HUAYEE

MINI EXCAVATOR
PRODUCT MANUAL

HY35C

- Detailed parameters
- How to use
- Things to note

www.huayeeusa.com

Preface

Introduction

These Operating Instructions are prepared for the safe and effective use of this machine. please read these Instructions before using this machine, and convert the contents hereof into your own knowledge based on a thorough understanding of driving operation, inspection, and conditioning before driving this machine.

⚠Warning

Improper use of this product may result in serious injury or death. Please read these Instructions carefully and fully understand the contents hereof before operating, maintaining or repairing this product. For the convenience of reading, please place these Instructions in a storage location behind the driver's seat and carefully keep it. Staff who have obtained the qualifications for mechanical operation shall also read these Instructions on a regular basis.

- **Please use this product based on a thorough understanding of the contents of these Instructions.**
- **Please keep these Instructions at hand and read them from time to time.**
- **In case these Instructions are lost or damaged, please place an order with u or our sales agent as soon as possible.**
- **When transferring this product, in order to ensure the proper use by the next user, please also transfer these Instructions to the transfer.**
- **We provide machinery that complies with the regulations and specifications of the country where the machine is used. In case your machine is a product purchased from another country, or from a person or company in another country, then the product may not be equipped with the safety devices and safety specifications required for use in your country. Please consult our sales outlets to see whether your machine complies with the regulations and specifications of your country.**
- **The safety-related matters are explained in Sections "Safety-related Information" and "Basic Safety Precautions". Please read them carefully.**

Words for Customers

Warranty

The warranty service is based on the warranty letter attached to this machine. We will, based on the information recorded in the warranty letter, provide free repair for faults for which we are liable. However, please note that, we provide no warranty for any fault caused by any use of this machine in violation of these Operating Instructions.

Follow-up Service

After you purchase this machine, we will provide free regular follow-up services according to the specified time and frequency. Additionally, in case there are any uncertainties regarding conditioning of this machine, please consult with our nearest sales agent.

Disclaimer

1. Some illustrations given in these Operating Instructions depict the state after the protective covers and lids are removed, in order to illustrate the subtle parts of the machine. Please be sure to restore such covers and lids according to the regulations before the operation of the machine and drive the machine according to these Operating Instructions. In case the above operations are neglected, major personal accidents may be caused, and important parts of the machine and other items may get damaged.

2. These Operating Instructions may be modified due to improvement of product, change in specifications, and enhancement of usability hereof. Therefore, please kindly be noted that the content of these Instructions may not be consistent with a portion of your machine.

3. These Instructions are written on the basis of our long-term rich experience and technologies. Although we expect the contents hereof to be foolproof, in case there is any error or omission, please contact us. In addition, with respect to the ordering of these Operating Instructions, please consult our sales agent.

Safety-related Information

General

1. In order to prevent danger caused by unexpected accidents and protect working personnel and machine, this machine is equipped with safety devices. However, the personnel driving this machine shall not only rely on such safety devices, but also read the precautions recorded in this Chapter carefully and operate this machine on the basis of a full understanding thereof. Furthermore, don't assume that the precautions described in this Chapter are sufficient, and please add additional precautions based on environmental conditions and other factors.

2. In these Instructions, the safety precautions known as "Danger", "Warning", and "Caution" are recorded everywhere. In addition, the safety identification labels provided on this machine also use such symbols. These contents are distinguished by the following safety symbols. Please take preventive measures according to the recorded contents, so as to ensure driving safety.

⚠Danger

This symbol is used on the safety information and safety identification labels for the locations where the risk of serious personal injury or death is high if the danger cannot be avoided. Such safety information contains the preventive measures that must be taken to avoid danger.

⚠Warning

This symbol is used on the safety information and safety identification labels for the possible locations where serious personal injury or death may be caused if the danger cannot be avoided. Such safety information contains the preventive measures that must be taken to avoid danger.

⚠Caution

This symbol indicates a state that minor personal injury, moderate health disorder or major mechanical damage may be caused if the danger cannot be avoided.

We cannot fully understand and predict all dangers. Therefore, the contents recorded in these Instructions as well as the safety identification labels provided on this machine may not necessarily explain all prevention methods and precautions. Please be careful not to cause any mechanical damage or personal accident due to the responsibility of the working personnel themselves when performing any driving operation, inspection, or conditioning beyond the scope of these Instructions.

3. In addition to the safety precautions mentioned above, the supplementary instructions that are extracted from the explanatory text and make the work easier for the working personnel are separately displayed and recorded. These are special matters that are useful for working personnel, so that no safety identification label for this machine is used. These contents include the operation methods, information, specifications, and necessary precautions for work locations where the machine may get damaged or may get its service life shorten.

4. Please be sure to follow the precautions recorded on the safety identification labels on this machine. In addition, please be careful not to remove or damage the safety identification labels. In case any safety identification label is damaged and thus the text cannot be read, please replace it with a new one in a timely manner. Please order a new nameplate from any of our sales agents.

5. Noise

The A-weighted emission sound pressure level at the operator's station is 80 dB(A). The uncertainty of measurement is 2.5 dB.
The A-weighted emission sound pressure level at operator's station is measured according to ISO 6396:2008.

The A-weighted emission sound power level is 94 dB(A). The uncertainty of measurement is 1.5 dB.
The A-weighted sound power level is measured according to ISO 6395:1988 referenced by 2000/14/EC.

6. Vibration

The hand-arm vibration value is 2.5 m/s2. The uncertainty of measurement is 0.5 m/s2.
The whole-body vibration value is 0.5 m/s2. The uncertainty of measurement is 0.1 m/s2.

Overview of Machine

Designated Operations

This machine is mainly used for the following operations.

- Excavation operation
- Land levelling operation
- Trenching operation
- Side ditch excavation operation
- Loading operation
- Hydraulic hammer operation

Characteristics of this Machine

- In narrow construction sites and road construction sites, even in a rotating state, the counterweight of this machine can rotate without going beyond the width of the crawler.
- By adopting the optimal leftward and rightward movement methods, the driver can clearly see the bucket, and can properly excavate the side ditch of the wall.

Trial Driving

This machine has been fully adjusted and inspected before delivery. In case the machine is used roughly from the beginning, its performance will rapidly deteriorate and its service life will be shortened. Therefore, please conduct a trial driving within the first 100 hours (subject to the time displayed on the timer). Please pay special attention to the following conditions while driving.

- Please don’t make the machine operate under heavy load and at high speed.
- Please don’t start the machine too quickly, accelerate the machine too quickly, make unnecessary emergency stop, or make drastic directional change.

The driving operation, inspection, conditioning, and safety related precautions in these Instructions are only applicable when this machine is used for designated operational purposes. When this machine is used for any operational purpose not recorded in these Instructions, all safety related matters are the responsibility of the user. However, please don’t engage in any operation that is prohibited in these Instructions

1. Safety

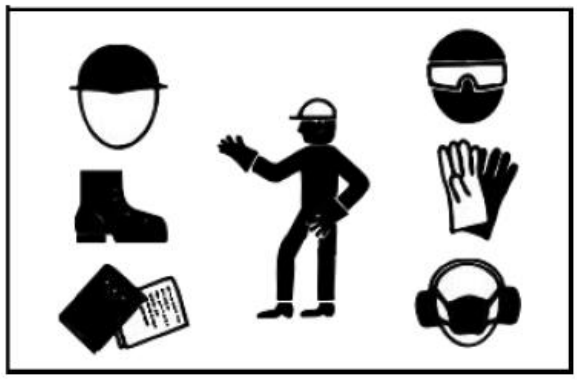
1.1 Basic Safety Precautions

Many accidents that occur during driving and conditioning of the machine are attributable to failure to follow basic precautions. Such accidents could have been prevented in case sufficient attention had been paid beforehand. These Instructions record the basic precautions. In addition to such basic precautions, there are many other matters that must be noted. Please fully understand all safety precautions before proceeding with any operation.

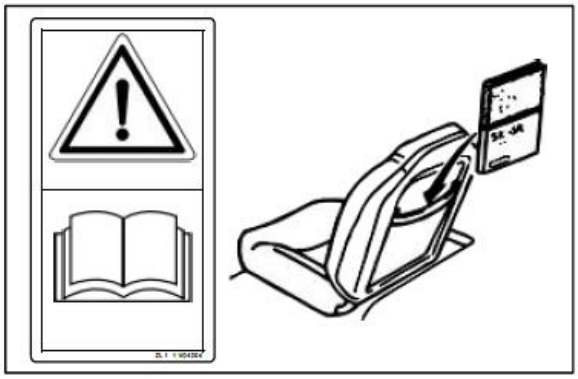
1.2 Precautions before Commencement of Operation

Comply with Safety Rules
Please comply with the safety related rules, precautions, and operational sequence. When operational tasks and commanding personnel are assigned, please carry out operation in accordance with the specified command signals.

Safe Clothing
Please wear a safety helmet, safety boots, and fitted work clothing, and use goggles, face shield, and gloves according to the operational requirements. In addition, please don't wear any work clothing with oil attached, since it is prone to catching fire.



Read these Operating Instructions
Please read these Operating Instructions before driving the machine. In addition, please keep these Operating Instructions in the pocket on the driver's seat. In case this machine is a machine equipped with driving shed (standard specifications), in order to prevent these Operating Instructions from being soaked by rainwater, please store them in a polyethylene bag with a zipper.



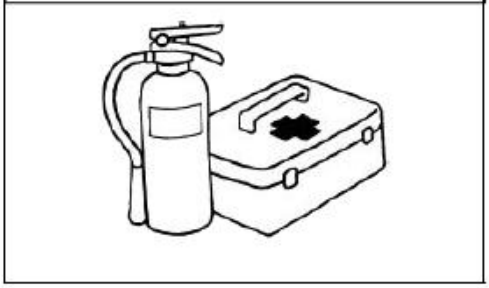
Never drive the machine when you are tiled or under the influence of alcohol

If your physical condition is not good, it will be difficult for you to deal with sudden accidents. Therefore, please prudently handle the driving when you are too tired, and never drive the machine under the influence of alcohol.

Prepare the safety equipment

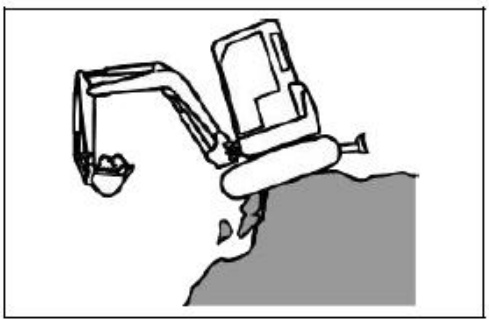
To deal with possible accidents and fires, please prepare fire extinguishers and first aid kits. Please learn the usage of fire extinguishers in advance. Please decide on the storage location for first aid kit.

Please decide on the contact method for emergency contact location and prepare a telephone number in advance.



Ensure the safety of work site

Thoroughly investigate and record the terrain and geological conditions of the work site in advance, and make preparation carefully, so as to prevent the accidents such as tipping of machine and collapse of soil before they occur.

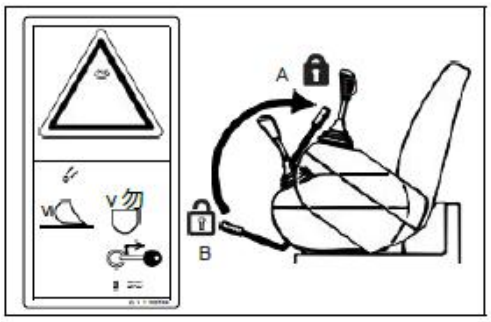


Lock the machine when leaving it

In case the temporarily-parked machine is accidentally started, it may get people caught or dragged, resulting in injury. When leaving the machine, please lower the bucket onto the ground, lock the joystick, and pull out the engine key.

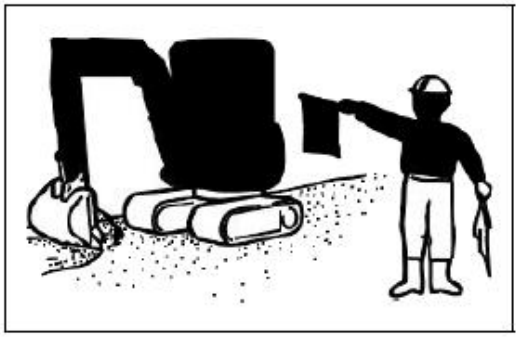
A. Locked position

B. Released position



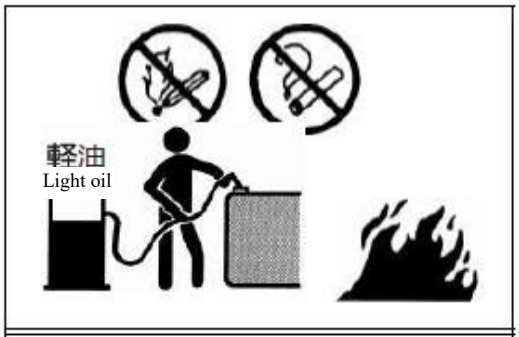
Pay attention to command signals and signs

Please set up signs on soft soil roadsides and foundations or assign command personnel as necessary. The driver must pay attention to signs and follow the command signals given by the command personnel. Please fully understand the significance of all command signals, signs, and signals. Please have only one person responsible for giving the command signals.



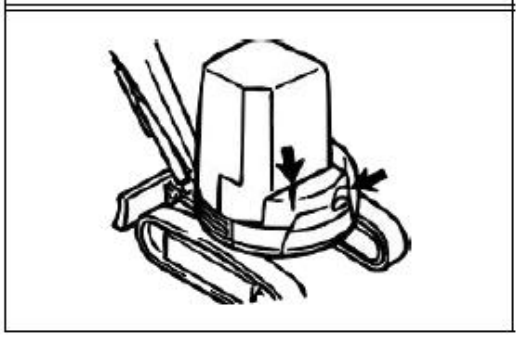
Smoking and open flame are strictly prohibited for fuel and hydraulic oil

In case fuel, hydraulic oil, and antifreeze are brought close to fire, they may catch fire. Especially, fuel is very flammable, so that it will be very dangerous for fuel to get close to open flame. Please stop the engine before refueling. Please tighten all fuel and hydraulic oil covers. Please store the fuel and hydraulic oil in the designated location.



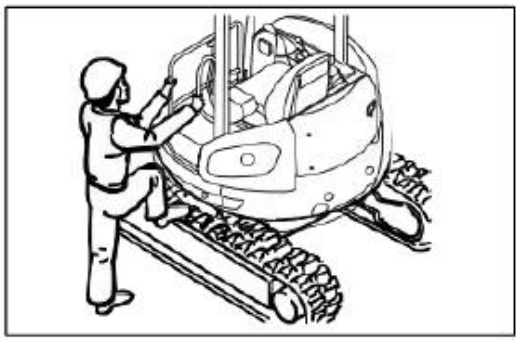
Safety devices must be installed

Please confirm that all protectors and cover plates are installed in proper positions. In case any of them is damaged, please repair it immediately. Please use the safety devices such as descending cut-off locking rod correctly based on a thorough understanding of their usage. Please absolutely not remove any safety device and repair or manage it, so as to ensure its normal function.



Use of handrails and pedals

When getting on and off the machine, please face the machine, use the handrails and crawler shoes, and ensure that your body is supported by at least three points on hands and feet. When getting off this machine, please make the driver's seat parallel to the crawlers before stopping the engine. Please inspect and clean the appearance and installation parts of pedals and handrails. In case there is any slippery object such as grease sticking to them, please remove it.

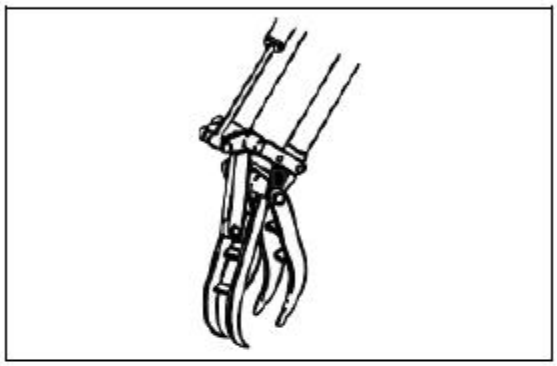


Pay attention to working machine

Collision with the working machine may cause injury. Don't approach the working machine. Please always pay attention to the surrounding crowd while driving this machine.

Precautions for optional attachments

When using any optional attachment installed, please read the operating instructions in Section "Other Optional Parts". Using any attachment other than those designated by us may not only cause safety problems, but also have a negative impact on the proper operation and service life of the machine. We shall not be held liable for any personal injury/death accident or product malfunction caused by the use of attachment other than those specified.

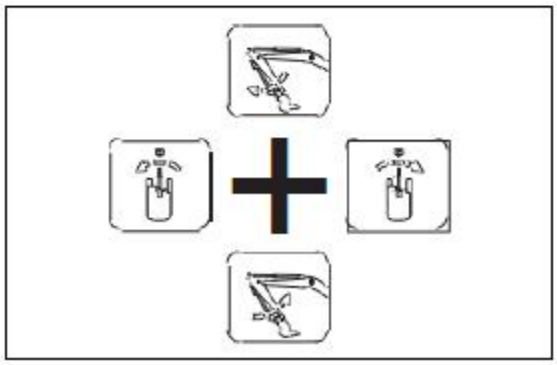


Prevention of fire

In case the combustible materials such as wood chips, dead leaves, and paper scraps are piled around the engine, fire may be caused. Please clear them away from time to time. Please inspect for leakage of fuel, hydraulic oil, and hydraulic oil systems. In case there is any defect, please repair it and wipe off the leaked oil.

Confirm the mode of joystick

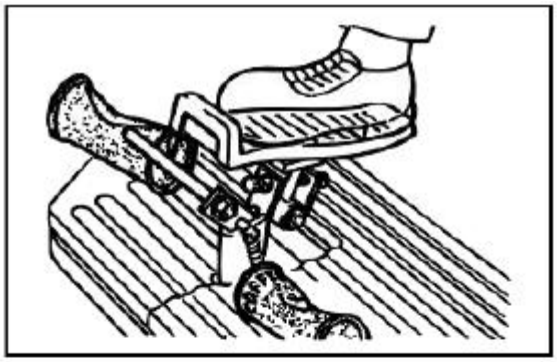
Please confirm the operation mode before carrying out the operation. The figure shows the ISO operation modes of the left joystick.



Left joystick

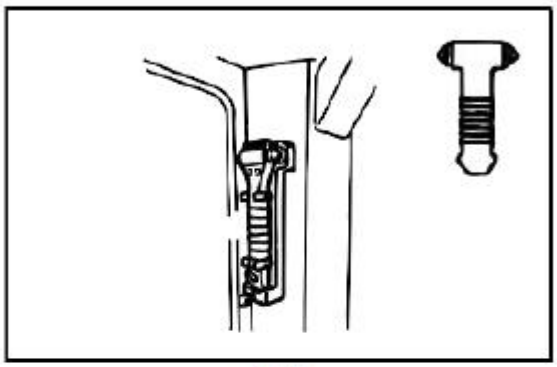
Clean the area around the driver's seat

Falling or slipping inside the cab is very dangerous. Please don't place components and tools inside the cab. In case soil, grease, or snow adheres to floors, poles, and handrails, it can easily cause people to slip and be very dangerous. Please wipe them clean.



Operation of life hammer (cab specifications)

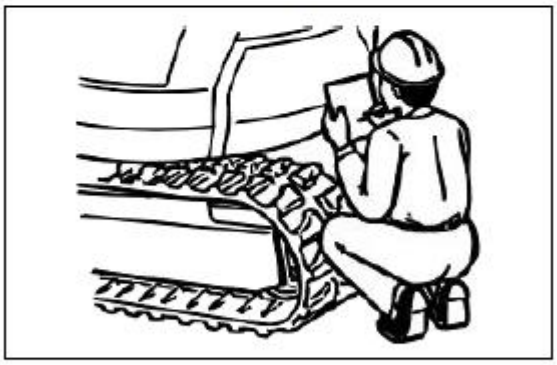
A tool prepared for emergency escape from the cab. In case an emergency situation arises, please use the life hammer to cut open the glass and escape from the cab.



Life hammer

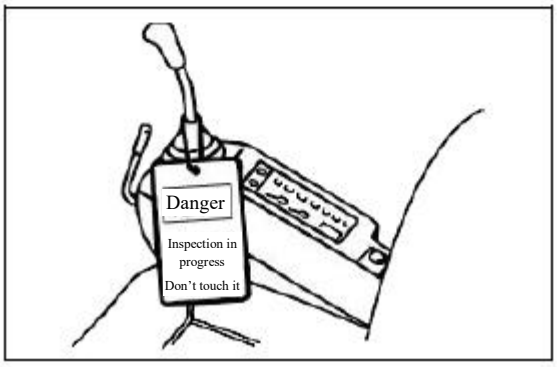
Implement the pre-operation inspection

Please inspect the area around the machine before starting the engine. Daily inspection shall not only rely on the monitoring panel (display), but also be based on the operating instructions. Please step off the driver's seat for inspection.



It is prohibited to drive the machine under inspection or conditioning

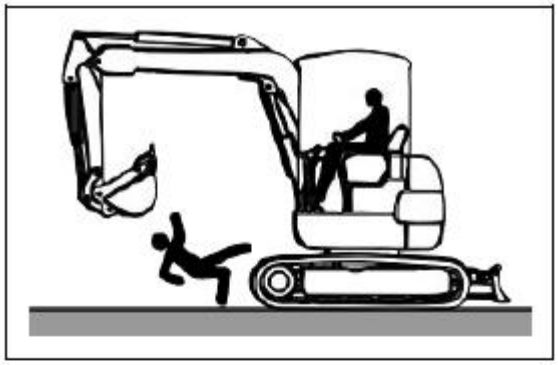
When a warning sign for inspection and conditioning is hung on an object such as door or joystick, the engine may be started for driving only after the person who hung such warning sign or someone familiar with the situation removes such warning sign.



1.3 Precautions Related to Driving

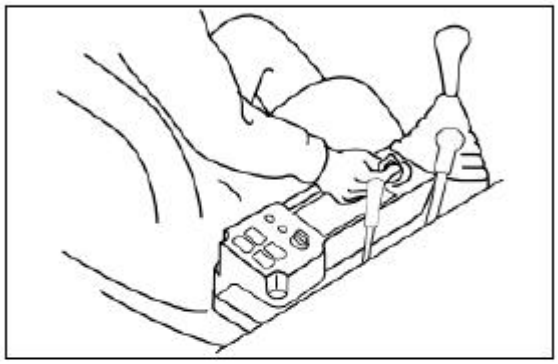
No one other than the driver is allowed to ride on the machine

No one other than the driver is allowed to ride on the machine; otherwise, it may cause personal safety accidents. Please absolutely prohibit such behavior.



Precautions for start-up of engine

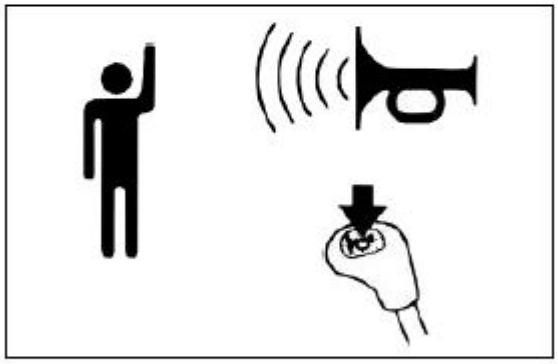
The engine must be started while the driver is sitting in the driver's seat. Please be careful not to short-circuit the starting circuit and battery during startup; otherwise, it will be dangerous, and the electrical system may get damaged.



Start the engine in accordance with the command signals

When starting the engine, please confirm that there is no one around, and sound the horn as a warning.

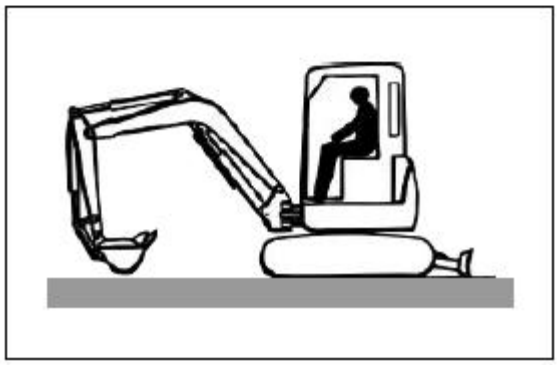
Don’t start the engine when warning signs are hung on the control devices.



Horn switch

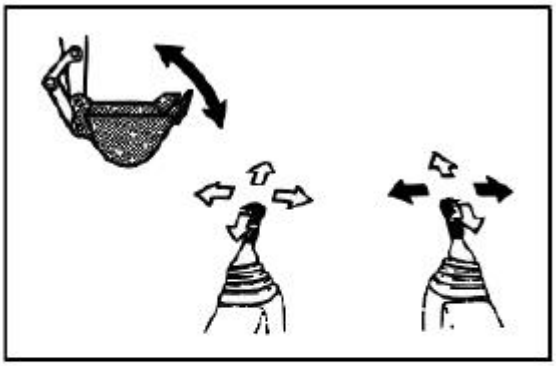
Inspection after start-up of engine

In case the inspection after start-up of engine is neglected, the abnormalities of the machine may not be discovered in time, and thus personal safety accident or mechanical damage may occur. Please conduct the inspection in a spacious area with no people or obstacles around. Please inspect the movement state of the machine, as well as the operation state of bucket, bucket arm, boom, bulldozer board, travelling mechanism and rotation mechanism. In case any abnormality is found, please carry out repair immediately.



Confirm the action of joystick

Before starting the operation, please pay attention to the safety of the surrounding area, slowly operate each joystick, and confirm that the operation mode displayed on the nameplate is consistent with the action of the machine.

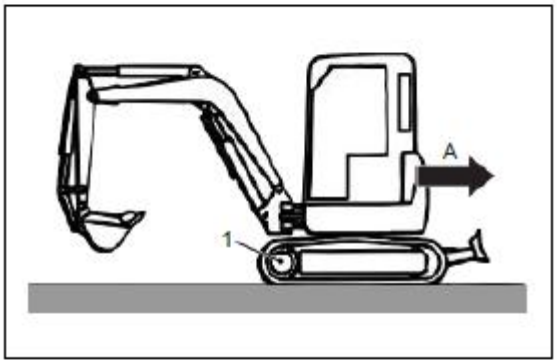


Confirm the movement direction of machine

Please confirm the position of the travelling motor (1) before making the machine travel. Please note that, in case the travelling motor is in the front position, the travelling rod shall be operated in the reversed direction.

Before travelling, please confirm that no one is entering the area around the machine. Please use the horn and command signal to give a warning.

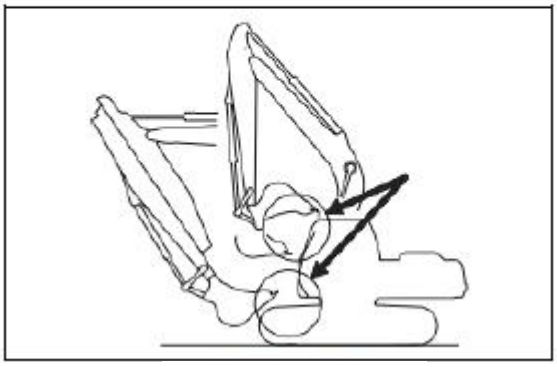
A. Travelling direction (Reverse travelling state)



Reverse travelling state

Be careful not to get the bucket collided

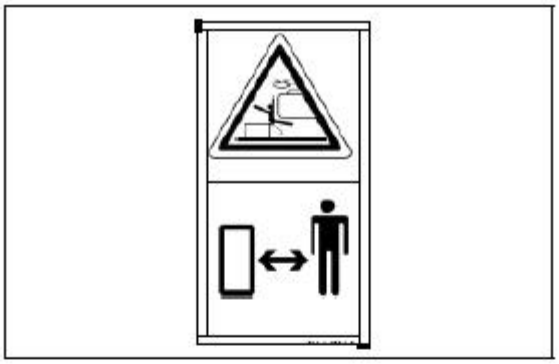
Due to the type of attachment installed, the bucket may collide with the driver's seat and get damaged. Before driving the machine, please confirm that a safe distance is maintained between the bucket and the driver's seat. When the bucket is placed close to the driver's seat, please carry out operation carefully.



Be careful not to collide

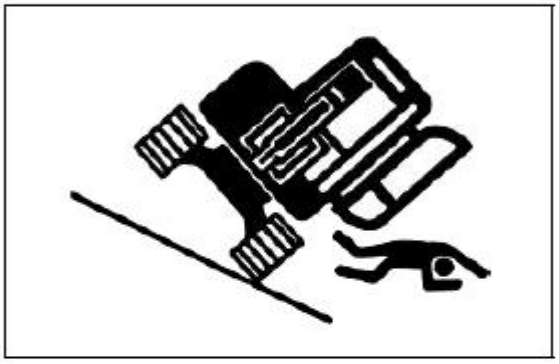
Prevent danger during rotation, forward movement, and backward movement

Prevent people from entering the rotation range. Please confirm whether there is neither people nor obstacle above, under or around the machine before starting the operation. To prevent people from entering the area surrounding the machine, please use horn and command signal to give a warning. Please deploy command personnel in dangerous locations and areas with poor visibility.



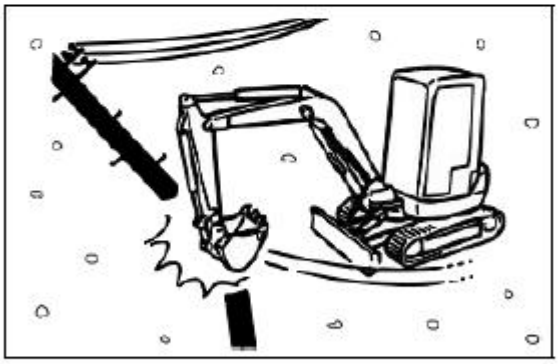
Precautions for travelling on sloping ground

When travelling on sloping ground, please ensure that the machine will not tip over or slip laterally. Lift the bucket to a height of 30-40cm above the ground, and immediately lower it onto the ground in case of emergency. Please don't change the travelling direction or cross horizontally on sloping ground. Please adopt the safe travelling modes such as temporarily descending to flat ground or taking detours.



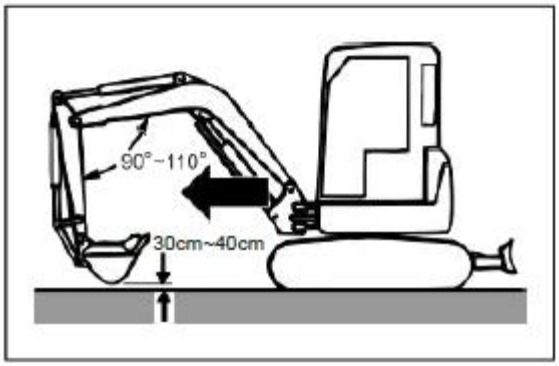
Precautions for travelling on frozen and snowy roads

On snowy and frozen roads, especially on sloping ground, the machine accidentally slip laterally. Therefore, please control the travelling speed and avoid sudden start, sudden stop, and sudden rotation. When travelling on the roadside and in areas with deep snow, please carry out operation carefully, as the roadside and facilities are buried in the snow and difficult to see. Please be aware that, frozen foundations may become soft due to the rise in temperature.



Precautions for travelling

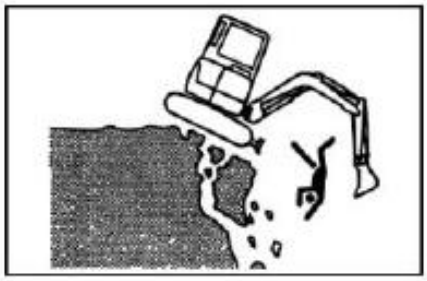
Please set the attachment to the posture shown in the right figure, and lift it to a height of 30-40cm above the ground for travelling. Please adopt a low speed when travelling on uneven ground, and avoid sharp movements when changing the travelling direction. Please don't cross any obstacle if possible. When you have to cross an obstacle, please keep the attachment at a lower position than the ground and make the machine travel at a low speed.



Dangerous operations are prohibited

When carrying out operation on roadside and cliff edge, the machine may get imbalanced easily, which is very dangerous. Therefore, in order to facilitate retreat, please maintain a right angle between the crawler and the roadside, and place the travelling motor at the rear.

Especially for soil-piled foundations and when it rains, the roadside may collapse. Please ensure the safety of the roadside. In addition, please be careful not to excavate too much around the bottom of the machine.

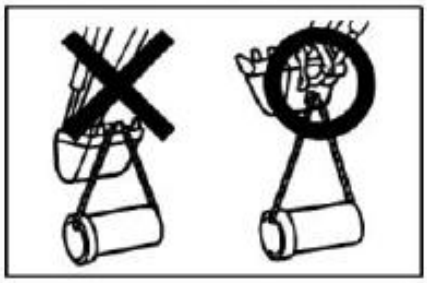


Precautions during lifting

As this machine is an excavator, please pay special attention to the handling of heavy objects.

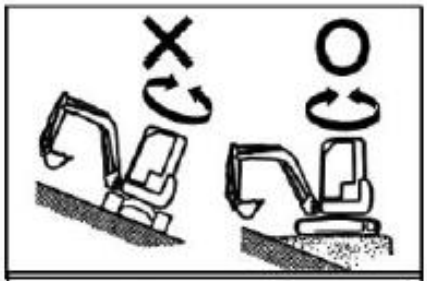
⚠Warning

Only hooks and chains may be used, and it is not allowed to use bucket shoe to lift objects.



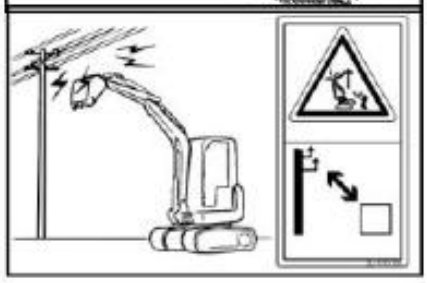
Operation on sloping ground

When carrying out operation on sloping ground, in case the machine gets unbalanced, it may tip over. Please carry out operation carefully. It is very dangerous to rotate the machine towards the bottom of the slope when the bucket is loaded with soil. When it is necessary to rotate the machine, please pile soil on the sloping ground and keep the machine level as much as possible.



Pay attention to the power line

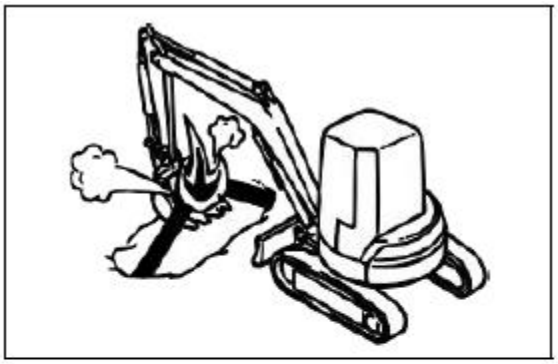
In case the machine or its attachment gets in touch with any high-voltage power line, personal injury or death may occur due to electric shock, which is very dangerous. When carrying out operation near a high-voltage power line, please take the appropriate measures such as contacting the power supply company and following their instructions. The safe target distance is as follows.



Voltage	Target Distance Required by Power Supply Company
Less than 100V-200V	More than 2m
Less than 6,600V	More than 2m
Less than 22,000V	More than 3m
Less than 66,000V	More than 4m
Less than 154,000V	More than 5m
Less than 275,000V	More than 7m
Less than 500,000V	More than 11m

Pay attention to buried objects

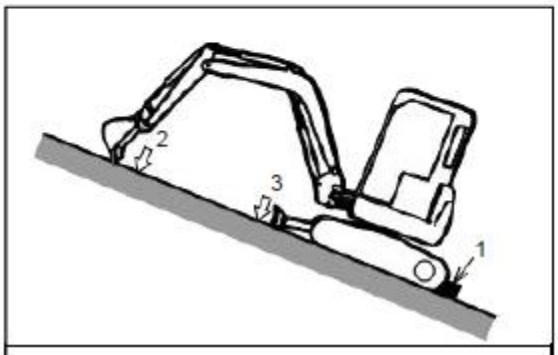
When carrying out operation in locations where water pipes, and natural gas pipes may be buried, it is necessary to make confirmation with the designated management companies, conduct trial excavation, and carry out operation carefully only after confirming the presence and location of buried objects.



Confirm safety when parking

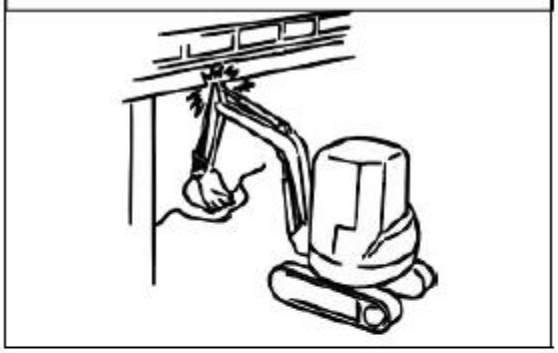
Please select a level road surface when parking the machine. When parking the machine on sloping ground, please place the brake wedges (1) under the crawlers, and make sure that the bucket (2) and bulldozer board (3) are in contact with the ground.

When parking the machine on a road, please set up flags, fences, lighting lamps, and other warning signs within a range that does not obstruct traffic, so as to ensure the safety of pedestrians and vehicles passing through.



Don’t get this machine collided

When carrying out operation in locations with height limit such as under tracks, bridges, and power lines, please be careful not to get the attachment collided.

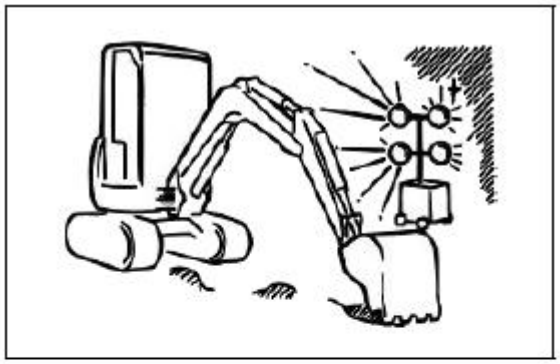


Digging holes is very dangerous

Please don’t dig holes under cliffs, since it is very dangerous. Digging holes under cliffs may loosened rocks and foundations, leading to the dropping of rocks.

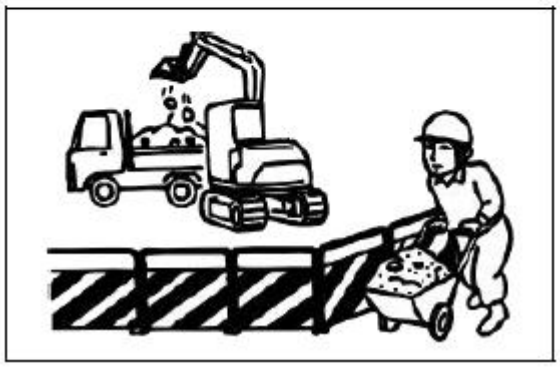
Adequate lighting

When carrying out operation in a dark location, please set up lighting facilities as necessary and work in a very bright environment. When the visibility becomes poor due to fog, snow, or rain, please suspend the operation, and wait until the visibility becomes good and will not interfere with the operation.



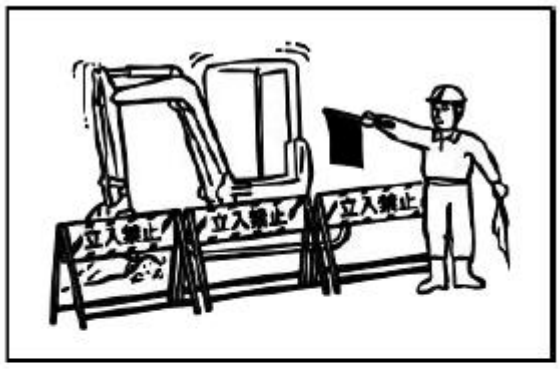
Prevent entry into operation site

In case people or other machinery enters the operation site, collision accidents and personal injury accidents may occur. Before starting the operation, please confirm whether there is neither person nor obstacle other than the command personnel within the scope of the operation. Please take the measures such as setting up "No Entry" sign, so as to prevent unrelated personnel from entering.



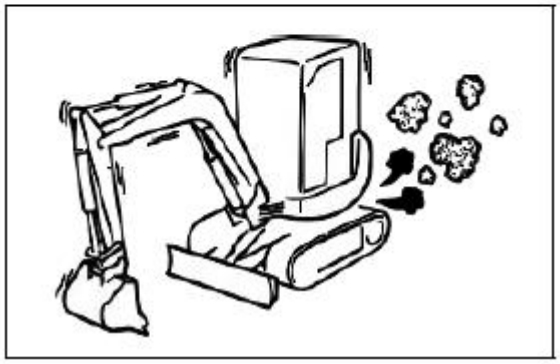
Precautions for operation in street

It is very dangerous for unrelated personnel to enter the operation site. Please set up the "No Entry" sign. When carrying out operation in any area with high traffic volume, please assign command personnel to prevent contact accidents.



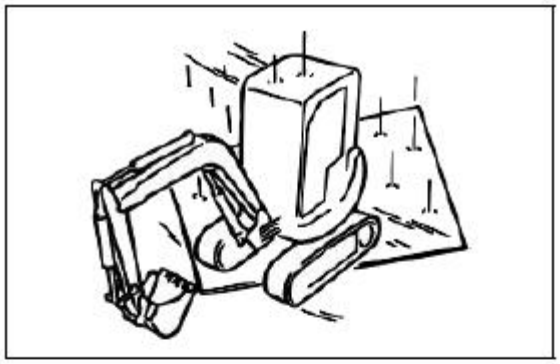
It is prohibited to use the machine which has not been conditioned

Using unconditioned machine may lead to unforeseen accidents and malfunctions. Don’t continue to use the machine after it has malfunctioned during the operation. Please repair the faulty part as soon as possible.



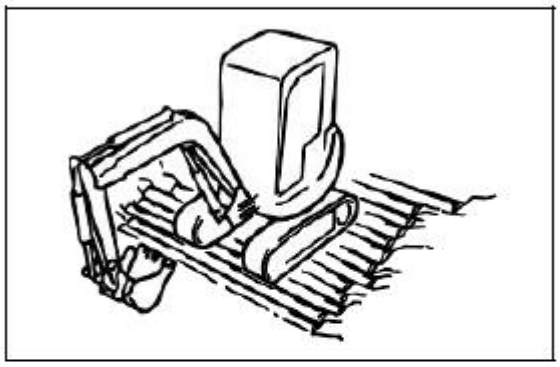
Easy to slide on floor and iron plate

The floor and plat will be slippery when getting wet due to factors such as rain and water. Special attention should be paid on inclined surfaces. Please take anti-slip measures on floor or plate before working. Please note that overlapping leaves and branches are also slippery.



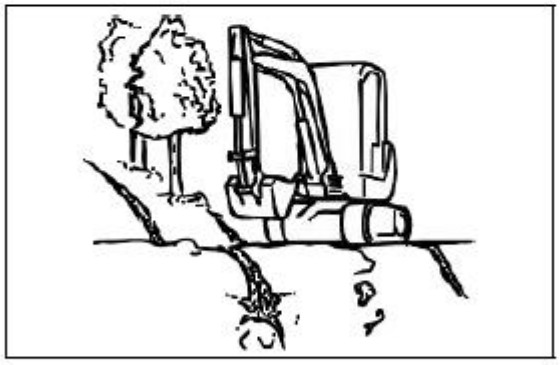
Carry out operation after the soft soil foundation is maintained

Staying on soft soil foundations and wetlands may also get the machine buried into the soil and make it difficult to drive out the machine. Please place round logs and wooden materials on the level ground to prevent the machine from sinking, and then carry out the operation. The frozen ground will make the foundation soft due to the rise in temperature.



Pay attention to the softness of foundation after rain

After rain, there is a risk of collapse of foundation, tipping of machine or falling due to the mass and vibration of the machinery. Please pay special attention to the soft foundation of cliffs and roadsides, and don't approach them unintentionally.



Pay attention to the soft foundation caused by earthquake and explosion

Please pay attention to the soft foundation and rolling rocks on cliffs and roadsides. In addition, please confirm whether there is any unexploded explosive.

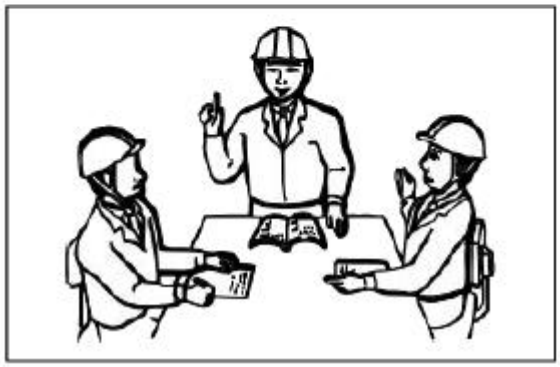
1.4 Precautions Related to Inspection and Conditioning

Understand the inspection and conditioning methods

Performing incorrect conditioning may not only cause mechanical damage, but also pose a risk of personal safety accidents (such as getting caught or burned) during conditioning. Before conducting inspection and conditioning, please read the operating instructions thoroughly, fully understand the conditioning methods (preparation made for safe operation, tools, qualifications, important components, decisions of operation commander, and wearing of protective equipment), and conduct inspection and conditioning in a safe manner.

Discuss the operation details

In order to avoid accidents caused by errors in operation, please fully discuss the operation details in advance. When the command personnel are assigned, please fully confirm the command personnel and command signals.



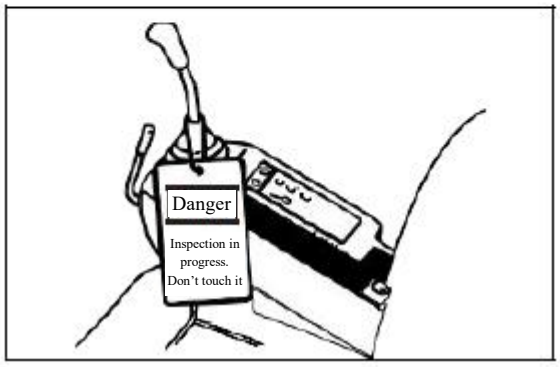
Organization, rectification and cleaning of operation site

During inspection and conditioning, in case the operation site is messy, there is a risk of injury due to falls, and debris.

Please organize the operation site, remove the lubricating grease, engine oil, paint, and debris that may hinder the operation, and carry out organization, rectification, and cleaning, so as to achieve the goal of safe operation.

