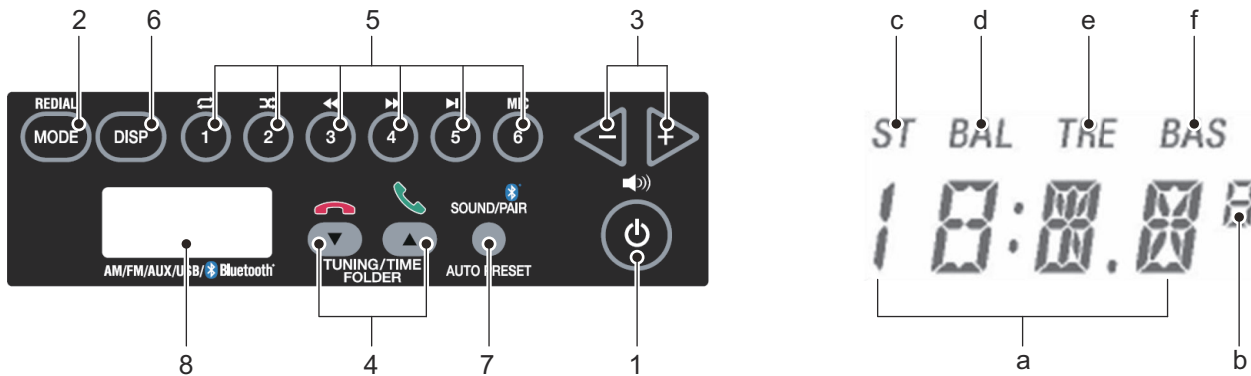
2.9 HANDLING OF RADIO TUNER

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.

2.9.1 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, 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), 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.

2.9.2 RECEIVABLE FREQUENCY

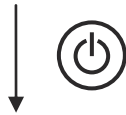
BAND	UNIT	FM	AM(MW)
DESTINATION		MHz	kHz
Japan	f_{MIN}	76.0	522
	f_{CEN}	83.0	999
	f_{MAX}	108.0	1629
	f_{step}	0.1	9
North America	f_{MIN}	87.5	530
	f_{CEN}	97.9	1000
	f_{MAX}	107.9	1710
	f_{step}	0.2	10
South and Central America	f_{MIN}	87.5	530
	f_{CEN}	97.9	1000
	f_{MAX}	108.0	1710
	f_{step}	0.1	5
Europe / Asia / Oceania	f_{MIN}	87.5	522
	f_{CEN}	98.0	999
	f_{MAX}	108.0	1629
	f_{step}	0.05	9

2.9.3 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)}



ON (on-air): Band name display

After 1 sec.



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

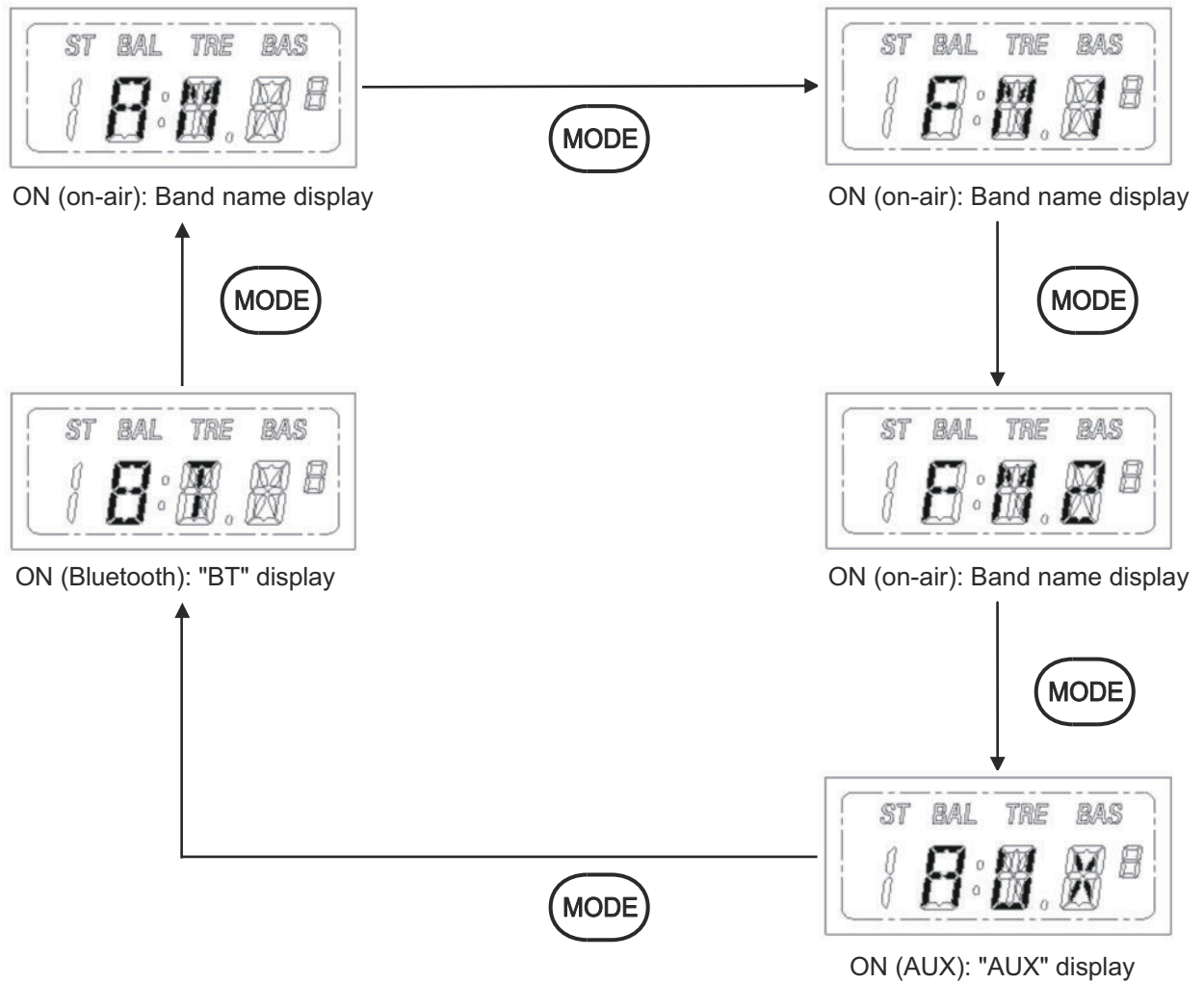
2.9.4 SWITCHING SOURCE

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.
- 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→BT→AM.



2

2.9.5 FM/AM

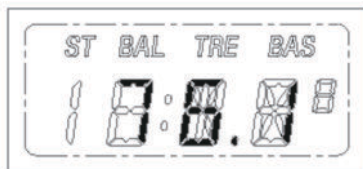
FREQUENCY ADJUSTMENT (1 STEP UP OR 1 STEP DOWN)

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

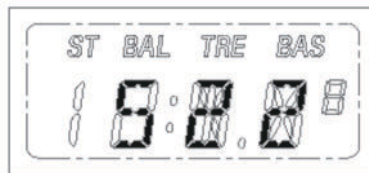
(When stereo sound is not received, "ST" pict turns off)



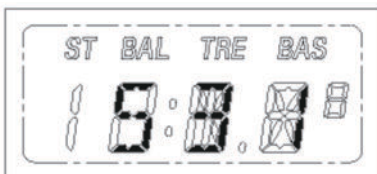
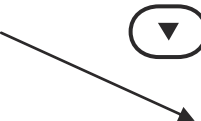
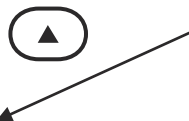
Frequency display

(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)

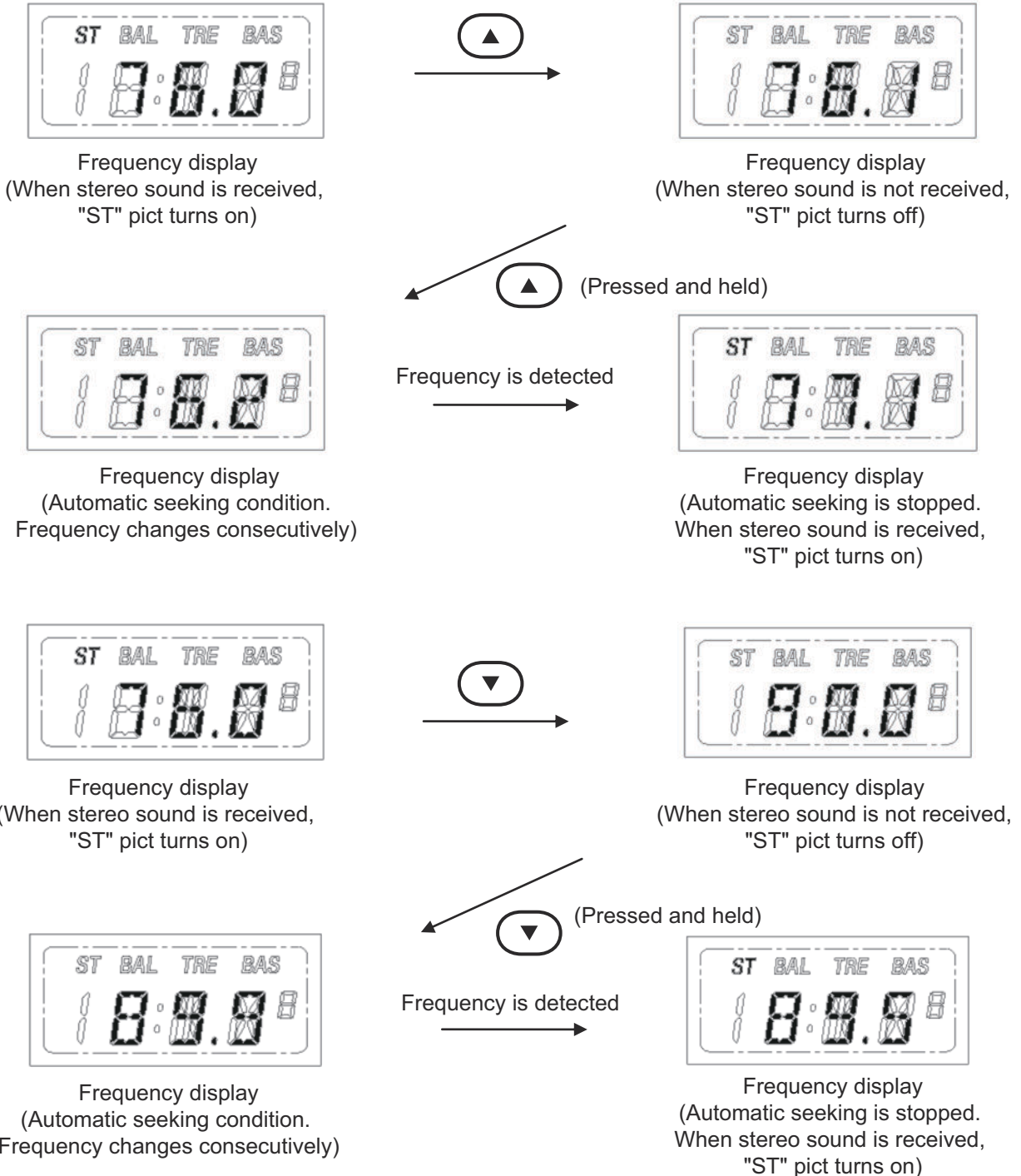
FREQUENCY ADJUSTMENT (AUTOMATIC SEEKING)

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)



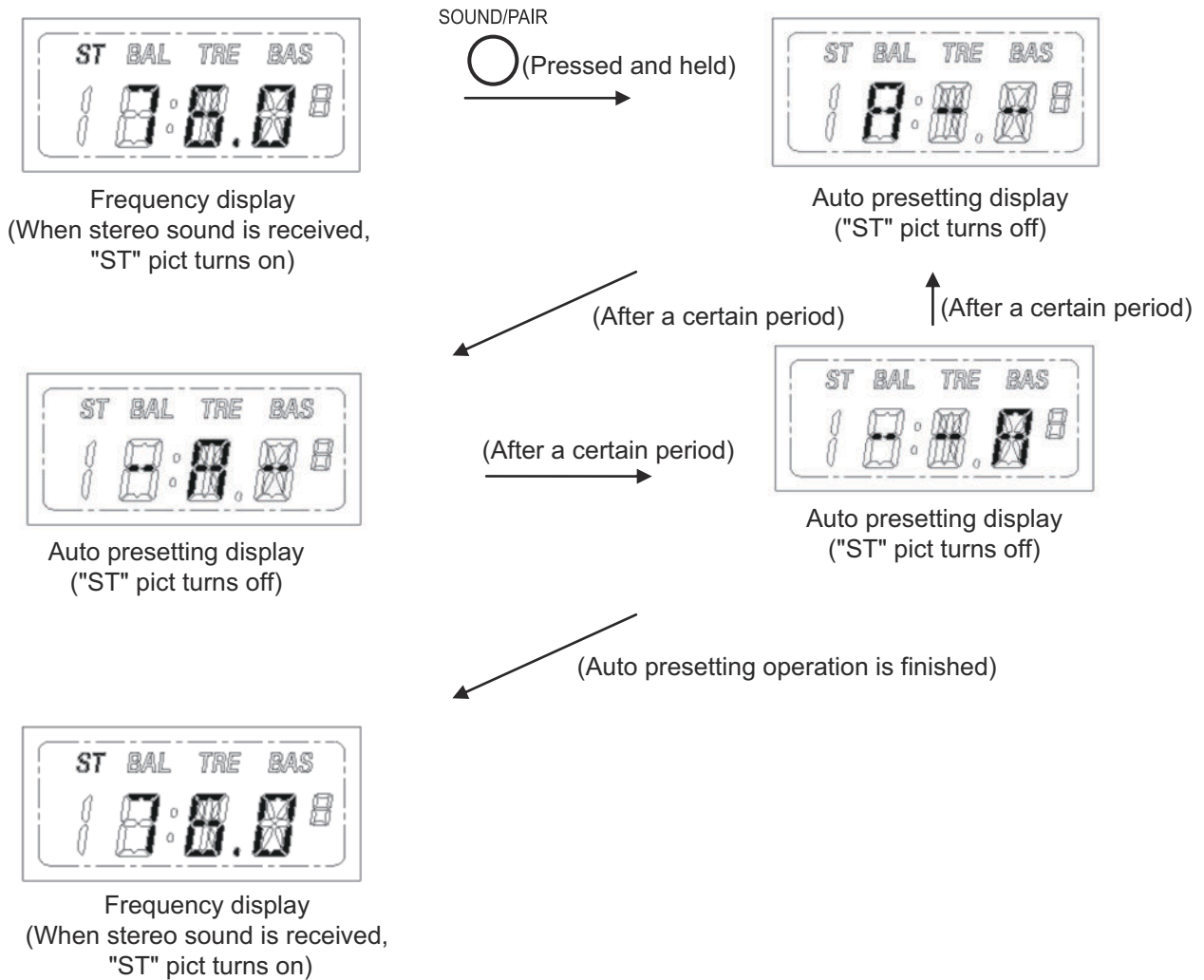
FREQUENCY ADJUSTMENT (AUTOMATIC PRESETTING)

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.

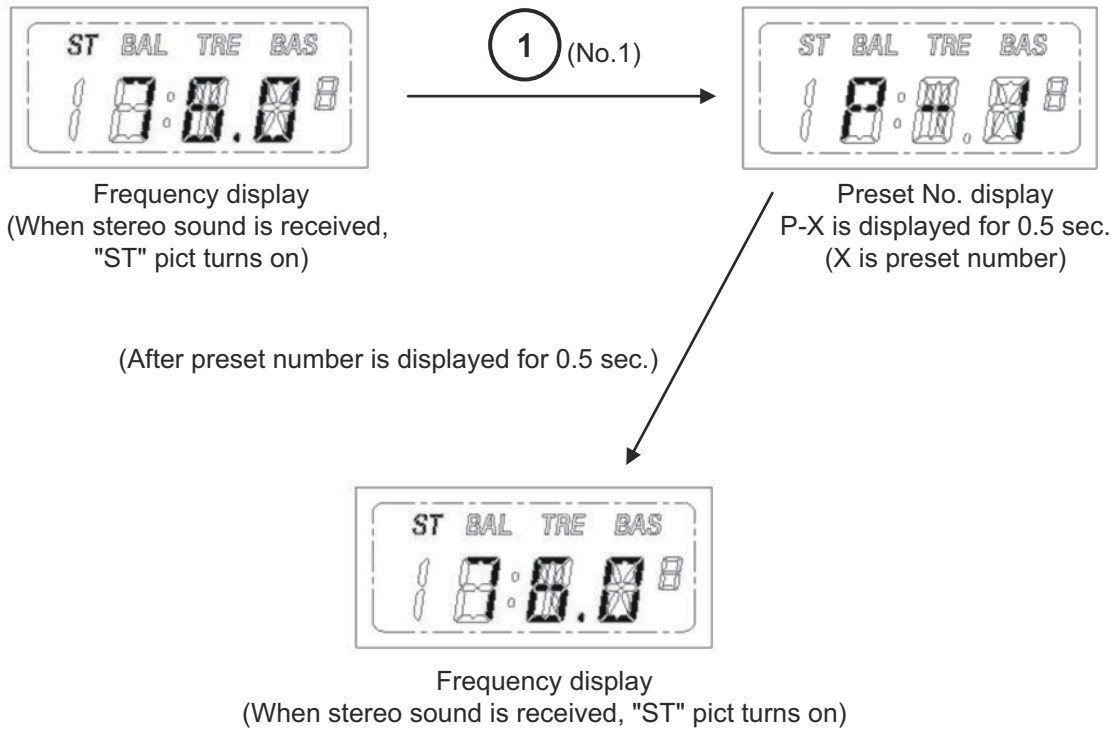
(In case that selected band is FM1)



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)}

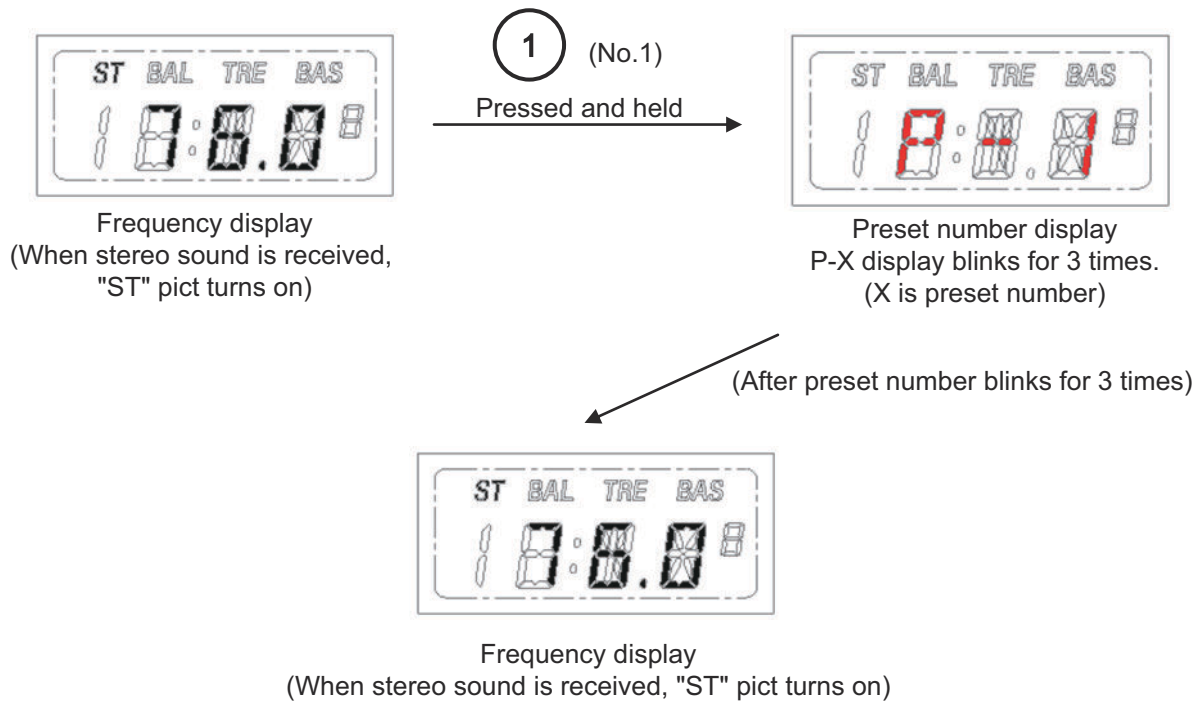


PRESET MEMORY

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)



2.9.6 Bluetooth Audio FUNCTION AND EXTERNAL INPUT TERMINAL

Using the Bluetooth Audio function or external input terminal (AUX) of the machine, you can listen to music from a mobile phone and external audio device.

Notice

Bluetooth Audio

- The Bluetooth Audio function of this machine does not guarantee wireless connection with all Bluetooth-compatible devices. The mobile phone or other device you wish to connect must conform to the Bluetooth standard specifications set by the Bluetooth SIG and must have obtained authentication. Even if the device you want to connect to conforms to the Bluetooth standard, depending on the device there may be cases where you cannot connect, the display/operation differs, or the sound cuts out.
- Follow the instructions in the manual of the corresponding device for how to use Bluetooth.
- The Bluetooth in this machine can have an adverse effect on electronic medical equipment such as cardiac pacemakers. Before using any electronic medical equipment when using Bluetooth Audio, be sure to check with the manufacturer of the electronic medical equipment first.

External input terminal (AUX)

- The external input terminal of the machine is not guaranteed to be compatible with all types of AUX terminals. Also, when each terminal does not match the inlet of this machine, connection is not available.
- When using external audio devices, follow the instructions in the corresponding manuals.

Bluetooth BASIC SPECIFICATION

Item	Description
Bluetooth version	5.0
Signal strength	Class 1
Maximum number of devices that can be paired	8
Supported profiles	A2DP / AVRCP/ HFP / SPP
Operating frequency	2402 - 2480 MHz
Modulation method	GFSK, $\pi/4$ -DQPSK, 8-PSK
Output value	Max. 10.0 dBm e.i.r.p

USB CHARGING

- Charging is possible via a cable plugged into the USB connector (Type A).
- Note that successful charging of all devices is not guaranteed.

2.9.7 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.

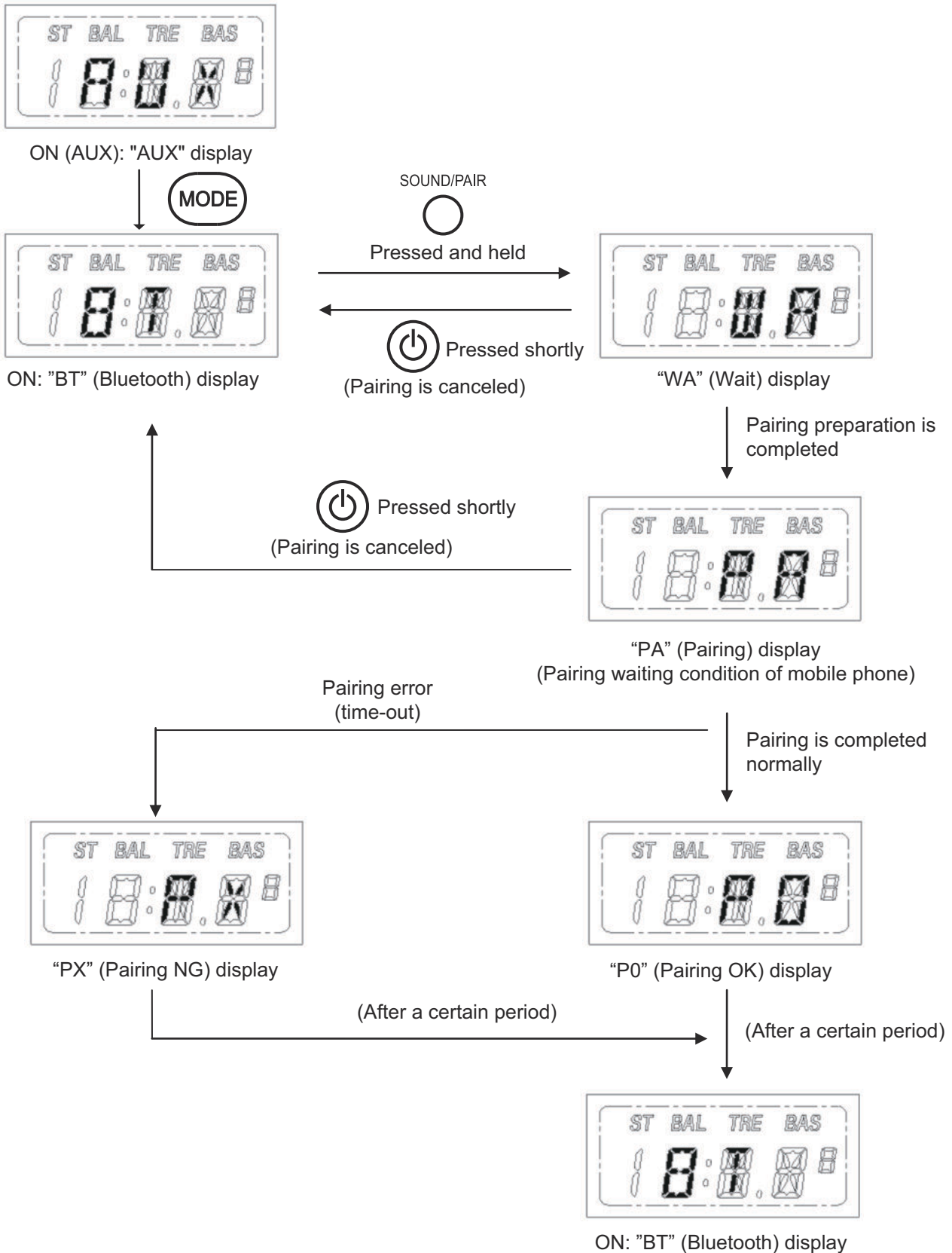
If the pairing is performed normally, "PO" is displayed and the pairing is finished normally.

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.

[2. MACHINE FAMILIARIZATION]

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.



2.9.8 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.

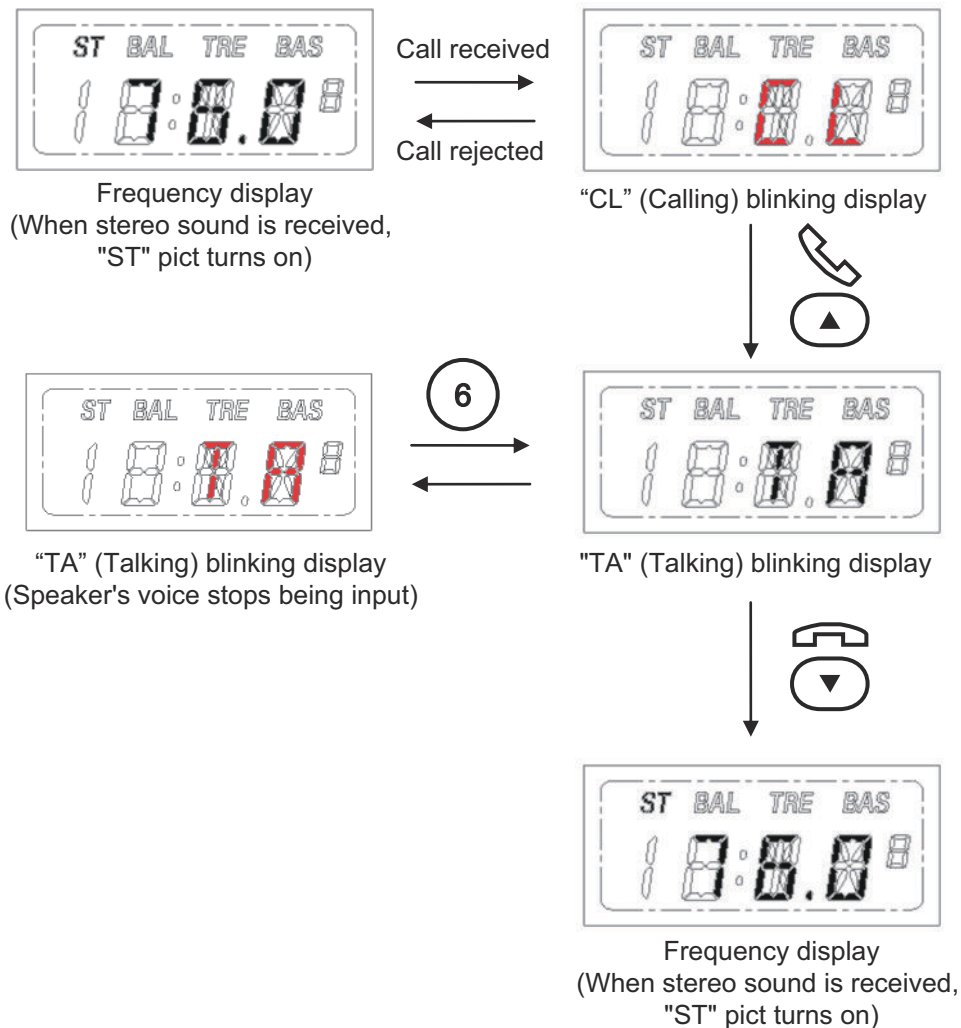
During the telephone conversation, by pressing [DOWN] key, the conversation is finished and the radio component changes to the status before receiving the phone call.

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.

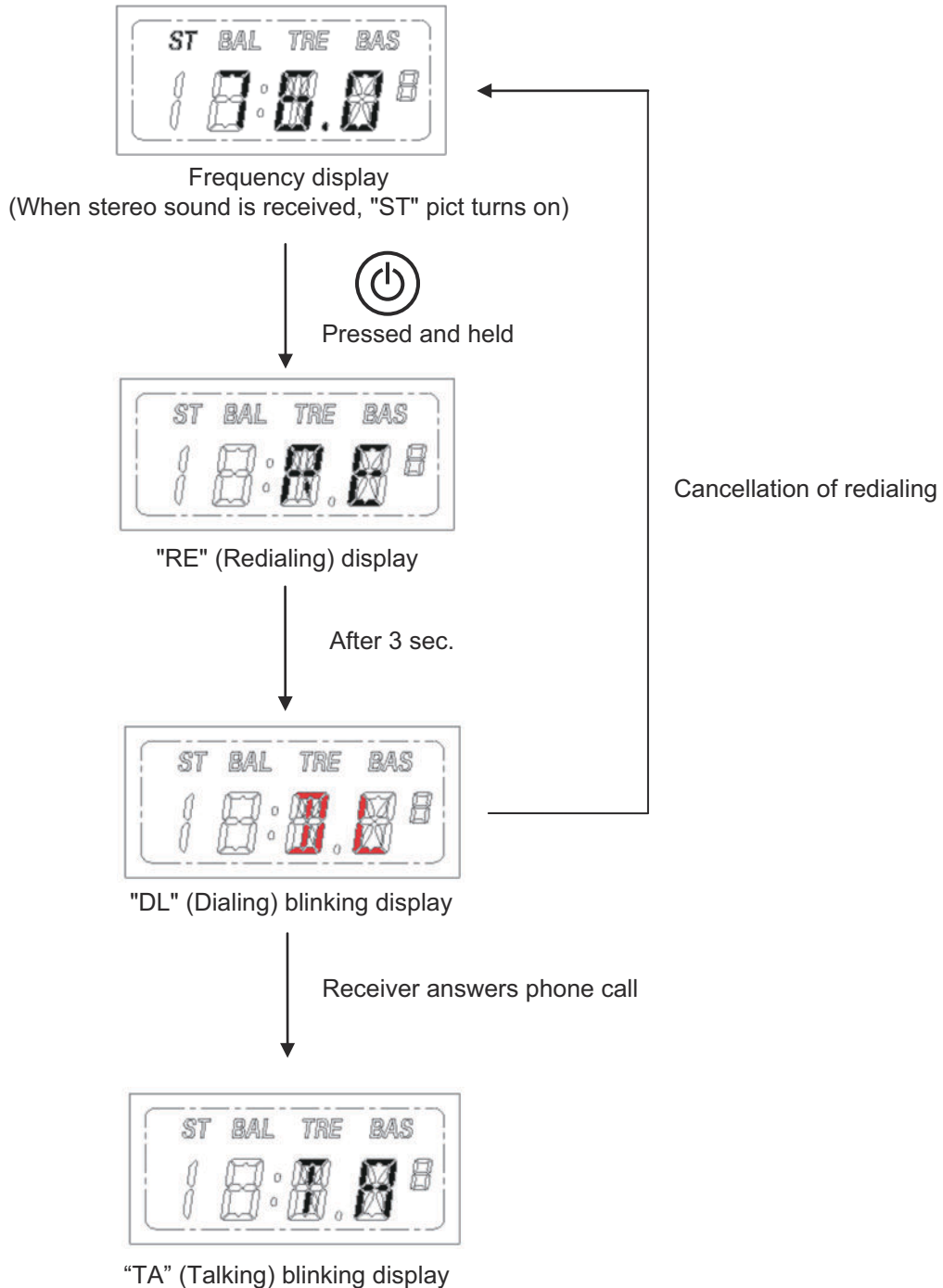
Even when this radio component is OFF, it automatically turns ON when performing redialing and enters the redialing process.

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)



2.9.9 FILE PLAYING FUNCTION

Before using this function, pairing (registration of a device) shall be done.

TRACK FORWARD/BACKWARD (BT-AUDIO)

While a 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.

Due to the Bluetooth device limitation, the track number cannot be displayed.

PAUSE (BT-AUDIO)

While the BT-Audio is being played, press [PRESET 5] to pause the track.

By pressing [PRESET 5] again, the track starts playing.

Due to the Bluetooth device limitation, during pause, the display does not blink.

2.9.10 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.

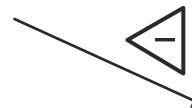
As for the volume level, at the status of radio (AM/FM1/FM2), AUX, and Bluetooth Audio, it is controlled respectively.

{As for "SOUND ADJUSTMENT" (TRE, BAS, BAL) described below, the radio, AUX, and Bluetooth Audio are set commonly.}

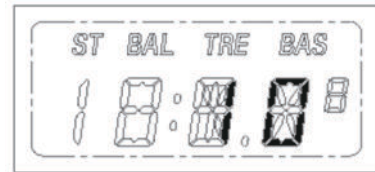
{In case that selected band is FM1 (sound level of 11)}



Frequency display
(When stereo sound is received, "ST" pict turns on)



Volume level display



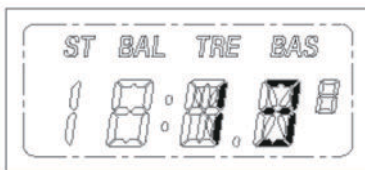
Volume level display



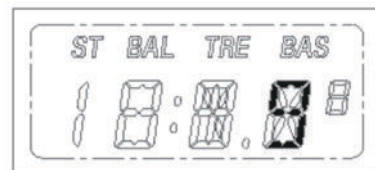
(Pressed and held)



(Pressed and held)



Volume level display



Volume level display

2.9.11 SOUND ADJUSTMENT

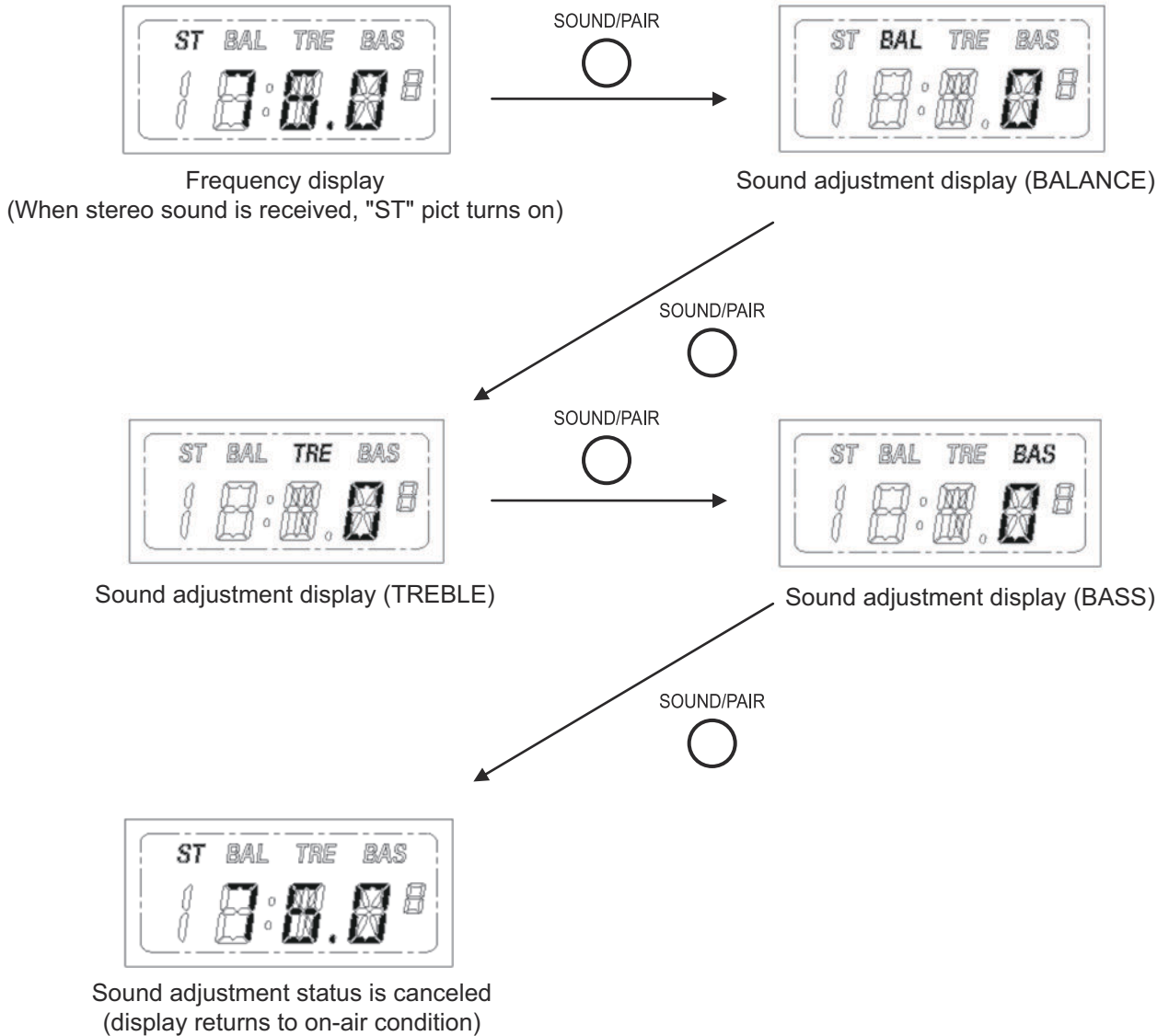
SOUND ADJUSTMENT

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)

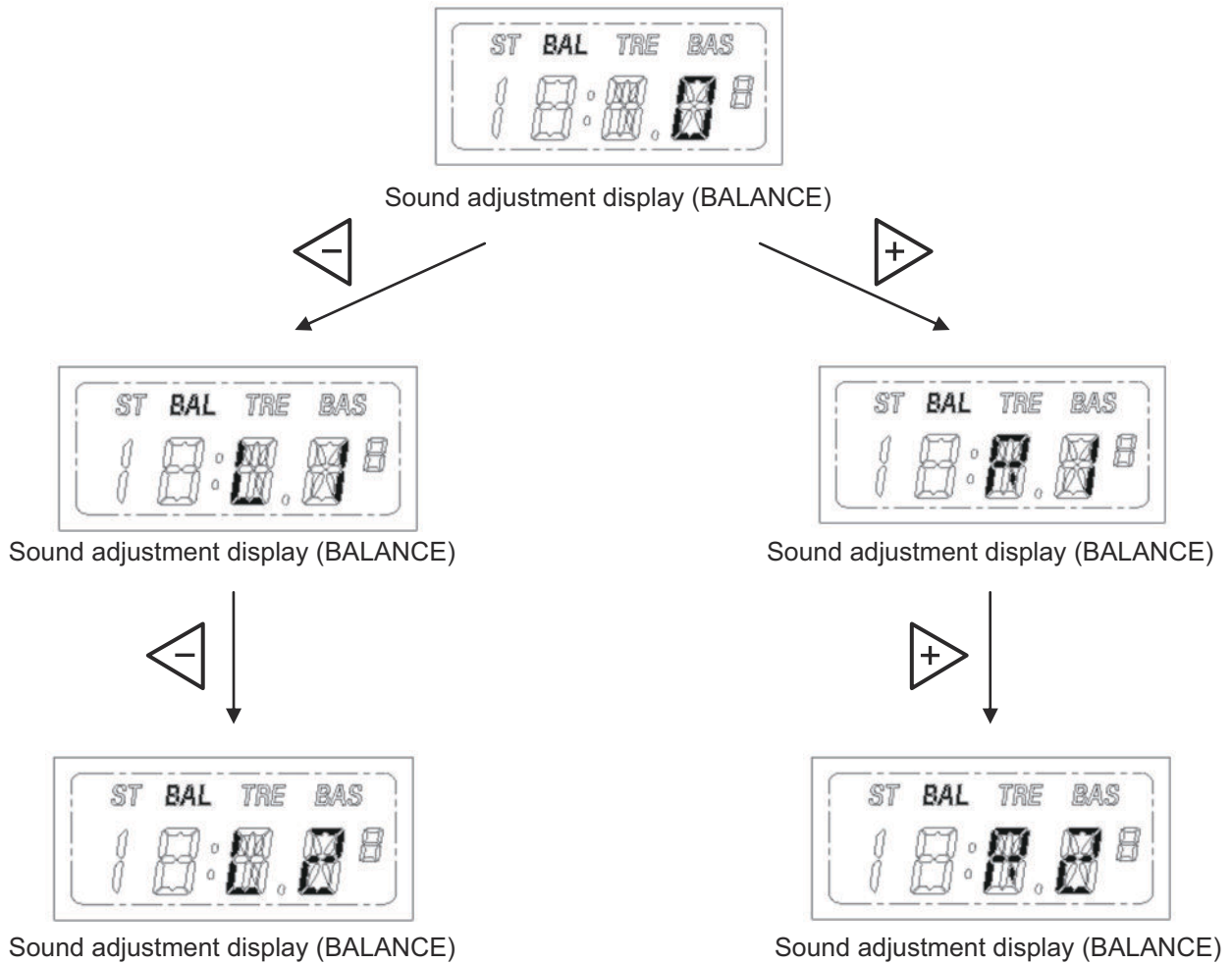


SOUND ADJUSTMENT (BALANCE)

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)

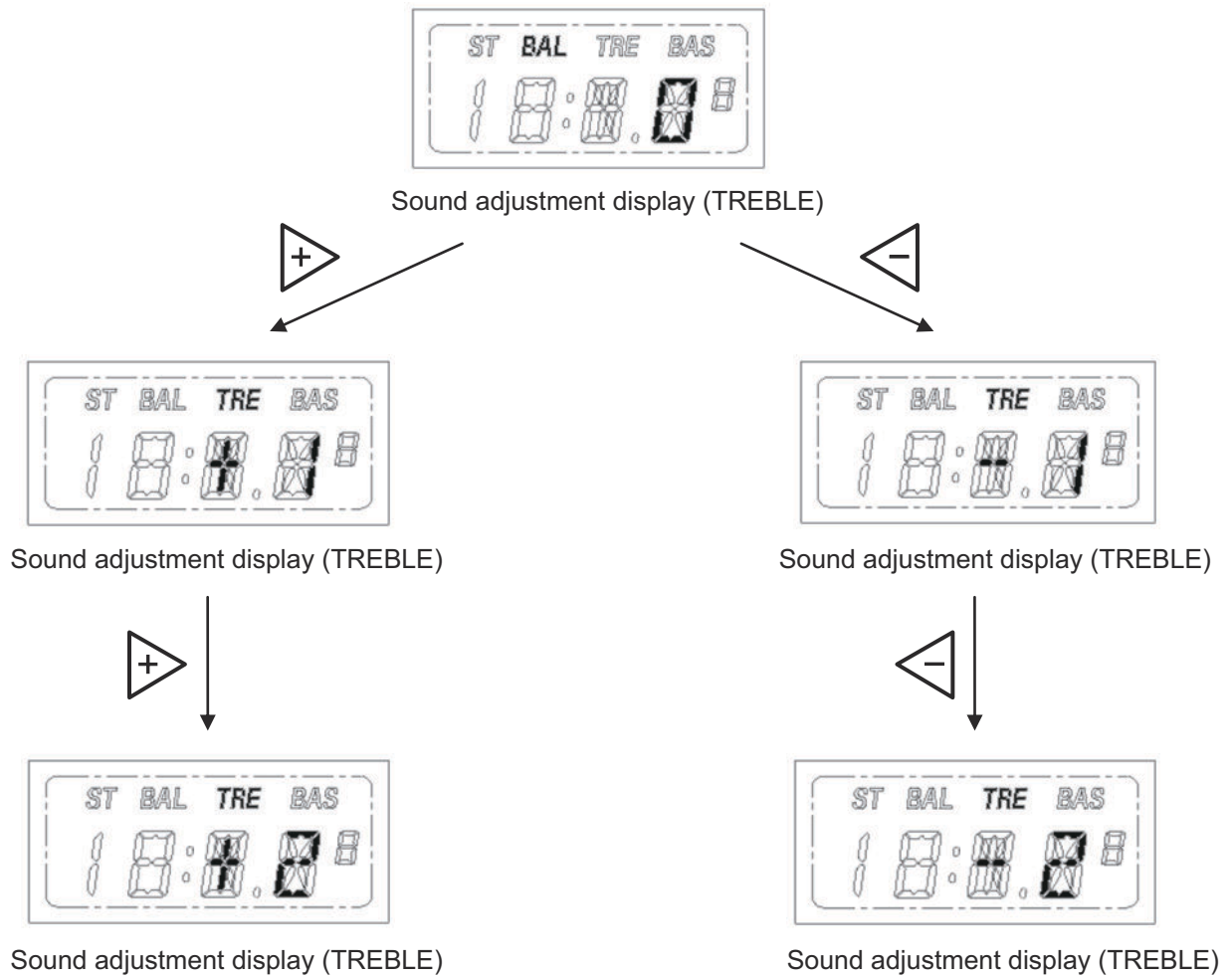


SOUND ADJUSTMENT (TREBLE)

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)



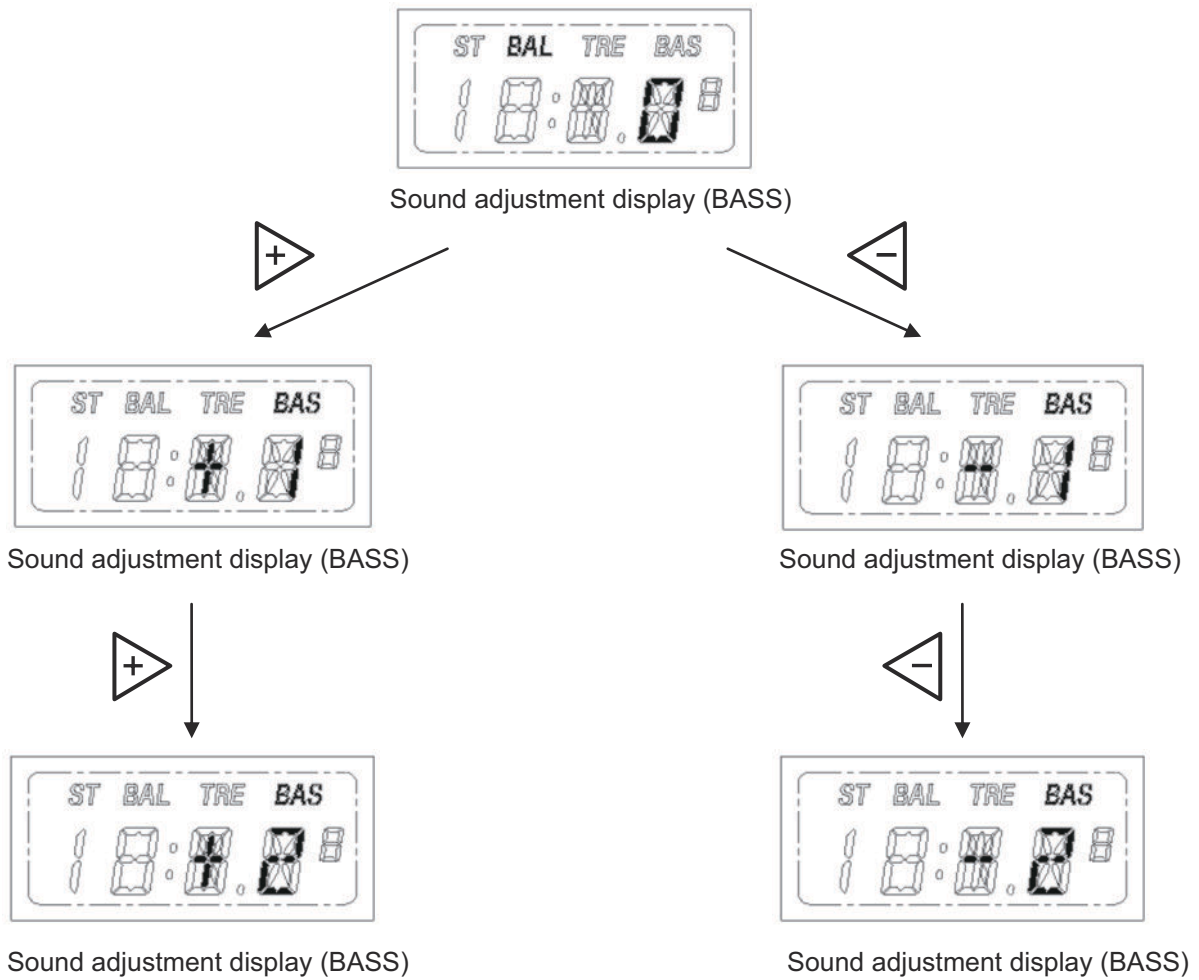
2

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)



2.9.12 CLOCK ADJUSTMENT

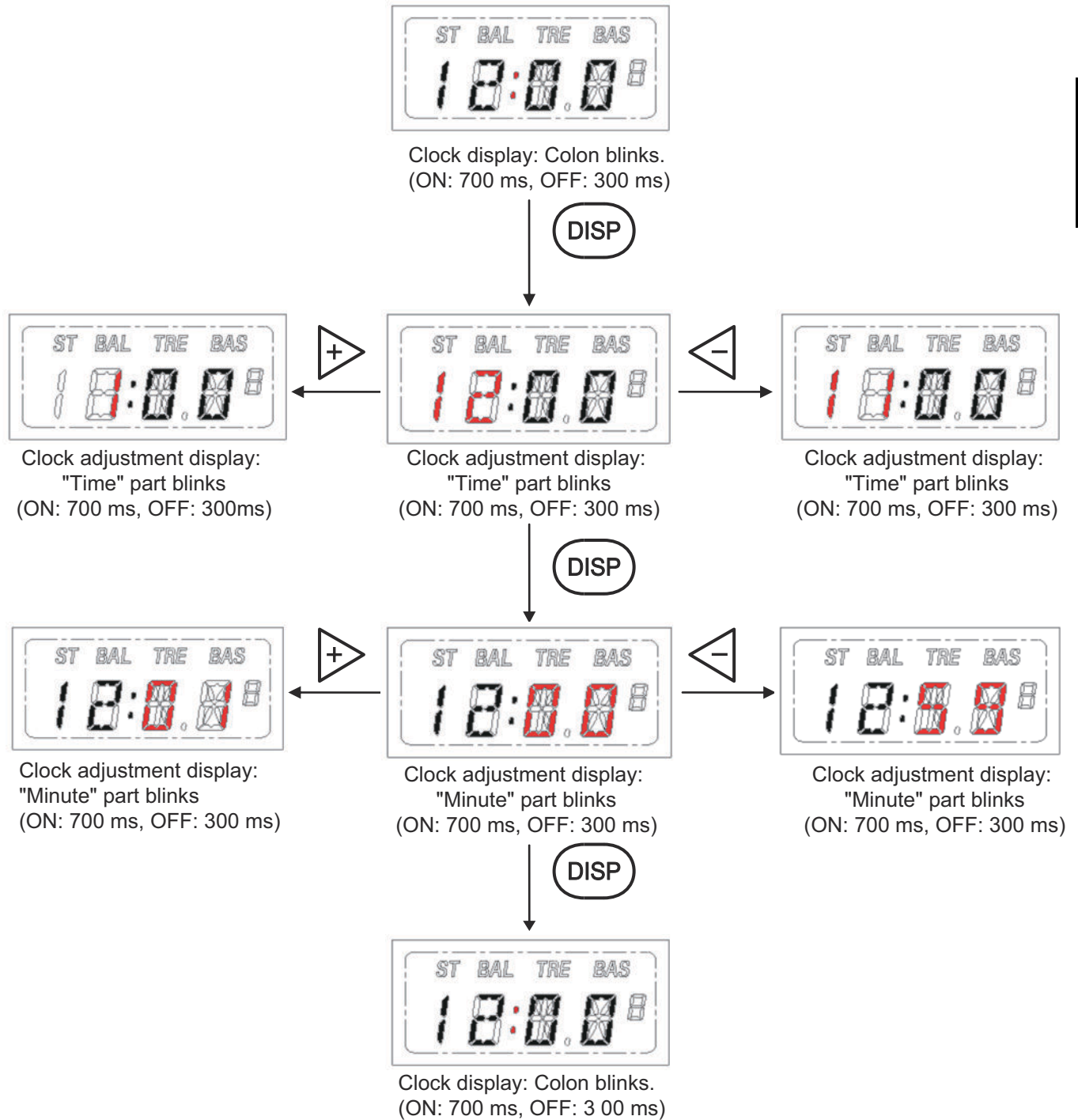
With the radio component in the clock display condition, press [DISP] key to enter the clock adjustment.

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.)