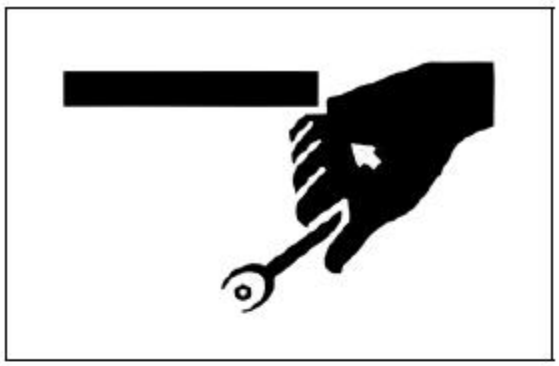
Use warning signs during inspection and conditioning

During inspection or conditioning of the machine, in case someone other than the personnel involved accidentally starts the engine and touches the joystick, a major personal safety accident may occur. Please set up a warning sign in a prominent location around the driver's seat that can be confirmed by anyone, indicating “Inspection in Progress”. If necessary, a sign may be set up around the machine body.



Use appropriate tools

It is very dangerous to use tools that are damaged or deformed, or tools that are not suitable for the original intention. Please use appropriate tools.



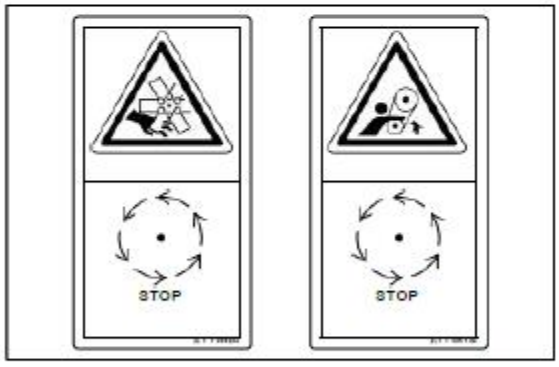
Always keep the machine clean

The oil and grease adhering to the machine are very dangerous. Please properly manage the machinery, so as to always keep it clean. In addition, in case water penetrates into the electrical system, it may cause poor operation and result in incorrect actions. Don’t use water and steam to clean various sensors, connectors, and driver's seat.

Perform inspection and conditioning after the engine has stopped

Being caught up in rotating part such as fan may cause major injury. Please wait for the rotation to come to a complete stop before carrying out conditioning.

Being caught in rotating part such as belt may cause major injury. Please wait for the rotation to come to a complete stop before carrying out conditioning.

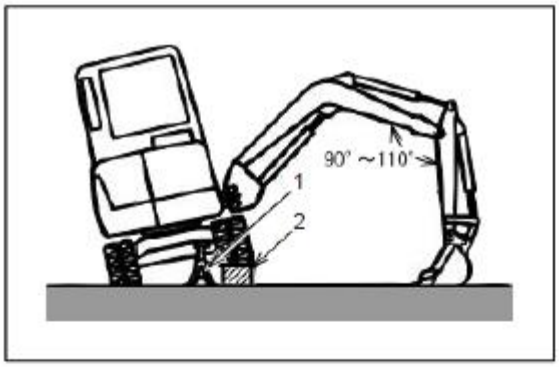


Precautions for replenishing of fuel and hydraulic oil

When replenishing fuel or hydraulic oil, please stop the engine and carry out this operation in a well-ventilated location. The spilled fuel or hydraulic oil is slippery and very dangerous. Please wipe it clean immediately. After the supplantation, please tighten the cover of fuel or hydraulic oil. Don’t use fuel for cleaning.

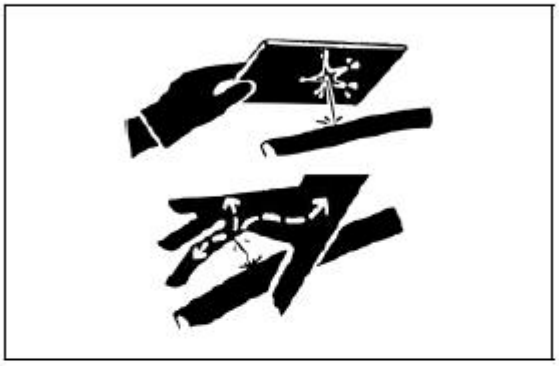
When using a jack for support

Negligence during support may cause accidents. When lifting the machine to inspect the lower travelling body, the angle between the bucket arm and the boom shall be 90-110°, so that the bottom of the bucket is grounded and the machine body is lifted. Please use safety strut (1) and safety block (2) to support the machine firmly.



Pay attention to high-pressure oil

There is usually internal pressure in hydraulic circuit. Before the internal pressure reaches zero, refueling, drain, inspection, and conditioning operations may not be carried out. Even the high-pressure oil leaking from small holes can be very dangerous when it is in contact with eyes and skin. Please wear goggles and gloves, and use thick cardboard and wooden boards to inspect the location of the leakage. In case high-pressure oil comes into contact with or enters the human body, please seek medical treatment from a professional doctor immediately.



Precautions for conditioning at high temperature and under high pressure

Opening the lid in a high temperature state may cause hot water or oil to spray out, posing a risk of burns to people. Don't open the lid when the temperature is high.

Pay attention to ventilation

There is a risk of gas poisoning when carrying out conditioning indoors and in locations with poor ventilation conditions. Especially during the inspection of engine exhaust, fuel, cleaning oil, and coatings, sufficient ventilation shall be carried out. When conditioning and driving the machine indoors, please carry out appropriate ventilation. Please extend the exhaust pipe outdoors, and open the doors and windows to allow outside air to enter. Please configure the ventilation fan as necessary.

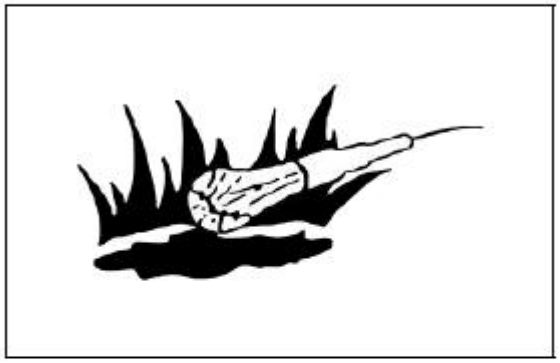
Prevent the risk of fire

During conditioning, the materials such as fuel and batteries that pose a fire hazard will be handled. To prevent the occurrence of fire:

- Please use non-flammable cleaning agents to clean components.
- Please eliminate any open flame that may cause ignition.
- Please prepare the fire extinguishers and other firefighting equipment.
- Please don't smoke during inspection and conditioning.
- When carrying out grinding and welding operations, please stay away from flammable materials.

Operation of lighting fixtures

When inspecting fuel, hydraulic oil, cooling water, and electrolyte, please use explosion-proof lighting fixtures. In case any non-explosion-proof lighting fixture is used, it may catch fire or explode.



Don't heat up hydraulic machine and piping

In case heating operation is carried out on or near hydraulic machine and piping, flammable steam and spray will be generated, which may cause fire. In case welding is carried out on or near hydraulic machine and piping, the welding gun will cause the above-mentioned components to be heated, which is very dangerous. Please absolutely prohibit such operation.

Precautions for high-altitude conditioning operation

Please don't approach the edge, since there is a risk of falling.

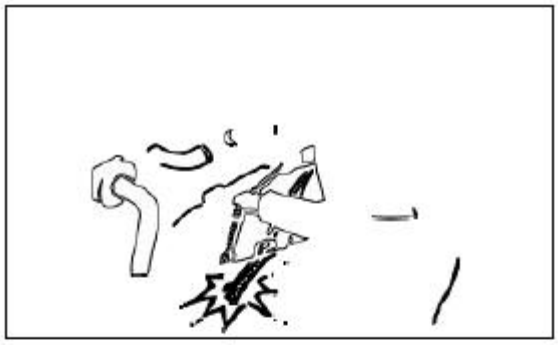
a. Please organize and tidy up the scaffolding before carrying out high-altitude conditioning operation.
   - Please don't spill oil or grease.
   - Please don't scatter tools.
   - Please be careful not to slip your feet while walking.

b. Never jump on or off the machine. Please use pedals and handrails when getting on and off the machine, and firmly support your body with your hands and feet.

c. Please use safety belts and other protective equipment according to the operation content.

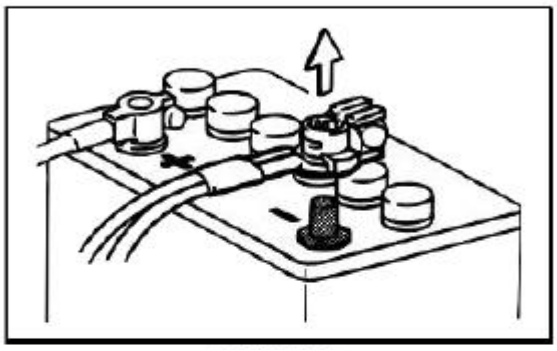
Don’t let tools and components fall off

In case an object falls, it may cause damage and mis-operation of the machine, resulting in accidents. When opening the inspection window and the fuel filling port of the fuel tank for inspection, please be careful not to drop nuts and tools into the fuel tank.



Precautions for battery

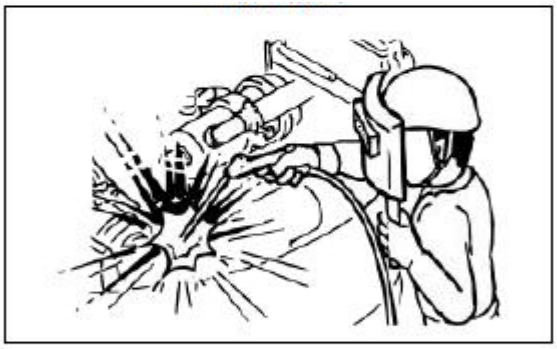
When repairing the electrical system and performing electrical welding, please remove the negative (-) terminal of the battery first, then remove the positive (+) terminal, and finally remove the battery body.



Dismantle it from the grounding end

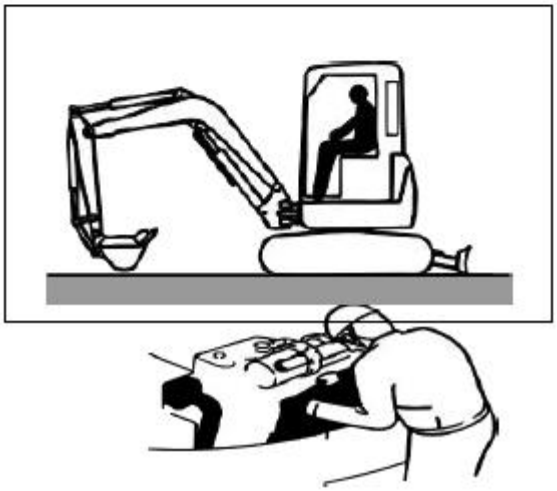
Precautions during retrofitting

We shall not be held liable for any personal accidents or malfunctions caused by retrofitting not specified by us.
When retrofitting this machine, please contact our sales agent in advance.



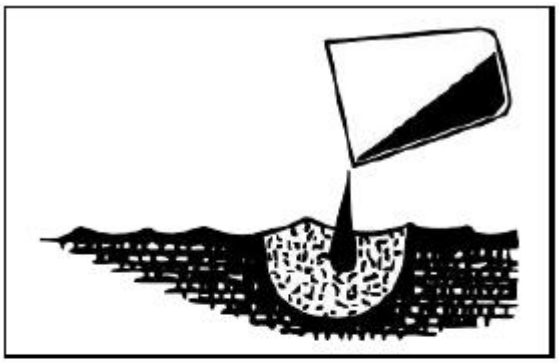
Precautions after conditioning

- After conditioning, idle the engine and confirm whether there are any oil or water leakage at the conditioning site.
- Slowly move each joystick and confirm its movement.
- Increase the engine speed, and confirm whether there is any oil or water leakage.
- Move each joystick and confirm whether there are no abnormal phenomena. Continue to carry out conditioning until you confirm that the operation of the machine is normal.



Disposal of waste liquid

When discarding the hazardous materials such as fuel, engine oil, cooling water, hydraulic oil, solvent, filter element, and battery, please follow the prescribed rules. When the machine discharges waste liquid, please use a container to store it. Don't discharge waste liquid into ground, river, lake, and sea; otherwise, it will cause environmental pollution.



Precautions for welding repair

When welding repair is carried out, the damage to electrical equipment and the heat generated during welding may lead to the production of gas from coating, posing a risk of fire. Please have qualified personnel perform welding operation in a clean location. The basic precautions during welding are as follows:

- To prevent explosion, please remove the battery.
- To prevent the production of gas from the coating on parts to be welded, please scrape it off.
- To prevent the mis-operation of the machine, please remove electronic components.
- Please use the same base material for grounding around the part to be welded.
- Please use grounding device, and ensure that there is no seal or bearing between the part welded and the grounding device.
- Please wear personal protective equipment.
- Please get the welding site well ventilated.
- Please clear away combustibles and prepare fire extinguishing equipment.

When adjusting the tension of the crawler shoes, pay attention to the high-pressure lubricating grease

High pressure is applied inside the grease cylinder, so that in case the grease injection port is suddenly loosened, the grease will spray out, which is very dangerous. When loosening the grease injection port, please slowly loosen it within one turn.

Don't carry out installation with your face, hands, and feet facing the grease injection port.

Please refer to **Page 4-20** for the key points related to adjustment of tension of crawler shoes.

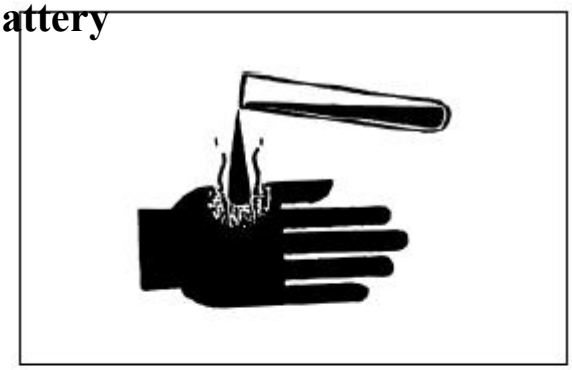
Pay attention to fragments when working with a hammer

When striking sturdy metal parts such as pins, edges, boots, and bearings, fragments may fly into eyes and cause eye injuries.

Please wear personal protective equipment such as goggles and helmets during operation.

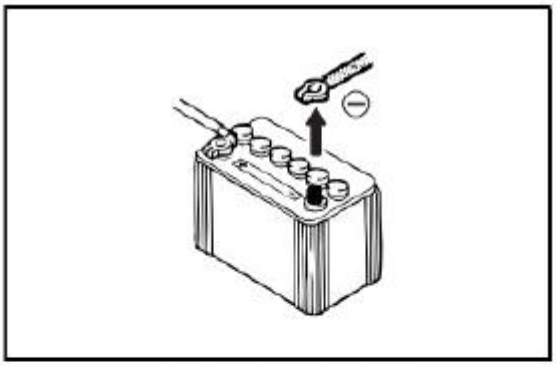
1.5 Precautions for Handling of Battery

Prevent burns from electrolyte
When handling the battery, please wear goggles, long sleeved shirts, and gloves. The electrolyte contains dilute sulfuric acid. Adhesion of electrolyte to eyes and skin may lead to blindness and burns. Therefore, in case the electrolyte accidentally adheres to your eyes or skin, please rinse the affected parts with plenty of water and seek medical treatment urgently.



Prevent explosion of battery
Hydrogen gas may be generated inside the battery, posing a risk of explosion. Please never get it close to fire. Please tighten the cover of the battery. Please install the battery terminals firmly. When charging the battery, please open the battery cover at a well-ventilated low point.

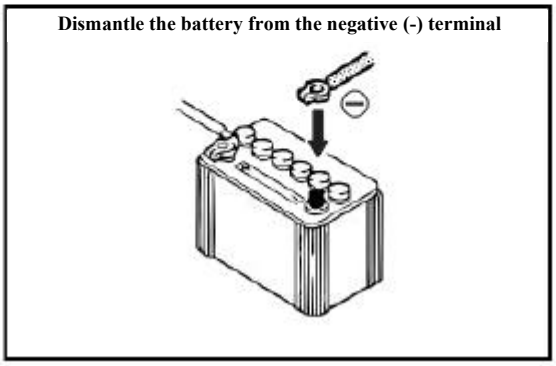
Precautions for replacement of battery
When dismantling the battery, please start from the negative (-) terminal. Conversely, when installing the battery, please start from the positive (+) terminal.
Please note that the contact between the positive (+) terminal and the machine body via tool may generate sparks.
Please don't make mistakes in the connection of the regulator cable.
Please never connect the (+) and (-) terminals. Finally, connect the (-) terminal to the upper frame.



拆卸从负极 (-) 端子开始

Dismantle the battery from the negative (-) terminal

Please refer to **Section "Start-up with Boost Cable"** below for the starting steps with regulator cable.



安装从正极 (+) 端子开始

Install the battery from the position (+) terminal

Disposal of waste battery
Please don't discard waste battery separately. Please get the waste battery recycled by sales agents or factories, and disposed of by professional personnel.

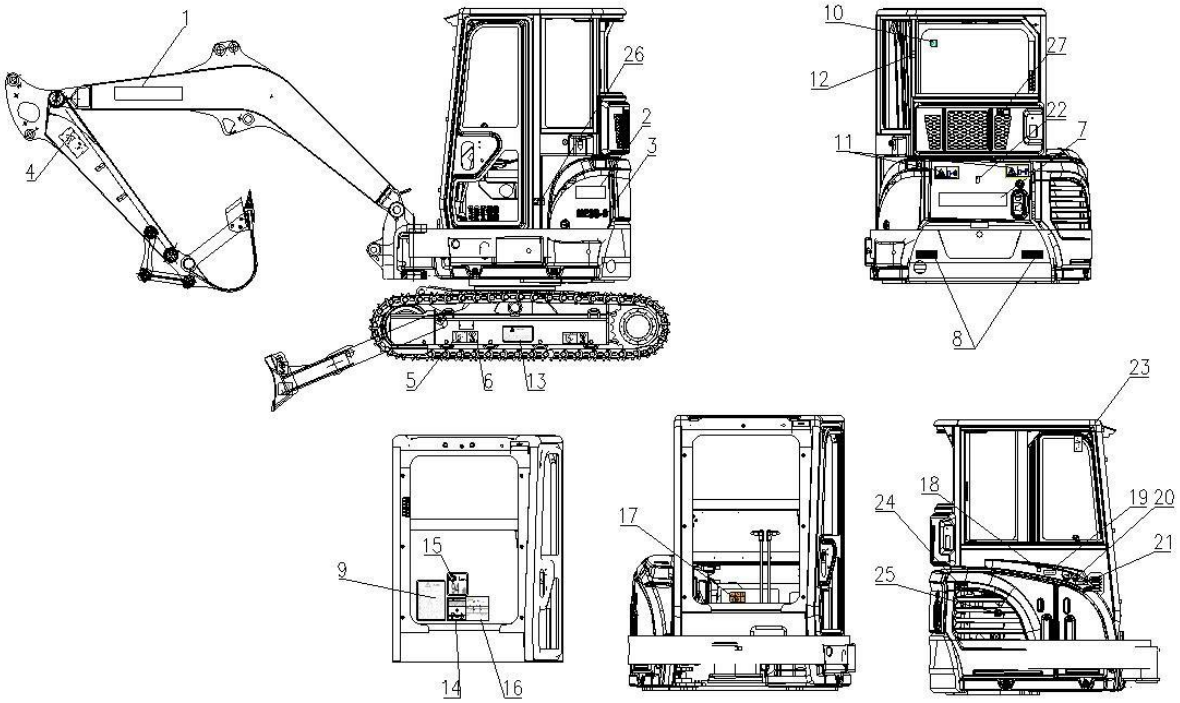
1.6 Safety Identification Labels

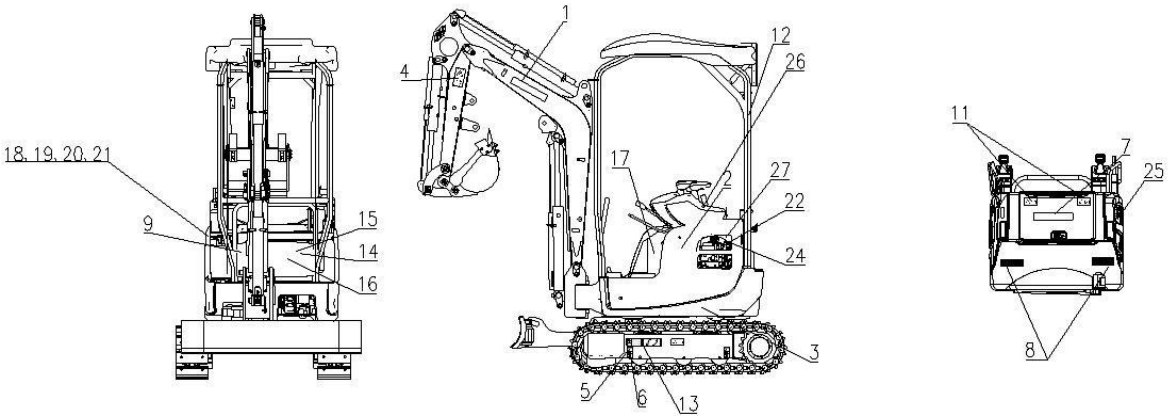
This machine is equipped with labels to prevent danger in areas that require special attention to safety. Please take sufficient time to familiarize yourself with the correct location and contents of such labels, as well as the measures to prevent dangers.

1.6.1 Operation of Safety Identification Labels

- Please don't remove the safety identification labels attached to the machine.
- Please confirm whether all safety identification labels can be read.
- When text and images cannot be seen, please wipe off the dirt on the safety identification labels. Please use cloth, water, and detergent to clear away the dirt. Please don't use organic solvent and gasoline.
- When a safety identification label is damaged, lost, or unreadable, it must be replaced. Please consult our sales agent regarding the new safety identification label.
- In addition to the safety identification labels mentioned below, there are other identification labels, which shall be handled in the same way as above.

1.6.2 Pasting Position of Safety Identification Labels





1. Brand label

Pasting Position: Boom

2. Brand label
Pasting Position: Side door

3. Model label
Pasting Position: Side door

4. Precautions for operation of attachment
Pasting Position: left and right sides of bucket arm
Figure No.: 07-90-010006
Accidentally entering the work area is very dangerous.
Please confirm whether there are no people within the scope of work before carrying out operation.
Especially when rotating the machine, please confirm the surrounding conditions in advance before rotating.

5. Binding label
Pasting Position: Lifting hole
Figure No.: 22-90-010036

6. Lifting label
Pasting Position: Lifting hole
Figure No.: 22-90-010013

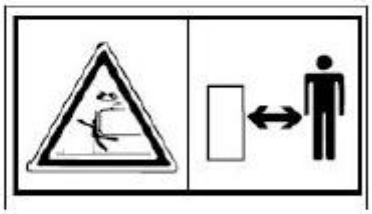
7. Counterweight brand label
Pasting Position: Counterweight

8. Reflective label on counterweight
Pasting position: counterweight
Figure No.: 02-90-000005CE (for EU)
Figure No.: 02-90-000005, 02-90-000006 (standard)

9. Warning label
Pasting Position: Inside the cab
Figure No.: 22-90-000012A
Please read the instructions before use

10. Escape exit label
Pasting Position: Rear window of cab
Figure No.: 07-90-010013
Emergency exit

11. No entry into work area
Pasting Position: Right cover plate
Figure No.: 07-90-010011
Please honk the horn before the machine and the attachments are activated, so as to urge surrounding personnel to pay attention. Please work only after confirming that no personnel have entered the scope of work.

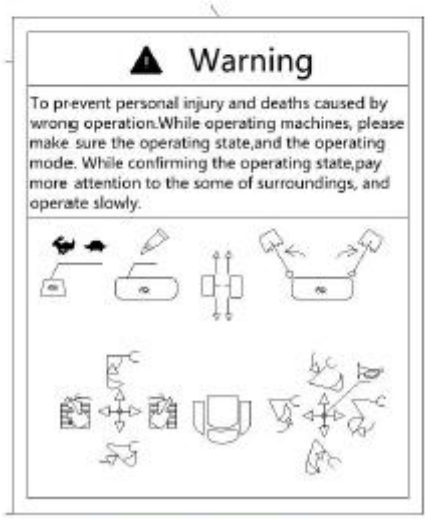


12. Fire extinguisher label
Pasting Position: Next to fire extinguisher bracket
Figure No.: 07-90-010020
Installation location of fire extinguisher

13. Warning label
Pasting Position: Outer side of crawler frame
Figure No.: 07-90-000017
Be careful not to make the machine run continuously for a long time

14. Operation label
Pasting Position: Inside the cab
Figure No.: 07-90-010018A
02-90-010020 (for 1.8T)
Standardized operation

07-90-010018A



02-90-010020

15. Noise label

Pasting Position: Inside the cab

Figure No.: 04-90-010010 (for 3.5t)

Figure No.: 02-90-010022 (for 1.8t)

Noise level

04-90-010010

02-90-010022

17. Seat belt
Pasting Position: Under the seat
Figure No.: 22-90-010037
Please properly use the seat belt

18. Hydraulic oil tank
Pasting Position: Hydraulic oil tank
Figure No.: 02-90-010013
hydraulic oil tank

19. Hydraulic oil tank
Pasting Position: Hydraulic oil tank
Figure No.: 22-90-010032A

20. Fuel tank
Pasting Position: Fuel tank
Figure No.: 22-90-000009
Fuel tank

21. Fuel tank
Pasting Position: Fuel tank
Figure No.: 22-90-010031
Fuel tank

22. Getting caught up
Pasting Position: Engine compartment
Figure No.: 22-90-010012

In case the conditioning or inspection is carried out while the fan and pulley are rotating, there is a risk of getting caught up. Therefore, please perform conditioning or inspection after the engine is stopped.

23. Warning for closing of front window
Pasting Position: Top of front window of cab
Figure No.: 22-90-010007

24. Burns

Pasting Position: Radiator duct, and engine compartment

Figure No.: 22-90-010025

When the machine has just been stopped, the hydraulic oil, engine oil, and cooling medium are in a high-temperature and high-pressure state. It is very dangerous to open the lid before the temperature drops.

25. No touch with hand

Pasting Position: Radiator air guide cover

Figure No.: 22-90-010025

26. Fastening of seat belt

Pasting Position: Buckle of seat belt

Figure No.: 22-90-010026

27. No touch

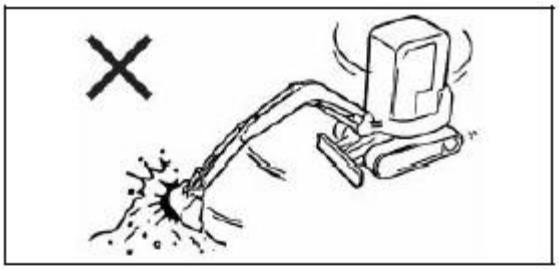
Pasting Position: Next to engine fan

Figure No.: 22-90-010028

1.7 Prohibitions for Operation

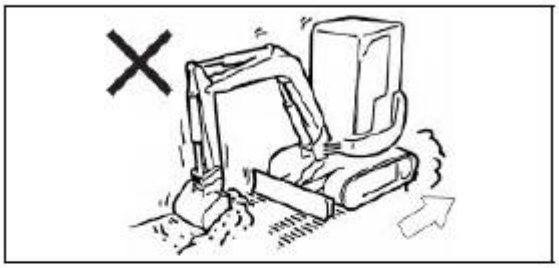
It is strictly prohibited to carry out operation with the rotational force

In case rock dragging and sidewall tapping operations are carried out with rotational force, the attachment may get damaged and the service life of the rotating device may get shortened. Please absolutely prohibit such operations.



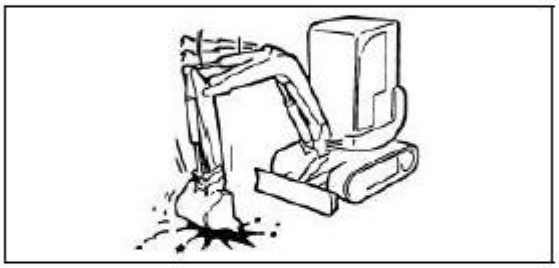
It is strictly prohibited to carry out operation with the travelling force

Please absolutely avoid using travelling force to excavate while the bucket is digging into the ground; otherwise, inappropriate force will be applied to various parts of the machine.



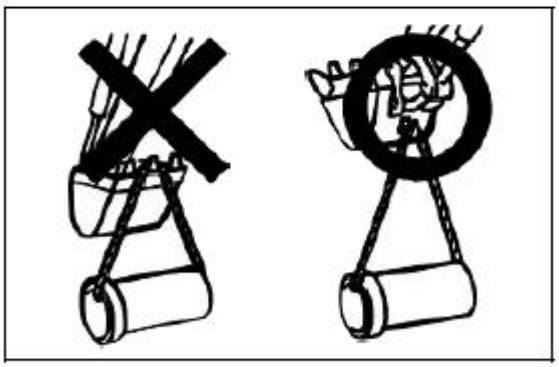
It is prohibited to carry out operation with the falling force of bucket

Please absolutely avoid using the bucket instead of a hoe or using the bucket for pile driving operation; otherwise, inappropriate force will be applied to various components of the machine.



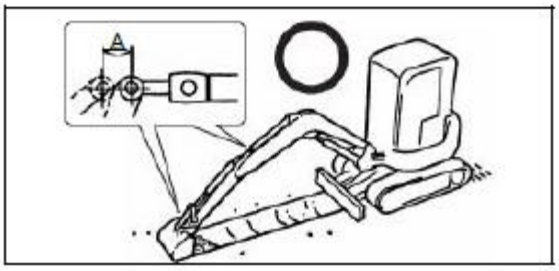
Don’t use the machines to lift weights

This machine is designed for excavation and loading, so that special attention shall be paid when lifting loads. Don’t exceed the capacity of the machine, only use the approved hanging chains, and don’t use bucket teeth to hang loads.



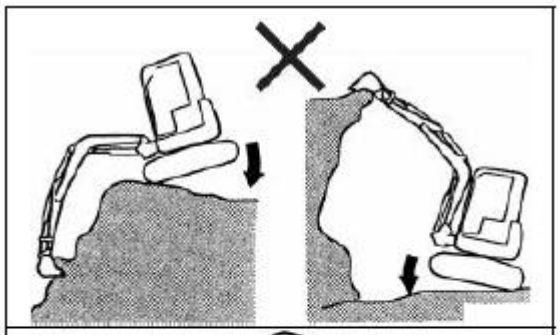
Don’t allow the hydraulic cylinder to reach the end of stroke during operation

During operation, please leave a certain amount of space (A) from the end of the cylinder. In case the hydraulic cylinder reaches the end of stroke, overloading may occur, which will not only damage the cylinder, but also damage the components such as pin, boom and bucket arm.



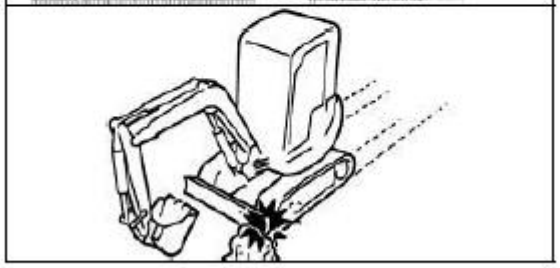
It is prohibited to carry out operation with the falling force of the machine

Please don't use the falling force of this machine for excavation. When excavating hard rocks, please use other method to divide them before excavation, which will not damage the machine and is more economical.



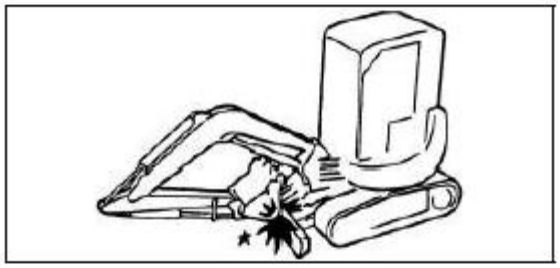
Precautions for hitting by bulldozer board

Please don't use the bulldozer board to hit rocks or other objects; otherwise, the bulldozer board bulldozer and cylinder may get damaged.



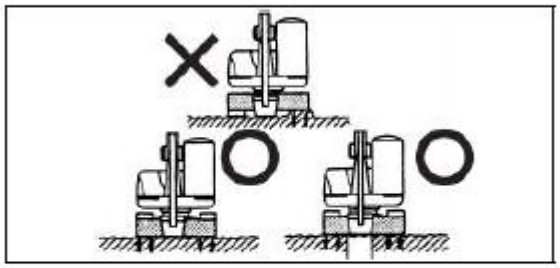
Precautions for folding of attachment

When folding the attachment into the travelling or transportation posture, please be careful not to get it collided with the bucket and bulldozer board.



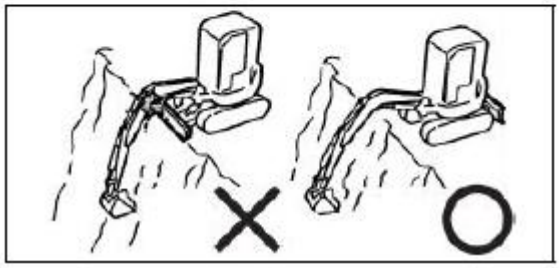
Use the bulldozer boards for support on both sides

When using the bulldozer board as a hydraulic outrigger, it is not advisable to rely solely on the single-sided support provided by the bulldozer board.



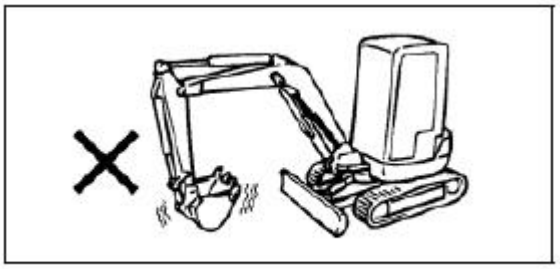
Precautions for deep excavation operation

When conducting deep excavation in front of the bulldozer plate, in order to prevent the bulldozer plate from colliding with the boom cylinder, unless necessary, please push the soil at the rear position.



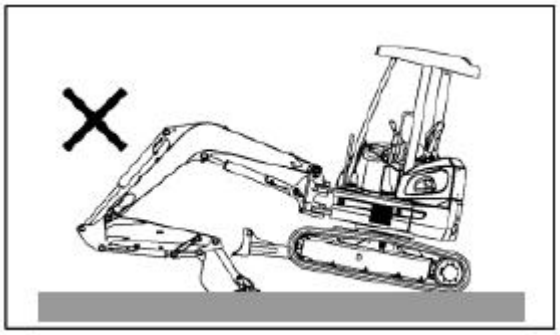
Precautions for shaking off residual soil in bucket

Please don't use the impact of the end of the bucket retracting rod to shake off the residual soil inside the bucket; otherwise, the attachment and cylinder may get damaged.



It is prohibited to lift the machine when the bucket arm cylinder reaches the end of stroke

It is strictly prohibited to lift the machine body when the bucket arm cylinder reaches the end of stroke; otherwise, the attachment and cylinder may get damaged.



It is prohibited to excavate rock formations

For hard rock formations, in case other methods are used to divide them into multiple small pieces and then excavate them, the machine will not be damaged, and the operation costs will be reduced.

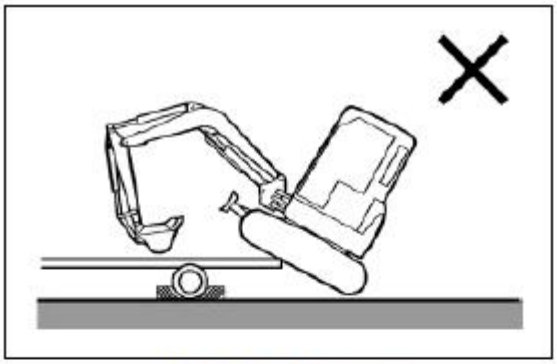
1.8 Transportation

Please note that loading and unloading operations are accompanied by danger.

A. Precautions during Loading and Unloading

Please select a flat and sturdy location for loading operation.

Please use a springboard that can support the weight of the machine. Please maintain an angle (A) of 15 degrees or less between the ground and the springboard. In addition, please confirm the width, length, and thickness required for safe loading and unloading. In case the springboard is bent, please reinforce it with safety blocks.

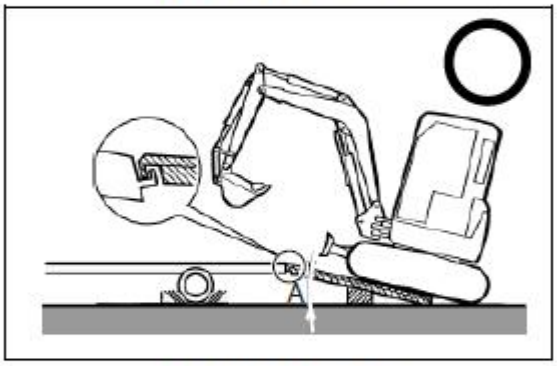


Loading and unloading with attachment

In order to prevent the lateral sliding of the machine, please remove any grease, dirt, or other objects adhering to the surface of the springboard. Please also remove the soil around the chassis of the machine.

Please don't adjust the travelling direction on the springboard. When it is necessary to correct the travelling direction, please temporarily drive the machine down from the springboard, and then make the correction.

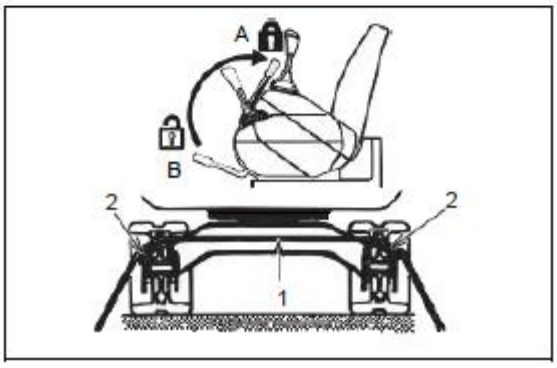
Please carry out loading and unloading operations while travelling at low speed.



Loading and unloading with springboard

After loading, please stop the engine and set the descending cut-off type safety locking rod to the locked position.

After loading, please place the brake wedges under the crawlers to prevent the machine from rotating, and use steel cables to securely fix the machine.



1. Steel cable
2. Corner stopper

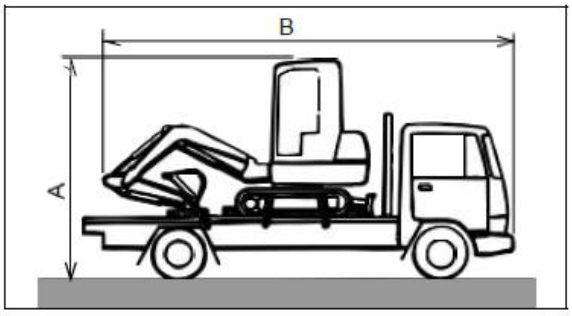
A. Locked position

B. Released position

B. Precautions during Transportation

Please transport the machine safely in accordance with the relevant laws and regulations. Please consider the maximum width, height, and weight of the machine when it is loaded onto truck or trailer for road transportation.
Please refer to **Chapter 5 "Transportation"** for loading, unloading, and fixation methods for this machine.

A. Full height
B. Full length



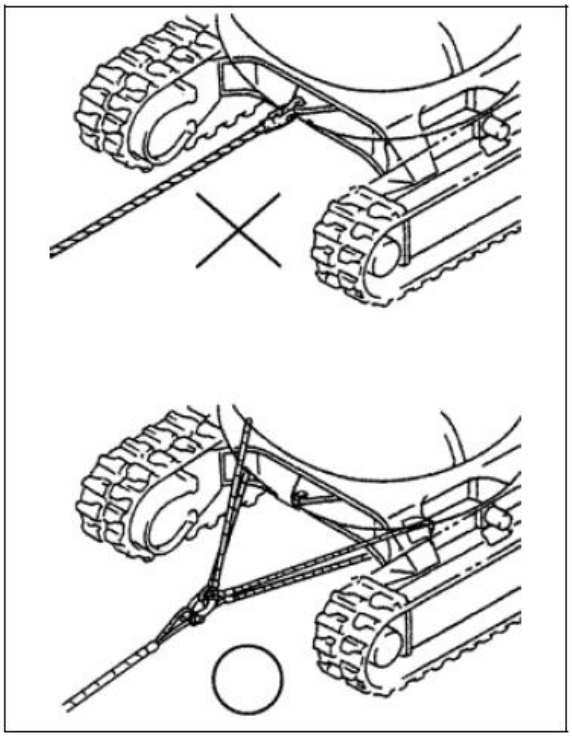
1.9 Towing

A. Towing method of machine body

When the machine is trapped in soft soil foundation and cannot be pulled out by its own strength, please use a steel cable of appropriate strength, hang it on the truck frame at the position as specified in the right figure, and use another machine to tow this machine.

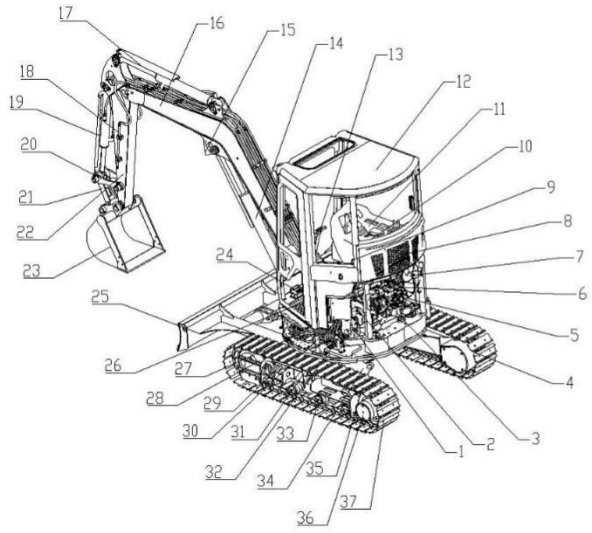
⚠Warning

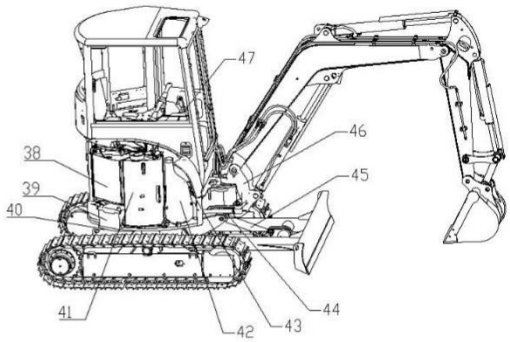
- **During towing, no person may enter between the towing machine and the towed machine.**
- **Please don't apply excessive loads to the towing steel cable.**
- **Please use a shackle when towing.**
- **The steel cable shall be horizontal or perpendicular to the crawler beam.**
- **Please operate the machine in low-speed mode.**
- **When towing the machine, in order to prevent damage to the steel cable or frame, please place stop blocks on the corners of the crawler beam.**



2. Driving Devices

2.1 Names of Machine Components





No.	Name	Symbol	Name	Symbol	Name
1	Engine	17	Bucket arm cylinder (with guard plate)	33	Load bearing wheels
2	Auxiliary water tank	18	Crushing hard pipe	34	Lower frame assembly
3	Oil filter	19	Bucket cylinder (with guard plate)	35	Chain supporting wheel
4	Right travelling motor	20	Rocker	36	Left travelling motor
5	Fuel filter	21	Connecting rod	37	Crawler assembly
6	Air filter	22	Bucket rod	38	Radiator
7	Cooling fan	23	Bucket	39	Battery
8	Air-conditioning external fan	24	Functional foot valve (left)	40	Silencer
9	Seat	25	Bulldozer shovel	41	Hydraulic oil tank
10	Armrest box	26	Foot cushion	42	Fuel tank
11	Pilot armrest	27	Main control valve	43	Central slewing joint
12	Cab	28	Guiding wheel	44	Side swing cylinder (with guard plate)
13	Travelling rod	29	Device	45	Bulldozer cylinder (with guard plate)
14	Boom cylinder (with guard plate)	30	Slewing motor	46	Skewed body
15	Lighting lamp	31	Supporting wheel	47	Descending cut-off type safety locking rod
16	Boom	32	Accumulator assembly		

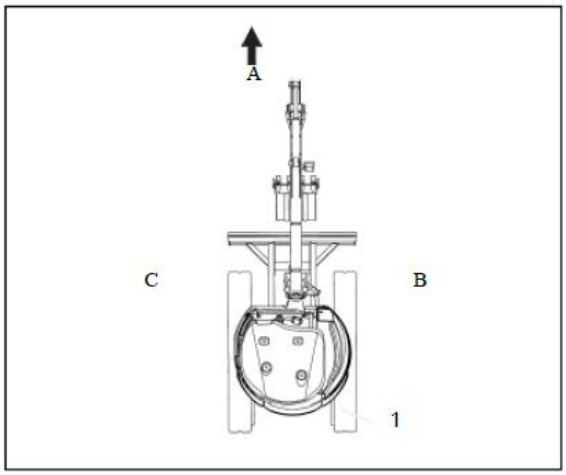
A. Designation of Front, Rear, Left and Right

In these Instructions, the front, rear, left, and right directions of the machine are determined based on the condition viewed from the cab in the forward direction when the travelling motor (1) is located at the rear.

A. Front

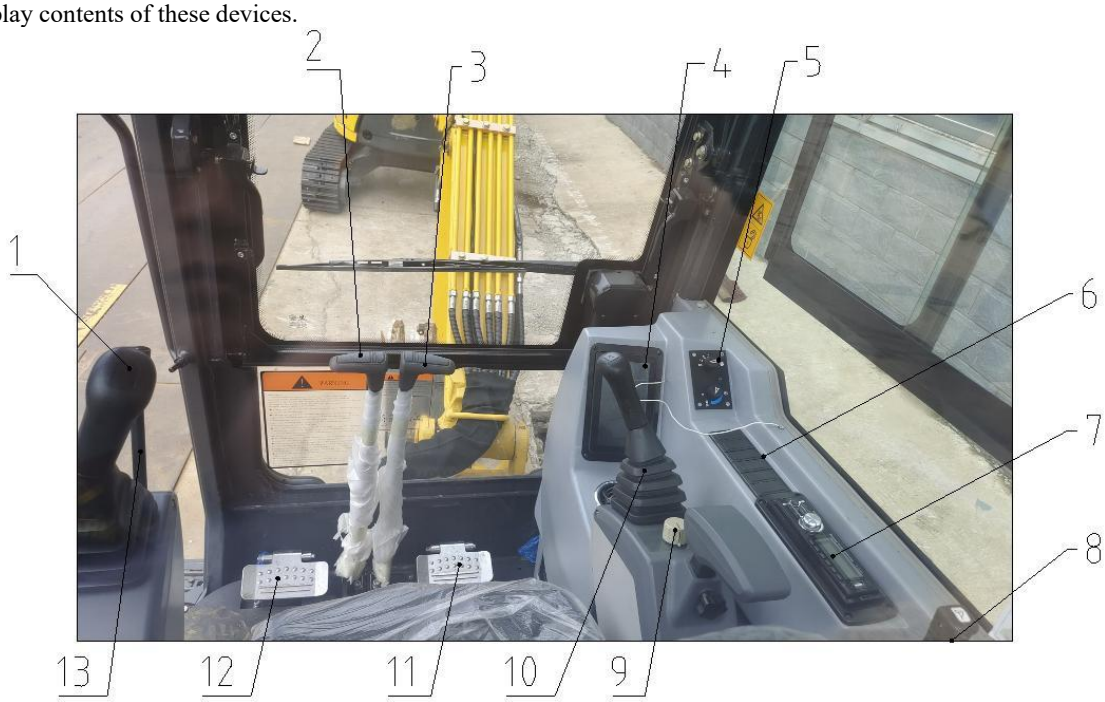
B. Right

C. Left



2.2 Configuration and Description of Driving Devices

Instructions for necessary devices for driving operations.
In order to carry out operation safely and quickly, it is important to have a correct understanding of the operation methods and display contents of these devices.



No.	Name	No.	Name
1	Left pilot joystick	9	Throttle knob
2	Left travelling rod	10	Right pilot joystick
3	Right travelling rod	11	Swing foot pedal
4	Display	12	Crushing/quick change pedal
5	Air-conditioning control knob	13	Descending cut-off type safety locking rod

6	Optional knob area	14	Backup rocker switch
7	Recorder	15	Lighting switch
8	Bulldozer shovel joystick	16	Start switch

2.3 Instructions for Driving Devices

Instructions for necessary devices for driving operations.
In order to carry out operation safely and quickly, it is important to have a correct understanding of the operation methods and display contents of these devices.

2.3.1 Configuration of Switches

1. Start Switch

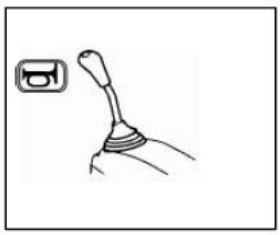
Used for start or stop of engine. **HEAT**:
When it is difficult to start the engine in cold weather, please place the key in this position. As a result, the preheating will be carried out for about 15 seconds.
OFF:
The position where the key can be inserted or removed. When the switch of electrical system is turned off, the engine will stop.
ON:
The current will flow into all circuits. Please insert the key in this position while driving the machine.
START:
In order to start the engine, set the key to the position "START". After the engine is started up, please remove your hand from the key. The key will automatically return to the position "ON".

2. Travelling Speed Switch

You can select either high travelling speed (2nd speed) or low travelling speed (1st speed) via the switch on the display. When the start switch is turned from "ON" to "OFF", the speed will be automatically adjusted to low level.

⚠Warning

Please use a low travelling speed when driving the machine downhill and loading/unloading the machine on or off truck or trailer. In case the stability of the machine is suddenly changed, it may tip over.



Please use it when the machine is travelling on soft soil road, on slope or in narrow area, or when significant towing force is required.

Please use it when the machine is travelling on a flat and sturdy surface.

3. Horn Switch

Caution

Before starting the machine, please sound the horn, so as to alert the people in surrounding area.

4. Working Lamp Switch

When this switch is pressed down, the working lamp on boom and the working lamp in driving shed/ cab will be turned on. You can also set them through the touch switch on the display.
OFF Position: The lamp will be turned off.
ON Position: The working lamp on boom and the working lamp in driving shed/ cab will be turned on.

5. Heater Switch (Optional) Please use it when the heating function is used in the cabin.
OFF Position: Turned off
ON Position: The fan of the heater will rotate.

The method of heating with engine cooling water is adopted. In case the cooling water has no heat, no warm air will be emitted.

6. Wiper Switch (Cab/Optional)

Rotate the switch to activate the windshield wiper and spray out the washer fluid.

Rocker button in left figure: The washer fluid will be sprayed.
OFF Position: The wiper will stop.
ON Position: The wiper will move.
Rocker button in right figure: The wiper will move and spray out the washer fluid.

In case the water sprayer is used continuously for more than 20 seconds, or in case it continues to be used when the washer fluid cannot be sprayed, the motor of the water sprayer will malfunction.

Caution

In case the travelling alarm does not sound when the travelling rod is operated, please stop the engine immediately and get it repaired by the nearest service provider designated by us. In case the operation is still carried out after the travelling alarm malfunctions, a major accident may occur.

2.3.2 Configuration and Action of Rods and Operating Pedals

No.	Name	No.	Name
1	Left pilot joystick	9	Throttle knob
2	Left travelling rod	10	Right pilot joystick
3	Right travelling rod	11	Swing foot pedal
4	display	12	Crushing/quick change pedal
5	Air-conditioning control knob	13	Descending cut-off type safety locking rod
6	Optional knob area	14	Backup rocker switch
7	Recorder	15	Lighting switch
8	Bulldozer shovel joystick	16	Start switch

1. Descending cut-off type safety locking rod

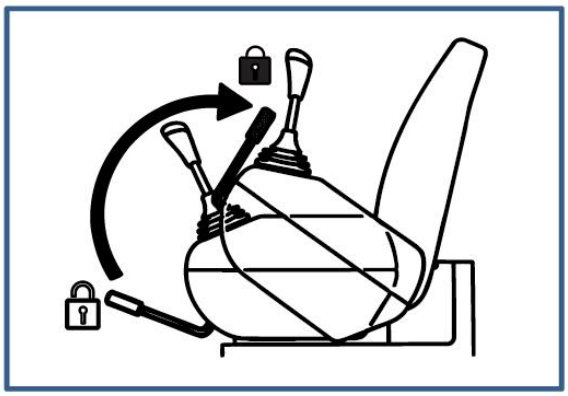
Even if your body accidentally touches the left and right joysticks and travelling rods, the machine will not start due to the equipped locking device.

⚠Warning

- **During driving, you may touch a joystick while standing or moving, inadvertently causing it to move. Please confirm that the descending cut-off type safety locking rod is in the "locked position", and that the boom axis rotation pedal is also in the "locked position" before standing or moving.**
- **Even when the descending cut-off type safety locking rod is in the "locked position", the boom axis rotation pedal cannot be locked.**
- **In case the descending cut-off type safety locking rod is indeed in the "locked position", it cannot be locked. Please confirm the state of the "locked position" as shown in the right figure.**
- **After completing the operation or during transportation, it must be set to the "locked position".**

Hydraulic function · Locking (A)

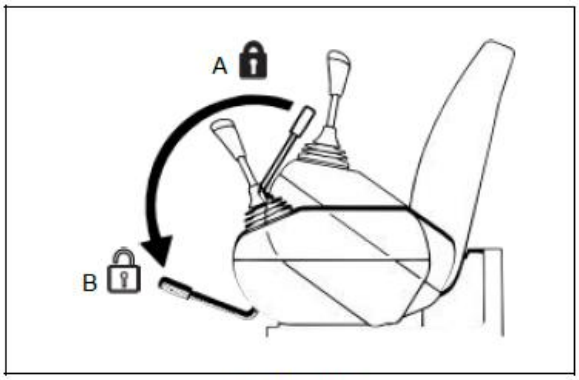
When the descending cut-off type safety locking rod is pulled upwards to the "locked position", the hydraulic function will be blocked.



- **When the left and right joysticks are in the hydraulically-locked position, even if the joysticks are moved, the attachment or rotary motor cannot operate.**
- **The descending cut-off type safety locking rod is only installed on the left side.**

Hydraulic function · Locking release (B)

When the rod is pushed downwards to the "locking release position", the locking of hydraulic function will be released.



Locking release position

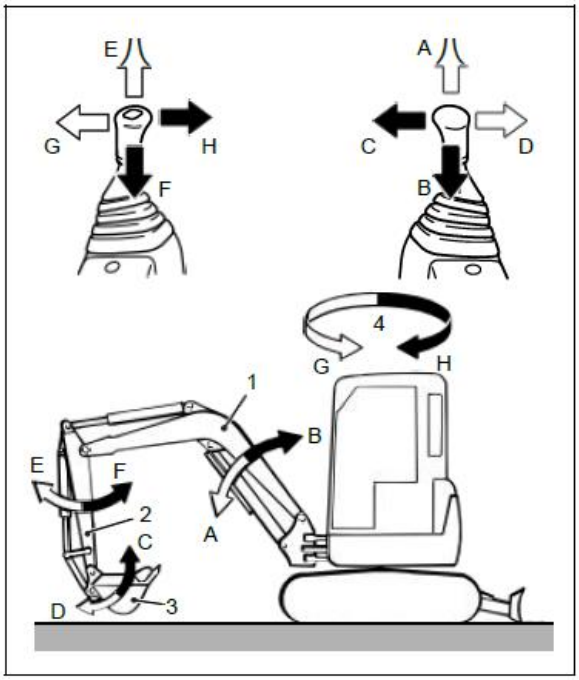
2. Joystick (ISO Operation Mode)

Perform each operation on the left and right joysticks as shown in the right figure.

⚠Warning

- **Before starting the operation, please confirm the safety in the surrounding area, slowly operate each joystick, and fully confirm whether the operation mode recorded on the operation mode label is consistent with the action of the machine.**
- **In case the content of the operation label is inconsistent with the action of the machine, but the operation is still carried out, major personal accidents may occur.**
- **When the label content is inconsistent with the action of the machine, please replace the label with the correct content that conforms to the action of the machine.**

When the joystick is released, it will return to the central position, and the action of each attachment will stop. Additionally, various operations can be performed simultaneously.



ISO operation mode

Left joystick			Right joystick		
2	E	Extension of bucket arm	1	A	Descending of boom
	F	Excavation by bucket arm		B	Rising of boom
4	G	Leftward rotation	3	C	Excavation by bucket
	H	Rightward rotation		D	Extension of bucket

3. Travelling rod

The travelling rod can be operated to move the machine forwards and backwards.

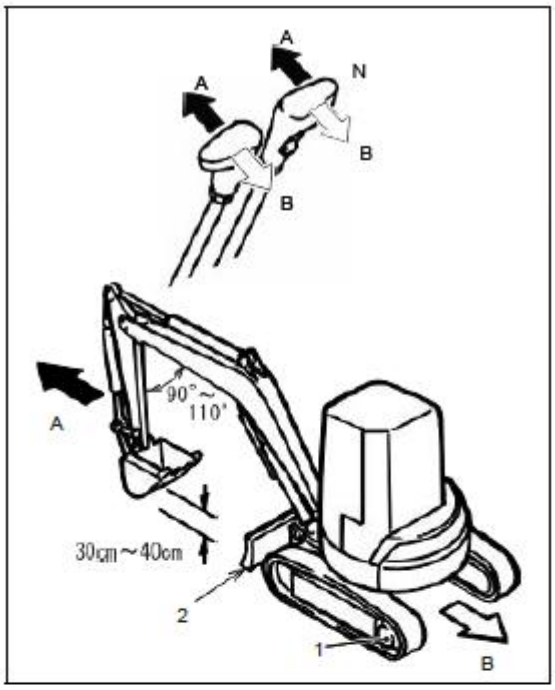
Warning

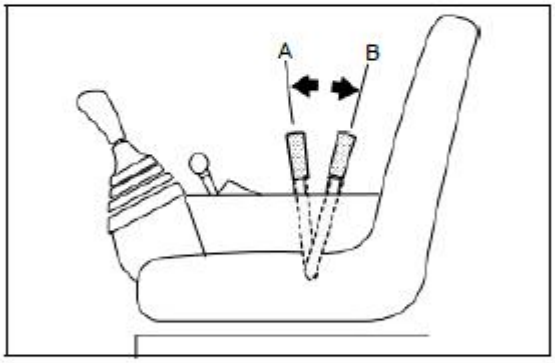
- **When the machine is travelling, please pay attention to various joysticks. In case any joystick is accidentally touched and thus the machine rotates or the attachment is operated, accidents may occur.**
- **When operating the travelling rod, please confirm the direction of the crawler beam. When the travelling motor is in front, please operate the travelling rod in the reversed direction.**

A: Moving forwards (simultaneously press down the left and right rods)
B: Moving backwards (simultaneously pull back the left and right rods)
N: Neutral (the machine will be stopped)

1. Travelling motor
2. Bulldozer board

Please refer to Section **"Key Points of Driving Operation"** on **Page 3-17** for the direction changing method.





4. Joystick

Adjustment of engine speed (output).
A: LO (low-speed idle)
Push the joystick to the foremost position. (The speed will be low)
B: HI (high-speed idle)
Pull the joystick to the rearmost position. (The speed will be maximum)

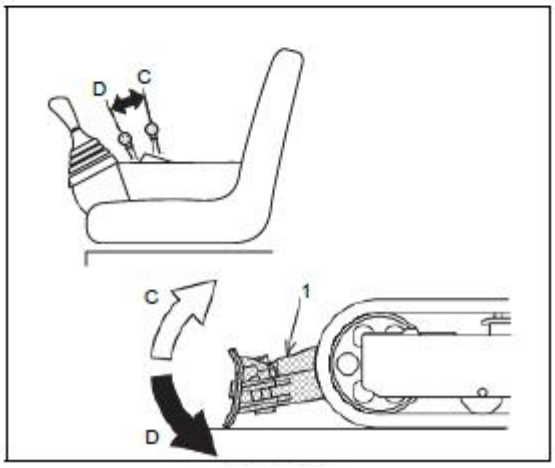
5. Bulldozer board joystick

This joystick is used to operate the bulldozer board (1) upwards and downwards.

Warning

- Even if the descending cut-off type safety locking rod is in the "locked position", it cannot lock this joystick.
- Please don't touch the joystick when it is not intended to operate the bulldozer board. In case this joystick is accidentally touched, major personal safety accidents may be caused.

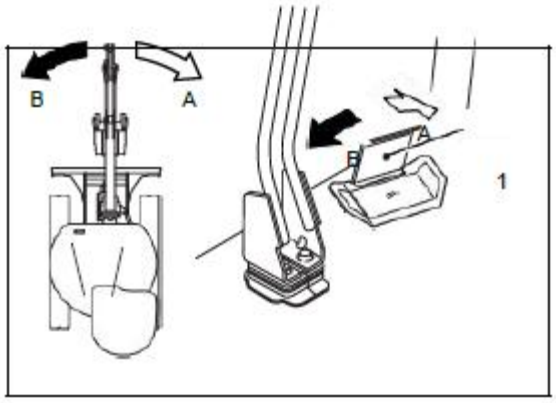
C: Lifting of bulldozer board (pulling backwards)
D: Lowering of bulldozer board (pushing forwards)



Operation of bulldozer board

6. Boom axis rotation pedal

This pedal is used to rotate the boom axis.



⚠Warning

When you don't intend to perform the arm axis rotation operation, please set the pedal to the locked state. In case the unlocked pedal is accidentally touched, major accidents may be caused.

A: Right axis rotation (stepping on the pedal with right foot)
B: Left axis rotation (stepping on the pedal with left foot)

The method for locking the pedal is to push the cover on the pedal forwards.

7. Optional pedals (crushing/hydraulic hammer/hydraulic pliers)

This pedal is used for operation when any external attachment is used.

⚠Warning

When no operation of pedal is required, please keep the pedal locked. Accidentally touching the unlocked pedal may cause major accidents.

Please refer to **Chapter 7 "Optional Parts"** for instructions on hydraulic hammer.

2.3.3 Wearing of Seat Belt

A. Method for fastening and removing the seat belt

1. After confirming that the seat belt is securely fastened, insert the buckle with a "click" sound.
2. Adjust the seat belt until it is securely fastened.
3. Press the red button (1) on the buckle, so as to remove the seat belt.

⚠Warning

In case the seat belt is not properly fastened, it cannot function properly.

- **Please confirm whether the mounting bracket of seat belt and the seat belt are abnormal before fastening the seat belt.**
- **Inspect whether the metal bolts used to install the seat are loosened, and in case any bolt is loosened, tighten it promptly.**
- **After prolonged use, in case the seat belt is damaged or fuzzy, or in case the metal parts are damaged or deformed, please replace the seat belt.**

2.3.4 Operation of Cab

A. Locking of cab door

⚠Caution

Please lock the opening and closing sides of the car door accurately during operation. It is very dangerous not to lock the cab door for the convenience of opening and closing. This is also the cause of malfunction.

Locking of cab door when it is opened: Please ensure that the cab door is fully opened until it is locked by the door latch behind the cab.

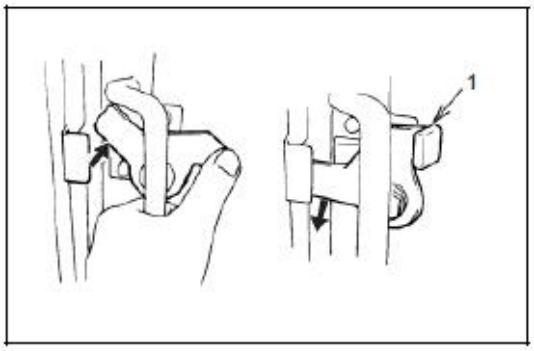
1. Door latch
2. Door handle
3. Key

B. Unlocking of cabin door

- When you want to open the door from the inside:
  Pull the lever (1) backwards, so as to open the door.
- When you want to unlock the door from the outside:
  Pull the door handle, so as to unlock the door.

C. Retraction of front window (upper half)

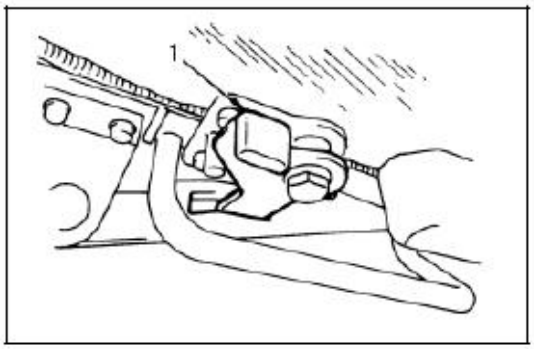
The front window (upper half) can be retracted and folded on the roof.



⚠Caution

Please open and close the front window when the machine is in a horizontal position and confirm its locked state. Especially when it is unlocked in a forward leaning position, the front window will fall down, which is very dangerous.

1. Park the machine at a horizontal position.
2. Press the locking rods (1) on the left and right sides of the front window (upper half) inwards, so as to unlock it.
3. Press the locking rods (1) on the left and right sides of the front window (upper half) inwards, so as to unlock it.
4. When closing the front window (upper half), please implement the steps 1-3 in reversed sequence.



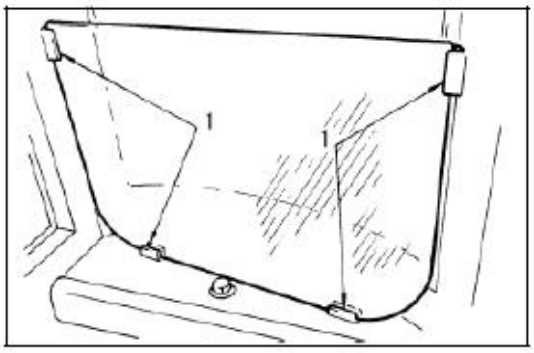
⚠Caution

When closing the front window, please slowly lower the window and be careful not to pinch your hands. Carrying out operation with the front window not locked or not fully locked is extremely dangerous. Please confirm its locked state.

D. Retraction of front window (lower half)

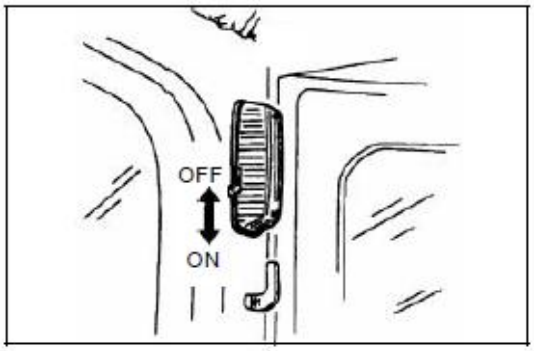
For the safe storage of the front window (lower half), please retract it onto the bracket (1) behind the cab.

1. Please lift the front window glass and remove it from the window frame.
2. The retraction method is to insert the front glass into the track of the rear glass.



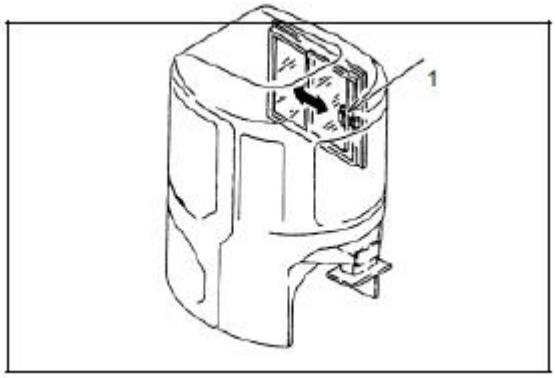
E. Indoor lamp

Please operate the switch according to the intended use.
ON: The lamp will be turned on.
OFF: The lamp will be turned off.



F. Opening and closing of right window

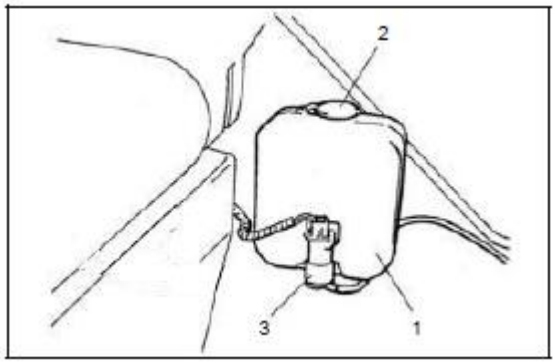
1. Unlock (1) and push the sliding glass.
2. Please close the window. Please lock it after it returns to the normal position.



G. Replenishing of washer fluid

The washer fluid tank is installed in the left rear of the cab.

1. Inspect the liquid level in the washer fluid tank (1).
2. When the liquid volume is low, please open the box cover (2) and replenish the specific washer fluid.
   1) Washer fluid tank
   2) Cover
   3) Motor



2.3.5 Protective Devices and Covers with Locks Attached

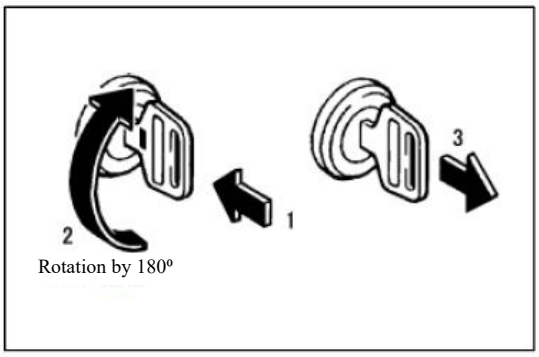
⚠Caution

Before opening the engine protection device or radiator cover, please stop the engine.

Install the locking devices for engine hood, fuel supply port, right cover plate, and cab door (optional).
Please use the key to turn on and off the devices.

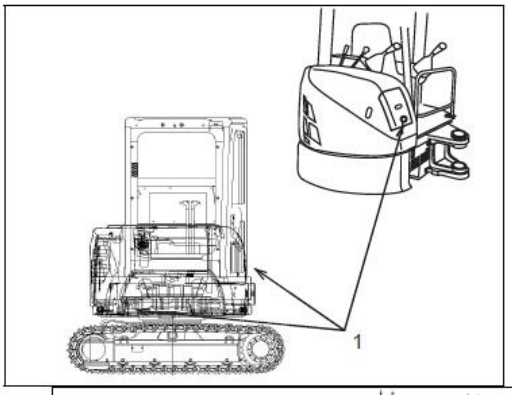
A. Opening

1. Insert the key.
2. After unlocking the device, remove the key and open the cover.
3. Use a piston rod to secure the cover while it is opened.



B. Locking

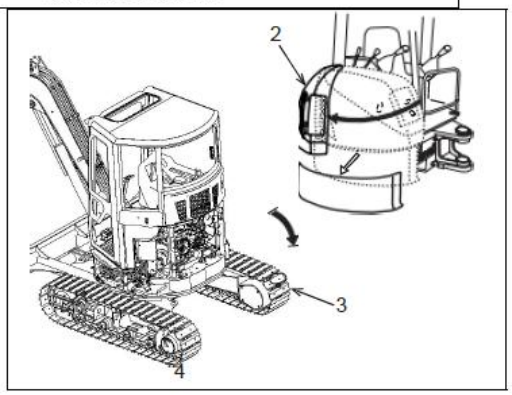
1. After the piston rod returns to its original position, fix it onto the bracket.
2. Open the cover.
3. Turn the key counterclockwise and remove it.
   Confirm that the key is inserted into the bottom position, and then turn the key. In case the key is turned halfway, it may get worn. Unless the protective device is left opened, it must be locked with key.



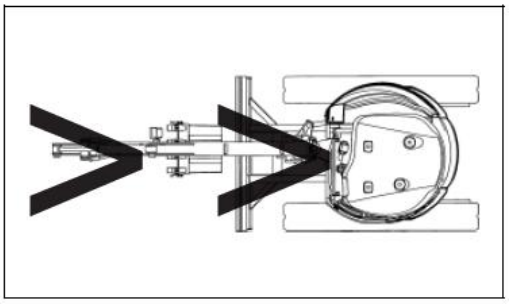
C. Opening and closing of protective devices and covers

As shown in the right figure, during inspection, conditioning and replenishing of lubricating grease, please follow the instructions to open the protective device or cover for inspection and conditioning.

1. Lock
2. Right cover plate
3. Engine hood
4. Left cover



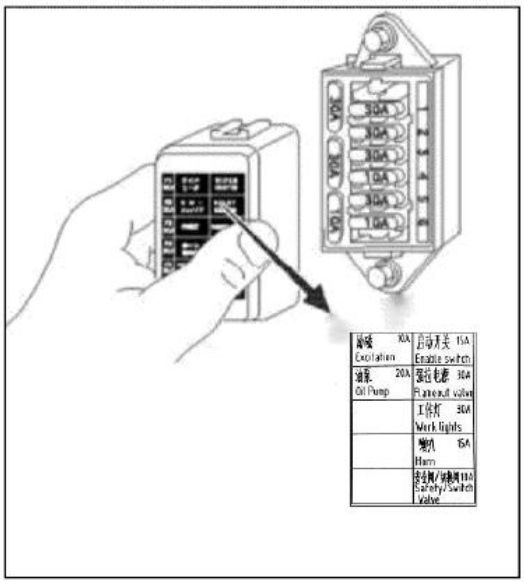
2.3.6 Electrical Equipment



A. Working lamp

In order to provide lighting for operation at night and other situations with poor visibility, this machine is equipped with two working lamps on the attachment and the driving shed. If the working lamp switch on the monitoring panel is pressed down, the working lamps will be turned on.

B. Fuse box (main)



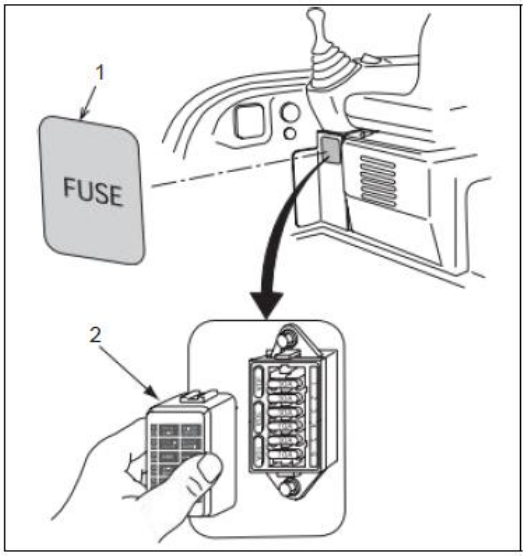
Caution

Before replacement of fuse, the start switch must be in the position "OFF" and the engine must be stopped.

Properly protect the electrical wiring and electrical equipment from burning due to excessive current. When the electrical system is not functioning properly, it may be due to a blown fuse. Please replace the fuse with a new one. In case the fuse is corroded and white powder appears, or in case there is looseness between the fuse box and the fuse, please carry out replacement.

The spare fuse is kept inside the fuse box.

C. Key points for replacement of fuse



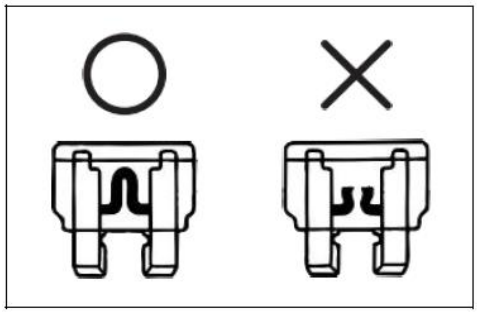
Caution

In case the newly replaced fuse is cut off immediately and frequent replacement is required, it indicates a malfunction in the electrical system. Please entrust us or our sales store to carry out repair or replacement.

The main fuse box is installed below the right joystick as shown in the right figure.

1. Please lower the bucket onto the ground.
2. Please set the descending cut-off type safety locking rod to the locked position.
3. Set the start switch to the position "OFF" and stop the engine.
4. Please remove the buckle (1).
5. The lid of the fuse box (2) can be locked individually. Please remove the fuse box lid after releasing it.

6. In case the fuse is in the disconnected state as shown on the right figure, please replace it with the spare fuse in the fuse box.



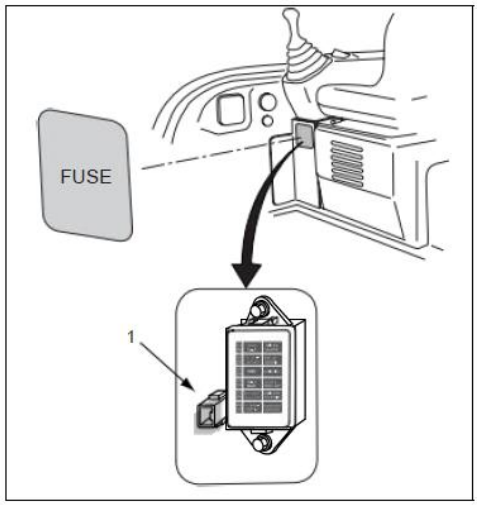
7. Replace the fuse until you hear a "pop" sound, which means that the fuse is embedded into the locking position on the lid.

- **Replace the fuse with the same capacity.**
- **The use of iron wire, or paper coated with silver foil is the cause of overheating and burning of wire.**

D. Fuse wire (for start-up)

In case the power supply cannot be connected even if the start switch is in the position "ON", the fuse wire may be broken. Please inspect and replace it.

1. Fuse wire (red connector)



A fuse wire is a large fuse wire installed in a circuit through which the heavy current flows. Like ordinary fuses, it protects electrical equipment and electrical wiring from burning due to abnormal current.

E. Display

Figure 1 shows the main interface of the JK5100HS 7-inch touch display control terminal which has been powered on. It can be divided into two display areas: state/operation display area and instrument parameter display area.

Figure 1: Main Interface

E1. State/operation display area

(1) Indication of pilot switch

The corresponding indication will be given according to the state of the machine's pilot safety lock. When the pilot lock is pulled up, will be displayed; when the pilot lock is pushed down, will be displayed.

(2) Indication of preheating signal

The corresponding indication will be given according to the preheating state of the machine. When the machine is in preheating process, will be displayed; when the machine is not in preheating process, will be displayed.

(3) Air filter blockage alarm (reserved)

The corresponding indication will be given according to the state of air filter blockage alarm. When the air filter is blocked, will be displayed; when the air filter is not blocked, will be displayed.

(4) Charging alarm

The corresponding indication will be given according to the state of charging alarm. Where there is a charging alarm, will be displayed; when there is no charging alarm, will be displayed.

(5) Oil pressure alarm

The corresponding indication will be given according to the state of oil pressure alarm. When there is an oil pressure alarm, B will be displayed; when there is no oil pressure alarm, will be displayed.

(6) Display of date (Beijing time)
The year, month, and day information will be displayed according to the set local Beijing time.

(7) Display of time (Beijing time)

The hour, minute, and second information will be displayed according to the set local Beijing time. 

(8) Indication of cooling water temperature (CAN communication)
The corresponding indication will be given according to the current cooling water temperature of the machine, and the display range of the icon  is 35℃-140℃.

(9) Indication of fuel level (AI05) 
The corresponding indication will be given according to the current fuel level percentage of the machine. The display range of the icon is 0%-100%, with the indication of 1-0 working hours
The icons in the icon area will flash alternatively when the machine starts timing, and the icon area will remain unchanged after stop of timing.
The indication will be given according to the current cumulative timing. The display range is from 0h to 999999.9h, accurate to 0.1h. The fault alarm is displayed in text.

(10) Working lamp switch
When the machine is powered on, the working lamps will be turned off by default, and the working lamp switch will be display as  . After the working lamp switch is pressed, the working lamp switch will be displayed as  , indicating that the working lamps are turned on. In case the working lamp switch is pressed again, the working lamp switch will return to the off state.

(11) Wiper switch

When the machine is powered on, the wiper switch will be turned off by default, and the wiper switch will be displayed as  . After the wiper switch is pressed, the wiper switch will be displayed as  , indicating that the wiper is in motion. After the wiper switch is pressed again, the wiper switch will return to the off state.

(12) Menu button
After the menu button  on the main interface is pressed, the main menu page will pop up. After the menu button on the main menu page is pressed, the display will return to the main interface.

(13) High/low speed switch
When the machine is powered on, the high/low speed switch will be at the low-speed state by default, and the high/low speed switch will be displayed as  . After the high/low speed switch is pressed, the high/low speed switch will be displayed as  , indicating that the machine has switched to high speed. After the high/low speed switch is pressed again, the high/low speed switch will return to the low-speed state.

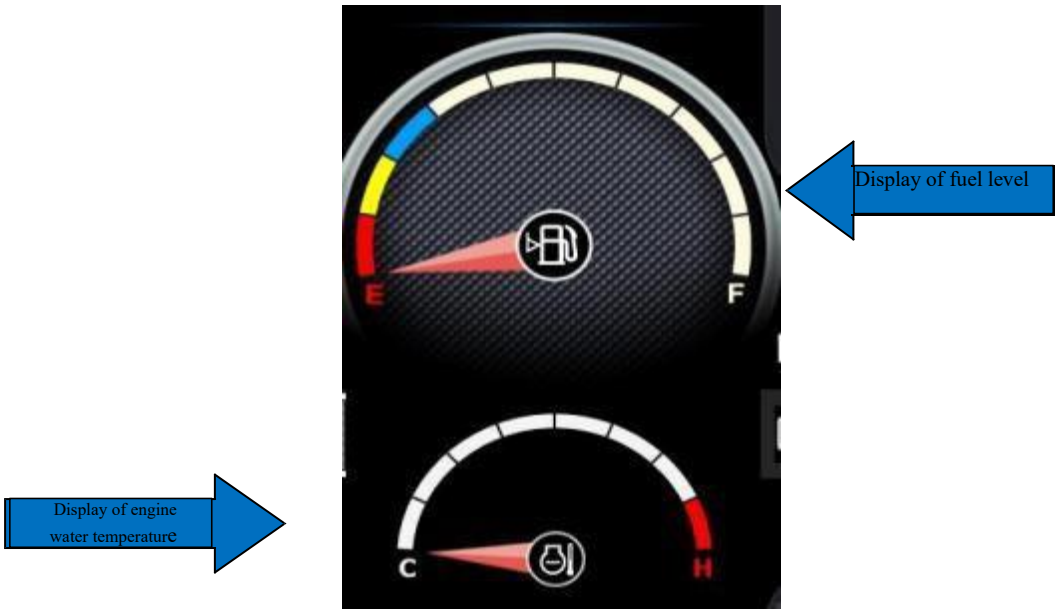
(14) Wiper spray switch
When the machine is powered on, the wiper spray switch will be turned off by default, and the wiper water spray switch will be displayed as  . When the wiper spray switch is pressed, the wiper will spray water continuously, and the wiper spray switch will be displayed as  , indicating that the wiper is spraying water. After the wiper spray switch is pressed again, the wiper spray switch will return to the off state.

(15) Buzzer mute button
When the instrument buzzer does not sound, the buzzer mute button will be displayed as  . At this time, there will be no effect if this button is pressed.

When the buzzer is not beeping, the buzzer mute button will be displayed as  . When the instrument buzzer is beeping, the buzzer mute button will be displayed as  . At this time, the instrument buzzer will be muted if this button is pressed, and thereafter the buzzer mute button will be displayed as  . After the buzzer mute button is pressed again, the buzzer will return to the beeping state.

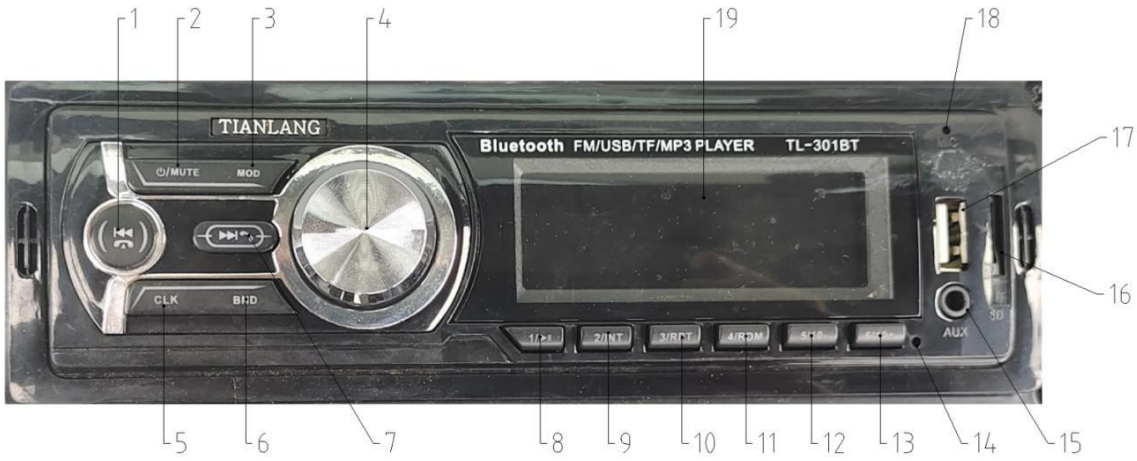
(16) Idle state
When the machine is powered on, the idle state will be allowed by default, and the icon will be displayed as  . When the idle state is turned off, the icon will be displayed as  .
(17) Homepage video
When the machine is powered on, the homepage video will be turned off by default. The homepage video can be turned on and off by clicking the icon.

E2. Intermediate instrument display area



Water temperature gauge in the central instrument display area in Figure 2: Its display range is 35-140℃;
Oil Level Gauge: Its display range is 0-100%.

F. Radio



Description Table of Radio Functions

No.	Name	No.	Name	No.	Name
1	Previous track/hang-up	8	Pause/play	15	AUX audio input
2	Power button/mute	9	Browse and play	16	SD card slot
3	Mode changeover	10	Randomly play	17	USB interface
4	Volume knob/fore and aft adjustment	11	Repeat	18	Microphone
5	Time button	12	Previous folder	19	Display
6	Waveband changeover	13	Next folder		
7	Next track/answer	14	Air hole		

3. Driving Operations

3.1 Driving Operations

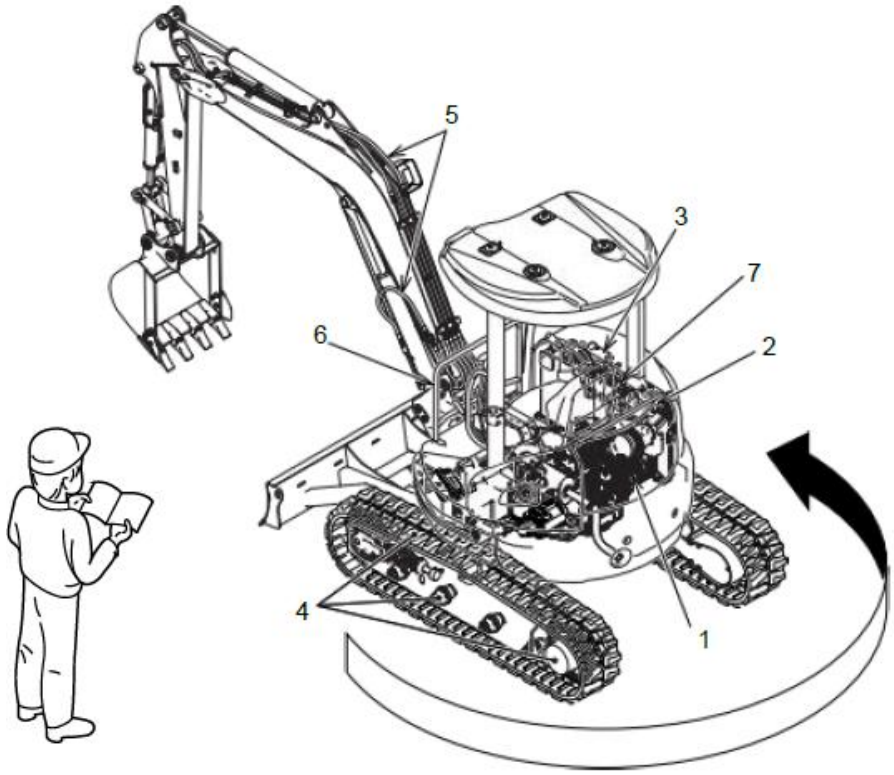
3.1.1 Inspection before Start of Engine

Please carry out inspection before starting the engine.
Before starting the engine, please inspect the surroundings of the machine, loosen the flat head screws and nuts, inspect the hydraulic oil, fuel, and cooling water for leakage, and inspect the state of the attachment and hydraulic system. Please also inspect whether the electrical wiring is loosened and whether there is dust on high-temperature parts.

A. Daily inspection

⚠Caution

Durin the daily inspection, it is necessary to not only refer to the monitoring panel, but also step out of the driver's seat and carry out inspection in accordance with these Operating Instructions.



1. Please inspect the engine for oil, fuel, and water leakage. In case there is any abnormality, please carry out repair.
2. Please inspect for foreign matters around the engine and in the radiator. In case there is any foreign object, please clear it away.
3. Please inspect the hydraulic machine, hydraulic oil tank, hoses, and joints for oil leakage. In case there is any abnormality, please repair the location of oil leakage.
4. Please inspect the underside of the machine (crawlers, guiding wheels, and drive chain wheels) for wear and damage, and inspect whether the flat head screws are loosened.
5. Please inspect whether the attachment, bulldozer board, oil cylinders, connections and hoses are cracked, worn or loosened. In case there is any abnormality, please carry out repair.
6. Inspect whether the protective equipment, stairs, and handrails are damaged, and whether the flat head screws are loosened. In case they are damaged or loosened, please repair and tighten them again.
7. Inspect whether the instruments and monitoring panel are damaged, and replace them in case there is any abnormality.

3.1.2 Inspection before Commencement of Operation

Please perform the following inspection before starting the engine every day.

A. Inspection and replenishment of cooling water

⚠Warning

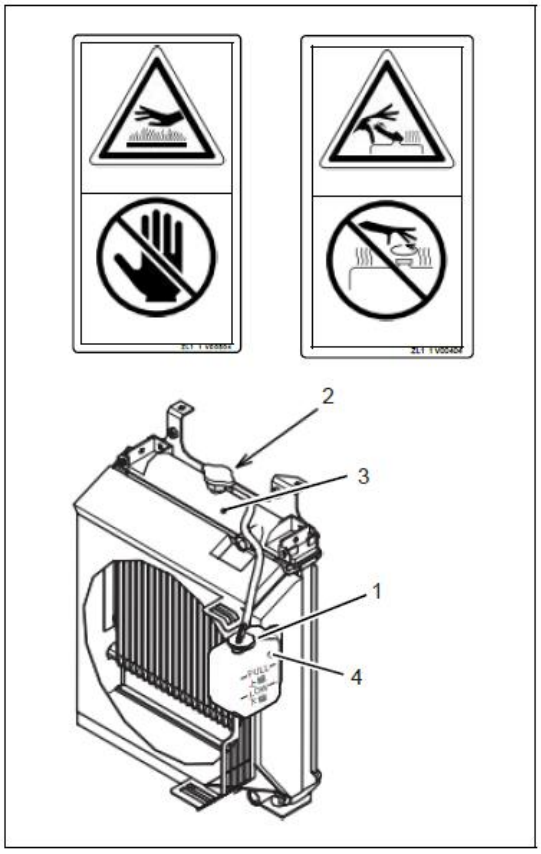
Normally, please don't open the radiator cover. Please inspect the cooling water through the backup water tank while the engine is still cool before driving.

You can confirm the backup water tank by opening the engine hood.

1. Cover above backup water tank
2. Radiator cover
3. Radiator
4. Backup water tank

1. Please inspect the water level only when the engine is in the cold state.

2. Confirm whether the cooling water is within the FULL-LOW range of the backup water tank.



The inspection of cooling water must be carried out when the engine is in the cold state. When the engine is in the hot state, due to the increase in water temperature, the water in the radiator will move to the backup water tank, and the water volume in the backup water tank will increase, so that the correct water volume cannot be indicated. In case the engine temperature drops, the water level will return to original level.

When the cooling water is insufficient, please replenish it.

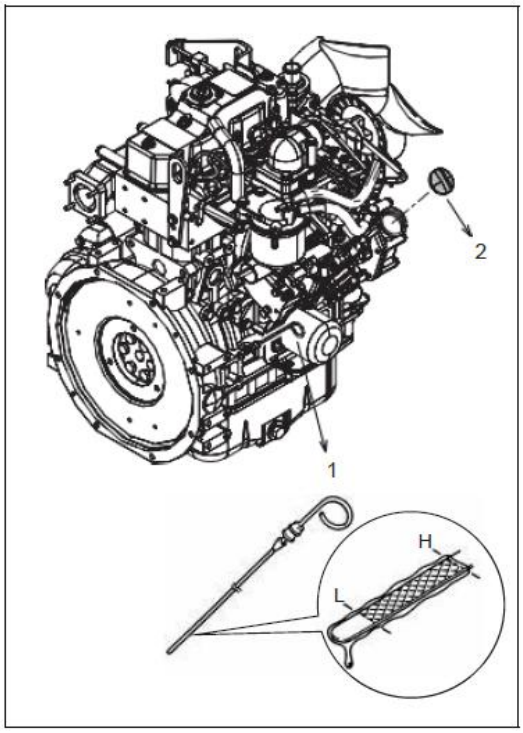
3. Open the top cover (1) of the cooling water and inject the cooling water until the water level reaches the upper limit position "FULL".
   In case the backup water tank is found to be empty, after inspecting for water leakage, please also inspect the water level in the radiator.
4. Remove the radiator cover (2) and inspect the water level.
5. When the cooling water is insufficient, replenish the cooling water until the water overflows from the water supply port.
6. After replenishing the water, please tighten the cooling water tank cover (2).