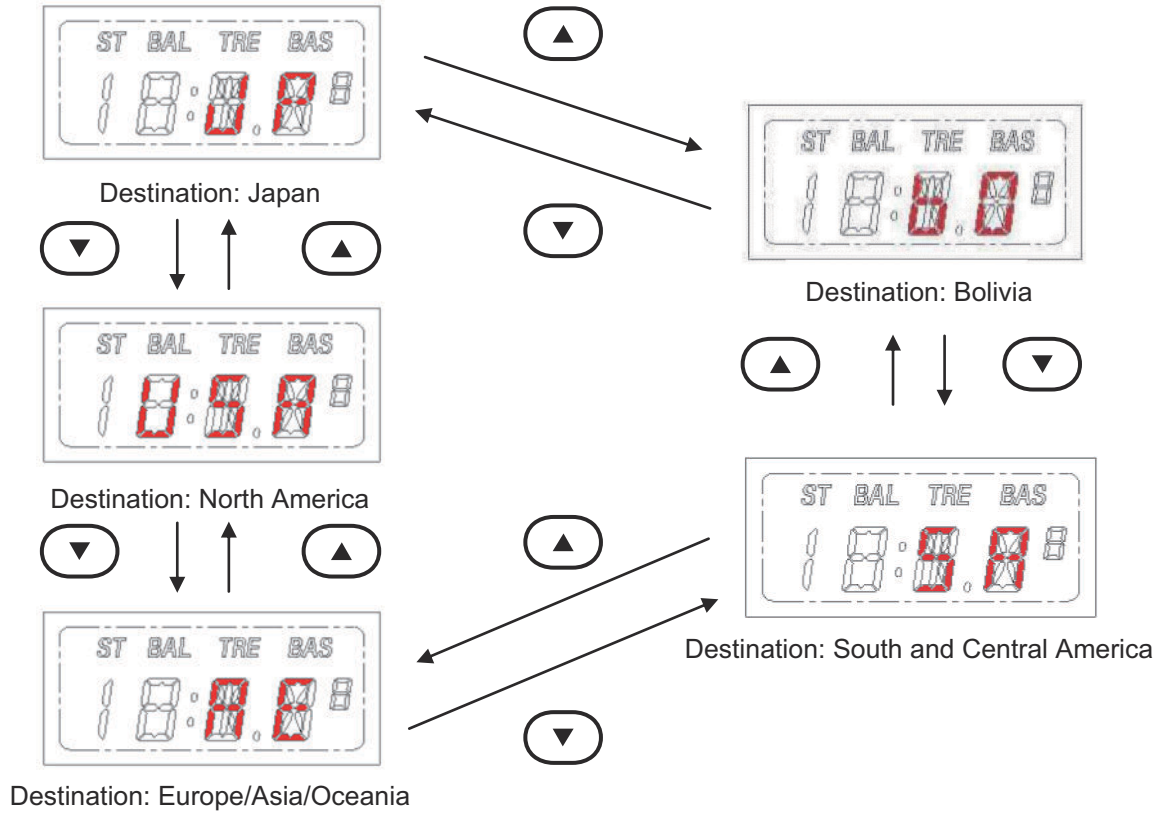
* The clock display is 12 hours display.



2.9.13 SETTING DESTINATION

SETTING DESTINATION

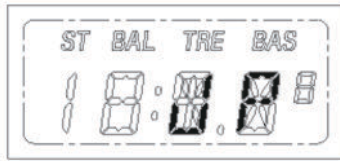
- With the radio turned off (clock display), press the following keys to switch the destination.
Press and hold the [MODE] and [VOL+] keys simultaneously for five seconds
- For differences in frequency ranges by destination, see "RECEIVABLE FREQUENCY".



- Press the [SOUND/PAIR] key to confirm the selection. This initializes and resets the memory.
- If there is no key operation for 10 seconds, or when the ACC power turns on, the destination setting mode is exited.

DISPLAYING DESTINATION

- While the radio is turned off (clock display), press the [DOWN] and [PRESET-4] keys simultaneously to display the current destination.



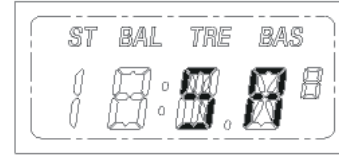
Destination: Japan



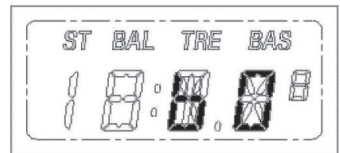
Destination: North America



Destination: Europe/Asia/Oceania



Destination: South and Central America



Destination: Bolivia

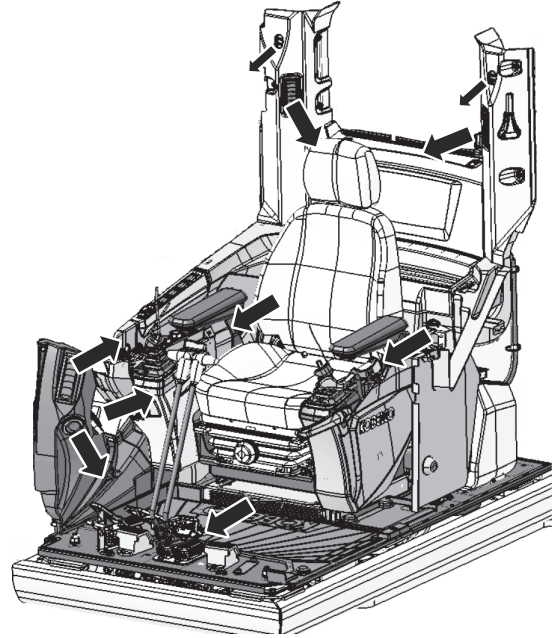
2.10 AIR CONDITIONER

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.

2.10.1 GRILLE (AIR OUTLET)

Select air stream in preferable direction by hand.



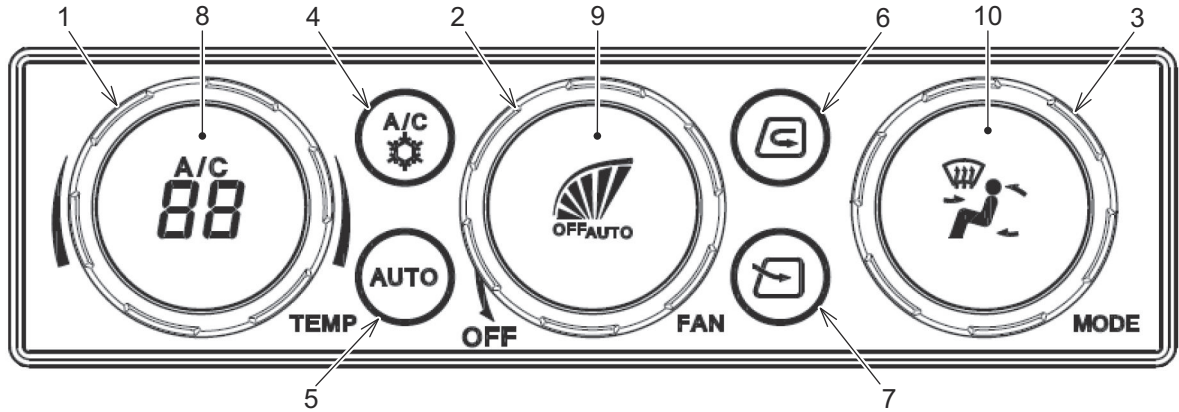
CAUTION

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.

2.10.2 AIR CONDITIONER CONTROL PANEL



Item	Name	Item	Name	Item	Name
1	Temperature setting dial	5	AUTO control switch	9	(Fan speed / AUTO / OFF) LCD display
2	Fan speed selector dial	6	Recirculation air selector switch	10	(Air outlet mode) LCD display
3	Air outlet mode selector dial	7	Fresh air selector switch		
4	Compressor switch	8	(Temperature / A / C) LCD display		

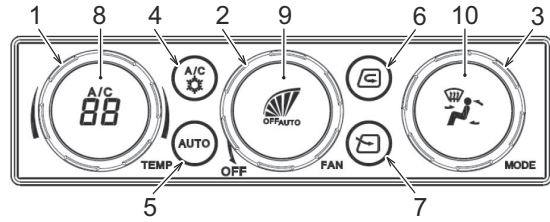
Notice

- (Temperature/A/C) LCD display (8) displays temperature and ON/OFF of the compressor; (fan speed/AUTO/OFF) LCD display (9) displays blower fan speed, AUTO, and OFF; and (air outlet mode) LCD display (10) displays air outlet mode.
- Each of switches (4 to 7) turns on the indicator (amber) when the item is being selected.
- Each of switches (4 to 7) and displays (TEMP/FAN/MODE/COOL displayed in blue/HOT displayed in red) are equipped with illumination at night. (COOL displayed in blue, HOT displayed in red, and others displayed in white)

2.10.3 AIR CONDITIONER OPERATION PANEL

MAIN POWER SWITCH AND DISPLAY

- When the panel is OFF, "OFF" is displayed on (fan speed/AUTO/OFF) LCD display (9).
- When the panel is OFF, if fan speed selector dial (2) is operated clockwise, or AUTO control switch (5) is pressed down, the panel becomes ON and air conditioner control starts.



Operating fan speed selector dial (2) is operated clockwise: Operation starts with the fan speed Lo (manual) (other than the fan speed, the setting is the same as the previous operation)

Pressing down AUTO control switch (5): FULL AUTO operation starts

- If the fan speed selector dial (2) is operated counterclockwise with the fan speed set to Lo, the panel becomes OFF.
- The air conditioner operation also turns OFF when the starter switch is turned OFF. However, if turned OFF with this 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

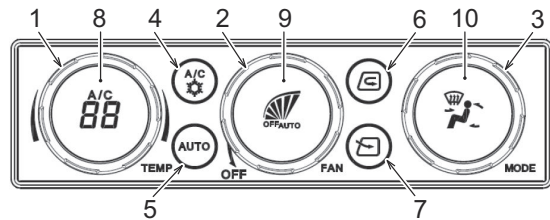
In the manual selection, (fan speed/AUTO/OFF) LCD display (9) is like the following.

Fan speed	Lo (Min.flow)	M1	M2	M3	M4	Hi (Max. flow)
LCD display						

By operating fan speed selector dial (2) in UP (turning clockwise) or DOWN (turning counterclockwise) direction manually, the AUTO control of fan speed is canceled, and "AUTO" on (fan speed/AUTO/OFF) LCD display (9) is turned OFF.

COMPRESSOR ON/OFF SWITCHING AND DISPLAY

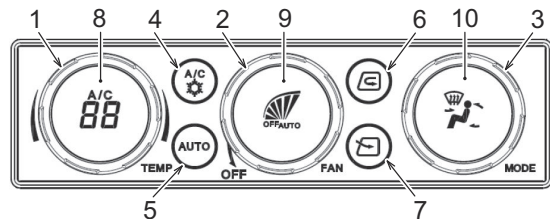
When compressor switch (4) is pressed with "A/C" on (temperature/A/C) LCD display (8) turned OFF and the indicator of compressor switch (4) turned OFF, the compressor turns ON and then "A/C" on (temperature/A/C) LCD display (8) turns ON and the indicator of compressor switch (4) turns ON.



If the compressor switch is pressed again, the compressor turns OFF and "A/C" on (temperature/A/C) LCD display (8) and the indicator of compressor switch (4) turn OFF.

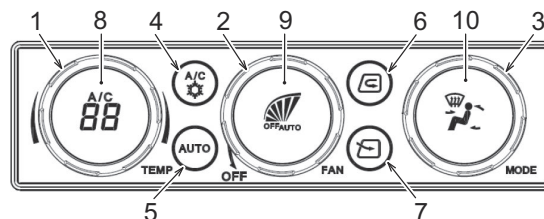
AUTO CONTROL SWITCHING AND DISPLAY

- "AUTO" on (fan speed/AUTO/OFF) LCD display (9) turns ON only when both the fan speed and the air outlet are under AUTO control.
- When AUTO control switch (5) is pressed, the fan speed and the air outlet become under the AUTO control, and "AUTO" on (fan speed/AUTO/OFF) LCD display (9) turns ON.
- When the panel is OFF, if AUTO control switch (5) is turned ON, the air conditioner function becomes ON. However, both the fan speed and the air outlet become AUTO control.



TEMPERATURE SETTING SELECTION AND DISPLAY

- The set temperature in digital display appears on (temperature/A/C) LCD display (8). The range of temperature setting is from 18 to 32 degrees C (64 to 90 degrees F).
- When changing the set temperature, operate temperature setting dial (1) clockwise (UP) or counterclockwise (DOWN)



The increment and decrement of both UP and DOWN are 1 degree C.

- The set temperature of 18 degrees C (64 degrees F) is the maximum cooling and that of 32 degrees C (90 degrees F) is the maximal heating control.
- The set temperature display can be switched from/to degrees F to/from degrees C.
With the panel turned ON, if recirculation air selector switch (6) and fresh air selector switch (7) are pressed simultaneously for 5 seconds or more, the "degrees F/C" display is switched (No unit is displayed).

LCD DISPLAY

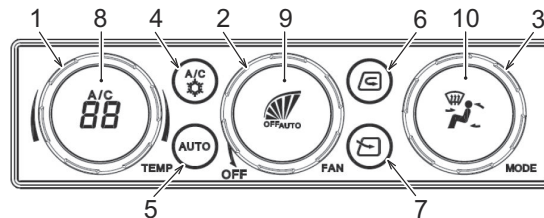
Celsius (degrees C): LO, 19 to 31, HI

Fahrenheit (degrees F): LO, 65 to 89, HI

LO: 18 degrees C (64 degrees F), HI: 32 degrees C (90 degrees F)

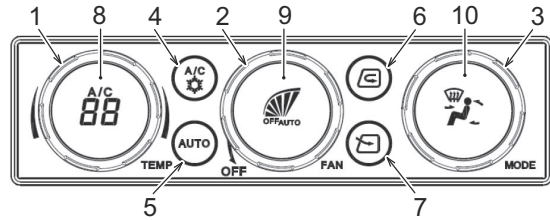
RECIRCULATION AIR SELECTION AND DISPLAY

- With the fresh air intake condition {with the indicator of fresh air selector switch (7) turned ON}, if recirculation air selector switch (6) is pressed, it will switch the setting to recirculation air and the indicator of recirculation air selector switch (5) turns ON.
- With the recirculation air condition {with the indicator of recirculation air selector switch (6) turned ON}, if fresh air selector switch (7) is pressed, it will switch the setting to fresh air intake and the indicator of fresh air selector switch (7) turns ON.



AIR OUTLET MODE SELECTION AND DISPLAY

- The current air outlet mode position is displayed with arrow(s) on (air outlet mode) LCD display (10).
- With "AUTO" turned ON, if air outlet mode selector dial (3) is operated, the mode displayed at that time is fixed. Then "AUTO" on (fan speed/AUTO/OFF) LCD display (9) turns OFF, and the AUTO control of the air outlet is released.



* The AUTO control of the air outlet is also released even when only the air outlet is under the AUTO control (with "AUTO" turned OFF).

<Air outlet mode and display>

Mode	1	2	3	4	5
Air outlet mode	FACE	VENT	B / L	F / D	DEF
	Upper body (front side)	Upper body	Upper body and foot	Foot and front glass	Defroster
LCD display					

- When air outlet mode selector dial (3) is operated clockwise in the manual control, the mode is switched through Mode 1 → Mode 2 → Mode 3 → Mode 4 → Mode 5.
- When air outlet mode selector dial (3) is operated counterclockwise in the manual control, the mode is switched through Mode 5 → Mode 4 → Mode 3 → Mode 2 → Mode 1.

2.10.4 HOW TO USE AIR CONDITIONER

Before turning the air conditioner on, close the doors and windows of the cab to achieve the best performance as an automatic air conditioner.

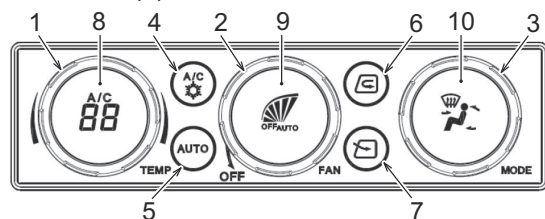
COOLING METHOD

Notice

To avoid freezing of the evaporator, do not operate the HVAC 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 control to a higher temperature, and run at maximum fan speed ("HI") for a while before turning compressor switch (4) "ON" again.

1. Turn fan speed selector dial (2) clockwise or press AUTO control switch (5).
2. Turn fan speed selector dial (2) clockwise and set the fan speed to "HI".
3. Operate temperature setting dial (1) and set your desired temperature.
4. Press compressor switch (4).
5. Press recirculated air switch (6) to select air recirculation.
6. Operate air outlet mode dial (3) and select VENT outlet (Mode 2).
7. When the cab's internal temperature drops, adjust to your desired temperature and fan speed.



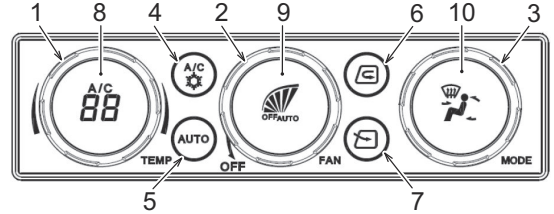
Press AUTO control switch (5) to have the temperature, fan speed, and mode changes controlled automatically.

HEATING METHOD

Notice

The engine coolant is used for heating, and heating is only possible when the coolant temperature is high.

1. Turn fan speed selector dial (2) clockwise or press AUTO control switch (5).
2. Turn fan speed selector dial (2) clockwise and set the fan speed to "HI".
3. Operate temperature setting dial (1) and set your desired temperature.
4. Press fresh air switch (7) to select fresh air intake.
5. Operate air outlet mode dial (3) and select foot/front glass outlet (Mode 4).
6. When the cab's internal temperature rises, adjust to your desired temperature and fan speed.
Press AUTO control switch (5) to have the temperature, fan speed, and mode changes controlled automatically.



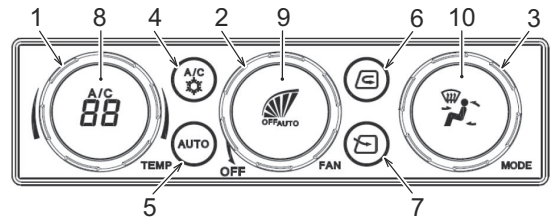
2

METHOD OF HEATING WITH DEHUMIDIFICATION AND DEMISTING

Notice

When the outdoor temperature is 0°C or lower (32°F), the HVAC (compressor) may not work.




1. Turn fan speed selector dial (2) clockwise or press AUTO control switch (5).
2. Operate fan speed selector dial (2) and set a desired fan speed.
3. Operate temperature setting dial (1) and set your desired temperature.
4. Press fresh air switch (7) to select fresh air intake.
5. Press compressor switch (4) to operate the HVAC (compressor).



2.10.5 SELF-DIAGNOSIS FUNCTION IN DISPLAY MONITOR



If there are problems on the input circuit of the driving line in the motor actuator, they can be checked on the panel display.

<Display for detection of motor actuator disconnection/short circuit and motor lock>

Error	Error	
Air mix	<ul style="list-style-type: none"> Displays "Er" on temperature display segment 	
Air outlet mode	<ul style="list-style-type: none"> Blinks human indication 	
Switching recirculation air and fresh air	<ul style="list-style-type: none"> Blinks indicators of recirculation air selector switch and fresh air selector switch 	

When a failure occurs in the input circuit of the evaporator sensor or the recirculation air sensor, it can be checked by the panel display.

<Display for detection of disconnection/short circuit of recirculation air sensor and evaporator sensor>

Error	Error	
Recirculation air sensor	<ul style="list-style-type: none"> Displays "E*" on temperature display (last digit displays 0 to 9) Turns off AUTO display 	
Evaporator sensor	<ul style="list-style-type: none"> Blinks A / C mark on (temperature / A / C) LCD display and indicator of compressor switch 	

Error detection of each sensor from monitor mode function

- With the panel turned ON, if the compressor switch and the AUTO control 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 recirculation air sensor and the evaporator sensor are shown in segment display.

<Contents of LCD display in monitor mode>

Display No.		Display data (displayed in 7 segments and 2 digits)	
No.	Fan speed in bar display	Display in decimal system (0 to 99) *A/C segment is OFF 88	Display in hexadecimal system (0 to FF) *A/C segment is ON A/C 88
0		Recirculation air sensor Temperature (degrees C)	Recirculation air sensor AD value
1		Evaporator sensor Temperature (degrees C)	Evaporator sensor AD value

UP by recirculation air selector switch

DOWN by fresh air selector switch

Switched by compressor switch

		1st digit in segment display															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2nd digit in segment display	0	Recirculation air sensor disconnection "0C" display															
	1	Evaporator sensor disconnection "0C" display															
	2	Each sensor is normal															
	3																
	4																
	5																
	6																
	7																
	8																
	9																
	A																
	B																
	C																
	D																
	E																
	F																
	Evaporator sensor short "F6" Display																

<Contents of error display>

Sensor Name	Short Display	Disconnection Display
Recirculation air sensor	F6	0C
Evaporator sensor	F6	0C

2.10.6 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.



2.11 HANDLING OF SEAT BELT



INSTALLATION OF SEAT BELT

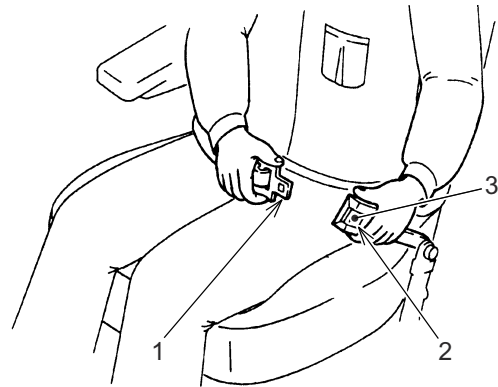
- Be sure to fasten your seat belt during operation. If not followed, it can result in serious accidents or death caused by being heavily hit inside the cab or thrown out of the cab when the machine tips/rolls over.
- Check the mounting bolts installed to the seat for looseness and retighten the bolts 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.

2.11.1 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.



2.11.2 HOW TO UNFASTEN SEAT BELT

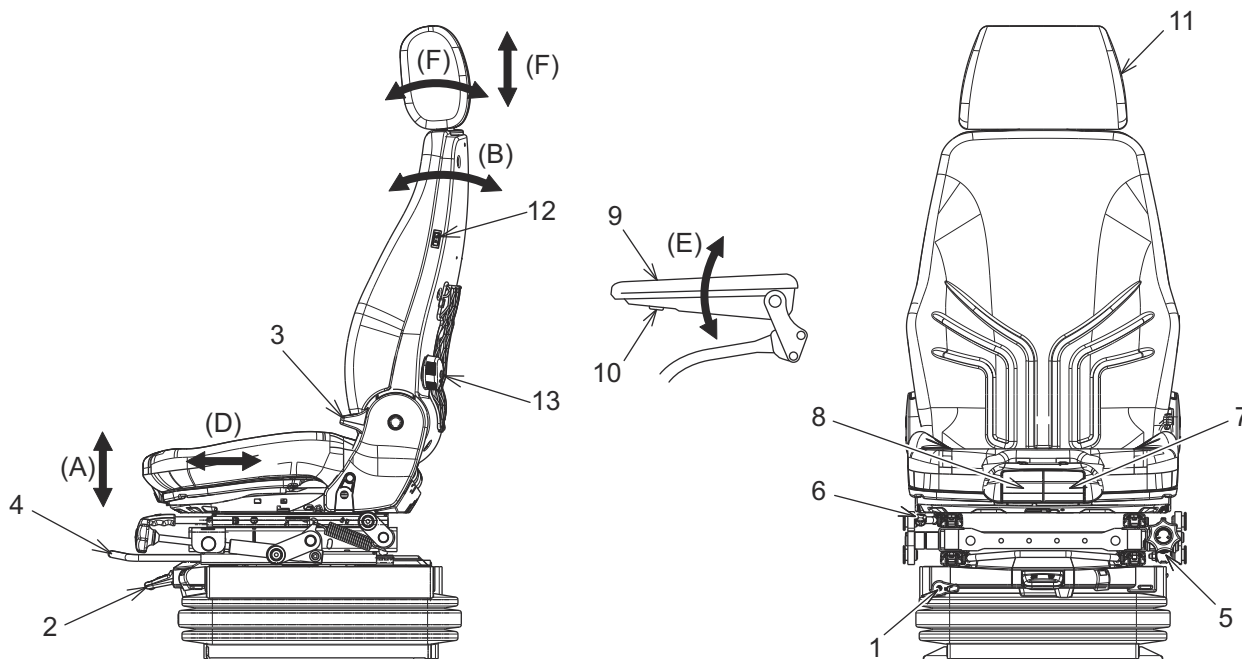
- Press the red button (3) of the buckle (2), and the belt (1) is unfastened.

2.12 OPERATOR'S SEAT CONTROLS (AIR SUSPENSION SEAT)

The operator's seat should be adjusted to a position from which the control levers and pedals can be reached easily.

CAUTION

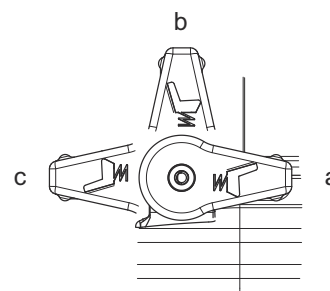
Be careful not to get hands caught between the handle and seat stand when adjusting the operator's seat.



2.12.1 DAMPER ADJUSTMENT

The damper can be adjusted.

- Move the handle (1) to the desired position. (3 levels)
 - a. Soft
 - b. Medium
 - c. Hard



2.12.2 WEIGHT ADJUSTMENT

(A) The height of the operator's seat adjusts to match the weight of the operator.

1. Briefly pull lever (2) upward to automatically adjust the seat height to the right level for the operator's weight.
2. Release the lever to lock the seat height.

Notice

- Make the adjustment with the damper set to "soft".
- Make the adjustment with the starter switch in the "ON" position.

2.12.3 HEIGHT ADJUSTMENT

(A) The height of the operator's seat can be adjusted.

1. Pull lever (2) upward fully.
 2. Adjust the seat to the desired height.
 3. Release the lever to lock the seat height.
-

Notice

- Make the adjustment with the damper set to "soft".
 - Make the adjustment with the starter switch in the "ON" position.
-

2.12.4 RECLINE ADJUSTMENT

(B) The angle of recline can be adjusted.

1. Pull lever (3) upward.
2. Tilt the backrest to the desired angle.
3. Release the lever to lock the angle of the backrest.

2.12.5 CONTROL STAND FORE/AFT ADJUSTMENT

(C) The operator's seat and the entire control stand position can be adjusted forward and backward.

1. Pull lever (4) upward.
2. Move the seat forward/backward into the desired position.
3. Release the lever to lock the control stand in position.

2.12.6 CONTROL BOX TILT ADJUSTMENT

The angle of the control box can be adjusted.

- Turn handle (5) to tilt the front of the control box up and down.

2.12.7 SEAT FORE/AFT ADJUSTMENT

(D) The position of the operator's seat can be adjusted forward and backward.

1. Pull handle (6) upward.
2. Move the seat forward/backward into the desired position.
3. Release the handle to lock the seat in position.

2.12.8 SEAT SURFACE TILT ADJUSTMENT

(A) The angle of the operator's seat surface can be adjusted.

1. Pull handle (7) upward.
2. Tilt the seat surface to the desired angle.
3. Release the handle to lock the seat surface in position.

2.12.9 SEAT SURFACE FORE/AFT ADJUSTMENTS

(D) The operator's seat surface can be adjusted forward and backward.

1. Pull handle (8) upward.
2. Move the seat surface forward/backward into the desired position.
3. Release the handle to lock the seat surface in position.

2.12.10 ARMREST ADJUSTMENT

(E) The fold-up and tilt of the armrest can be adjusted.

- Armrest (9) can be lifted up backward.
- Rotate control dial (10) on the underside of armrest (9) to adjust the angle of the armrest in its normal position.

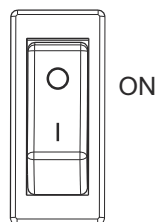
2.12.11 HEADREST ADJUSTMENT

(F) The headrest can be adjusted upward/downward and forward/backward.

- To move it up/down, take hold of headrest (11) with both hands and gently pull it up or push it down.
- To move it forward/backward, take hold of headrest (11) with both hands and gently move it to the desired position.

2.12.12 SEAT WARMER

The seat heats up when seat warmer switch (12) is switched "ON".



Notice

Do this with the starter switch in the "ON" position.

2.12.13 LUMBAR SUPPORT

The lumbar support control (13) can be used to adjust the shape of the backrest at the lower back position.

2.13 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.

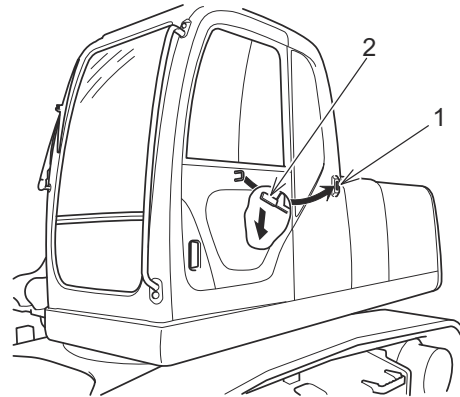
2.13.1 CAB DOOR LOCK



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.

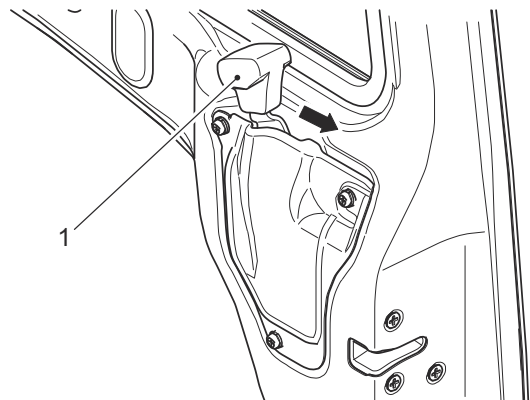
This procedure is used to securely lock the door in open position.

- 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.



2.13.2 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.



2.13.3 OPENING/CLOSING UPPER FRONT WINDOW

**WARNING**

Opening/closing the upper front window

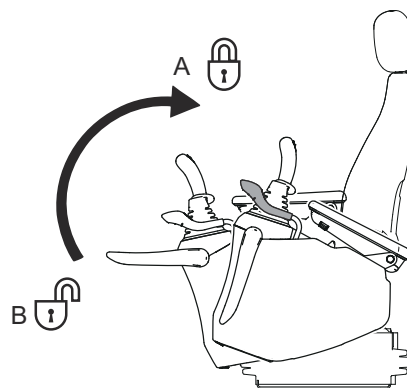
- Open and close the front window with the machine on level ground and ensure it is securely locked when closed. If the lock is not engaged, especially when the machine is tilted forward, there is a risk of the front window falling open.
- When closing the front window, the weight of the window may cause it to fall more rapidly. Hold and close it securely with both hands.
- When opening/closing the front window, set the control lock lever to the "LOCKED" position and stop the engine.

**CAUTION**

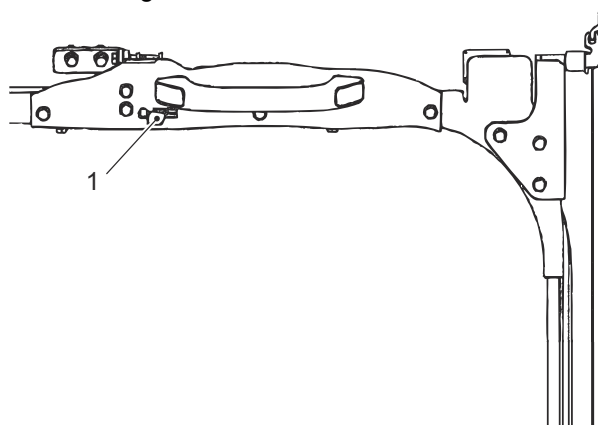
Open and close the window slowly and be careful not to trap your fingers. It is extremely dangerous to operate the machine with the front window unlocked or incompletely locked. Double check that the window is securely locked.

2

1. Move the machine to firm, level ground.
2. Lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.



4. Push lock lever (1) at the top-middle of the upper front window to the right to release the lock.

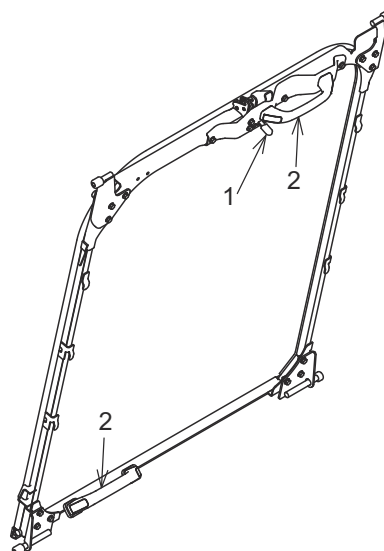


[2. MACHINE FAMILIARIZATION]

5. Hold handles (2) on the upper and lower sides of upper front window, and pull up and move the upper front window to the end on the rear side of the roof until it is securely locked.

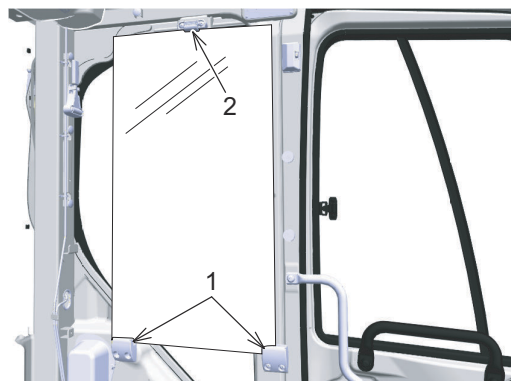
WHEN CLOSING FRONT WINDOW

- 1) Hold handles (2) on the upper and lower sides of the upper front window and push lock lever (1) to the right to release the lock.
- 2) When the upper-front window is returned to its original position, it is locked automatically. However, check that the window is securely locked.



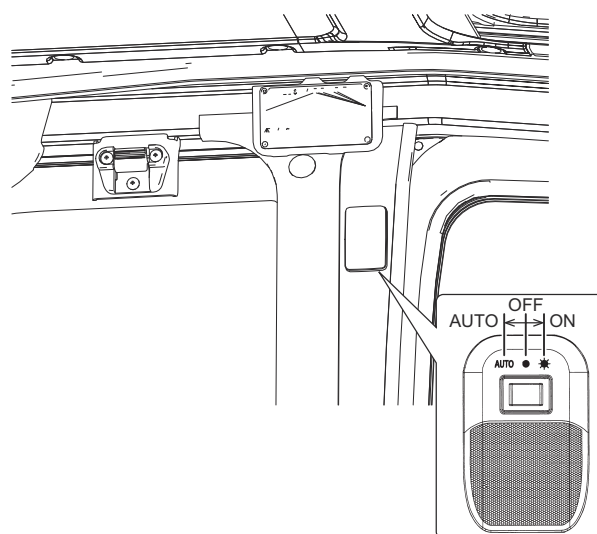
2.13.4 REMOVING FRONT WINDOW (LOWER)

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 left 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.



2.13.5 INTERIOR LIGHT

Operate the switch in accordance with the purpose.



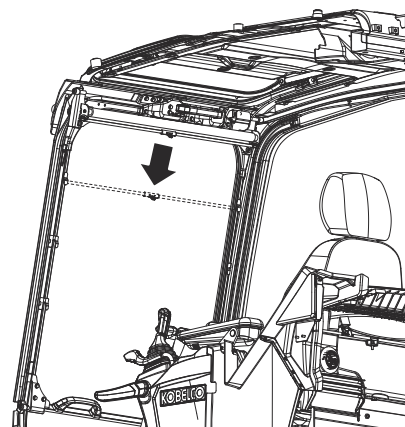
Switch	Function
AUTO	The interior light turns on and off as the door opens and closes.
OFF	The interior light does not turn on.
ON	The interior light turns on.

2.13.6 ROLL-UP BLIND

This is a curtain that can be rolled up.

Pull the curtain down and hook it onto the left and right hooks on the window frame to secure it in place.

To stow the curtain, pull the curtain down to unfasten it, and then use your hand to slowly roll the curtain back up.



2.14 EMERGENCY ESCAPE FROM OPERATOR'S STATION

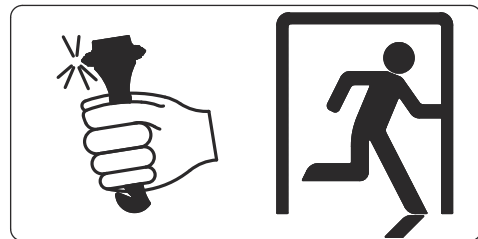
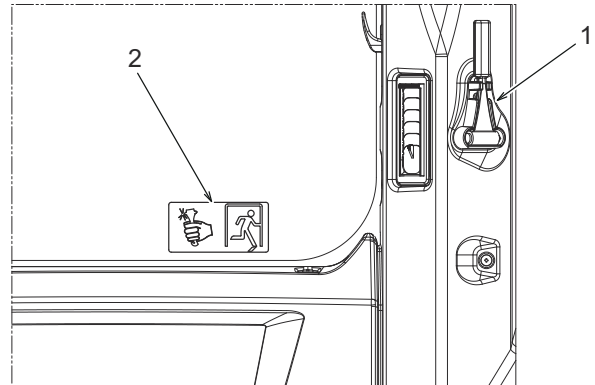
If it is impossible to open the cab door in an emergency, escape from the cab by the following way.

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.

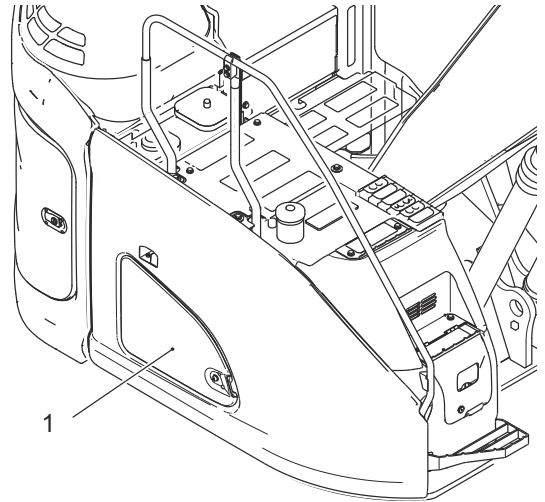
2.15 OTHER ACCESSORIES

2.15.1 TOOLBOX

The toolbox can be used to store tools and equipment. The toolbox is located at the right side of the machine (1).

Use the starter key to unlock the door. Then open the cover.

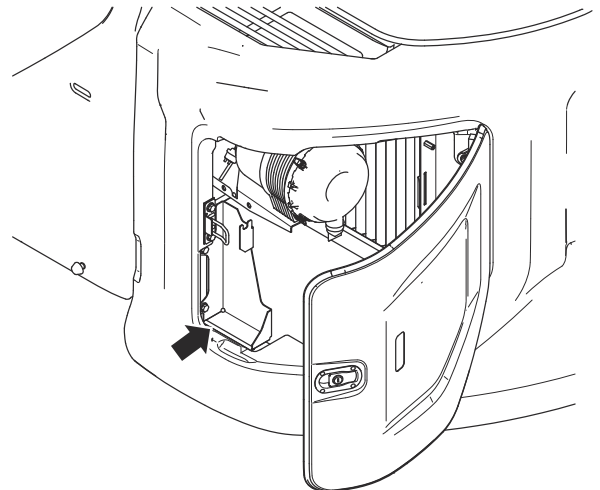
After using the tool, close the cover and then lock the toolbox shut with the starter key.



2.15.2 GREASE GUN HOLDER

This is located at the rear left side of the machine.

Stow the grease gun here when not in use.



2.15.3 GUARD/SIDE DOOR (WITH LOCK)

CAUTION

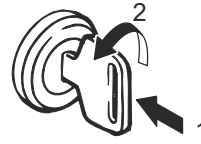
Always stop the engine before opening the engine hood, battery cover, side doors, etc.

The engine hood, fuel filler port, left/right side doors and cab door cover are provided with locks.

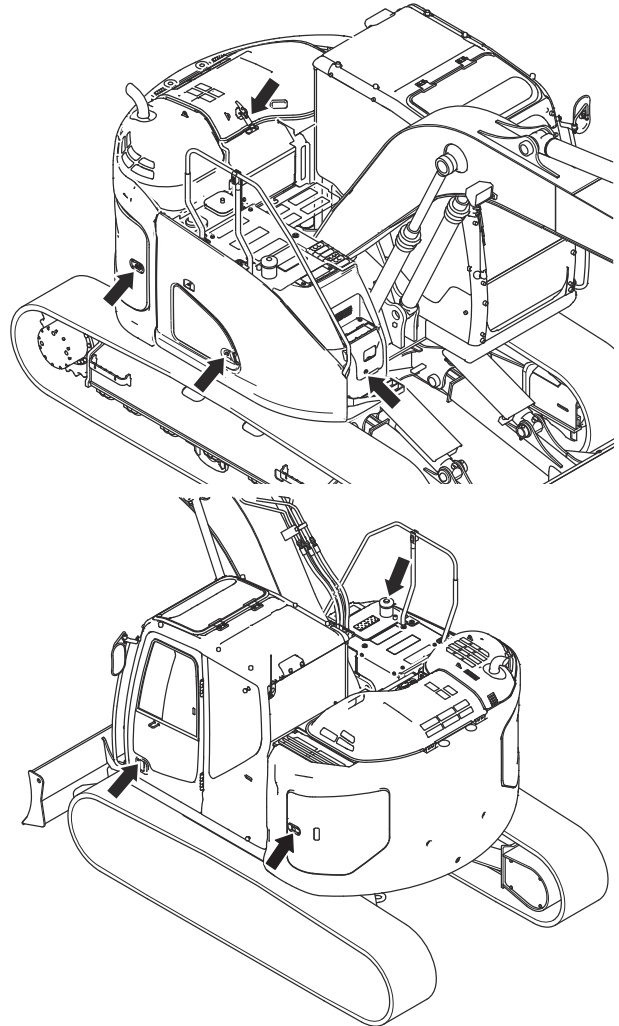
Use the starter key to open and close the engine guard. When using the starter key, fully insert it and then turn it. The starter key may break if not fully inserted.

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 lock rod.



HOW TO LOCK GUARD AND SIDE DOOR

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



2.16 Battery power-off switch

CAUTION

When turning the battery power-off switch to the off ("O") position, turn the starter switch to the off position and wait five minutes or more before operating the battery power-off switch.

If the cover of the battery power-off switch is opened before five minutes has passed since the starter switch was turned off, the buzzer may start sounding.

If the battery power is cut off just after the engine stops, the electronic devices may become damaged.

Notice

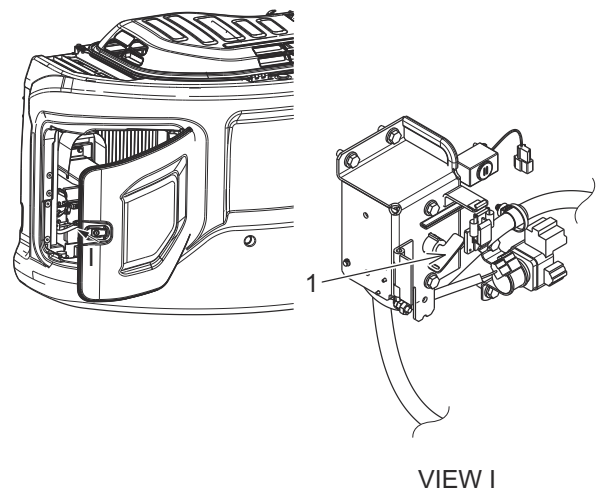
When the switch is turned off, all electrical circuits are shut down, and the preset memory and clock memory of the radio are cleared.

The battery power-off switch de-energizes all circuits connected to the batteries.

Having opened the left side door, the switch can be found where the door was opened. It is usually set to the on ("I") position.

ON (I): Turn key (1) right to connect the electrical circuit.

OFF (O): Turn key (1) left to shut off the electrical circuit.



Notice

Turn the battery power-off switch to the off position for the following purposes:

To stop operation of the machine for a long period (one month or longer)

De-energize the electrical system to prevent battery discharge, short circuits, or electric leakage.

To perform electrical system maintenance and electric welding

Cut off the power supply path to avoid damage to electrical components and prevent fire and other hazards.

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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 materials, fuel leakage and oil leakage in heated area around the engine, or 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.
- Check a greasing status of the attachment/equipment. If grease doesn't ooze out of the sliding surfaces of the attachment/equipment, grease them.

3.1.1 LOCK ROD

The side doors and the engine hood etc. have the lock rod.

When opening the side door or the engine hood etc. be sure to fix them with the lock rod to avoid unintentional closing.

CAUTION

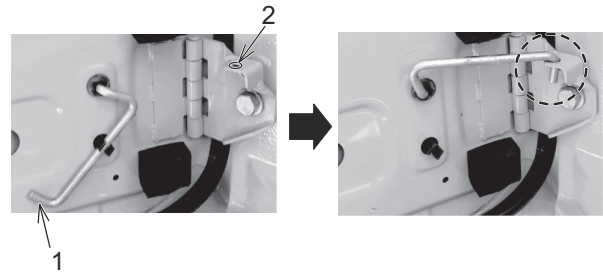
Before performing inspection or maintenance, be sure to confirm that the side doors and the engine hood, etc., are securely fixed with the lock rod.

If the side doors and the engine hood, etc., are not fixed, it may result in personal injury.

SWING TYPE LOCK ROD

Open the side door or the engine hood, etc., and then insert lock rod (1) into lock hole (2) to fix it with the lock rod.

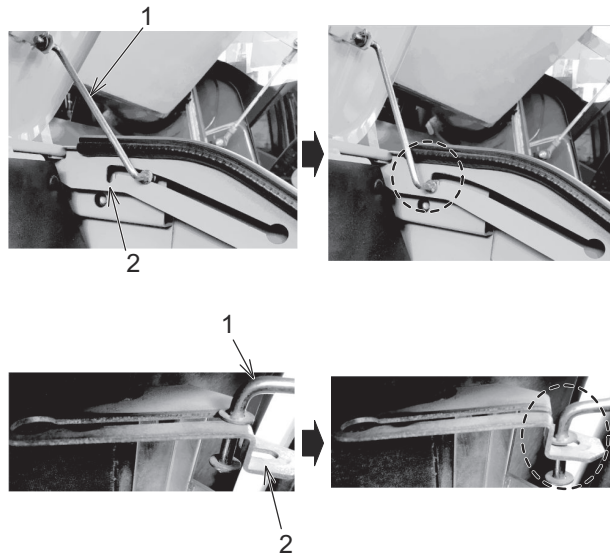
When closing the side door or the engine hood, etc., remove the lock rod from the lock hole and return it to its original position. And then, close the side door or the engine hood etc.



SLIDE TYPE LOCK ROD

Open the side door or the engine hood, etc., and slide and put lock rod (1) into notch (2) at the rail. Then, fix the side door or the engine hood with the lock rod.

When closing the side door or the engine hood, etc., remove the lock rod from notch (2) and then close the side door or the engine hood etc.



3.2 CHECK BEFORE STARTING ENGINE

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

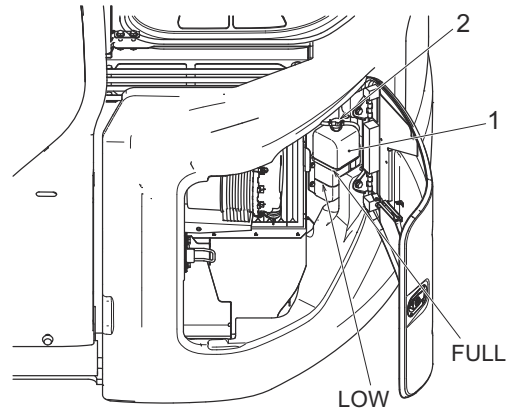
3.2.1 CHECKING COOLANT LEVEL AND REFILLING



Handling the radiator

- Do not open the radiator cap unless required. Use reserve tank (1) to check the coolant level when the engine is cool.
- The coolant remains hot after the engine is stopped and high pressure builds up in the radiator. Removing the radiator cap under this condition may cause burns. After the coolant temperature has dropped, turn the cap slowly to release the pressure.
- If the coolant level in the reserve tank drops frequently, immediately contact your KOBELCO authorized dealer.

1. Use the starter key to open the side door on the left side of the machine and secure it in place with the lock rod.
2. Check that the coolant level in reserve tank (1) is within the "FULL" (upper limit) and "LOW" (lower limit) levels. If low, remove reserve tank filler port cap (2) and add coolant up to the "FULL" level.
If the reserve tank is empty, check for water leaks and check the coolant level in the radiator. If the coolant level is low, fill the radiator with coolant and then fill the reserve tank with coolant. Then immediately contact KOBELCO and your KOBELCO authorized dealer.
3. After filling, tighten the cap securely.
4. Release the lock rod and close the side door.



3.2.2 INSPECTION AND MAKE UP OF OIL LEVEL OF ENGINE OIL PAN



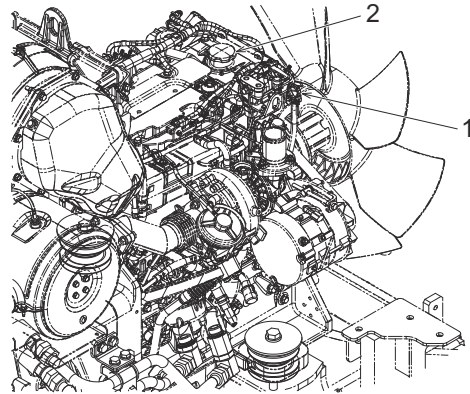
Temperature after stopping the engine

After stopping the engine, engine parts and oil remain hot and may cause burns. Allow the temperature to drop before starting work.

Notice

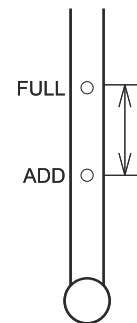
- Ensure the machine is level when checking the engine oil level.
- Always check the engine oil level before starting the engine.
- When checking the engine oil level after operation, wait approximately 30 minutes after stopping the engine before checking it.

1. Use the starter key to open the engine hood and secure it in place with the stay.
2. Pull out oil level gauge (1) and wipe off any oil with a waste cloth.
3. Fully reinsert oil level gauge (1) before pulling it out again.

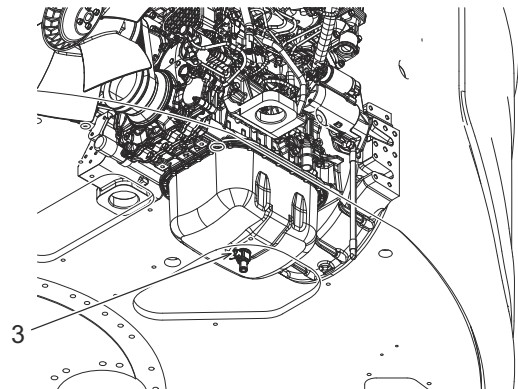


4. If the oil on oil level gauge (1) is between the "FULL" (upper limit) and "ADD" (lower limit) levels, the oil level is correct. If the oil does not reach the "ADD" level, refill it via the oil filler cap (2).

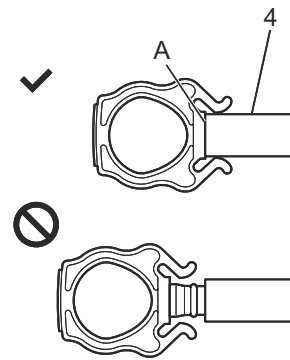
If the oil is significantly contaminated or deteriorated, change it ahead of the periodic replacement interval. See "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4 for the correct engine oil to use.



5. When the oil is at "FULL" level or above, loosen drain valve (3) to drain the excess engine oil and check the oil level once again.



6. Check that the oil level is appropriate, then insert level gauge (1) securely.



Notice

- Insert oil level gauge (1) carefully so as not to bend it. If not, oil level gauge (1) may become deformed.
- Oil level gauge (1) must be inserted until the grip (A) is flush against guide tube (4). A gap between the gauge and tube may lead to water intruding that could damage the engine.

7. Release the stay and close the engine hood.

3.2.3 CHECKING FUEL LEVEL AND REFUELING



Refueling

- Never use anything other than diesel oil for fuel. Check the fuel type again before refueling.
- Always stop the engine before refueling.
- To avoid fire, do not overflow fuel while refueling. Wipe up fuel spillages thoroughly.



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). Otherwise, fuel may overflow as it expands with increasing ambient temperature.
- Only use diesel oil that meets national standards. To achieve a good fuel efficiency and exhaust gas properties, the engine of this machine uses an electronically controlled fuel injection system.

The system requires high-precision parts and high lubricating ability. If low viscosity fuel with low lubricating ability is used, service life may be significantly decreased.

1. Check the fuel level on the monitor.

After turning the starter switch to the on position, the fuel level meter is displayed. The needle points to "E" when the fuel level is low.

2. Refuel only after stopping the engine.

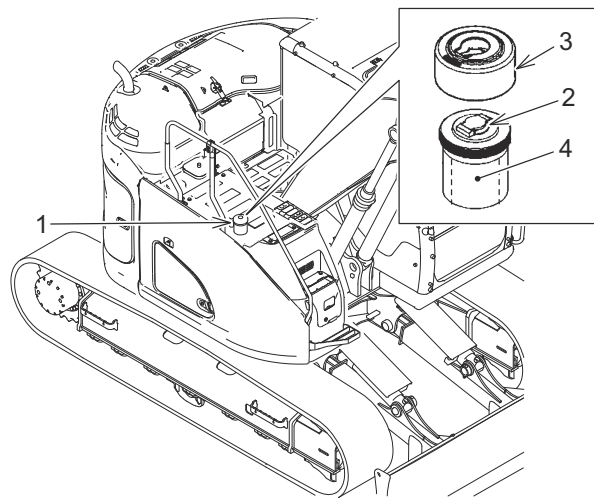
3. Remove rubber cover (3) from filler port (1), if any, and then open the tank by turning filler cap (2).

4. Refuel the machine with strainer (4) installed in filler port (1).

If dirt or other contaminants are present on strainer (4), remove it and wash with diesel oil or clean it by air blowing before putting it back in filler port (1).

Fuel tank capacity: 186 L (49.1 gal)

5. After refueling, tighten filler cap (2) securely. Install rubber cover (3) by aligning it with the cap.



3.2.4 DRAINING FUEL PRE-FILTER

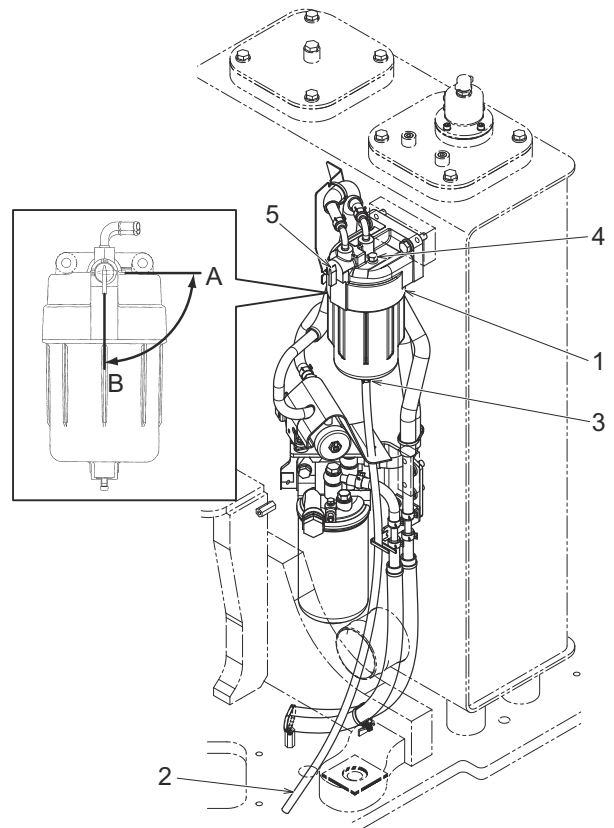
WARNING

If foreign material is present on the mounting area of the drain plug, the O-ring may become damaged. Damage to the O-ring causes fuel leaks that could result in fire.