B. Inspection on Leakage of Cooling Water

In case the water level in the backup water tank does not drop and only the water level in the radiator drops, the reason may be poor air tightness (leakage) of the radiator. Please consult with our sales agent.

C. Inspection on level of engine oil · Replenishment

- **Please carry out inspection when the machine is in a horizontal state.**
- **Please inspect the level of engine oil before starting the engine.**
- **After completing the operation, please inspect the level of engine oil 30 minutes after the engine has stopped.**



1. Open the engine protector with the key.
2. Insert and remove the engine oil dipstick (1), wipe off the oil adhered to the dipstick, and then insert and remove it again. In case the oil level is between the "H (upper limit)" and "L (lower limit)" on the dipstick, it is appropriate. In case the engine oil is severely contaminated or deteriorated, it may be replaced as early as possible without following the regular replacement schedule.
3. When the fuel level is too low, please remove the oil filler cap (2) and replenish the engine oil. Please confirm the fuel level again after replenishment.
4. Wipe the oil filler cap (2) clean and reinstall it.
5. Close and lock the engine protector.

D. Inspection on oil level in hydraulic oil tank and replenishment of hydraulic oil

⚠Warning

In case high temperature and high pressure are generated inside the hydraulic oil tank, it will be very dangerous. When removing the oil filler cap, please stop the engine and press the valve from above the rubber cap, so as to release the pressure in the hydraulic oil tank.

D.1 Inspection

1. Select a horizontal and hard location, place the machine in the posture for inspection on hydraulic oil (as shown in the right figure), and then stop the engine.
    1. Bucket
    2. Bulldozer board
2. Inspect the oil level through the dipstick on the side of the hydraulic oil tank. In case the oil level is within the range of "H" and "L", it is appropriate.

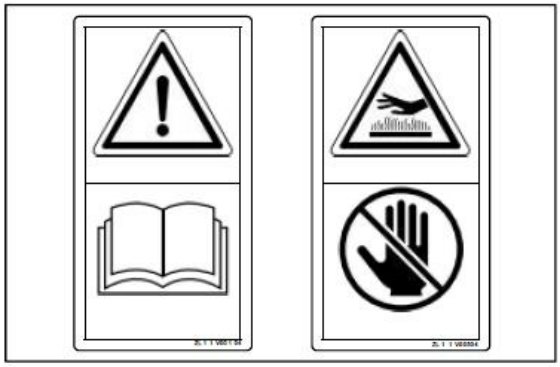
    - The oil level may change with oil temperature. Please carry out inspection according to the following standards.
      Before driving:
      Near the "L" oil level (oil temperature: 10-30℃)
      During normal driving:
      Near the "H" oil level (oil temperature : 50-80℃)

D.2 Replenishment

Please don't replenish the oil above the maximum oil level; otherwise, the hydraulic machine may get damaged and oil may spray out.

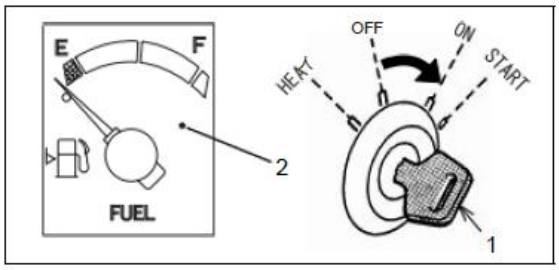
1. Please open the side cover on the right side and support it with an iron rod.
2. Loosen the screws, remove the tank cover, and replenish the hydraulic oil from the oil filler until the oil level reaches the specified position.
4. Inspect the O-ring on the tank cover and replace it in case it is worn or damaged.
5. Install the tank cover and tighten the screws with the specified torque.
   Tightening torque: 23.5±1.98N·m {2.4±0.20kgf·m}
6. After starting the engine, operate each cylinder evenly and gently for 5-10 times, and then return the machine to the posture for inspection on hydraulic oil level.
7. After stopping the engine, inspect the oil level. In case the oil level is too low, please replenish the oil again.
8. Remove the iron rod and restore the tank cover to its normal position.

E. Inspection on fuel level and replenishment of fuel

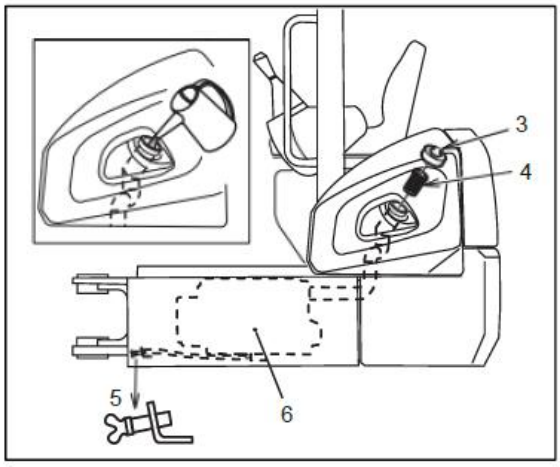


⚠Warning

- **Adding wrong gasoline may be very dangerous. Please confirm again whether the type of fuel is correct before replenishment.**
- **Please stop the engine when replenishing the fuel.**
- **Please prevent the fuel from overflowing when replenishing the fuel; otherwise, fire may be caused. Please wipe the spilled fuel clean.**



1. Start switch
2. Fuel gauge
3. Fuel filler cap
4. Strainer
5. Drain plug
6. Fuel tank



1. Set the start switch (1) to the position "ON" while the engine is stopped. As a result, the monitoring panel lamp will be turned on.
2. Confirm the fuel level through the fuel gauge (2). In case the fuel level is too low, open the fuel filler cap (3).
3. Replenish the fuel through the fuel filler.
   Please refer to the **"List of Lubricating Greases Added"** for the used fuel (capacity).
4. When impurities adhere to the strainer (4), please clean it with light diesel or by using an air gun, and then reset the fuel filler.
5. After replenishing the fuel, please tighten the fuel filler cap (3), close the hydraulic oil tank cover and lock it with the key, so as to completing the operation.
   Please fill up the fuel tank after completing daily driving operations.

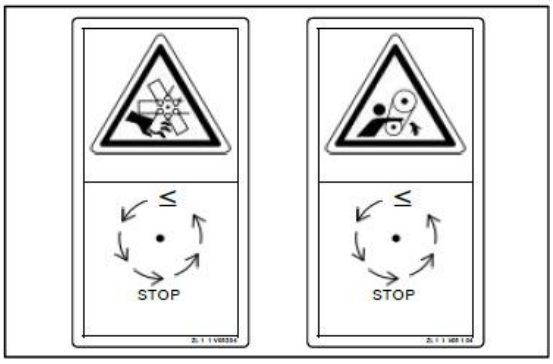
F. Inspection for leakage of fuel

Inspect the fuel tank and the surrounding area of the engine. In case the leakage of fuel is confirmed, stop the engine, and consult with our sales agent.

G. Inspection of belts

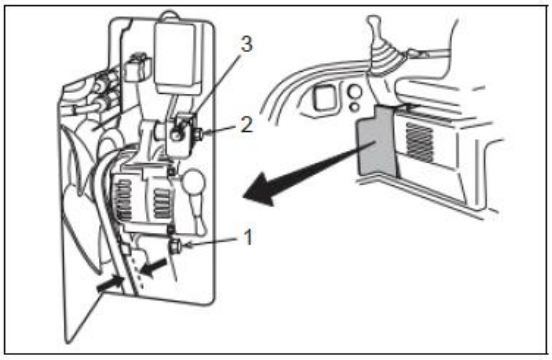
⚠Danger

Being caught in rotating parts such as belts or fans may result in major injury.
Please wait until the belts and fans have completely stopped before carrying out conditioning.



Inspect the tension state of fan belt and inspect whether the fan belt is worn or damaged.
Loosened belt may cause poor charging of the battery, overheating of engine and premature wear of belt. Additionally, in case the belt is too tight, the bearings and belt may get damaged.
When inspecting the tension of the belt, use your thumb to firmly press the central position of the belt. In case the bending amount is within the following range, it is normal.

Belt	When the new belt is tensioned (mm)	When the in-service belt is tensioned (mm)	Pressing force (N)
Fan	8-12	10-14	98



The "in-service belt" refers to the belt installed on the engine pulley and in the state where the engine has been running for 5 minutes.

Please refer to **"D. Adjustment of belt tension"** in Chapter **"**Inspection · Maintenance**"** for the key points of inspection and adjustment of each fan belt.

1. Mounting bolts
2. Special adjusting bolts
3. Adjusting bolts

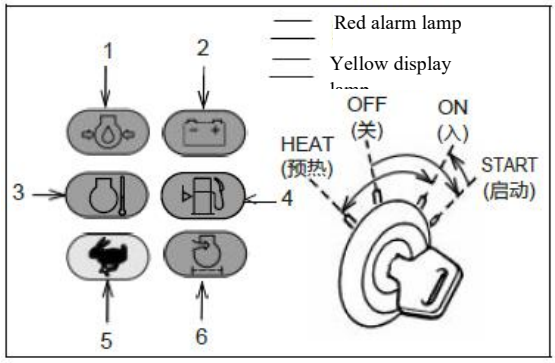
3.1.3 Confirmation on Operation before Start of Engine

A. Inspection on functioning of alarm lamps

Warning

In case the joystick is accidentally touched, the machine may start suddenly. Please set the descending cut-off type safety lock rod to the "locked position" and then move it.

1. Before starting, please perform inspection according to the following steps, so as to confirm the functioning of alarm lamps and display lamps.
2. Confirm whether the descending cut-off type safety lock rod is in the "locked position".
3. Confirm whether each joystick is in the "neutral position".
4. Insert the key into the start switch. In case the alarm lamps at each position of "HEAT · ON · START" function as shown on the right table, they are normal.
5. Under normal circumstances, in case the alarm lamps and display lamps don't function, maybe the engine fails or the electrical circuit component fails. Therefore, the machine may not be used directly, but shall be repaired by our sales agent.

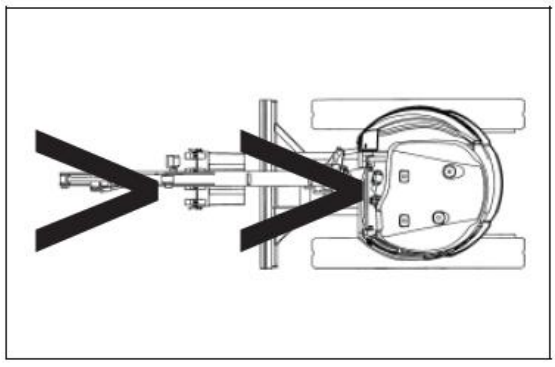


It is necessary to inspect whether the alarm lamps and display lamps are functioning properly before operating the machine.

Lamp \ Key operation		OFF→HEAT Preheating	OFF→ON Before start	START→ON After start
1	Engine oil pressure lamp	Off	On	Off
2	Battery charger lamp	Off	On	Off
3	Engine cooling water temperature lamp	Off	Off	Off
4	Fuel level lamp	Off	Off	Off
5	Travelling speed 2 lamp	Off	Off	Off
6	Strainer blockage lamp	Off	Off	Off

B. Confirmation on lighting of working lamp

When the start switch "ON" is turned on, turn on the working lamp switch and inspect whether the lamp comes on.
In case the lamp does not come on, maybe the bulb is damaged or broken. Please refer to **Page 4-27** for repair.



3.1.4 Start of Engine

A. Start at room temperature

Warning

Please confirm whether there are no people or obstacles around, and sound the horn after starting the engine.

1. Please confirm whether the descending cut-off type safety locking rod (1) is in the "locked position (A)".
2. Please confirm whether the position of each joystick is in the "neutral position".
3. Set the throttle lever (2) to a position slightly higher than low-speed idle.
4. Turn the start switch (3) to the position "START", so as to start the engine. After the engine is started, quickly release the key. The key will automatically return to the position "ON".

The engine may not be unloaded after being started.
In case the engine cannot be started even if the key to the start switch is turned to the position "START", please temporarily turn the key to the position OFF before the running time of the starter reaches 15 seconds, wait for 30 seconds, and then restart the engine.

B. Start in cold weather

When it is cold, as the viscosity of the engine oil increases and the performance of the battery decreases, it will be difficult to start the engine. Please use a preheating device.

1. Please implement the first to third steps in Section "Start at room temperature" above.
2. Turn the start switch (1) to the position "HEAT" for preheating.

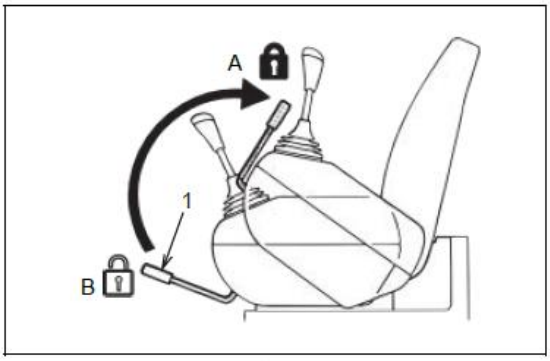
It will be easy to start up the engine after it has been preheated for about 15 seconds.

3. Turn the start switch (1) to the position "START", so as to start the engine.

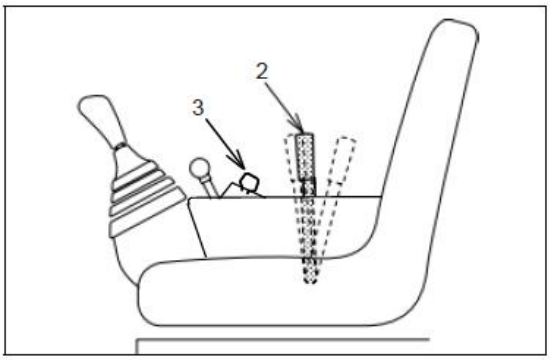
- **In cold season, the engine may produce white smoke when it is first started. The white smoke will disappear soon, and this is not an abnormal phenomenon.**

- **Please don't let the starter run continuously for more than 15 seconds. In case the startup fails, please wait for 30 seconds before restarting the engine.**

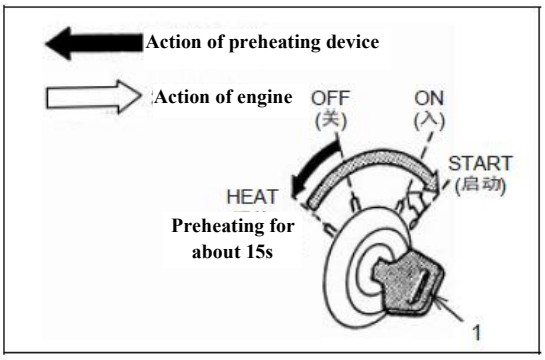
4. After the engine is started up, please release the start switch (1). As a result, the key will automatically return to the position "ON".



Locked position



A position slightly higher than low

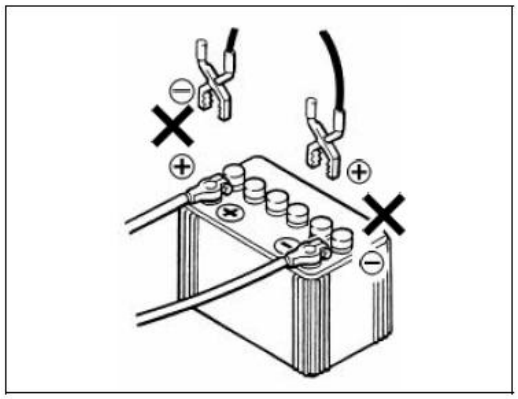


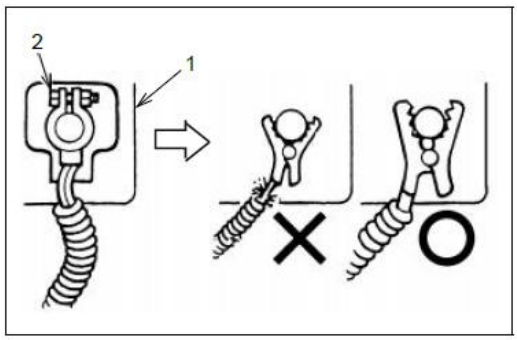
C. Start with booster cables

Please start the engine with auxiliary cables as follows.

Warning

- **The battery may produce flammable gas (hydrogen). In case there are sparks near the battery, fire or explosion may be caused. Smoking or open flame is strictly prohibited.**
- **Please don't allow the normal machine to come into contact with any faulty machine.**
- **When starting the engine with auxiliary cables, please wear goggles.**
- **When connecting the cables, please never let the (+) terminal come into contact with the (-) terminal.**
- **Please don't reverse the positive (+) and negative (-) terminals when connecting the auxiliary cables. In case the auxiliary cable at the negative (-) end is finally connected to the engine body (hook) of the faulty machine, sparks may be generated. Therefore, it shall be connected to the engine body as far away from the battery as possible.**
- **After the electrolyte is frozen, please use another power source to start the engine.**



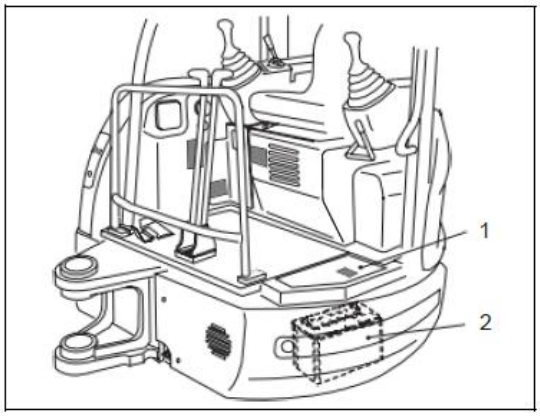


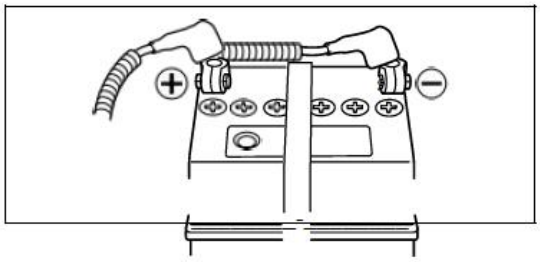
1. Battery
2. Bolt

Please use the auxiliary cable and clamps that match the size of the battery.
Please use the undamaged and corrosion-resistant cables and clamps.

D. Connection and removal of auxiliary cables

Set the start switch to the position "OFF" (the engine stops). Please connect the auxiliary cables in the following order.



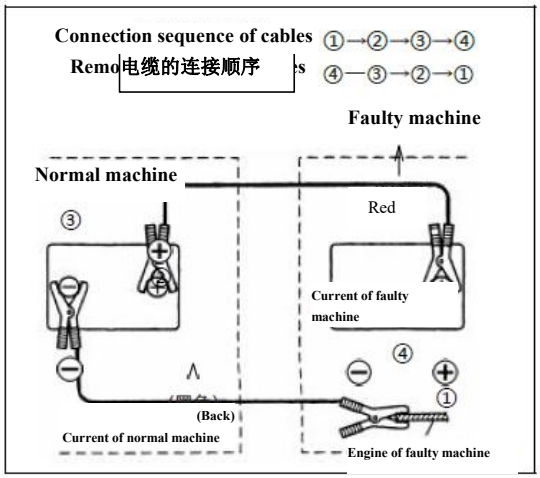


Warning

- **Please note that reversing the auxiliary cables may cause the battery to explode.**
- **The starting system of the machine uses the voltage of 12V. The auxiliary battery also uses the voltage of 12V.**

1. Please set the switches of normal and faulty machines to "OFF".

2. Tilt the driver's seat forwards and remove the cover (1) of the left battery.
3. Remove the terminal cover of the battery (2) and connect the cable clamp of the auxiliary cable.
4. Connect the clamp of the auxiliary cable (red) at the positive terminal (+) to the positive terminal (+) of the faulty machine's battery.



5. Connect the clamp of the auxiliary cable (red) at the positive terminal (+) to the positive terminal (+) of the normal machine's battery.

6. Connect the clamp of the auxiliary cable (black) at the negative terminal (-) to the negative terminal (-) of the normal machine's battery.

7. Finally, connect the clamp of the auxiliary cable (black) at the negative (-) terminal to the engine body (hook) of the faulty machine.

8. Start the engine of the normal machine and let it idle at high speed for about 10 minutes.
9. Start the engine of the faulty machine.

10. After the engine of the faulty machine is started up, immediately remove the auxiliary cables in the reversed connection sequence.
Finally, investigate the fault cause of the starting/charging system of the faulty machine and repair it.

3.1.5 Stop of Engine

Before stopping the engine, in order to protect the engine, please drive the machine at low speed for about 5 minutes without load.

⚠Caution

In case an emergency stop is made while the machine is running at high speed, the engine temperature will rise sharply, leading to deterioration of the engine oil, adhesion of sealing components, and other adverse phenomena.

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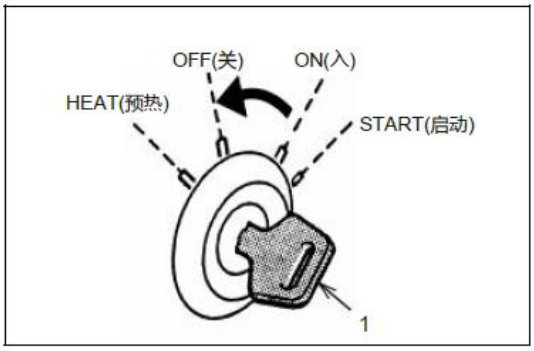
1. Unless in special circumstances, please lower the bucket onto the ground when the engine is stopped.
2. Pull the descending cut-off type safety locking rod and set it to the "locked position".
3. Adjust the throttle to the "low-speed idle position" and let the engine idle for about 5 minutes.

After driving, the engine will be in a high temperature state. Therefore, it is necessary to let it idle, so as lower the engine water temperature.



4. Please set the key of the start switch (1) to the position "OFF", so as to stop the engine.
5. Please remove the key from the start switch (1).

3.1.6 Inspection after Start of Engine

After starting the engine, please don't immediately drive the machine. It is necessary to conduct inspection and confirmation.

⚠Warning

- **In case the joystick is accidentally touched, the machine may suddenly start. Please set the descending cut-off type safety locking rod to the "locked position" before starting to work or move.**
- **The inspection after start of engine is very dangerous. Please confirm the safety conditions in surrounding area before conducting the inspection.**
- **When carrying out maintenance or repair, please stop the engine and place a warning sign "Inspection in progress. Don't start the engine" in a prominent location.**

- **For a new engine, please don't make it run at excessively high speed within the first 50 hours.**
- **Please confirm whether all alarm lamps are off.**
- **Please listen for any abnormal sound.**
- **Please inspect the surrounding area of the engine for any oil or water leakage.**
- **Please perform the no-load warm-up driving for about 5 minutes, so as to warm up the engine and allow oil to flow into all components.**

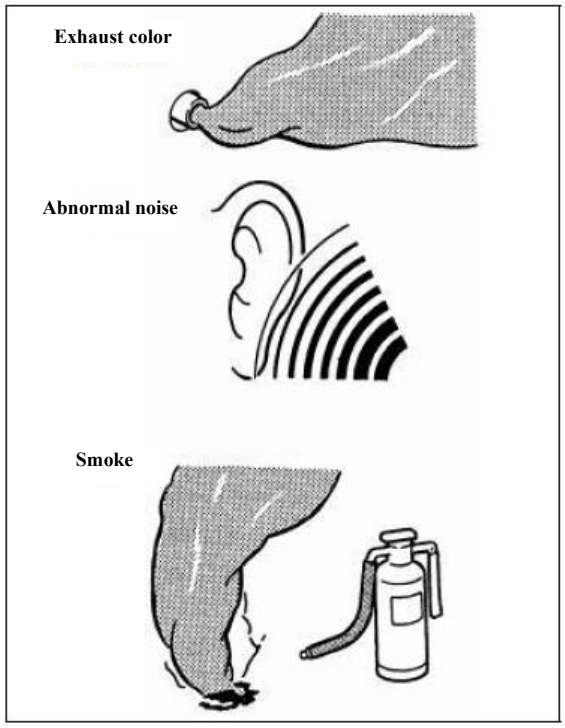
A. Inspection on color, abnormal noise and odor of exhaust

Please perform the following inspection when the engine is running.

1. Please inspect whether the exhaust color during driving is abnormal. Please avoid driving when the black smoke is continuously emitted. The appearance of black smoke is a signal of excessive use of the engine, which may shorten its service life. In case the black smoke still appears during idling at low idle (without load), the engine must be adjusted.
2. In case there is any abnormal sound during driving, please stop the inspection immediately. In case you persist in driving, major damage accident may occur. Please identify the location and cause of the abnormal sound and carry out repair.
3. Avoid driving within the resonance rotation range.

Resonance at a certain rotation speed may cause a sharp increase in vibration intensity, which may damage components. Therefore, please avoid using the engine near such rotation speed.

4. In case there is a burnt smell or smoke, please stop the engine immediately. In case there is a fire, please use a chemical fire extinguisher to extinguish it.



- **In case there is any abnormality during the above inspection, please immediately drive the machine to a safe location, stop the engine, and get the machine inspected or repaired by our sales agent.**

B. Confirmation on action of each switch/rod

Perform the following inspection after the engine and hydraulic oil are warmed up.

The appropriate temperature for hydraulic oil is 50-80℃. Even when working at low temperatures, the operation shall be carried out after the oil temperature has risen to 20℃. This can extend the service life of the machine.

B.1 Descending cut-off type safety locking rod

1. When the engine is working, please set the descending cut-off type safety lock rod to the "locked position".
2. Please move the left and right joysticks after confirming the safety of the surrounding area.
3. Please confirm whether the attachment, rotation mechanism, and travelling mechanism will not act even if the joystick is moved.

In case it is confirmed that there is an abnormal condition in the machine, please stop the engine immediately, identify the cause, and handle it correctly. Additionally, please get the machine repaired by our sales agent.

3.1.7 Warming up

Please perform warming up in the following sequence.

A. Warming up of engine

⚠Danger

- **Please avoid emergency acceleration of the engine until the warming up is completed.**
- **Please don't perform continuous no-load idling for more than 20 minutes; otherwise, the engine may malfunction.**

Set the throttle lever to the middle position between high-speed idle and low-speed idle, run the engine at medium speed, and drive the machine without load for about 5 minutes.

B. Warming up of hydraulic oil

The appropriate temperature for hydraulic oil is 50-80℃. Even when working at low temperature, the operation shall be carried out after the oil temperature has risen to 20℃.

1. Set the throttle lever (1) to the "medium-speed operating position" to accelerate the engine.
2. Please use the "releasing position".
3. Please raise the boom to a certain height above the ground.

4. Set the right joystick (2) to the full stroke for extension or retraction of bucket, and maintain this state for about 5 minutes.
5. After warming up the hydraulic oil, make each cylinder slowly move back and forth for several times until the rotation and travelling can be achieved gently, which means that the warming up of hydraulic oil is completed.

After the warming up of engine is completed, in case the warming up of hydraulic oil is not carried out, the performance of the machine cannot be fully utilized.

3.1.8 Key Points of Driving Operation

The key points of driving operation are the basic skills for driver. Please carefully study the following basic operations. Please further improve your driving skills by familiarizing yourself with the performance or structure of this machine.

Key points for travelling

⚠Warning

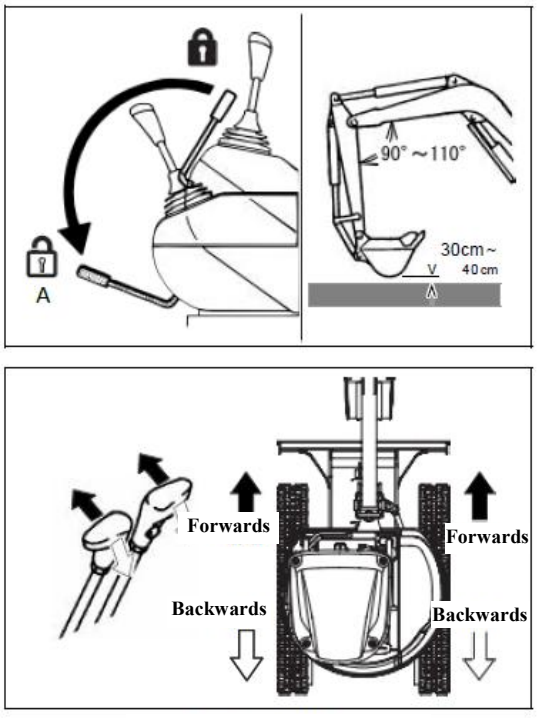
- **When travelling, please confirm the position of the travelling motor. When the travelling motor is in front, the travelling rod shall be operated in reverse.**
- **Please honk the horn to alert the personnel at the work site.**
- **Before the machine and attachment are activated, please confirm whether there is a safe distance between the surrounding people and the machine/attachment.**

⚠Caution

After confirming any abnormality of the machine during driving operation, please immediately stop the operation, identify the cause, and handle it correctly.

A.1 Forward and backward travelling

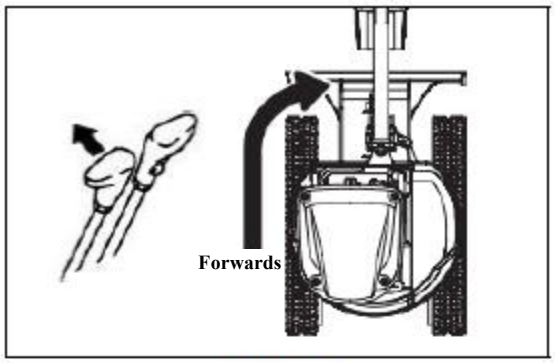
1. Please set the descending cut-off safety locking rod to the "released position (A)" and raise the bucket to about 30-40cm above the ground.
2. Pull the bulldozer joystick forwards to raise the bulldozer board.
3. Simultaneously move the left and right travelling rods forwards (for travelling forwards) or backwards (for travelling backwards). Whether during travelling forwards or backwards, the travelling speed may be adjusted by the movement of travelling rod.



Travelling forwards or backwards

A.2 Single-side turning

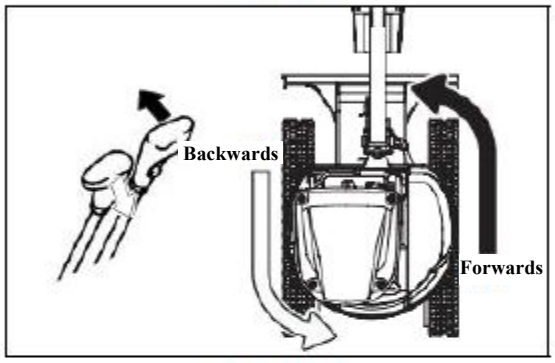
In order to change the travelling direction by driving the crawler at one side, please operate any one of the two travelling rods



Single-side turning

A.3 Both-side reverse turning

In order to change the travelling direction in place by driving the left and right crawlers in reverse, please push one of the two travelling rods forwards and pull the other backwards.



Both-side reverse turning

B. Stop of travelling

⚠Caution

In case the operation of attachment or the rotation operation has to be performed while the machine is travelling, please don't carry out the operation quickly

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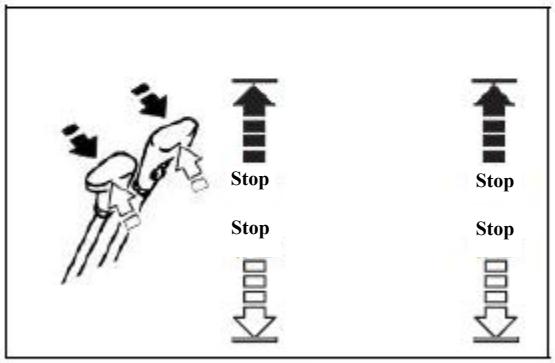
Please set the left and right travelling rods to the neutral position, so as to stop the machine.
Please avoid emergency stop and try to stop the machine with sufficient safety distance.



Stop of machine

C. Precautions for travelling

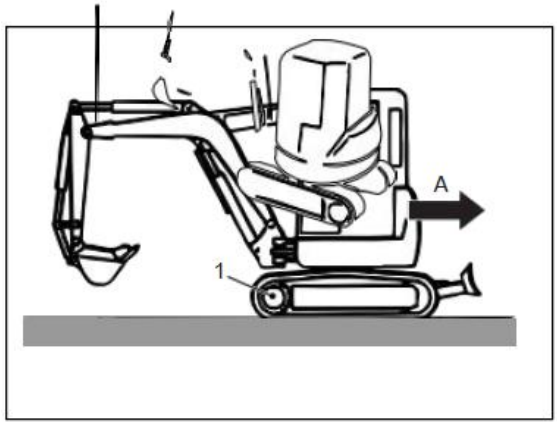
⚠Warning

- **When travelling on roadsides and in narrow areas, please assign the commanding personnel.**
- **Don't drive the machine when there is anyone other than the driver inside the machine.**

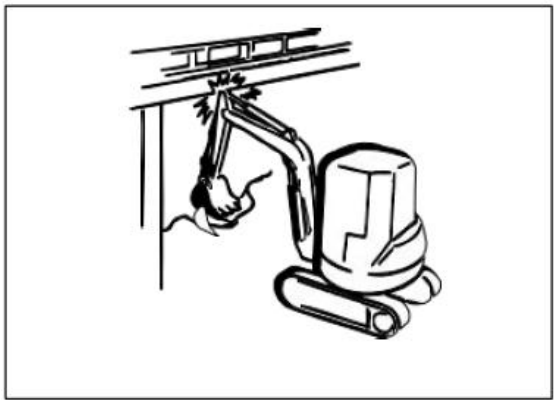
1. Travelling motor
A. Traveling direction
B. Low-speed idle position C. Low speed (1st speed)

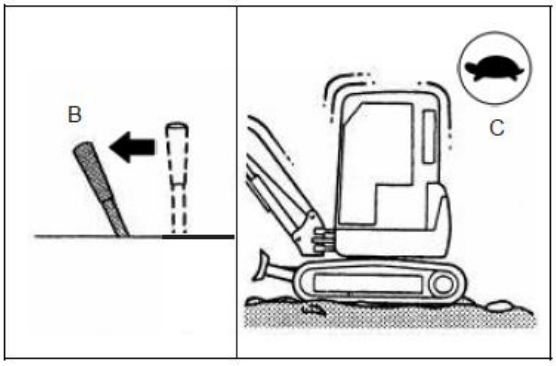
1. For the purpose of travelling, please clarify the position of the travelling motor (1) in advance, and then operate the travelling rod.
2. Please select a flat and hard ground for travelling. In addition, please travel straight or take big turn as much as possible, and avoid rapid single-side turning. When travelling in a narrow area, please complete the turning by multiple movements.
3. Investigate the strength of roadsides and bridges, and reinforce them in case the strength is insufficient.
4. Be careful not to collide with bridges and electrical wires.
5. Travelling under poor road conditions may have a huge impact on the machine. Please lower the engine speed and travel at low speed (1st speed).
6. Please be careful not to let rolling stones or other objects collide with the travelling motor (1), and don't apply force to the crawlers during travelling uphill.
7. When travelling on snowy or frozen roads, please control the travelling speed and avoid emergency start, emergency advancing, emergency stop, or emergency rotation.
8. During transportation, when loading or unloading the machine, please clean the soil around the bottom of the machine, implement the anti-slip treatment to prevent slipping due to blockage of crawler shoes, and prevent the machine from sliding laterally on springboard. Please refer to the following text for the instructions on use of springboard.

Reversed travelling state



Reversed travelling state



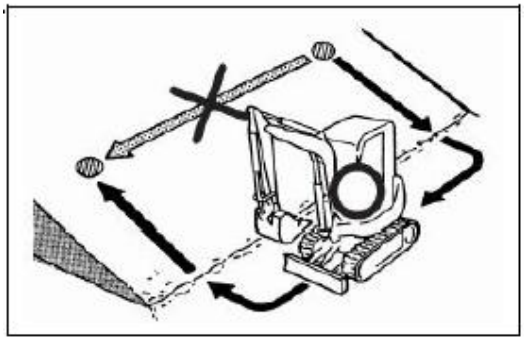


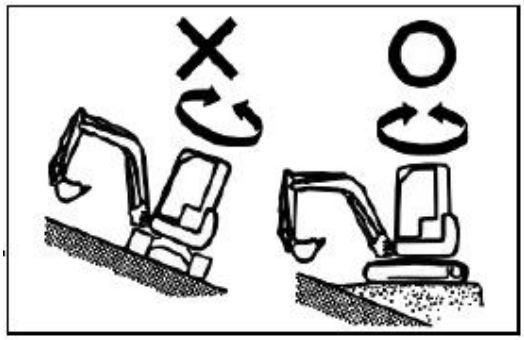
D. Precautions for travelling uphill and downhill

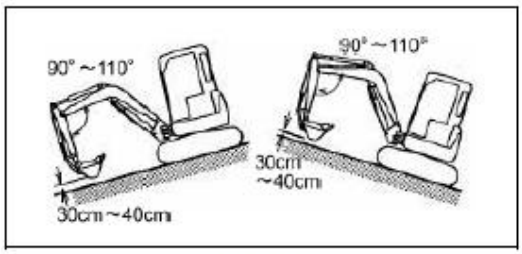
⚠Warning

- **Please never change the travelling direction or travel horizontally on sloping ground. Please travel safely by temporarily returning to flat ground and then taking a detour.**
- **Please keep travelling with the bucket lifted 30-40cm off the ground. Please don't go downhill by means of backward travelling.**
- **When the machine slides or becomes unstable, immediately lower the bucket and dig it into the ground.**
- **During operation on sloping ground, when the machine is rotating, it may fall due to imbalance. Especially when the bucket is filled with sand, rotating downwards is very dangerous. When it is necessary to perform the above operation, please pile soil on the slope to make the machine in a horizontal position before rotating it.**
- **Please don't travel on a slope above 30°, as there is a risk of falling.**
- **When it is necessary to park the machine on sloping ground, please lower the bucket to the ground and place brake wedges under the crawlers.**

1. The maximum gradeability of this machine is 58% (30°).
2. When travelling uphill, please operate the travelling rod slowly.
3. When traveling uphill or downhill, please use the low speed (1st speed).
4. When travelling on a slope or inclined surface, please lift the bucket 30-40cm off the ground and travel at low speed.
5. When stalling on sloping ground, lower the bucket to the ground, set all joysticks to neutral positions, and then start the engine again.
6. When travelling uphill, in case the crawler shoes slide and the machine cannot go uphill through the crawlers (travelling motor), the bucket arm may be extended, so as to go uphill with the power of working machine.

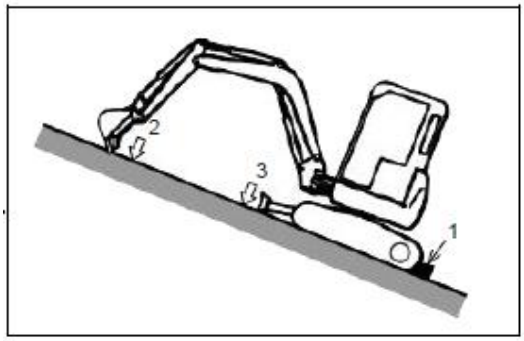






下坡 / 爬坡
Travelling downhill/travelling uphill

7. When parking/stopping the machine on sloping ground, even for a short period of time, please lower the bucket (2) and bulldozer board (3) to the ground, and set each joystick to the "neutral position". After setting the descending cut-off type safety locking rod to the "locked position", place brake wedges (1) under the crawlers.



When the hydraulic oil is in cold state, the machine cannot obtain the sufficient gradeability. In case you want to go up a steep slope, please warm up the engine before driving.

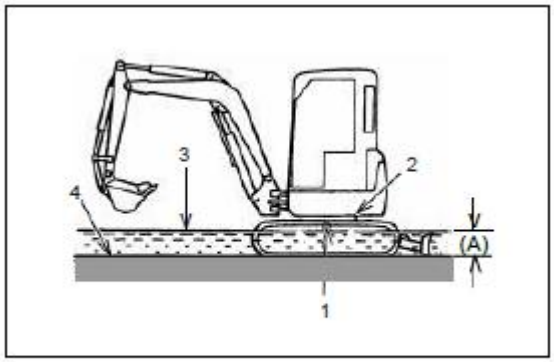
E. Travelling on softer ground

Caution

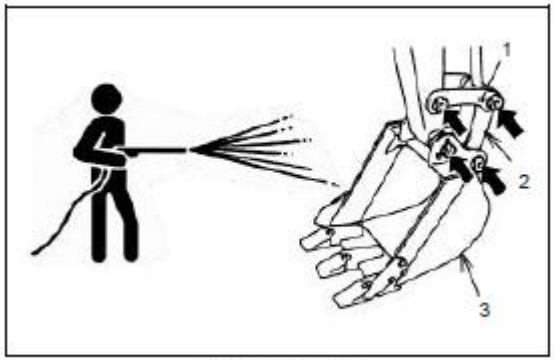
Water and sand must not enter the rotating bearings, rotating pinions, and rotating central bearings. In case the machine is used after water and sand enter the rotating bearings, poor rotation may be caused.

1. Chain wheel support
2. Rotating bearings
3. Water surface
4. Riverbed

1. When the riverbed is flat and the water flow is stable, the travelling depth in the water may reach the upper drum (A).
2. When crossing a river, please use the bucket or other equipment to confirm the condition of the riverbed while carefully crossing the river. Please never enter any deep water beyond the allowed depth (A).
3. The machine may sink slightly into softer ground. Therefore, please be careful not to get the machine stuck in mud while driving.
4. After travelling in seawater, please carefully clean the machine, so as to remove salt.
5. For those parts that have been in contact with water for a long time, please use a grease gun to add lubricating grease until the old grease inside is flushed out.



1. Idle wheel connecting rod
2. Bucket connecting rod
3. Bucket



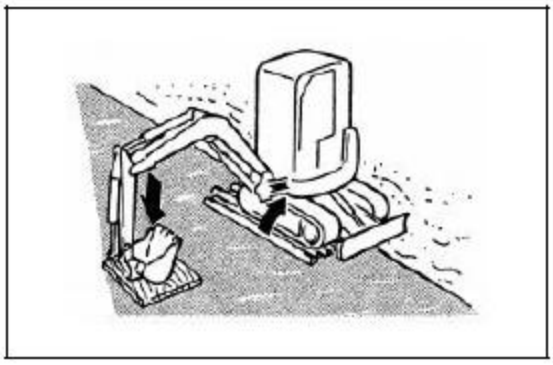
Parts to which the lubricating grease must be added

F. Key points for getting out of soft ground

Please avoid travelling on soft soil surfaces if possible. Please be careful not to get the machine stuck in mud while driving. In case the machine is stuck in mud, please use the following methods to get out.

F.1 Sing side stuck

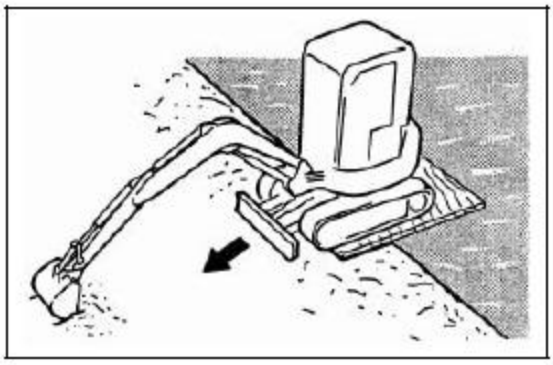
When only one side is stuck, please place a carpet at the bottom of the bucket, press it towards the ground so as to raise the crawler shoes at the stuck side, and then place round logs or wood so as to get out.



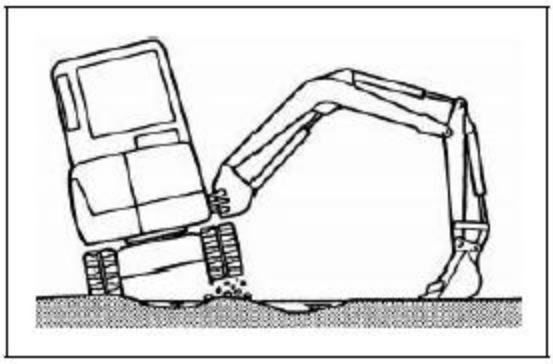
When using the boom and bucket arm to lift the machine, please use the bottom of the bucket to push the ground instead of using the bucket shoe. Please set the angle between boom and bucket arm to 90-110° while lifting the bulldozer board.

F.2 Both sides stuck

When the crawlers at both sides are stuck and the machine cannot move due to slipping, please place the logs and wood as mentioned above, dig the bucket into the front side of the escape end, pull the bucket arm according to the same excavation method, and set the travelling rod for travelling towards the escape end, so as to pull out the machine body.



When travelling on a weak foundation, in case the area around the bottom of the machine is filled with soil and gravel, making it possible for the crawlers to get opened and for the machine to travel, please use the boom and bucket arm to lift up the crawler on one side, clear away the soil, sand, and other debris, and then drive the machine away. Moving the raised clawer forwards and backwards alternately can cause the embedded stones, gravel, and soil to fall off.



⚠Caution

Please operate inside the cab. No person may approach the area around the machine.

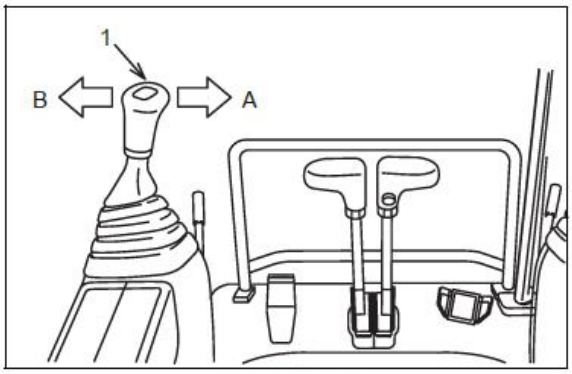
G. Key points for rotation

Warning

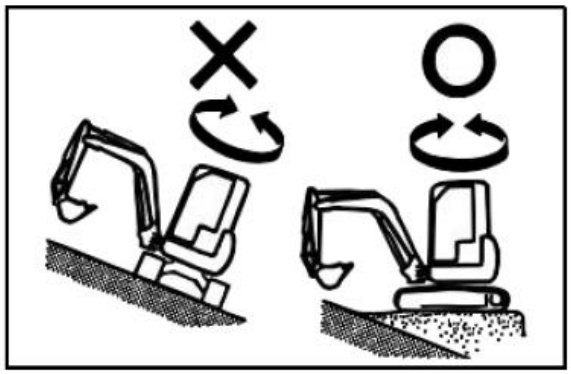
• Rotating the machine on sloping ground poses a risk that the machine loses balance and falls.

1. Left joystick
   A. Rightward rotation
   B. Leftward rotation

1. Please set the descending cut-off type safety lock rod to the "released position".
2. Please raise the bucket to a certain height above the ground.
3. Please operate the left joystick (1) to rotate the machine.
4. When there is no rotation operation, please operate the joystick to make the attachment parallel to the crawler beam before stopping or travelling. Unless in special circumstances, please travel in parallel.



ISO operation mode



3.1.9 Key Points for Operation

⚠Warning

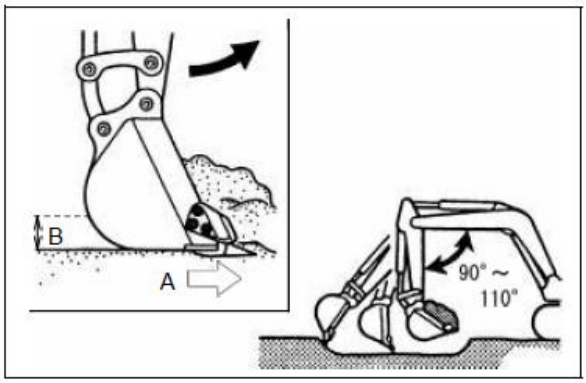
When working or rotating on sloping ground, the machine may fall due to imbalance. Especially when the bucket is filled with sand, rotating downwards is very dangerous. When it is necessary to perform the above operation, please pile soil on the slope to make the machine in a horizontal position before rotating it.
Please confirm the safety conditions in surrounding area before rotating the machine.

In addition to the operations shown below, the range of usage can be widened by using various rotating attachments.

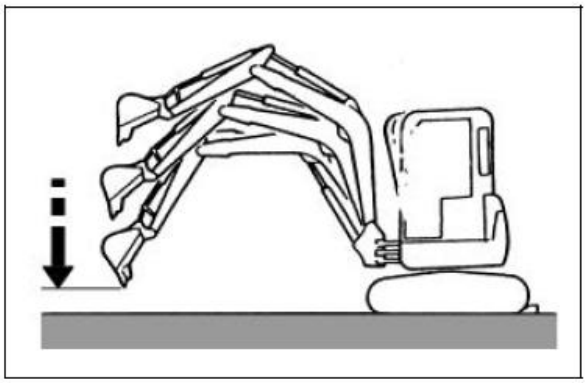
A. Excavation operation

1. Excavation mainly utilizes the tension of the bucket arm and, if necessary, the gripping force of the bucket.
2. When strong excavation force is required, please set the angle between boom and bucket arm to 90-110° and carry out excavation slowly.
3. Make the bucket shoe face the excavation direction (A) if possible, and carry out excavation with a shorter stroke (B) of bucket.

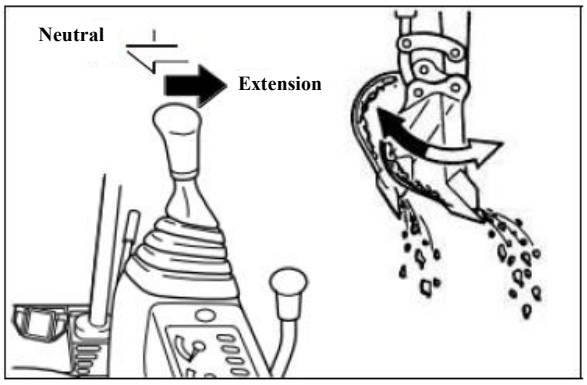
In this way, the resistance to excavation will be smaller, which can reduce the damage to the bucket shoe.



4. Please don't perform gathering operation when lowering the boom.
Especially, an emergency stop during the lowering of boom may cause significant impact to the machine, resulting in adverse effects on various components.

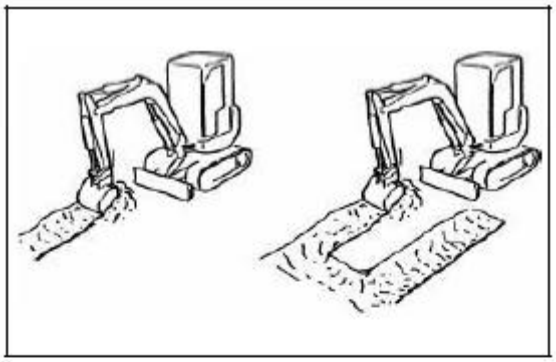


5. When it is difficult to shake off the soil, please set the bucket to the extension posture and operate the bucket rod for 2-3 times, so as to shake off the soil.



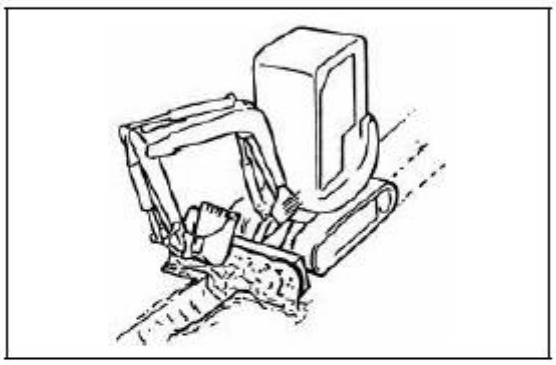
A.1 Trenching operation

Please install the bucket suitable for trenching operation. In case the trench to be excavated is parallel to the crawlers, the operational efficiency will be improved. When excavating a wider trench, please first excavate the sides of the trench, and finally excavate the center of the trench.



A.2 Bulldozing operation

1. Use the bulldozer board for burial, filling, and land levelling operations after the excavation operation is completed.
2. Fill the soil from the top or side. When the burden on the machine is too heavy, please operate the bulldozer joystick and adjust the bulldozer board up and down.



A.3 Side ditch excavation operation

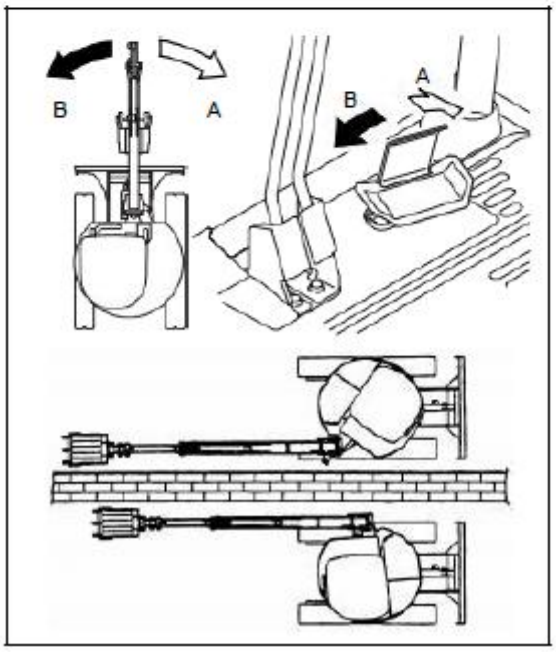
⚠Warning

The operational range of boom axis rotation operation is relatively wide. Therefore, please operate the attachment while always paying attention to the surrounding conditions.

When the left or right axis rotation pedal is pressed, the boom will rotate around the left or right axis, so that the side ditch excavation operation can be carried out in a narrow area.

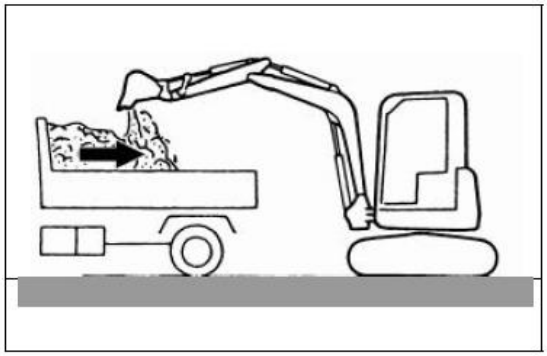
In case the axis rotation pedal is pressed leftwards, the leftward axis rotation will be carried out; in case it is pressed rightwards, the rightward axis rotation will be carried out. The above operation can be used to carry out the side ditch excavation operation as shown in the right figure.

A. Rightward axis rotation
B. Leftward axis rotation



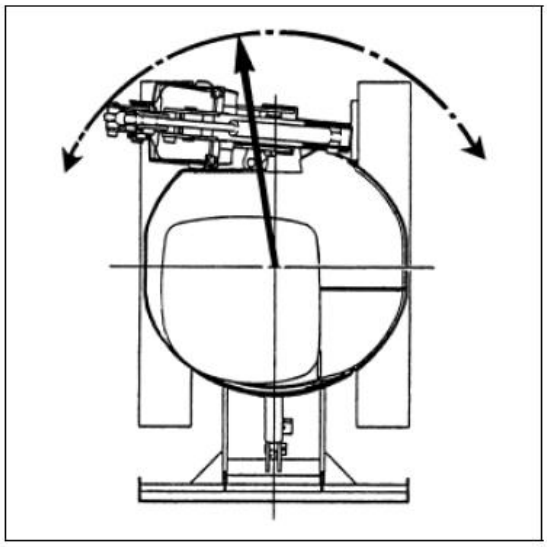
B. Loading operation

1. Please set the truck to be loaded at a location with a small rotation angle and clear visibility for the driver, so as to improve the operational efficiency.
2. Loading from the front of the truck to be loaded can facilitate the operation, while loading horizontally can get soil loaded.



C. Operation in narrow place

When working in a narrow place, in case the machine is set to the posture shown in the right figure, it can rotate even in a relatively narrow place.



C.1 Minimum rotation posture

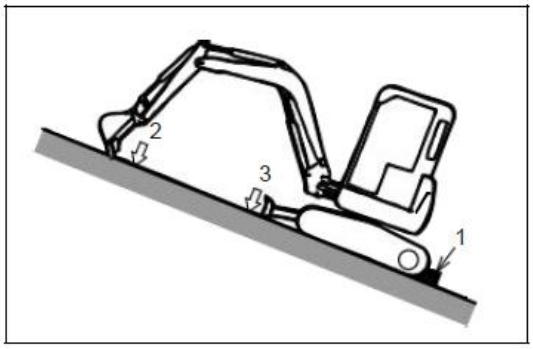
1. Set the bucket arm cylinder and bucket cylinder in the fully-extended state, so as to fold the bucket.
2. Set the boom cylinder in the fully-extended state.
3. Please press the right operating pedal, so as to rotate the boom around the axis.
4. Operate the joystick to rotate the machine.

When rotating the machine, please be careful not to collide with the attachment.

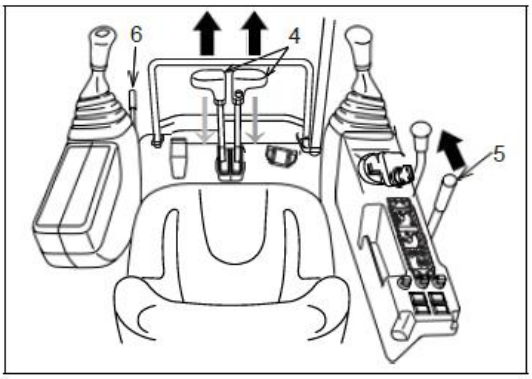
3.1.10 Parking of Machine

⚠Warning

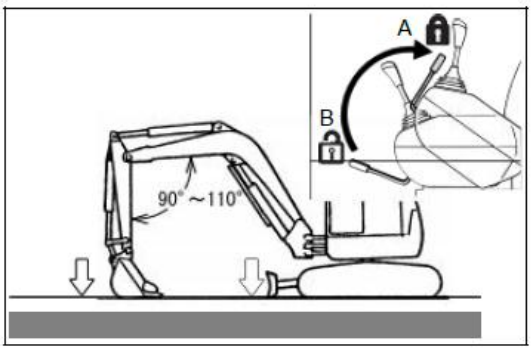
- **Please park the machine in a hard and level location.**
- **Please avoid parking the machine on sloping ground. When it is necessary to park the machine on sloping ground, please dig the bucket into the ground, and place brake wedges (1) under the crawlers, so as to prevent the machine from moving.**
- **In order to prevent incorrect operation of the machine due to accidental touch with joystick, the descending cut-off type safety locking rod must be set to the "locked position" and the engine must be stopped.**



1. Please set the left and right travelling rods (4) to the "neutral position".
2. Please set the throttle lever (5) to the "low-speed idle position".
3. Please make the bucket (2) touch the ground.
4. Please make sure the bulldozer board (3) touch the ground.



5. Please set the descending cut-off type safety locking rod (6) to the "locked position".
   A. Locked B. Released

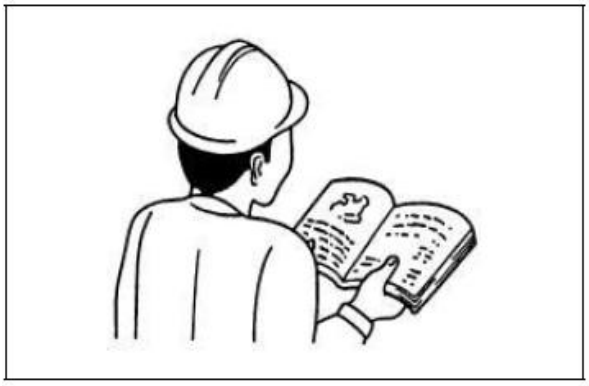


3.1.11 Inspection and Confirmation after Completion of Operation

Inspect the engine cooling water temperature, engine oil pressure, ad fuel level through the monitoring panel.

1. In case the fuel level is too low, please stop the engine and fill it up.
2. In case the engine cooling water temperature and engine oil pressure warning lamps display abnormalities, please transfer the machine to a safe location and immediately stop the engine. Please carry out repair by reference to the key points recorded on the "Checklist for Inspection and Conditioning".

3.1.12 Inspection and Confirmation after Stop of Engine



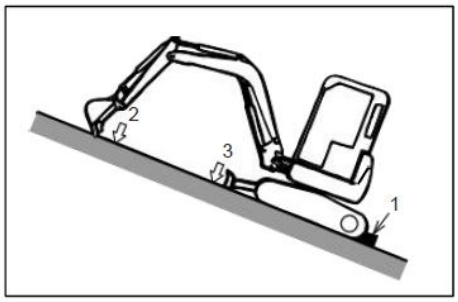
1. Please carry out inspection for oil leakage, water leakage, attachment, packaging, and surrounding area of the machine. In case there is any leakage or abnormality, please carry out repair immediately by reference to the key points recorded on the "**Checklist for Inspection and Conditioning**".
2. Please top up the fuel tank.
   Please top up the fuel tank after completing the driving operations every day. However, please don't refuel too much, exceeding the necessary level (at the top of the fuel tank). As the external temperature rises, fuel may overflow from the fuel tank due to expansion.
3. Please clear away the soil adhering around the bottom of the machine.

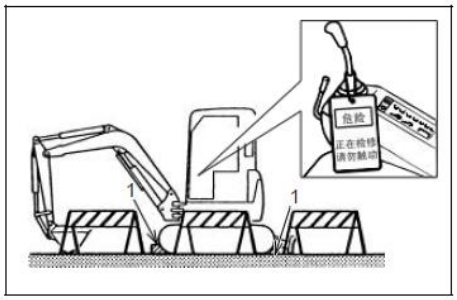
3.1.13 Countermeasures after Emergency Stop of Engine

- In order to protect the engine, please be careful not to stop it urgently. Please note that, the engine shall be stopped after approximately 5 minutes of no-load running at low speed. In addition, when an emergency stop is necessary, please pay full attention to the safety conditions.
- When facing danger or having to stop the engine urgently due to the malfunction of this machine, please take preventive measures according to the following records to avoid damaging the machine or causing personal safety accidents.
- Please restart the engine after the engine and cooling water have cooled down.

⚠Caution

In case of emergency stop of engine during high-speed rotation, the engine oil will get deteriorated and the seal component will adhere due to the rapid rise in engine temperature.





1. After emergency stop, please also set the descending cut-off type safety locking rod to the "locked position".
2. After emergency stop in a state where there is no grounding outside, please place a safety stop block under the attachment or bucket (2) for support, and place brake wedges (1) under the crawlers.
3. When making an emergency stop on sloping ground, please place brake wedges (1) under the crawlers at both ends.
4. Please confirm the safety of the surrounding area, set up a "no entry" sign, take measures to prevent others from approaching the machine, until the engine can be restarted or the machine can be moved.
5. When there is an emergency stop for unknown reason or it is necessary to carry out maintenance operation, please entrust our sales agent to carry out repair or operation.
6. Please restart the engine after the engine cooling water has cooled down.

3.1.14 Operation of Rubber Crawler Shoes

A. How to use rubber crawler shoes

Rubber crawler shoes have advantages that iron crawler shoes don't have. In case the rubber crawler shoes are used in the same way as iron crawler shoes, their advantages cannot be brought into full place. Please carry out the operation appropriately based on the on-site conditions and the operation contents.

Due to the unique properties of their material, rubber crawler shoes have many advantages, but also have certain weaknesses in terms of strength. Therefore, please fully understand the strengths of rubber crawler shoes. In addition, by following the prohibitions and precautions during operation, the service life of rubber crawler shoes can be extended, and the advantages of rubber crawler shoes can be brought into full play. Please read the "Precautions for use of rubber crawler shoes" carefully before use.

Item \ Type	Rubber crawler shoes	Iron crawler shoes
Small vibration	ⓞ	△
Smooth travelling	ⓞ	○
Low noise	ⓞ	△
No damage to paved road surface	ⓞ	△
Easy operation	ⓞ	△
Prone to damage	△	ⓞ
Strong towing force	ⓞ	ⓞ

o: Extremely excellent; ○: Excellent; △: Ordinary

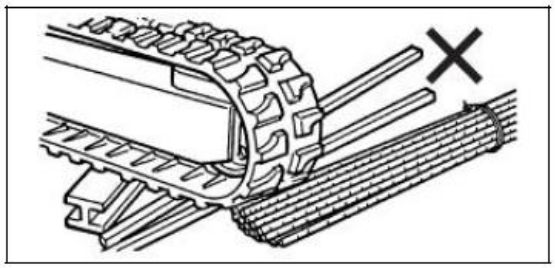
B. Warranty for rubber crawler shoes

Damage caused by working on sites with sharp corners such as iron plates, U-shaped grooves, blocks, gravel, rocks, steel bars, and iron filings that may damage rubber crawler shoes is not included in the scope of warranty.

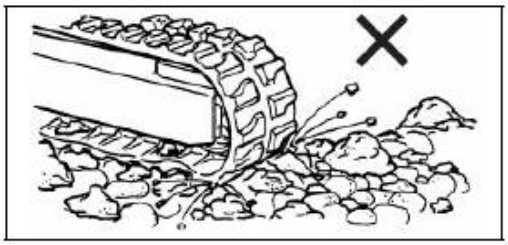
C. Prohibitions for rubber crawler shoes

It is absolutely prohibited to carry out the following operations.

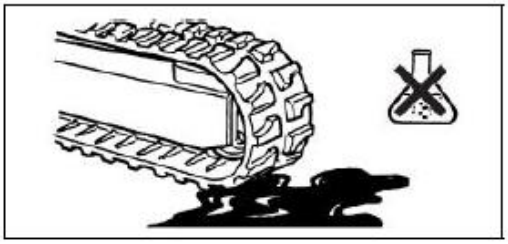
1. Carrying out operation and rotation near gravel foundations, uneven and sturdy rocks, steel bars, iron filings, and edges of iron plates can damage the rubber crawler shoes.



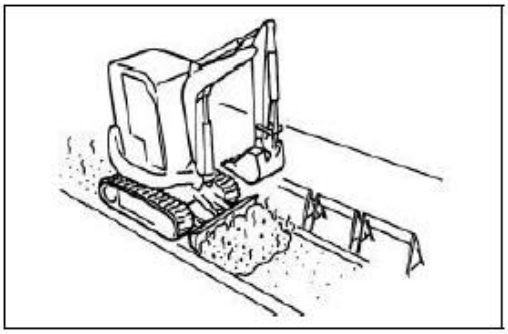
2. In places such as riverbeds where there are many large and small stones, the rubber crawler shoes may be damaged or the wheels may fall off due to being embedded in the stones. In addition, forcibly pressing soil while the crawler shoes are sliding may shorten the service life of rubber crawler shoes.



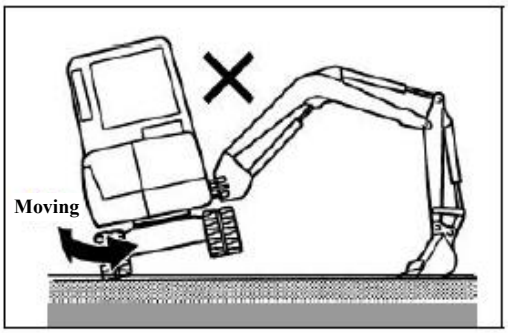
3. Please note that the rubber crawler shoes shall not be stained with oil, fuel, and chemical solvents. In case they are stained with such substances, please wipe them off immediately. In addition, in case there is residual oil on the road surface, don't make the machine travel over it.



4. Don't enter any hot place such as iron plate placed next to campfire or in hot weather, and don't carry out land leveling operation on asphalt road.
5. When long-term storage (for more than 3 months) is required, please store the machine in a room that is not exposed to direct sunlight and rain.



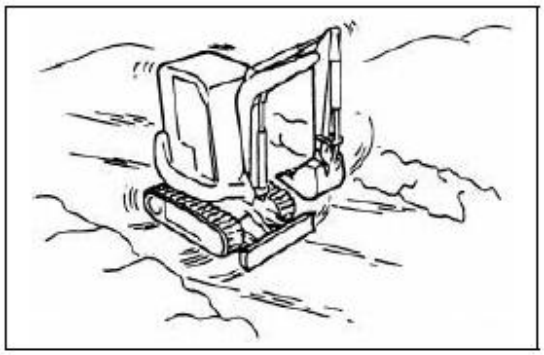
6. Moving the crawler on other side while using the attachment to support the crawler on one side may cause the rubber crawler shoes to fall off and be damaged.



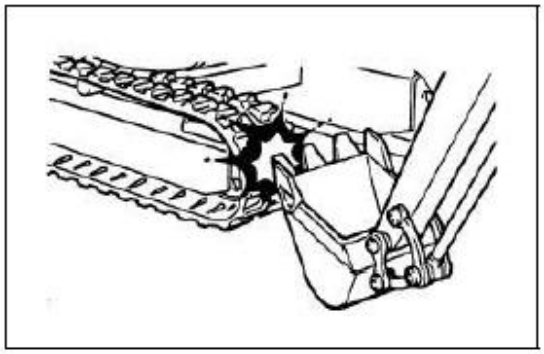
D. Precautions for use of rubber crawler shoes

Please pay attention to the following key points during operation.

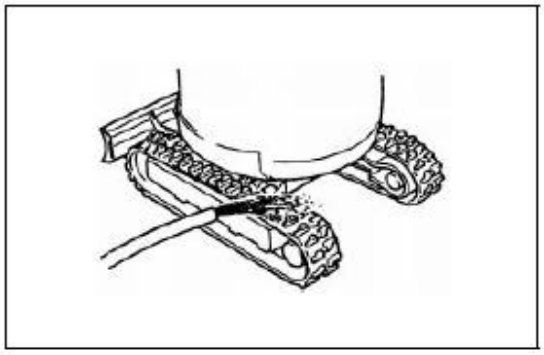
1. The rubber crawler shoes may slip on snowy and frozen roads. Please avoid using rubber crawler shoes on snowy or frozen sloping ground.
2. Please avoid both-side reverse turning on concrete pavement.
3. Rapidly changing the travelling direction may cause early wear and damage to the rubber crawler shoes. Therefore, please try to avoid it as much as possible.



4. During operation, please be careful not to get the rubber crawler shoes damaged by the bucket.
5. Please be careful not to rub the rubber crawler shoes on concrete or wall while driving.
6. Please slowly lower the machine supported by the attachment.



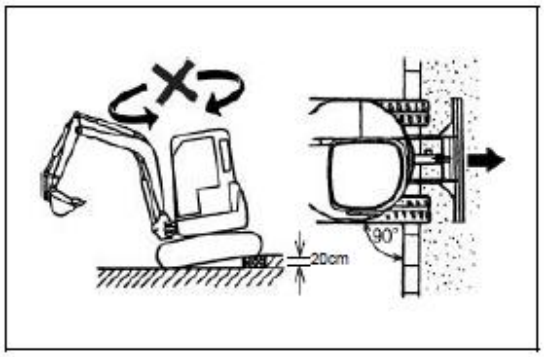
7. When carrying out operation in a location with high salt content and corrosiveness, the salt and corrosive substances may invade the central metal parts due to contact. Therefore, please avoid using the machine in such location or rinsing the machine with water after use in such location.



8. Due to the characteristics of rubber, please use the rubber crawler shoes within the range of -25℃ to +55℃.

⚠Caution

In order to prevent the rubber crawler shoes from slipping out, please use them within the appropriate tension range. When the tension is relaxed, the following conditions may cause the rubber crawler shoes to slip off. Please also be careful when working under appropriate tension.



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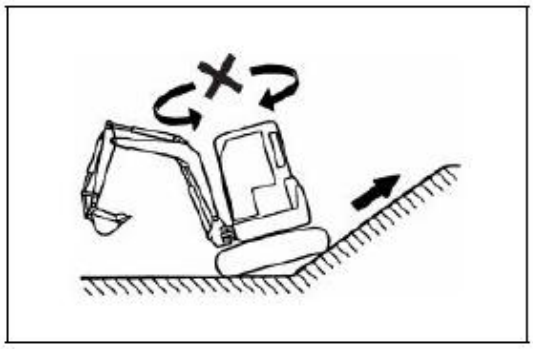
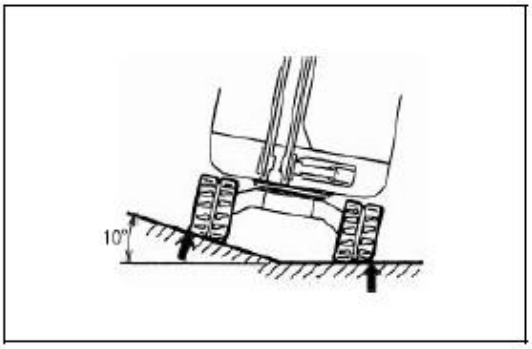
9. Please avoid changing the travelling directions in areas with prominent steps (about 20cm). When crossing steps, please ensure that the machine is at a right angle to the steps.

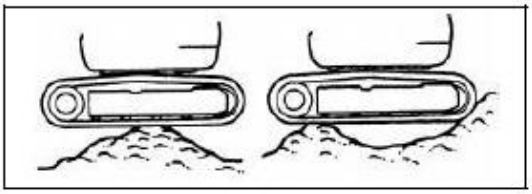
10. During travelling backwards for going uphill, please avoid changing the travelling direction when transitioning from flat ground to sloping ground.



11. Travelling on slope or convex ground with single-side crawler shoes on such ground may damage the crawler shoes. Therefore, please ensure that the machine is travelling with the crawler shoes on both sides maintained on the same plane.



12. Changing the direction of rubber crawler shoes by using the posture shown in the right figure may cause detachment of wheels or damage to rubber crawler shoes. Therefore, please avoid it.



3.1.15 Operations under Special Conditions

A. Operation in cold weather

⚠Warning

In case the atmospheric temperature is low, it will be to start the engine due to the decrease in fluidity of engine oil, and the radiator may get damaged due to freezing of cooling water.

A1. Fuel and engine oil

Please use high-quality and low-viscosity fuel and engine oil for each device. Regarding viscosity, please refer to the **"List of Lubricating Greases Added"**.

A.2 Cooling water

When driving or storing the machine in cold regions, it is necessary to determine the proportion of cooling water before adding it into the cooling system according to the expected minimum outside atmospheric temperature.

The freezing of cooling water may damage the radiator, cylinder block, and cylinder head. In order to prevent rusting and freezing for engine cooling system, the cooling water mixed with "ultra-long life coolant" has been used upon delivery of the machine.

When carrying out operation or storing the machine in cold weather, please inspect the concentration of cooling water from time to time, and maintain an appropriate concentration.

A.3 Battery

The decrease in atmospheric temperature may lead to the decrease in capacity and the freezing of electrolyte. Therefore, please try to make the charging rate close to 100% as much as possible, and use covers or other methods to insulate the battery. Regarding the charging rate, please measure the specific gravity and estimate the charging rate according to the table below.

Specific gravity of electrolyte

Charging Rate	Electrolyte Temperature		
	-20℃	0℃	20℃
100%	1.28	1.27	1.26
90%	1.26	1.25	1.24
80%	1.24	1.23	1.22
75%	1.23	1.22	1.21

Please don’t measure the specific gravity of the electrolyte immediately after work, but rather measure it when the electrolyte temperature has roughly decreased to the outside atmospheric temperature.

A.4 After completion of operation

In order to prevent the freezing of mud and water adhering to the machine from causing poor movement around the bottom of the machine, please follow the following instructions.

- Please thoroughly clear away the mud and water adhering to the machine. Especially after water has been drained sufficiently around the bottom of the machine, please park the machine on a dry and sturdy ground, so as to prevent the freezing around the bottom of the machine.
- The frozen mud and water adhering to piston rod surface of any cylinder may cause damage to seal during contraction. Therefore, please fully retract each cylinder and minimize the exposed part of piston rod.

B. Operation in seaside areas

B.1 Before operation

- Please confirm the tightening condition of all plugs, faucets, and covers.
- Please apply lubricating grease to necessary components related to electrical equipment, so as to prevent corrosion.

B.2 After operation

Please clean the machine carefully, remove salt, and take the necessary rust prevention measures such as applying engine oil and lubricating grease.

C. Operation of electrical equipment

Electrical equipment shall not come into contact with water. When washing the machine or carrying out conditioning in rain, please properly protect the electrical equipment from and against water. Especially when the driver's seat is equipped with electrical components such as relays and fuses, please be extremely careful.

D. Operation in dusty areas

D.1 Air filter

Please clean and replace the filter element as soon as possible.

D.2 Radiator

Please clean it as soon as possible, so as to avoid dust accumulation in the radiator core.

D.3 Fuel

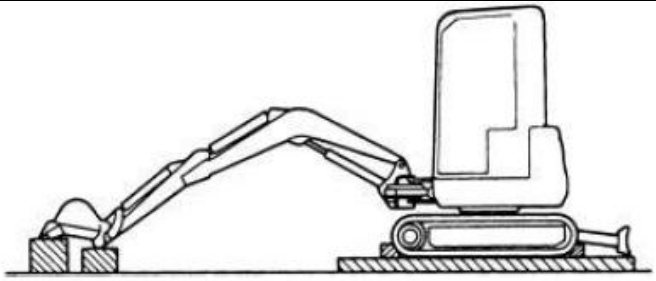
- When refueling, please be careful not to get any dust mixed. In addition, please conduct early inspection of components and filters as soon as possible.
- Especially, please clean the starting motor and generator as early as possible, so as to prevent the accumulation of dust.

D.4 Electrical equipment

Especially, please clean the starting motor and generator as early as possible, so as to prevent the accumulation of dust. Please refer to the **"Inspection and Conditioning"**.

3.1.16 Precautions for Long-term Storage

When the machine needs to be idle for more than one month, in order to prevent functional degradation during next driving, please manage it based on the following key points.

Item	Operation Contents
Wahing the machine	**• Thoroughly clean the machine, inspect the area around the bottom for any abnormality, and add lubricating grease to all parts that require it.**
Adding lubricating grease to each component	**• Inspect the oil level and impurities of lubricating grease, add it in case the amount is insufficient, and replace it in case there are too many impurities. • When using the machine again, please note that the lubricating grease may age during storage. Apply anti-rust oil to those areas prone to rusting, especially the exposed part of piston rod in each cylinder.**
Battery	**• Remove the negative terminal of the battery, protect it with a cover, or remove it from the machine for storage. The battery will discharge on its own during storage, so that please charge the battery once a month.**
Cooling water	**• When it may freeze, please add antifreeze into the radiator. • Usually the long-life coolant will be added, which requires no special change.**
Preventing dust and moisture	 **• Please keep the machine in a dry indoor place. In case it is necessary to store the machine outdoors, please place wood or other materials on a flat surface for use. • Please fully retract the exposed part of piston rod of each cylinder before parking the machine. • The bucket must be lowered to the ground and the brake wedges must be placed under the crawlers.**
Carrying out lubrication driving on a regular basis (during storage)	**• In case the oil film on any part disappears or any part rusts, abnormal wear may be caused during the next driving. Please start the engine once every month and, while moving the machine, activate the attachment, so as to deliver the lubricating oil to all parts. • When starting the engine, please inspect the engine oil level and cooling water level, and in case the level is too low, replenish them. • Please wipe off the anti-rust oil on cylinders and piston rods. After the lubrication driving, please apply the anti-rust oil again. • After starting the engine, please perform sufficient warm-up driving, and repeat the travelling, rotation, and excavation actions for multiple times, so as to prevent the oil film on the lubricated parts from disappearing. • When the machine is stored indoors, please get the place well-ventilated while warming up the engine.**
Operation after long-term storage	**• When using the machine again after long-term storage, please carry out the following operations before starting the work. • Please wipe off the anti-rust oil on cylinders and piston rods. • Please apply oil and grease to all parts.**

4. Inspection and Conditioning

4.1 Inspection and Conditioning

4.1.1 Regular Inspection and Conditioning

By conducting regular inspection and conditioning, the performance of the machine can be brought into full play while the service life of its components can be prolonged. The interval time for refueling is generally determined by a timer, and the value of the timer is roughly consistent with the date. For refueling to be carried out in a planned manner according to the date, the timer time may be ignored, and the refueling may be carried out on a certain date (daily, weekly, or monthly). For items without specific conditioning time, please refer to the instructions in Section "Irregular Conditioning". In addition, when carrying out operation under harsh operating conditions or in operation sites with high levels of dust and moisture, it is recommended to shorten the time interval specified in the *Table of Time Interval for Refueling and Conditioning* for refueling and conditioning.

4.1.2 Precautions for Inspection and Conditioning

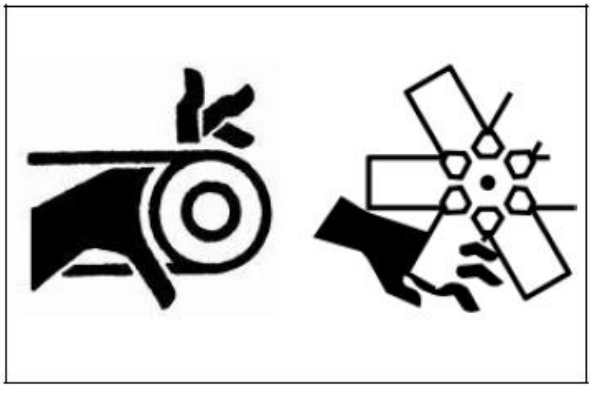
Please don't use the methods other than those recorded in these Operating Instructions for inspection and conditioning operations. Please park the machine on a flat ground for inspection and conditioning operations.

A. Confirmation of timer

Please inspect the timer every day, so as to confirm whether there are any items that have reached the necessary conditioning time.

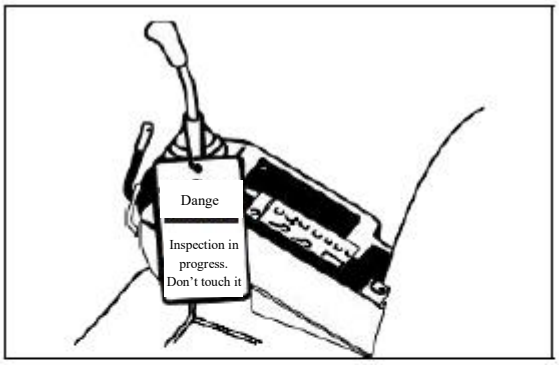
B. Conditioning after stop of engine

Please stop the engine and perform the inspection and conditioning on the engine. In case the inspection and conditioning are carried out while the engine is running, hands may get caught in the cooling fan and fan belt and be injured. When it is necessary to perform inspection and conditioning when the engine is running, please arrange for two or more working personnel, one of whom shall be in a state for stopping the engine at any time, while the other person shall keep communication with such person and perform the inspection and conditioning.



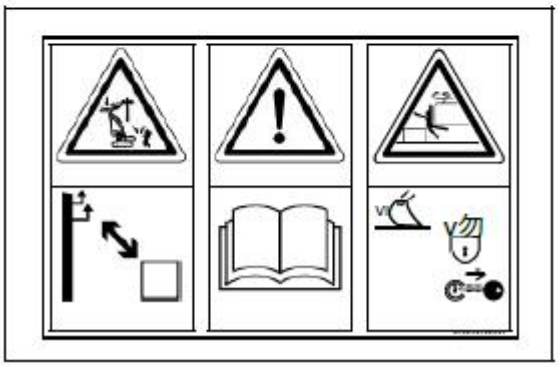
C. Warning sign

When conducting inspection and conditioning, please lock the start switch or joysticks, and hang a warning sign around the driver's seat that reads "Inspection in progress. Don't touch it."



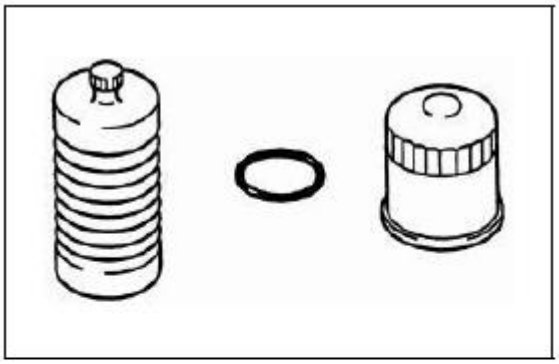
D. Precautions

Please conduct inspection and conditioning operations based on the understanding of the content of the safety identification labels attached to the machine.



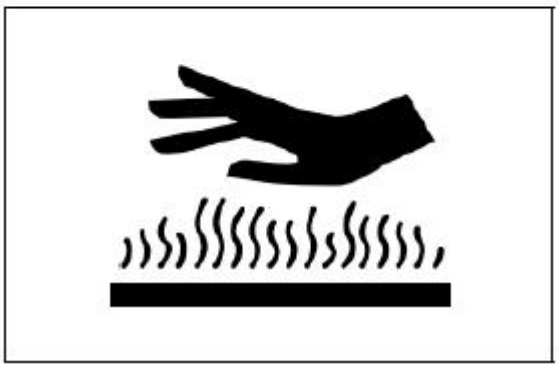
E. Use of genuine components

- Please use KOBELCO's genuine parts when replacing components and applying grease. Additionally, please use the grease with specified viscosity according to the atmospheric temperature.
- Please keep oil and grease containers in a clean room, so as to prevent dust and water from entering them.



F. Temperature of water and oil

After the engine has just stopped, it is very dangerous to immediately perform the operations such as draining oil, draining water, and replacing filter element due to high temperatures. Please wait for the temperature to decrease before performing such operations. After the hydraulic oil has cooled down, please perform low-speed idling for about 5 minutes, and then drain the oil when the oil temperature rises slightly (about 20-40°C).



G. Internal pressure

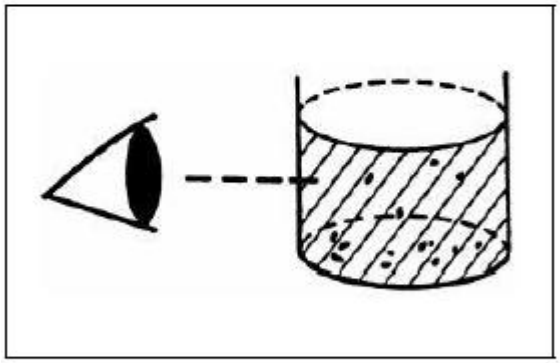
Please release the internal pressure before disassembling the piping, joints, and other related components of hydraulic system, air system, fuel system or cooling system with internal pressure. Please refer to Section 4.8 for the internal pressure releasing method.

H. Mixing of impurities

Install plugs and covers into the oil ports of hydraulic hoses and hydraulic components, so as to prevent foreign matters from entering.

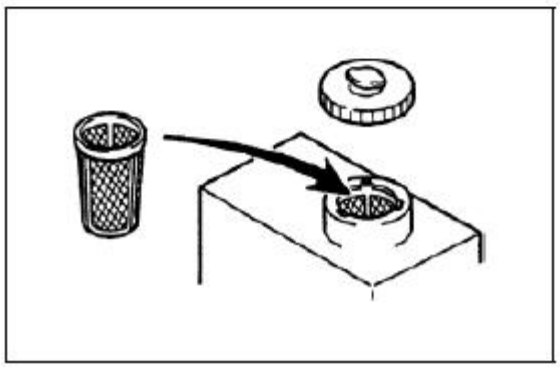
I. Inspection on oil drain and filter element

When replacing hydraulic oil or filter element, please inspect the oil drain and old filter element, so as to confirm whether there is no large amount of metal powder and foreign matters.



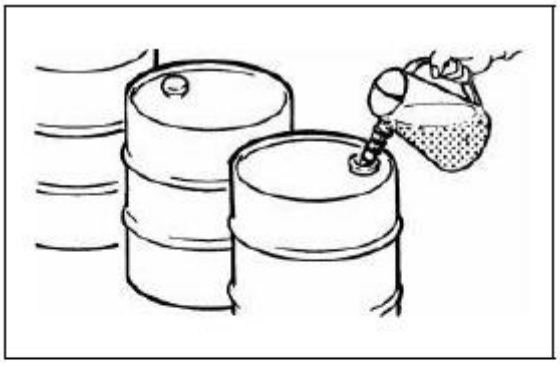
J. Precautions for replenishment of oil

In case the oil filler is equipped with a stainer, it is absolutely prohibited to remove the filter and inject the oil.



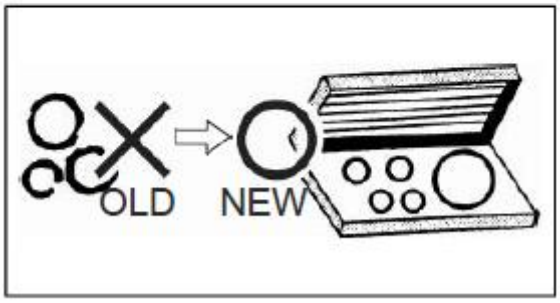
K. Disposal of waste oil

Waste oil must be discharged into containers such as oil tanks and disposed of correctly as industrial waste.



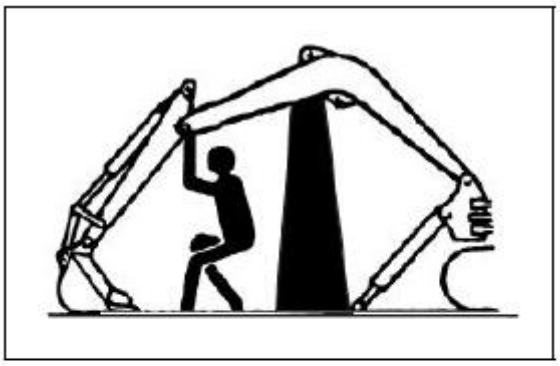
L. Cleaning of installation surface

Please clean the installation surfaces of the O-rings, gaskets, and other seals that have been removed, and then replace them with new ones. In addition, please apply a slightly thinner layer of engine oil on the sealing surface during installation, and then correctly install it in the O-ring groove.



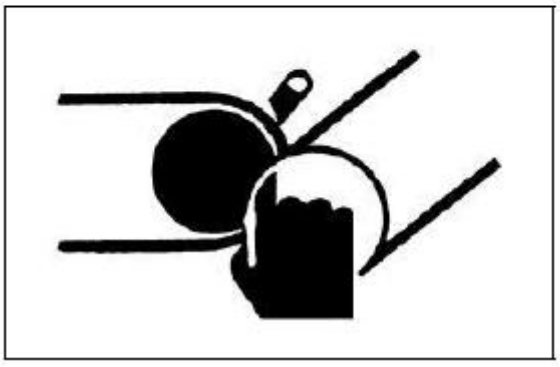
M. Setting of locking devices

When conducting inspection and conditioning under the attachment, please set up installation blocks and safety pillars to prevent the attachment from sliding or tipping over. In case the gap changes, major personal safety accidents may occur.



N. Precautions when replacement of bucket

Please don’t insert your hand into the pin hole.
When aligning the pin with the pin hole, fingers, hands, and wrists must not be inserted into the pin hole.
When aligning holes, please visually align them.



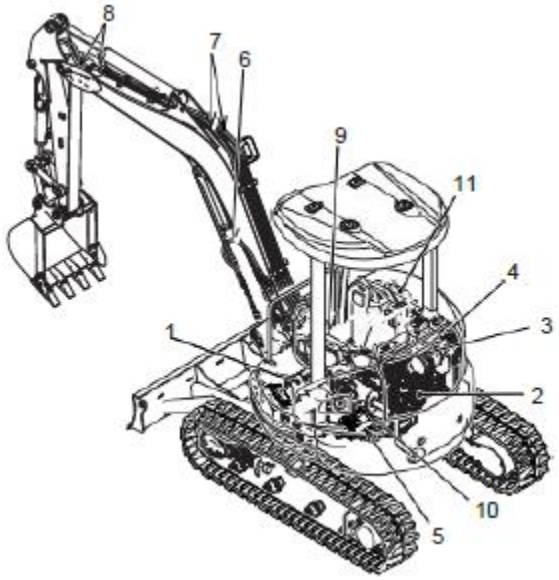
D. Dusty operation site

When carrying out operation in dusty operation site, please pay attention to the following matters.

- Please carefully inspect whether the air filter is clogged through the alarm lamp.
- Please clean the radiator core as soon as possible, so as to prevent blockage.
- Please clean and replace the fuel filter as soon as possible.
- Electrical equipment, especially starter and engine, must not have dust accumulated.