The fuel pre-filter is designed to extract any water in the fuel.

Water needs to be drained from the fuel pre-filter after it has accumulated.

1. Use the starter key to open the side door on the right side of the machine and secure it in place with the lock rod.
2. Place a container for draining oil under drain hose (2).
3. Raise fuel shutoff valve (5) to "Closed" position (A).
4. Loosen drain valve (3) and air bleeder plug (4) to drain accumulated water from fuel filter (1) into the container.
5. After draining the water, tighten drain valve (3) and air bleeder plug (4) securely. Inspect the drained water in the container. If there is significant contamination, clean the element and inside of the casing.
6. Lower fuel shutoff valve (5) to "Open" position (B).
7. Release the lock rod and close the side door.



3.2.5 CHECKING HYDRAULIC OIL LEVEL



Pressure inside the hydraulic oil tank

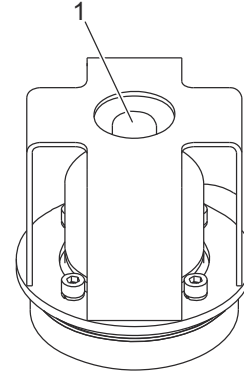
The inside of the hydraulic oil tank is dangerous due to high temperature and high pressure.

Before removing filler port plug (2), stop the engine and then press air breather (1) to release the pressure inside of the hydraulic oil tank.

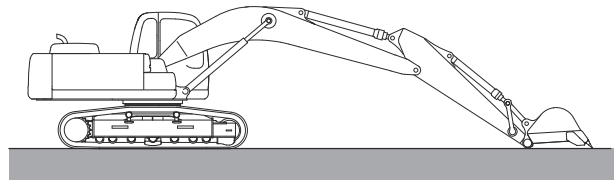
Notice

For details about refilling the hydraulic oil, see "5,000 HOUR MAINTENANCE" in Chapter 4.

The hydraulic oil tank is on the right side of the machine.



1. Park the machine on firm, level ground.
2. Retract the arm and bucket cylinders and place the bucket and dozer (if fitted) on the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.

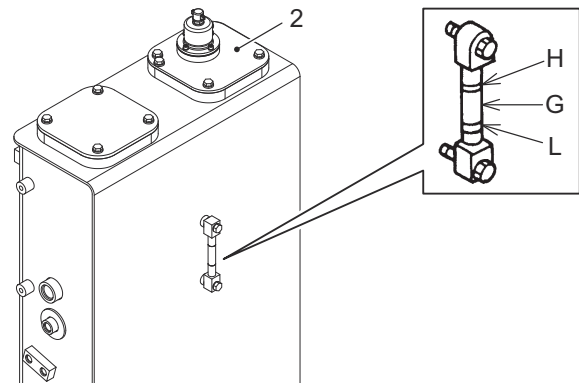


4. Check the oil level using level gauge (G) on the side of the hydraulic oil tank.

The oil should be within the "L" and "H" levels.

Use the following as a guide, because the oil level varies with oil temperature.

- Before operation: Near the "L" level (Oil temperature 10 to 30°C (50 to 86°F))
- During normal operation: Near the H level (Oil temperature 50 to 80°C (122 to 176°F))



Notice

Do not supply oil to the "H" level or above. If the hydraulic oil tank becomes full, it can cause damage to the tank and other parts of the machine and there is a risk of hydraulic oil spraying out.

3.2.6 CHECKING FAN BELT AND HVAC COMPRESSOR BELT



WARNING

Inspecting and maintaining the belt

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

Carrying out inspection and maintenance while the engine is running could result in your body or clothing catching on the belt, fan, or other rotating parts, leading to a serious accident resulting in injury or death.



CAUTION

If there is any evidence of cracking or other damage, if the belt slips excessively, or if the belt cannot be adjusted within the specified range, replace the belt with a new one. Keep oil and oily substances away from belts. They may cause the belt to slip and shorten its service life.

Notice

- When replacing the belt for a new one, run the engine at idle for three to five minutes to re-check the belt's tension or adjust it as needed.
- After running the engine for approximately two hours, the new belt reaches full initial elongation.
- When a belt is part of a set of two, be sure to replace both for new belts at the same time.

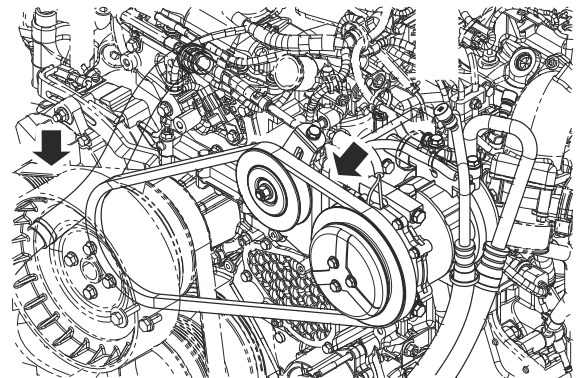
The engine of this machine is fitted with an alternator, fan and HVAC compressor belt.

Inspect the belt for wear and damage and check it for tension, adjusting properly in order to maintain maximum engine performance and service life.

Notice

For details on adjusting the belts, see Chapter 4 "ADJUSTING FAN BELT AND HVAC COMPRESSOR BELT" in INSPECTION AND MAINTENANCE.

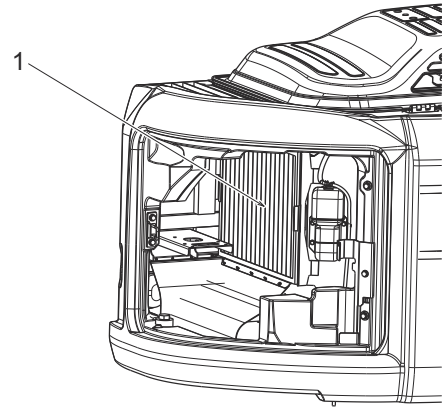
- To check the belt tension, press on the center of the belt with your compression gauge. The tension is normal if the deflection falls within the range shown in the following table.



Belt	When tensioning a new belt mm (inch)	On inspection mm (inch)	Pushing force N (lbf)
Fan/Alternator	4.2 to 5 (0.17 to 0.20)	6.6 to 7.4 (0.26 to 0.29)	98 (22)
HVAC compressor belt	2.3 (0.09)	2.3 (0.09)	<ul style="list-style-type: none"> • 25 to 31 (5.6 to 7.0) *When tensioning a new belt • 12 to 15 (2.7 to 3.4) *When inspecting

3.2.7 INSPECTING RADIATOR, OIL COOLER CORE AND FILTER

1. Use the starter key to open the side door on the left side of the counterweight.
2. Visually inspect filter (1) for mud, dust, leaves, etc.
3. If the filter is extremely dirty, clean it as described in "250-HOUR (3-MONTHLY) INSPECTION & MAINTENANCE" in INSPECTION AND MAINTENANCE.



3.2.8 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.



3.2.9 ADJUSTMENT OF MIRRORS

**WARNING****ABOUT ADJUSTMENT OF MIRRORS**

Be sure to adjust the mirrors before operation.

When the mirrors are poorly adjusted, visibility cannot be ensured and it could cause severe injury.

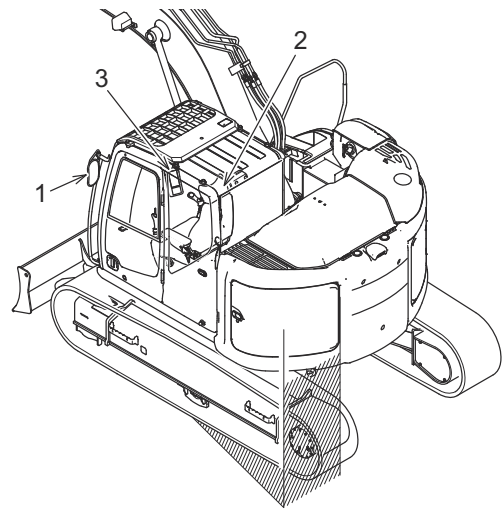
**CAUTION**

Use genuine mirrors only.

When the mirrors are attached to a non-specified place, such as the handrail of the cab entrance, the strength of handrail may be decreased and it may cause damage or falling off of the mirror.

Adjust cab left mirror in a way so that the blind spot can be minimized when seeing it from the operator's seat.

- (1) Mirror
- (2) Seat
- (3) Monitor



[3. MACHINE OPERATION]

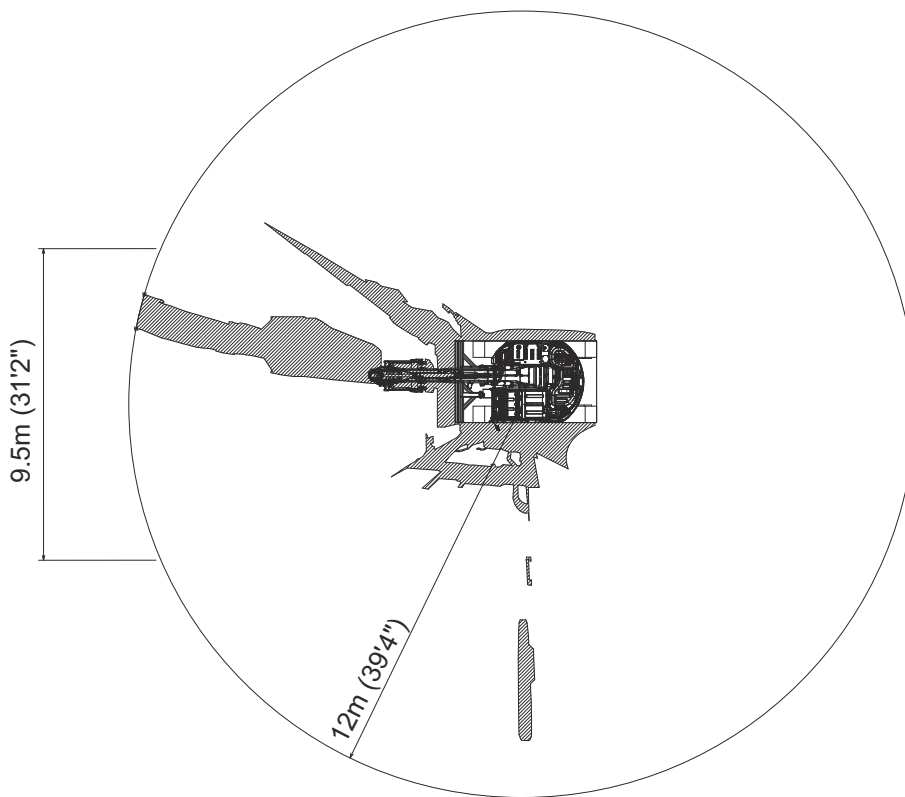
VISIBILITY MAPS

- The following visibility maps give an indication of which areas the operator cannot see (hatched areas) both directly and indirectly (through the mirrors and cameras). Safety checks should also be performed for areas the operator cannot see. The operator can use these maps 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.
 - These maps are not the same as the visibility requirements stipulated in EN474-1.
 - These maps were made according to the standard specification. Be cautious as these maps may change according to the machine specification.
-

Notice

These maps give an indication of over the ground from the immediate vicinity of the machine to a radius of 12 m (39'4") away from the operator reference point (680 mm (26.8") above and 20 mm (0.79") in front of the Seat Index Point).

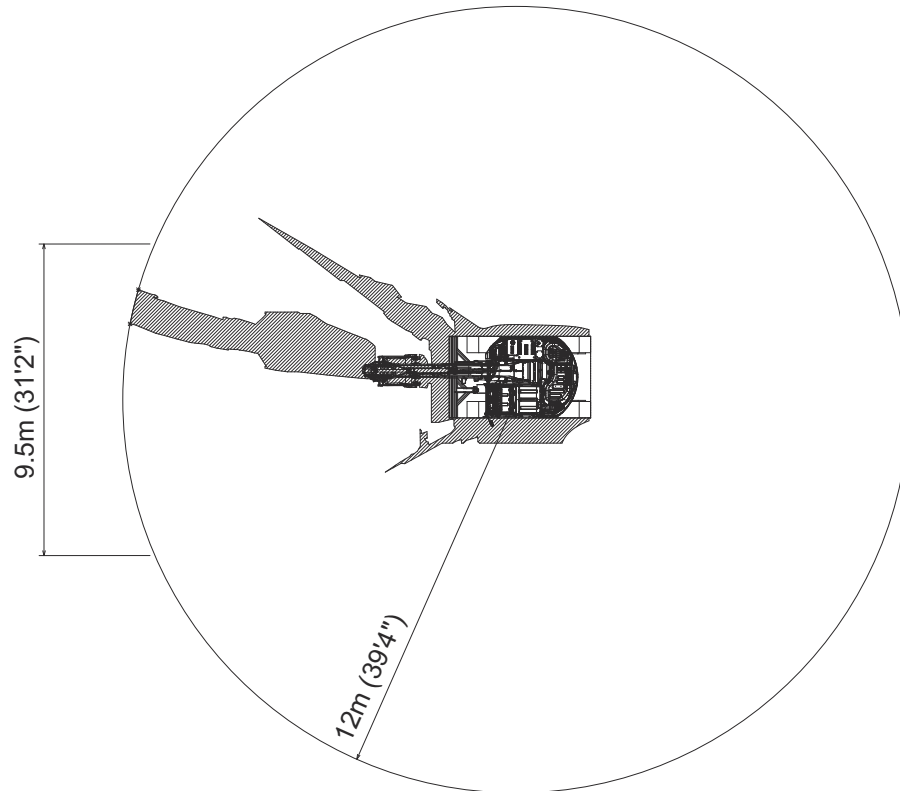
DIRECT AND INDIRECT VISIBILITY (WITH MIRRORS AND DOUBLE CAMERA SETUP)



Shaded area: Area the operator cannot see

DIRECT AND INDIRECT VISIBILITY (WITH MIRRORS AND TRIPLE CAMERA IMAGE SETUP)

Objects may appear in double in areas where the field of view of the camera overlaps.



Shaded area: Area the operator cannot see

MIRROR A (CAB LEFT SIDE)

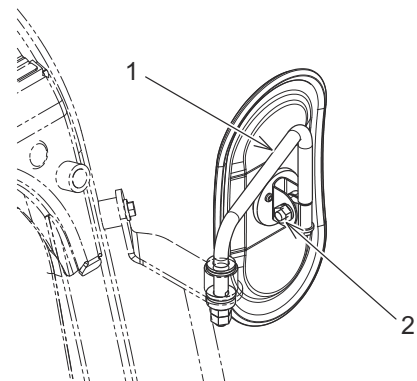
Adjust the mirror in the way that a person (or the object of 1.2 m (3'11") high and 30 cm (11.8") in diameter) who stands on the left rear end of the machine can be identified by the operator in the operator's seat.

- Install the mirror to the position shown in the figure.
- Install the mirror in the way not to come in contact with stay (1) of the mirror.
- If the movement of the mirror is not smooth, loosen nut (2) of the mirror to adjust it.

Tightening torque of nut (2)

M10: 18.6 to 25.5N·m (13.7 to 18.8 lbf·ft)

- Adjust the mirror to reflect the machine side face.

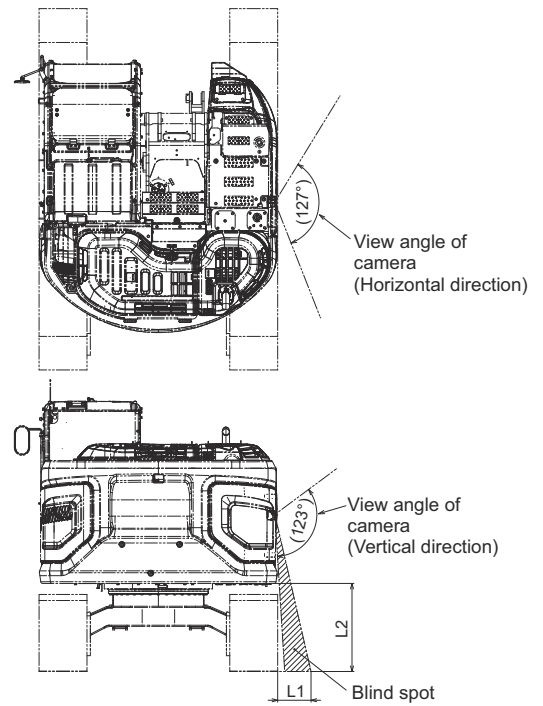


SIDE CAMERA (RIGHT SIDE)

Blind spot dimensions

L1: 348 mm (13.7")

L2: 919 mm (36.2")

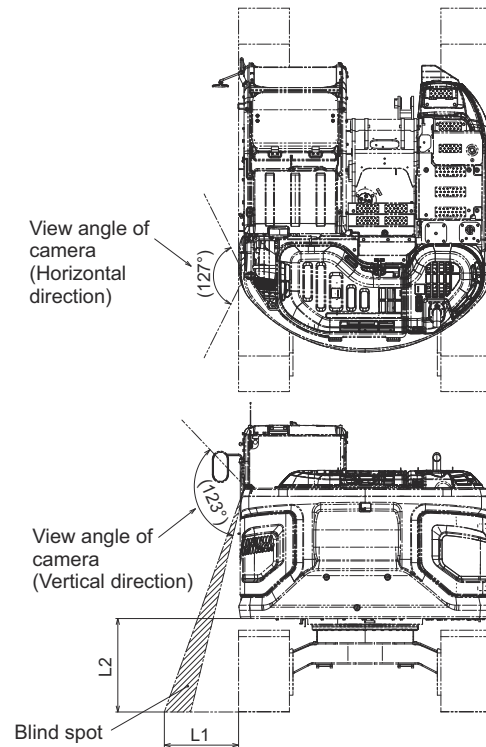


SIDE CAMERA (LEFT SIDE)

Blind spot dimensions

L1: 730 mm (28.7")

L2: 919 mm (36.2")

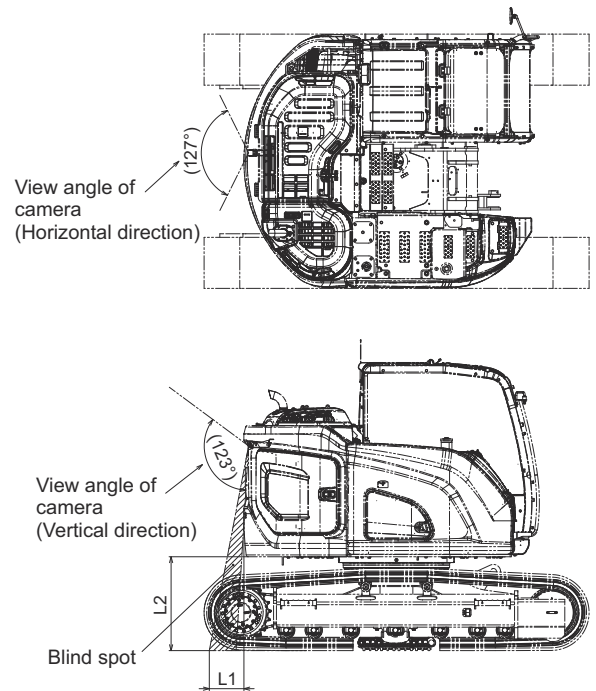


CAMERA (BEHIND MACHINE)

Blind spot dimensions

L1: 339 mm (13.3")

L2: 919 mm (36.2")

**3.2.10 CHECKING DISPLAY OF MONITOR**

Before starting the engine, check the display status of the monitor according to the following procedure.

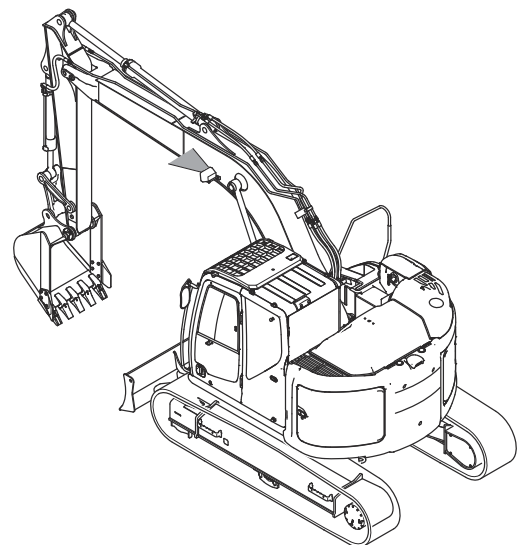
CAUTION

When the warning is displayed on the monitor, ask your KOBELCO authorized dealer for inspection.

1. Make sure the control lock 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 is displayed on the monitor.

3.2.11 CHECKING WORKING LIGHT

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



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.

3.2.13 CHECKING HORN

1. Press the horn switch located on top of the left control lever grip.
2. The horn should sound while the button is pressed.

If the horn does not sound or if it sounds strange, stop the machine and contact your KOBELCO authorized dealer.

3.3 STARTING ENGINE



WHEN STARTING ENGINE

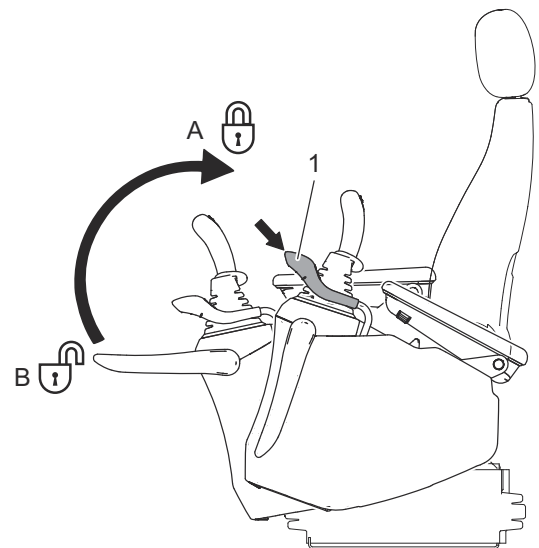
After making sure that no one is near the machine and no obstruction is left around the machine, sound horn and start the engine.

Notice

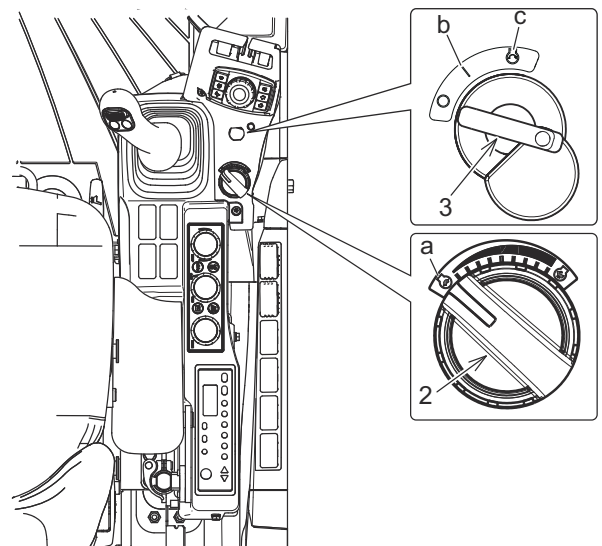
- Do not hold the starter key switch in the START position for more than 15 seconds. If the engine does not start, return the starter key switch to the OFF position, wait 30 seconds, and then try it again.
- When starting engine, if warning is displayed on the monitor, stop engine immediately and identify the cause, and then repair it if necessary.
- After the auto idling stops, when necessary to restart the engine, start the engine after returning the starter key switch to ACC or OFF once and the throttle potentiometer to the low idling position. But it is impossible to start the engine again until the buzzer stops sounding after the engine stops.

3.3.1 HOW TO START THE ENGINE

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



3. Turn engine throttle (2) to low idle position (a).
4. Turn key (3) of the starter key switch to "ON" position (b) and check the monitor performance.
5. Turn key (3) of the starter key switch to "START" position (c) to start the engine.
6. Release your hand from key (3) immediately after the engine starts. The starter key will return to the "ON" position automatically.



3.3.2 STARTING ENGINE IN COLD CONDITIONS

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

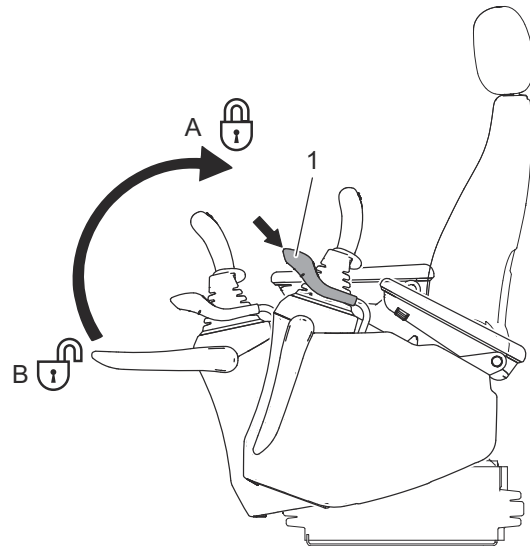
Notice

If performing auto warming-up, refer to "SWITCH SETTING SCREEN" in Chapter 2 of this manual and set automatic warming-up to "ON".

For manual warming-up operation, refer to "WARMING-UP OPERATION" in Chapter 3 of this manual.

1. Make sure that control lock lever (1) is in "LOCKED" position.

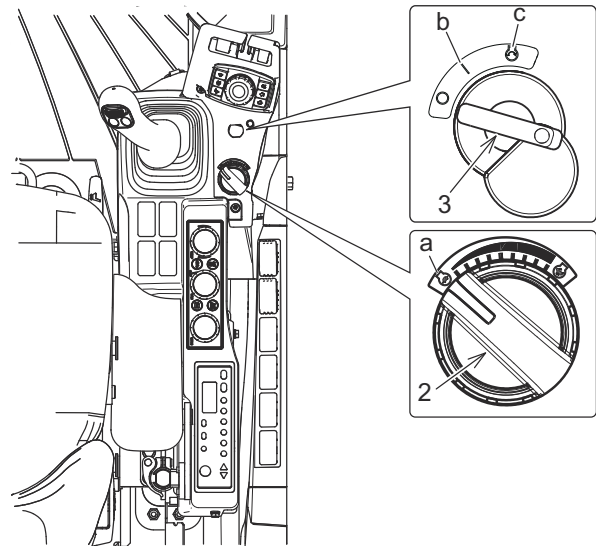
- A: "LOCKED" position
- B: "UNLOCKED" position



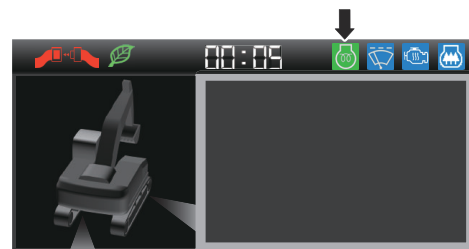
2. Ensure all control levers are in their neutral positions.

3. Turn engine throttle (2) to low idle position (a).
4. Turn starter key switch (3) to the "ON" position (b) and hold it there.

When the coolant temperature decreases to 10°C (50°F) or less, the glow plug is preheated automatically by the engine coolant temperature sensing.



5. Check the machine status on the monitor.
6. After completion of preheating (within 5 seconds), turn key (3) of the starter key switch to the "START" position (c) to start the engine.
7. Release your hand from key (3) immediately after the engine starts. The starter key will return to the "ON" position (b) 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 24 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.

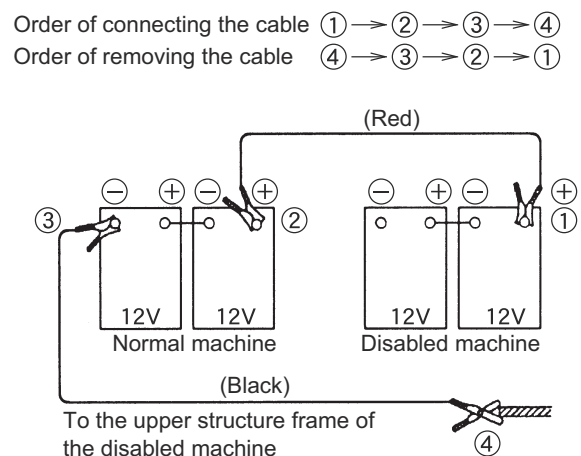


- Use the battery of which the capacity is equivalent to that of the disabled machine for the normal machine.
- Select the jumper cables and clips with a proper size for the battery.
- Check the jumper cables and clips for damage and corrosion.
- Connect the clip securely.
- Check that the control lock 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 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.



[3. MACHINE OPERATION]

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 THE ENGINE

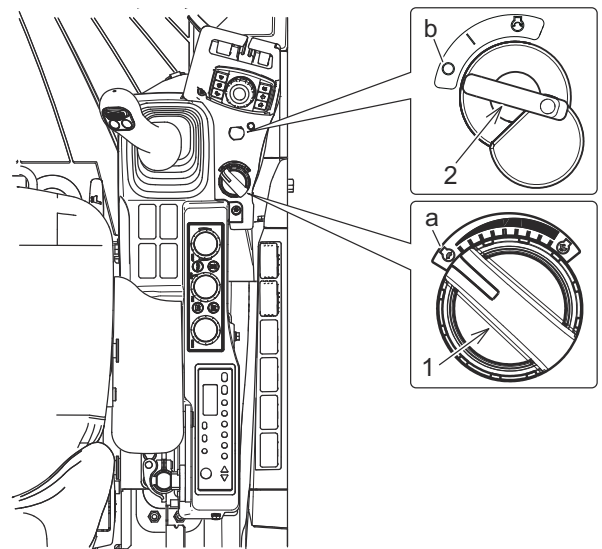
Notice

Before stopping the engine, leave it running at low idle for 5 minutes without moving the control levers. Be certain to set the engine throttle to low idle before stopping the engine.

Notice

If the battery power is cut off just after the engine stops, the exhaust gas cleaning device may become damaged. Before turning the battery power-off switch to the "O (OFF)" position or removing the battery terminal, turn the starter key switch OFF and wait at least 5 minutes before turning the battery power-off switch to OFF or removing the battery.

1. Lower the bucket to the ground before stopping the engine.
2. Set the control lock lever to the "LOCKED" position.
3. Set engine throttle (1) to low idle position (a).
4. Allow about 5 minutes of "COOLING" at low idle.
5. Turn starter key (2) to "OFF" position (b) to stop the engine.
6. Remove starter key (2) and store it.



3

Notice

It may be possible to hear the DEF/AdBlue pump running even after the engine has been switched off.

This is not a failure of the DEF/AdBlue circuit. Any DEF/AdBlue remaining in the DEF/AdBlue lines is pumped back into the tank to prevent it from freezing or drying up.

3.5 CHECK AFTER STARTING ENGINE

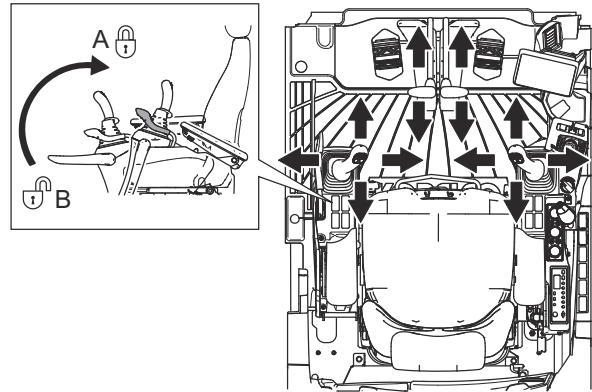
Before operation, be sure to inspect and check the machine after starting the engine. If any failures are found, contact your KOBELCO authorized dealer.

3.5.1 CHECK OF CONTROL LOCK LEVER

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

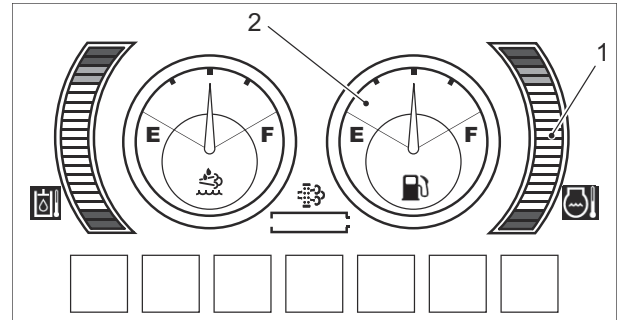
See "PILOT CONTROL LOCK LEVER" in Chapter 2.

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 MONITOR

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 monitor and the pointer is at a proper position on engine coolant temperature meter (1) and fuel level meter (2).



CAUTION

When the warning is displayed on the monitor, ask your KOBELCO authorized dealer for inspection.

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.

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)

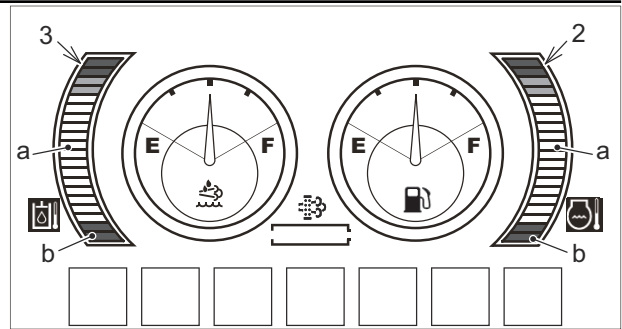
The smoke may look white in winter due to cold weather.

3.6 WARMING-UP



ABOUT WARMING-UP

- When the reading of hydraulic oil temperature meter (3) is in low temperature range (b), rapid operations may cause severe damages to the hydraulic components. Before starting operations, warm-up the hydraulic oil until the reading of hydraulic oil temperature meter (3) rises to normal range (a).
- 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.



Notice

In warming-up the engine, turn auto idling stop function switch OFF.

Notice

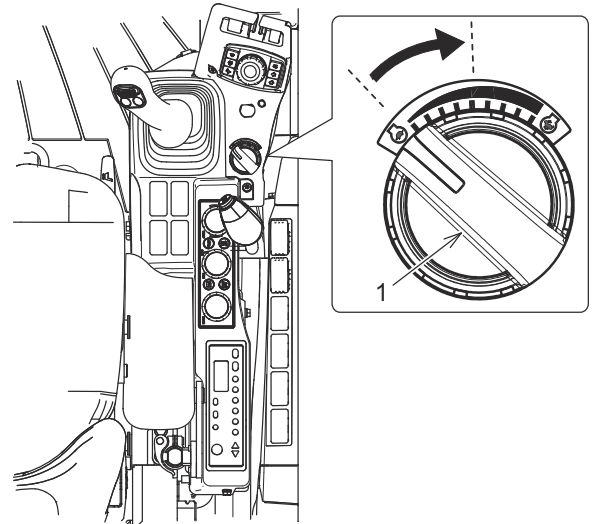
For the engine start up procedures with the automatic warming-up system, see "USER MENU SETTING" in Chapter 2.

3.6.1 ENGINE WARMING-UP

Notice

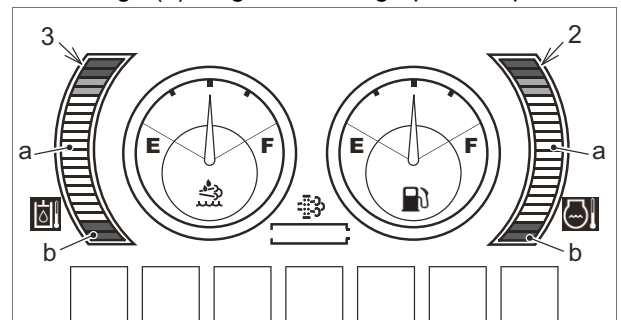
Avoid gunning the engine as it may lead to engine trouble or poor performance.

1. Check that auto idle stop function is set to "OFF".
2. Set the engine throttle (1) midway between the low idle position and full throttle.



3. Allow the engine to run unloaded at middle speed for approximately 5 minutes.

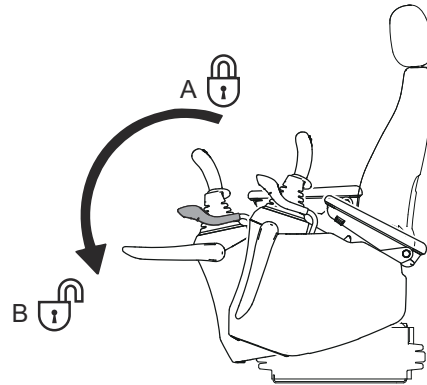
When engine coolant temperature meter (2) reads within normal range (a), engine warming-up is completed.



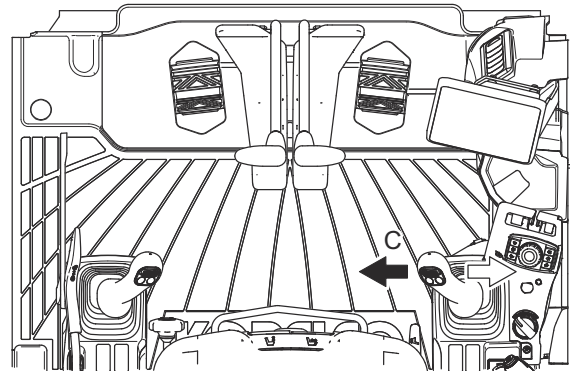
3.6.2 HYDRAULIC OIL WARMING-UP OPERATION

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

1. Set control lock lever (1) to the "UNLOCKED" position.
2. Raise the boom to a height at which the bucket can be moved.

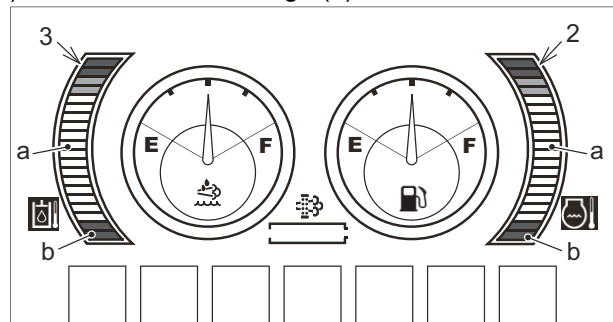


3. Move the right control lever slowly toward bucket digging side (C) to the stroke end position and allow pressure relief to take place until the reading of hydraulic oil temperature meter (3) falls within normal range (a).
4. After that, slowly extend and retract each cylinder several times.



5. Also perform swing and traveling operations slowly to circulate the warm hydraulic oil.

If the reading of hydraulic oil temperature meter (3) falls within low temperature range (b), repeat the above steps until the reading of hydraulic oil temperature meter (3) falls within normal range (a).



3.7 AUTO IDLE STOP FUNCTION

Notice

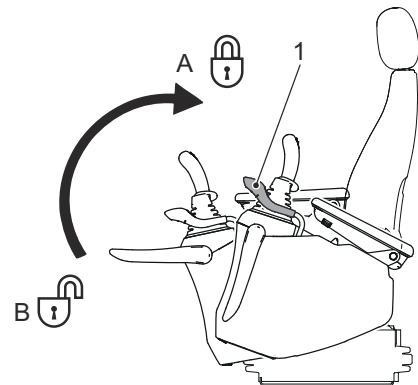
The machine features an auto idle stop function to reduce fuel consumption and exhaust emissions resulting from unnecessary engine idling.

- When the auto idle stop switch is "ON", the engine shuts down after a set period of time if the control lock lever has been raised and the engine is running.
- To restart the engine after an auto idle stop, always return the starter key switch to the "OFF" position and return the engine throttle to the low idle position before restarting. Note, however, that after the engine is switched off, it cannot be restarted until the warning buzzer stops.
- While the control lock lever is in "LOCKED" position (A), switch the auto idle stop function to "OFF" to warm up the engine, use the HVAC, or continue to use the work lights. These functions will not be usable while the auto idle stop function is ON as this function switches the engine off.
- Always turn the starter key switch to the "OFF" position when leaving the operator's seat.
- The auto idle stop function will not operate if the engine coolant temperature and coolant level warnings are displayed or if the automatic warming-up function has been activated, regardless of whether the auto idle stop switch is set to ON/OFF.
- Do not use auto idle stop mode when performing lifting work.

Although normally "OFF", the auto idle stop function can be set so that the engine automatically comes to a stop after a set period of time if control lock lever (1) is in "LOCKED" position (A) (while the engine is running). This can help reduce fuel consumption and exhaust gases.

- For information on setting the auto idle stop function, see "AUTO IDLE STOP SETTINGS" in Chapter 2.
- The default time for the engine to come to a stop is 300 seconds.

For details on how to change this time, contact your KOBELCO authorized dealer.



Notice

- After setting the control lock lever to "LOCKED" position (A), the engine will start to decelerate after approximately 4 seconds.
- The buzzer will sound for 5 seconds before the engine comes to a stop.
- Excessive idling: Do not allow the engine to idle for more than 15 minutes as this is considered excessive. Excessive idling can cause engine wear and build up of carbon soot, which can, in turn, cause premature component failure.

3.7.1 RESTART AFTER AUTO IDLE STOP



When leaving the operator's seat, be sure to set the starter switch to the "OFF" position.

1. Check that the buzzer stops.
2. Turn the engine throttle to the low idle position.
3. Return the key of the starter switch to "ACC" or "OFF" once and then restart the machine.

3.8 WORK MODE SELECTION

Check the monitor in the operator's station before operating the machine.

Before selecting a work mode, see "WORK MODE SELECTION" in Chapter 2.

3.9 SWITCHING ATTACHMENT MODE

Make sure that an appropriate attachment mode for the front attachment installed on the machine has been selected before operating the machine.

See "SWITCHING ATTACHMENT MODE" in Chapter 2 for details about switching between attachment modes.

3.10 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.

3.10.1 PRECAUTIONS OF MACHINE OPERATION



WARNING

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 acceleration operation, the engine speed increases abruptly. Operate the control lever carefully.

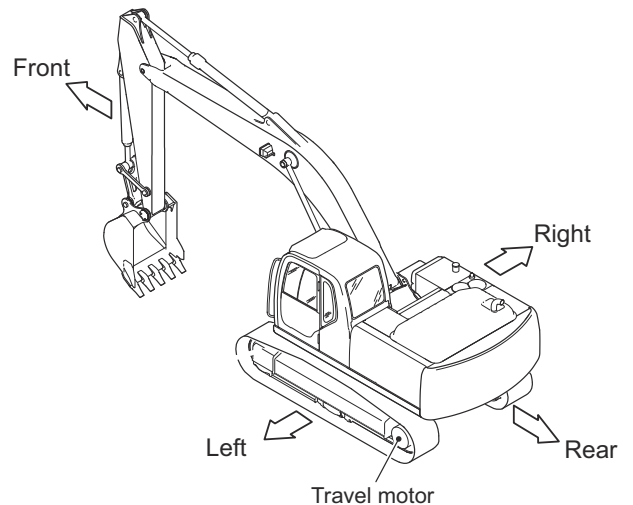


CAUTION

- The indications on the monitor do not assure the condition of the devices. Daily maintenance should be performed not only by seeing the monitor 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.



3.10.2 TRAVEL PROCEDURES



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.



ABOUT TRAVEL SPEED

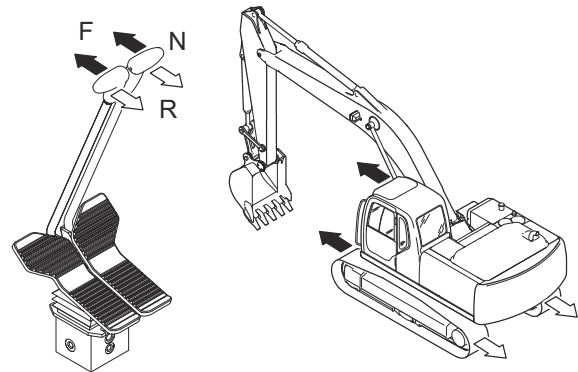
During traveling, do not change the travel speed. Also, the travel speed should be set to the LOW (1st) speed when the machine is traveling on a downhill, or being loaded to/unloaded from a trailer. A sudden change of the machine stability could cause personal injury.

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.

F: Forward traveling

N: Neutral (Stop)

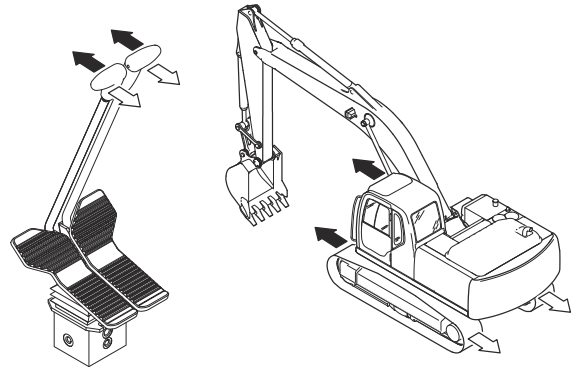
R: Backward traveling



Forward/Reverse traveling

- Push (forward) or pull (backward) both the left and right travel levers simultaneously.

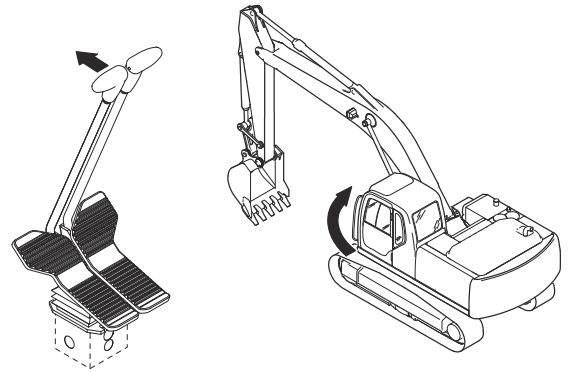
Both the forward and reverse travel speed can be changed by lever displacement.



Pivot turn

This operation drives only one crawler to turn the machine.

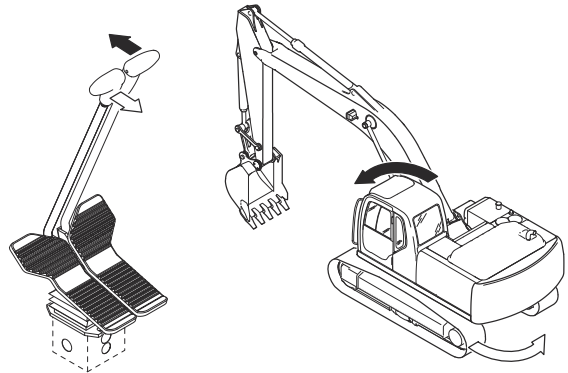
- Operate one of the two travel levers to make a pivot turn.



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.



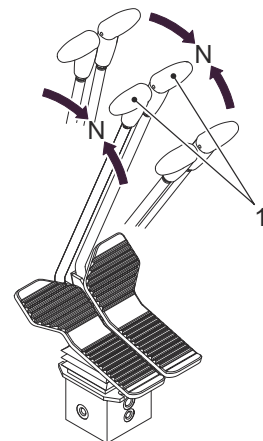
STOP TRAVELING



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.



3.10.3 TRAVEL SPEED SELECT SWITCH (LOW/HIGH)

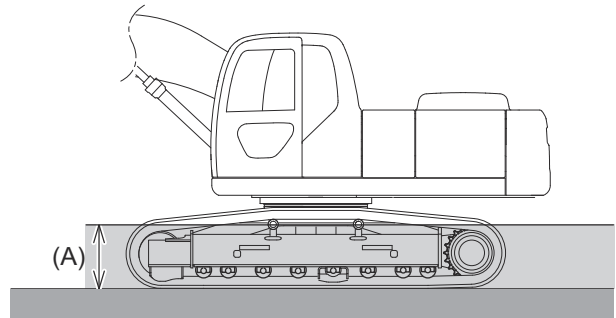
Refer to "TRAVEL SPEED SELECT SWITCH (LOW/HIGH)" in Chapter 2 of this manual for more information on switching the travel speed from low (1st) to high (2nd).

3.10.4 MACHINE OPERATION IN WATER OR ON SOFT GROUND

CAUTION

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).
- 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.



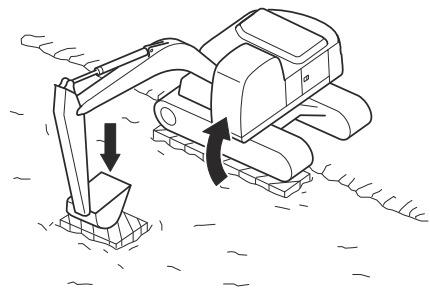
3.10.5 GETTING OUT OF SOFT GROUND

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

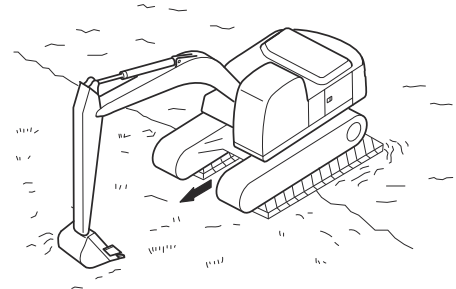
When using the boom and arm to lift up the machine, push the bottom of the bucket, not the teeth, against the ground.

WHEN BOTH SIDES OF MACHINE GET STUCK IN SOFT GROUND

CAUTION

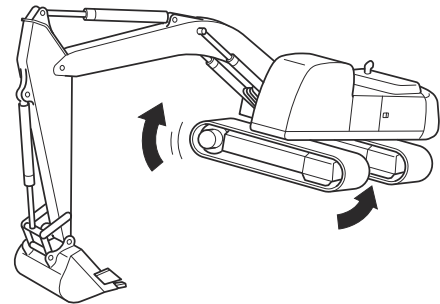
Operate the machine at the operator's seat. Keep the area around the machine clear of people.

1. 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.



2. 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.



3.10.6 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.



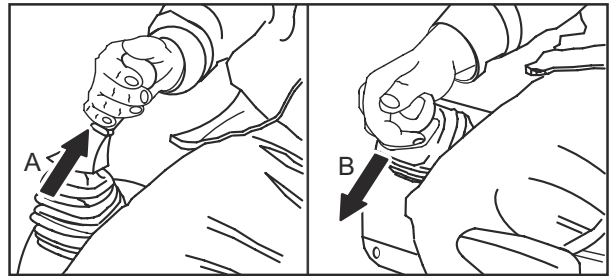
INTERFERENCE BY FRONT ATTACHMENT

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.

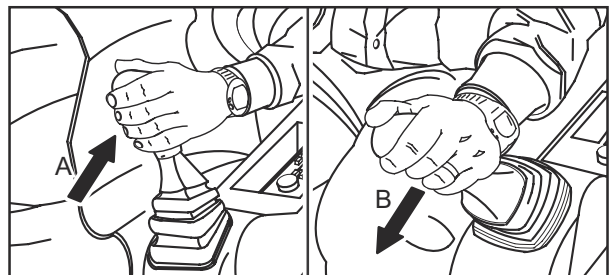
- A: Pull the right control lever backward to move the boom up.
- B: Push the right control lever forward to move the boom down.
- Return the right control lever to the neutral (center) position to stop the boom.



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.

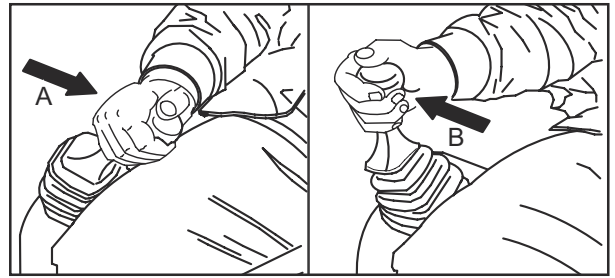
- A: Pull the left control lever backward to move the arm closer to the cab (Arm in).
- B: Push the left control lever forward to move the arm forward and away from the cab (Arm out).
- Return the left control lever to the neutral (center) position to stop the arm.



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



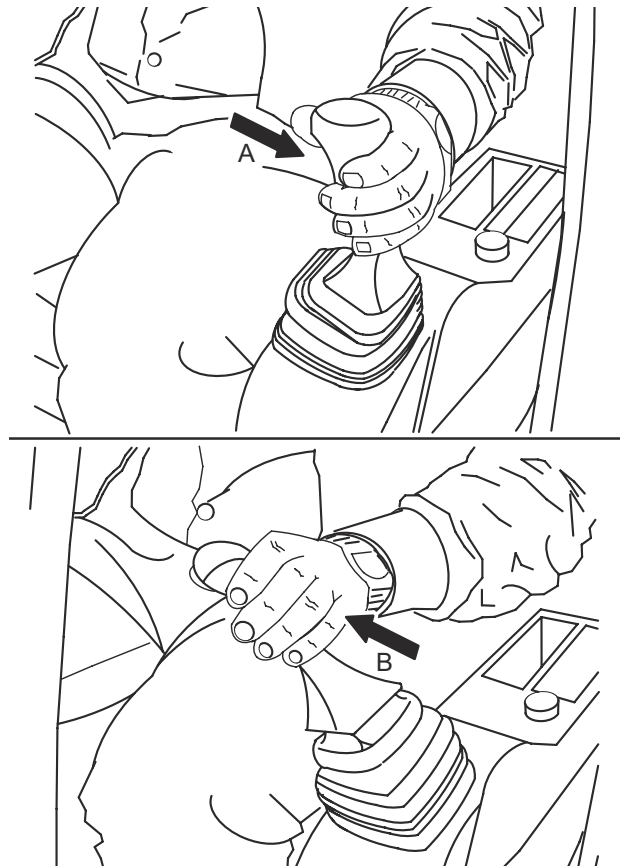
PRECAUTIONS TO PREVENT DANGER IN SWINGING

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.



3.11 WORK PROCEDURES OF MACHINE

3.11.1 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.

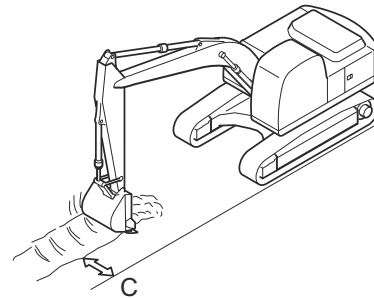
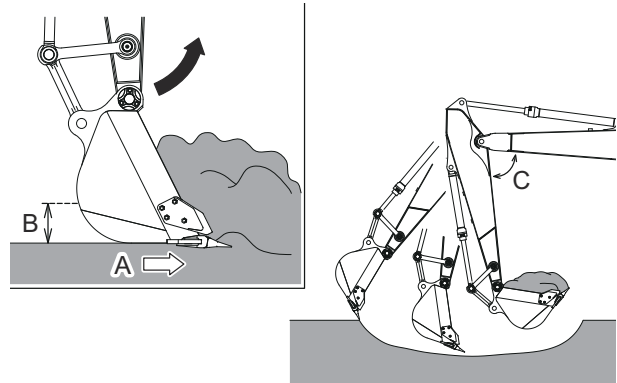
This will reduce the digging resistance and damage to the tooth tips.

- 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.

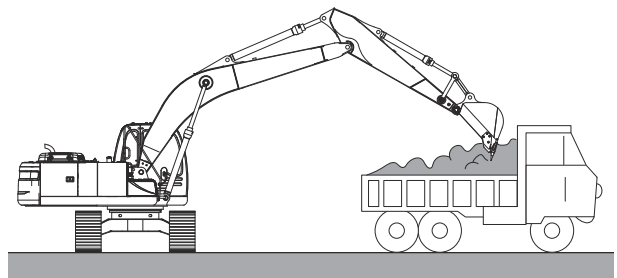
- When digging a wide trench, dig both sides of it first and dig the center last.

To improve the efficiency, attach a bucket suitable for trenching and place the crawlers parallel (C) to the trench to dig.



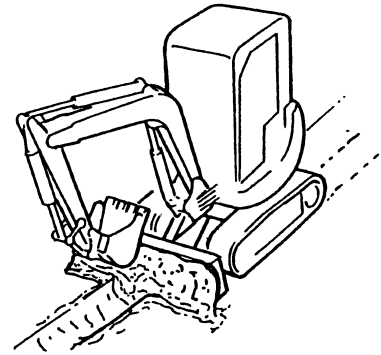
3.11.2 LOADING WORK

- 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.



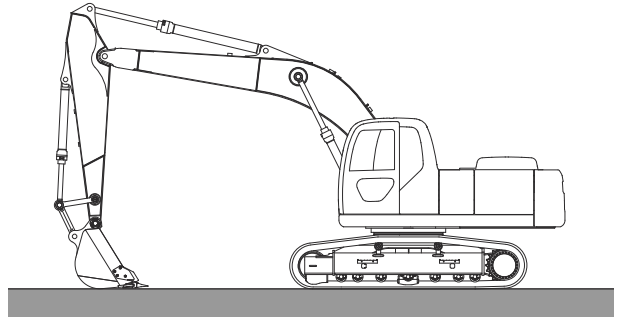
3.11.3 GROUND LEVELING WORK

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.

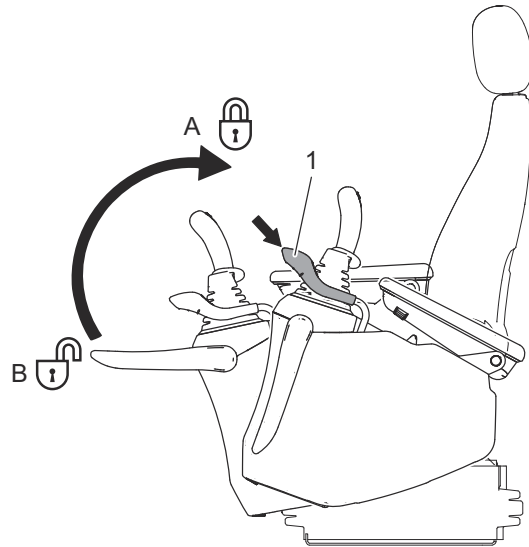


3.12 ALWAYS PARK MACHINE PROPERLY

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 acceleration switch to the "OFF" position.



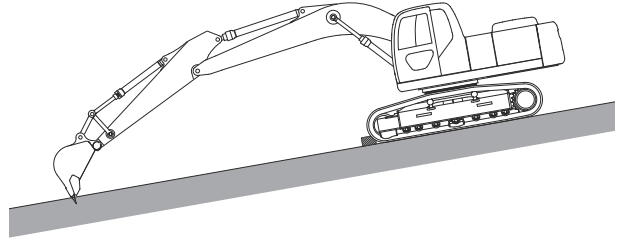
4. Pull the control lock lever(1) to the locked(up) position(A).
If not locked, accidental or unintended contact with the control levers, pedals and other control devices may result in unexpected and unintended machine movement.
5. Turn engine throttle to the low idle position.
6. Turn the starter switch 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.



3.12.1 PARKING MACHINE ON SLOPE

If the machine must be parked on a slope, follow the procedure below.

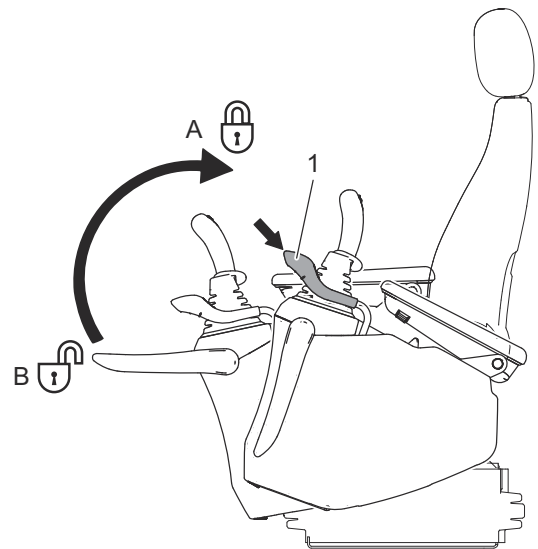
1. The undercarriage and the upper structure and the attachment /equipment must face downhill.
2. Lower the attachment into the ground. If equipped with a bucket, wedge the bucket into the ground.
If equipped with a dozer blade, lower it to the ground.
3. Set the auto acceleration switch to the "OFF" 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 engine throttle to the low idle position.
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 secure.
7. Block the tracks in the front and the rear.



3.13 INSPECTION AND CHECK AFTER OPERATION

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

- 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.

3.14 MACHINE OPERATION IN ADVERSE CONDITIONS

3.14.1 OPERATION IN COLD CONDITIONS



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 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.

BATTERY FLUID SPECIFIC GRAVITY

Charge level	Electrolyte temperature		
	-20°C	0°C	20°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.

- Sufficiently remove any mud and water stuck to the machine. In particular, 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.

3.14.2 OPERATION IN MARINE ENVIRONMENTS

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

3.14.3 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.
- In particular, clean the starter and alternator earlier than the specified interval to prevent the deposit of dust.

3.15 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.

3.15.1 WASHING THE MACHINE

Wash the machine thoroughly, inspect and maintain the travel system components and touch up any peeling paint or scratches. Grease the greasing points.



Do not wash the inside of the cab.

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

3.15.2 REFILLING OIL/GREASING

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

- To prevent condensation in the fuel tank, fully fill to the upper limit with new and clean fuel.
- Apply a sufficient quantity of anti-rust oil to any parts which rust easily, especially to the exposed area of each cylinder piston rod.
- Every two months, grease the attachment/equipment and perform lubricating operation.

3.15.3 BATTERY

- To replenish any self-discharge occurring during storage, perform an auxiliary charge at least once a month.
- If the machine is equipped with a battery power-off switch, turn the switch to the off position to cut off the current.
- Disconnect the negative (-) battery terminal and remove the batteries from the machine for storage.

Be careful not to connect the negative (-) terminal of the battery to the body (ground terminal) with a tool, etc., when removing the battery. It will cause a short circuit even when the battery power-off switch is OFF.



Before turning the battery power-off switch to the off (O) position or removing the battery terminal, turn the starter switch off and wait at least five minutes before starting work.

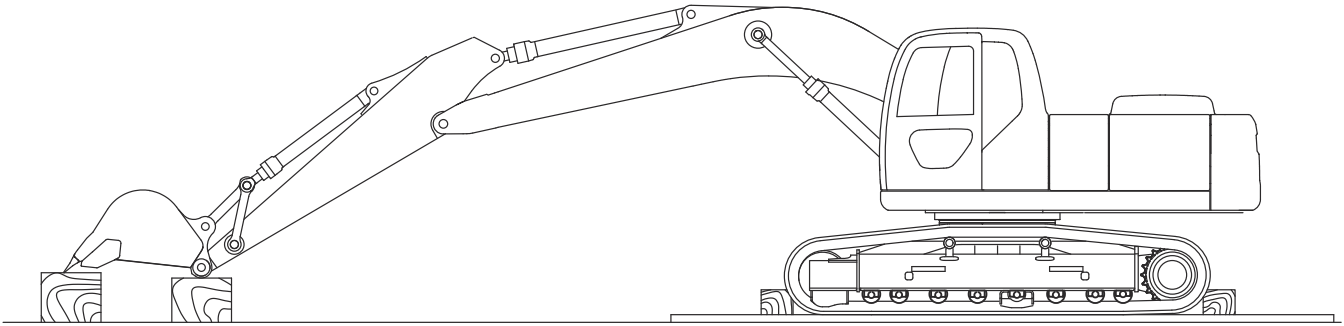
If the battery power is cut off just after the engine stops, the exhaust gas cleaning device may become damaged.

3.15.4 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.

3.15.5 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.

3.15.6 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.

3.15.7 TREATMENT AFTER LONG-TERM STORAGE

When starting to use the machine after a long-term suspension, carry out the following procedures.

- Loosen the plugs of the travel reduction and swing reduction units and remove any dust and water deposited during long-term storage.
- Lubricant deteriorates when the machine is not in use. Use extreme caution when starting to use the machine at time of reuse.
- Check the deterioration of the hydraulic hoses carefully after long-term storage. Replace any deteriorated hoses.
- Wipe off any anti-rust oil from the cylinder rods.
- Apply oil and grease to all necessary parts.
- Check the engine oil level and coolant level before starting the engine. Refill with engine oil or coolant if levels are low.
- After starting the engine, fully warm up the machine and repeat travel, 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.
- If the DEF/AdBlue in the DEF/AdBlue tank has expired as per the expiration periods in the table below, have the DEF/AdBlue changed by your KOBELCO authorized dealer. Do not smell old DEF/AdBlue as the ammonia odor may cause irritation.

Ambient temperature in storage	Expiration period
10°C (50°F) or less	36 month
25°C (77°F) or less	18 month
30°C (86°F) or less	12 month
35°C (95°F) or less	6 month
Above 35°C (95°F)	1 month

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4 INSPECTION AND MAINTENANCE

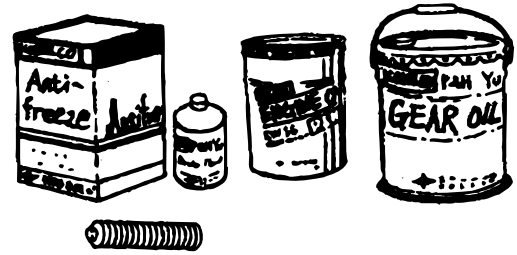
4.1 GENERAL



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 of 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 INSPECTION AND MAINTENANCE OF MACHINE

4.2.1 PERIODIC INSPECTION AND MAINTENANCE

Regular inspection and maintenance extends the service life of machine parts and maximizes the utility of the machine. Inspection and maintenance intervals are given in terms of both total operating hours and calendar days. The earlier of the two intervals should be used. For items that do not have a specified service interval, see "UNSCHEDULED MAINTENANCE". Also, operation in sites under severe work conditions or with high level of dust or moisture may need more frequent lubrication and maintenance than the service times specified in the "INSPECTION AND MAINTENANCE CHART".

4.2.2 GENERAL SAFETY & PRECAUTION

Carry out inspection and maintenance according to the procedures detailed in this manual. Park the machine on firm, level ground before inspection and maintenance work.

Notice

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

Stop the engine before inspection and maintenance

Always stop the engine before carrying out any inspection or maintenance in the engine area. Inspecting or servicing a running engine could lead to hands becoming entangled with the cooling fan or fan belt, resulting in injury. If running the engine is unavoidable for proper inspection or maintenance, operations should be carried out by two or more people in close communication, with one person capable of stopping the engine at any time.

Apply warning tags

Apply the tag "DO NOT START ENGINE! UNDER INSPECTION/MAINTENANCE" in a noticeable place such as around the operator's seat as well as the starter switch or control levers before inspection and maintenance.

Use KOBELCO genuine parts

- For replacement of parts, grease and oil, be sure to use KOBELCO genuine parts. Use grease and oil of the specified viscosity according to the ambient temperature.
- Store containers of grease and oil in a clean, indoor location to guard against the ingress of dust, water and other contaminants.

Beware of contamination

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 filter

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.

Disposing waste oil and antifreeze

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

Keep sealing surfaces clean

After removing O-rings or gasket seals, clean the sealing surface before replacing with new parts.

When assembling, apply a thin coat of oil to the O-ring or seal and seat it correctly in its groove.

Do not mix oils

Never mix different kinds of oil. When refilling with a different type of oil, change the total amount of old oil.

4.2.3 LOCK ROD

The side doors and the engine hood etc. have the lock rod.

When opening the side door or the engine hood etc. be sure to fix them with the lock rod to avoid unintentional closing.

CAUTION

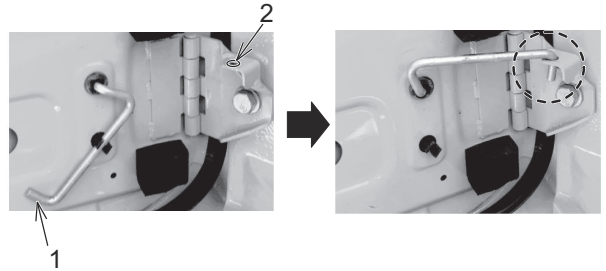
Before performing inspection or maintenance, be sure to confirm that the side doors and the engine hood, etc., are securely fixed with the lock rod.

If the side doors and the engine hood, etc., are not fixed, it may result in personal injury.

SWING TYPE LOCK ROD

Open the side door or the engine hood, etc., and then insert lock rod (1) into lock hole (2) to fix it with the lock rod.

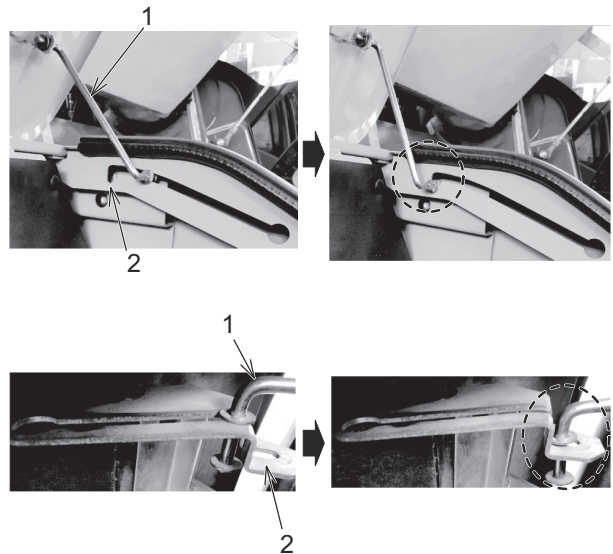
When closing the side door or the engine hood, etc., remove the lock rod from the lock hole and return it to its original position. And then, close the side door or the engine hood etc.



SLIDE TYPE LOCK ROD

Open the side door or the engine hood, etc., and slide and put lock rod (1) into notch (2) at the rail. Then, fix the side door or the engine hood with the lock rod.

When closing the side door or the engine hood, etc., remove the lock rod from notch (2) and then close the side door or the engine hood etc.



4.3 LUBRICANT, FUEL & COOLANT SPECIFICATIONS

Regardless of the outdoor temperature, the reduction units below 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	89.9 L (24 gal) 176 L (64.5 gal) (Hydraulic system)																	(KOBELCO BRAND) Long life hydraulic oil KW5046 P/No. KAPYN01T01066D3
Engine oil pan	Engine oil	[Total volume] 17.0 L (4.5 gal) [H level] 15.0 L (4.0 gal) [L level] 11.0 L (2.9 gal)																	*(KOBELCO BRAND) JASODH-1
																			*(KOBELCO BRAND) JASODH-1
Swing motor reduction unit	Gear oil	1.65 L (0.4 gal)																	(KOBELCO BRAND) A.P.I classification for "service GL-4" P/No. KAPSP90020
Travel motor reduction unit		2.1 L X 2 (0.6 gal X 2)																	
Swing motor reduction unit (Housing)	EP grease	0.4 kg (0.9 lbs)																	(KOBELCO BRAND) Extreme pressure multipurpose grease Cartridge P/No. KAPG0420D1 (400g x 20 units) Pail can P/No. KAPG1601D1
Attachment pins		16 places																	
Slewing ring gear		1 place																	
Track tension Adjustment		2 places																	
Operating lever (Pilot valve)		As required																	
Swing gear		8.2 kg (18.0 lbs)																	
Fuel tank	Diesel fuel	186 L (49.1 gal)																	ASTM D-975
																			EN 590
Radiator (Reserve tank)	Engine coolant (Antifreeze)	Radiator capacity: 12.6 L (3.3 gal) System full capacity: 17 L (4.5 gal)																(KOBELCO BRAND) (Do not mix and use different types of coolants.) P/No. KAPYN01T01110D1	

Notice

- If oil leakage or damage is observed on the lower roller, upper roller, or front idler, contact your KOBELCO authorized dealer for repair.
- Be sure to use the specified fuel. To achieve a good fuel efficiency and exhaust gas properties, the engine of this machine uses an electronic control high pressure fuel injection system.

The system requires high-precision parts and high lubricating ability. If low viscosity fuel with low lubricating ability is used, service life may be significantly decreased.

Notice

Use KOBELCO-specified oil when replacing and refilling the long-life hydraulic oil.

When an unspecified hydraulic oil is used or mixed, performance is reduced and the replacement interval of hydraulic oil needs to be shortened.

Notice

This machine is intended to be used in temperatures of -20°C to 40°C (-4°F to 104°F).

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

4.4.1 GREASE AND OIL FOR USE

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

4.4.2 PRECAUTIONS FOR BIO-OIL

- When changing mineral based hydraulic oil to bio-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.

4.4.3 REPLACEMENT INTERVAL OF BIO-OIL

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

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

4.4.4 FLUSHING PROCEDURES OF BIO-OIL

1. Drain all mineral oil from the hydraulic oil tank.
2. Drain all mineral oil from the cylinders.
3. Fill with 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. Fill with 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.

4.5 WEAR PARTS

Replace wear parts such as filters and elements as part of periodical maintenance or before they reach their wear limit.

Machine usage will be more economical if wear parts are changed appropriately.

Part numbers are subject to change without notice.

When placing orders for parts, ask your KOBELCO authorized dealer for the part numbers.

Wear parts list

Item	Part number	Part name	Quantity	Replacement interval	
Hydraulic oil tank	YN52V01025R200	Return filter element kit (STD: breaker)	1	Replace at 50 hrs. for the first time, then every 1,000 hrs. (or every 250 hrs. for breaker specification).	
Hydraulic oil tank	LQ50V00004F1	Suction strainer	1	Clean every 2,000 hrs.	
Air breather	YN57V00012S002	Element	1	Replace every 1,000 hrs. Replacement every 1,000 hrs. is just a rough guideline. If the machine is operated in very dusty conditions, replace the element earlier.	
Air cleaner	LP11P00015S005	Element (outer)	1	Replace every sixth clean or every year	
	LP11P00015S006	Element (inner)	1	Replace (do not clean) at the same time as the outer element.	
	LP11P00015S002	O-ring	1	When required	
Engine oil filter	VI8983020750	Cartridge	1	Replace after the first 50 hrs., then every 500 hrs.	
Fuel filter	Main	VI8981430411	Element	1	Replace every 500 hrs.
	Pre	YN21P01068R100	Element	1	
	Final	VI8983129180	Cartridge	1	
HVAC	YT50V01036P1	Fresh air filter	1	After the 10th cleaning, replace if severely clogged	
	LQ50V01007P1	Recirculation air filter	1		
Pilot line filter	YN50V00020F1	Pilot line filter	1	Clean every 2,000 hrs.	
Radiator	YY05P00061S005	Radiator cap	1	Replace every 1,000 hrs.	
Bucket (STD)	2412N278D11	Side cutter	1	When required	
	2412N278D21	Side cutter	1		
	ZS13C20050	Bolt	8		
	ZN13C20016	Nut	8		
	2412U16F1	Tooth assembly	5		
Communication controller battery	YN22E00643S001	Battery	1	Replace every year	

Notice

- The internal battery of the communication controller must be replaced every year. Contact your KOBELCO authorized dealer for replacement.

4.6 TIGHTENING TORQUES FOR BOLTS & NUTS (SPECIFIC LOCATIONS)

Refer to the following table for tightening/retightening bolts and nuts in specific locations on the machine.

Inspect the machine for loose or missing nuts and bolts before starting work each day and as part of the regular maintenance schedule. Tighten any that are loose and replace any that are missing.

With new machines, check and retighten nuts and bolts after the first 50 hours and every 250 hours thereafter. For locations other than those shown in the following table, use the torquing values given in "TIGHTENING TORQUES FOR BOLTS & NUTS" in Chapter 4.

Size (M)	Width across flats mm	Location	Tightening torque N·m (lbf·ft) (Dry)	Recommended thread locking agent
M5	-	Fuel tank level sensor installation	1.96 ± 0.2 (1.45 ± 0.15)	
M8	13	Condenser installation	11 ± 1.1 (8.11 ± 0.81)	
	13	Coolant sub-tank installation	10.7 ± 1.1 (7.89 ± 0.81)	
M10	17	Condenser mounting bracket	46.5 ± 4.6 (34.3 ± 3.39)	
	17	Swivel joint dust cover installation	14.7 ± 1.5 (10.8 ± 1.11)	Loctite #572 application
	17	Swing bearing access panel cover installation	29.4 ± 2.9 (21.7 ± 2.14)	Loctite #572 application
	17	Air cleaner installation	39 ± 3.9 (28.8 ± 2.88)	
	17	Engine oil filter installation	46.5 ± 4.6 (34.3 ± 3.39)	
	17	Hydraulic oil tank cover installation	46.5 ± 4.6 (34.3 ± 3.39)	
	17	Fuel tank bottom cover installation	46.5 ± 4.6 (34.3 ± 3.39)	
	17	Lower frame grease bath cover installation	10.8 ± 0.98 (7.97 ± 0.72)	
	17	Handrail installation	46.5 ± 4.6 (34.3 ± 3.39)	Loctite #262 application
	17	Floor plate rubber mount installation	46.5 ± 4.6 (34.3 ± 3.39)	
M12	19	Swivel joint installation	107.8 ± 10.8 (79.5 ± 7.97)	Loctite #262 application
	19	Power take-off bracket installation	64.7 ± 6.4 (47.7 ± 4.72)	Loctite #262 application
	19	Handrail installation	80 ± 8 (59.0 ± 5.90)	
	19	Handhold installation	115 ± 12 (84.8 ± 8.85)	Loctite #242 application
	19	Cab installation	80 ± 8 (59.0 ± 5.90)	
	19	Travel motor cover installation	83.4 ± 8.4 (61.5 ± 6.20)	Loctite #262 application
	19	Front idler adjuster connection	115 ± 12 (84.8 ± 8.85)	Loctite #262 application
M16	24	Engine installation	191 ± 19 (141 ± 14.0)	Loctite #271 application
	14	Main pump installation	235 ± 24 (173 ± 17.7)	Loctite #262 application
	14	Power take coupling installation	220 ± 10 (162 ± 7.38)	
	24	Travel motor installation	279 ± 29 (206 ± 21.4)	Loctite #262 application
	24	Floor plate rubber mount installation nut	191 ± 19 (141 ± 14.0)	

Size (M)	Width across flats mm	Location	Tightening torque N·m (lbf·ft) (Dry)	Recommended thread locking agent
	24	Sprocket installation	279 ± 29 (206 ± 21.4)	Loctite #262 application
	24	Lower roller installation	279 ± 28 (206 ± 20.7)	Loctite #262 application
	24	Fuel tank installation	191 ± 19 (141 ± 14.0)	Loctite #262 application
	24	Shoe bolt installation	412 ± 39 (304 ± 28.8)	
	24	Swing bearing installation (outer race)	256 ± 25.6 (189 ± 18.9)	Loctite #262 application
	24	Swing bearing installation (inner race)	279 ± 29 (206 ± 21.4)	Loctite #262 application
	24	Handrail installation	191 ± 19 (141 ± 14.0)	

Size (M)	Width across flats mm	Location	Tightening torque N·m (lbf·ft) (Dry)	Recommended thread locking agent
M20	30	Hydraulic oil tank installation	370 ± 37 (273 ± 27.3)	Loctite #262 application
	30	Upper roller installation	539 ± 54 (398 ± 39.8)	Loctite #262 application
	30	Swing reduction unit installation	539 ± 54 (398 ± 39.8)	Loctite #262 application
M24	36	Cab installation	191 ± 19 (141 ± 14.0)	
M27	41	Counterweight installation	1.27 ± 0.13 kNm (937 ± 95.9)	Loctite #262 application
M33	50	Counterweight installation	1.67 ± 0.17 kNm (1232 ± 125)	Loctite #262 application
5/8-18UN F	19	Idler adjuster grease nipple installation	58.8 ± 9.6 (43.4 ± 7.08)	

CAUTION

Counterweight installation bolts can loosen over time if the counterweight strikes a solid obstacle when turning or otherwise operating the machine.

Use a torque wrench to check that the installation bolts are tightened to the specified torque.

If any installation bolts are loose, tighten them to the specified torque.

4.7 TIGHTENING TORQUES FOR BOLTS & NUTS

For tightening and retightening of bolts which are not specified in the table "TIGHTENING TORQUES FOR BOLTS & NUTS (SPECIFIC POSITIONS)", see the following table.

METRIC COARSE THREAD (NOT PLATED)

Classification		Torque value Unit : N•m {lbf•ft}					
		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.5 {3.2±0.4}	3.7±0.4 {2.7±0.3}	9.6±1.0 {7.1±0.7}	8.1±0.8 {6.0±0.6}	17.4±1.8 {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}	23.5±2.0 {17.3±1.5}	19.6±2.0 {14.5±1.5}	42.2±3.9 {31.1±2.9}	35.3±3.9 {26.0±2.9}
M10	P=1.5	21.6±2.0 {15.9±1.4}	17.9±1.8 {13.2±1.3}	46.1±4.9 {34.0±3.6}	39.2±3.9 {28.9±2.9}	83.4±8.8 {61.5±6.5}	70.6±6.9 {52.1±5.1}
M12	P=1.75	36.3±3.9 {26.8±2.9}	31.4±2.9 {23.2±2.1}	79.4±7.8 {58.6±5.8}	66.7±6.9 {49.2±5.1}	143±15 {105±11}	121±12 {89.2±8.9}
M14	P=2	57.9±5.9 {42.7±4.4}	49.0±4.9 {36.1±3.6}	126±13 {92.9±9.6}	106±10 {78.2±7.4}	226±20 {167±15}	191±19 {141±14}
M16	P=2	88.3±8.8 {65.1±6.5}	74.5±6.9 {55.0±5.1}	191±20 {141±15}	161±16 {119±12}	343±39 {253±29}	284±29 {209±21}
M18	P=2.5	122±12 {90.0±8.9}	103±10 {75.8±7.2}	265±29 {195±21}	226±20 {167±15}	481±49 {355±36}	402±39 {297±29}
M20	P=2.5	172±17 {127±13}	144±14 {106±10}	373±39 {275±29}	314±29 {232±21}	667±69 {492±51}	559±59 {412±44}
M22	P=2.5	226±20 {167±15}	192±20 {142±15}	500±49 {369±36}	422±39 {311±29}	902±88 {665±65}	755±78 {557±58}
M24	P=3	294±29 {217±21}	235±29 {173±21}	637±69 {470±51}	520±49 {383±36}	1160±118 {856±87}	941±98 {694±72}
M27	P=3	431±39 {318±29}	353±39 {260±29}	941±98 {694±72}	765±78 {564±58}	1700±167 {1250±123}	1370±137 {1010±101}
M30	P=3.5	588±59 {434±44}	490±49 {361±36}	1285±127 {948±94}	1079±108 {796±80}	2300±235 {1700±173}	1940±196 {1430±145}
M33	P=3.5	794±78 {586±58}	667±69 {492±51}	1726±177 {1270±131}	1451±147 {1070±108}	3110±314 {2290±232}	2610±265 {1930±195}
M36	P=4	1030±98 {760±72}	863±88 {637±65}	2226±226 {1640±167}	1863±186 {1370±137}	4010±402 {2960±297}	3360±333 {2480±246}

METRIC FINE THREAD (NOT PLATED)

Torque value Unit : N•m {lbf•ft}

Classification		4.8T		7T		10.9T	
		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M8	P=1.0	11.3±1.1	9.5±1.0	24.5±2.0	20.6±2.0	44.1±3.9	37.3±3.9
		{8.3±0.8}	{7.0±0.7}	{18.1±1.5}	{15.2±1.5}	{32.5±2.9}	{27.5±2.9}
M10	P=1.25	22.6±2.0	18.7±1.9	48.1±4.9	41.2±3.9	87.3±8.8	73.5±6.9
		{16.7±1.5}	{13.8±1.4}	{35.5±3.6}	{30.3±2.9}	{64.4±6.5}	{54.2±5.1}
M12	P=1.25	39.2±3.9	33.3±2.9	85.3±8.8	71.6±6.9	154±16	129±13
		{28.9±2.9}	{24.6±2.1}	{62.9±6.5}	{52.8±5.1}	{114±12}	{95.2±9.6}
M16	P=1.5	92.2±8.8	77.5±7.8	196±20	169±17	363±39	304±29
		{68.0±6.5}	{57.2±5.8}	{145±15}	{125±13}	{268±29}	{224±21}
M20	P=1.5	186±19	155±16	402±39	333±29	726±69	608±59
		{137±14}	{114±12}	{297±29}	{246±21}	{535±51}	{448±44}
M24	P=2	314±29	265±29	686±69	569±59	1240±118	1030±98
		{232±21}	{195±21}	{506±51}	{420±44}	{915±87}	{760±72}
M30	P=2	637±59	530±49	1390±137	1157±118	2500±255	2080±206
		{470±44}	{391±36}	{1030±101}	{853±87}	{1840±188}	{1530±152}
M33	P=2	853±88	706±70	1860±186	1550±155	3350±334	2790±275
		{629±65}	{521±52}	{1370±137}	{1140±114}	{2470±246}	{2060±203}
M36	P=3	1070±108	892±88	2330±226	1940±196	4200±422	3500±353
		{789±80}	{658±65}	{1720±167}	{1430±145}	{3100±311}	{2580±260}

4.8 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	
1-3/16-12 UN	36	177 ± 18 {130 ± 13}
	41	206 ± 21 {152 ± 15}
1-7/16-12 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}
1-1/4	50	392 ± 40 {289 ± 30}
1-1/2	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}
1-1/4	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}	
1-1/4	55.1 ± 7.1	10	93.3 ± 8.4	14
	{41 ± 5.2}		{69 ± 6.2}	
1-1/2	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.


4.9 INSPECTION AND MAINTENANCE CHARTS

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

Carry out inspection and maintenance according to the calendar-based or hour meter-based timings, whichever comes first.

Chart symbols

 Indicates a regular inspection or service based off the hour meter.

 Indicates a first, one-time service interval.

 Indicates a regular inspection/maintenance interval.

Engine

Item/Interval	When required	Daily inspection	1-monthly or every		3-monthly or every		6-monthly or every		12-monthly or every		Oil/Fluid (Replacement parts)	Relevant section
		8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
Engine oil	Inspect oil level	○									Engine oil	3.2.2
	Replace			⊙ (First time)		○						
Replace oil filter				⊙ (First time)		○					Cartridge	4.15.1
Fuel pre-filter	Drain	○									Cartridge	3.2.4
	Replace					○						
Fuel filter	Replace					○					Cartridge	4.15.3
Replace final fuel filter						○					Cartridge	4.15.4
Inspect air cleaner inlet		○										3.2.12
Air cleaner element	Inspect/clean		When warning lamp is on (up to sixth time)		○						Outer element (do not clean inner element)	4.14.5
	Replace		After outer element is cleaned for sixth time or after one year			○					Outer/Inner element	
Clean radiator coolant and cooling system	Inspect water level	○										3.2.1
	Replace/clean							○ (Or every 2 years)			LLC	4.17.1
Inspect radiator hose for split/damage						○						4.14.3
Clean radiator, oil cooler core, intercooler, and filter						○						4.14.7
Fan belt and HVAC belt	Inspect	○										3.2.6
	Adjust			⊙ (First time)		○						4.14.1
Clean or replace radiator cap/reserve tank cap	Clean					○						4.14.6
	Replace						○					
Check tightness of engine mounting bracket								○				4.16.3
Inspect intake system rubber hose						○						4.14.2
Clean/inspect fuel electromagnetic pump filter								○				4.15.10

Item/Interval	When required	Daily inspection	1-monthly or every		3-monthly or every		6-monthly or every		12-monthly or every		Oil/Fluid (Replacement parts)	Relevant section
		8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
* Inspect/adjust valve clearance									○			—
* Inspect/adjust compression pressure									○			—
* Inspect intake and exhaust manifold tightness			◎ (First time)						○			—
* Check the tightness of the oil pan and other auxiliaries			◎ (First time)						○			—
* Inspect each tightening part of the turbocharger			◎ (First time)						○			—
* Inspect the rotational condition of the turbocharger rotor and impeller									○			—
* Inspect turbocharger rotor play									○			—
* Inspect for leaks in turbocharger lubrication system		○							○			—
* Inspect/clean starter brushes and commutator									○			—
* Check for water and fuel in the oil pan				○								—
* Inspect the tightness of the fan mounting bolts				○								—
* Check thermostat function									○			—
* Check starter function									○			—
* Inspect startability, exhaust color, and abnormal sound		○										—
* Inspect heater plugs and intake air heaters (starting aids)						○						—
* Check alternator function									○			—
* Inspect the tightness of each pipe joint				◎ (First time)					○			—
* Inspect exhaust pipe and muffler for loose installation and damage				◎ (First time)					○			—
* Inspect/clean alternator brush (if equipped with brush)									○			—
* Clean EGR cooler										○		—
Inspect for oil/fuel leakage		○										3.1
Inspect for water leakage		○										3.1
Inspect electrical system		○										—

Notice

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

[4. INSPECTION AND MAINTENANCE]

Fuel system

Item/Interval		When required	Daily inspection	1-monthly or every	3-monthly or every	6-monthly or every	12-monthly or every					Oil/Fluid (Replacement parts)	Relevant section
			8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
Fuel tank	Inspect oil level		○										3.2.3
	Drain water/sediment			○									4.12.2
	Clean cap and strainer					○							4.15.7
Bleed air from fuel piping		○											4.10.6

Hydraulic system

Item/Interval		When required	Daily inspection	1-monthly or every	3-monthly or every	6-monthly or every	12-monthly or every					Oil/Fluid (Replacement parts)	Relevant section
			8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
Hydraulic oil tank	Hydraulic oil	Inspect oil level	○									Hydraulic oil	3.2.5
		Replace					○ (Breaker)			○			4.18.1
	Suction strainer	Clean						○			Strainer	4.17.4	
	Change return filter			◎ (First time)		○ (Breaker)		○				Element	4.16.1
	REPLACING AIR BREATHER ELEMENT							○				Element	4.16.2
Inspect hydraulic component, piping and hose for oil leakage/damage			○										3.1
Clean pilot line filter								○					4.17.7

Upper frame

Item/Interval		When required	Daily inspection		1-monthly or every	3-monthly or every	6-monthly or every	12-monthly or every					Oil/Fluid (Replacement parts)	Relevant section
			8H	50H	100H	250H	500H	1,000H						
Swing reduction unit oil	Inspect oil level				○ (120H)								Gear oil SAE #90 GL-4	4.13.1
	Replace					◎ (First time)		○						
Grease the swing bearing							○						EPG lithium-added EP grease	4.15.5
Check grease on the swing grease bath								○					EPG lithium-added EP grease	4.17.6
Inspect swing brake operation			○											—
Grease control lever push rod/universal joint							○						EPG lithium-added EP grease	4.15.8
Inspect tightness of swing bearing mounting bolt							○							4.15.6
Check counterweight mounting bolt tightness				◎ (First time)		○								4.6
Grease swing reduction unit								○						4.17.5
Inspect base machine structure			○											3.1

Lower frame

Item/Interval		When required	Daily inspection		1-monthly or every	3-monthly or every	6-monthly or every	12-monthly or every					Oil/Fluid (Replacement parts)	Relevant section
			8H	50H	100H	250H	500H	1,000H						
Travel reduction unit oil	Inspect oil level				○ (120H)								Gear oil SAE #90 GL-4	4.13.2
	Replace					◎ (First time)		○						
Adjust crawler tension				○										4.12.3
Inspect upper/lower roller, including for oil leakage			○											3.1
Inspect idler/travel reduction unit, including for oil leakage			○											3.1
Inspect sprocket/idler/roller, including for wear			○											3.1



[4. INSPECTION AND MAINTENANCE]

Attachment/equipment

Item/Interval	When required	Daily inspection	1-monthly or every		3-monthly or every		6-monthly or every		12-monthly or every		Oil/Fluid (Replacement parts)	Relevant section
		8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
Grease attachment/equipment (around bucket)		○ (Up to 50 hrs.)				○					Lithium added EPG EP grease	4.11.1
Grease attachment		○ (Up to 50 hrs.)				○ (Only 250 hrs. for new vehicles)	○					
Replace bucket	○											4.10.3
Replace teeth and side cutter	○											4.10.4
Inspect attachment/equipment structure		○										3.1
Grease attachment/equipment (installation part of boom cylinder rod pin)	○											4.10.9

Electrical system

Item/Interval	When required	Daily inspection	1-monthly or every		3-monthly or every		6-monthly or every		12-monthly or every		Oil/Fluid (Replacement parts)	Relevant section
		8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
Battery	Inspect fluid level			○								4.12.1
	Measure specific gravity			○								4.12.1
	Clean/apply grease			○								4.12.1
	Measure voltage								○			4.16.4
Inspect electric wiring		○										3.1
Inspect performance of instruments, switches, and warning lights		○										3.2.10 3.2.11

Accessories and other items

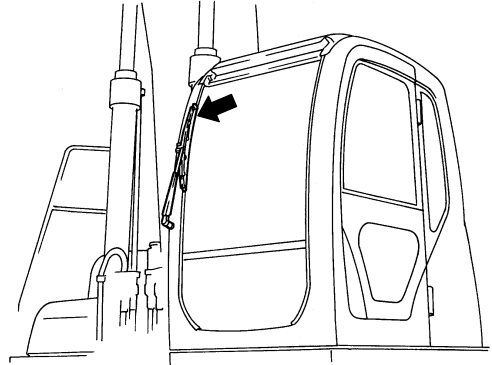
Item/Interval	When required	Daily inspection	1-monthly or every		3-monthly or every		6-monthly or every		12-monthly or every		Oil/Fluid (Replacement parts)	Relevant section
		8H	50H	100H	250H	500H	1,000H	2,000H	4,500H	5,000H		
HVAC	Inspect refrigerant volume							○				4.15.9
	Filter	Inspect/clean condenser				○						4.14.7
		Clean				○						4.14.4
	Replace		Replace after cleaning 10 times									
Inspect wiper blade	○											4.10.1
Inspect washer fluid	○											4.10.2
Inspect external appearance of machine for deformation/damage		○										3.1
Inspect for missing/loose nut/bolts		○										3.1
Seat belt	Inspect	○										2.11
	Replace									○ (3 years)		2.11

4.10 MAINTENANCE WHEN REQUIRED

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

4.10.1 CHECKING AND REPLACING WIPER BLADES

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

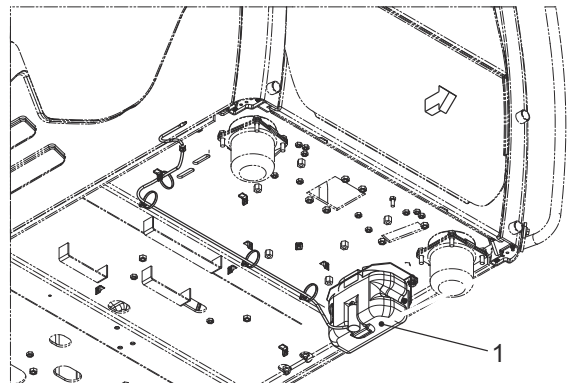


4.10.2 WASHER FLUID INSPECTION

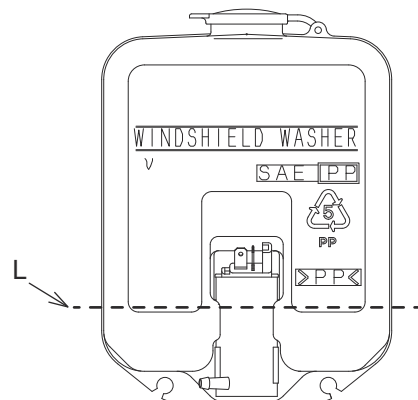
Notice

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

1. Remove the floor mat.
2. Inspect the fluid level of washer tank (1).



3. When the washer fluid level becomes lower than (L), remove the cap and supply the washer fluid for automobiles.
4. Put the floor mat back to its original position.



4.10.3 BUCKET REPLACEMENT



WARNING Inserting pin

When aligning the pin with the pin hole, do not put your fingers in the pin hole.

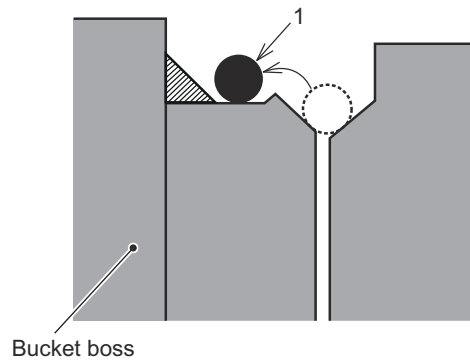


CAUTION

- Choose level and firm ground to replace the bucket. When working together, be sure to give each other signals and take care to be safe.
- Do not perform any sudden operations with the front attachment as it is dangerous.
- Place the removed bucket in a stable position.

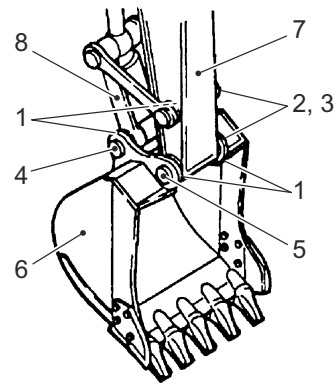
REMOVING BUCKET

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.



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.

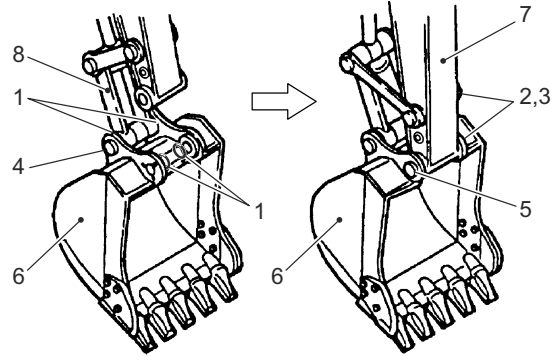


INSTALLING BUCKET

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.

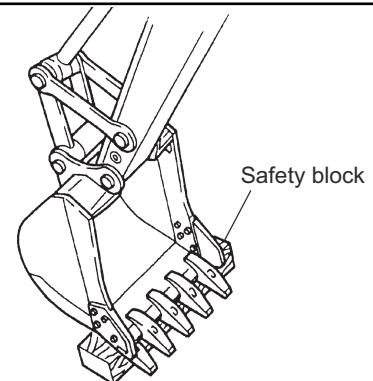


4.10.4 REPLACING TOOTH POINT AND SIDE CUTTER

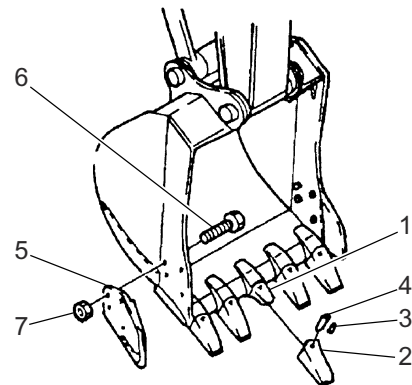
CAUTION

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

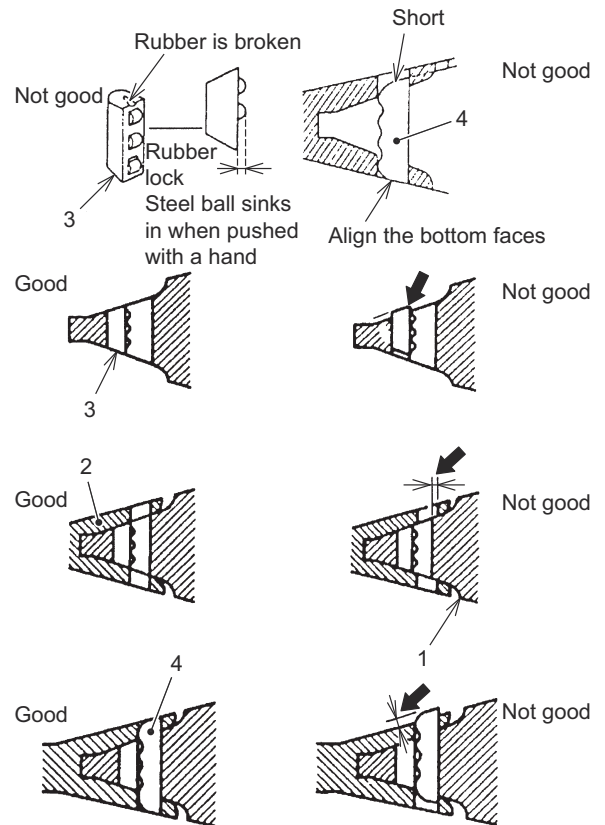


REPLACING TOOTH POINTS



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.

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

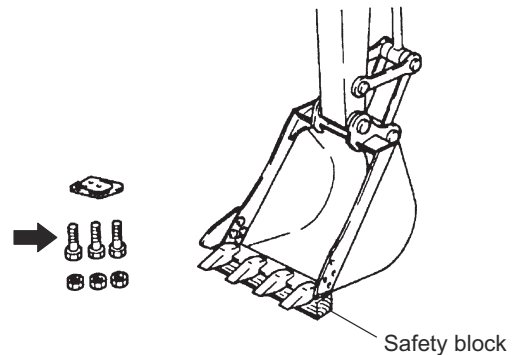
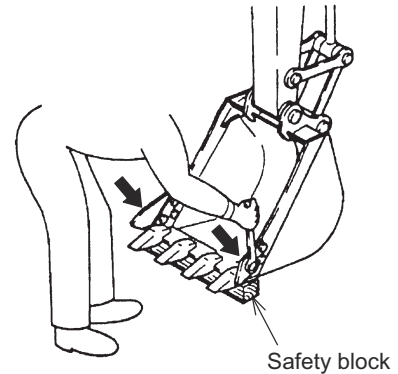
If the replacement is delayed, the body of the bucket will be damaged.
Early replacement is recommended.

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: $980 \pm 50 \text{ N}\cdot\text{m}$ ($723 \pm 37 \text{ lbf}\cdot\text{ft}$)

3. After tightening the nuts, spot-weld them.

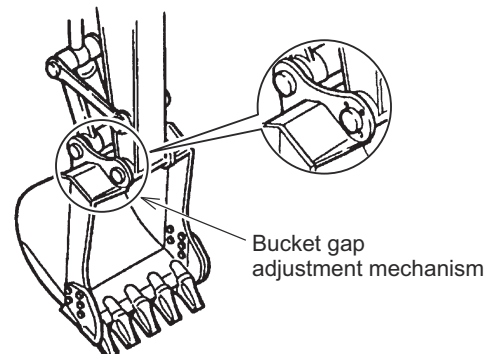


4.10.5 INSPECTION AND ADJUSTMENT OF BUCKET GAP ADJUSTMENT MECHANISM

CAUTION

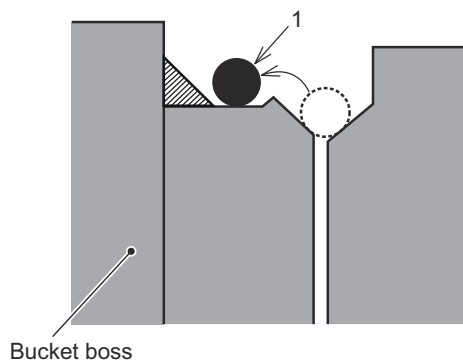
- When adjusting bucket gaps, pull up the pilot control shut-off lever to the "LOCKED" position and stop the engine.
- If the bucket gaps are not properly adjusted, galling is generated in the contact surface between the bucket and the arm causing abnormal noise and damage on the shaft the O-ring.

1. Place the bucket as shown in the figure in stable condition.



[4. INSPECTION AND MAINTENANCE]

2. Move O-ring (1) from the specified position to the bucket boss.
3. Swing the upper structure right very slightly to press the tip of the arm to the right of the bucket lightly (the side without the gap adjustment system).
4. Move the pilot control shut-off lever to the "LOCKED" position, and then stop the engine.



5. Measure gap (A) between the bucket and the arm boss.

When the measurement value is 1.0 mm (0.04 inch) or more, adjust it.

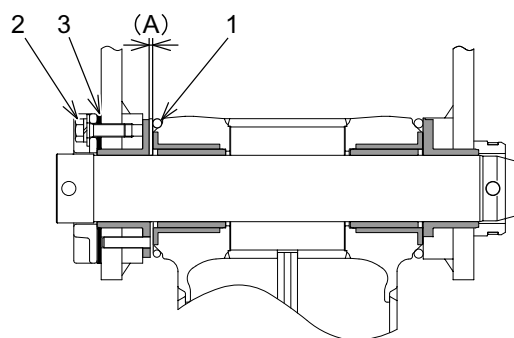
6. Loosen each bolt, and remove appropriate number of shims to adjust the gap.

There are 5 pieces of shims (3) {1 mm (0.04 inch)} in average in 3 bolts (2) on the gap adjustment part.

7. Tighten bolts (2) with the specified tightening torque evenly.

Tightening Torque: $181 \pm 20 \text{ N} \cdot \text{m}$ ($133 \pm 15 \text{ lbf} \cdot \text{ft}$)

8. Fit O-ring (1) in place.



4.10.6 BLEEDING AIR FROM FUEL PIPING

After replacement of the fuel filter element or if the machine completely runs out of fuel, air will enter the fuel piping and the engine will not start.

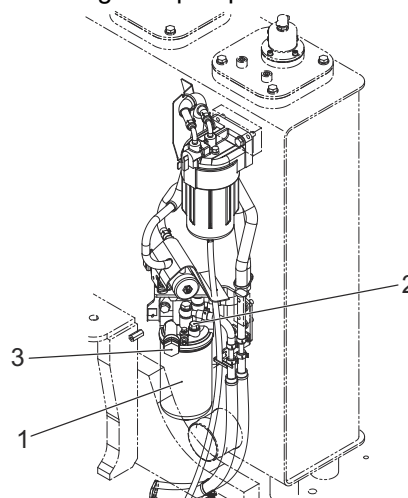
Bleed air from the fuel lines as outlined below.



Bleeding air from fuel piping

- Wipe up fuel spillages as they are a fire hazard.
- After carrying out the work, check that there is no fuel leakage.

1. Turn the starter switch key to the on position to activate the fuel electromagnetic pump.
2. Prepare a container to catch the fuel under fuel filter (1).
3. Clean the area around air bleeder plug (2) and loosen the air bleeder plug.
4. Press priming pump (3) repeatedly.
5. When fuel comes out of the air bleeder plug without air bubbles, tighten the air bleeder plug.
6. Wipe off any leaked fuel after air bleeding is complete.
7. After replacing the fuel filter, leave the starter switch key in the on position for ten minutes before starting the engine to remove any contaminants.
8. Start the engine and check for fuel leaks.

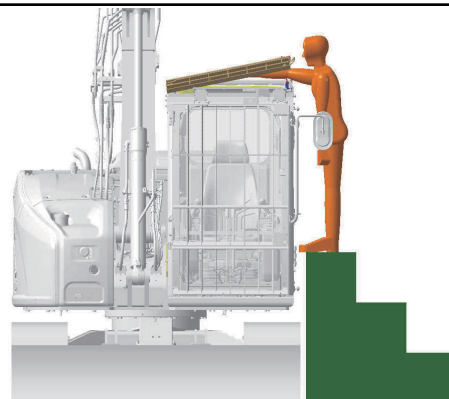


4.10.7 CLEANING CAB SKYLIGHT

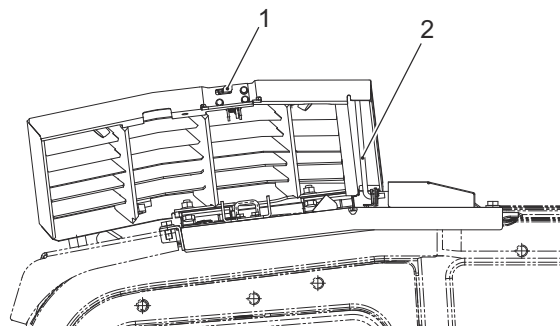
CAUTION

- When cleaning the cab skylight, pull up the control lock lever to the "LOCKED position" and stop the engine.

Before starting cleaning, place the work platform at the left side of the machine.



- Release lock (1) of the cab guard.
- Lift up the cab guard and fix it with support stay (2).



4

CAUTION

Securely fix the cab guard with the support stay in order to avoid your hand from being caught, resulting in injuries.

- Clean the cab skylight.
- After cleaning the cab skylight, release the support stay, close the cab guard, and then lock it.

4.10.8 RELEASING INTERNAL PRESSURE IN HYDRAULIC SYSTEM

Before replacing the front attachment or the hydraulic piping, release the internal pressure of the hydraulic system.

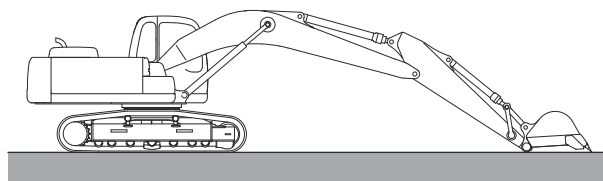
Release the internal pressure of the hydraulic system following the next steps.



RELEASING INTERNAL PRESSURE IN HYDRAULIC SYSTEM

Immediately after operation, there is a hazard of getting burn by heated parts. Wait until the temperatures decrease before starting works.

1. Move the machine to a level and firm place.
2. Retract the arm cylinder and bucket cylinder, and place the bucket on the ground.
3. Start the engine.



4. Release the internal pressure referring to "PRESSURE RELEASE" in Paragraph "SETTING MENU SCREEN" in Chapter 2.

When internal pressure releasing is started, "DRAINING HYD. PRESS." is displayed on the monitor and the engine speed is reduced to a low speed.



DRAINING HYD. PRESS.

5. The buzzer sounds intermittently.
(To stop the buzzer, push the buzzer stop switch).
6. In this condition, move the control levers of the attachment/equipment to release the pressure.
Be cautious that the attachment/equipment may move due to its own weight.
7. Set the starter key to "OFF" to stop the engine and to finish releasing the internal pressure.



After turning the key OFF and finishing the internal pressure releasing, wait 5 minutes or more before turning the key ON again.

If the key is turned ON again soon after the key OFF, it may cause the internal pressure releasing to finish improperly, resulting in continued releasing operation.