4.1.3 Regularly-replaced Important Safety Components

The following components may experience aging, wear, and fatigue due to changes in prolonged use and repeated use, which could potentially cause major accidents. Because it is difficult to determine the service life of such components through visual inspection and driving experience, they are referred to as "regularly-replaced important safety components". In case the replacement time is reached, please consult with our nearest sales agent for regular replacement.



Device Name	No.	Usage Location	Product Name	Replacement Time	Reason for Selection
Engine	1	Fuel tank	Fuel hose	Every 2 years	Fire may occur due to leakage of fuel
	2	Jet pump	Fuel hose	Every 2 years	
	3	Heater	Hose between engine and heater	Every 2 years	Accident may occur due to spraying of hot water
	4	Radiator	Hose	Every 2 years	
Hydraulic system	5	Oil suction and oil outlet hoses	Hose	Every 2 years	Pollution or fire may occur due to leakage of oil
	6	Boom cylinder oil circuit hose	Hose	Every 2 years	It may be difficult to maintain the attachment due to leakage of oil, which is the reason for the falling of attachment
	7	Bucket arm cylinder oil circuit hose	Hose	Every 2 years	
	8	Bucket cylinder oil circuit hose	Hose	Every 2 years	
	9	Axis rotation cylinder oil circuit hose	Hose	Every 2 years	
	10	Rotating motor oil circuit hose	Hose	Every 2 years	Pollution or fire may occur due to leakage of oil
	11	Oil return circuit	Pipe joint (gasket)	Every 2 years	

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1. When replacing the hose, please replace both the O-ring and the gasket at the same time.
2. In case it is confirmed that the hose clamp is deformed or cracked during inspection or replacement of hose, please replace the clamp at the same time.
3. When replacing the fuel hose, please strictly follow the installation position, so as to prevent fire.

4.2 List of Lubricating Greases Added

Please select the oils that are suitable for the external atmospheric temperature and use them separately.

Application position	Types of oil products	Capacity upon replacement	Usage: To be used separately according to temperature -22° -4° 14° 32° 50° 68° 86° 104° F -30° -20° -10° 0 10 20 30° 40° C	Designated grease
Hydraulic oil tank	Hydraulic oil	Standard oil amount 38L Full capacity 48L	ISO VG 46	(KOBELCO genuine) KW5046 (20L) P/No. KAP2421R157D9
			ISO VG 32	(KOBELCO genuine) KW5032S (20L) P/No. KAP2421R157D7
Rotating motor	Hydraulic oil	Automatic filling		
Engine oil pan	Engine oil (CD level according to API classification)	6.7L (High oil level) 3.9L (Low oil level)	SAE 40	SAE40
			SAE 30	SAE30
			SAE 10W	SAE10W
			SAE 10W-30	SAE10W-30
Fuel tank	Light diesel oil	38L	JIS 2	JIS 2
			JIS 3	JIS 3
			JIS	JIS Special 3
Radiator	Cooling water	Radiator 1.6 liters Total water capacity 4.6 liters	30% LLC mixed	KOBELCO antifreeze (In case of commercial cooling water, the proportion of antifreeze added must meet the requirements) P/No. KAPLLC95-20
			50% LLC mixed	
Travelling reducer motor	Gear oil (API classification) (GL-4 level)	0.7L (X2)	SAE #90	(KOBELCO genuine) GL-4 level A.P.I. specification P/No. KAPSP90020
Chain supporting wheel		45 cc (X2)	SAE #90	
Guiding wheel		80 cc (X2)	SAE #90	
Load bearing wheel	Engine oil (CD level according to API classification)	35 cc (X8)	SAE #90	SAE30
Bulldozer pin	Extreme-pressure multifunctional grease	20 locations		(KOBELCO genuine) NLGI No.2 EP-type extreme-pressure multifunctional lithium-based grease (Filter element KAPG0420D1) (400g x 20) (Filter element KAPG1601D1)
Axis rotation cylinder pin				
Rotating bearing		1 location		
Guiding wheel adjuster		2 locations		
Rotating gear		3.6 kg		
Joystick and pedal		Several grams		

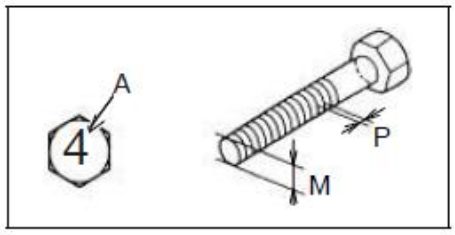
Notes:

1. For new machines, please use the grease marked with ※ (except for those in cold regions)
2. **The total capacity of hydraulic oil tank includes the total amount of hydraulic oil in cylinders and various devices.**

4.3 Tightening Torque of Flat Head Screws and Nuts

Please tighten the flat head screws and nuts of each component by reference to the table below. Before starting daily operation and during regular inspection, inspect whether the flat head screws and nuts are loosened or detached. In case they are loosened or detached, please tighten or replace them. During the first 50 service hours of a new machine, please inspect and tighten them. In addition, during maintenance, inspection and conditioning, in case it is necessary to replace the disassembled flat head screws and nuts, please use KOBELCO's genuine products of the same model as the disassembled screws and nuts. Please tighten the flat head screws and nuts by reference to the table below.

- The tightening torque of resin covers is different from the torque values in the table below. In case they need to be tightened, please contact our sales store. In case any bolt or nut is tightened with excessive torque, the tightening area may get damaged.
- In case the tightening torque value is indicated in this Document, please carry out tightening according to such specified value. (The actual torque may differ from what is stated in this Document)
- The identification method for strength (A) is as follows: The strength is identified by the number marked on the top of the flat head screw. (Example: 4=4.8T) Flat head screws below M5 are unmarked.



Metric Ordinary Bolts (Uncoated)

N·m {kgf·m}

Size	Strength Identification	4.8T		7T		10.9T	
	Usage Identification	Lubricated	Unlubricated	Lubricated	Unlubricated	Lubricated	Unlubricated
M6	P=1	4.4±0.5 {0.45±0.05}	3.7±0.4 {0.38±0.04}	9.6±1.0 {0.98±0.1}	8.1±0.8 {0.83±0.08}	17.4±1.8 {1.77±0.18}	14.7±1.5 {1.5±0.15}
M8	P=1.25	10.7±1.1 {1.09±0.11}	9.0±0.9 {0.92±0.09}	23.5±2.0 {2.4±0.2}	19.6±2 {2.0±0.2}	42.2±3.9 {4.3±0.4}	35.3±3.9 {3.6±0.4}
M10	P=1.5	21.6±2.0 {2.2±0.2}	17.9±1.8 {1.83±0.18}	46.1±4.9 {4.7±0.5}	39.2±3.9 {4.0±0.4}	83.4±8.8 {8.5±0.9}	70.6±6.9 {7.2±0.7}
M12	P=1.75	36.3±3.9 {3.7±0.4}	31.4±2.9 {3.2±0.3}	79.4±7.8 {8.1±0.8}	66.7±6.9 {6.8±0.7}	143±15 {14.6±1.5}	121±12 {12.3±1.2}
M14	P=2	57.9±5.9 {5.9±0.6}	49.0±4.9 {5.0±0.5}	126±13 {12.8±1.3}	106±10 {10.8±1.1}	226±20 {23±2}	191±19 {19.5±1.9}
M16	P=2	88.3±8.8 {9.0±0.9}	74.5±6.9 {7.6±0.7}	191±20 {19.5±2.0}	161±16 {16.4±1.6}	343±39 {35±4}	284±29 {29±3}
M18	P=2.5	122±12 {12.4±1.2}	103±10 {10.5±1.0}	265±29 {27±3}	226±20 {23±2}	481±49 {49±5}	402±39 {41±4}
M20	P=2.5	172±17 {17.5±1.7}	144±14 {14.7±1.4}	373±39 {38±4}	314±29 {32±3}	667±69 {68±7}	559±59 {57±6}
M22	P=2.5	226±20 {23±2}	192±20 {19.6±2.0}	500±49 {51±5}	422±39 {43±4}	902±88 {92±9}	755±78 {77±8}
M24	P=3	294±29 {30±3}	235±29 {24±3}	637±69 {65±7}	520±49 {53±5}	1160±118 {118±12}	941±98 {96±10}
M27	P=3	431±39 {44±4}	353±39 {36±4}	941±98 {96±10}	765±78 {78±8}	1700±167 {173±17}	1370±137 {140±14}
M30	P=3.5	588±59 {60±6}	490±49 {50±5}	1285±127 {131±13}	1079±108 {110±11}	2300±235 {235±24}	1940±196 {198±20}
M33	P=3.5	794±78 {81±8}	667±69 {68±7}	1726±177 {176±18}	1451±147 {148±15}	3110±314 {317±32}	2610±265 {266±27}
M36	P=4	1030±98 {105±10}	863±88 {88±9}	2226±226 {227±23}	1863±186 {190±19}	4010±402 {409±41}	3360±333 {343±34}

Metric Fine-tooth Bolts (Uncoated)

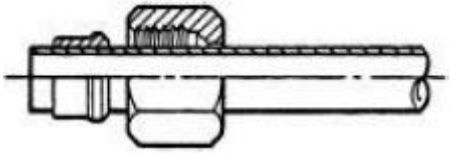
N·m {kgf·m}

Size	Strength Identification	4.8T		7T		10.9T	
	Usage Identification	Lubricated	Unlubricated	Lubricated	Unlubricated	Lubricated	Unlubricated
M8	P=1	11.3±1.1 {1.15±0.11}	9.5±1.0 {0.97±0.1}	24.5±2.0 {2.5±0.2}	20.6±2.0 {2.1±0.2}	44.1±3.9 {4.5±0.4}	37.3±3.9 {3.8±0.4}
M10	P=1.25	22.6±2.0 {2.3±0.2}	18.7±1.9 {1.91±0.19}	48.1±4.9 {4.9±0.5}	41.2±3.9 {4.2±0.4}	87.3±8.8 {8.9±0.9}	73.5±6.9 {7.5±0.7}
M12	P=1.25	39.2±3.9 {4.0±0.4}	33.3±2.9 {3.4±0.3}	85.3±8.8 {8.7±0.9}	71.6±6.9 {7.3±0.7}	154±16 {15.7±1.6}	129±13 {13.2±1.3}
M16	P=1.5	92.2±8.8 {9.4±0.9}	77.5±7.8 {7.9±0.8}	196±20 {20±2}	169±17 {17.2±1.7}	363±39 {37±4}	304±29 {31±3}
M20	P=1.5	186±19 {19±1.9}	155±16 {15.8±1.6}	402±39 {41±4}	333±29 {34±3}	726±69 {74±7}	608±59 {62±6}
M24	P=2	314±29 {32±3}	265±29 {27±3}	686±69 {70±7}	569±59 {58±6}	1240±118 {126±12}	1030±98 {105±10}
M30	P=2	637±59 {65±6}	530±49 {54±5}	1390±137 {142±14}	1157±118 {118±12}	2500±255 {255±26}	2080±206 {212±21}
M33	P=2	853±88 {87±9}	706±70 {72±7}	1860±186 {190±19}	1550±155 {158±16}	3350±334 {341±34}	2790±275 {284±28}
M36	P=3	1070±108 {109±11}	892±88 {91±9}	2330±226 {238±23}	1940±196 {198±20}	4200±422 {428±43}	3500±353 {357±36}

4.4 Tightening Torque of Joints and Hydraulic Hoses

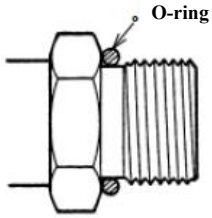
A. Embedded joint

Sleeve Size Outer Diameter x Thickness (mm)	Wrench Used (mm)	Tightening Torque N·m {kgf·m}
10×1.5	19	44±4.9{4.5±0.5}
15×2.0	27	147±20{15±2}
18×2.5	32	177±20{18±2}
22×3.0	36	216±20{22±2}
28×4.0	41	275±29{28±3}
35×5.0	55	441±44{45±4.5}



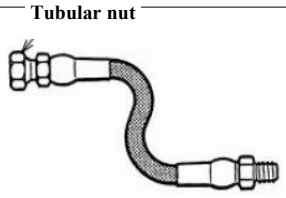
B. Joint (O-ring type)

Screw Diameter (PF)	Wrench Used (mm)	Tightening Torque N·m {kgf·m}
1/8	14	17±2{1.7±0.2}
1/4	19	36±2{3.7±0.2}
3/8	22	74±5{7.5±0.5}
1/2	27	108±9.8{11±1.0}
3/4	36	162±9.8{16.5±1.5}
1	41	255±9.8{26.0±1.0}



C. Hydraulic hose

Screw Diameter (PF)	Wrench Used (mm)	Tightening Torque N·m {kgf·m}
1/8	14	15±2.0{3.0±0.5}
1/4	19	29±4.9{3.0±0.5}
3/8	22	49±4.9{5.0±0.5}
1/2	27	78±4.9{8.0±0.5}
3/4	36	118±9.8{12.0±1.0}
1	41	137±15{14.0±1.5}



The condition for this tightening torque is: suitable for use without lubricating oil.

4.5 Assembly of Hydraulic Hose/Pipe Joints

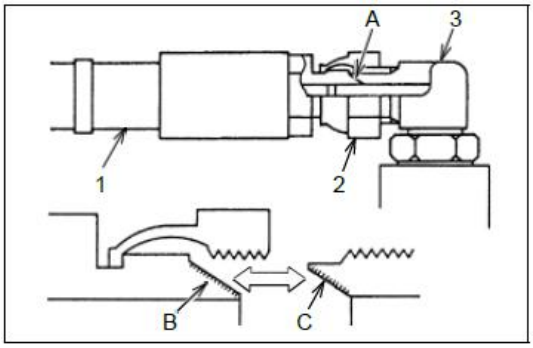
There are two types of joints used for hoses and pipes.

A. Metal joint

The metal crimping is adopted to seal the openings of connectors (T-joints, an elbow joints) and hoses. Be careful not to damage the setting surface during disassembling and assembling.

1. Hose
2. Pipe connecting nut
3. Connector

A. Setting surface
B. Metal crimping surface of hose mouth
C. Interface crimping surface



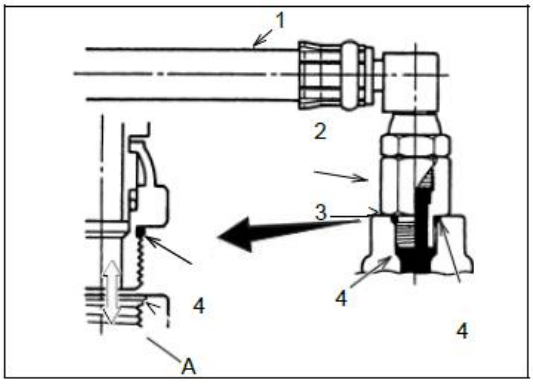
Metal joint

B. O-ring sealing joint

The O-rings are assembled in the metal part of hose mouth to seal the hydraulic pressure at the joint and prevent oil leakage.

The tightening torque of each hydraulic hose joint depends on the spring diameter of the metal part at the hose mouth. Even before the regular inspection time of hydraulic components, in case abnormal conditions are found in any hose joint, please pay attention to the following items and repair or replace them.

1. Hose
2. Pipe connecting nut
3. Connector
4. O-ring



A. Interface crimping surface

O-ring sealing joint

B.1 O-ring

1. During reassembling, the O-ring must be replaced with a new one.
2. When oil leakage occurs due to loose pipe joints, it is not enough to simply tighten the pipe joints. Instead, a new O-ring shall be replaced and confirmed to be correctly installed on the sealing surface before tightening.
3. Please don't use the O-rings that have already been damaged or aged. In addition, in case any O-ring other than genuine product is used, even if the size is the same but the material or hardness is different, it will cause oil leakage or significantly reduce the service life of hydraulic components.

B.2 Joint

1. During assembling, please be careful not to damage the O-ring grooves or sealing surfaces on hoses, pipelines, and hydraulic components. Using damaged products may cause oil leakage.

2. Please be careful not to mix impurities or dust during installation. Assembling with foreign matters is the cause of oil leakage

B.3 Hose

1. Please don't install a hose when it is bent or the bending radius is reduced; otherwise, the service life of the hose will be shortened.
2. After cleaning the hose, pipeline, and hydraulic component joints and their surrounding areas, please completely remove the cleaning solution, wait for such areas to become dry, and then carry out installation. Additionally, please apply sufficient grease to the screws before installation.

4.6 Release of Hydraulic Oil and Internal Pressure of Hydraulic System

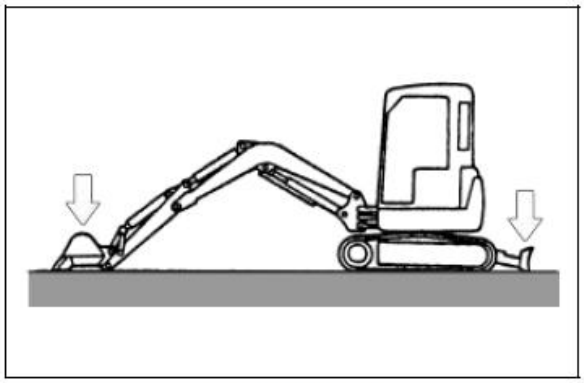
When adding/draining the hydraulic oil or repairing/maintaining the hydraulic components such as return oil filter element, oil suction strainer, and cylinder, please release the internal pressure of the hydraulic system in advance.

A. Release of internal pressure of hydraulic system

Warning

When disassembling the oil filler, please stop the engine and push the rubber cover upwards or loosen the flange, so as to release the pressure.

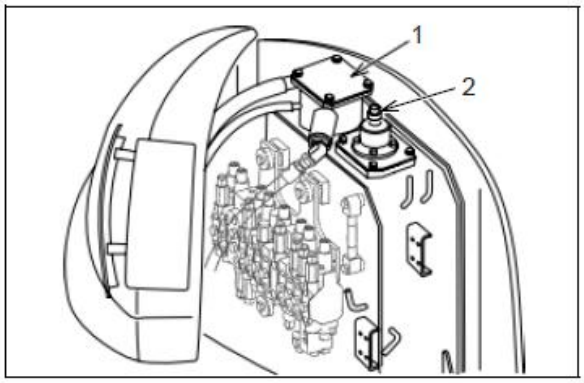
1. Select a horizontal and hard location, as shown in the right figure, retract the bucket arm cylinder and bucket cylinder to the end of their stroke, lower the bucket, and set the machine to the "hydraulic oil inspection posture" with the bucket and bulldozer board lowered onto the ground.
2. For hydraulic pilot operated machine, operate the joystick for release of pressure circuit during low-speed idle until the engine stops.



Hydraulic oil inspection posture

Only the above method can be used to release the internal pressure of hydraulic system.

3. In case of manual (wire control) pressure relief, the joystick may be operated after the engine has stopped.
4. Please set the descending cut-off type safety locking rod to the "locked position".
5. Please stop the engine.
   (Please set the start switch to the position "OFF")
6. Please open the cover above the hydraulic oil tank (1) and support it with a stick.
7. Press and hold the rubber cover of the air tank (2) above the hydraulic oil tank (1) for multiple times (5-7 times), so as to release the pressure inside the hydraulic oil tank.
8. After the above operation, the pressure in the hydraulic system and hydraulic oil tank will be released. Please conduct the inspection and conditioning of hydraulic system.



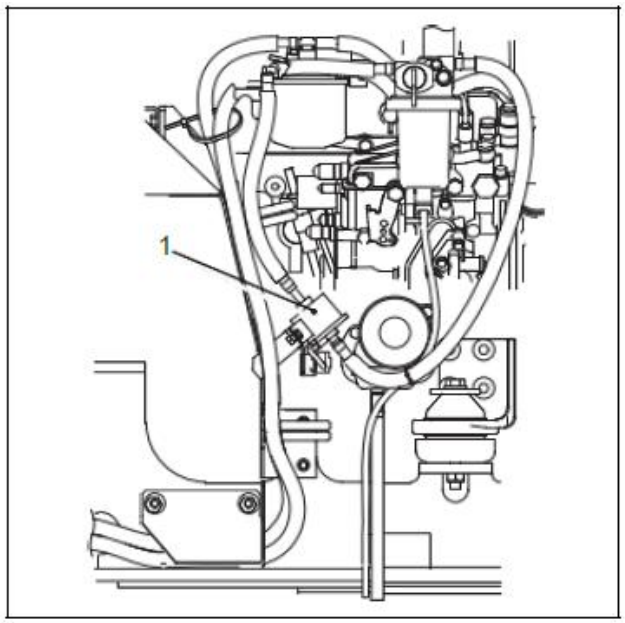
4.7 Air Bleeding for Fuel System

Mixing or retention of air in fuel system may result in the inability to transport fuel to the fuel injection pump. When the fuel tank is "empty" and the fuel filter is replaced, residual air will be generated. Therefore, please be sure to bleed it.

A. Key points of automatic air bleeding

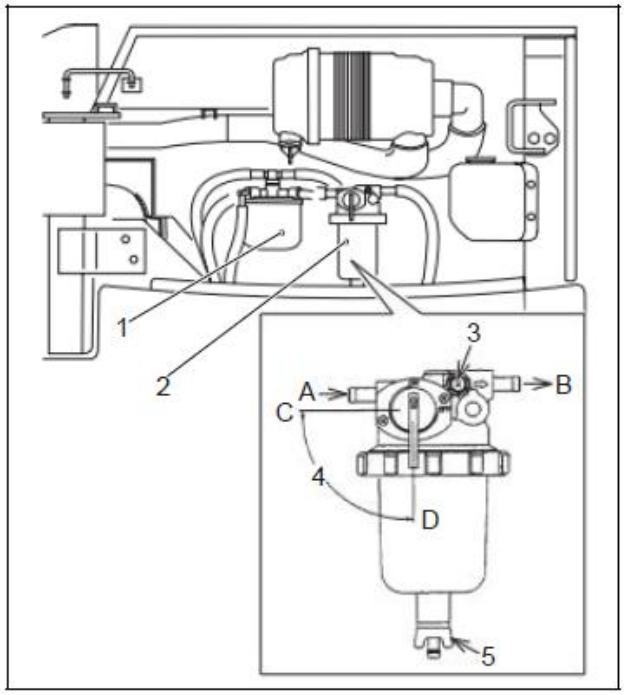
The fuel supply pump of this machine is installed on the side of the engine, and the air bleeding shall be carried out through the following steps.

1. Top up the fuel tank.
2. Set the start key switch to the position "ON", and operate the fuel supply pump for about 2 minutes, so as to achieve the automatic air bleeding.
    1. Fuel pump



B. Key points for air bleeding

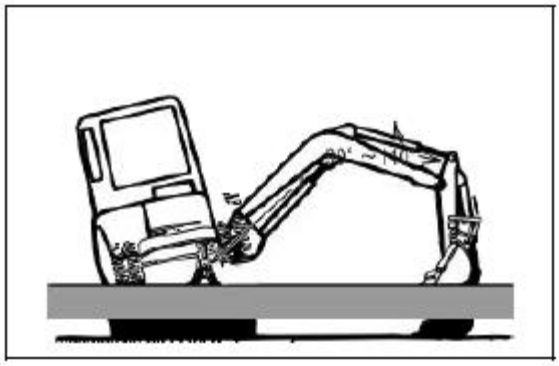
1. Please set the descending cut-off type safety lock rod to the "locked position" and then stop the engine.
2. Top up the fuel tank.
3. Please confirm that the faucet of the oil-water separator is at the position "ON" (D).
4. Use a screwdriver (+) to loosen the air bleeding plug above the oil-water separator by 2-3 turns.
5. Set the start switch to the position "START" and perform the start operation. Make the engine idle, so as to deliver the fuel.
6. After the fuel without bubbles flows out of the air bleeding plug hole, tighten the air bleeding plug (3).
    1. Fuel filter element
    2. Oil-water separator
    3. Air bleeding plug
    4. Fuel drain valve
    5. Water drain valve
    A. Ful inlet
    B. Fuel outlet
    C. Closed
    D. Opened



4.8 Replacement of Rubber Crawler Shoes

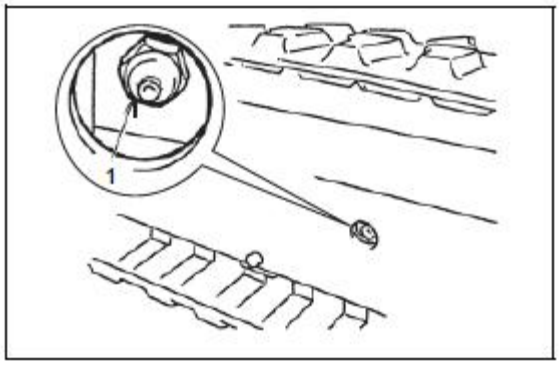
⚠Warning

- Please arrange for two working personnel to carry out the operation, and arrange for the driver to drive the machine according to the command signals from the working personnel. Please lift the machine and replace the rubber crawler shoes. It will very dangerous in case the machine body accidentally falls off during replacement. When carrying out the replacement, please don't move any other component except for the rubber crawler shoes that need to be replaced.
- The high pressure acts on the grease cylinder, so that in case the grease injection port is loosened, the grease will spray out, which is very dangerous. Please don't get the grease injection port close to your cheek or other body part, and please slowly loosen it. The grease injection port may fly out due to the high-pressure grease inside, which is very dangerous. Therefore, please slowly loosen the grease injection port within 1 turn, so as to release the internal pressure.
- In case the rubber crawler shoes are disassembled in a sequence other than that specified in Section "Disassembling of rubber crawler shoes" below, the grease may spray out, which is very dangerous. When the crawler becomes loose, please get it repaired by our sales agent.



4.8.1 Disassembling rubber crawler shoes

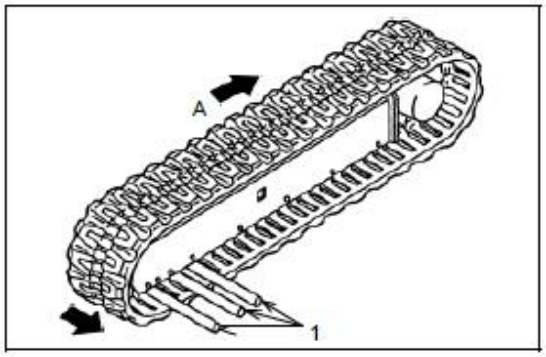
1. Lift up the machine body by pressing the boom and bucket arm against the ground. Please operate the joystick slowly.
2. Use a safety strut (1) to support the lower travelling body.



3. Slowly loosen the grease injection port (1) on the grease cylinder and drain the grease.
4. Please slowly loosen the grease injection port (1) within 1 turn at most.

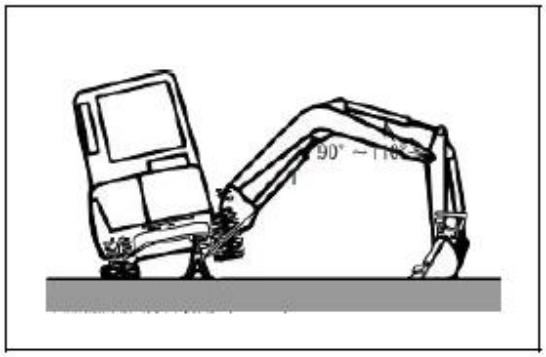
5. After the iron pipes are embedded in the rubber crawler shoes, rotate the sprocket teeth slowly in the backward direction. As a result, the rubber crawler shoes will be lifted up through the iron pipes and will be slid horizontally for disassembly.

1. Iron pipes
A. Rotation direction



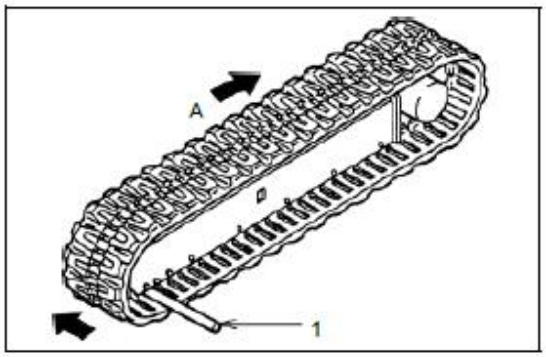
4.8.2 Installation of rubber crawler shoes

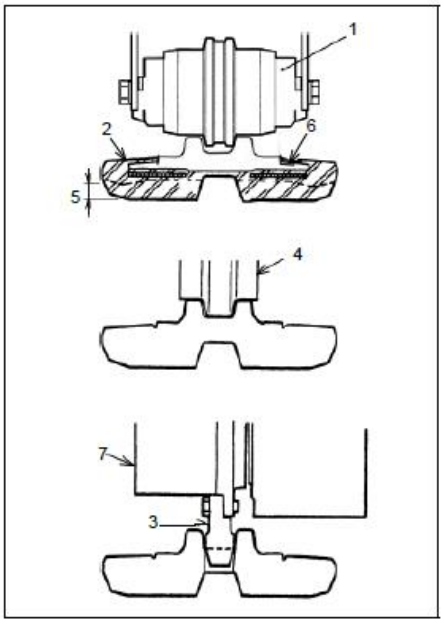
1. Lift up the machine body by pressing the boom and bucket arm against the ground. Please operate the joystick slowly.
2. Use a safety strut (1) to support the lower travelling body.



3. Get the rubber crawler shoes engaged with the sprocket teeth and pre-assemble the guiding wheel.
4. Slowly rotate the sprocket teeth in the forward direction, push in the rubber crawler shoes, and then stop the rotation.
5. After the iron pipes are embedded in the rubber crawler shoes, rotate the sprocket teeth slowly in the backward direction again. As a result, the rubber crawler shoes will be firmly assembled on the guiding wheels.

1. Iron pipes
A. Rotation direction





4.8.3 Inspection and Adjustment of Tension of Crawler Shoes

Properly adjusting the tension of crawler shoes can extend the service life of crawler shoes and travelling devices, and can also prevent the occurrence of crawler shoes falling out due to insufficient tension.

⚠Warning

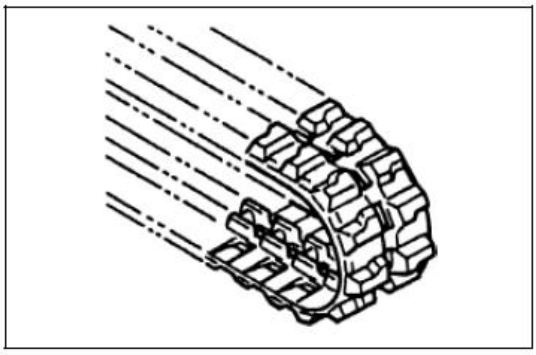
To inspect the tension of crawler shoes, it is necessary to lift the crawler at the inspection end. Therefore, in case the machine body accidentally falls, it will be very dangerous. During the inspection, please absolutely do not let the machine move. Please arrange for two working personnel to carry out the operation, and the arrange for the driver to drive the machine according to the command signals given by the operators.

A. Rubber crawler shoes

The wear state varies due to different working conditions and soil conditions.

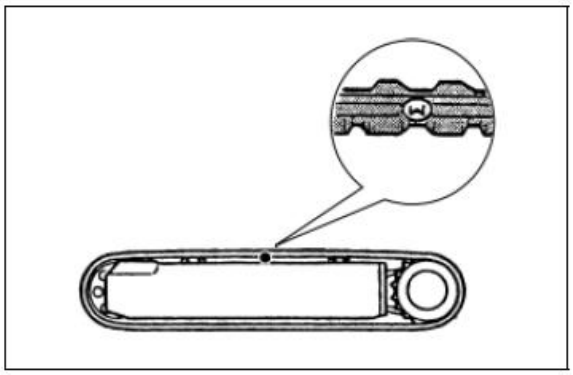
Rubber crawler shoes

Therefore, please inspect the wear and tension state from time to time. Especially during assembling of a new product, there may be some stretching in the initial stage. Therefore, please carefully adjust the tension after use for about 30 hours.



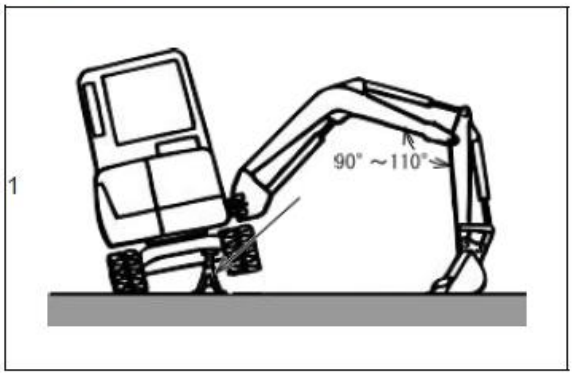
A.1 Inspection

1. Move the rubber crawler shoes until the joint part (mark M) of the rubber is moved to the upper end of the central part between the axles.



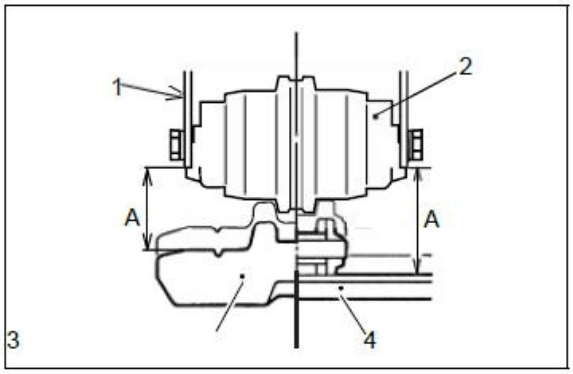
Rubber track shoes

2. Rotate the machine by 90° as shown in the right figure, lower the bucket onto the ground, retract the boom cylinder, lift up the crawler at the inspection end, and use safety strut (1) to support the lower frame.



3. Please measure the gap "A" between the bottom of the crawler beam and the top of the crawler shoes at the center of the crawler beam.

1. Crawler beam
2. Load bearing wheels
3. Rubber crawler shoes
4. Iron crawler shoes



Rubber crawler shoes/iron crawler shoes

Appropriate tension "A" (mm):

Rubber: 70-80mm
Iron: 115-130mm

4. In case the tension is not within the appropriate range, please carry out adjustment by reference to the following section.

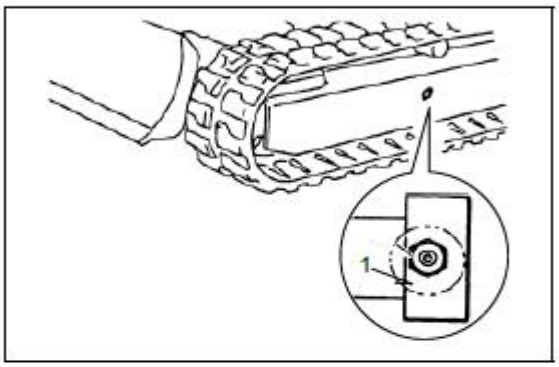
Working with the crawler shoes in a relaxed state may lead to detachment of wheel and premature wear of crawler shoes.

A.2 Adjustment

The tension of crawler shoes must be adjusted according to the operating conditions on site. In operation sites with a large amount of gravel and stones, please adjust the tension of crawler shoes to a relatively gentle and appropriate level before operating if possible. In addition, when carrying out operation on a solid foundation, please adjust the tension of crawler shoes to a slightly stronger and appropriate level before operation.

⚠Warning

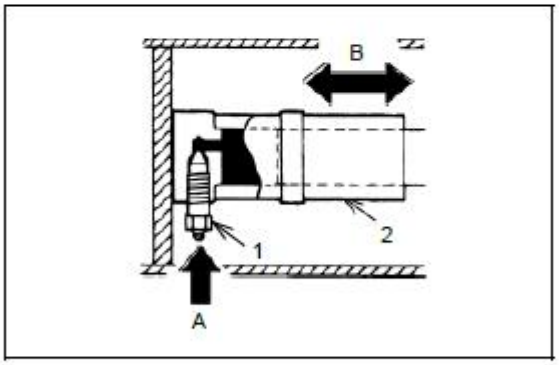
- **The grease injection port may fly out due to the high-pressure grease inside, which is very dangerous. Therefore, please slowly loosen the grease injection port within 1 turn.**
- **When loosening the grease injection port for tension adjustment or disassembling of crawler shoes, please slowly loosen the grease injection port within 1 turn, and release the internal pressure slowly, because the lubricating grease cylinder of the track spring is pressurized with high-pressure grease.**
- **When loosening the grease injection port, don't face your cheek and body towards the installation direction.**



A.2.1 Tensioning up the crawler shoes

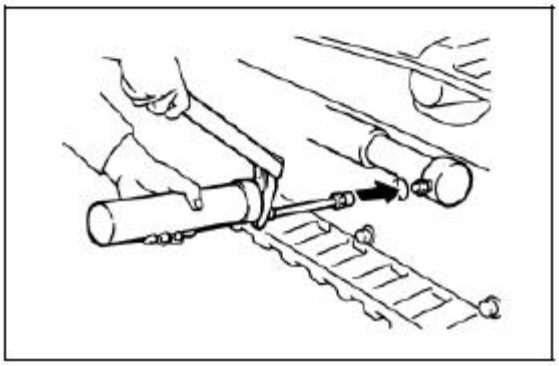
Please prepare a grease gun

1. Please use the grease gun to inject the lubricating grease into the grease injection port (1), so as to achieve the appropriate tension on the crawler shoes.
2. Confirm that the tension of the left and right crawler shoes is equal and correct, and make the machine move forwards and backwards to equalize the pressure.



1. Lubricating grease injection port
2. Lubricating grease cylinder
A. Injecting the lubricating grease
B. Pressure

3. Inspect the tension condition of the crawler shoes again, and carry out adjustment as necessary, until the appropriate tension is achieved.



In case crawler shoes are still relaxed after the lubricating grease is injected, maybe the crawler shoes must be replaced, or there is any malfunction in the seal or body of the lubricating grease cylinder. Please get such components repaired or replaced by our sales agent.

A.2.2 Relaxing the crawler shoes

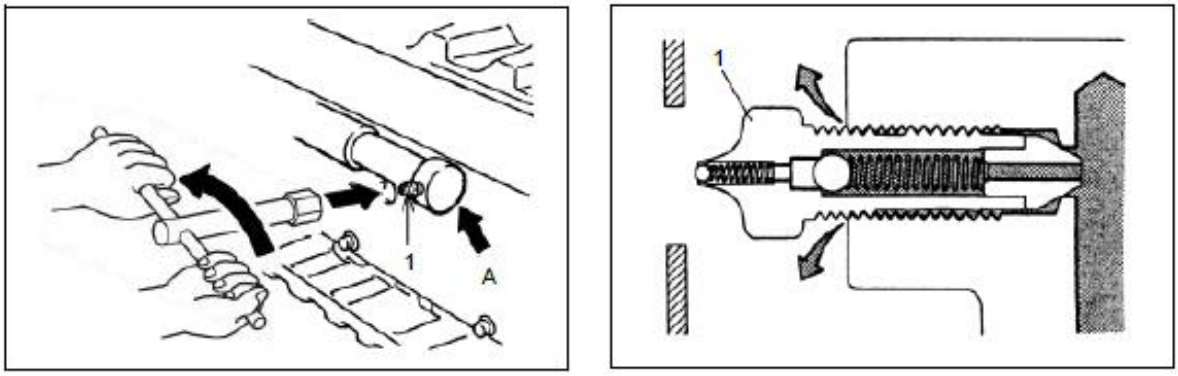
⚠Warning

- **Discharging the lubricating grease without using the following method is very dangerous.**
- **In case the grease cannot be discharged and the crawler shoes are not relaxed even after the grease injection port is loosened, please get the machine repaired by our nearest sales agent.**
- **Please absolutely don't disassemble the grease injection port, otherwise, it will be very dangerous.**

1. Please slightly loosen the grease injection port (1) of the grease cylinder and discharge the grease. When loosening the grease injection port (1), please loosen it at most 1 turn.
2. When it is difficult to discharge the lubricating grease, please move the machine (crawler shoes) forwards and backwards slightly.
3. Please tighten the grease injection port (1).

Tightening Torque: 73.5±14.7N·m {7.5±1.5kgf·m}

Please move the machine forwards and backwards to confirm whether the crawler shoers are in the correct tension state. Inspect the tension condition of the crawler shoes again and adjust the tension condition of the crawler shoes as necessary, until the appropriate tension is achieved.



Detail Diagram of Part A (discharge of lubricating grease)

4.9 Checklist for Inspection and Conditioning

The table below shows the maintenance items for various devices recommended by us, including regular and timed replenishment of oil, replacement of components, and inspection. Please compare the timer with the specified time, and use the earlier one as the standard for inspection and conditioning. For inspection and conditioning items, please refer to the key points for inspection and conditioning as described later. **The meanings of the markings in the table are detailed as follows:**

■: Indicates the timer-based intervals for necessary items during regular inspection.

※: Indicates the time interval to be followed during the first inspection and conditioning.

○: Indicates the time interval for necessary inspection and conditioning.

Device Category	Item/Interval		Irregular	Pre-operation inspection 8H	Weekly 50H	Every 3 months 250H	Every 6 months 500H	Every 12 months 1000H	1500H	2000H	5000H	Oil/Grease (Replacement of Parts)	Reference Record Page
Engine	Engine oil	Inspection on oil level		○								Engine oil	3-5
		Replacement			※ (First time)	○							4-43
	Replacement of oil filter element				※ (First time)	○						Filter element	4-45
	Oil-water separator	Drain of water		○									4-38
		Cleaning				○						Filter element	
	Fuel filter element	Replacement				○						Filter element	4-49
	Air filter element	Inspection and cleaning				○						Filter element	4-47
		Replacement					○					Filter element	
	Radiator cooling water	Inspection on water level		○									3-4
		Replacement						○				Tap water (LLC)	4-50
		Inspection for leakage		○									3-5
	Fan belt	Inspection		○									3-8
		Adjustment			※ (First time)	○							4-44
	Cleaning of radiator core		○										4-26
	Cleaning of radiator cover		○										4-26
	Inspection for cracks and damages on cooling system hoses			○									4-46
	Inspection on color, abnormal noise, and odor of exhaust gas			○									3-14
	Inspection and adjustment of valve clearance							○					4-51
	Inspection and adjustment of fuel injection valve								○				4-53
	Inspection and adjustment during fuel injection								○				4-53
	Inspection and adjustment of starting motor and generator							○					4-51
Fuel system	Fuel tank	Inspection on oil level and replenishment of oil		○									3-7
		Discharge of water and sediment			○								4-40
		Inspection for leakage		○									3-7

Device Category	Item/Interval			Irregular	Pre-operation inspection 8H	Weekly 50H	Every 3 months 250H	Every 6 months 500H	Every 12 months 1000H	1500H	2000H	5000H	Oil/Grease (Replacement of Parts)	Reference Record Page
Hydraulic system	Hydraulic oil tank	Hydraulic oil	Inspection on oil level		○								Hydraulic oil	3-5
			Cleaning and replacement								○	○		4-62
		Oil suction strainer	Cleaning and replacement								○		Strainer	4-54
		Replacement of return oil filter element				※ (First time)	○ (Hydraulic hammer 200H)		○		○		Filter element	4-52
	Inspection for oil leakage and damage of various components such as oil cylinders, piping, and hoses				○									4-35
	Cleaning of oil circuit filter										○			4-56
Upper frame	Replenishment of lubricating grease to rotating bearings						○						Lubricating grease	4-44
	Replacement of lubricating grease in rotating grease groove										○		Molybdenum extreme pressure grease	4-61
Lower frame	Traveling reducer motor	Replacement of oil						※ (First time)			○		Gear oil	4-58
	Inspection and adjustment of tension of rubber crawler shoes					○								4-20
	Inspection for wear and damage and adjustment of rubber crawler shoes			○										4-32
	Load bearing wheel, and guiding wheel	Inspection			○									4-36
		Replacement of gear oil									○			4-59
	Inspection for oil leakage and wear of chain wheel and travelling reducer motors				○									4-36
Attachment	Replenishment of lubricating grease to lock	Around the bucket			○ (50H)	○							Lubricating grease	4-37
		Boom, bucket arm, cylinder, and bulldozer board			○ (50H)		○						Lubricating grease	4-42
	Replacement of bucket			○										4-30
	Inspection and adjustment of bucket adjusting mechanism			○										
	Inspection on wear and damage of side cutting plate of bucket shoe			○										4-28
Electrical	Inspection on electrical wiring			○										4-34
	Inspection on liquid level and specific gravity of battery					○							Distilled water	4-40
	Inspection on functioning of alarm lamp				○									3-9
	Inspection on each switch and joystick				○									3-15
	Replacement of working lamp (lamp)			○									12V 55W (Iodine tungsten lamp)	4-27
Spare parts • others	Inspection for abnormal deformation and damage on appearance of machine				○									4-35
	Inspection for looseness and detachment of all flat head bolts and nuts				○									4-35
	Joystick	Inspection			○									3-15
		Replenishment of lubricating grease		○									Lubricating grease	4-34

4.10 Irregular Conditioning

A. Cleaning of exterior of radiator core

Please read the "Basic Safety Precautions" in these Instructions thoroughly and carry out the operation and conditioning based on a full understanding thereof.

⚠Warning

In case compressed air, water vapor, and high-pressure water come into direct contact with human body, external injuries may be caused. Please wear goggles, face shield, helmet, and safety boots.

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1. Please remove the right cover plate and the lower cover under the radiator by reference to Section "**Opening and closing of side cover plate and lid**".
2. Please inspect whether there are any residual soil and impurities in the radiator fan.
3. Please use compressed air to remove dirt and impurities from the radiator core and fan.

To prevent damage to the fan when using compressed air, please keep it away from the fan. In case the fan is damaged, water leakage and overheating may be caused.

B. Cleaning or replacement of radiator cover

⚠Warning

High-pressure water vapor generated inside the radiator is very dangerous. Please don't loosen or open the radiator cover when the cooling water is at high temperature or under high pressure.