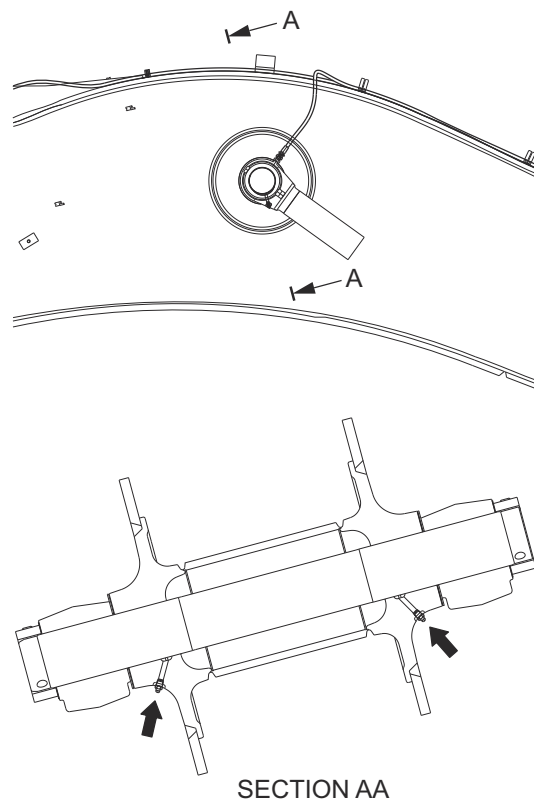
- When releasing the internal pressure is failed, "FAIL DRAIN HYD. PRESS" is displayed on the monitor, and the buzzer sounds continuously. In that case, turn the starter key "OFF", wait 5 minutes or more, and then perform procedures 4. to 7. again.



FAIL DRAIN HYD. PRESS.

4.10.9 GREASING ATTACHMENT/EQUIPMENT

When greasing the boom side bosses located at the boom cylinder rod installation part, grease two grease nipples shown in the figure.

**Notice**

Some machine specifications do not have the grease nipples for greasing.

4.11 8 HOUR (DAILY) INSPECTION & MAINTENANCE PROCEDURES

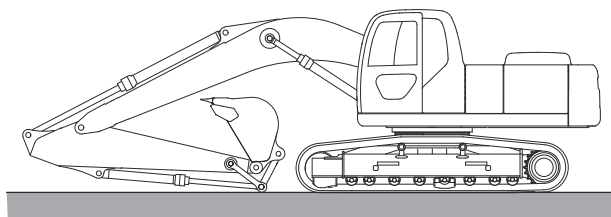
Thoroughly read and understand "SAFETY PRECAUTIONS" of this manual before performing the inspection and maintenance.

See "EVERYDAY CHECK-UP" in Chapter 1 and "CHECK BEFORE STARTING ENGINE" and "CHECK AFTER STARTING ENGINE" in Chapter 3 to perform a daily pre-operation inspection and maintenance (before operation and immediately after starting operation).

4.11.1 GREASING ATTACHMENT

Before applying grease, set the machine in the grease application position as shown in the figure, remove all grease nipples, and then apply grease until the grease comes out through the gap between the pin and the hole.

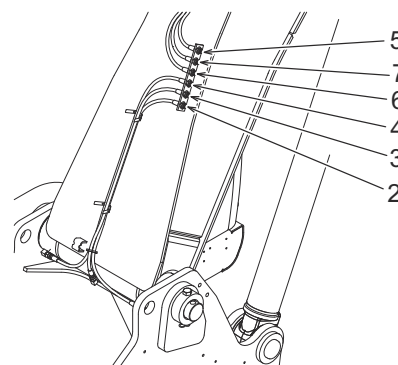
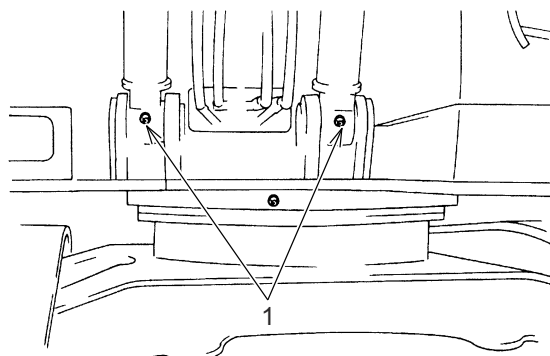
The grease gun is located inside the cover on the right front of the machine.



Notice

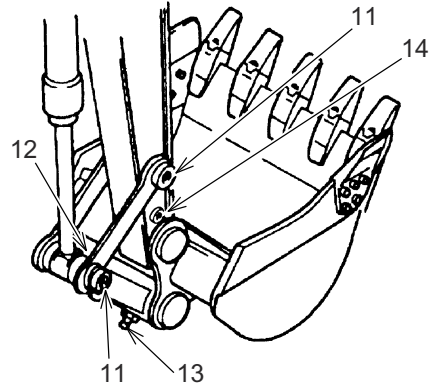
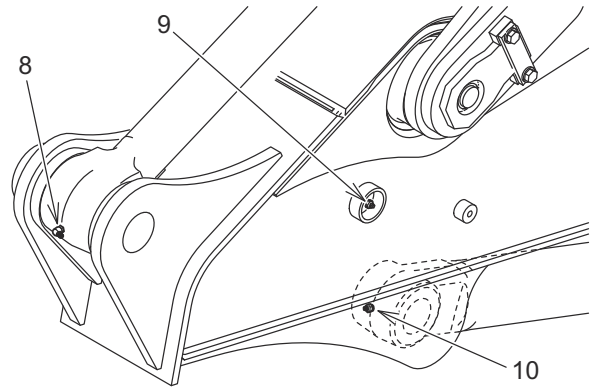
- Grease greasing points (1) to (14) every 8 hours during the first 50 hours of operation by a new machine. Then, at the time when 250 hours of operation has been reached, grease each of the greasing points. After that, grease greasing points (1) to (10) every 500 hours or every 6 months, whichever comes first. Also, regarding pins (11) to (14) around the bucket, grease them every 250 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 breaker, grease the machine every day.
- Grease the machine before the work if it has not been used for one month or longer.

- Grease grease nipples (1) on the right and left boom cylinder heads.
- Among six grease nipples near the boom foot, grease the boom foot pin from (2), (3), and (4), the boom cylinder rod from (5) and (6), and the arm cylinder head from (7).



[4. INSPECTION AND MAINTENANCE]

- Grease grease nipple (8) on the arm cylinder rod, grease nipple (9) in the connecting part between the boom and the arm, and grease nipple (10) on the bucket cylinder head.
- Grease grease nipple (11) on the link pin, grease nipple (12) on the bucket cylinder rod, three grease nipples (13) on the bucket link, and grease nipple (14) on the left side of the arm end.



4.12 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.

4.12.1 BATTERY INSPECTION/MAINTENANCE



Inspection and maintenance of batteries

- Wear safety glasses, long-sleeve shirt and gloves when handling batteries.
- Do not place batteries near sources of fire because the hydrogen gas generated inside batteries is flammable and may cause an explosion.
- If the dilute sulfuric acid from a battery comes into contact with skin or eyes it may cause burns or blindness. In such cases, wash the skin or eyes with clean water and seek medical treatment.
- Be sure to stop the engine prior to battery inspection and maintenance.
- Turn the battery power-off switch 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 or other metal objects on the batteries' upper protective cover. Doing so could lead to a short circuit resulting in fire or explosion.



Before turning the battery power-off switch to the off ("O") position or removing the battery terminal, turn the starter switch off and wait at least five minutes before starting work.

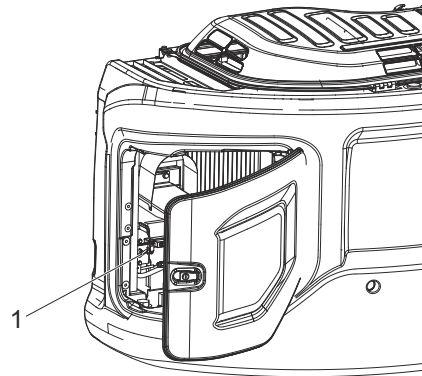
If the battery power is cut off just after the engine stops, the exhaust gas cleaning device may become damaged.

CHECKING BATTERY ELECTROLYTE LEVEL

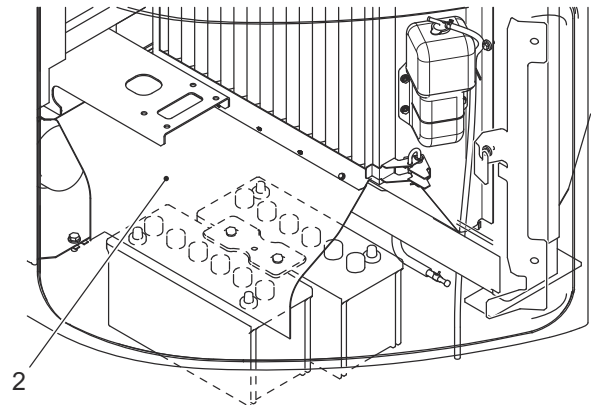
Notice

- Clean the battery terminals, then apply grease or commercial anti-rust lubricant spray.
- Do not dispose of batteries yourself; always employ the services of a public service company.
- When replacing aging batteries, do not combine old batteries with new batteries. Doing so may reduce the service life of the new battery. Always replace both batteries at the same time.

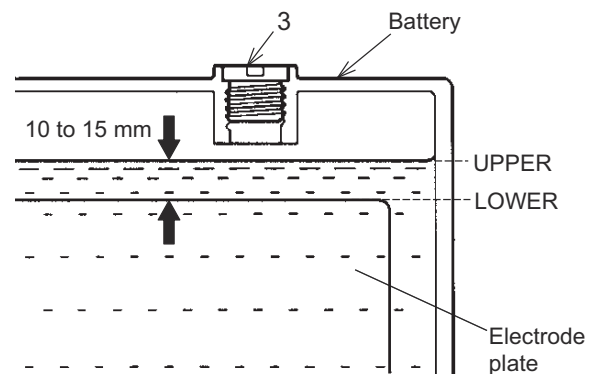
1. Use the starter key to open the side door on the left side of the machine and secure it in place with the lock rod.
2. Turn battery power-off switch key (1) to the off position.



3. Lift battery protective cover (2).



4. If the fluid level is not up to the specified level (10-15 mm above the electrode plate) after removing cap (3), add distilled water to the specified level.
5. Clean the battery cap vent hole and tighten cap (3) firmly.
6. Return protective cover (2) to its original position on the battery.
7. Release the lock rod and close the side door.



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 quantities decrease significantly.
- Charge the batteries as soon as possible.

Notice

Measure the specific gravity when the liquid temperature becomes almost equivalent to the ambient temperature.

The specific gravity of battery electrolyte changes according to the liquid temperature. If the specific gravity is at the lower limit or below (small value), charging is necessary.

Measure the specific gravity of the battery electrolyte by using a hydrometer and check the charging condition of the battery.

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

4.12.2 DRAINING WATER AND SEDIMENT IN FUEL TANK

WARNING

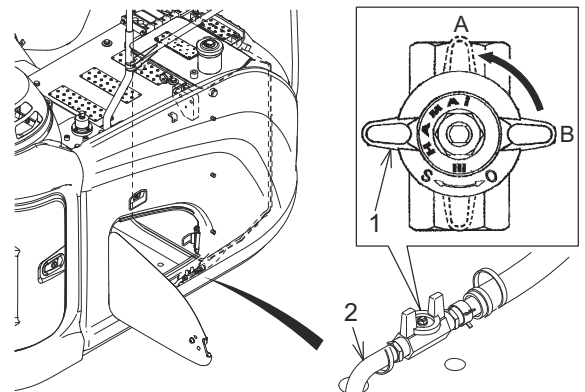
Handling fuel

- Wipe up fuel spillages as they are a fire hazard.
- After carrying out the work, check that there is no fuel leakage.

1. Move the machine to firm, level ground.
2. Swing the upper structure slightly to where drain valve (1) behind the fuel tank can be opened, and then lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
4. Place a container for draining under draining hose (2).
5. Use the starter key to open the side door on the right side of the machine.
6. Turn drain valve (1) on the back of the fuel tank to "Open" position (A). Then drain any water and deposit that has accumulated at the bottom of the tank.

Take care to avoid being splashed by fuel.

7. When clean fuel is discharged, turn drain valve (1) to the "Closed" position (B).



4.12.3 ADJUSTING CRAWLER TENSION

Notice

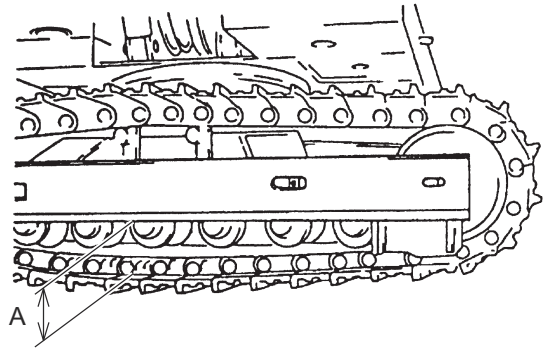
- Before inspecting and greasing the crawler, remove soil adhered to the crawler tracks completely by washing them.
- Crawler adjustment is necessary depending on the work condition at the working site. At a working site covered with many gravel and cobbles, loosen the crawler tension slightly, and on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

CHECKING CRAWLER TENSION

- 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: 270 to 300 mm (10.6 to 11.8 inch)



CRAWLER TENSION ADJUSTMENT PROCEDURE

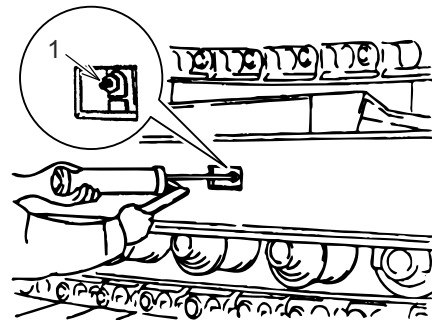


WARNING Crawler failure

Inability to adjust the tension of a crawler indicates failure.

Very large forces are applied to the track springs. Grease in the cylinder is under high pressure. Improper adjustment or disassembly is extremely dangerous and could lead to personal injury.

1. Crawler tension is adjusted by applying grease to grease nipple (1) of the lower frame idler adjuster with a grease gun.
2. In order to even up the tensions of the left and right crawlers, travel the machine forward and backward to equalize pressure.
3. Recheck the amount of slack in the crawler and readjust as necessary.
4. Perform the same adjustment on the opposite crawler



CRAWLER LOOSENING PROCEDURE



Grease cylinder handling

Grease cylinders are under high pressure. Loosening a cylinder's grease nipple too fast may cause high-pressure grease to be ejected, leading to an accident resulting in injury or death. Keep your face and other objects away from the grease nipple area and loosen it gradually.

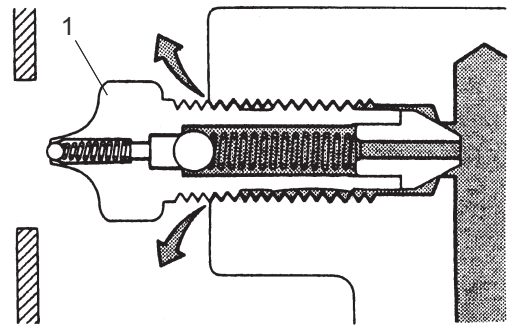
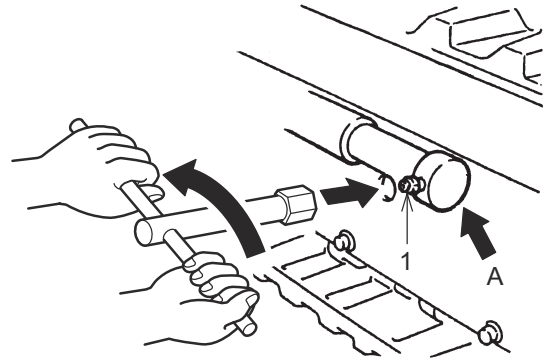
Do not loosen the grease nipple more than one turn because it can pop out due to the high internal pressure of the grease.

1. Lower the machine to firm, level ground.
2. Slowly loosen grease nipple (1) of the grease cylinder a maximum of one turn to drain grease.

If the grease is not draining well, raise the crawler to be loosened and rotate it slightly.

3. When the crawler tension is correct, retighten grease nipple (1).

For tightening torques, see "TIGHTENING TORQUES FOR BOLTS & NUTS (SPECIFIC LOCATIONS)" in Chapter 4.



DETAILS OF A SECTION (GREASE DISCHARGE)

4.13 120 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".

4.13.1 CHECKING OIL LEVEL OF SWING REDUCTION UNIT



Oil temperature immediately after operation

Immediately after operation, the oil is hot and it may cause burns. Allow the temperature to drop before starting work.

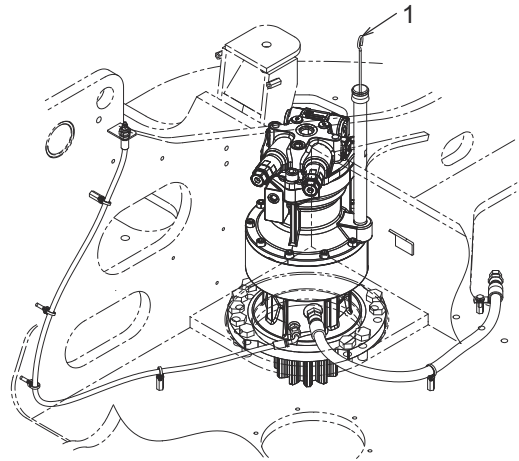
1. Move the machine to firm, level ground.
2. Lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
4. Use level gauge (1) to check the gear oil level.

The oil level should be within the indicated range on level gauge (1).

5. If the gear oil is low, remove level gauge (1) and refill with the specified gear oil via the filler port.

For the specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.

6. Install level gauge (1).

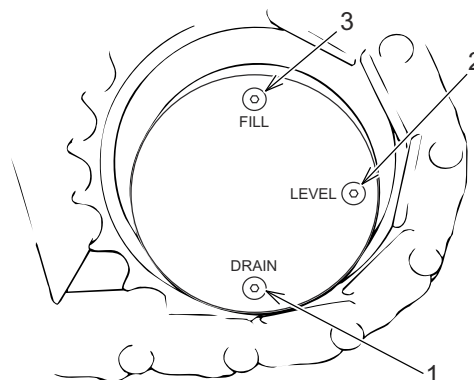


4.13.2 CHECKING OIL LEVEL OF TRAVEL REDUCTION UNIT

**WARNING****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 pilot control shut-off lever to the "LOCKED" position.
4. Slowly loosen filler plug (3) and release the internal pressure.
5. 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.
6. If the gear oil level is low, remove level plug (2) and fill plug (3) and refill the specified gear oil.
For specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
7. Clean level plug (2) and fill plug (3) with light oil and install them.
8. Check the other travel reduction unit in the same procedure.



4.14 250 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".

4.14.1 ADJUSTING FAN BELT AND AIR CONDITIONING COMPRESSOR BELT

CHECKING FAN BELT AND HVAC COMPRESSOR BELT



WARNING

Inspecting and maintaining the belt

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

Carrying out inspection and maintenance while the engine is running could result in your body or clothing catching on the belt, fan, or other rotating parts, leading to a serious accident resulting in injury or death.



CAUTION

If there is any evidence of cracking or other damage, if the belt slips excessively, or if the belt cannot be adjusted within the specified range, replace the belt with a new one. Keep oil and oily substances away from belts. They may cause the belt to slip and shorten its service life.

Notice

- When replacing the belt for a new one the belt does not have any initial adaptability. As such, run the engine at idle for three to five minutes to re-adjust the tension of the belt.
- After running the engine for approximately two hours, the new belt reaches full initial elongation.
- When a belt is part of a set of two, be sure to replace both for new belts at the same time.

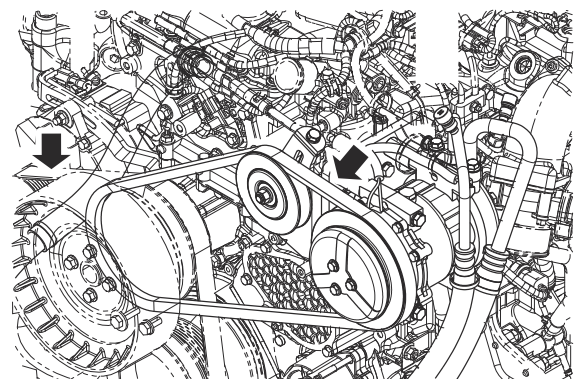
The engine of this machine is fitted with an alternator, fan and HVAC compressor belt.

Inspect the belt for wear and damage and check it for tension, adjusting properly in order to maintain maximum engine performance and service life.

Notice

For details on adjusting the belts, see Chapter 4 "ADJUSTING FAN BELT AND HVAC COMPRESSOR BELT" in INSPECTION AND MAINTENANCE.

- To check the belt tension, press on the center of the belt with your compression gauge. The tension is normal if the deflection falls within the range shown in the following table.



[4. INSPECTION AND MAINTENANCE]

Belt	When tensioning a new belt mm (inch)	On inspection mm (inch)	Pushing force N (lbf)
Fan/Alternator	4.2 to 5 (0.17 to 0.20)	6.6 to 7.4 (0.26 to 0.29)	98 (22)
HVAC compressor belt	2.3 (0.9)	2.3 (0.9)	<ul style="list-style-type: none"> • 25 to 31 (5.6 to 7.0) *When tensioning a new belt • 12 to 15 (2.7 to 3.4) *When inspecting

ALTERNATOR & FAN BELT ADJUSTMENT



Inspecting and maintaining the belt

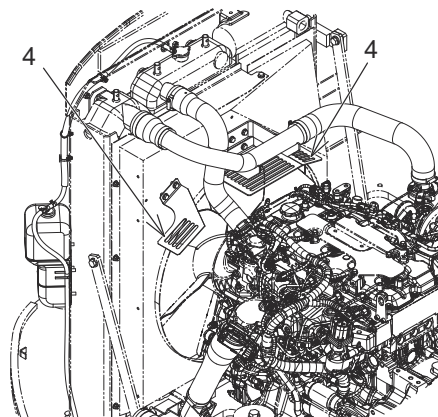
Be sure to stop the engine before inspection and maintenance of the engine.

Inspecting and maintaining the running engine may cause serious accidents resulting in injury or death by being caught in the rotating parts, such as the fan and belt.

Notice

If the tension of the belt is not correct, this may not only decrease alternator performance, but also damage the belt and/or alternator.

1. Use the starter key to open the engine hood and secure it in place with the stay.
2. Remove the installation bolts of fan guards (4) and remove fan guards (4).



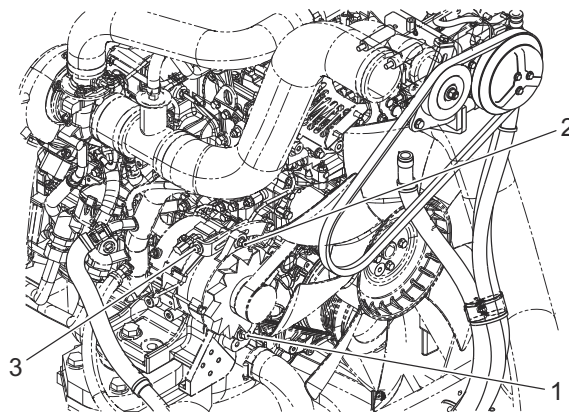
3. Loosen installation bolt (1) and adjustment nut (2) slightly and adjust the belt tension.
4. Loosen adjustment bolt (3) and adjust the alternator and fan belt to the specified tension. Then tighten installation bolt (1) and adjusting nut (2).

Tightening torque

Installation bolt (1): 44 to 58 N·m (32 to 43 lbf·ft)

Adjusting nut (2): 20 to 30 N·m (15 to 22 lbf·ft)

5. Following adjustment, run the engine at low idle for about five minutes.
6. Stop the engine and check the fan belt tension.
7. Install fan guards (4).
8. Release the stay and close the engine hood.



ADJUSTING HVAC COMPRESSOR BELT TENSION



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 serious accidents resulting in injury or death by being caught in the rotating parts, such as the fan and belt.

Notice

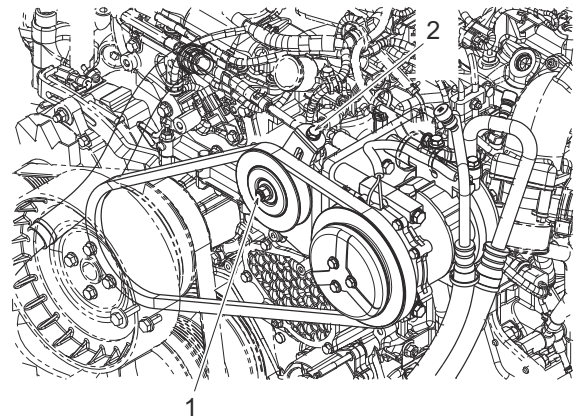
If the tension of the belt is not correct, this may not only decrease the performance of compressor but also damage the belt and compressor.

1. Use the starter key to open the engine hood and secure it in place with the stay.
2. After loosening nut (1) of the idle pulley, turn adjusting bolt (2) to adjust the belt to the specified tension and tighten nut (1).

Tightening torque

Nut (1): $46.5 \pm 4.6 \text{ N}\cdot\text{m}$ ($34.3 \pm 3.4 \text{ lbf}\cdot\text{ft}$)

3. After adjustment, operate the engine at low idle for about five minutes and then check the fan belt tension again.
4. Release the stay and close the engine hood.



4.14.2 INSPECTING INTAKE SYSTEM RUBBER HOSE

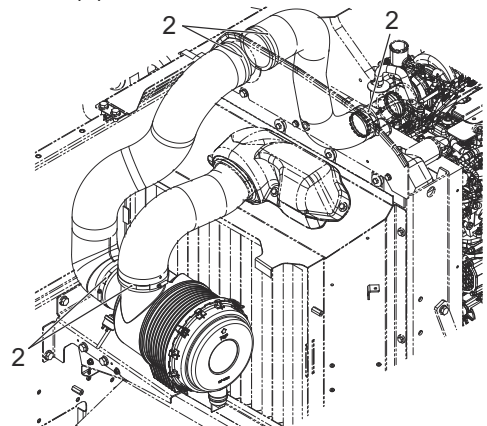


Handling rubber hoses

- Do not touch parts that are hot. Contact with high-temperature parts during or immediately after operation may cause burns.
- When replacing the rubber hoses, cover the inlet with a clean cloth to prevent dirt ingress.

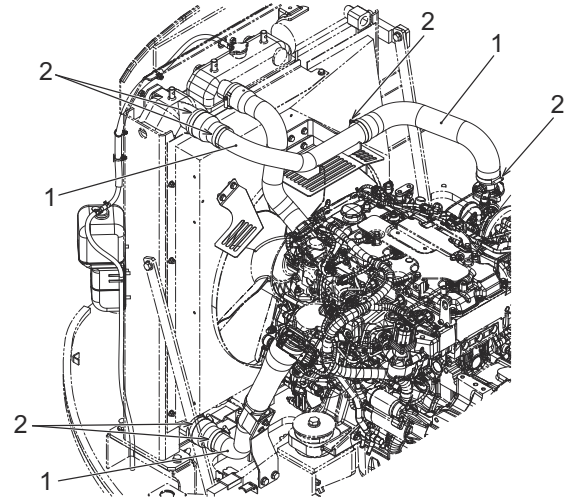
CHECKING RUBBER SUCTION HOSE FOR AIR CLEANER

1. Check that rubber hose (1) is not damaged or deteriorated and band (2) is not loose.
2. If there is any damage or deterioration, replace both rubber hose (1) and band (2) with new parts.



CHECKING RUBBER HOSE OF INTERCOOLER

1. Check that rubber hose (1) is not damaged or deteriorated and band (2) is not loose.
2. If there is any damage or deterioration, replace both rubber hose (1) and band (2) with new parts.



4.14.3 CHECKING RADIATOR HOSES FOR CRACKS AND DAMAGE



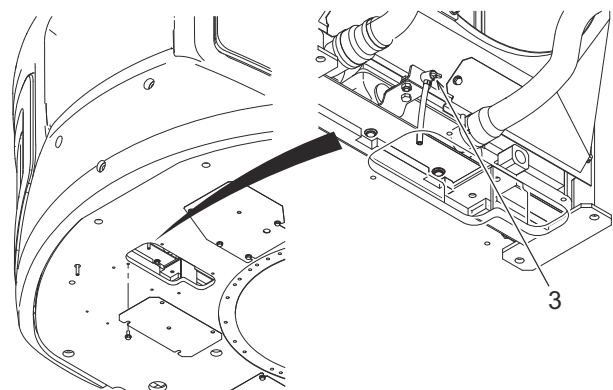
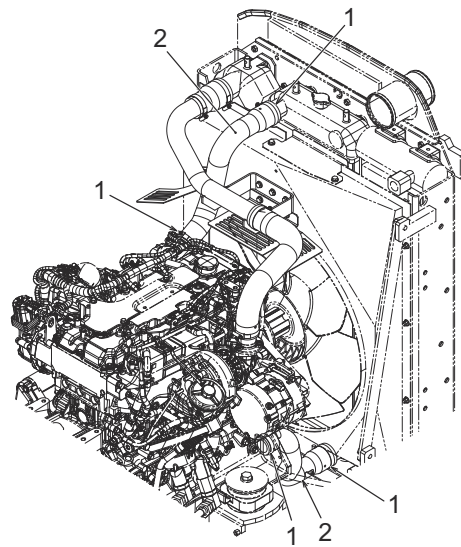
Look out for radiator hose damage

Replace hoses immediately at the first sign of cracking, permanent set or water leakage. This can prevent serious failure such as engine overheating.

CHECKING RADIATOR HOSES

1. Use the starter key to open the engine hood and secure it in place with the stay.
2. Inspect all hoses for water leakage due to looseness of hose clamps (1) or cracking/permanent set of hoses (2).
3. Tighten hose clamps (1) if necessary.

Replace hoses (2) if any cracks or signs of permanent set are visible.



RADIATOR HOSE REPLACEMENT

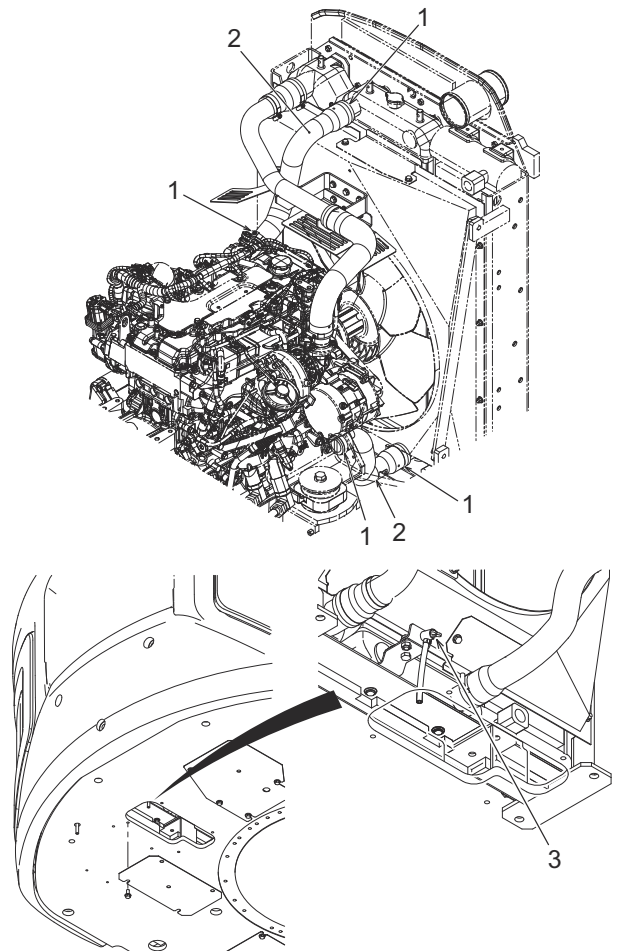


Replacing radiator hoses

High-pressure steam inside the radiator may cause personal injury. Do not loosen or remove the radiator cap when the coolant is at high temperature and pressure.

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

1. Loosen the four bolts under the radiator and remove the cover.
2. Loosen the radiator cap slowly. After checking that the pressure has been completely released, remove the cap by pushing it downward and loosening it further.
3. Loosen drain valve (3) and drain the coolant into a container until the radiator coolant level falls below the level of hose (2) to be replaced.
4. Loosen clamps (1), remove damaged hose (2) and replace it with a new hose.
5. Tighten drain valve (3).
6. After refilling the radiator with coolant, refill the reserve tank as well.
7. After refilling, tighten the radiator cap securely.
8. Release the stay and close the engine hood.
9. Reinstall the cover under the radiator into its correct position.



4

4.14.4 CLEANING OR REPLACING HVAC FILTERS

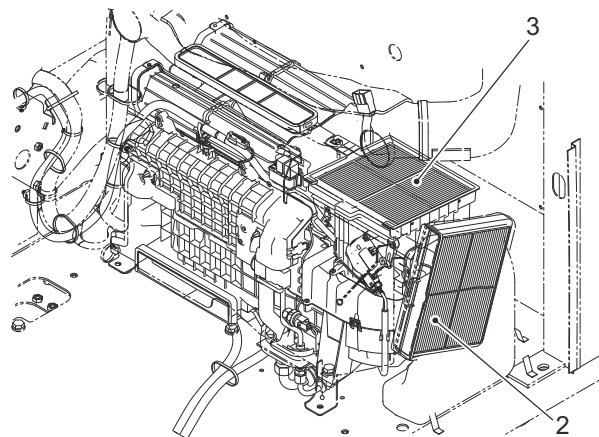
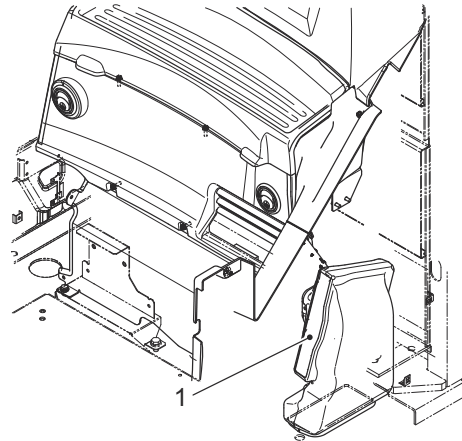
Notice

The maintenance interval is for reference only. When operating the machine in sandy or dusty conditions, more frequent maintenance is required.

	Clean	Replace
Recirculation air filter	Every 500 hrs.	After approximately 10 cleans
Fresh air filter	Every 250 hrs.	After approximately 10 cleans

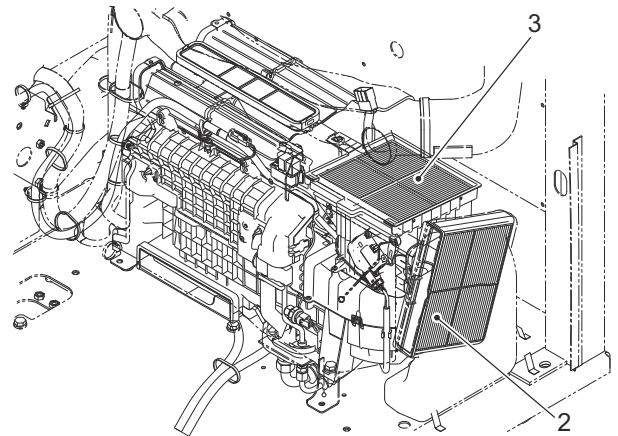
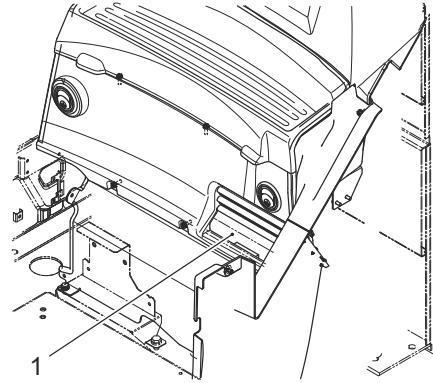
CLEANING OR REPLACING AIR CONDITIONER FRESH AIR FILTER

1. Fresh air duct (1) is placed on the left rear side of the operator's seat.
2. Hold the handle of the fresh air filter (2) inserted into fresh air duct (1) and pull it out toward you.
3. Clean the recirculation/fresh air filters by blowing compressed air (0.2 MPa (29 psi) or less) to them.
4. Install the cleaned or replacement filters in the reverse order of removal.



CLEANING OR REPLACING OF AIR CONDITIONER RECIRCULATION AIR FILTER

1. Hold the lower side of cover (1) at the left rear side of the operator's seat and pull it toward you.
2. Hold the handle of recirculation air filter (3) through the opening of the removed cover (1) and pull it out forward.
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.



Notice

Install the recirculation air filter with the arrow facing rearward.

4.14.5 INSPECTING/CLEANING/REPLACING AIR CLEANER ELEMENTS

CAUTION

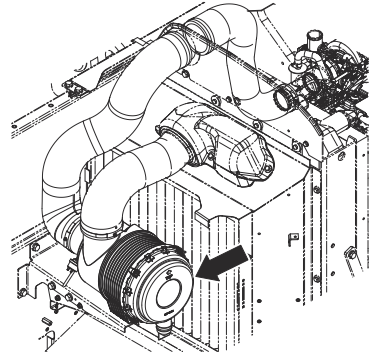
- Wear safety glasses, a respirator and protective gloves when using compressed air.
- Stop the engine before cleaning or replacing the air cleaner elements.
- Do not remove the inner element unless it is being replaced.
- Be careful to prevent dust or dirt from entering the inlet.

	Clean	Replace
Outer element	When warning is displayed on monitor or every 250 hours	After six cleans or after 1 year
Inner element	—	When replacing outer element



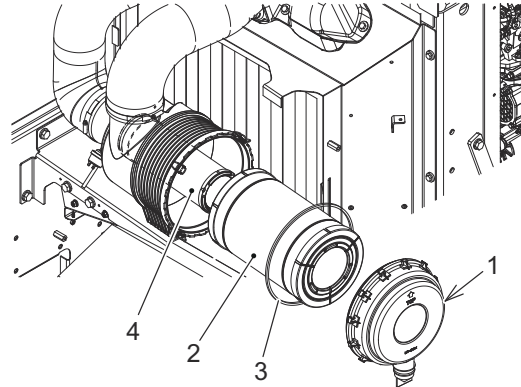
CLEANING/INSPECTION OF OUTER ELEMENT

1. Use the starter key to open the side door on the left rear side of the machine and fix it with the stay.



2. Remove the clamps from air cleaner cover (1) and open it.

3. Remove outer element (2) and clean inside the air cleaner.

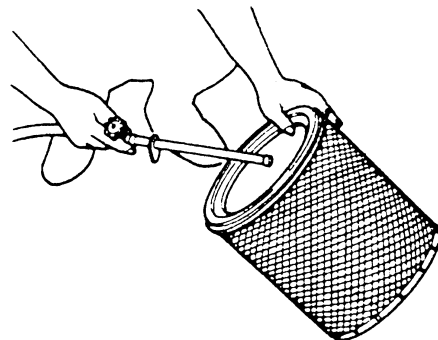


4. From the inside of outer element (2), blow compressed air of 0.2 Mpa (29 psi) or less along the folds. Then blow compressed air along the folds from the outside before repeating the procedure from the inside again.

Do not attempt to clean the outer element by hitting or tapping against a solid object.

5. After cleaning, check outer element (2) for holes or tears and if present, replace with a new part.

6. Install outer element (2) and attach O-ring (3) to cover (1).



CAUTION

Attach the cover to the air cleaner with the O-ring in place.
Without the O-ring, water may enter the air cleaner, causing engine failure.

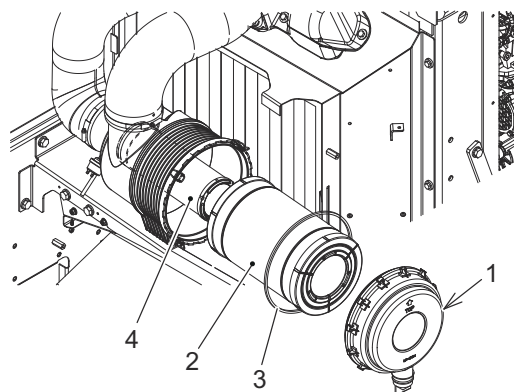
7. Install cover (1) into the air cleaner with the arrow pointing up and secure it in position with the clamps.

8. Close the side door and lock it with the starter key.

REPLACING INNER ELEMENT

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

1. Remove outer element (2).
2. Clean the inside of the air cleaner.
3. Remove inner element (4).
4. Remove the cover over the inlet and install a new inner element (4).
5. Install new outer element (2) and attach O-ring (3) to cover (1).
6. Install cover (1) onto the air cleaner with the arrow pointing up and secure it in position with the clamps.
7. Close the side door and lock it with the starter key.



4.14.6 CLEANING OR REPLACING RADIATOR CAP



Handling the coolant and cap

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

High-temperature steam and coolant may spray out and cause burns.

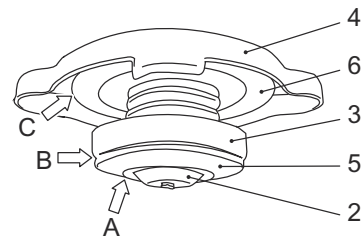
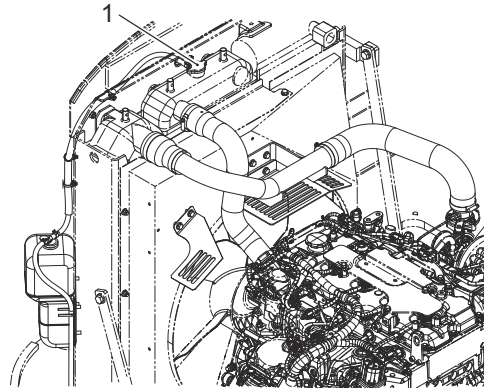
- Wait until the coolant temperature drops, then slowly turn and open the cap.
- Antifreeze is poisonous. Avoid contact with skin. If it does get into your eyes or come into contact with your skin, flush immediately with plenty of water and seek medical attention.



Close the cap securely after opening it.

Inspect/Clean	Replace
Every 250 hrs.	If damaged, or every year

1. Open the engine hood and secure it with the stay.
2. Loosen radiator cap (1) slowly. After checking that the pressure has been completely released, remove the cap by pushing it downward and loosening it further.
3. Check the following areas on the cap. Clean off any deposited foreign material and replace the cap if any damage is visible.
 - 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.



4.14.7 RADIATOR, OIL COOLER CORE AND FILTER CLEANING

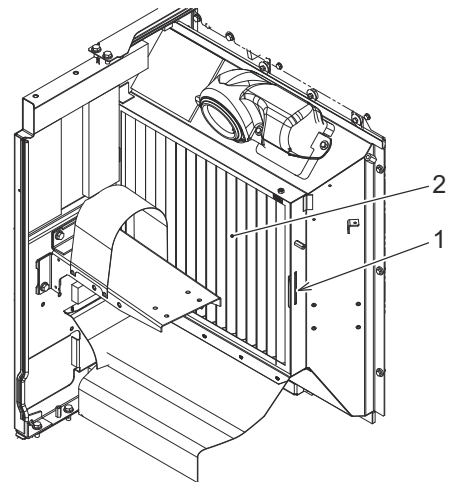
**WARNING****Handling precautions**

There is a danger of injury from a direct blow to the body by compressed air, steam, or water under pressure. Wear safety glasses or goggles, a mask and safety shoes, etc.

Notice

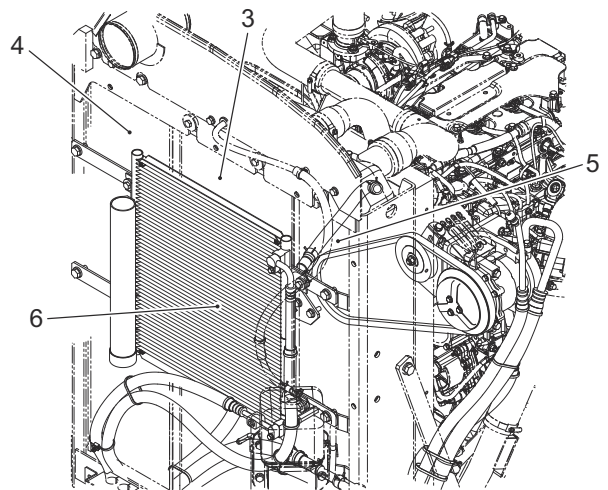
Maintain a good distance from the fins to prevent them from being damaged by compressed air or high-pressure water jets. Damaged fins may cause coolant leakages and overheating.

1. Use the starter key to open the engine hood.
2. Use the starter key to open the side door on the left side of the counterweight.
3. Push plate (1) to remove the protrusion from the slit.
4. Slide filter (2) and pull it out.



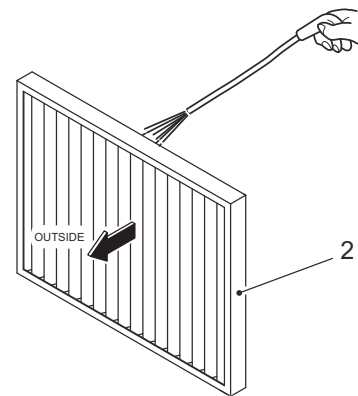
4

5. Check filter (2), radiator (3), oil cooler (4), intercooler (5) and condenser (6) for mud, dirt, leaves, etc., and clean as required.

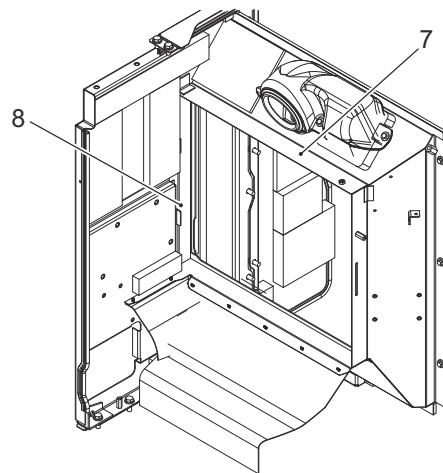


[4. INSPECTION AND MAINTENANCE]

6. Remove dirt, mud, etc., from the radiator cores and fins with compressed air (0.2 MPa (29.0 psi)) or water.



7. Insert filter (2) into duct (7). Check that filter (2) is properly seated in receptacle (8) of duct (7) and that plate (1) of the filter is in the slit on the duct side.
8. Close and lock the door on the left side of the counterweight.



4.15 500 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".

4.15.1 REPLACING ENGINE OIL AND ENGINE OIL FILTER

WARNING

High-temperature parts

- Contact with high-temperature parts during or immediately after operation may cause burns. Do not touch parts that are hot.
- After operation, the oil and oil filter remain hot, so wait for the temperature to drop before starting replacement.

CAUTION

- Do not reuse the filter element, O-ring or gasket.
- When replacing the O-ring or gasket, check that it fits the installation site to prevent it from being twisted and damaged.

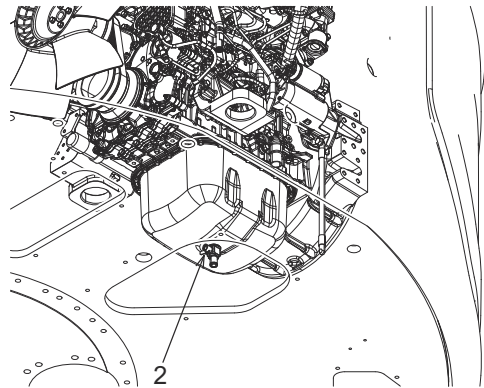
Notice

- Inspect drained engine oil for iron chips or iron powder. If found to be present, contact your KOBELCO authorized dealer.
- Change the oil after 50 hrs. of operation has been reached for the first time.
- Whenever the engine oil is changed, replace the engine oil filter as well.
- When the oil filter is replaced, run the engine at low idle for several minutes until oil fills the filter.

1. Loosen the five bolts of the under cover under the engine and remove the cover.

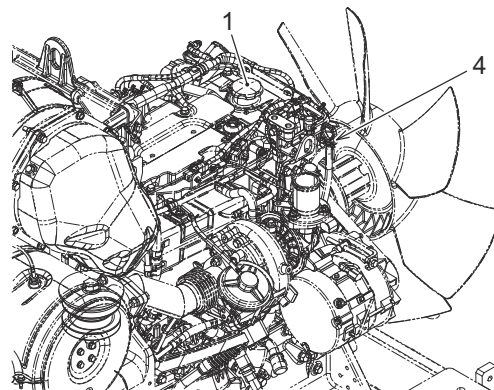
2. Place a container for draining oil under drain valve (2).

Container volume: 17.0 L (4.5 gal) or more

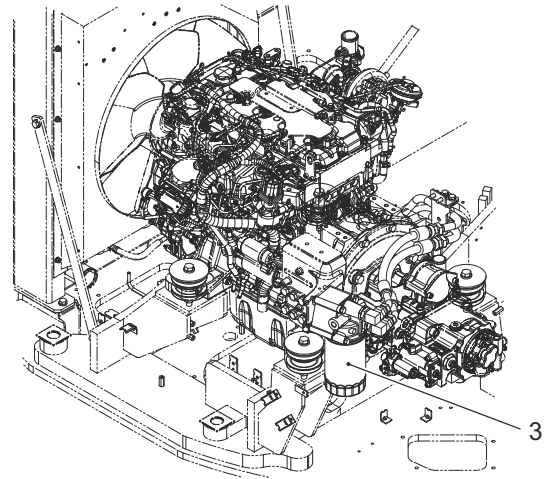


3. Clean the area around oil filler cap (1), remove the cap, then loosen drain valve (2) of the engine oil pan to drain the oil.

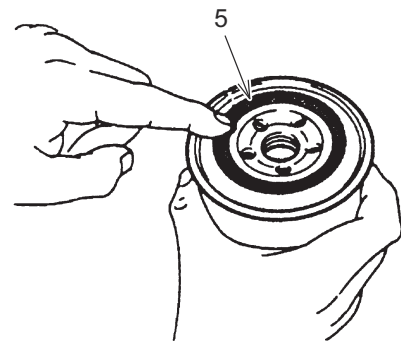
4. After draining the oil, tighten drain valve (2) and oil filler cap (1) securely.



5. Turn filter element (3) with a filter wrench and remove it.
6. Remove dirt and foreign material from the mounting surface of the oil filter body.



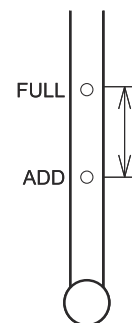
7. Apply clean engine oil to the gasket of the new filter element, then install the filter element by turning it by hand until it stops.



CAUTION

- Do not reuse the filter element, O-ring or gasket.
- When replacing the O-ring or gasket, check that it fits the installation site to prevent it from being twisted and damaged.

8. Use the filter wrench to tighten the filter element by approximately one 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 oil level gauge (4) to ensure the engine oil has been filled to the proper level, in between the upper limit (H) and lower limit (L).
11. Attach oil filler cap (1).
12. Start the engine, run at low idle for several minutes, and then stop the engine again. About ten minutes later, check the engine oil level. If the level is low, refill the engine oil repeatedly to the proper level.
13. Check that there is no leakage from the mounting surface of the oil filter.
14. Attach the cover under the engine to the original position.



4.15.2 FUEL PRE-FILTER REPLACEMENT



WARNING

Handling fuel

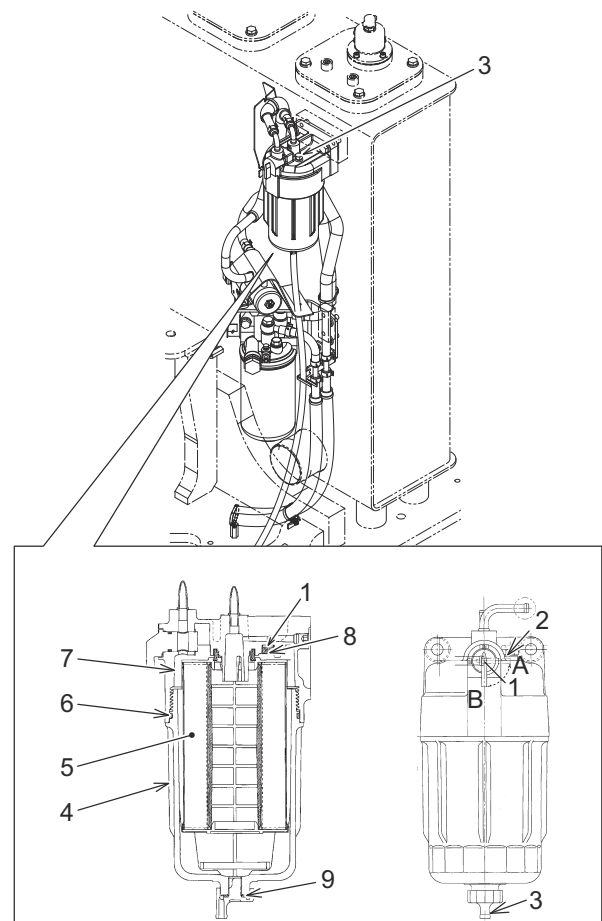
- Wipe up fuel spillages as they are a fire hazard.
- After carrying out the work, check that there is no fuel leakage.



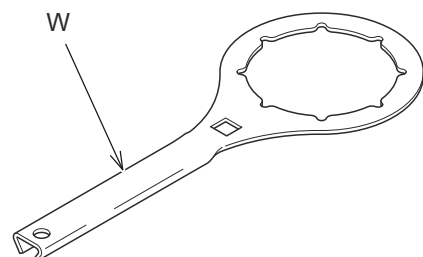
CAUTION

- Do not reuse the filter element, O-ring or gasket.
- When replacing the O-ring or gasket, check that it fits the installation site to prevent it from being twisted and damaged.

1. Place a container for discharge under the pre-fuel filter.
2. Turn stop valve (1) to the "Close" position (A).
3. Clean the area around air bleeder plug (2).



4. Drain fuel from the filter by loosening air bleeder plug (2) and drain plug (3).
5. Remove air bleeder plug (2) and drain plug (3).
6. Remove casing (4) by turning it with the filter wrench (W) provided with the machine.
7. Install new filter element (5) into casing (4).
8. Coat the new O-ring (6) with a thin layer of diesel oil before installing it in casing (4).
9. Remove dirt and foreign materials from the mounting surface of cover (7).



10. Use filter wrench (W) to turn casing (4) to attach it securely to cover (7).

Tightening torque: $30 \pm 2 \text{ N}\cdot\text{m}$ ($22.1 \pm 1.48 \text{ lbf}\cdot\text{ft}$)

11. Replace gaskets (8) and (9) with new ones and apply a thin coat of diesel oil to them. Then fit them to air bleeder plug (2) and drain plug (3).

12. Attach air bleeder plug (2) and drain plug (3).

13. Turn stop valve (1) to the "Open" position (B).

14. Bleed the air according to "BLEEDING AIR FROM FUEL PIPING" in Chapter 4.

4.15.3 REPLACING FUEL FILTER



Handling fuel

- Wipe up fuel spillages as they are a fire hazard.
 - After carrying out the work, check that there is no fuel leakage.
-



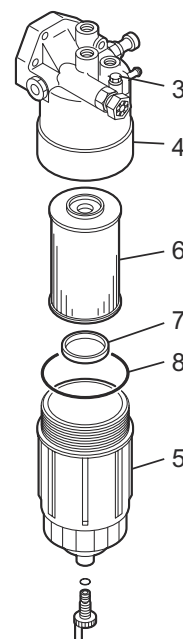
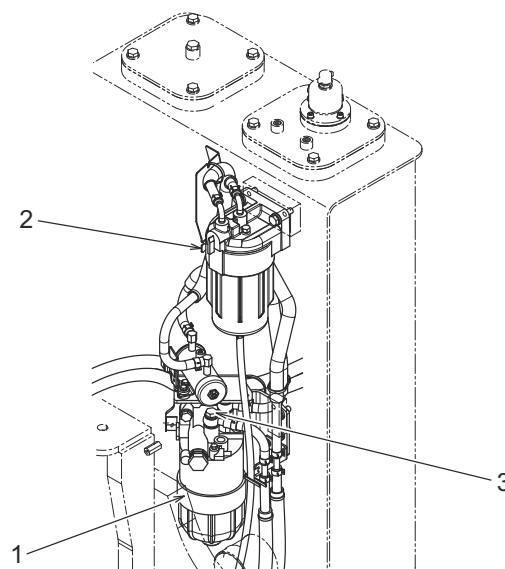
When using biodiesel fuel, replace the filter every 250 hours.



- Do not reuse the filter element, O-ring or gasket.
 - When replacing the O-ring or gasket, check that it fits the installation site to prevent it from being twisted and damaged.
-

1. Place a container for draining under fuel filter (1).
2. Refer to "FUEL PRE-FILTER REPLACEMENT" in Chapter 4 to close stop valve (2).

3. Clean the area around air bleeder plug (3).
4. Drain fuel from the filter by loosening air bleeder plug (3).
5. Remove casing (5).
6. Remove fuel filter element (6) with a filter wrench. Filter wrench, part number: YW01T01014P1
7. Use a rag or similar to thoroughly wipe away any fuel adhering to fuel filter element (6) installation surface of filter bracket (4).
8. Prepare a new fuel filter element and ensure the seal is properly seated in the groove.
9. Apply clean fuel to the gasket.
10. Install fuel filter element (6) and float (7) into filter bracket (4). At this point, tighten fuel filter element (6) by 3/4 turn after the seal contacts the installation surface of filter bracket (4).
11. Prepare a new O-ring for casing (5) and install casing (5). At this point, after O-ring (8) in casing (5) contacts the installation surface at the bottom of fuel filter element (6), tighten it by 1/2 turn.
12. Tighten air bleeder plug (3).
13. Open stop valve (2).
14. Bleed the air according to "BLEEDING AIR FROM FUEL PIPING" in Chapter 4.



4.15.4 REPLACING FINAL FUEL FILTER



WARNING Handling fuel

- Immediately after stopping the engine, parts remain at high temperature. Before starting the work, wait for parts to cool down.
- Wipe off spilled fuel to prevent fire.



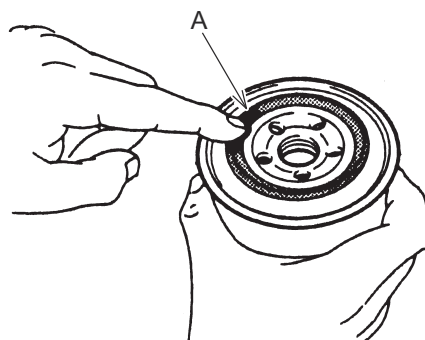
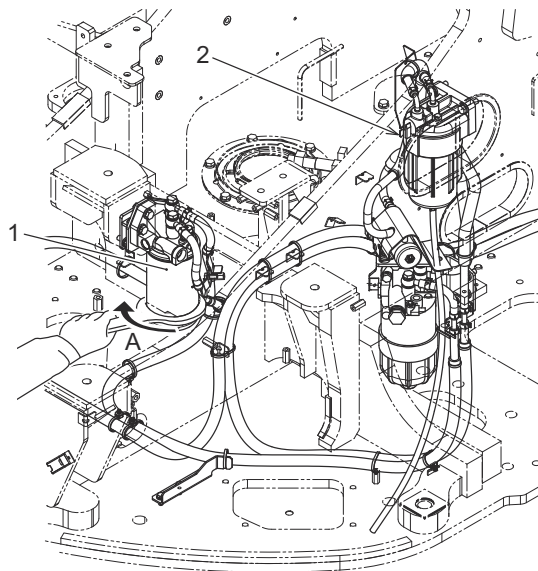
When using biodiesel fuel, replace the filter every 250 hours.



- Do not reuse O-rings, gaskets and similar parts.
- When replacing the O-ring or gasket, check that it fits the installation site to prevent it from being twisted and damaged.
- The fuel filter cannot be reused because it is a cartridge type.

1. Stop the engine and open the right side door.
2. Remove the under cover under the engine.
3. Place a container for draining under fuel filter (1).
4. Refer to "FUEL PRE-FILTER REPLACEMENT" in Chapter 4 to close fuel pre-filter valve (2).
5. By using the fuel filter wrench supplied with the machine, turn filter cartridge (1) counterclockwise (A) to remove it.
6. Wipe the sealing surface of the filter base clean to prevent dust and foreign materials from entering.
7. Apply a thin layer of clean diesel oil to packing (A) of the new filter cartridge, hand-tighten it, and then re-tighten it by approximately 2/3 turn more.
8. Open fuel pre-filter valve (2).
9. Bleed the air according to "BLEEDING AIR FROM FUEL PIPING" in Chapter 4.
10. Close the right side door and lock it.
11. Reinstall the under cover.

Tightening torque: 80 N·m (59 lbf·ft)



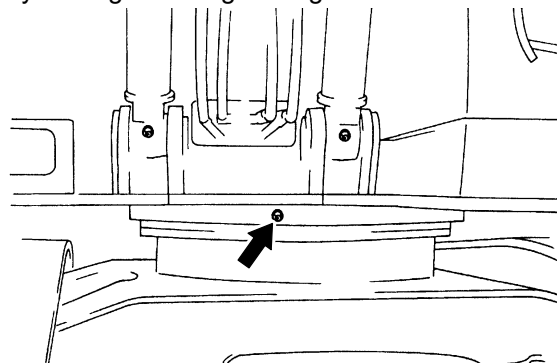
4.15.5 GREASING SWING BEARING

WARNING 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.
(About maximum 35 cc per each direction)

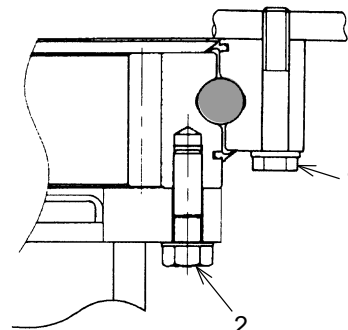


4.15.6 CHECKING SWING BEARING MOUNTING BOLT FOR LOOSENESS

Notice

Use a torque wrench when tightening the bolts of the swing bearing.

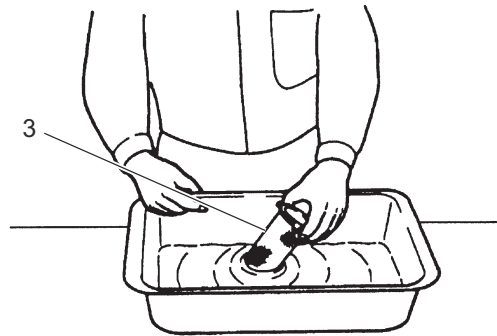
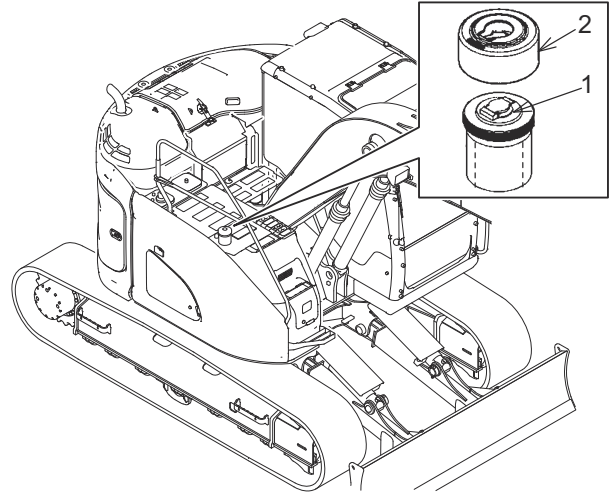
1. Check that bolts (1) and (2), which tighten the swing bearing are not loose.
2. When they are loose, remove bolts (1), and (2), apply the recommended thread locking agent (Loctite #262 or equivalent) and tighten them.
Tighten diagonally positioned bolts alternately.



Mounting part	Tightening torque N·m (lbf·ft)
Inner race	279±29(206±21)
Outer race	256±25.6(189±19)

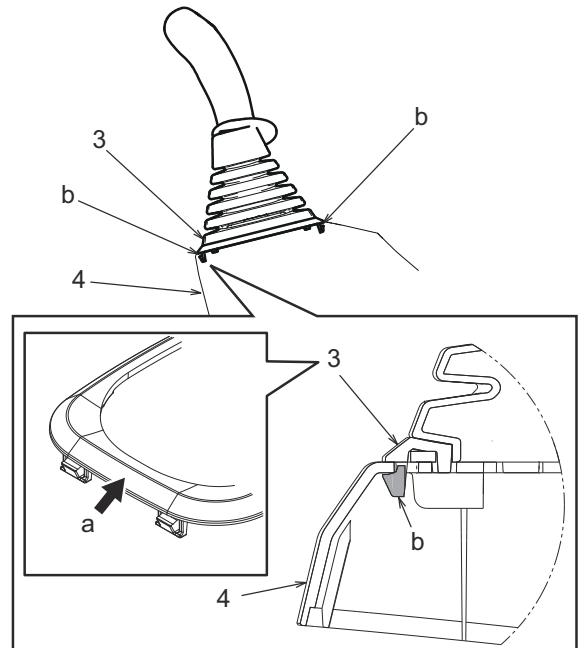
4.15.7 CLEANING FUEL TANK CAP AND STRAINER

1. Stop the engine.
2. Remove rubber cover (2) from the filler port, if any, and then use the starter key to open the tank by turning filler cap (1).
3. Check the seal on filler cap (1) and replace it if damaged.
4. Wash strainer (3) with clean diesel oil and install it.
- Replace the strainer if there are signs of damage.
5. Install filler cap (1) and lock it with the starter key. Then install rubber cover (2) by aligning it with filler cap (1).

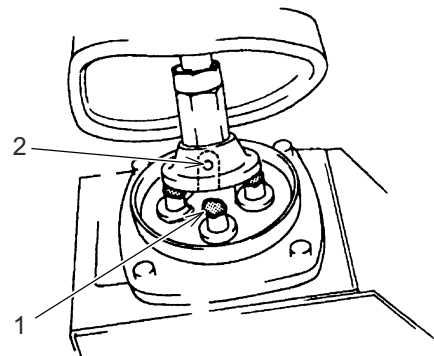


4.15.8 LUBRICATING PUSH ROD OF CONTROL LEVER

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).



4.15.9 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 refrigerant 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 produced.

Notice

- When filling or changing refrigerant, confirm the type of refrigerant and use the specified refrigerant. (Refrigerant type: R-134a Quantity: 780 g ± 50 g (1.72 lbs ± 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 will prevent the refrigerant gas from leaking from the compressor sealing.
- If an oil stain is found around a pipe joint, it is a sign of gas leakage. Contact your KOBELCO authorized dealer for inspection.

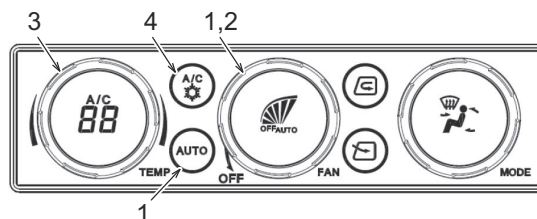
Notice

Be sure to follow the following regulations to protect the global environment.

- Do not release the refrigerant sealed in this product to the atmosphere without care.
- Extract the sealed refrigerant from the unit when disposing this product.

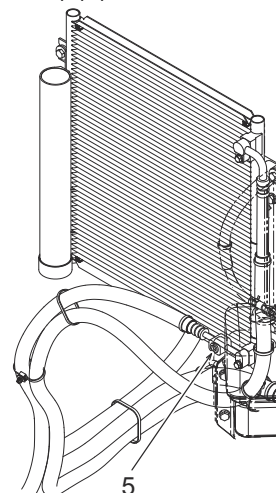
1. Start the engine, and set the engine speed to the middle speed position of the engine throttle.
2. Fully open the windows of the cab and the doors.
3. Set the air conditioner as shown in the following.

- (1) Air conditioner control: ON
- (2) Fan speed selector switch: HI display
- (3) Temperature setting switch: MAX COLD
- (4) Air conditioner switch: ON




4. Check the amount of the refrigerant by seeing sight glass (inspection window) (5).

See the figure of "Condition of Sight Glass" for judging whether the refilled refrigerant volume is sufficient or not.



Condition of Sight Glass

When insufficiently charged	After turning ON the main power switch, bubbles are seen continuously.	
-----------------------------	------------------------------------------------------------------------	------------------------------------------------------------------------------------

4.15.10 CLEANING OR REPLACING ELECTROMAGNETIC FUEL PUMP



REPLACING FILTER

When removing since the fuel is present inside the pump (1), use a container or something similar to receive the fuel, so that the fuel does not splash on the engine. Also, be cautious of fire.

Notice

- When the filter (3) is removed, make sure to replace the gasket (2), (4) and clean the magnet portion inside the cover (5).
- Do not disassemble the piston and its parts locating at the inside center of the electromagnetic pump.
- When removing the gasket (2) and (4), hold the outer part of the gasket with your fingers and pull it out.

Contact your KOBELCO authorized dealer for replacement of the filter.

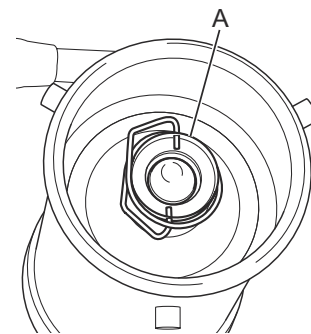
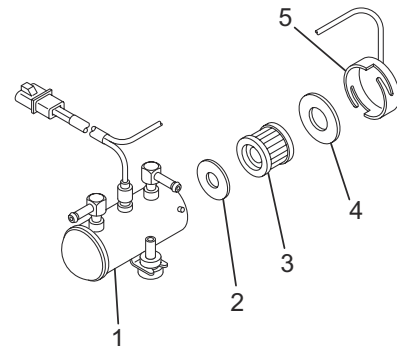
1. Disconnect the wiring attached to the pump (1) cover (5). Turn the cover using a wrench to remove it.

A: Impossible to disassemble

2. Remove the filter (3) and gasket (2), (4), and replace or clean them.

Clean the removed filter (3) with clean diesel fuel, and blow off the dirt and other impurities using high-pressured air. Then, install the filter (3) and a new gasket (2), (4).

3. Install the cover (5). Securely tighten it all the way to the end using the wrench.



4

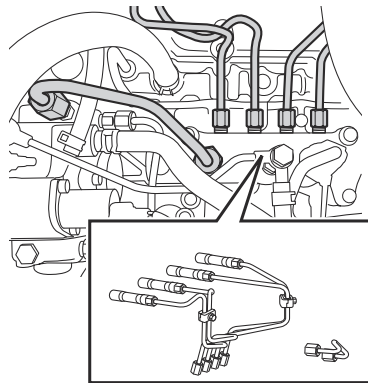
Notice

- After the cover (5) has been installed, make sure to check the airtightness.
- The interval of replacement or cleaning should be shortened depending on the status of fuel management and refuel.

HANDLING THE FUEL PIPING

When the injection pipe (high-pressure pipe) is removed, do not reuse but replace it. Also, when the pipe is found loosened, replace it.

Reuse of the removed injection pipe can cause fuel leakage.



4.16 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".

4.16.1 Change return filter



WARNING

BEWARE OF HOT PARTS

- The high-temperature and high-pressure oil in the hydraulic oil tank is dangerous.
Before removing the cover, stop the engine and press the air breather to release pressure in the tank.
 - Immediately after engine operation, the oil is at high temperature and may cause burns. Wait for the oil temperature to drop before carrying out any maintenance work.
-



CAUTION

Residual internal pressure in the tank could cause hydraulic oil to spray out or the cover to be blown off when removing the bolts and cover from the top of the hydraulic oil tank.

When releasing pressure from the tank, continue until a hissing sound can no longer be heard.

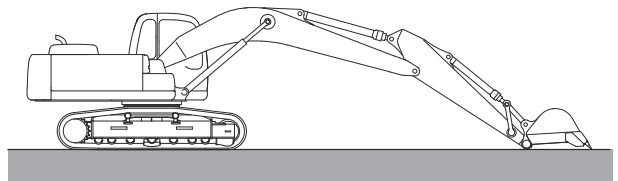
Notice

Pre-filtered hydraulic oil in the filter contains contaminants. When removing the return filter, do not return the hydraulic oil remaining in the filter back to the tank.

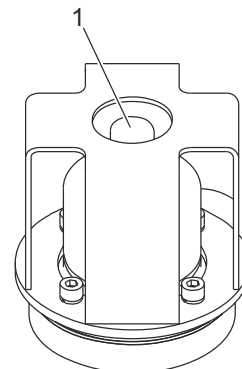
Notice

- Consult your KOBELCO authorized dealer when ordering a return filter element kit.
Replace the return filter after the first 50 hours of operation, and then every 1,000 hours.
For the breaker specification, replace it every 250 hours.
 - Replace the return filter if a hydraulic oil filter replacement warning is displayed, regardless of the set maintenance time.
-

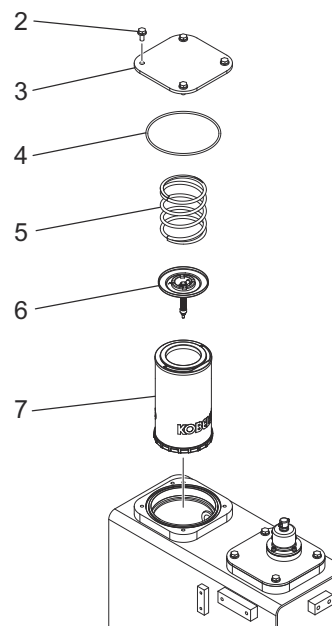
1. Move the machine to firm, level ground.
2. Put the machine in the hydraulic oil level inspection position.
3. Stop the engine and set the control lock lever to the "LOCKED" position.



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. Remove bolts (2) and cover (3) on the tank upper surface.
6. Remove spring (5), check valve (6) and element assembly (7) from the tank.
Be careful not to allow oil from inside the filter to reenter the tank.
7. Replace O-ring (4) found on the mounting surface of cover (3).
8. Replace element assembly (7).
9. To install element assembly (7), carry out steps 5 and 6 in reverse order.
10. Install cover (3) with bolts (2).
In addition, tighten the bolts with the following tightening torque.
Tightening torque: $46.5 \pm 4.6 \text{ N}\cdot\text{m}$ ($34.3 \pm 3.4 \text{ lbf}\cdot\text{ft}$)
11. Start the engine.



4.16.2 REPLACING AIR BREATHER ELEMENT

WARNING

Following engine operation, hydraulic oil remains hot and may cause burns. Wait for the oil temperature to drop.

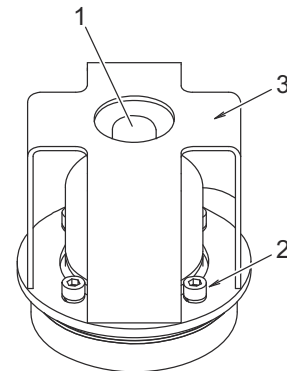
Notice

To avoid breakage of bolts, do not over-tighten nut (5).
Tightening torque: 10 to 14 N·m (7.4 to 10.3 lbf·ft)

Notice

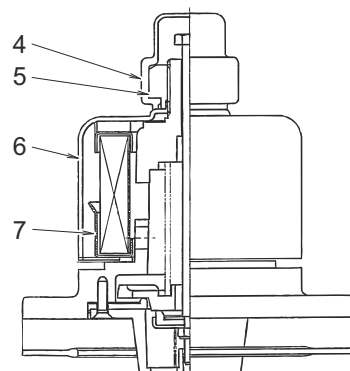
- Never allow water or dirt to enter the air intake and exhaust ports when replacing the air breather element.
- Replace the air breather element at regular intervals to extend the service life of the hydraulic components.
- As a guideline, every 1,000 hours. When operating the machine in sandy or dusty conditions, more frequent replacement is required.

1. Move the machine to firm, level ground.
2. Lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
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. Remove cap screws (2) and cover (3) on the top of the tank.



6. After removing breather cap (4), remove nut (5).
7. Turn cover (6) counterclockwise to remove it, and then remove element (7).
8. Install a new element (7) and align cover (6) in the groove to reinstall it.
9. Tighten nut (5).
10. Install breather cap (4).
11. Reinstall cover (3) using cap screws (2).

Tightening torque: 4.41 ± 0.49 N·m (3.25 ± 0.36 lbf·ft)



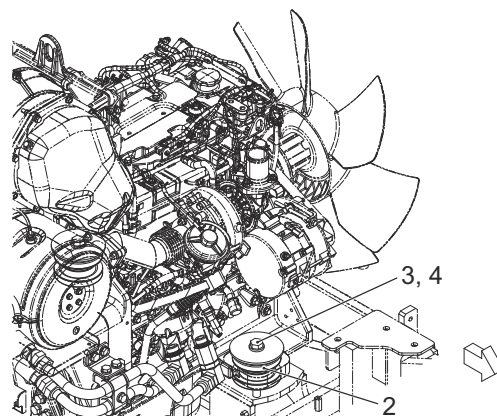
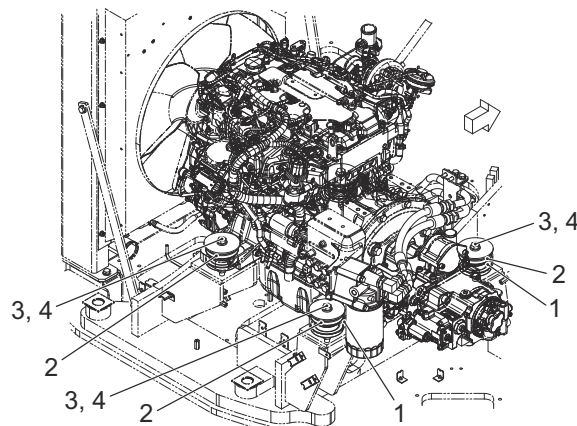
4.16.3 CHECKING TIGHTNESS OF ENGINE MOUNTING BRACKET

1. Check for signs of damage or deterioration of engine mounting brackets (1) and rubber mounts (2), and for looseness in installation bolts (3) and nuts (4).

If there is any damage or deterioration to engine mounting brackets (1) or rubber mounts (2), contact your KOBELCO authorized dealer for replacement.

2. Tighten any installation bolts (3) or nuts (4) that are found to be loose.

For tightening torques, see Chapter 4 "TIGHTENING TORQUES FOR BOLTS & NUTS (SPECIFIC LOCATIONS)".



4.16.4 CHECKING BATTERY VOLTAGE



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.
-

Notice

- Do not use the battery power-off switch for any other purposes other than described in this manual.
Never turn the battery power-off switch to the "O (OFF)" position while the engine is running.
To prevent electric devices from being damaged, when turning the battery power-off switch to the "O (OFF)" position, turn the starter key switch to the "OFF" position first and wait 1 minute or more and then operate the battery power-off switch.
 - After setting the switch to the OFF position, all electrical circuits are shut down, and the preset memory and clock memory of the radio are cleared.
-

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.

4.17 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".

4.17.1 CHANGING COOLANT



WARNING

Handling of coolant

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

High-temperature steam and coolant may spray out and cause burns.

- When opening the radiator cap, wait for the coolant temperature to drop first, and then slowly turn and open the cap.
 - Antifreeze is poisonous. Avoid contact with skin. If coolant does get into your eyes or come into contact with your skin, flush immediately with plenty of water and seek medical attention.
-



CAUTION

Any residual air in the coolant system will lead to damage of the machine. Perform the work according to the procedure and do not allow air to remain inside the coolant circuit.

Notice

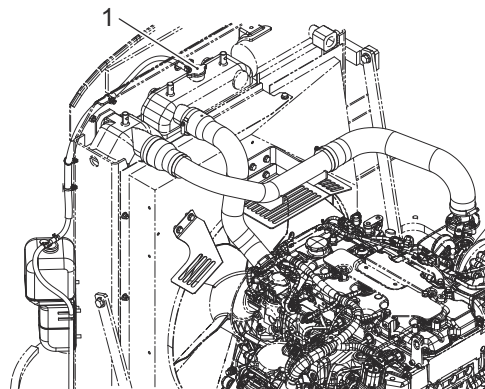
Use KOBELCO genuine antifreeze at 50% concentration. Use clean water (tap water for example) to dilute the antifreeze.

- Use the specified antifreeze. Use of the wrong antifreeze may cause rust inside the coolant circuit as well as other damage to the machine.
 - Do not mix different types of coolant.
 - Replace the coolant earlier than the specified interval when it is dirty and/or foaming.
-

1. Move the machine to firm, level ground and ground the bucket.
2. Stop the engine and set the control lock lever to the "LOCKED" position.
3. Loosen radiator cap (1) slowly. After checking that the pressure has been completely released, remove the cap by pushing it downward and loosening it further.

This is the radiator filler opening.

4. Remove the under cover under the radiator, place a container for the drained coolant, then open drain plug (2) and drain plug (3) on the engine sideface to drain the coolant.
5. After draining the coolant, close drain plug (2) and drain plug (3) and run tap water into the radiator filler opening using a hose.



6. Open drain plug (2) and drain plug (3), start the engine and run it at low idle for ten minutes, letting the water run through the system.

When flushing the system with running water, monitor the coolant level and ensure the system always remains full.

Pay attention at all times to ensure that the hose does not come out of the radiator water inlet.

7. Stop the engine, turn off the water and close drain plug (2) and drain plug (3) after the water is drained.
8. Use a cleaning solvent to clean the system. When cleaning, follow the manual provided with the cleaning solvent in use.
9. After cleaning with the cleaning solvent, repeat steps 5 to 7 again to flush the system. When doing this, keep flushing the system until the water that drains out is clean.

10. Drain the coolant in reserve tank (4) and clean the interior.

11. Fill the radiator with coolant through the water inlet until it is visible at the neck of the inlet.

In order to minimize the chances of air entering the system, pour the coolant slowly. (Pouring rate: 4 L/min)

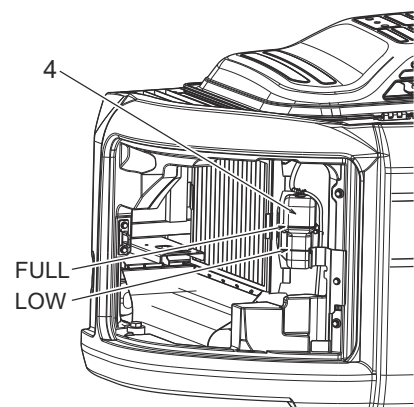
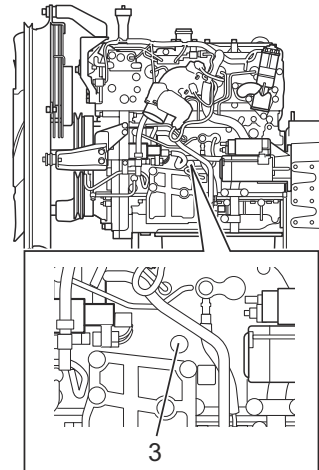
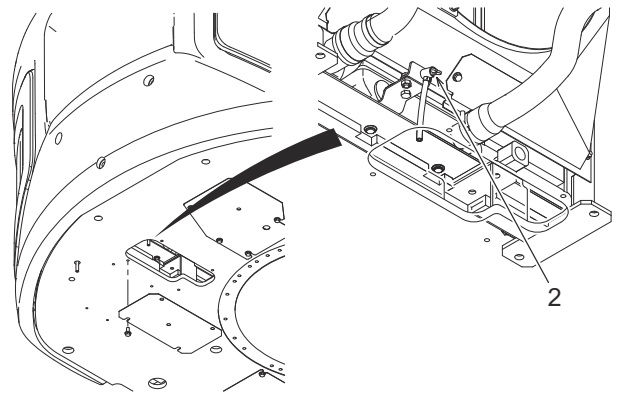
12. Start the engine and let it run for five minutes at low idle, then five minutes at high idle, to allow air to drain from the cooling channels. Leave radiator cap (1) off while this is happening.

13. Stop the engine, wait approximately three minutes, top up the radiator with coolant until it is visible at the neck of the inlet, then close radiator cap (1).

14. Fill reserve tank (4) with coolant to the midpoint between the "LOW" (lower limit) and "FULL" (upper limit) levels.

15. Reinstall the undercover below the radiator.

16. Once the coolant is sufficiently cool, check the level at the radiator filler opening and in reserve tank (4).
 - Fill up the system if the level at the radiator filler opening is low.
 - Fill reserve tank (4) to the midpoint between the "LOW" (lower limit) and "FULL" (upper limit) levels.



4.17.2 REPLACING OIL OF SWING REDUCTION UNIT



Handling oil immediately after operation

Immediately after operation, the oil is hot and it may cause burns. Allow the temperature to drop before starting work.

Notice

Change the oil after 500 hrs. of operation has been reached for the first time.

Notice

- Inspect drained oil for iron chips or iron powder. If found to be present, contact your KOBELCO authorized dealer.
- Treat drained waste oil as industrial waste and dispose of it accordingly.

1. Move the machine to firm, level ground.
2. Lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
4. Place a container for drain oil under drain plug (1) on the lower side of the swing reduction unit.

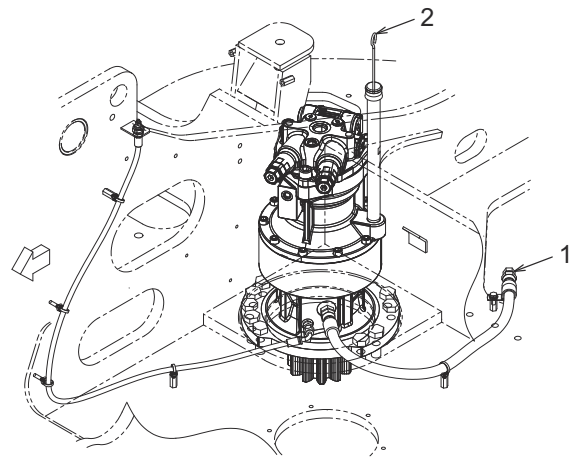
Container volume: 1.6 L (0.4 gal) or more

5. Remove drain plug (1) to drain the oil in the container.
6. After draining the oil completely, clean the drain plug with diesel oil and attach it in place.
7. Remove level gauge (2), then fill the unit with the indicated volume of the specified gear oil.

The oil level should be within the indicated range on level gauge (2).

For the specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.

8. Install level gauge (2).



4.17.3 REPLACING OIL IN TRAVEL REDUCTION UNITS



WARNING HANDLING OF OIL IMMEDIATELY AFTER OPERATION

- 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.

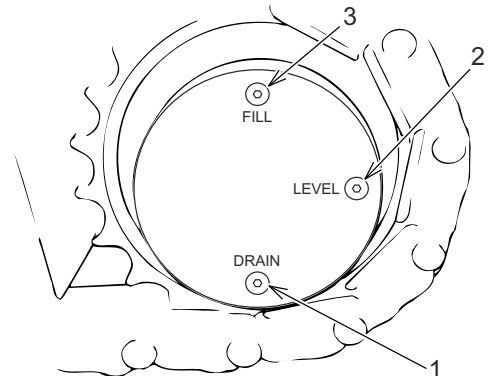
Notice

Replace the oil after 500 hours of operation has been reached for the first time.

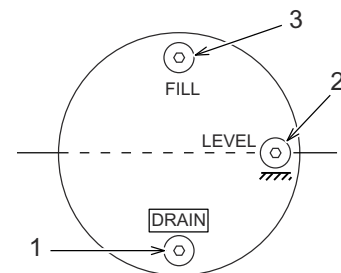
Notice

- 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 pilot control shut-off lever to the "LOCKED" position.
4. Place a container for drain oil under drain plug (1).
Container: 2.1 L (0.6 Gal) x 2 or more
5. Remove drain plug (1), level plug (2) and 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 from level plug (2).
For the specified gear oil, see "LUBRICANT, FUEL & COOLANT SPECIFICATIONS" in Chapter 4.
8. Clean level plug (2) and fill plug (3) with light oil and install them.
9. Similarly, replace the oil of the travel reduction unit on the other side.



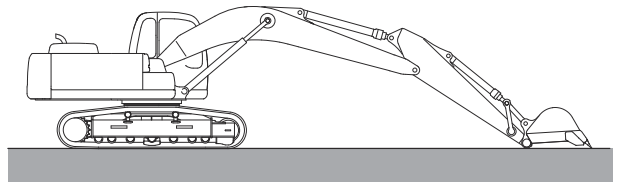
4.17.4 CLEANING SUCTION STRAINER



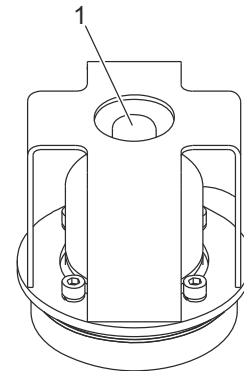
Handling the hydraulic oil tank

- The high-pressure and high-temperature oil in the hydraulic oil tank is dangerous. Before removing the cover, stop the engine and press the air breather to release pressure in the tank.
- Immediately after engine operation, the oil is at high temperature and may cause burns. Wait for the oil temperature to drop before carrying out any maintenance work.

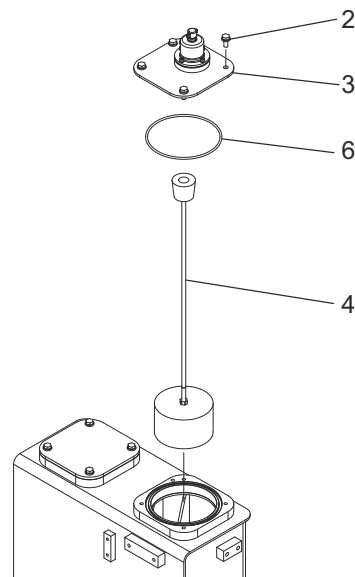
1. Move the machine to firm, level ground.
2. Put the machine in the hydraulic oil level inspection position.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
4. Clean the surface around the cover to prevent foreign materials from entering the inside of the hydraulic oil tank.



5. Keep pressing air breather (1) on the top of the hydraulic oil tank until the pressure inside the hydraulic oil tank is released.



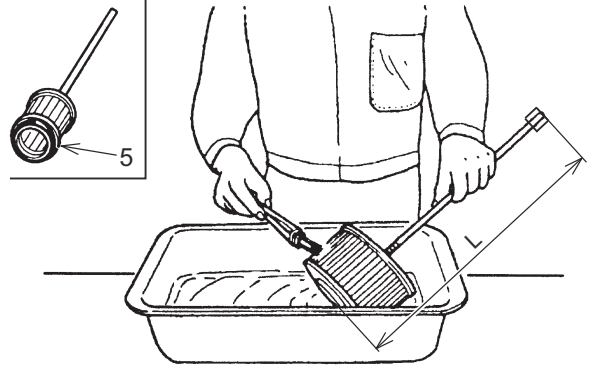
6. Remove bolts (2) and cover (3) on the tank upper surface.



Notice

Be sure not to drop any bolts, etc., into the tank.

7. Remove suction strainer (4).
8. Clean suction strainer (4) with diesel oil or cleaning solvent, dry it well and check it for damage. Replace with a new part if the surface of the strainer is significantly damaged.
L: 796 ± 1 mm (31.3 ± 0.04 inch)
9. If strainer O-ring (5) and O-ring (6) shows signs of wear or damage, replace with a new part.
10. Reinsert suction strainer (4) into the hydraulic oil tank.
11. Reinstall cover (3) with bolts (2).
Tightening torque: 46.5 ± 4.6 N·m (34.3 ± 3.4 lbf·ft)
12. Start the engine and run it at low idle for several (five to seven) minutes. Then extend and retract each cylinder and swing the machine.
13. Return the machine to the hydraulic oil inspection position, stop the engine and carry out an oil level check. If the oil level is low, refill the hydraulic oil.



4.17.5 GREASING SWING REDUCTION UNIT



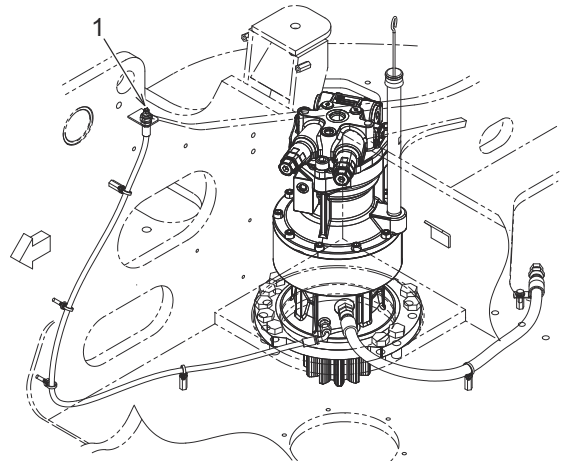
Handling immediately after operation

Immediately after operation, parts remain hot and may cause burns. Allow the temperature to drop before starting work.

Notice

Do not apply too much grease or the bearing seal may be damaged.

1. Move the machine to firm, level ground.
2. Lower the bucket to the ground.
3. Stop the engine and set the control lock lever to the "LOCKED" position.
4. Apply about 100 cc of grease (about 1/4 cartridge) through grease nipple (1) on the swing reduction unit.
Apply grease using a hand pump.



4.17.6 CHECKING GREASE IN SWING GREASE BATH

Notice

- When grease quality deteriorates, it can cause damage on the pinion shaft of the swing reduction unit and the swing bearing.

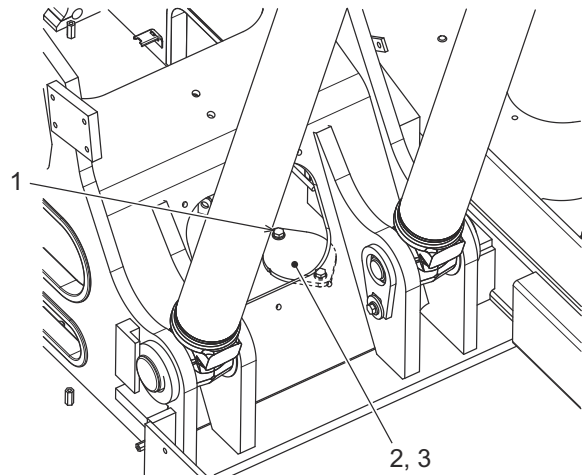
When the swing bearings gears are damaged or the grease is deteriorated and needs to be replaced, contact your KOBELCO authorized dealer.

Because the upper structure needs to be disassembled to replace grease for the swing grease bath, contact your KOBELCO authorized dealer.

- Do not reuse the removed packings (3) and (7) and be sure to replace them with new ones.

1. Loosen bolt (1) at the forward side of the upper structure, and remove cover (2) and packing (3) for inspection.

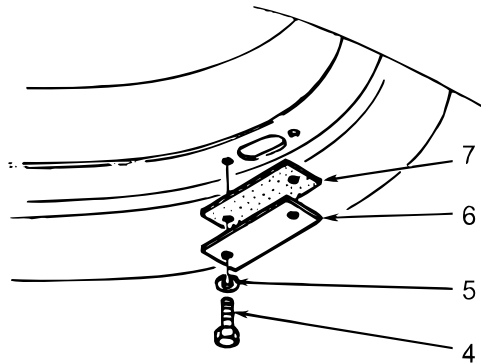
2. After inspection, replace with new packing (3), and after cleaning cover (2), apply Loctite #572 and then install it.



3. If water is deposited, loosen bolt (4) and spring washer (5) in the lower side of the lower frame, and remove cover (6) and packing (7) to drain the water.

The grease may become white due to slight contamination of water.

If water contamination is found, replace the grease with new grease after sucking the old grease by using a grease vacuum pump.



4.17.7 CLEANING PILOT LINE FILTER

CAUTION

Immediately after operation, there can be a spray of hot hydraulic oil that can burn you.

Wait for the oil temperature to drop.

Release the internal pressure in the hydraulic oil tank and hydraulic system before performing work.

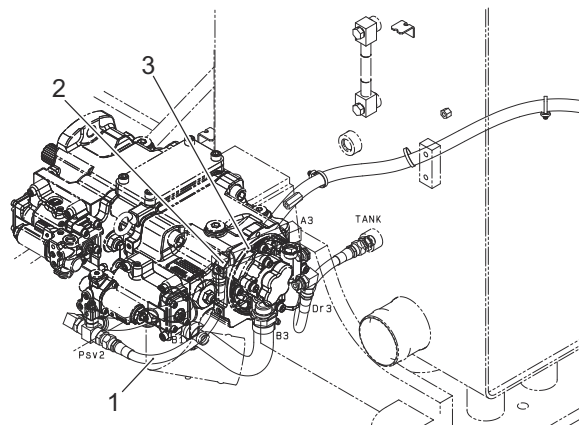
1. Open the side cover next to the pump and remove hose (1), connector (2) and line filter (3).
2. Clean line filter (3) with diesel oil and then reinstall.

Tightening torque

Hose (1): $49 \pm 5 \text{ N}\cdot\text{m}$ ($36.1 \pm 3.7 \text{ lbf}\cdot\text{ft}$)

Connector (2): $74 \pm 7 \text{ N}\cdot\text{m}$ ($54.6 \pm 5.2 \text{ lbf}\cdot\text{ft}$)

Line filter (3): $74 \pm 7 \text{ N}\cdot\text{m}$ ($54.6 \pm 5.2 \text{ lbf}\cdot\text{ft}$)



4.18 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".

4.18.1 CHANGING HYDRAULIC OIL



Handling the hydraulic oil tank and oil

- The high-pressure and high-temperature oil in the hydraulic oil tank is dangerous. Before removing the cover, stop the engine and press the air breather to release pressure in the tank.
- Immediately after engine operation, the oil is at high temperature and may cause burns. Wait for the oil temperature to drop before carrying out any maintenance work.

Notice

When a hydraulic breaker is attached, deterioration of the hydraulic oil is more rapid than during normal bucket digging work. See "NIBBLER (CRUSHER) AND BREAKER PERIODIC INSPECTION AND MAINTENANCE" in Chapter 7 for maintenance of the hydraulic oil.

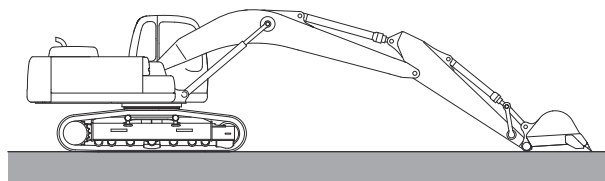
Notice

- Treat drained waste oil as industrial waste and dispose of it accordingly.

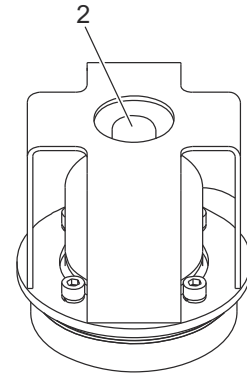
1. Move the machine to firm, level ground.
2. Swing the upper structure so that drain plug (1) on the bottom of the hydraulic oil tank is positioned at the midpoint of the left/right crawler frames.



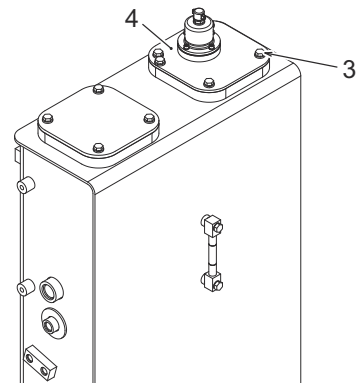
3. Retract the arm cylinder and bucket cylinder and place the bucket and dozer (if applicable) on the ground.
4. Stop the engine and set the control lock lever to the "LOCKED" position.
5. Clean the area around the cover to prevent foreign materials from entering the hydraulic oil tank.



- Keep pressing air breather (2) on the top of the hydraulic oil tank until the pressure inside the hydraulic oil tank is released.



- Remove bolts (3) and cover (4) on the tank upper surface.



IMPORTANT

Be sure not to drop any bolts, etc., into the tank.

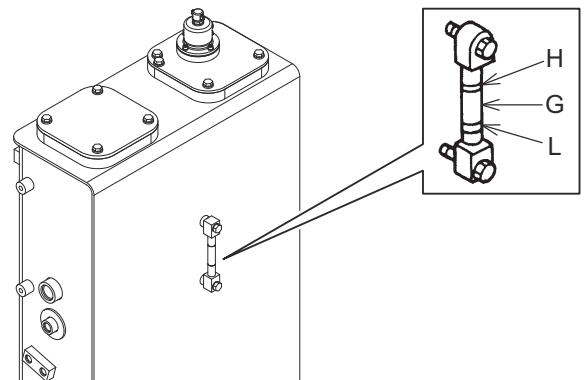
- Place a container for draining oil under drain plug (1) on the bottom of the hydraulic oil tank.
- Slowly loosen drain plug (1) and drain the hydraulic oil completely.
- Clean drain plug (1) and reinstall it in its original position.
Tightening torque: $108 \pm 10 \text{ N}\cdot\text{m}$ ($79.7 \pm 7.4 \text{ lbf}\cdot\text{ft}$)



- Refill the hydraulic oil through the filler port on the top of the tank.

While filling, keep an eye on the oil level using level gauge (G).

- Attach filler port cover (4) with four bolts (3).
Tightening torque: $46.5 \pm 4.6 \text{ N}\cdot\text{m}$ ($34.3 \pm 3.4 \text{ lbf}\cdot\text{ft}$)
- Start the engine and run it at low idle for several (five to seven) minutes. Then extend and retract each cylinder and swing the machine.
- Return the machine to the hydraulic oil inspection position, stop the engine and carry out an oil level check. If the oil level is low, refill the hydraulic oil.



4.19 MAINTENANCE OF MACHINES OPERATING IN SEVERE CONDITIONS

In general, "machines operating in severe conditions" refers to any of the following situations.

- Machines operating in environments that are constantly full of dust or other fine particles
- Machines operating under heavy load for long, sustained periods
- Machines operating with the engine at low idle for long, sustained periods
- Machines operating with the engine idling frequently
- Machines operating with the engine stopping and starting frequently
- Machines that have failed before even though standard maintenance has been sufficiently performed

For machines operating in such severe conditions, shorter maintenance intervals and other countermeasures must be adopted.

4.19.1 RECOMMENDED MAINTENANCE FOR MACHINES OPERATED UNDER SEVERE CONDITIONS

Notice

See "INSPECTION AND MAINTENANCE CHART" in Chapter 4 for standard maintenance intervals.

Item	Recommended maintenance
Engine oil level inspection	Check before starting work
Engine oil	Chemical synthetic oil (high-performance oil)
Engine oil change	Replace every 250 hrs.
Engine oil filter replacement	Replace whenever engine oil is changed
Fuel filter replacement	Replace every 500 hrs.
Replacing fuel pre-filter/water separator	Replace every 250 hrs.
(Replaceable) CCV filter replacement	Replace every 500 hrs.
DPF replacement	The DPF service life may be reduced to less than the standard replacement interval. If the manual regeneration warning is displayed frequently, contact your KOBELCO authorized dealer.
Injector cleaning	Wash with dedicated fuel additive every 1,000 hrs. or 12 months.
Engine combustion chamber cleaning	Wash with dedicated fuel additive every 1,000 hrs. or 12 months.
Air cleaner element (outer)	Clean before starting work Replace every 250 hrs.
Air cleaner element (inner)	Replace (do not clean) at the same time as the outer element
iNDr filter	Depending on the operation environment, clean it every three hrs. Keeping a spare is recommended.

4.19.2 STARTING AND STOPPING ENGINE

Allow the machine to warm up before starting work.

When work is complete, only stop the engine after leaving it running at low idle for five minutes without touching the control levers.

4.19.3 USAGE DURING WORK

When the work comprises frequent light-load operations with the engine at low idle, periodically change the engine speed to high idle and perform some heavy-load operations.

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5 TRANSPORTATION

5.1 TRANSPORTATION

Transport the machine safely, observing transportation-related laws and regulations.

5.1.1 STRICTLY OBSERVE TRANSPORTATION RELATED LAWS AND REGULATIONS

When transporting the machine, check the local restrictions with the transportation company asked to transport it.

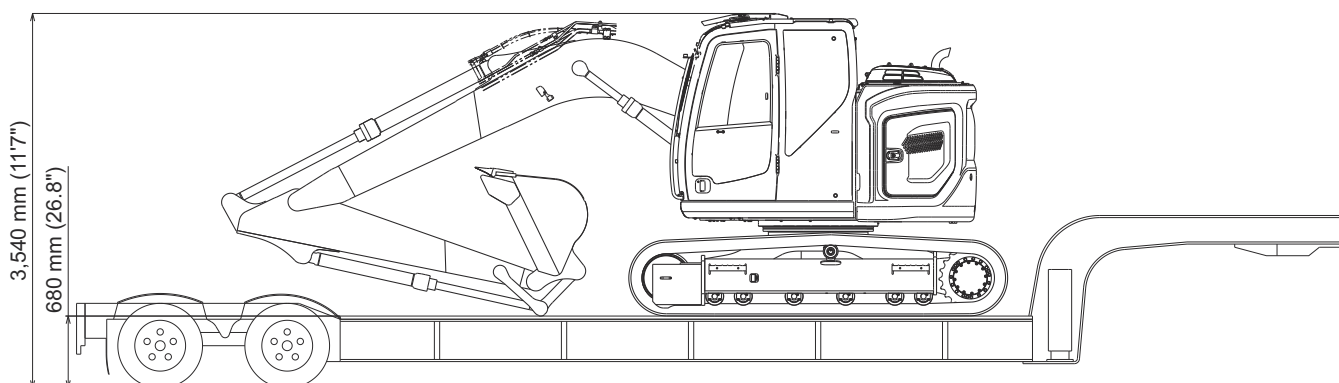
- When transporting this machine with a trailer, etc., consider the width, height, length and mass of the machine. The transportation mass and dimensions vary depending on the type of shoe and the specifications of the attachment/equipment.
- Refer to masses and dimensions described in "NIBBLER (CRUSHER) AND BREAKER" in "SPECIFICATIONS" in this manual to select the proper transportation method.
- Perform a previous examination on the route, such as limitations on width, height and mass (weight) of vehicles and traffic regulations, etc.



Check control lever operation

Before operation, be sure to pay attention to the surroundings and operate each control lever slowly to confirm that each motion is in accordance with the control pattern indicated on the identification plate. When it does not match, replace the identification plate with one that properly matches.

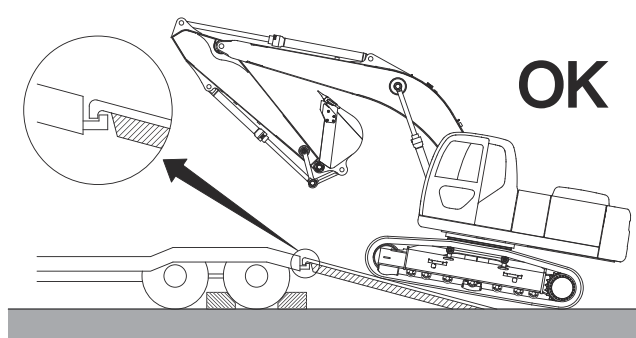
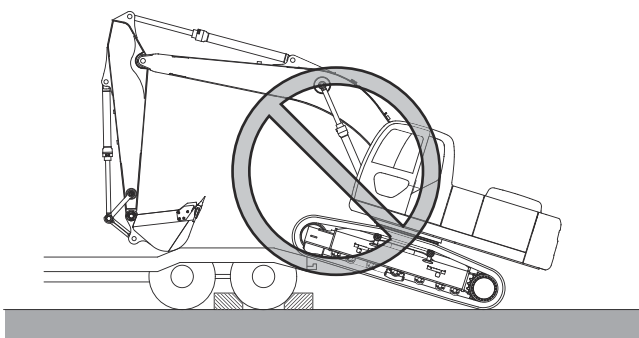
In addition, see "PRECAUTIONS FOR OPERATION" in Chapter 1 for precautions regarding operations.



The dimensions and weight are as follows. Arm: 2.38 m (7'10"), Bucket: 0.50 m³ (0.65 cu·yd), Boom: 4.68 m (15'4").

Refer to Chapter 6, "SPECIFICATIONS", for the mass.

5.2 LOADING/UNLOADING THE MACHINE



WARNING 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 acceleration 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.
- When the machine is going down a slope or being loaded on or unloaded from the trailer, set the LOW (1st)/HIGH (2nd) travel speed select switch to LOW.

Since the LOW (1st)/HIGH (2nd) automatic travel speed select switching system automatically changes the traveling speed, it may adversely affect machine control when the machine is going down a slope or being loaded on or unloaded from the trailer. This abrupt change of machine control may cause severe accidents.

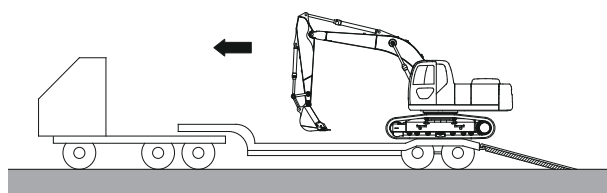
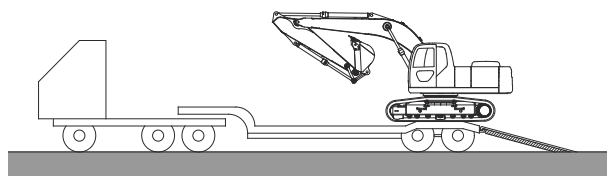
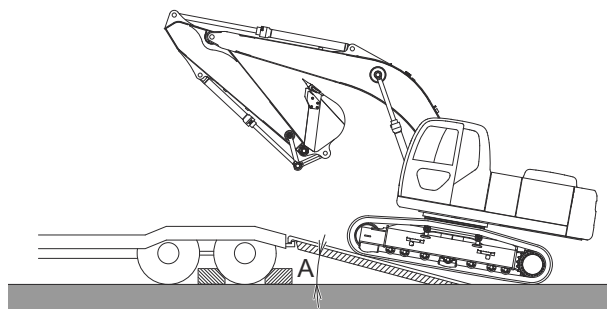
- Perform loading and unloading the machine according to the guidance of a signal person.