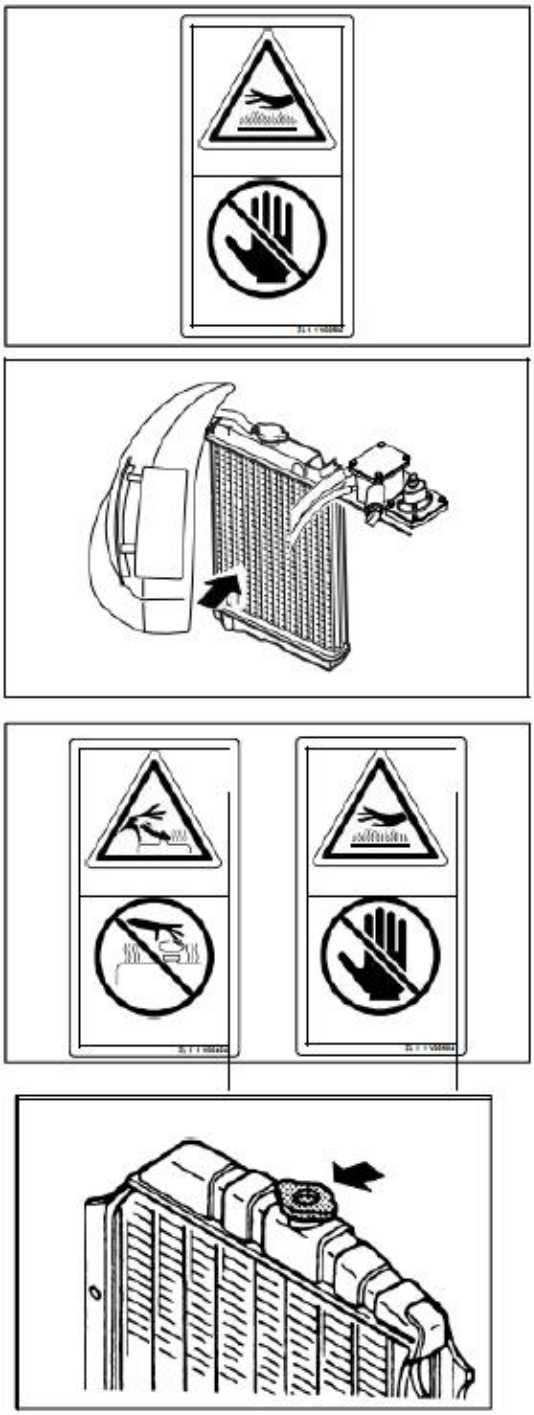
- **Please stop the engine when opening the radiator cover.**
- **Please wait until the cooling water has fully cooled down.**

⚠Caution

In case the radiator cover is not fully tightened, steam and hot water may spray out while the machine is running, which may burn the working personnel.

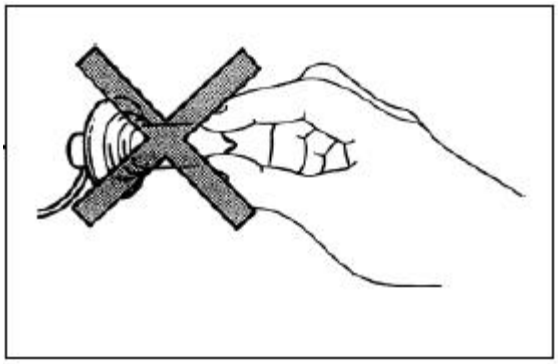
---

1. Please remove the cover after it has so cooled down that it can be touched with bare hands.
2. Slowly loosen the cover, release the pressure, press down the cover, loosen the cover again in this state, and remove it.
3. Please inspect whether the cover is damaged or whether there are any foreign matters adhering to it. Please clean the cover with clean cloth or replace it as necessary.
4. Please tighten the radiator cover.



C. Replacement of working lamps

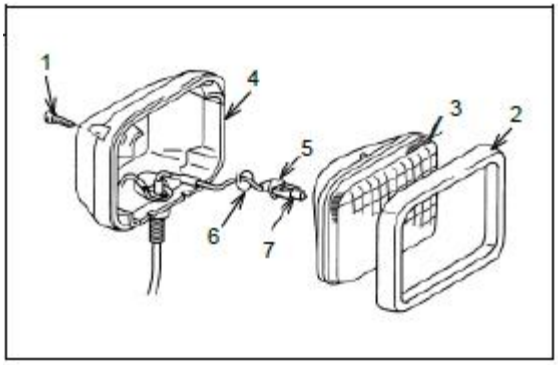
The working lamps of this machine are iodine tungsten lamps (55W). We only explain the replacement of lamp here. For any abnormalities related to working lamps, please refer to Section 2.3.7 on inspection of fuses.



⚠Caution

The lamp is at high temperatures during use, and in case grease or other substances adhere to the surface of the bulb, the service life of the lamp may be shortened. When replacing the bulb, please hold the flange and don't touch the glass part with your hands.

When replacing the lamp, please be careful not to damage the lens. When removing the screw (1), in case the lens is not protected, it may fall off and thus be damaged.



C.1 Replacement of working lamp on attachment

1. Remove the screws (1) (4 pieces), and then remove the rim (2) and lens (3) from the housing (4).
2. Remove the spring (6) used to fix the lamp holder (5).
3. Remove the lamp (7) from the lamp holder (5) and install a new lamp.
4. Please tighten and fix the lamp according to the reversed sequence as specified in 1 above.

Working lamp on attachment

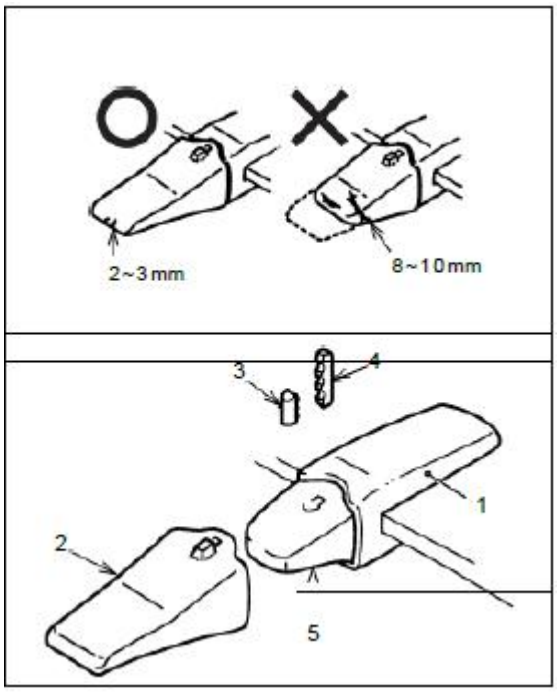
D. Inspection for wear and damage of bucket shoe and side blades

⚠Caution

When replacing the bucket shoe and side blades, please install a safety block (wooden skid) on the bottom of the bucket.

Inspect the bucket shoe and side blades for wear and damage. For bucket shoe with openings and cracks, please replace it as soon as possible before it is worn to the adapter (1). In addition, please replace the severely-worn adapter as soon as possible. In case the replacement time is extended, the bucket body may get damaged.

1. Connector
2. Bucket shoe
3. Rubber locking pin
4. Sealing pin
5. Front edge of bucket teeth
6. Wooden skid
7. Hammer
8. Stamping tool



Bucket shoe (with crack)

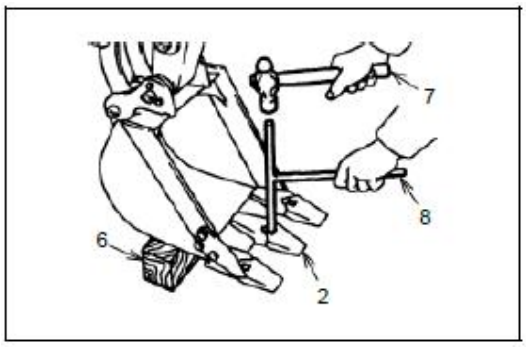
D.1 Replacement of shoe and side blades

Please consult with our sales agent when replacing the shoe and side blades.

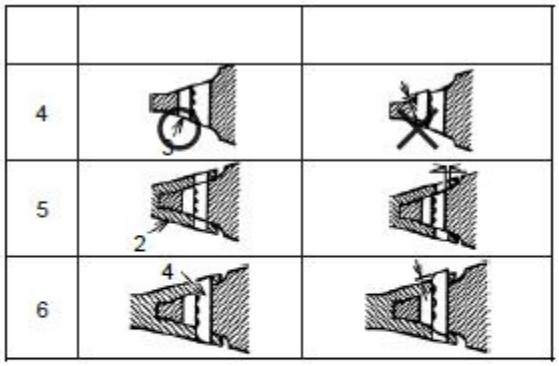
⚠Caution

When performing tapping operations, metal sheets may fly out, and if they splash into eyes, major injury accident may occur. Please wear personal protective equipment such as goggles, safety helmet, and gloves when performing such operation.

1. When inserting the pin of bucket shoe, place the bucket on the wooden skid (6), and ensure that the bucket shoe is parallel to the ground and touch the ground.
2. Use a stamping tool (8) and a hammer (7) to punch out the sealing pin (4) without damaging the rubber locking pin (3).
3. Inspect the dismantled sealing pin (4) and rubber locking pin (3). Replace the short sealing pin and defective rubber locking pin as shown in the right picture with new ones.



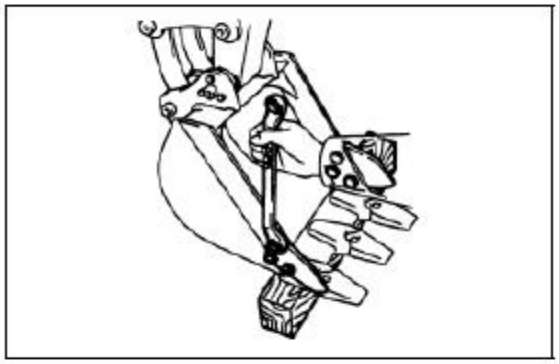
4. Press the rubber locking pin (3) into the hole at the front edge of the adapter.
5. Insert the bucket shoe (2) into the front edge of the bucket teeth.
6. Insert the sealing pin (4) until it is at the same height as the surface of the bucket shoe.



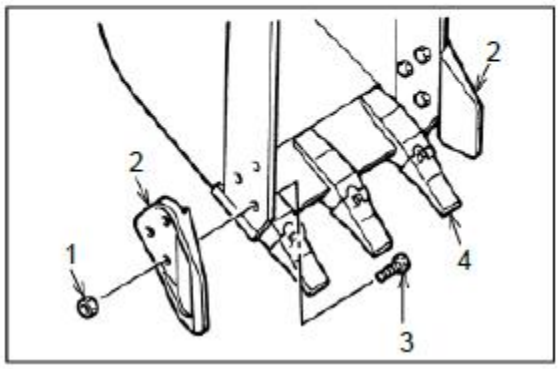
Please insert the bucket shoe so that the rear of the pin hole on the bucket shoe is on the same line as the rear of the pin hole on the front edge of the bucket teeth or deeper than the rear of the pin hole on the front edge of the adapter.

D.2 Replacement of side blade

1. After removing the sand and soil adhering around the flat head screws, perform gas cutting on the flat head screws, and then remove the side blades.
2. Please clean the installation surfaces thoroughly and then install the new side blades. When replacing the side blades, please replace the flat head screws and nuts with new ones.
   Tightening Torque: 279±29.4N·m {28.5±3kgf·m}



3. After tightening the nuts, please perform spot welding on all nuts.



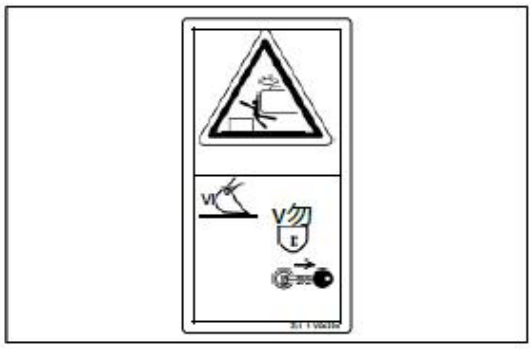
1. Nut
2. Side blade
3. Flat head screws
4. Bucket shoe

In case the replacement time is extended, the bucket body may get damaged. Please replace them as soon as possible.

E. Replacement of bucket

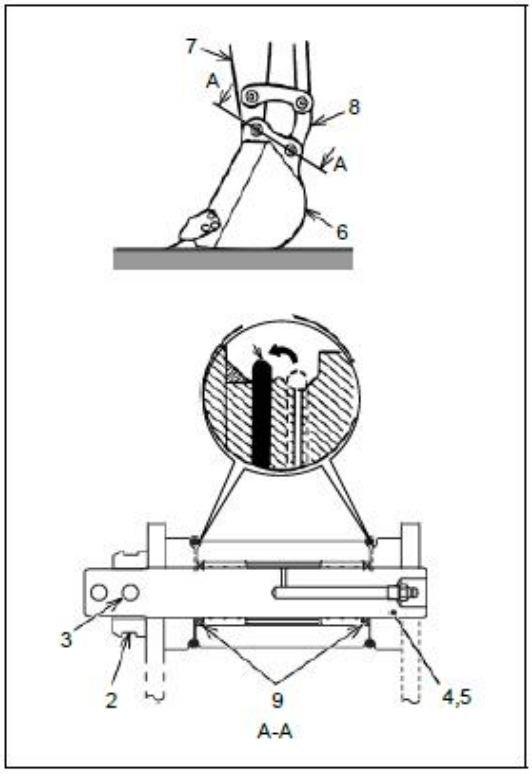
⚠Warning

- **Please select a flat location for operation. When working together, please confirm the command signal and pay full attention to safety.**
- **When aligning the pin holes, in case fingers are inserted into the holes, major injury may occur. Please never insert your fingers into the pin hole. Please align them visually.**



E.1 Dismantlement of bucket

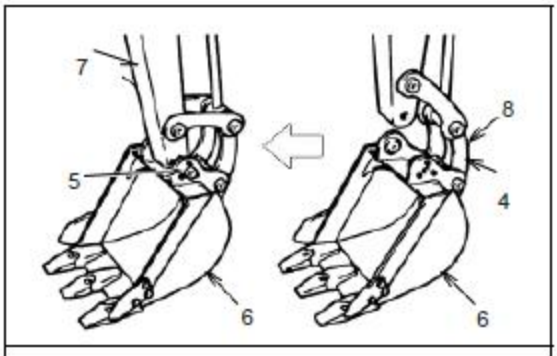
1. Make the back of the bucket touch the flat ground gently, so as to stabilize it and prevent any load from being applied to the bucket and bucket arm pin. In case the bucket is forcibly pressed against the ground, the resistance will increase, making it difficult to remove the pin.
2. The O-ring (1) is prone to damage. Therefore, please move it from the regular position (the groove between the bucket arm hub or bucket connecting rod and bucket hub) towards the bucket hub.
3. After inserting the pin, let it fall into the regular groove. After removing the external brake elastic ring (2) and rotation brake pin (3), pull out the pins (4) and (5), and remove the bucket (6).



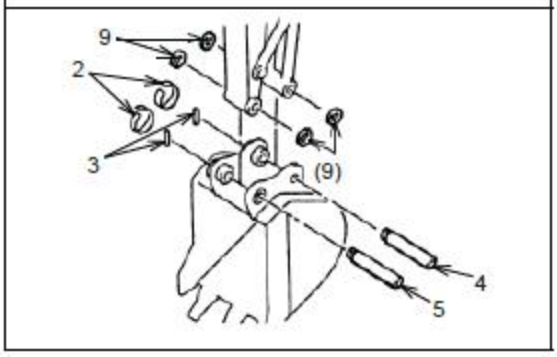
- **Please note that the pin pulled out shall be free of sand, gravel, or soil.**
- **Please be careful not to damage the dust rings (9) located at both ends of the bucket arm (7) and bucket connecting rod (8).**

E.2 Installation of bucket

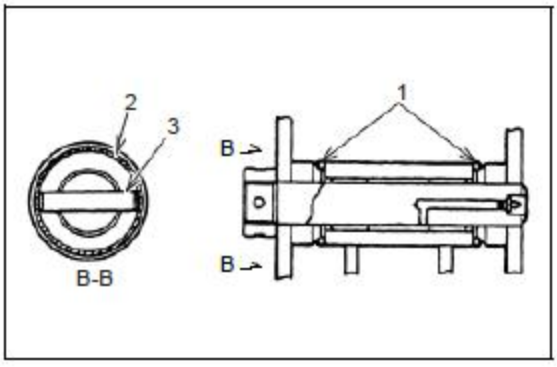
1. Clean the pins and pin holes on all parts, and apply sufficient lubricating grease to make them easy to slide.
2. Simultaneously operate the bucket cylinder and align the pin holes of bucket (6) and bucket connecting rod (8), and then insert the pin (4).
3. Lift the boom, so as to lift the bucket slightly off the ground.



4. Move the bucket arm (7), align the pin holes on bucket (6) and bucket arm (7), and then insert the pin (5).
5. After inserting the pin (3), install the elastic ring (2), and then insert the O-ring (1) into the regular position.
6. Add lubricating grease to the dedicated grease injection port of each pin, until the lubricating grease overflows from the gap of the pin.



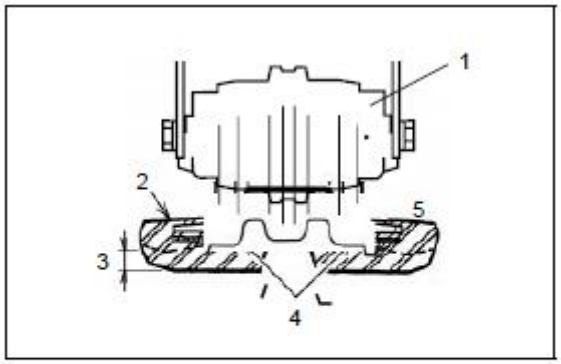
In case the elasticity of O-ring (1) disappears or there are cracks, please replace it.



F. Inspection of rubber crawler shoes (for machine with rubber crawler shoes)

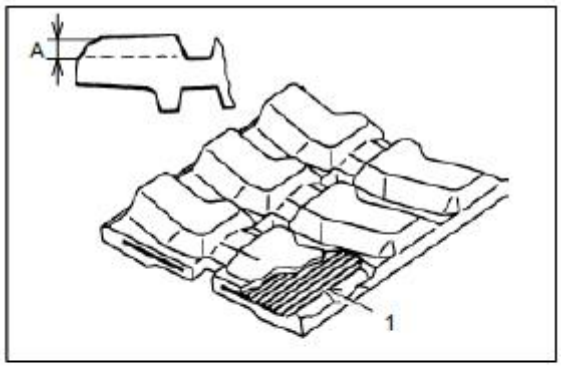
In case the rubber crawler shoes change to the following state, they need to be repaired or replaced. Please get they repaired or replaced by our sales agent.

1. Load bearing wheel
2. Rubber crawler shoes
3. Convex plate
4. Steel cord
5. Steel core



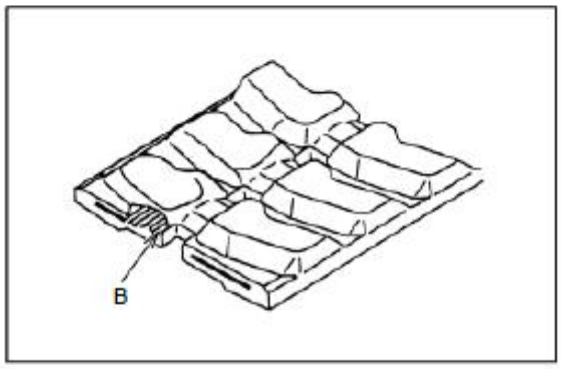
F.1 Height of convex plate

1. The height (A) of convex plate will decrease due to wear, resulting in a decrease in towing force. In case the height is less than (A) 5mm, please replace the convex plate with a new one.
2. When the convex plate is worn and more than 2 chain links of the steel cord (1) inside the crawler shoes are exposed, please replace the convex plate with a new one.



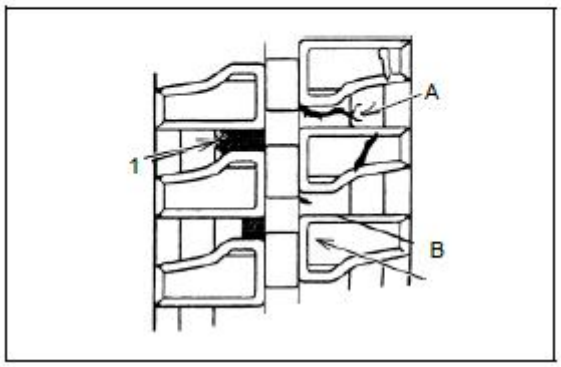
F2. Cutting of steel cord

In case the convex plate wears out and the single-side steel cord (B) is cut by more than half, please replace the convex plate with a new one.



F3. Crack on rubber crawler shoes

In case there are cracks (A) between the convex plates of the rubber crawler shoes, and the crack length exceeds 60mm, please carry out repair. However, in case the crack is small (B) but the internal steel cord (1) can be seen, please carry out repair as soon as possible.



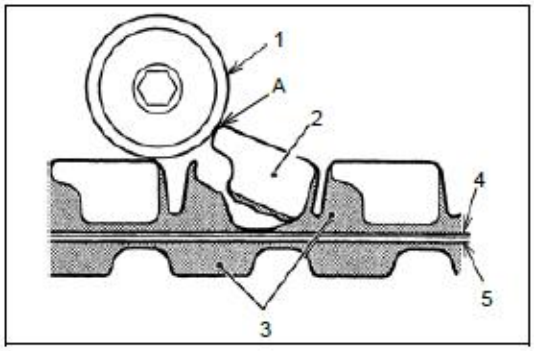
Please consult with our sales agent, so as to determine the replacement and repair of rubber crawler shoes.

F4. Detachment of steel core of rubber crawler shoes

Due to the usage of rubber track shoes, even in the absence of external damage and wear on the convex block (outer side), the steel core side (inner side) may still experience wear and tear due to collision and friction between the rollers, guiding wheels, and sprocket teeth, leading to detachment of steel core.

1. Load bearing wheel
2. Steel core
3. Rubber
4. Canvas
5. Steel cord

A. Damage caused by collision



Please note that, we provide no warranty for matters caused by use of rubber track shoes in a prohibited manner or use of crawler shoes under inappropriate tension.

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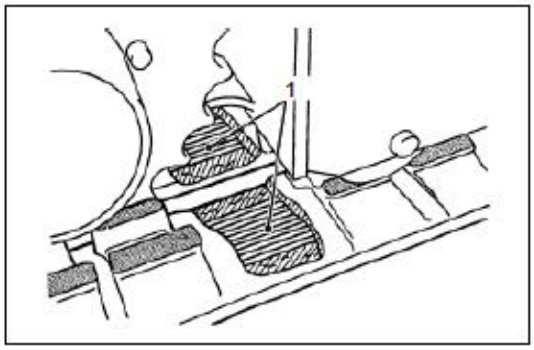
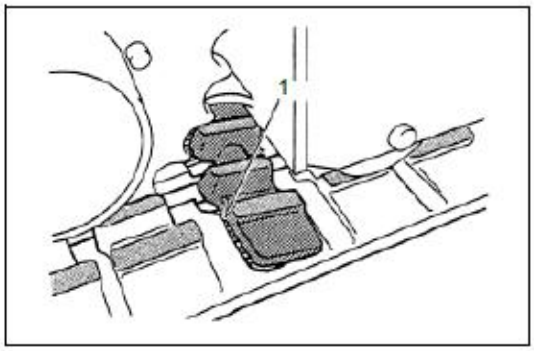
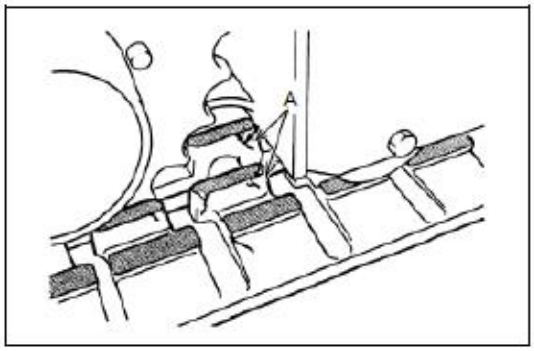
1. In case any part of the steel core (1) of the rubber crawler shoe is detached, please replace the rubber crawler shoe with a new one.



2. In case there are cracks on the rubber crawler shoe that expose the steel core (1), please replace the rubber crawler shoe with a new one.



3. When a crack (A) occurs in the part of the steel core in contact with the roller, it must be repaired.



- **Using the rubber crawler shoes in a prohibited manner may cause the detachment of steel core.**
- **Understand the prohibitions on use of rubber crawler shoes by reference to the operation of rubber crawler shoes.**

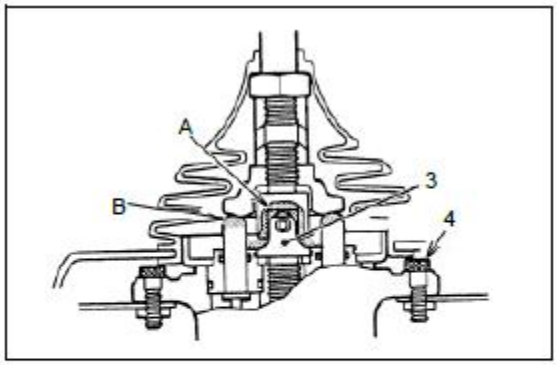
G. Application of lubricating grease to joystick

When the joystick becomes heavy and cannot move smoothly, please apply a few grams of lubricating grease to the sliding part (A) and top (B) of the universal joint.

1. Adjust the machine to the parking posture, set the descending cut-off type safety lock rod to the "locked position", and then stop the engine.

2. Without damaging the rubber sleeve (2), gently pull up the joystick (1) at the end with abnormality by hand.

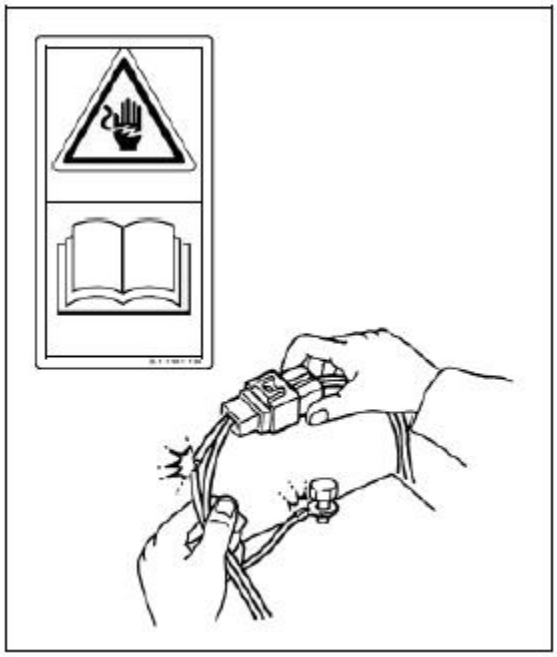
3. Apply the lubricating grease to the sliding part (A) and top (B) of the universal joint (3) at four locations.
4. Restore the rubber sleeve.
5. Inspect the looseness of the pilot valve. In case the mounting bolt (4) (hexagon socket bolt) is loosened, please tighten it.



H. Inspection on electrical wiring

⚠Warning

- **In case the fuse has to be replaced frequently or short circuit occurs in electrical wiring, please consult with our sales agent.**
- **When inspecting the electrical wiring, please remove the grounding (-) cable of the battery in advance. In case short circuit is cased accidentally, fire may occur.**



Please inspect whether the electrical wiring is broken or short circuited, whether the fuse is damaged, and whether the connection parts of the terminals are loosened or damaged.
Please inspect the wiring of:

- Battery
- Starting motor
- Engine

In addition, please confirm the operation state of the monitoring panel (instrument) at the same time.

4.11 Conditioning Every 8 Hours (or Every Day)

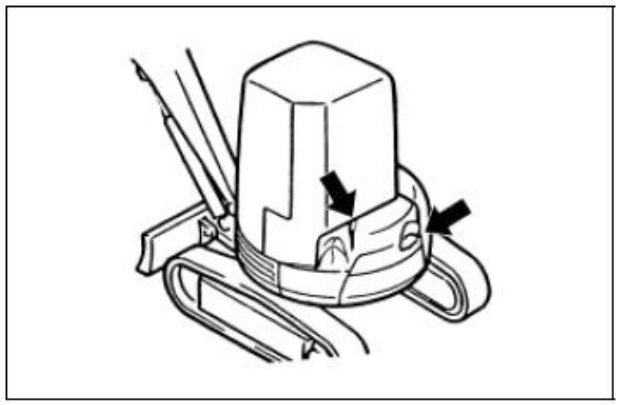
Please carefully read and fully understand **Section "Basic Safety Precautions"** in **Chapter 1** before proceeding with operation and conditioning. Please conduct the following inspection and conditioning before or after the start of a day's operation.

Please refer to Chapter 3 “Driving Operations” for the following inspection and conditioning items.

• Inspection and replenishment of cooling water	Page 3-4	• Inspection and replenishment of engine oil	Page 3-5
• Key point s for driving operation	Page 3-17	• Confirmation on actions of each switch and joystick	Page 3-15
• Inspection and replenishment of fuel	Page 3-7	• Inspection on color, abnormal noise, and odor of exhaust	Page 3-14
• Inspection for fuel leakage	Page 3-7	• Confirmation on functioning of working lamp	Page 3-9
• Inspection on belts	Page 3-8	• Inspection on actions of alarm lamps	Page 3-9
• Inspection and replenishment of hydraulic oil	Page 3-5		

A. Inspection for abnormal deformation and damage of machine appearance

The deformation of side cover plate and engine hood may not appear to have significant damage, but it may collide with the hoses and components inside the machine. Please entrust our sales agent to determine whether repair is needed.



B. Inspection on looseness of each flat head screw and nut

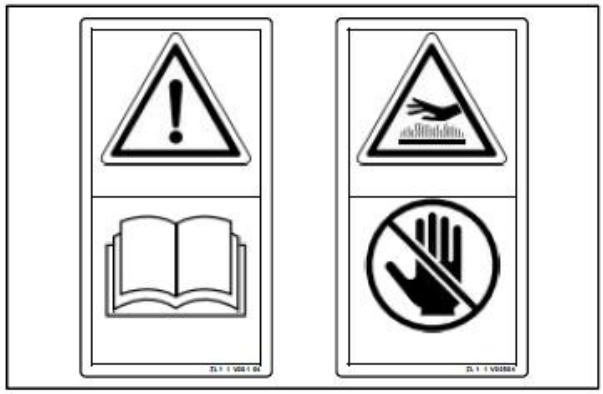
Please inspect whether any flat head screw or nut has fallen off due to looseness. In addition, please inspect the hose clamps of each component. Abnormal sound during driving may cause oil leakage and fire. Please re-tighten them by reference to **Page 4-12 ~ Page 4-14**.

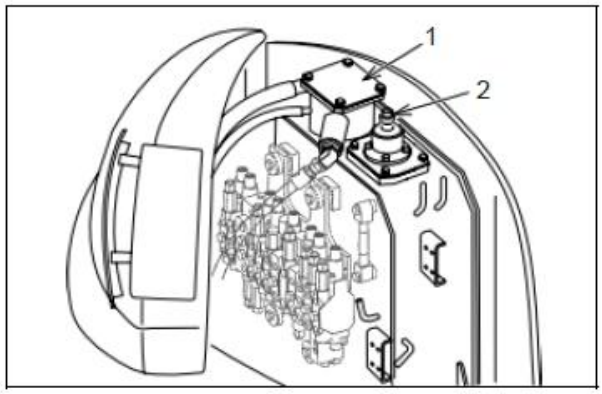
Please use the tools that are suitable for the operating location. For tools, please refer to Page 4-11.

C. Inspection for oil leakage and damage of each cylinder, piping, and hose

⚠Warning

There is usually internal pressure in hydraulic circuit. Please don't perform inspection, conditioning, oil replenishment or oil drain operations before the internal pressure is released. Even high-pressure oil discharged from small holes can be very dangerous in case it comes into contact with skin and eyes. The leakage of hydraulic oil usually cannot be visually inspected. Please wear goggles and gloves, and use thick paper and wooden boards for inspection. When high-pressure oil comes into contact with human body, please seek medical treatment from a professional physician immediately.





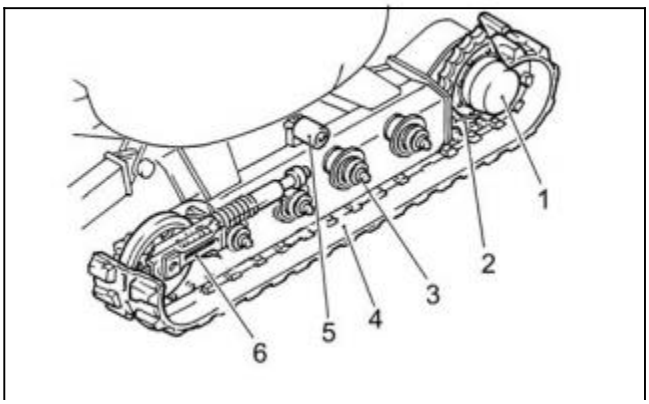
The leakage of hydraulic oil may cause insufficient force in attachment, rotation, and travelling movements, ultimately leading to failure of the machine. In addition, it may also result in a state where unilateral operation is not possible. Please drive the machine to a safe place immediately and stop the engine.

1. Set the descending cut-off type safety lock rod to the "locked position" and stop the engine.
2. Confirm the location of the oil leakage, lower the temperature of each component to below 40℃, and then wear goggles and gloves for inspection.
3. Please press the rubber cover of the air tank above the hydraulic oil tank for multiple times (5-7 times), so as to release the pressure inside the hydraulic oil tank.

1. Hydraulic oil tank
2. Exhaust valve

When an abnormality occurs, please stop the machine immediately and get the machine repaired by our sales agent. In case the level of cooling water or engine oil is below the specified level due to leakage, the alarm lamp will come on.

D. Inspection for oil leakage and wear of lower travelling body



1. Travelling motor
2. Driving sprocket
3. Load bearing wheel
4. Crawler shoe
5. Chain supporting wheel
6. Guiding wheel

1. Please inspect whether there is any oil leakage in the guiding wheel and travelling motor.
2. Please inspect whether there is any abnormal wear on the surface of the load-bearing wheel, guiding wheel, and sprocket teeth, or whether the mounting bolts are not loosened.
3. Make this machine travel in a spacious area and inspect whether there is no abnormal noise from the machine.

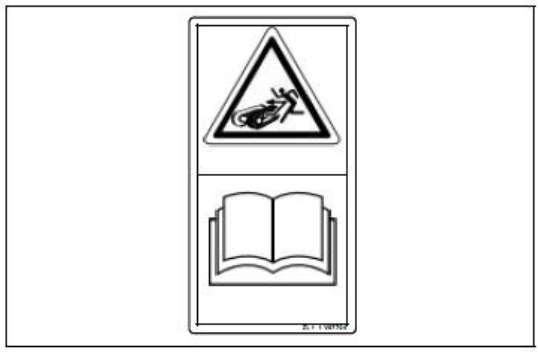
In case there is any abnormal wear, abnormal noise or oil leakage, please contact our sales agent.

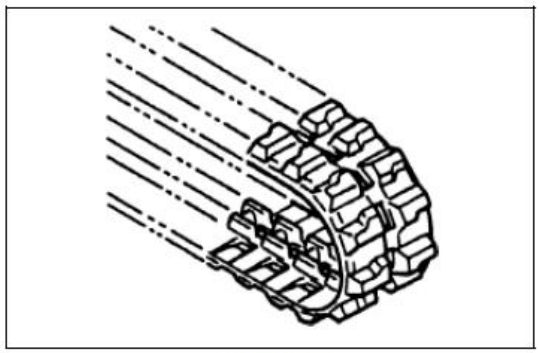
4.12 Conditioning Every 50 Hours (or Every Week)

Please carefully read and fully understand **Section "Basic Safety Precautions"** on **Page 1-3** before proceeding with the operation and conditioning.
During the implementation of this conditioning, please also implement “Conditioning Every 8 Hours”.

A. Inspection and adjustment of tension of crawler shoes

Properly adjusting the tension of crawler shoes can extend the service life of the crawler shoes and travelling devices, and prevent the crawler shoes from falling out due to insufficient tension.





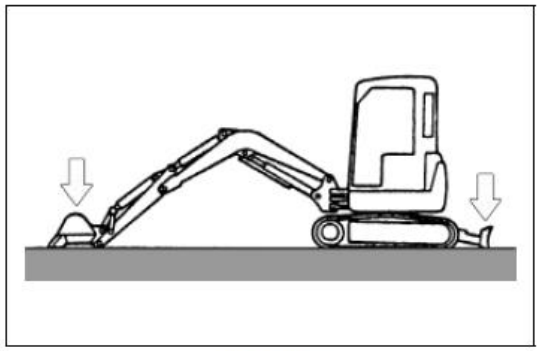
Rubber track shoes

⚠Warning

The inspection on tension of crawler shoes needs to be carried out by lifting the crawler on the inspection side. In case the machine body falls down accidentally, it is very dangerous. Please never make the machine move during the inspection. When two people are carrying out this operation, please ask the driver to operate the machine according to the command signals given by the working personnel.

For inspection and adjustment of tension of crawler shoes, please refer to **Page 4-20**.

B. Replenishment of lubricating to rotary pin of bucket



加油姿势
Grease replenishment posture

Precautions for replenishment of lubricating grease

1. **Within 50 service hours of the new machine, please replenish the lubricating grease to the locations marked (A) - (D) every 8 hours.**

Thereafter, please replenish the lubricating grease every 50 hours.

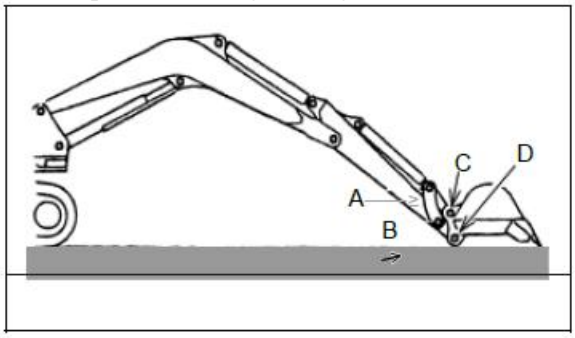
2. **When digging in water or wiping with grease, it is necessary to replenish more grease.**
3. **After working under harsh operating conditions with special attachment, please replenish grease daily.**
4. **When the machine has been idle for more than one month, please replenish grease before use.**

1. Set the attachment and bulldozer board to the grease replenishment posture (as shown in the right figure), and then stop the engine.

2. Before replenishing the lubricating grease, please wipe the grease injection port clean. In case there is any damage, replace it.

3. Use a grease gun and replenish grease through the grease injection port as shown in the table below.

4. After replenishing the lubricating grease, please wipe the discharged old grease clean.



No.	Part to be Lubricated	Location
A	Bucket cylinder piston rod pin	1
B	Idle connecting rod, and bucket arm connecting pin	1
C	Bucket connecting rod pin	1
D	Bucket arm and bucket connection pin	1

C. Discharge and cleaning of oil-water separator

In case the red circle (6) of the oil-water separator sinks to the bottom of the shell (F), it indicates that there is no water mixed in. In case the red circle (6) rises, it indicates that water has mixed in below the circle. Please discharge the mixed water in accordance with the following steps.

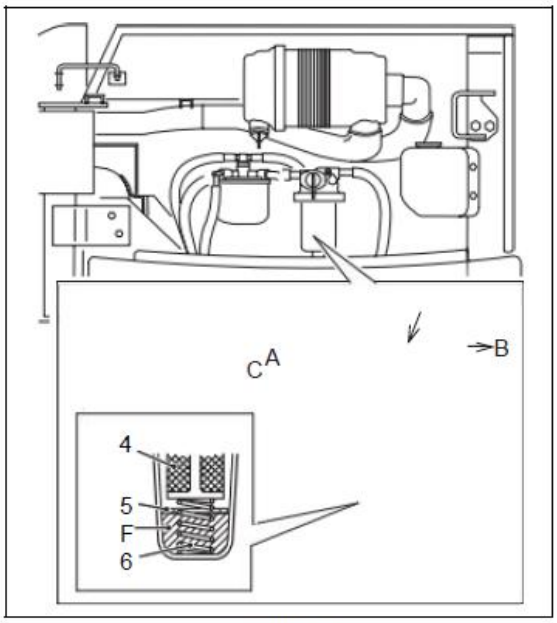
⚠Warning

In case fuel adheres to the surrounding area, it may cause a fire. Therefore, please wipe it clean.

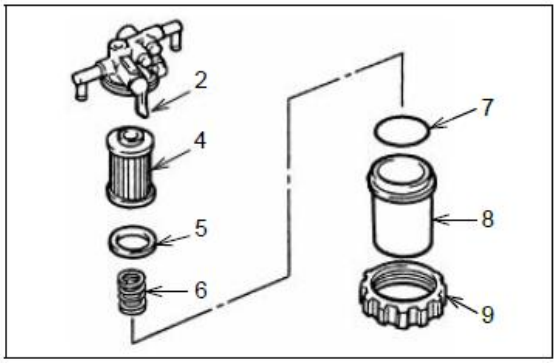
---

1. Air bleeding bolt
2. Fuel drain valve
3. Water drain valve
4. Filter element
5. Circle (red)
6. Spring
7. O-ring
8. Shell
9. Locking ring

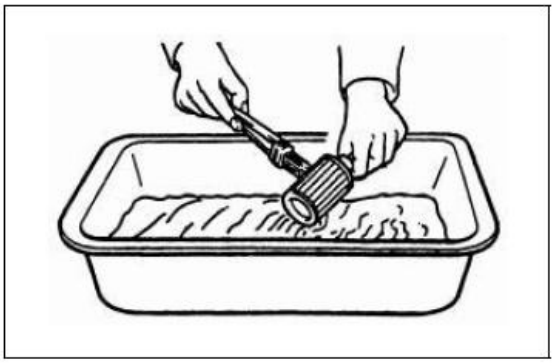
A. Fuel inlet
B. Fuel outlet
C. Closed
D. Opened



Oil-water separator



1. Set the descending cut-off type safety lock rod to the "locked position" and stop the engine.
2. Open the engine protector and wait for all parts to cool down. Then, open the drain valve (2) of the oil-water separator and set it to the "closed" position (C).
3. Loosen the ring (9), remove the shell (8), and drain the remaining water into the container.



Please be careful not to lose the red float (5) and spring (6) inside the shell.

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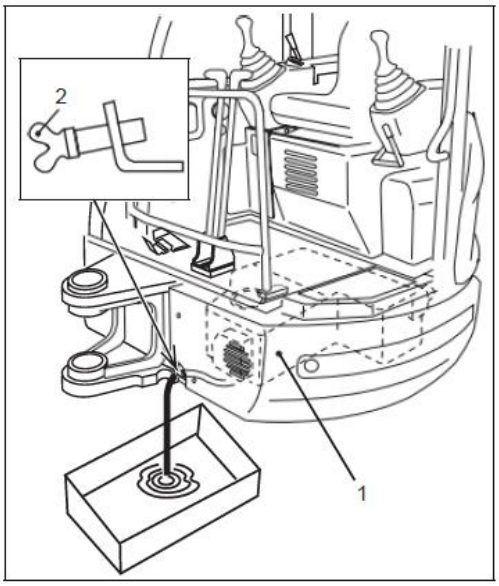
4. Inspect the water discharged into the container, and in case there are many impurities, clean the filter element (4) and the inside of the shell (8).
5. Dismantle the filter element (4) and clean it with light oil.
6. Please replace the O-ring (7) with a new one. Please install the filter element (4) into the main body of the oil-water separator.
7. Install the O-ring (7) into the shell (8) and tighten the ring (9).
8. Please push down the water drain valve and set it to "opened" (D).
9. After draining the water, please bleed air from the fuel system by reference to **Page 4-17**.

Please don’t use gasoline to clean the filter element.

D. Drain of water and sediment from fuel tank



⚠Warning

- **When discharging fuel from the fuel tank (1), please stop the engine in advance.**
- **Please carefully wipe off any spilled fuel.**

Loosen the drain plug on the fuel tank (1) and drain the water and sediment into the container. Water may settle at night, so that it is more effective to drain it before starting the engine in the morning.

1. Rotate the drain plug (2) below the fuel tank (1) to between the left and right rollers.
2. Place the container used to contain the discharged fuel under the drain plug (2).
3. Loosen the drain plug (2). Drain the sediment at the bottom and the fuel mixed with water together. Please be careful not to touch the fuel at this time.
4. After only clean fuel flows out, tighten the drain plug (2).

After tightening the drain plug, please inspect whether there is any fuel leakage.
In case fuel leakage is confirmed, please stop the engine and consult with our sales agent.

E. Inspection on liquid level and specific gravity of battery

In hot summer, the electrolyte level may drop. Please inspect it in advance.
In case the battery is used continuously with a low level of electrolyte, it may become unusable.
Please inspect the electrolyte level regularly. In case it is lower than the specified level, please add distilled water before starting the engine (before charging).

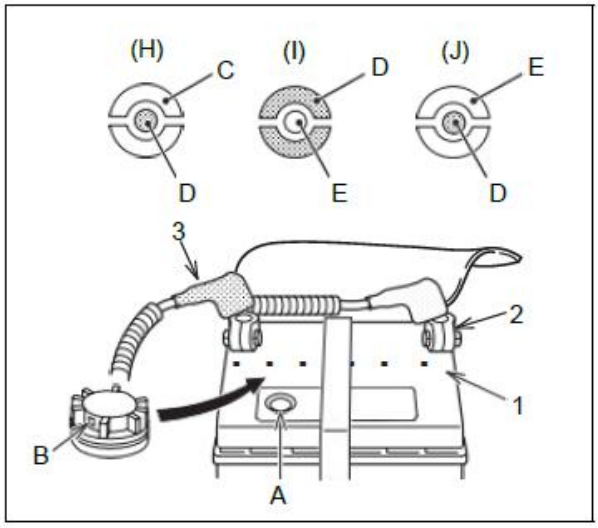
⚠Warning

- **The battery may produce flammable hydrogen gas, which poses a risk of fire and explosion. Please never get it close to open flame. Please charge it in a well-ventilated location.**
- **The electrolyte is a strongly-acidic solution and can even penetrate into metals. In case skin and eyes come into contact with electrolyte, there is a risk of burns and blindness. In case the electrolyte adheres to human body, please wash it away immediately with plenty of water and seek medical treatment immediately.**

Inspect the display of the observation hole (A) in the right figure. In case it is red or white, it indicates low level or insufficient charging. Please keep the display of the observation hole blue.