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. On the switch box, 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 (if installed), and travel slowly.



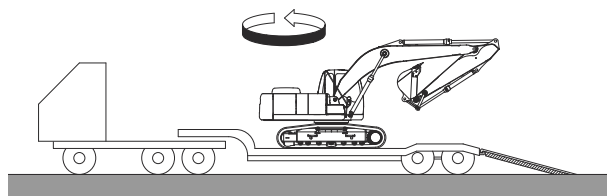
5

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.

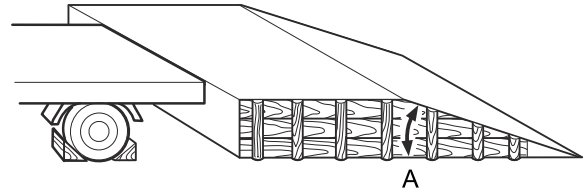
When the clearance between the ramp or the trailer bed is insufficient, the machine may abruptly lean to one side when it goes over the ramp top, and strike its arm or bucket cylinder against the trailer bed, ramp, or ground, resulting in damage to the cylinder.

6. When the machine comes to the required position, slowly swing the upper structure 180 degrees.
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.



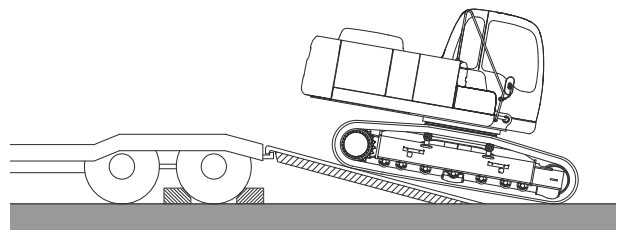
LOADING A MACHINE WITHOUT ATTACHMENT/EQUIPMENT



DO NOT SWING

Do not swing the machine during loading and unloading the machine.
It may cause the machine to tip/roll over to the counterweight side.

- When loading a machine without an attachment/equipment, adjust the travel direction so the counterweight comes to the top of the slope.



5.2.2 FIXING THE MACHINE

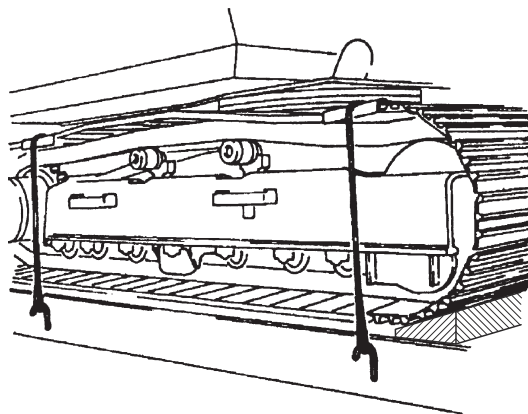
Notice

- Retract the radio antenna in before transportation. In addition, remove the mirrors if required. Store the removed parts securely in the cab.
 - Place a wood block under the bucket (attachment) link to avoid contacting the ground and protect the bucket cylinder from being damaged during transportation.
-

After loading the machine on the required position, fix the machine by the following procedures.

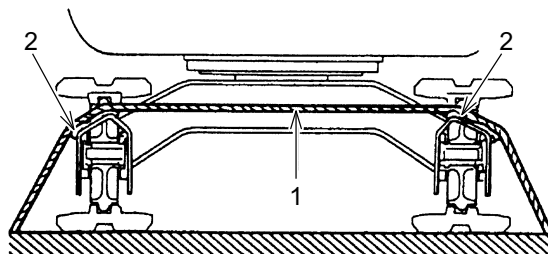
CRAWLER

1. Check that all guards and doors are locked.
2. Chock the front and rear of the crawlers and fix the machine securely with wire ropes of appropriate strength to prevent the body from moving back and forth or rolling by vibration of the trailer. In addition, secure individual parts and removed parts securely on the trailer.

**RUBBER CRAWLER AND PAD SHOE**

1. Check that all guards and doors are locked.
2. Chock the front and rear of the crawlers and fix the machine securely with wire ropes of appropriate strength to prevent the body from moving back and forth or rolling by the vibration of the trailer. In addition, secure individual parts and removed parts securely on the trailer.

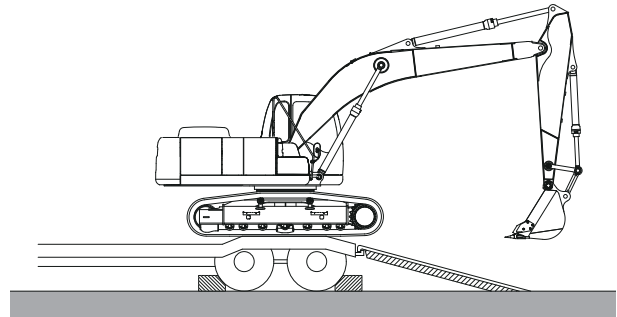
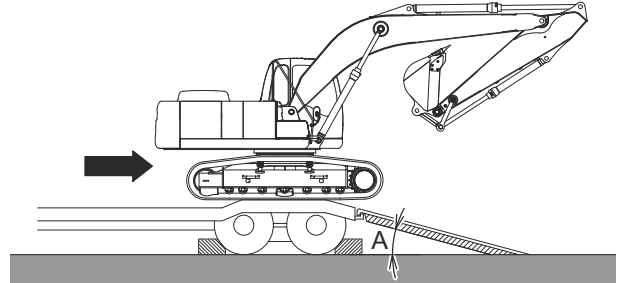
Do not directly apply the wire rope (1) on the rubber crawler or the pad shoe. Place pads (2) (such as soft cloth) at the left and right of the crawler frame to fix the rope securely on the loading platform of the truck.



5.2.3 UNLOADING

Use the following procedure.

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. Loosen the chain or wire rope that secured the machine.
4. Start the engine, and set the control lock lever to the "UNLOCKED" position.
5. Press the travel speed select switch on the switch box and set it to the LOW (1st) speed.
6. Raise the boom slowly.
7. Raise the attachment, raise the dozer (if attached) with the arm retracted under the boom, and travel slowly.
8. Stop the machine while it is level over the back of the trailer.
9. Check that the ramp and the machine are parallel, and adjust the arm and boom to be at an angle of 80° to 100°.

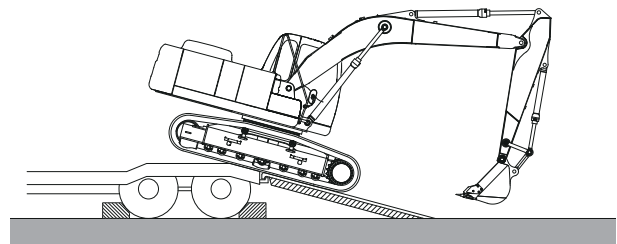


CAUTION

When this machine is traveling up or down a ramp, fold the arm and attachment as shown in the figure and raise the boom to avoid interference with the ramp or trailer bed.

When the clearance to 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.

10. Slowly move the boom and the arm to enable the bucket to be placed on the ground in an emergency, and slowly go down the ramp while keeping the bucket close to the ground until you have completely descended.
11. Once on the ground, slowly turn the upper structure through 180° to the forward travel position (with the travel reduction units rearward).

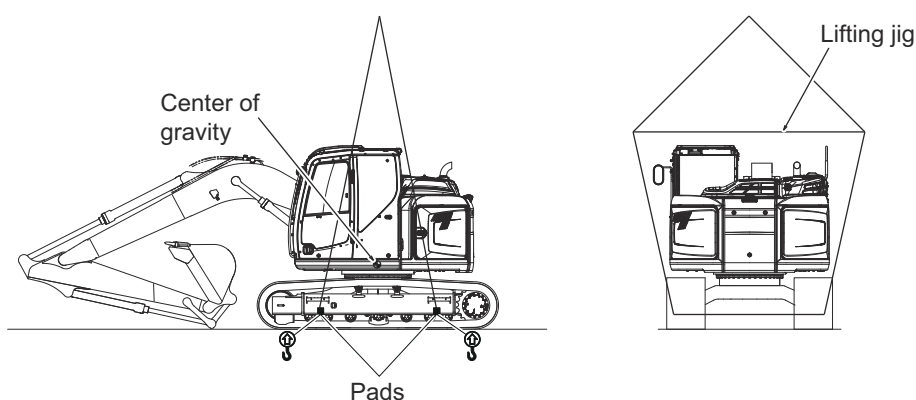


5.3 LIFTING THE MACHINE



Lifting the machine

- Wire rope and other lifting tools used for lifting must be of sufficient strength and show no signs of damage or deterioration.
- Incorrect lifting methods or wire rope attachment results in the machine moving during the lifting operation, leading to accidents resulting in injury or death and/or machine damage.
- Do not apply sudden loads to the wire rope and tools used for lifting.
- Evacuate the nearby area when the machine is being lifted. Unexpected movement may occur when lifting.
- Keep clear of the area around and under the machine while it is being lifted.
- When lifting the machine in a group, communicate with each other via signals.
- Do not perform lifting work while workers are on the machine.
- Ensure the machine remains level while it is being lifted.



Notice

- Use this lifting method for standard specification machines.
When actually lifting, you need to check the weight and center of gravity of the machine, as well as the strength of the wire rope and lifting jigs according to the type of attachment and optional specifications, so contact KOBELCO or your KOBELCO authorized dealer.
- Use wire ropes and lifting jigs that are long enough so that they do not come into contact with the machine when lifting.
- If necessary, cover the wire rope with cloth or other material to prevent damage to the machine.

5.3.1 LIFTING THE MACHINE

1. Move the machine onto level ground.
2. Extend the arm cylinder and bucket cylinder to their maximum length, and lower the boom so that the attachment/equipment is in contact with the ground.
3. Make sure that the direction of the cab and the direction of the crawlers are parallel.
4. Put the control lock lever in the "LOCKED" position, stop the engine and remove the starter key.
5. Close the front window glass and all the other windows of the cab. Lock the cab door, left and right side doors, engine hood, etc.
6. Pass the wire rope between the first and second lower rollers on both the front and back sides of the machine.
7. Lift the machine with the wire rope at an angle of 20° to 30°.
8. After lifting the machine off the ground, stop lifting and wait for the machine to stabilize before slowly lifting it up.

5.4 INSTALLING AND REMOVING MIRROR

When the machine is shipped from a factory, the mirrors are not installed.

When removing and installing the mirrors, see "ADJUSTMENT OF MIIRRORS" in Chapter 3.

5.5 TOWING MACHINE

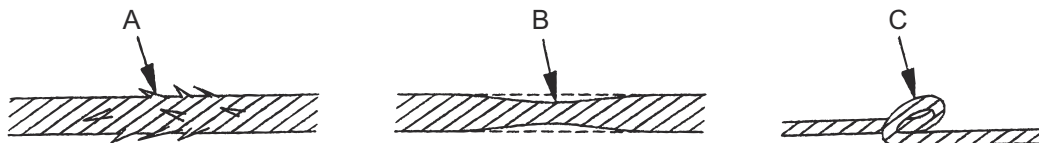


Read operating manual.

Read, understand and abide by the safety notes and instructions in this manual. Improper use of the machine without due consideration for the advice in this manual could result in serious injury or death, or significant damage to the machine.

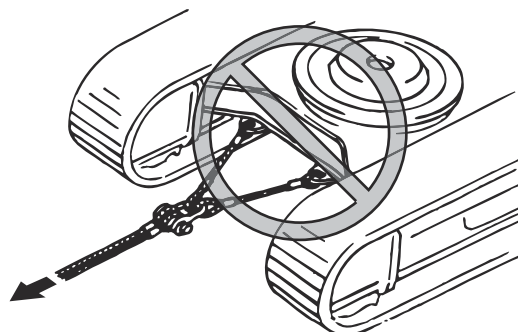
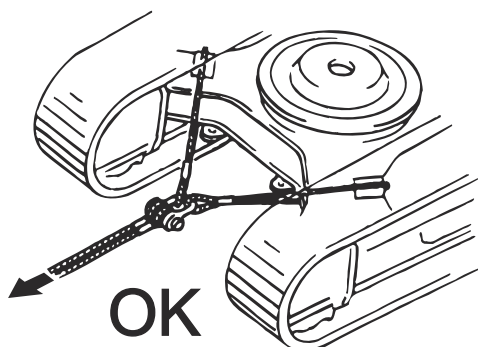
Incorrect towing may lead to serious personal injury. Note the following points when towing.

- Always wear leather gloves when handling wire rope or chain.
- The allowable force of the crawler frame is 100% load of the total machine weight.
- Check any wire rope or chain to be used is suitable for towing and strong enough to tow the weight of the machine.
- Never use wire rope that has broken strands (A), reduced diameter (B), kinks (C) or any other visible damage, or the wire rope may break while towing.
- Never tow the machine on a slope.
- While towing, never stand between the towing machine and the machine or object that is being towed.
- To prevent damage to the wire rope or chain and the crawler frame, cover the edges of the crawler frame with pads.
- Move the machine slowly, being careful not to apply any sudden load to the wire rope or chain.
- Shackles must be used for attaching any wire rope or chain used for towing.



5.5.1 HOW TO TOW MACHINE

- If the machine is no longer able to travel on its own, tow it using another machine by attaching wire rope or chain of suitable strength to the locations shown on the crawler frame figure.
- Keep the wire rope or chain level and straight with respect to the orientation of the lower frame, as shown in the figure.
- When towing the machine with travel motor brakes released, chock both crawlers securely before releasing the brakes to prevent the machine from moving unexpectedly.



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6 SPECIFICATION

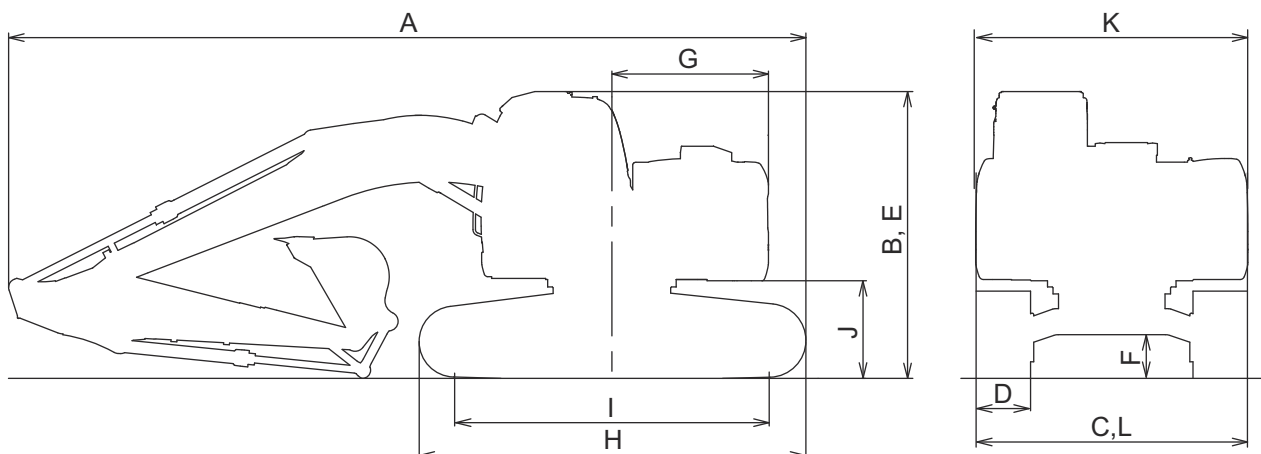
6.1 GENERAL SPECIFICATIONS

6.1.1 SK135SR-7, SK140SRLC-7

Item		Unit	SK135SR-7	SK140SRLC-7
Operating mass		kg (lb)	14,300 (31,530)	14,500 (31,970)
Bucket capacity		m ³ (cu-yd)	0.50 (0.65)	
Engine name		-	ISUZU 4JJ1 diesel engine	
Engine rated power	With fan	kW/min ⁻¹ (hp/rpm)	65.4/2,000 (88/2,000)	
	Without fan		73.0/2,000 (98/2,000)	
A	Overall length	mm (ft.in.)	7,430 (24'5")	7,510 (24'8")
B	Overall height	mm (ft.in.)	2,860 (9'5")	
C	Overall width	mm (ft.in.)	2,490 (8'2")	
D	Track shoe width (grouser shoe)	mm (inch)	500 (19.7")	
E	Cab height	mm (ft.in.)	2,860 (9'5")	
F	Minimum ground clearance (not including lug height)	mm (inch)	415 (16.3")	
G	Tail swing radius	mm (ft.in.)	1,490 (4'11")	
H	Overall crawler length	mm (ft.in.)	3,580 (11'9")	3,750 (12'4")
I	Tumbler center distance	mm (ft.in.)	2,870 (9'5")	3,040 (9'11.7")
J	Clearance height under upper structure (excluding lug height)	mm (inch)	870 (34.3)	
K	Overall upper structure width	mm (ft.in.)	2,480 (8'2")	
L	Overall crawler width	mm (ft.in.)	2,490 (8'2")	
Ground contact pressure		kPa (psi)	45 (6.5)	43 (6.2)
Swing speed		min ⁻¹ (rpm)	11.0 (11.0)	
Travel speed (LOW/HIGH)		km/h (mph)	3.4/5.6 (2.1/3.5)	
Gradeability		% (deg)	70 (35)	

Notice

General specifications indicate the standard specification with the 4.68 m (15'4") boom and 2.38 m (7'10") arm. The bucket capacity is indicated in ISO.

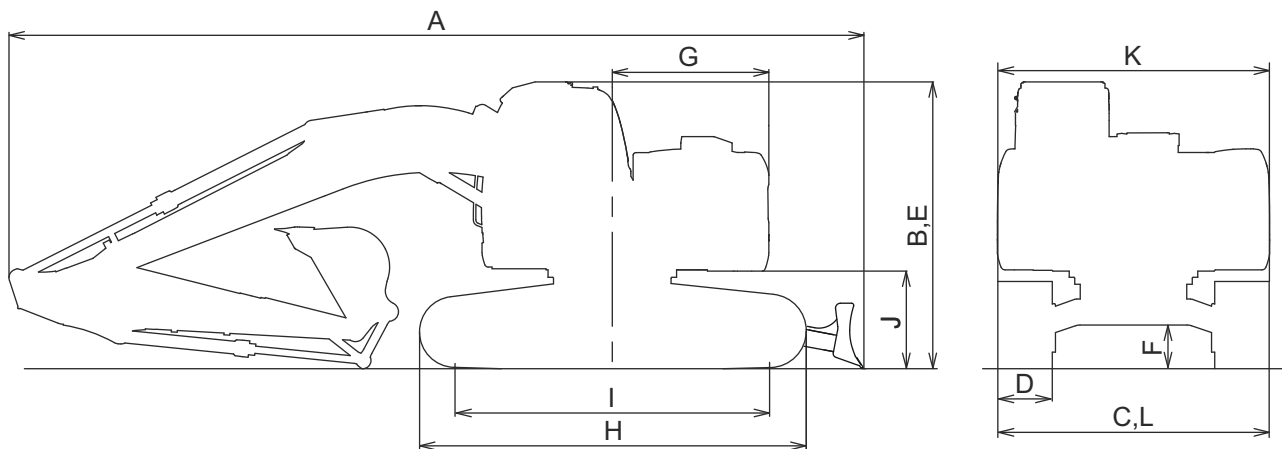


6.1.2 SK135SR-7, SK140SRLC-7 (WITH DOZER)

Item		Unit	SK135SR-7	SK140SRLC-7
Operating mass		kg (lb)	15,100 (33,300)	15,300 (33,740)
Bucket capacity		m ³ (cu.-yd)	0.5 (0.65)	
Engine name		-	ISUZU 4JJ1 diesel engine	
Engine rated power	With fan	kW/min ⁻¹ (hp/rpm)	65.4/2,000 (88/2,000)	
	Without fan		73.0/2,000 (98/2,000)	
A	Overall length	mm (ft.in.)	8,070 (26'6")	
B	Overall height	mm (ft.in.)	2,860 (9'46")	
C	Overall width	mm (ft.in.)	2,490 (8'2")	
D	Track shoe width (grouser shoe)	mm (inch)	500 (19.7")	
E	Cab height	mm (ft.in.)	2,860 (9'5")	
F	Minimum ground clearance (not including lug height)	mm (inch)	400 (15.7")	
G	Tail swing radius	mm (ft.in.)	1,490 (4'11")	
H	Overall crawler length	mm (ft.in.)	3,580 (8'6")	3,750 (12'4")
I	Tumbler center distance	mm (ft.in.)	2,870 (9'5.0")	3,040 (9'12")
J	Clearance height under upper structure (excluding lug height)	mm (inch)	870 (34.3)	
K	Overall upper structure width	mm (ft.in.)	2,480 (8'2")	
L	Overall crawler width	mm (ft.in.)	2,490 (8'2")	
Ground contact pressure		kPa (psi)	48 (7.0)	46 (6.7)
Swing speed		min ⁻¹ (rpm)	11.0 (11.0)	
Travel speed (LOW/HIGH)		km/h (mph)	3.4/5.6 (2.1/3.5)	
Gradeability		% (deg)	70 (35)	

Notice

General specifications indicate the standard specification with the 4.68 m (15'4") boom and 2.38 m (7'10") arm. The bucket capacity is indicated in ISO.



6.2 SHOE TYPES AND APPLICATIONS

Notice

- Be sure not to use shoes other than 500 mm (19.7") grouser shoes on working sites with a large amount of rocks, rubble or fallen trees.
Traveling and doing digging work on working sites with a large amount of rocks, rubble or fallen trees may lead to shoes bending or the loosening of shoe bolts, and also damage to travel system parts (links, rollers, etc.).
- The attachment/equipment is with a 2.38 m (7'10") arm and 0.50 m³ (0.65 cu·yd) (heaped) bucket.
- *Dimensions do not include shoe lug height.

6.2.1 SK135SR-7

Type		Grouser shoe		
		500 (19.7")	600 (23.6")	700 (27.6")
Application		Regular ground use	Soft ground use	Soft ground use
		(Standard)	(Optional)	(Optional)
Machine specifications	Operating mass kg (lb)	14,300 (31,530)	14,600 (32,190)	14,800 (32,630)
	Base machinery mass kg (lb)	11,400 (25,140)	11,700 (25,800)	11,900 (26,240)
	Cab height mm (ft-in)	2,860 (9'5")	←	←
	*Minimum ground clearance mm (inch)	* 415 (16.3")	←	←
	Crawler overall length in mm (ft-in)	3,580 (11'9")	←	←
	Crawler overall width in mm (ft-in)	2,490 (8'2")	2,590 (8'6")	2,690 (8'10")
	Ground contact pressure in kPa (psi)	45 (6.5)	38 (5.5)	33 (4.8)

6.2.2 SK135SR-7 (WITH DOZER)

Type		Grouser shoe		
		500 (19.7")	600 (23.6")	700 (27.6")
Application		Regular ground use	Soft ground use	Soft ground use
		(Standard)	(Optional)	(Optional)
Machine specifications	Operating mass kg (lb)	15,100 (33,300)	15,400 (33,960)	15,600 (34,400)
	Base machinery mass kg (lb)	11,600 (25,580)	11,900 (26,240)	12,000 (26,460)
	Cab height mm (ft-in)	2,860 (9'5")	←	←
	*Minimum ground clearance mm (inch)	* 400 (15.7")	←	←
	Crawler overall length in mm (ft-in)	3,580 (11'9")	←	←
	Crawler overall width in mm (ft-in)	2,490 (8'2")	2,590 (8'6")	2,690 (8'10")
	Ground contact pressure in kPa (psi)	48 (7.0)	40 (5.8)	35 (5.1)

6.2.3 SK140SRLC-7

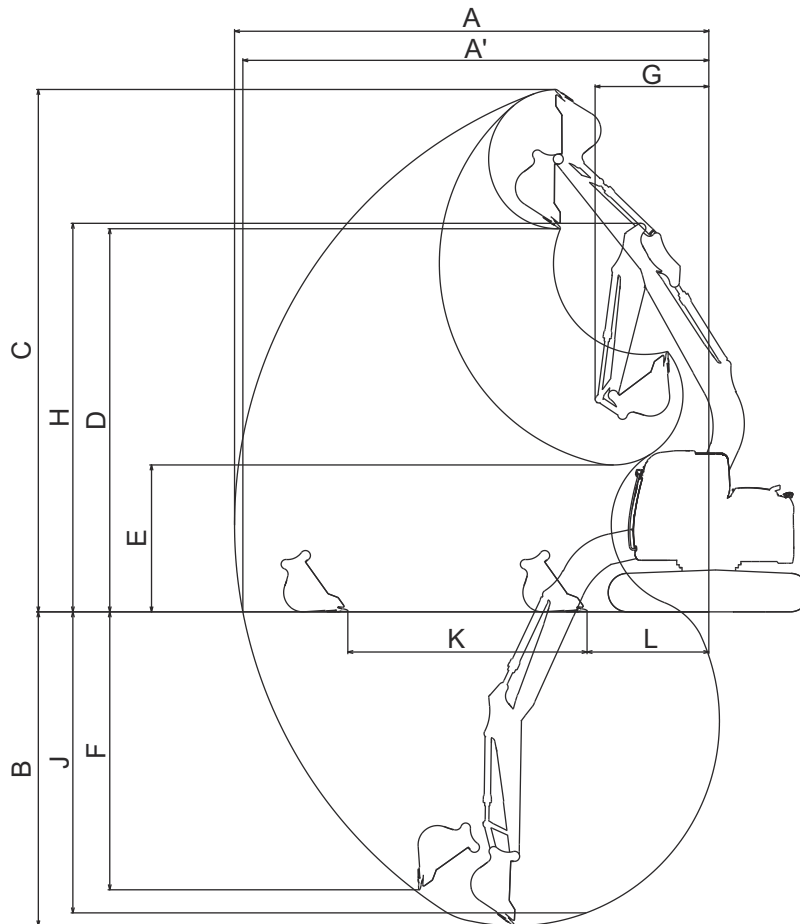
Type		Grouser shoe		
		500 (19.7")	600 (23.6")	700 (27.6")
Application		Regular ground use	Soft ground use	Soft ground use
		(Standard)	(Optional)	(Optional)
Machine specifications	Operating mass kg (lb)	14,500 (31,970)	14,800 (32,630)	15,000 (33,080)
	Base machinery mass kg (lb)	11,600 (25,580)	11,900 (26,240)	12,100 (26,690)
	Cab height mm (ft-in)	2,860 (9'5")	←	←
	*Minimum ground clearance mm (inch)	* 415 (16.3")	←	←
	Crawler overall length in mm (ft-in)	3,750 (12'4")	←	←
	Crawler overall width in mm (ft-in)	2,490 (8'2")	2,590 (8'6")	2,690 (8'10")
	Ground contact pressure in kPa (psi)	43 (6.2)	37 (5.4)	32 (4.6)

6.2.4 SK140SRLC-7 (WITH DOZER)

Type		Grouser shoe		
		500 (19.7")	600 (23.6")	700 (27.6")
Application		Regular ground use	Soft ground use	Soft ground use
		(Standard)	(Optional)	(Optional)
Machine specifications	Operating mass kg (lb)	15,300 (33,740)	15,600 (34,400)	15,800 (34,840)
	Base machinery mass kg (lb)	11,800 (26,020)	12,100 (26,680)	12,300 (27,120)
	Cab height mm (ft-in)	2,860 (9'5")	←	←
	*Minimum ground clearance mm (inch)	* 400 (15.7")	←	←
	Crawler overall length in mm (ft-in)	3,750 (12'4")	←	←
	Crawler overall width in mm (ft-in)	2,490 (8'2")	2,590 (8'6")	2,690 (8'10")
	Ground contact pressure in kPa (psi)	46 (6.7)	39 (5.7)	34 (4.9)

6.3 WORKING RANGES

6.3.1 BACKHOE ATTACHMENT



Attachment type		2.38 m (7'10") arm	2.84 m (9'4") arm
Item		0.50 m ³ (0.65 cu-yd) bucket	0.38 m ³ (0.50 cu-yd) bucket
A	Maximum digging reach	8,370 (27'6")	8,810 (28'11")
A'	Maximum reach at ground reference plane	8,210 (26'11")	8,660 (28'5")
*B	Maximum digging depth	5,520 (18'1")	5,980 (19'7")
*C	Maximum height of cutting edge	9,180 (30'1")	9,550 (31'4")
*D	Maximum dumping height	6,750 (22'2")	7,110 (23'4")
*E	Minimum dumping height	2,620 (8'7")	2,250 (7'5")
*F	Vertical digging depth	4,500 (14'9")	4,950 (16'3")
G	Min. front swing radius	2,100 (6'11")	2,500 (8'2")
*H	Height at minimum swing radius	6,870 (22'6")	6,890 (22'7")
*J	Eight-foot level digging depth	5,290 (17'4")	5,780 (18'12")
K	Horizontal digging stroke at ground level	Stroke	4,190 (13'9")
L		At minimum	2,180 (7'2")
			2,140 (7'0")

Notice

*Dimensions do not include shoe lug height.

6.4 ATTACHMENT TYPE AND COMBINATION

6.4.1 FRONT VARIATION

This machine is equipped with various attachments/equipment to handle a wide range of tasks.

- When a large-capacity bucket is in use, combine it with a short arm to maintain machine stability and avoid overloading the machine body, front end and cylinders.
- When a long boom or arm is in use, it should be combined with a lower-capacity bucket.

4.68 m (15'4") boom specification and bucket combination

Type	Bucket capacity (m ³) (cu-yd)		Bucket width mm (ft-in)		Number of bucket teeth	Mass kg (lbs)	ARM	
	SAE (Heap- ed)	SAE (Struck capaci- ty)	With side cut- ter	Without side cutter			2.38 m (7'10")	2.84 m (9'4")
Backhoe bucket	0.38 (0.50)	0.28 (0.37)	800 (31.5")	740 (29.1")	4	340 (750)	○	◎
	0.45 (0.59)	0.35 (0.46)	915 (36.0")	855 (33.7")	4	360 (794)	○	△
	0.50 (0.65)	0.37 (0.48)	1,000 (3'3")	940 (37.0")	5	390 (860)	◎	×
Breaker	-	-	-	-	-	-	○	○
Nibbler (crush- er)	-	-	-	-	-	-	○	○

Symbols for applicable arm column

- ◎ Standard combination
- General work: Digging and loading of sand, gravel and clayey soil
- △ Light work: Work mainly involving loading, such as loading loose soil and sand (e.g. field work, loading sand and gravel)
- × Not available: This is not covered by the warranty, so do not use in this combination.

Notice

- When attaching attachment/equipment to the machine, attach genuine attachment/equipment recommended by KOBELCO.
Our manufacturer's warranty does not cover cases in which failures of this machine or attachment/equipment are caused by unauthorized attachment/equipment.
- Before using an inversely installed bucket, check that it does not interfere with the arm because interference can occur during operation and cause damage.

7 MACHINE OPERATION MANAGEMENT SYSTEM

7.1 MACHINE OPERATION MANAGEMENT SYSTEM

- Machine Operation Management System is the system that manages information, such as the operating information and failure of the hydraulic excavator.
- To use this system, communication contract is required. Consult your KOBELCO authorized dealer for the contract.



ABOUT DISASSEMBLY AND REPAIR

Never disassemble or repair the communication controller or transceiving antenna of this system. Do not pinch the cable or pull it by force and damage it. This may cause a failure or fire of the machine.



- Electromagnetic waves generated from the components of this system may adversely affect the medical electric devices, such as cardiac pacemaker device.

When using medical electric devices while operating the machine, use extreme caution and consult the manufacturers of the medical electric devices in advance.

- Do not spill water over the cable and the components of this system. This may cause a failure of the machine.
-

Notice

- Installation and removal of the components and the cable of this system is performed by your KOBELCO authorized dealer.
 - The communication controller of this system does not require inspection and operation.
-

Notice

- Because this system uses wireless signals, it cannot be used in a place where no radio wave reaches (in the mountains, inside a building, in a tunnel, etc.), in a place of weak radio wave, or outside the communication area.

When making the contract, check the communication area with your KOBELCO authorized dealer.

- This system consumes very little electricity even when the starter switch is OFF (turned off).
For a long term storage of the machine, see "PRECAUTIONS FOR LONG-TERM STORAGE" in Chapter 3.
 - The built-in battery for communication controller needs to be replaced every year. For replacement, contact your KOBELCO authorized dealer.
-

7.2 REMOTE DOWNLOAD SYSTEM

This system sometimes automatically renews (downloads) the software of the controller in this machine. At that time, the instruction will appear on the monitor, so that operate the jog dial.

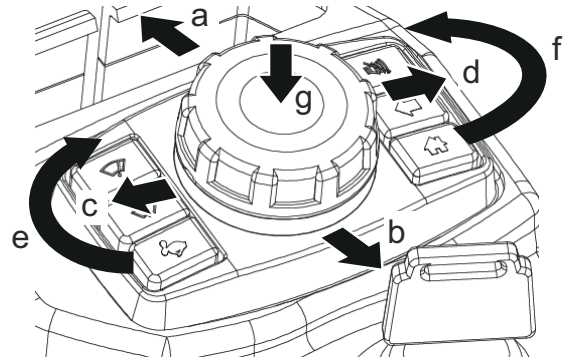
Jog dial operation

Tilting (a, b, c, d) and rotating (e, f) the jog dial

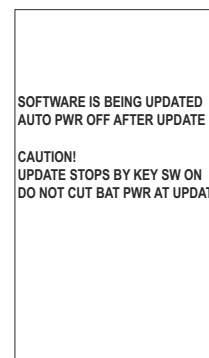
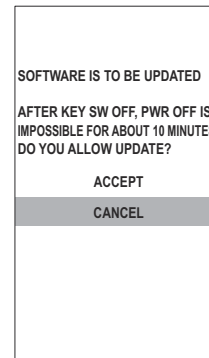
To move the cursor on the monitor and adjust the values and others.

Pushing down (g) the jog dial

- To switch the screen to the selected setting screen.
- To determine the adjusted value and others.



1. If update of the software is possible, when the starter switch is turned to the "ON" or "START" position and the engine is started, the following selection screen appears on the monitor.
2. Using the jog dial, move the cursor to [ACCEPT].
3. Push down (g) the jog dial to set preparation of update. (At this time, the updating of the software does not start)
4. Then the screen returns to the normal screen, so that continue the machine operation.
5. Then, turn the starter key to the "OFF" position to display the following screen on the monitor, and then the update of the software starts. The update takes almost 10 minutes.



CAUTION

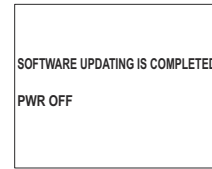
During the renewal of the software, do not turn OFF the battery power-off switch or remove the battery terminals. If the battery power is shut off during the renewal, it can damage the controller.

6. When the renewal is completed, the following screen appears on the monitor and the power turns OFF.

The renewal of the software sometimes fails. At that time, the following screen appears on the gauge cluster and the power turns OFF.

In that case, the next time the starter key turns "ON", the selection screen appears again.

When the renewal of the software keeps failing, contact your KOBELCO authorized dealer.



Notice

- The renewal of the software is performed when required.
- The renewal of the software will not start when [CANCEL] is set, 30 seconds elapses with the selection screen displayed, or the control lock lever is moved to the "UNLOCKED" position, even if the starter key is turned "OFF".

In that case, the next time the starter key turns "ON", the selection screen appears again.

- During the renewal of the software, if the starter key turns "ON", the renewal stops and the power turns OFF.

In that case, the next time the starter key turns "ON", the selection screen appears again.

- If a certain period has passed after the selection screen appeared because [CANCEL] has been set repeatedly, the selection screen stops to appear and the renewal of the software is not performed.

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8 OPTIONAL EQUIPMENT

8.1 OPERATION OF HYDRAULIC BREAKER AND NIBBLER (CRUSHER)

8.1.1 SELECTION OF NIBBLER (CRUSHER) AND BREAKER

- When attaching a nibbler (crusher) or breaker, select one that appropriately matches the stability and working pressure of the base machine.

Follow the handling precautions specified by the nibbler (crusher)/breaker manufacturer.

- Use of the unapproved attachments/equipment voids KOBELCO's liability for the machine.

8.1.2 INSTALLING NIBBLER (CRUSHER) AND BREAKER

Once the nibbler (crusher) or breaker is installed, check that there is no mounting area looseness, oil leakage from piping or abnormal sound before starting operation.

When the nibbler (crusher) or breaker is detached, close the plugs on the piping on the base machine side of the arm top end and the piping on the nibbler (crusher) or breaker side to ensure no foreign material or water enters.

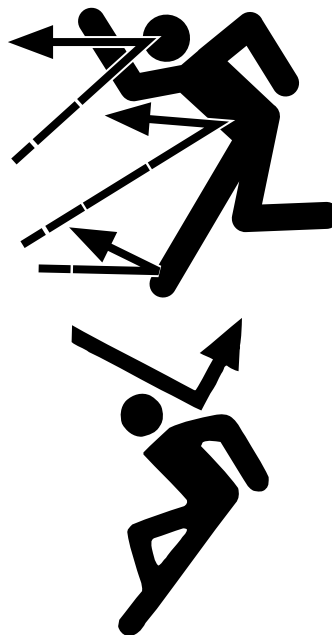
8.1.3 POTENTIAL HAZARDS WHEN OPERATING

PAY ATTENTION TO FALLING MATERIALS AND FLYING DEBRIS

Be sure to install the top guard and the front guard (option) when performing demolition, working in quarry or mining applications or any site in which falling materials and/or flying debris can be generated .

- If working with the hydraulic breaker or other attachments, be sure to install front guard.
- 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.

As for installing the front guard (option), contact your KOBELCO authorized dealer.



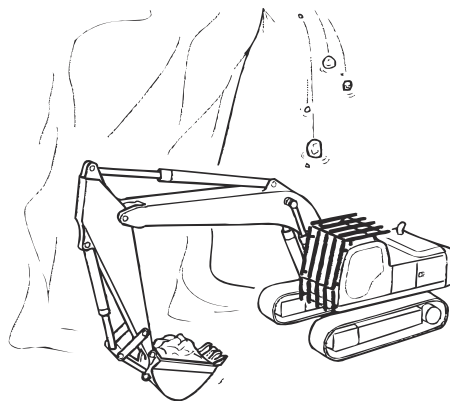
CHECK PROTECTIVE RELATED GUARDS AND EQUIPMENT

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

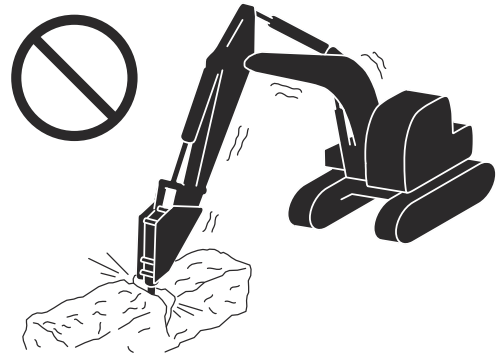
- The top guard is designed according to ISO10262 and should not allow loads up to 227 kg (500 lbs.) dropped from a height of 5.22 m (17 ft.) to penetrate the cab. During building demolition or other activities, the load, the distance of the drop, or both could produce forces that exceed the limits of the top guard and cause 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.



8.1.4 PRECAUTIONS IN USE OF BREAKER

DO NOT PRY AND BREAK FORCIBLY

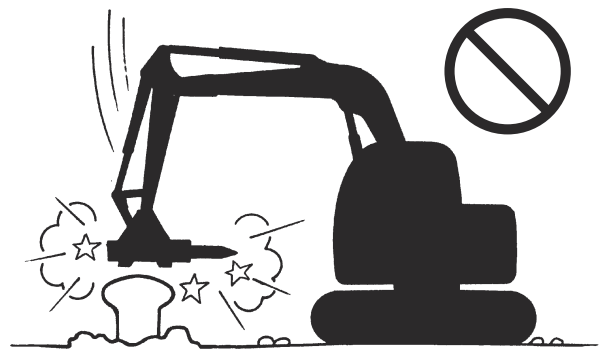
Do not break a rock or concrete by prying it with the breaker. Prying may cause damages to the boom, the arm, and the breaker.



DO NOT USE BREAKER FOR OTHER THAN INTENDED PURPOSE

Do not break a rock or concrete by falling or hitting the breaker.

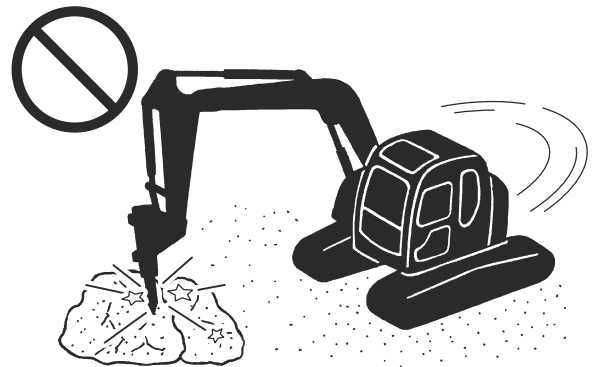
Hitting may cause damages to the boom, the arm, the breaker, and the base machine.



DO NOT MOVE DEBRIS

Do not use the breaker for moving debris and others.

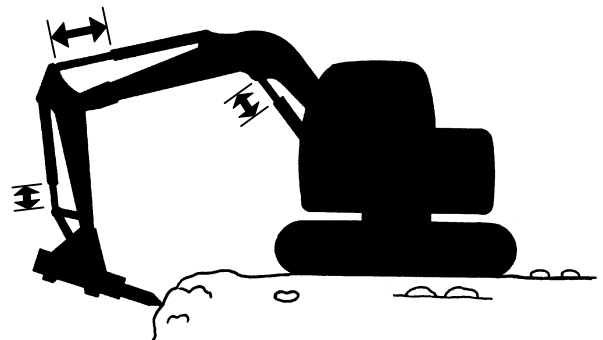
Especially, when pulling down rocks and others with the flank of the breaker by using the swinging force, it may cause damages to the boom, the arm, the breaker, and the base machine.



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 1 MINUTE OR LONGER

If an object cannot be broken by hitting the same point for 1 minute 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

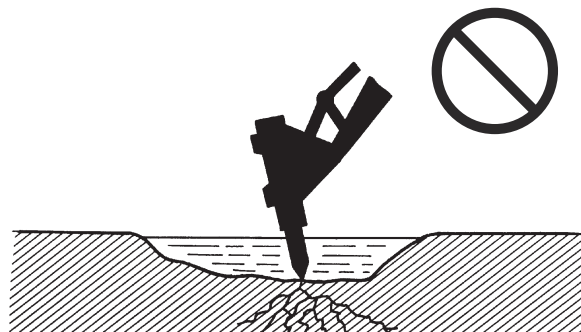
Never use the breaker for lifting work.



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

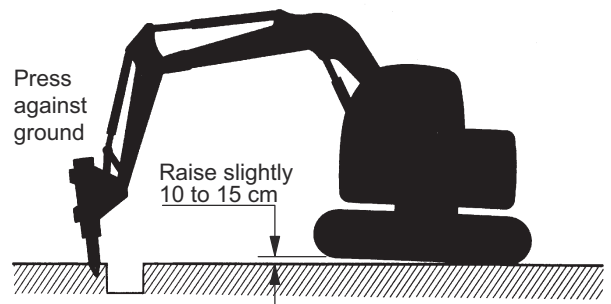
Do not operate the breaker without contact. Operation without material under the tool causes increase of the hydraulic oil temperature and damages to the breaker.



PAY ATTENTION TO LIFTING UP OF MACHINE

The lifting amount of the machine during breaker work shall be 10 to 15cm.

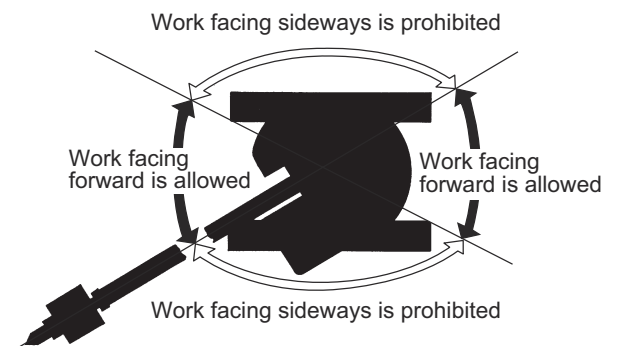
If the lifting amount is large, it can cause damages to the boom and the arm.



DO NOT WORK FACING SIDWAYS

Do not operate the breaker when the machine is facing sideways.

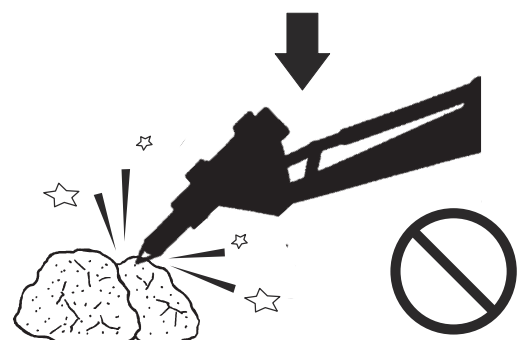
It will cause excessive loads on the travel system, resulting in bending of the shoe plates and oil leakage from the roller.



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.



[8. OPTIONAL EQUIPMENT]

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.



8.1.5 PRECAUTIONS IN USE OF NIBBLER (CRUSHER)

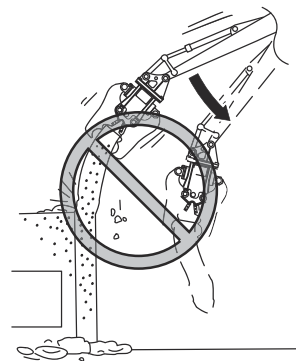
CAUTION

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).

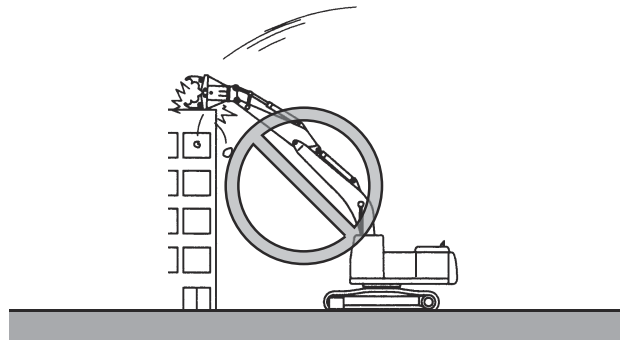
Prying may cause damages to the boom, the arm, and the nibbler (crusher).



DO NOT USE NIBBLER (CRUSHER) FOR OTHER THAN INTENDED PURPOSE

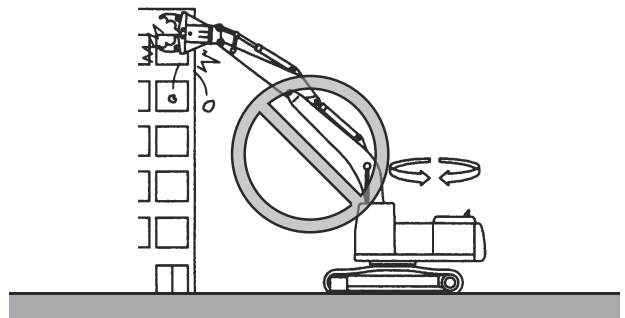
Do not drop or hit the nibbler (crusher) to an object.

Hitting may damage the boom, the arm, the nibbler (crusher), and the base machine.

**DO NOT SWING DURING NIBBLER (CRUSHER) WORK**

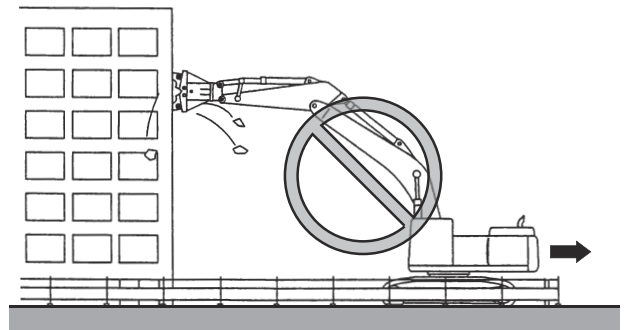
Do not demolish or pull down an object by using the swinging force of the machine while holding the object by the nibbler (crusher).

It may cause damages to the boom, the arm, the nibbler (crusher), and the base machine.

**DO NOT TRAVEL DURING NIBBLER (CRUSHER) WORK**

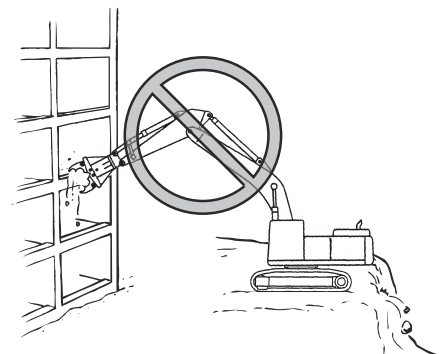
Do not demolish or pull down an object by traveling the machine while holding the object by the nibbler (crusher).

It may cause damages to the boom, the arm, the nibbler (crusher), and the base machine.

**DO NOT WORK ON UNSTABLE PLACE**

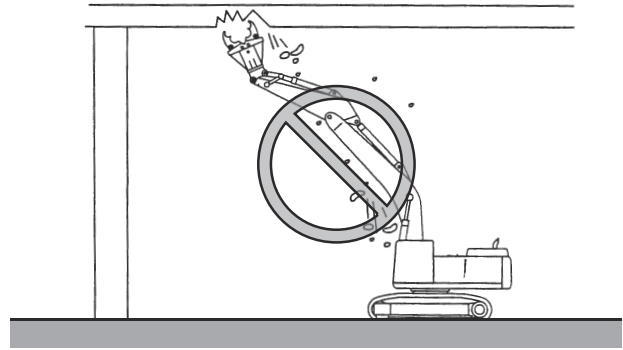
Do not perform work when the machine is on a weak ground or debris.

Working under unstable condition may cause the machine to tip over.



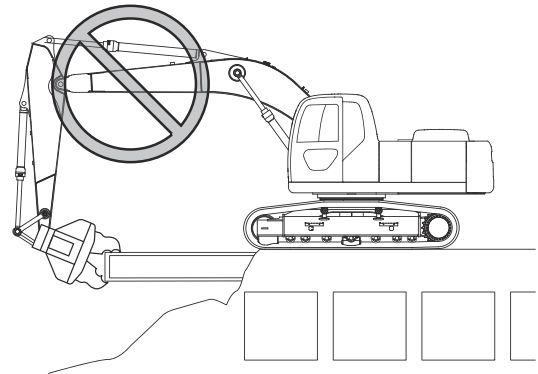
WATCH OUT FOR FALLING OBJECTS OVERHEAD

Operating the nibbler (crusher) over the machine can cause demolished structures to fall onto the machine.



PAY ATTENTION TO GROUND

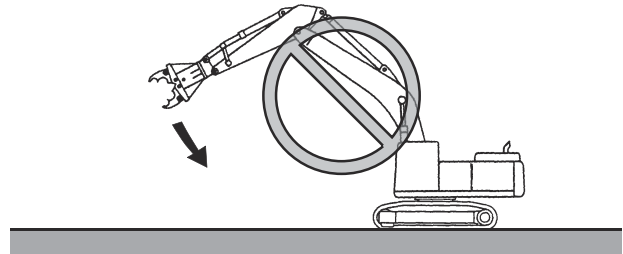
If an object under the machine is demolished, it causes the ground of the machine to be unstable, resulting in falling of the machine.



DO NOT OPERATE MACHINE ABRUPTLY

Do not operate or stop the boom, the arm, and the nibbler (crusher) abruptly.

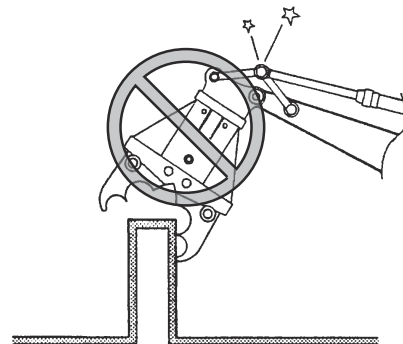
It can cause damages to each cylinder and the machine to tip over.



CYLINDER ROD AT STROKE END

Operate the cylinder rod with leaving some space to the stroke end.

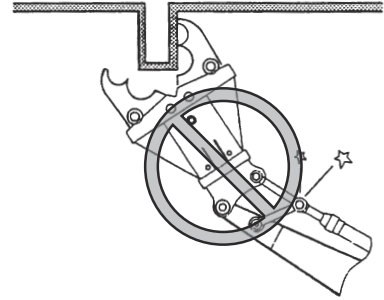
Operating the hydraulic cylinder at the stroke end during demolition work may cause excessive loads on the boom, the arm, the link portions, and the base machine, resulting in damages.



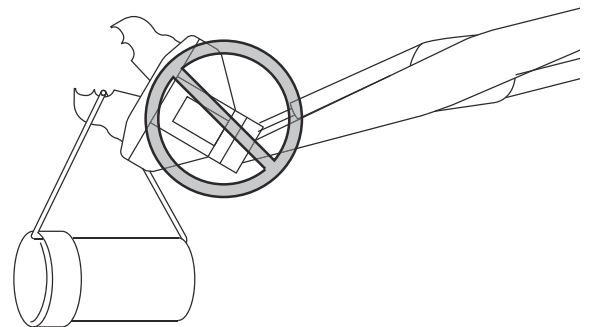
DO NOT HOLD OBJECT OBLIQUELY BY NIBBLER (CRUSHER)

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.

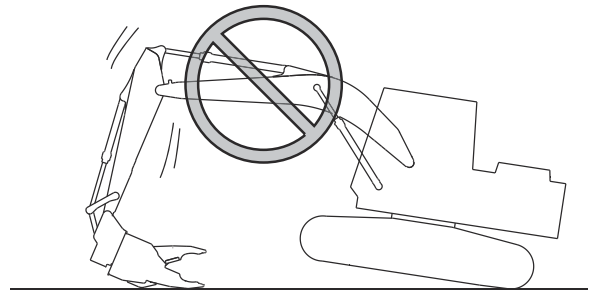
**NEVER PERFORM LIFTING WORK**

Never use the nibbler (crusher) for lifting work.

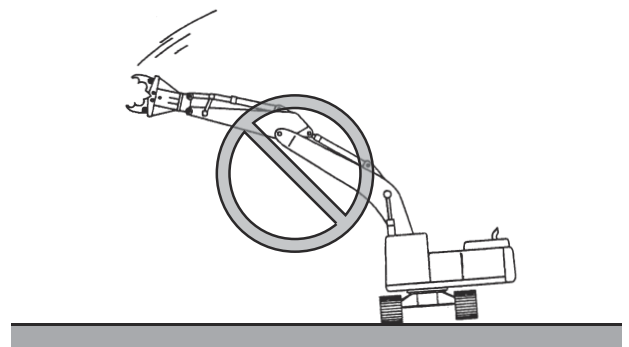
**DO NOT LIFT BASE MACHINE**

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 SIDWAYS**

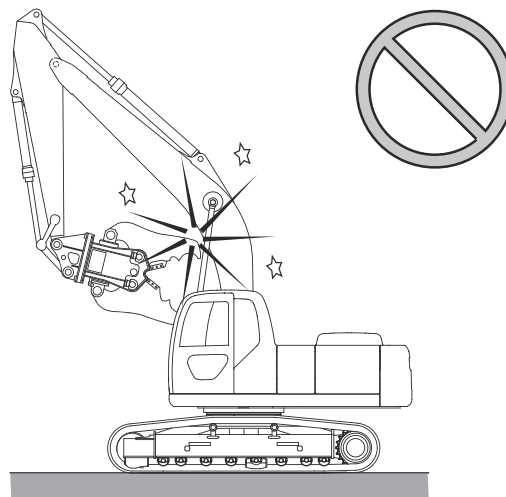
Operating the nibbler (crusher) while the machine is facing sideways may cause the crawlers to be raised off the ground and the machine to become unstable. Always ensure machine is stable before operating.



[8. OPTIONAL EQUIPMENT]

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.



8.2 SELECTION OF ATTACHMENT MODE AND SELECTOR VALVE

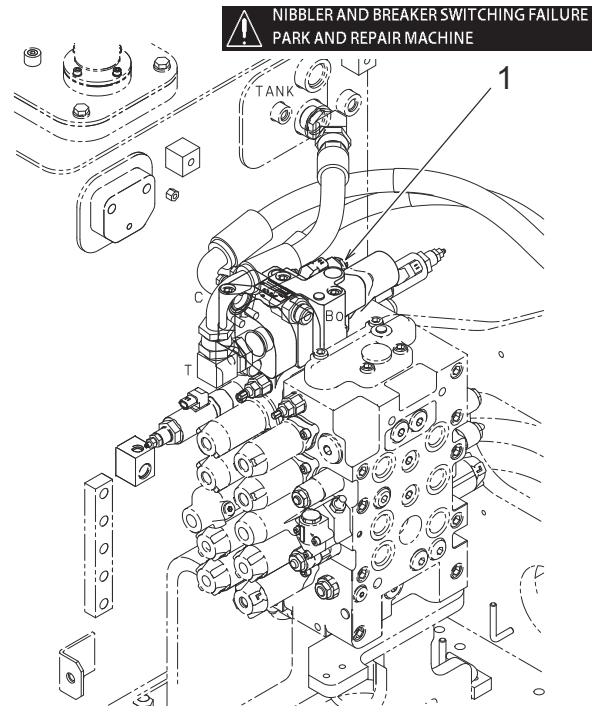
8.2.1 SWITCHING ATTACHMENT MODE

See "SWITCHING ATTACHMENT MODE" in Chapter 2 for details about switching the equipped attachment.

8.2.2 SWITCHING SELECTOR VALVE

Selector valve (1) switches the flow of hydraulic oil. The valve automatically switches when the attachment mode is set, so the correct attachment mode for the installed attachment/equipment must be selected.

See "SELECTING ATTACHMENT MODE" in Chapter 8 for details about switching between attachment modes.



Attachment mode	Hydraulic circuit
Other than breaker	Two-way circuit
Breaker	One-way circuit

CAUTION

If the monitor displays "SELECTOR VALVE FAULT", the Mechatro Controller's input and output signals may not agree.

Select the appropriate attachment mode again. If the selector valve failure remains even when the correct attachment mode has been selected, it may indicate an electrical failure. Contact your KOBELCO authorized dealer in that case.

8.3 SWITCHING STOP VALVE

Stop valves (1), (2) at the arm top end are used to stop the flow of hydraulic oil. When installing and removing the attachment, the stop valves must be switched to the stop position.

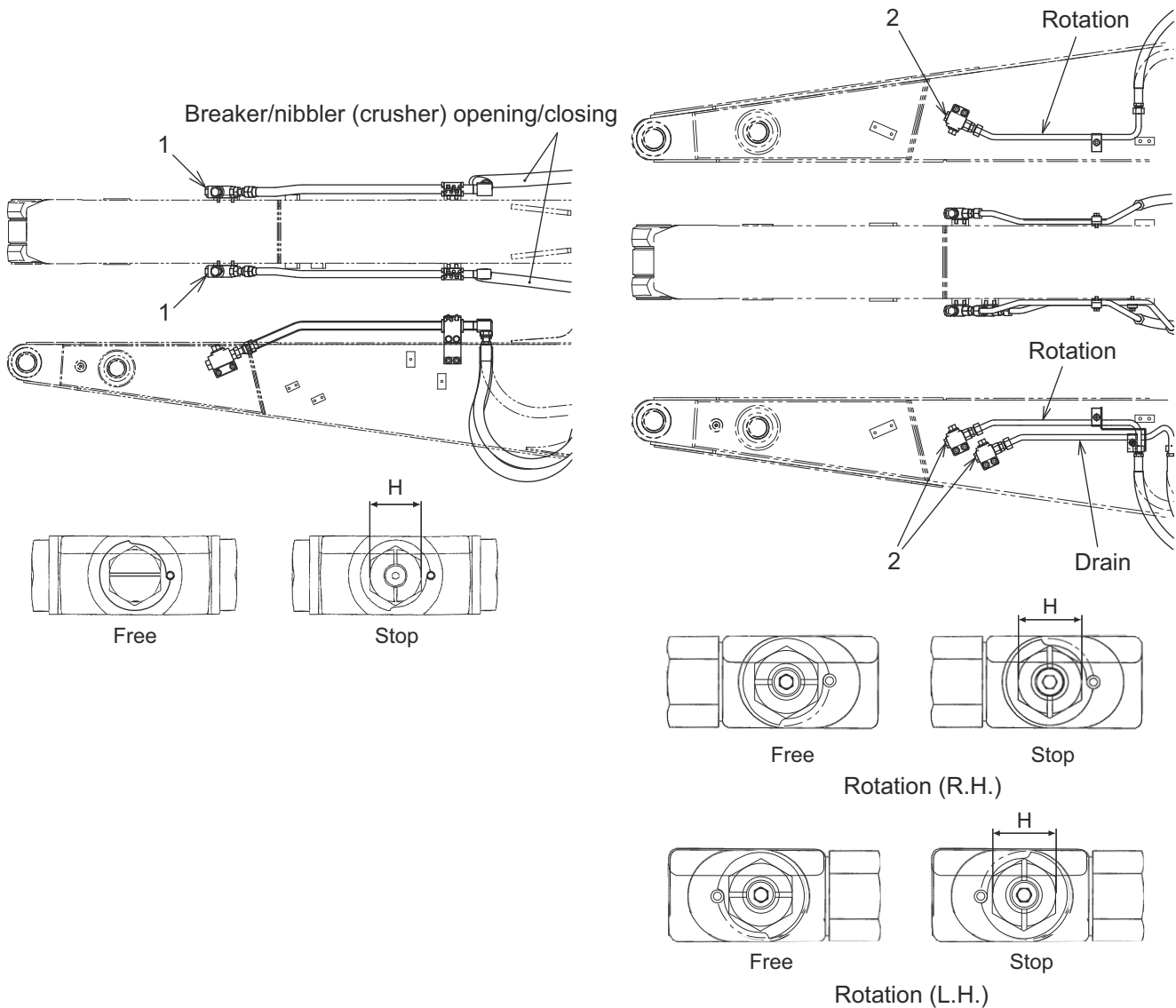
Notice

If the pressure still remains inside the piping, slowly loosen the subject hoses and connectors to release the pressure inside the hydraulic piping.

VALVE POSITION

Free: Hydraulic oil flows

Stop: Hydraulic oil stops



TOOLS

Hydraulic Circuit	Stop Valve	Wrench Size (H)
Breaker/nibbler opening/closing	1	24 mm
Rotation	2	24 mm
Drain		

8.4 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 "SETTING OF ATTACHMENT MODE DETAILS" 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.

8.5 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) piping.

Operation may differ depending on manufacturer and specification of an attachment/equipment installed.

Check the operation manual for the manufacturer specification of the attachment/equipment before operation.

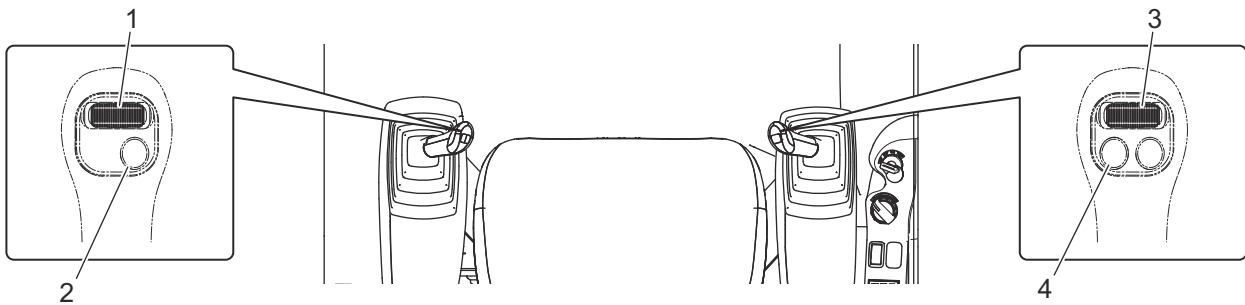


Using proportional hand control

Read, fully understand and follow all safety precautions and procedures in the operation & maintenance manual before attempting any operation of the machine.

Notice

When using the nibbler (crusher) or the breaker, see "SELECTION OF ATTACHMENT MODE AND SELECTOR VALVE" in Chapter 8 in the operation & maintenance manual.

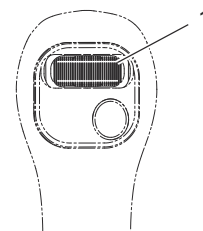


Left control lever switch		Right control lever switch	
1	Extra/rotation hand control	3	Nibbler (crusher) control switch
2	Horn switch	4	Breaker control switch

8.5.1 EXTRA/ROTATION HAND CONTROL

Slide switch (1) located on top of the left control lever.

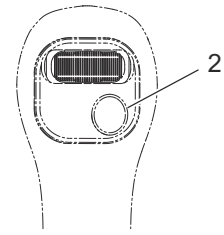
The table below shows to which of the left and right sides of the attachments/equipment (as seen from inside the cab) the high-pressure oil flows when switch (1) is slid.



Operation procedure	Hydraulic oil flow
Sliding to the left	Right side piping
Sliding to the right	Left side piping

8.5.2 HORN SWITCH

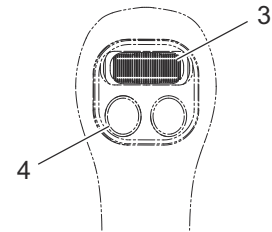
For horn switch (2), see "HORN SWITCH" in Chapter 2 in the operation & maintenance manual.



8.5.3 NIBBLER (CRUSHER) OPERATION

Slide switch (3) located on top of the right control lever to open or close the nibbler (crusher).

The table below shows to which of the left and right sides of the attachments/equipment (as seen from inside the cab) the high-pressure oil flows when switch (3) is slid.



Operation procedure	Hydraulic oil flow
Sliding to the left	Left side piping
Sliding to the right	Right side piping



Working with a nibbler (crusher)

Do not touch breaker switch (button) (4) when operating the nibbler (crusher).
Doing so may cause the nibbler (crusher) to move abruptly.



Leaving the operator's seat

Do not leave the machine with the engine running.

Notice

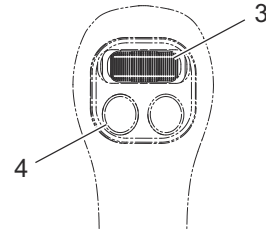
According to the slide distance of the nibbler (crusher) control switch, the hydraulic oil flow rate increases or decreases.

8.5.4 BREAKER OPERATION

To operate the breaker, press switch (4).

The table below shows that when switch (4) is pressed, the left piping on the attachment/equipment receives high pressure oil flow when looking from the operator's seat.

Operate the breaker a maximum of 60 seconds, then release the switch.



Operation procedure	Hydraulic oil flow
Press switch (4)	Left side piping
Release switch (4)	Stops (does not flow)

Notice

The breaker can be operated by sliding nibbler control switch (3). However, use breaker control switch (button) (4) as much as possible.

WARNING Leaving the operator's seat

Do not leave the machine with the engine running.

8.6 PERIODIC INSPECTION AND MAINTENANCE OF NIBBLER (CRUSHER) AND BREAKER

8.6.1 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	250	250

8.7 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.

8.8 MULTI-CONTROL VALVE



SWITCHING THE MULTI-CONTROL VALVE

When switching the multi-control valve, be sure to stop the engine.



CHECKING THE CONTROL LEVER PATTERN

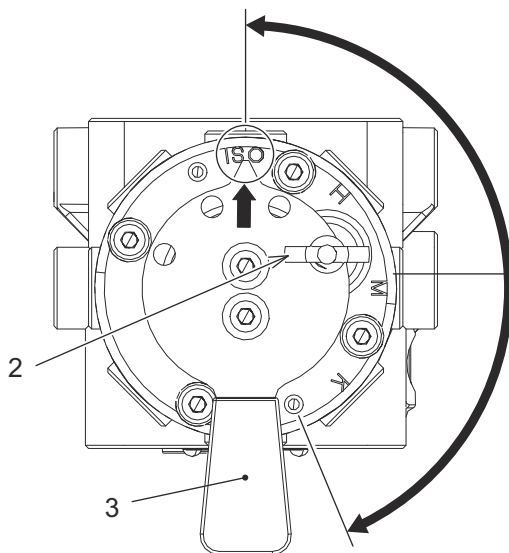
- If you do not check the control lever pattern before operation, it is dangerous because it may cause an unexpected machine movement. Be sure to check the movement of the machine at each control lever position before operation.
- If you operate the machine while the control pattern label does not match 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.



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.

Notice

- The control pattern label is adhered to the right-side of the cab.
- The control pattern label is a magnet sticking type. It should be store because it is required when changing the control pattern.



CONTROL PATTERN

Y [ISO (JIS)].....	KOBELCO, KAWASAKI, KATO, IHI
H.....	KOMATSU, HITACHI, SUMITOMO
M.....	mitsubishi
K.....	KOBELCO(OLD)

8.9 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.

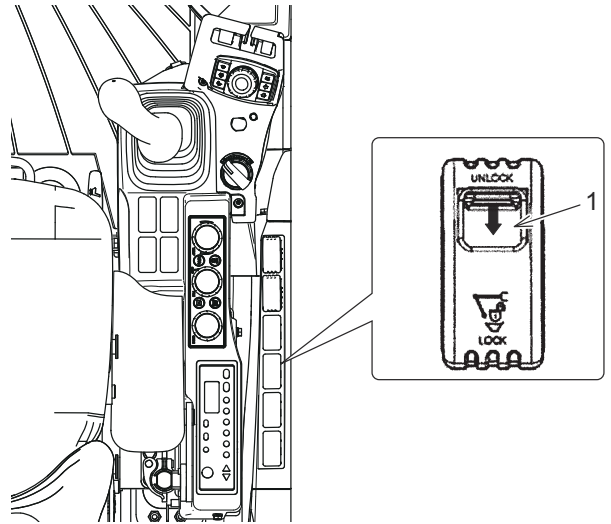
Because when the hydraulic pipes or electric wires are damaged, the hydraulic holding power will be lost, resulting in falling off of the front attachment.

8.9.1 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.



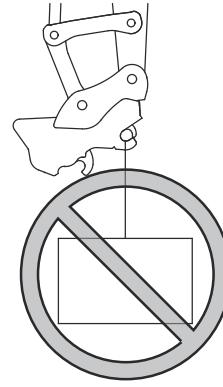
Notice

- The alarm sound keeps going off while the "UNLOCK" or "LOCK" side of the quick hitch operation switch is being pushed.
- For detailed operations, see "REMOVING FRONT ATTACHMENT" and "INSTALLING FRONT ATTACHMENT" sections in Chapter 8.

8.9.2 PROHIBITED WORKS

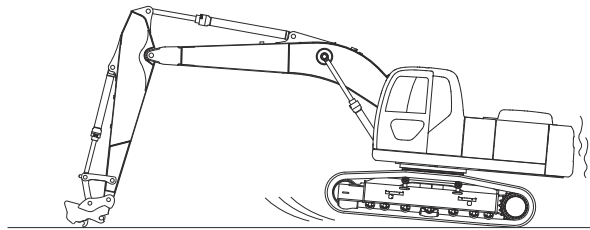
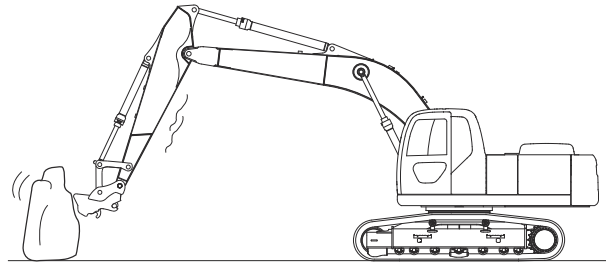
DO NOT PERFORM LIFTING WORK

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.



8.9.3 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

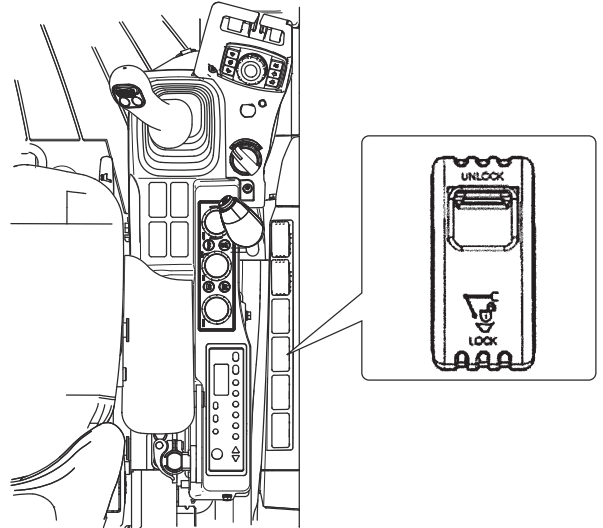
When the quick hitch is installed, the operating range and the lifting capacities will be changed. Also, according to the installed quick hitch or front attachment, it may interfere with the attachment/equipment or the base machine.

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.

CHECK QUICK HITCH OPERATION SWITCH

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	L.H
UNLOCK side	R.H

INSPECTION BEFORE OPERATION

Before operating the machine, check the installation part for engagement and looseness, and the pipes for oil leakage.

8.9.4 REMOVING FRONT ATTACHMENT



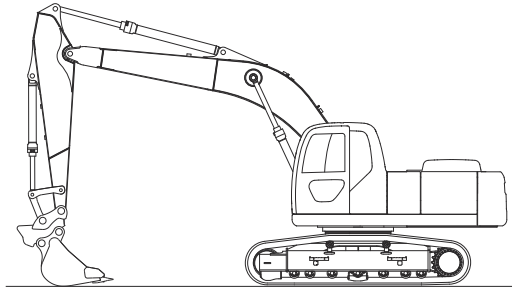
REMOVING FRONT ATTACHMENT

- Work on a stable and level ground to prevent the front attachment from falling down.
- Be sure to lower the front attachment to the ground before operating the quick hitch.

The quick hitch shown in the explanation figures is an example.

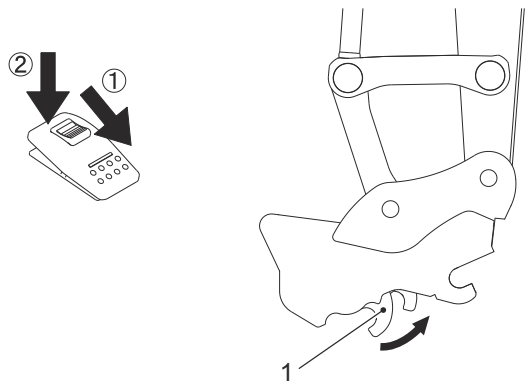
Before performing this work, carefully read the operation & maintenance manual of the installed quick hitch.

1. Move the machine to a level ground and lower the front attachment to the ground.

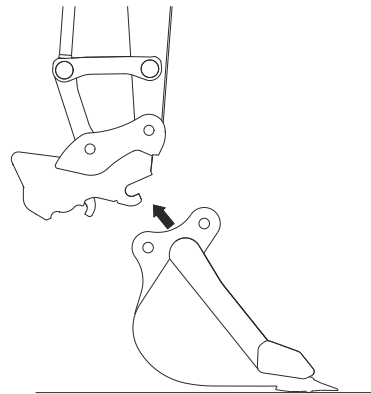


2. Push the "UNLOCK" side of the quick hitch operation switch to move movable hook (1) to release the front attachment.

(See "QUICK HITCH OPERATION SWITCH" in Chapter 2.)



3. Move the attachment/equipment of the machine side to remove the front attachment.



Notice

Some kinds of quick hitch may be difficult to remove from the front attachment. In that case, operate the pressure reducing valve to make the removal work easier.

(See "MANUAL SWITCHING OF PRESSURE REDUCING VALVE FOR QUICK HITCH" in Chapter 8.)

8.9.5 INSTALLING FRONT ATTACHMENT



WARNING

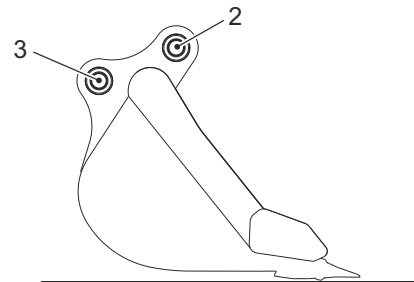
INSTALLING FRONT ATTACHMENT

- Work on a stable and level ground to prevent the front attachment from falling down.
- After installing the front attachment, make sure that the quick hitch holds the front attachment securely.

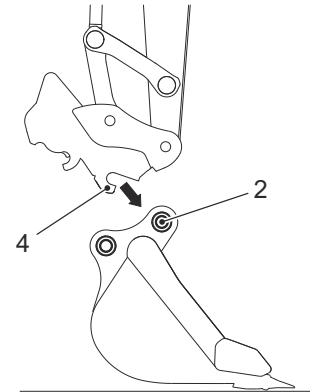
The quick hitch shown in the explanation figures is an example.

Before performing this work, carefully read the operation & maintenance manual of the installed quick hitch.

1. Place the front attachment on a level ground.
Attach pins (2) and (3) to the front attachment.

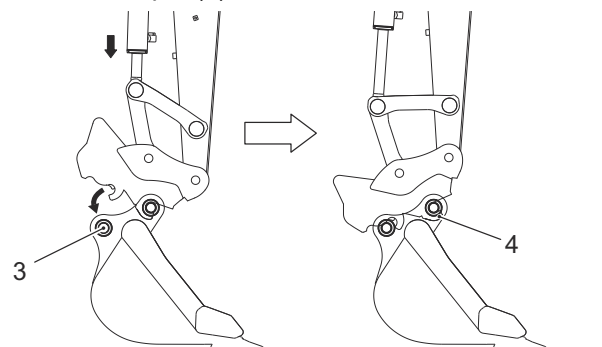


2. Operate the machine to lower the quick hitch and engage fixed hook (4) with pin (2).



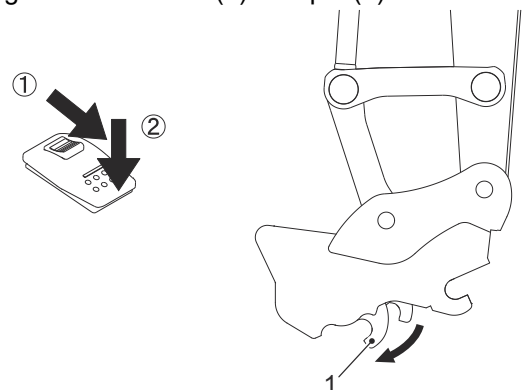
3. Extend the bucket cylinder so that the quick hitch comes in contact with pin (3).

At that time, make sure that fixed hook (4) engages with pin (2).



4. Push the "LOCK" side of the quick hitch operation switch to engage movable hook (1) with pin (3).

(See "QUICK HITCH OPERATION SWITCH" in Chapter 2).



[8. OPTIONAL EQUIPMENT]

5. Check that the front attachment is securely installed, according to the operation & maintenance manual of the installed front attachment.

Notice

If the engagement of the quick hitch cannot be fully checked from the operator's seat, get off the machine and check the engagement at a place close to the quick hitch.

8.9.6 MANUAL SWITCHING OF QUICK HITCH PRESSURE REDUCING VALVE

With certain types of quick hitch, the front attachment may be difficult to remove.

If this happens, the pressure reducing valve can be switched manually to apply high pressure to the unlocked side of the quick hitch, making the attachment easier to remove.

- Turn valve selector knob (1) toward A to increase the pressure applied to the unlocking side (rod side) of the quick hitch.

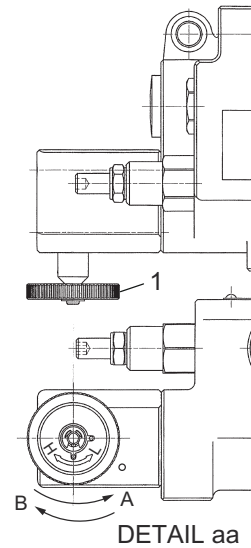
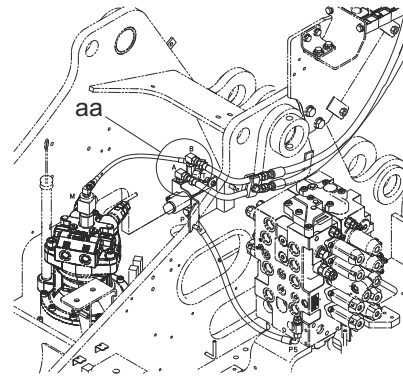
Then, with the pressure applied, remove the front attachment.

(See "REMOVING FRONT ATTACHMENT" in Chapter 8)

- Apart from when removing the front attachment, selector knob (1) should be kept fully turned toward B direction at all times.

This will reduce the pressure on the unlock side (rod side) of the quick hitch.

When turning the selector knob, do not stop halfway. Be sure to turn the knob fully until it stops.

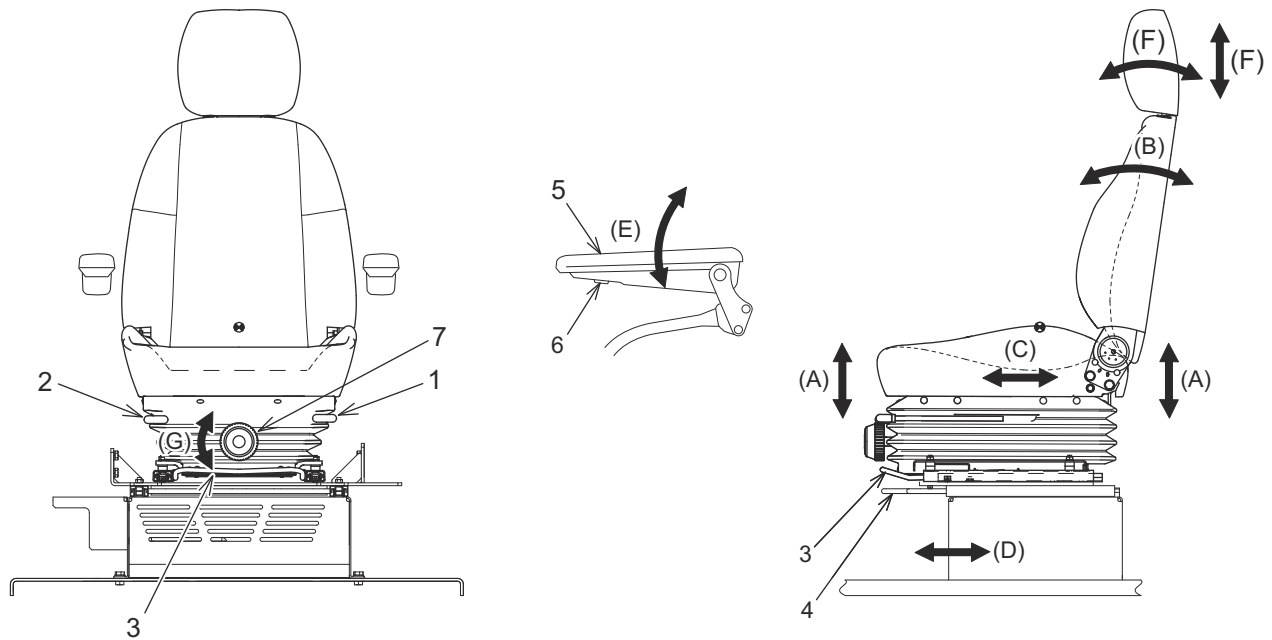


8.10 HANDLING OF OPERATOR'S SEAT (MECHANICAL SUSPENSION SEAT)

The position of operator's seat can be adjusted. Adjust the 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.



8.10.1 HEIGHT AND TILT ADJUSTMENT

(A) The height and angle of operator's seat can be adjusted.

- Pull lever (1) up to tilt the front of the seat up/down. (5 levels tilting)
- Pull lever (1) down to tilt the rear of the seat up/down. (5 levels tilting)
- The height of the seat is adjusted by tilting the front and rear of the seat alternatively.

8.10.2 RECLINING ADJUSTMENT

(B) The reclining angle can be adjusted.

- Pull lever (2) up, and recline the backrest to your desired angle. After adjustment, release the lever to fix the angle.

8.10.3 FRONT/REAR SEAT ADJUSTMENT

(C) The position of operator's seat can be adjusted back and forth.

- To slide the seat back and forth, pull handle (3) up.
After adjusting the seat to your desired position, release the handle and check that the seat is locked securely.
(Adjustable length: 160 mm)

8.10.4 FORWARD AND REARWARD ADJUSTMENT OF CONTROL STAND

(D) The control stand can be adjusted forward and rearward.

- Pull up lever (4) and move the operator's seat and then forward and rearward adjustment of the whole control stand becomes possible.

8.10.5 ARM REST ADJUSTMENT

(E) The arm rest can be lifted up, and its angle can be adjusted.

- Arm rest (5) can be lifted up backward.
- Turn control dial (6) at the bottom of arm rest (5) by hand to fine adjust the angle of the arm rest in regular position up/down.

8.10.6 HEAD REST ADJUSTMENT

(F) The head rest can be moved up, down, back, and forth.

- To adjust the head rest up and down, hold the head rest with both hands, and move it up or down slowly.
- To adjust the head rest back and forth, hold the head rest with both hands, and move it back and forth to your desired position.

8.10.7 SUSPENSION ADJUSTMENT

(G) The suspension can be adjusted.

- Turn dial (7) to adjust the displayed weight of the adjustment grip to match with your weight.

9 SPECIAL PROCEDURES

9.1 SPECIAL PROCEDURES AT ENGINE FAILURE

- This chapter describes how to release the brakes of the travel motor and the swing 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.

9.2 LOWERING ATTACHMENT TO GROUND

In the event of an engine failure, the attachment can be lowered to the ground using the following methods.



Lowering the attachment to the ground

Before lowering the attachment to the ground, make sure that there are no people standing underneath the attachment. A person could be hit by the lowering attachment, which may result in injury.

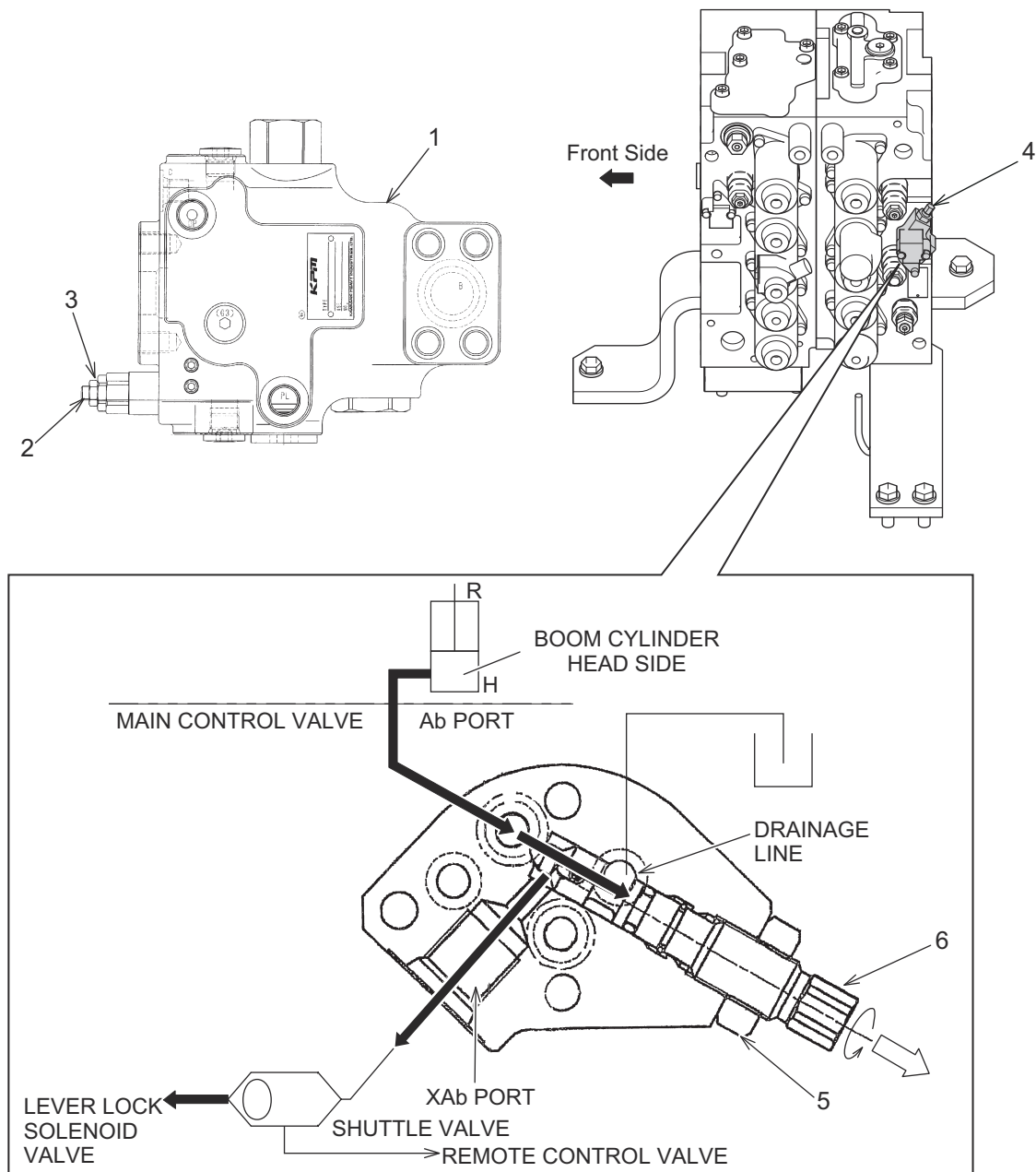
1. First, if the boom cylinder has a holding valve, loosen lock nut (3) on the port relief valve of holding valve (1). Then loosen adjusting screw (2)
2. Loosen lock nut (5) on emergency manual valve (4) on the upper side of the control valve and loosen needle valve (6).
3. The hydraulic oil on the head side of the boom cylinder flows through the orifice to the drain circuit, slowly lowering the boom.

Depending on the machine position and holding pressure, it may take between four to eight minutes to lower the attachment to the ground.

- Once the attachment/equipment is lowered to the ground, tighten each part of holding valve (1) and emergency manual valve back to their original positions.

Notice

Contact your KOBELCO authorized dealer for re-adjustment of the set pressure of the relief valve.



9.3 RELEASING TRAVEL MOTOR BRAKE

Applicable tools

- Chock block: 4 blocks
- Allen wrench: 1 (10 mm)
- Allen wrench: 1 (8 mm)
- Torque wrench: 150 to 170 N·m (111 to 125 lbf·ft)
- Plastic hammer or soft-faced hammer
- Drain oil container: 2 (6 L)
- Lifting eye: 1 (M10: 1.5x30 mm)
- Lifting device {100 kg (221 lbs) or more}
- Thread sealant (for drain plug, level plug and fill plug)



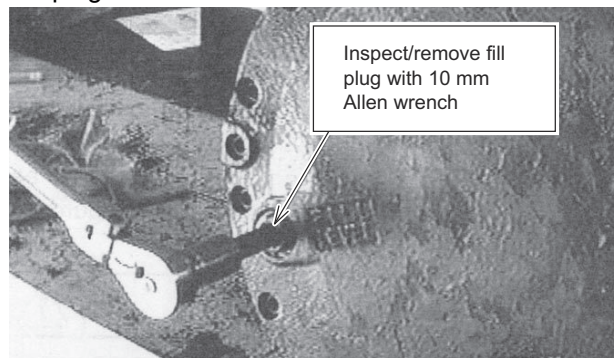
Crawler chocks

When releasing the brakes of the travel motor or swing motor, be sure to put chocks on the front and rear of the crawlers. Also, see Chapter 9 "LOWERING ATTACHMENT TO GROUND" and lower the attachment to the ground. It is very dangerous to lower the attachment on a slope or soft ground, as the upper structure and machine may move unintentionally.

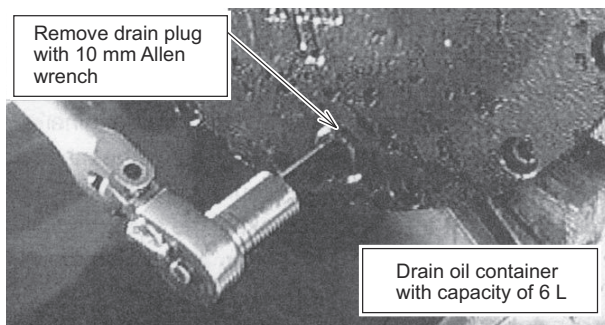


- Do not damage the cover of the travel motor. Doing so may cause oil leakage.
- Make sure to keep the removed parts clean. If foreign material or other contaminants gets mixed in, it can cause a failure.
- Be careful not to get your hands caught during removal/installation work.

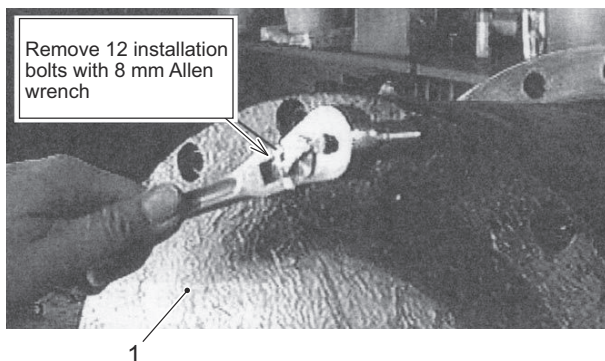
1. When releasing the brake, put a chock block on the front and back of each crawler to prevent the machine from moving.
2. See Chapter 9 "LOWERING ATTACHMENT TO GROUND" and lower the attachment to the ground.
3. Turn the starter switch to OFF and remove the key.
4. Use a hexagonal wrench to remove the inspection plug and fill plug from the travel motor.



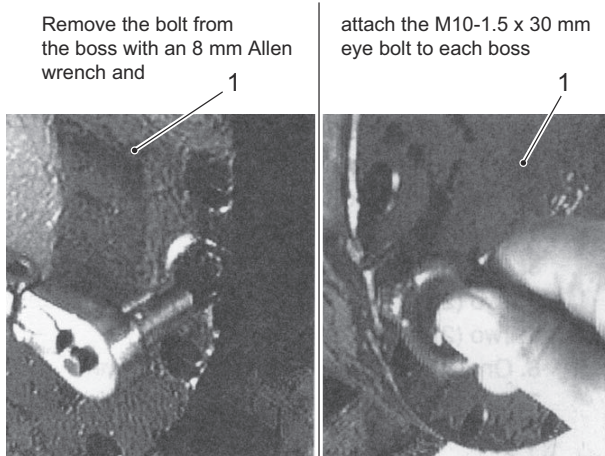
- Place the drain oil container under the drain plug of the travel motor, then remove the drain plug from the travel motor.



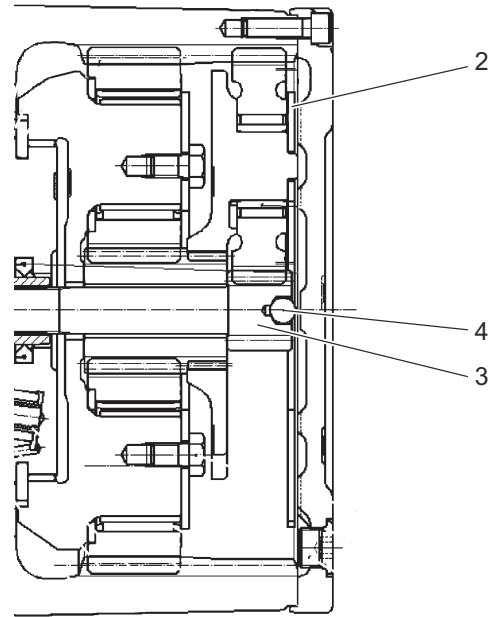
- Remove the bolts (12 places) from cover (1) of the travel reduction unit.



- Remove the bolts (two places) from the boss section of cover (1), then install the lifting eye into each hole.
- Attach the lifting tool to the lifting eye and remove any excess slack in the chain or cable.
- Use a plastic hammer to gently tap the edge of the cover and remove cover (1).
- Remove thrust plate (2).



11. Remove sun gear 1 (3).



Notice

Be careful not to drop sun gear 1 (3) as it may slip due to gear oil.

12. Remove steel ball (4) from sun gear 1 (3).

If the steel ball is difficult to remove, use a magnet.

13. Remove three each of planetary gear 1 (5), needle roller bearing with cage (6), and inner ring (7).



14. Remove the pillar from carrier 1 (8).



15. Take out carrier 2 (9).
16. Reattach removed cover (1) to the housing by tightening the bolts (12 places).
17. Refill with oil via the hole of the fill plug.
18. Follow the above procedure for the left and right travel reduction units, and move the machine to a location where it can be repaired.



Moving the machine

Because the parking brake is released, the machine may move unintentionally, which is very dangerous. Make sure no one is in the vicinity of the machine and then move the machine. Apply chocks to the front and back of the left and right crawlers after moving the machine.

19. After repairing the machine, attach the removed parts in the reverse order of the removal procedure.
 - Tightening torque
 - Cover attaching bolt: 66.7 N·m (49.2 lbf·ft)
 - Plug: 98.1 N·m (72.4 lbf·ft)

9.4 RELEASING SWING BRAKES



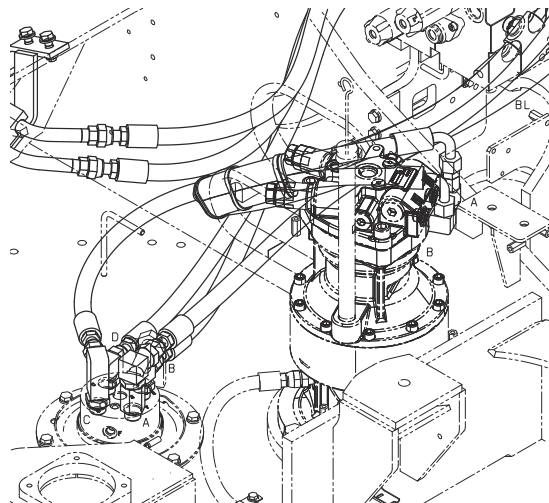
WARNING

CHOCKING CRAWLERS

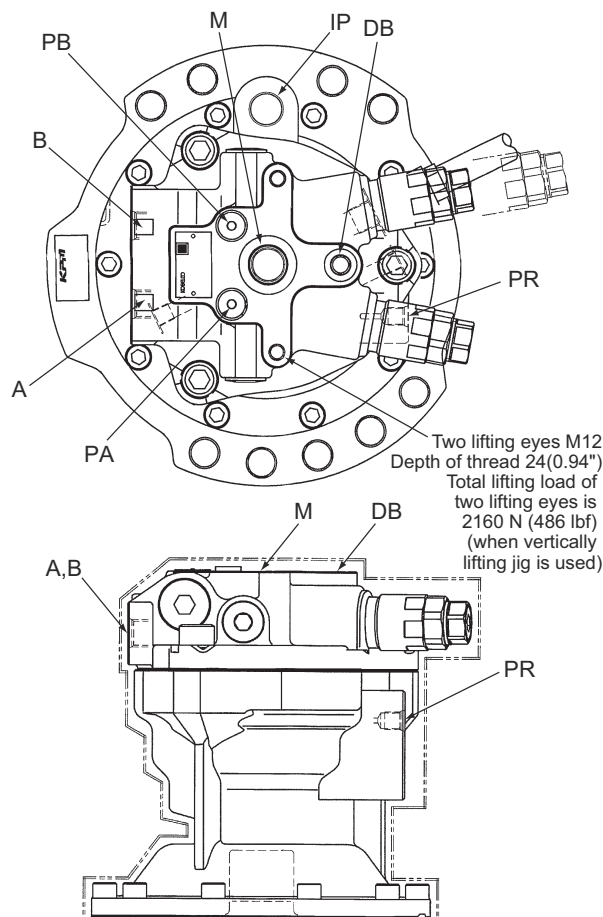
When releasing the brakes of the travel motor and the swing motor, chock the front and rear of the crawlers. See "LOWERING ATTACHMENT TO GROUND" in Chapter 9 to lower the attachment to the ground. On a slope or soft ground, the upper structure and the machine may move unintentionally and it is very dangerous.

9.4.1 RELEASING SWING BRAKE WITH HYDRAULIC HAND PUMP

1. See Chapter 9 "LOWERING ATTACHMENT TO GROUND" and lower the attachment to the ground.
2. Remove all hoses and connectors connected to the swing motor.



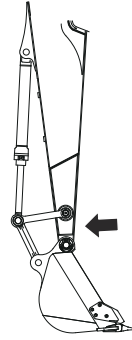
3. Attach a connector of a size that is compatible with the hydraulic hand pump to the PR port of the swing motor and connect it to the hydraulic hand pump.
4. Using the hydraulic hand pump, apply pressure of 2.8 Mpa (406 psi) to release the swing brake.



Symbol	Name	Size	Torque N·m (lbf·ft)
A, B	Main port	2-PF1/2	108 (80)
M	Make-up port	PF3/4	167 (123)
DB	Drain port	PF3/8	74 (55)
PR	Brake release port	PF1/4	36 (27)
IP	Gear oil filler port	PF3/4	98 (72)
PA, PB	Pressure gauge port	PF1/4	36 (27)

[9. SPECIAL PROCEDURES]

5. Hang the wire rope from the arm top end.
6. Slowly turn the machine by towing the rope hanging from the arm top end with a towing machine.



Turning the machine

Because the swing brake is released, the machine may move unintentionally, which is very dangerous. Make sure no one is within the swing radius of the machine and then turn the machine.

7. After repairing the machine, reassemble the removed parts as they were before.

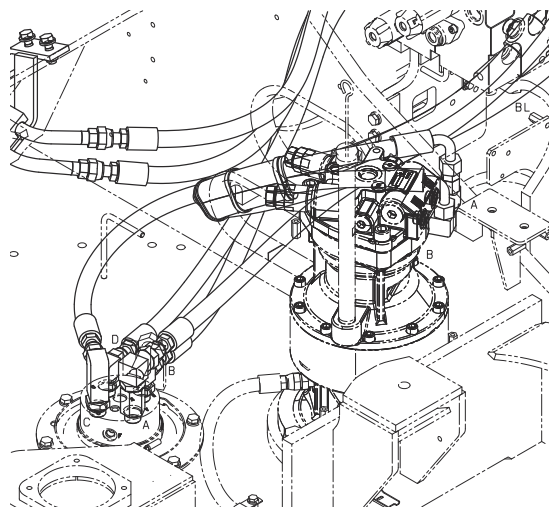
9.4.2 RELEASING SWING BRAKE BY DISASSEMBLY

If you are unable to prepare a hydraulic hand pump, follow the steps below to release the swing brake.

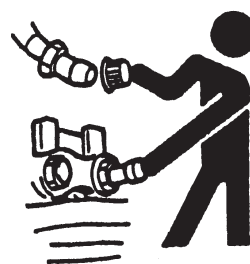
Applicable tools

- Allen wrench: 1 (14 mm)
- Lifting eye: 2 (M12: 1.75x22 mm)
- Lifting device {100 kg (221 lbs) or more}
- Torque wrench: 400 N·m (295 lbf·ft)
- Plastic hammer or soft-faced hammer
- Waste cloth or paper towels
- Plugs and caps
- Tools for removing/installing hoses, tubes and connectors

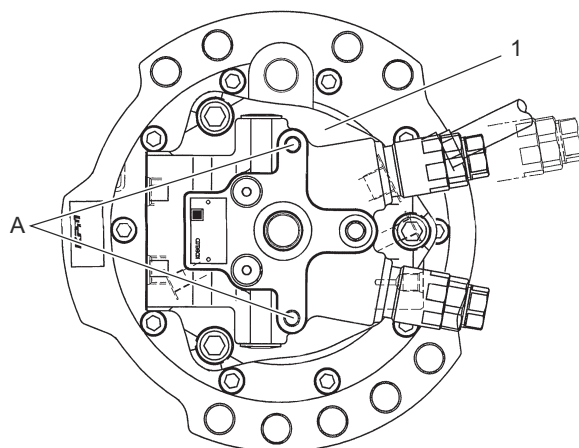
1. See Chapter 9 "LOWERING ATTACHMENT TO GROUND" and lower the attachment to the ground.
2. Remove all hoses and connectors connected to the swing motor.



3. Attach plugs or caps to the hoses, tubes and connectors.

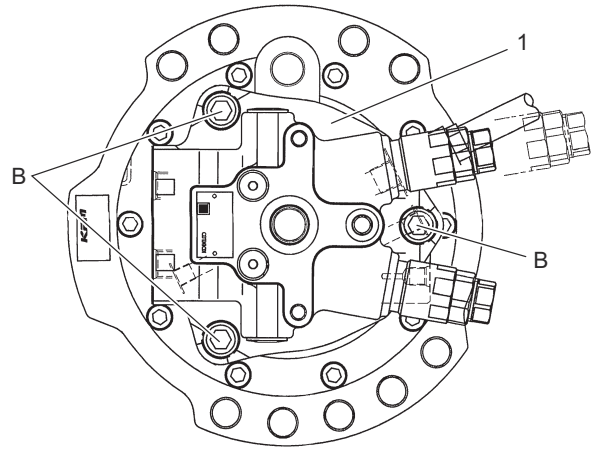


4. Install the lifting eye to the lifting position (A) of valve casing (1).



[9. SPECIAL PROCEDURES]

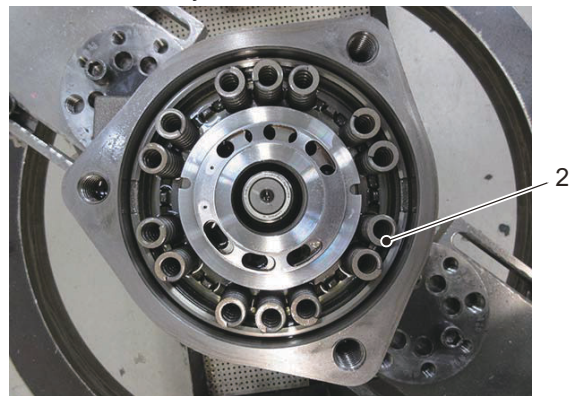
5. Remove the attaching bolts (B) (three places) from valve casing (1) evenly.
6. Attach the lifting tool to the lifting eye and remove any excess slack in the chain or cable.



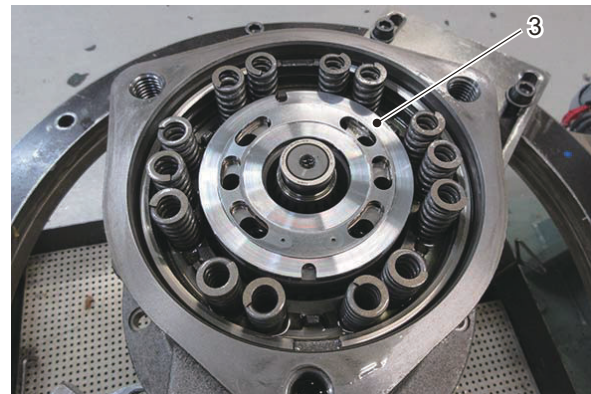
Notice

When you remove the three attaching bolts (B), the valve casing rises due to the spring pressure. Releasing the spring pressure may cause the machine to move.

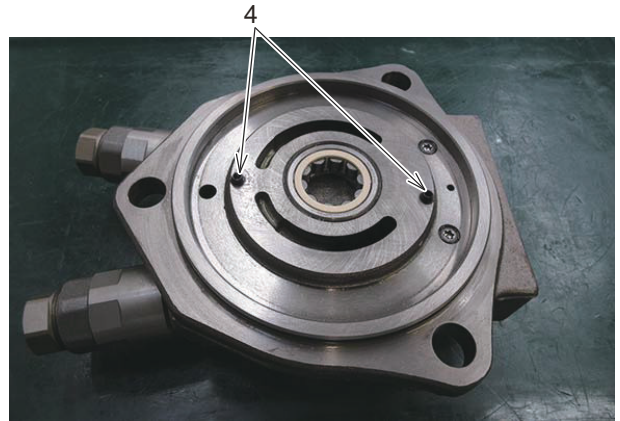
7. Use the lifting device to slowly remove valve casing (1).
8. Remove spring (2) from the swing motor and place it in a container with new hydraulic oil. Close the container to prevent contamination.



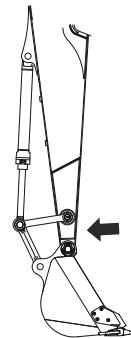
9. Align the holes of valve plate (3) in the swing motor with the front and back of the swing motor housing.



10. Place valve casing (1) over the swing motor so that positioning pins (4) of valve casing (1) aligns with the holes of valve plate (3).
11. Push valve casing (1) onto the swing motor by hand and attach the attaching bolts (B) (three places).



12. Hang the wire rope from the arm top end.
13. Slowly turn the machine by towing the rope hanging from the arm top end with a towing machine.



WARNING

Turning the machine

Because the swing brake is released, the machine may move unintentionally, which is very dangerous. Make sure no one is within the swing radius of the machine and then turn the machine.

14. After repairing the machine, reassemble the removed parts as they were before.

Tightening torque

Attaching bolt of valve casing: 333 N·m (246 lbf·ft)

CAUTION

- Do not damage the valve casing. Doing so may cause oil leakage.
- Make sure to keep the removed parts clean. If foreign material or other contaminants gets mixed in, it can cause a failure.

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