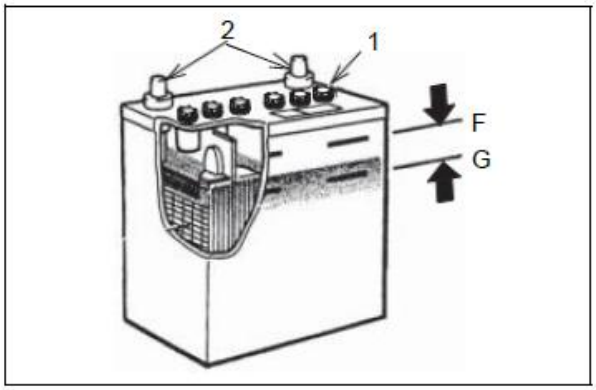
1. Liquid outlet plug
2. Terminal
3. Terminal cover

A. Display
B. Vent
C. Blue
D. Red
E. White
F. (Upper limit)
G. (Lower limit)
H. Good
I. Low electrolyte level
J. Insufficient charging



Display on observation hole

1. Set the descending cut-off type safety lock rod to the "locked position" and stop the engine.
2. Remove the bottom cover and the left battery cover.
3. Remove the liquid port plug (1) from each section and inspect the electrolyte.
4. When the liquid level is low, please add distilled water to the specified surface (10-15mm above the electrode plate).
5. Clean the vent of the liquid outlet plug (1) to prevent blockage, and then tighten it firmly.
6. In case the terminal (2) is dirty, please clean it with hot water and then tighten it. Please apply the lubricating grease or commercially-available anti-rust oil. In case the terminal is oxidized, grind it with a wire brush and mineral paper before installation.



In case the engine speed cannot be increased and the engine cannot be started, please measure the specific gravity of the electrolyte. In case it is lower than the specified value, please charge the battery.

Standard specific gravity of electrolyte: 1.28 (20℃)

Please refer to **Page 3-33** for the specific gravity of electrolyte under special conditions such as cold weather, so as to achieve a charging rate close to 100%. In case the specific gravity does not increase after charging, the battery must be replaced.

Please use a specific gravity meter to measure the specific gravity of electrolyte, as its specific gravity will only vary with temperature changes. Please consult with our sales agent for the measurement of specific gravity and the charging of battery.

4.13 Conditioning Every 250 Hours

Please carefully read and fully understand **Section "Basic Safety Precautions"** on **Page 1-3** before proceeding with the operation and conditioning. During the implementation of this conditioning, please also implement “Conditioning Every 8 Hours” and “Conditioning Every 50 Hours”.

A. Replenishment of lubricating grease to attachment and bulldozer board pin

---

Precautions for replenishment of lubricating grease

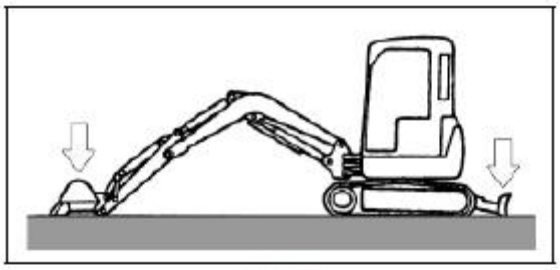
- **Within the first 50 service hours of the new machine, please replenish the lubricating grease to the locations marked (4) - (14) every 8 hours.**

Thereafter, please replenish the lubricating grease every 250 hours.

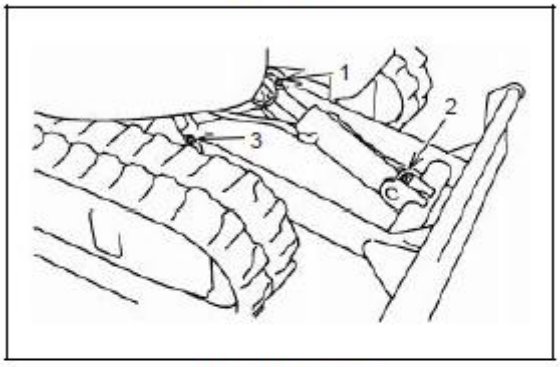
- **When a special attachment is installed for operation, please replenish the lubricating grease before each day's operation.**
- **When carrying out excavating in water, please replenish the lubricating grease to the submerged portions before and after each day's operation.**
- **When the machine has been idle for more than one month, please replenish grease before use.**

---

1. Please set the attachment and bulldozer board to the grease replenishing posture (as shown in the right figure), and then stop the engine.

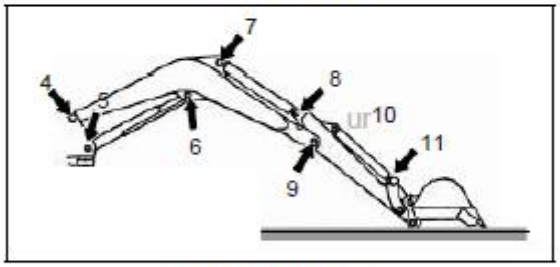


Grease replenishing posture

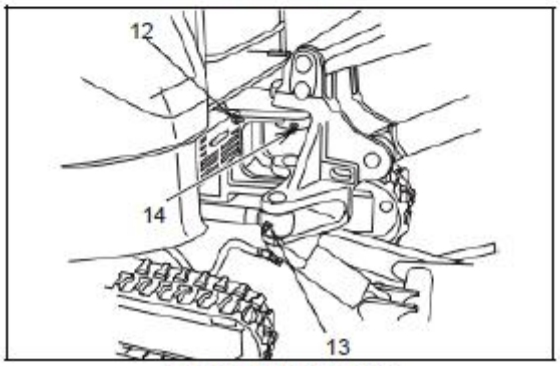


Grease replenishing locations for bulldozer board

2. Before replenishing the lubricating grease, please wipe the grease injection port clean. In case there is any damage, please replace it.
3. Use a grease gun to replenish the lubricating grease to the grease injection port in accordance with the direction of the arrow in the right figure and the table on the next page.
4. After replenishing the lubricating grease, please wipe off the old grease that has been pressed out.



Grease replenishing locations for attachment (1/2)



Grease replenishing locations for attachment (2/2)

The special bushing (3) for the bulldozer board base pin is an iron bushing. Therefore, please replenish the lubricating grease in advance when the bulldozer board is used frequently.

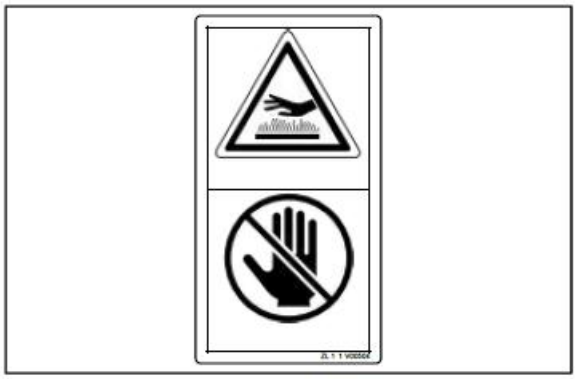
In addition, when replenishing the lubricating grease to the attachment, please also replenish the lubricating grease to the bulldozer board base pin (3).

No.	Part to be Lubricated	Location	No.	Part to be Lubricated	Location
1	Bulldozer cylinder piston rod pin	1	2	Bulldozer cylinder base pin	1
3	Bulldozer board base pin	1	4	Boom base pin	1
5	Boom cylinder base pin	1	6	Boom cylinder piston rod pin	1
7	Bucket arm cylinder base pin	1	8	Bucket arm cylinder piston rod pin	1
9	Boom and bucket arm connecting pins	2	10	Bucket cylinder base pin	1
11	Bucket cylinder piston rod pin	1	12	Axis rotation cylinder base pin	1
13	Axis rotation cylinder piston rod pin	1	14	Axis rotation bracket, and frame connecting pin	2

B. Replacement of engine oil

Warning

- **After the engine has just stopped, all components are in a high temperature state. Please don't replace the engine oil immediately; otherwise, there is a risk of burns. Please wait for the engine oil to cool down before proceeding**
- **Please replace it only after the first 50 hours.**

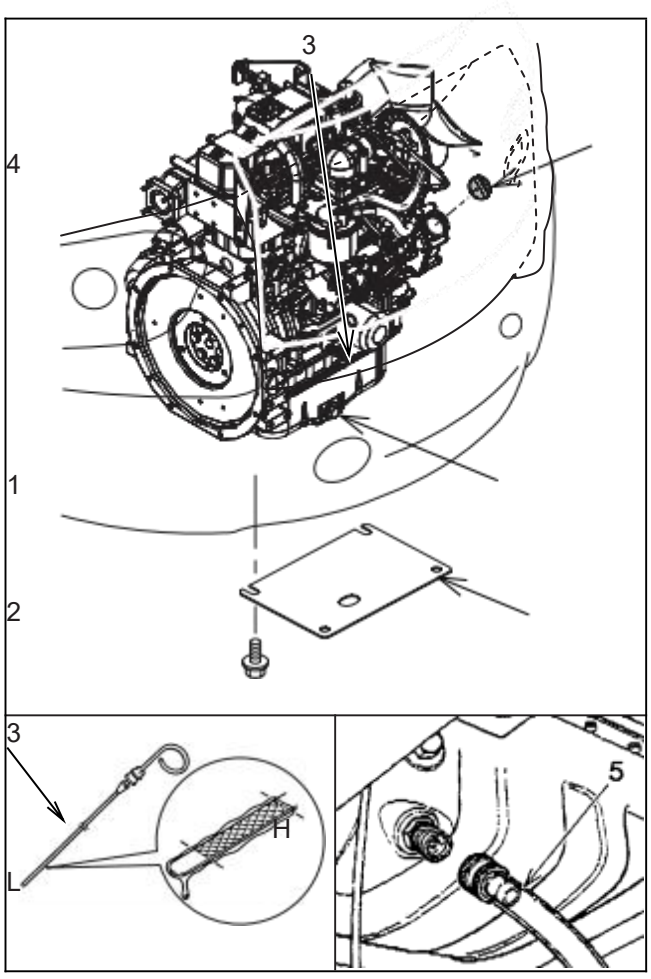


Oil container: container with a capacity of 7.0L or more

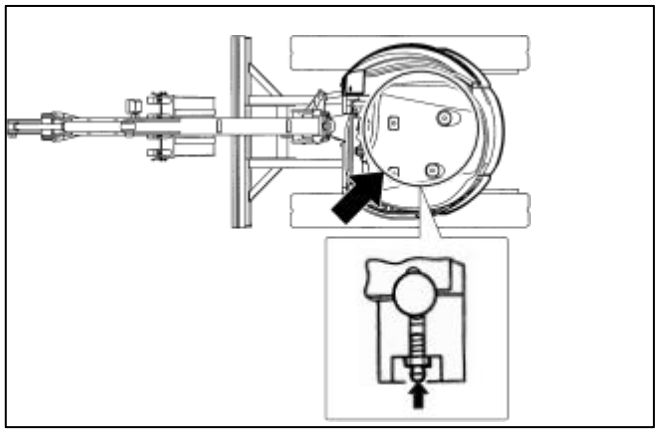
Oil replacement volume: 6.7L (upper limit of standard oil volume)

Component number of quick release type oil drain hose: PM91Z01005P1

1. Please place an oil container under the oil drain plug (1) at the bottom of the engine.
2. Remove the cover (2) under the oil drain plug.
3. Remove the oil drain cover (1), connect the quick release type oil drain hose (5) to the oil drain port, and then drain the engine oil.
4. Inspect the discharged engine oil. In case there is a large amount of metal powder and impurities, please contact our sales agent
5. After draining the oil, please remove the quick release oil drain hose and install the oil drain cover (1)
6. Open the side cover plate of engine, remove the yellow oil filler cap (4), and add the specified engine oil. Please refer to Page **4-9** for recommended engine oil
7. Start the engine and let it idle for a few minutes before stopping it. By reference to the inspection on oil level in engine oil pan as described on **Page 3-5**, confirm whether the oil level is between the "H" and "L" marks on the dipstick.
8. Please install the cover (2) properly.



C. Replenishment of lubricating grease to rotating bearing

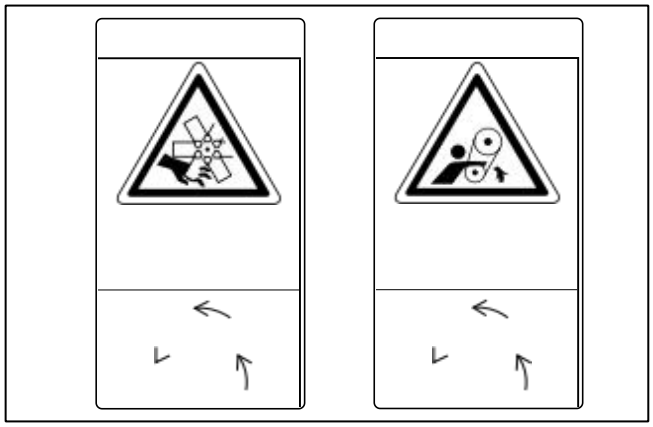


Warning

When replenishing grease to the rotating bearing, please don't rotate it.

The rotating bearing makes the machine rotate at 90 degrees, changing its position in 4 directions. Please replenish the lubricating grease until the old grease is pushed out to the sealing surface. There is only one location for replenishment of grease (grease injection port).

D. Adjustment of tension of belt

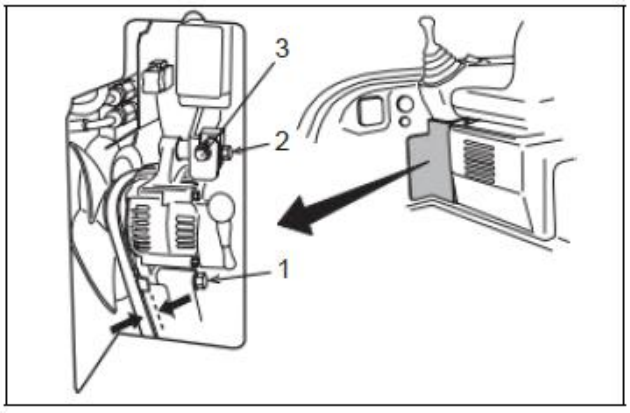


Warning

Please stop the engine before conducting inspection and conditioning. Conducting inspection and conditioning while the engine is running may cause hands to get caught in the cooling fan and fan belt, posing a risk of injury.

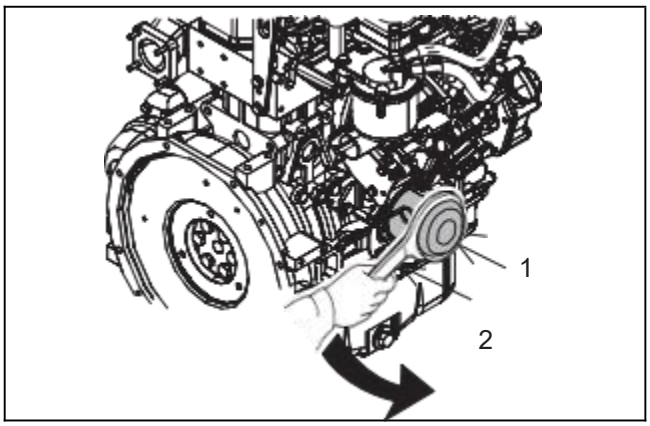
Please inspect and adjust the tension, wear, and damage of the belt correctly, so as to maintain the highest performance and service life of the engine

When using a rod for adjustment, due to personal differences, it is easy to cause excessive or insufficient tension. Please carry out inspection on tension.



The "in-service belt" refers to the belt installed on the engine pulley and in the state where the engine has been running for 5 minutes

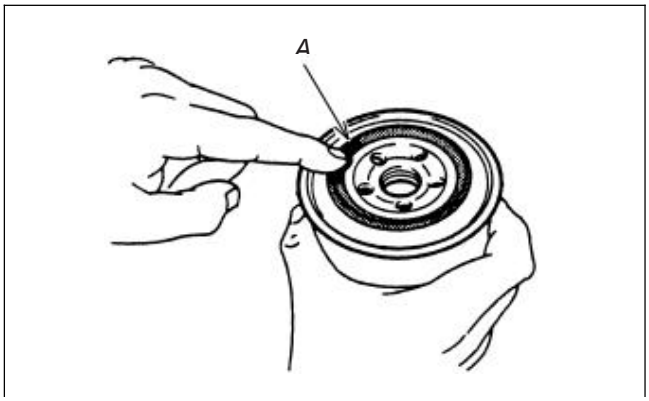
E. Replacement of engine oil filter element



⚠Warning

After the engine has just stopped, all components are in a high temperature state. Please wait until each component has cooled down, and then carry out operation.

- **The oil filter element is a canister-sealed type, so that it cannot be reused. Additionally, it is not allowed to disassemble and clean the filter element. Please replace it.**
- **Please replace it after the first 50 service hours.**
- **Please use the attached filter wrench for dismantlement.**



During initial use, the engine oil filter element only needs to be replaced with a new one after 50 hours.

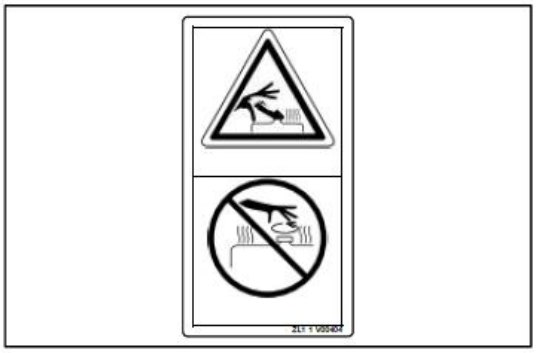
1. Please stop the engine, open the side cover plate of engine, and then remove the cover.
2. Use the filter wrench (2) to rotate the filter canister leftwards, so as to remove it.
3. Please wipe the sealing surface of the filter base clean, so as to prevent impurities and foreign matters from entering.
4. Apply a thin layer of clean engine oil on the sealing ring (A) of the filter element (1) of the new product, tighten it by hand, and then tighten it for about 2/3 of a turn.
5. Start the engine, let it idle for a few minutes, and then confirm whether there is no oil leakage on the installation surface of the filter element.
6. Close the side cover plate of engine, and then install the cover.

- **When the machine is used in dusty areas, please shorten the replacement interval.**
- **Please consult with our sales agent when inspecting the removed filter element and adhering iron filings.**

F. Inspection on hose of cooling system

Please replace the hose before it becomes unusable. In case it is replaced as early as possible, the costs can be reduced, and major malfunctions caused by overheating of engine can be prevented. In addition, the non-scheduled operation interruption can also be minimized.

1. Inspect whether the clamps of each hose are loosened, whether there are no cracks on the hoses, and whether there is no water leakage due to deformation.
2. Retighten the loosened pipe clamps. In case there is any crack or deformation on a hose, please replace it.

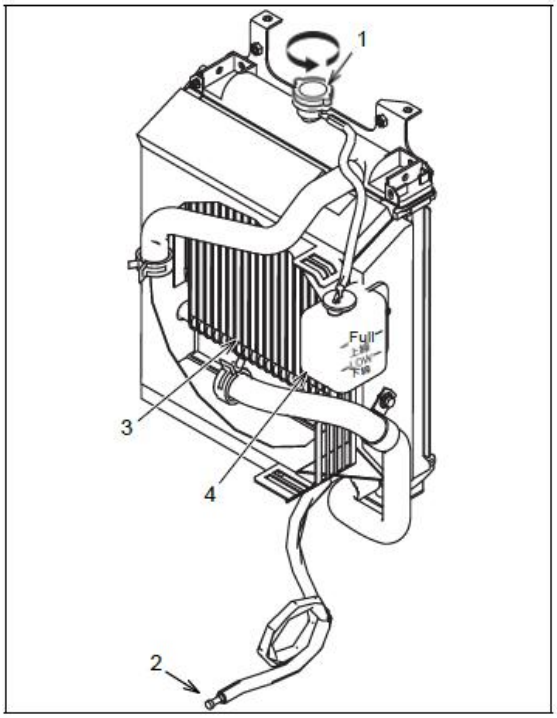


G. Replacement on hose of cooling system

⚠Warning

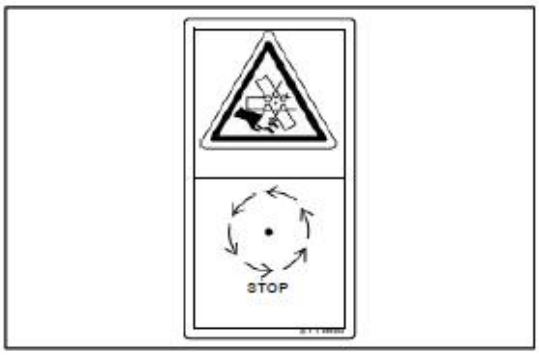
High-pressure water vapor generated inside the radiator is very dangerous. Please don't loosen or open the radiator cover when the cooling water is at high temperature or under high pressure.

- **Please stop the engine when opening the radiator cover.**
- **Please wait until the cooling water has fully cooled down.**



1. Loosen the radiator cover (1), confirm that the pressure is released, hold down the cover, and then loosen it again to remove it.
2. After removing the cover under the water drain plug, remove the water drain plug (2) and drain the cooling water into the container.
3. Please loosen the pipe clamp, remove the damaged hose, and replace it with a new hose.
4. Install the water drain plug.
5. While injecting water into the radiator (3), inject water into the auxiliary water tank (4). Please refer to **Page 3-4**.
6. Thereafter, please tighten the radiator cover.
7. Please install the cover.

H. Inspection, cleaning, and replacement of air filter element

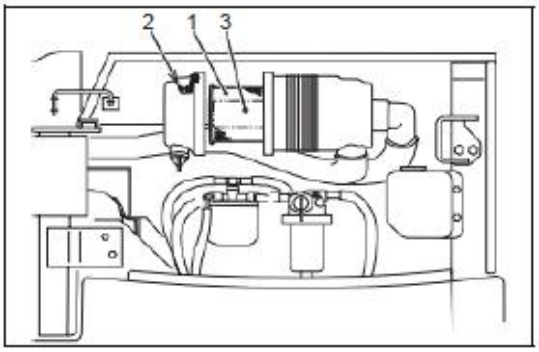


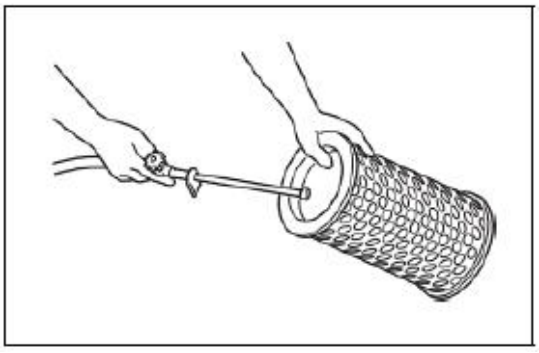
Warning

When using compressed air, please wear goggles.

- **When the air filter blockage lamp is on, please inspect, clean or replace the filter element. But in case the filter element is damaged or the housing seal is damaged, the air filter blockage lamp will not light up.**
- **Please don't remove the inner filter element for cleaning; otherwise, impurities may enter it and cause failure of engine.**
- **When cleaning or replacing the filter element, please cover the engine intake with clean cloth after removing the filter element, so as to prevent dust from entering.**

Cleaning and replacement of external filter element
Cleaning: When the alarm lamp on the monitoring panel is on
Replacement: After cleaning for 6 times or after 1 year.



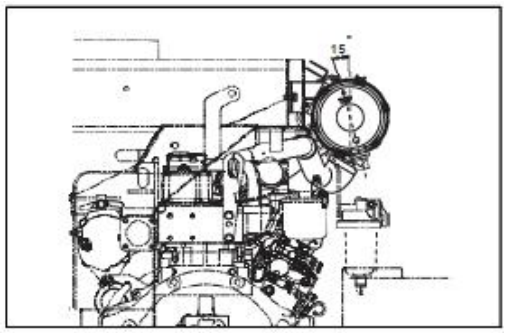


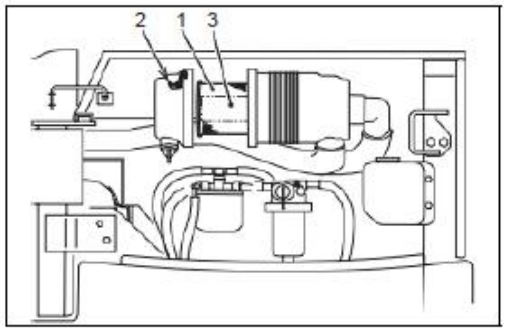
H.1 External filter element

1. Please remove the two pipe clamps (2) of the air filter cover.
2. Please remove the external filter element (1) from the housing.
3. Please clean the inside of the housing.
4. Please blow up and down the creases on the inside and outside of the filter element (1) with compressed air below 0.7MPa {kgf/cm2}, so as to remove any clogged dust and impurities.
5. After cleaning, use an electric lamp to inspect the thinner part, small holes, and seal on the inside of the filter element (1) for damage. If necessary, please replace it with a new one.
6. Please install the external filter element (1) into the housing.
7. Please let the "TOP" mark on the suction side cover face upwards, and use two clamps (2) to install the cover.

Caution

When installing the cover, in order to avoid collision with the internal hose, please ensure that the position "TOP" is 15 degrees away from the engine side during installation.





⚠Caution

Please be careful when installing the O-ring. In case water is mixed in, it can cause failure of engine.

8. In case the alarm lamp on the monitoring panel lights up shortly after cleaning, and the external filter element has been cleaned for less than 6 times, please replace it with a new filter element.

H.2 Internal filter element

1. Please remove the external filter element (1) and then remove the internal filter element (3).

2. Please install the new internal filter element (3) and the new external filter element (1). Please make the "TOP" mark on the suction side cover face upwards, and use two clamps (2) to install the cover.

⚠Caution

- **When installing the cover, in order to avoid collision with the internal hose, please ensure that the position "TOP" is 15 degrees away from the engine.**
- **Please be careful when installing the O-ring. In case water is mixed in, it can cause failure of engine.**

Please don't clean and reuse the internal filter element on the machine of dual filter specification.

The internal filter element must be replaced simultaneously with the external filter element.

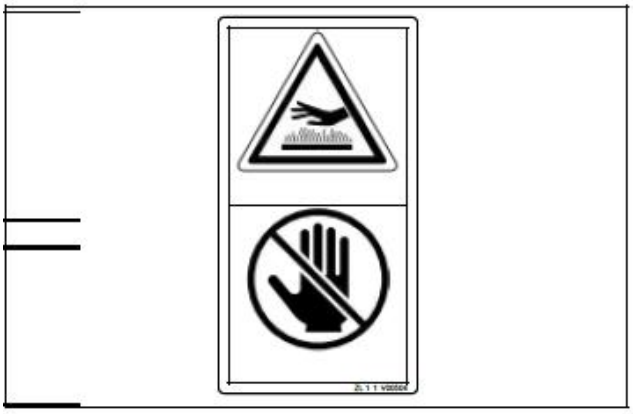
A. Replacement of fuel filter element

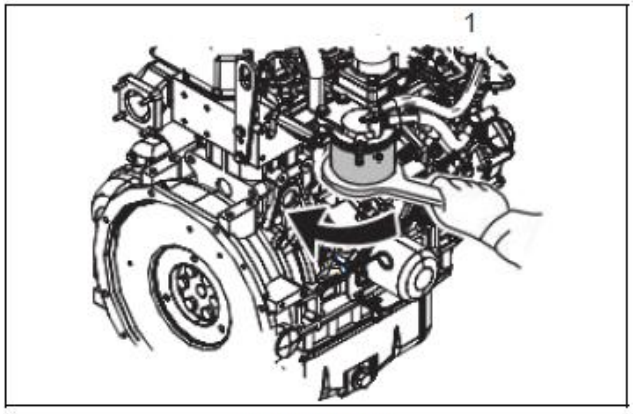
Warning

- **After the engine has just stopped, all components are in a high temperature state. Please wait for each component to cool down before proceeding with the operation.**
- **Scattered fuel can cause a fire. Please wipe it clean.**

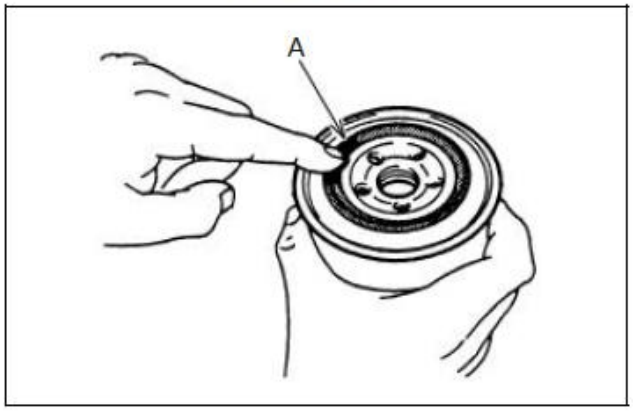
The oil filter element is a canister-sealed type, so that it may not be reused. In addition, the inside may not be disassembled and cleaned. Please replace it.

1. Please stop the engine and open the side cover plate of engine.
2. Use the fuel filter wrench to turn the filter element canister (1) to the left (A) and remove it.
3. Please wipe the sealing surface of the filter element base clean, so as to prevent impurities and foreign matters from entering.





Dismantlement of fuel filter element



4. Apply a thin layer of clean engine oil on the sealing ring (A) of the new filter element (1), tighten it by hand, and then tighten it for about 2/3 of a turn.
5. Please bleed air by reference to Section "Air bleeding for fuel system".
6. Start the engine, let it idle for a few minutes, and then confirm whether there is no oil leakage on the installation surface of the filter element.

4.15 Conditioning Every 1,000 Hours (or Every 12 Months)

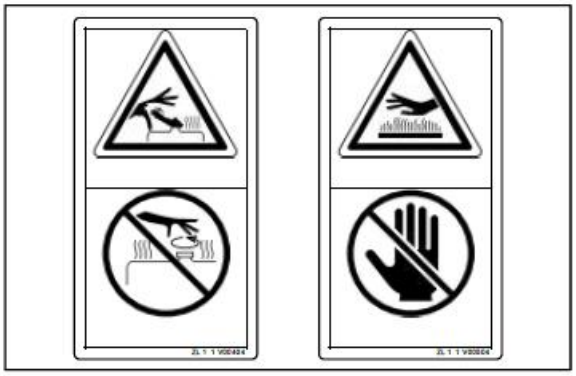
Please carefully read and fully understand **Section "Basic Safety Precautions"** on **Page 1-3** before proceeding with the operation and conditioning. During the implementation of this conditioning, please also implement “Conditioning Every 8 Hours”, “Conditioning Every 50 Hours”, “Conditioning Every 250 Hours” and “Conditioning Every 500 Hours”.

A. Replacement of cooling water

⚠Warning

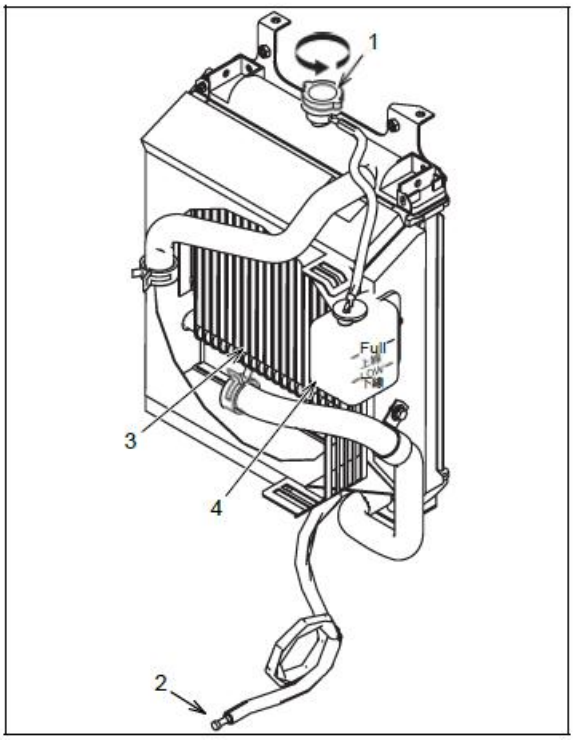
The high-pressure steam generated by radiator is dangerous. Please don’t loosen or open the cover of radiator when the cooling water is in a high temperature and high pressure state.

- **When opening the radiator cover, please stop the engine.**
- **Please wait until the cooling water has fully cooled down.**



⚠Caution

- **The antifreeze solution has ignition properties and is also harmful to human health. Please don’t get it close to open flame during inspection or replacement.**
- **Please don’t splash antifreeze solution onto eyes and skin. In case it is splashed into eyes or skin, please rinse eyes or skin immediately with plenty of water and seek medical treatment.**

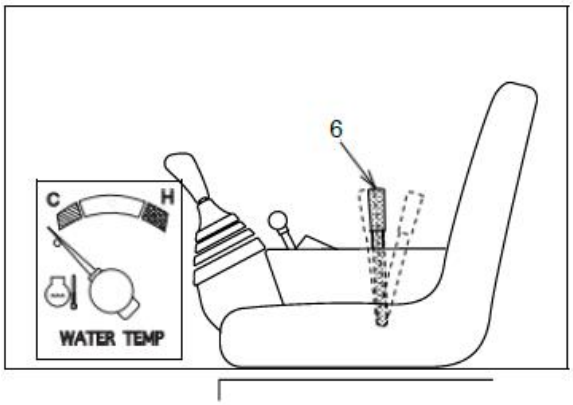


Please use soft water with less impurities (such as tap water) as cooling water. To prevent rusting and freezing of the cooling system, please use the cooling water mixed with more than 30% of "ultra long life coolant". In addition, the proportion of "ultra long life coolant" must meet the expected minimum outdoor atmospheric temperature conditions.

For the relationship between the concentration of "ultra long life coolant" and the critical temperature for outdoor use, please refer to the **"List of Lubricating Greases Added"**. Please prepare a container specifically for containing the cooling water.

1. After the engine stops, please open the engine baffle to start the cooling water operation.
2. Slowly loosen the radiator cover (1), confirm that the pressure has been released, press down the cover, and in this state, loosen and remove the cover.
3. After removing the bottom cover under the water drain plug, please remove the water drain plug (2) and drain the cooling water into the container.
4. After draining the water, install the water drain plug and add tap water from the water supply port.

5. Thereafter, gradually increase the low idle speed of the engine (using the throttle control rod (6) to carry out adjustment). After the engine has run for about 10 minutes, the pointer of the water temperature gauge within the white range will show that the water temperature has risen above 80℃.
6. Stop the engine, remove the water drain plug and drain water into the container. Add tap water into the radiator (3) with the water drain plug removed. Carry out cleaning when the discharged water runs out.
7. Install the water drain plug and add tap water and "ultra-long life coolant" (with a mixing ratio of more than 30%) into the radiator, until he water level reaches the radiator cover. Temporarily start the engine to fully bleed the air from the cooling system.
8. After stopping the engine, confirm the level of cooling water during cooling (the water level in the auxiliary water tank (4) shall be between FULL and LOW).
9. After confirming that there is no leakage of cooling water, install the bottom cover, and close the engine baffle, so as to complete the operation.

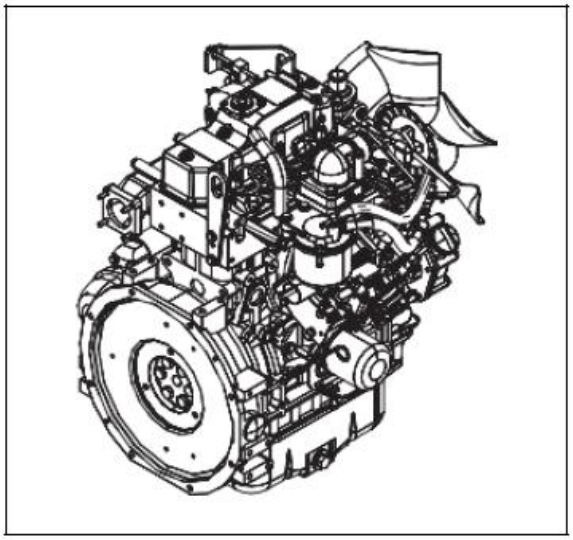


⚠Caution

The following items are the internal inspection and conditioning items for engine, which requires proficient operation. Additionally, as specialized knowledge is required for adjustment, please get the operation carried out by our sales agent.

B. Inspection and adjustment of valve clearance

In order to correct the timing deviation of intake and exhaust valves, please carry out inspection and adjustment. In case the inspection is not carried out, abnormal phenomena such as insufficient output, poor exhaust color, and noise may occur.



C. Inspection and adjustment of starting generator

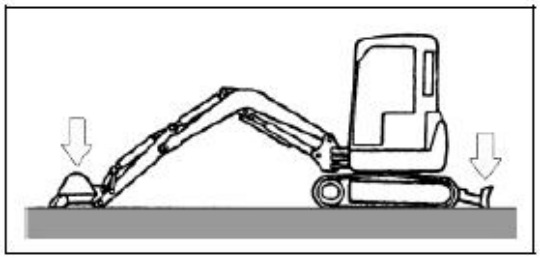
The electric brush may wear out and the bearing grease may be used up. Please carry out adjustment so that the starting ability and power generation capability can be fully utilized.

D. Replacement of return oil filter element

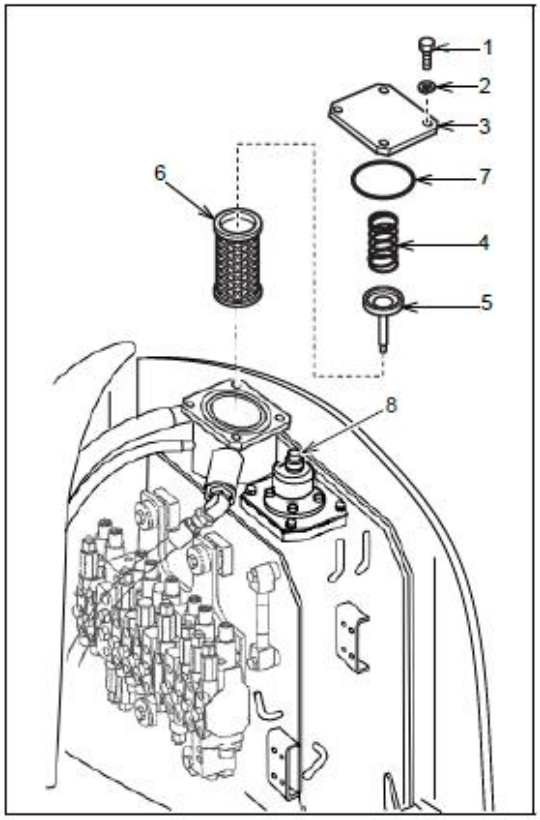
The return oil filter element installed in the hydraulic oil tank can remove impurities from the hydraulic oil, keeping the oil clean at all times. It is a very important component in preventing failures of hydraulic components and extending the service life of hydraulic components. Therefore, please carefully handle the return oil filter element.

⚠Warning

- **After the engine has just stopped, the hydraulic oil tank is in a high temperature and high pressure state, which is very dangerous. When disassembling the return oil filter element, please stop the engine and press the valve from above the spare cover, so as to release the pressure in the hydraulic oil tank.**
- **Please replace the return oil filter element only after the hydraulic oil has cooled down.**

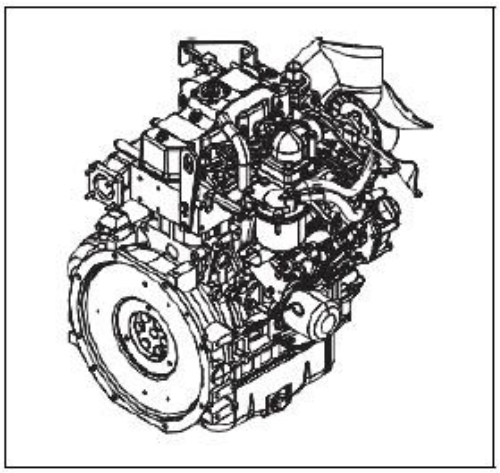


The return oil filter element only needs to be replaced with a new one after the first 50 service hours.
When the hydraulic hammer is installed, the aging of hydraulic oil is usually more severe than that when the bucket is installed for excavation operation. Please replace the return oil filter and hydraulic oil in advance. Please refer to the "Checklist for Regular Inspection and Maintenance" for replacement interval (time).



1. Select a horizontal location, set the machine to the hydraulic oil inspection posture, and then stop the engine.
2. Please open the right cover plate.
3. To prevent foreign matters such as dust and impurities from entering, please clean the area near the installation position of the filter element.
4. Press the valve for multiple times (5-7 times) from above the spare cover (8), so as to release the pressure inside the hydraulic oil tank.
5. Please remove the flat head screw (1), spring washer (2), and tank cover (3) from the hydraulic oil tank.
6. Please remove the spring (4), valve (5), and filter element (6) from the hydraulic oil tank.
7. Please replace the O-ring (7) on the installation surface of the tank cover (3).
8. Use light oil to clean the disassembled components thoroughly.
9. Install the filter element according to Steps 5 and 6 above in reversed sequence.
10. Please install the tank cover (3).
    Tightening Torque: 23.5±1.98N·m {2.4±0.20kgf·m}
11. Start the engine, operate each dedicated joystick, set the machine to the hydraulic oil level inspection posture, and inspect the level of hydraulic oil.
12. Remove the stick, restore the cover on the hydraulic oil tank to its normal position, and lock it.

4.16 Conditioning Every 1500 Hours



Caution

The following items are the inspection and conditioning items for inside of engine, which requires proficient operation. Additionally, as specialized knowledge is required for adjustment, please get the operation carried out by our sales agent.

A. Inspection on fuel injection valve

For situations where the exhaust color deteriorates during operation and the engine output is lower than before, please identify the cause of deterioration of injection state of fuel injection valve.

Adjust the fuel injection state to the most suitable state, so that the performance of the engine can be fully utilized.

B. Inspection and adjustment of fuel injection time

In order to ensure the optimal performance of engine, please adjust the timing of fuel injection.

4.17 Conditioning Every 2000 Hours

Please carefully read and fully understand **Section "Basic Safety Precautions"** before proceeding with the operation and conditioning. During the implementation of this conditioning, please also implement “Conditioning Every 8 Hours”, “Conditioning Every 50 Hours”, “Conditioning Every 250 Hours”, “Conditioning Every 500 Hours” and “Conditioning Every 1,000 Hours”.

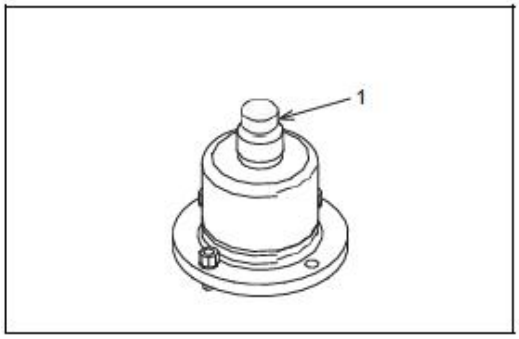
A. Cleaning of oil inlet filter element

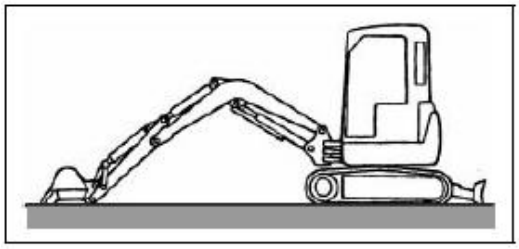
⚠Warning

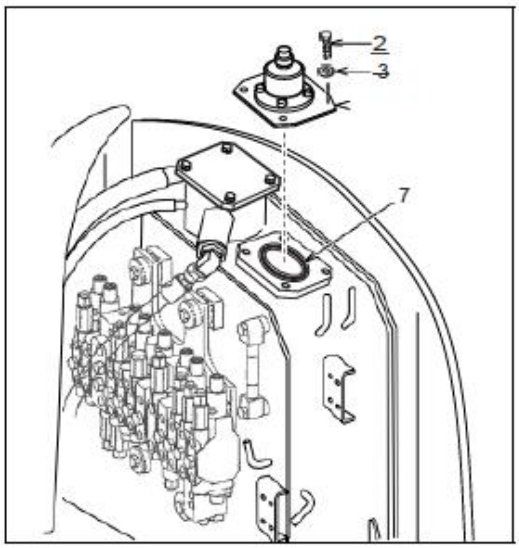
- **The oil in the hydraulic oil tank is in a high temperature and high pressure state, which is very dangerous. When removing the outer cover, please stop the engine and remove the air bleeding valve. Press the valve to release the pressure in the tank.**
- **Shortly after the engine is started, the oil temperature is very high, posing a risk of burns. Please wait until the temperature drops before proceeding with the operation.**

1. Select a horizontal location, set the machine to the hydraulic oil inspection posture, and then stop the engine.
2. Place the safety rod in the "locked position".
3. In order to prevent foreign matters such as dust and impurities from entering, please clean the area near the installation position of the filter element.
4. Press the valve for multiple times (5-7 times) from above the spare cover (1), so as to release the pressure in the hydraulic oil tank.
5. Please remove the flat head screws (2), spring washer (3), and tank cover (4) from the fuel tank.

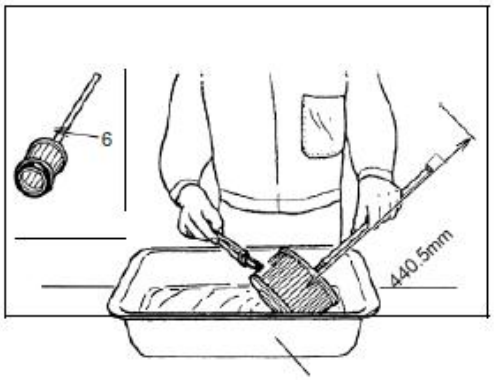
Please be careful not to drop bolts or other objects into the hydraulic coil tank.



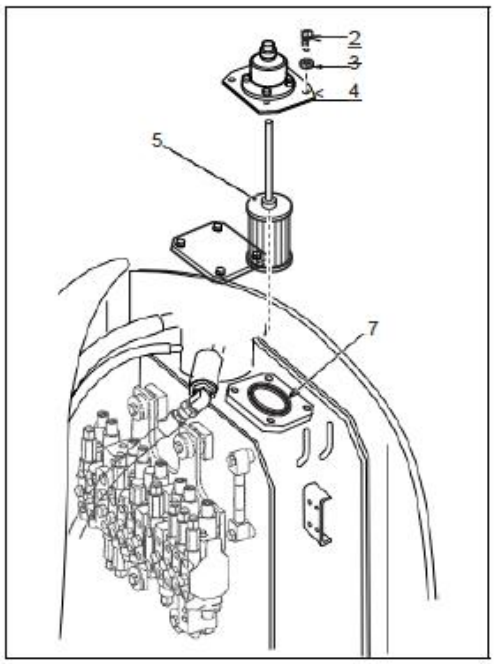




6. Please remove the oil inlet stainer (5)
7. Remove the dust and other debris adhering to the oil suction strainer (5), and clean it with clean light diesel or cleaning agent. After it is thorough dried, please inspect the strainer. In case the strainer (5) is damaged, please replace it with a new one.



8. Inspect the bottom of the strainer (5) and the O-rings (6) and (7). In case there is wear or damage, please replace them.
9. Install and insert the oil suction strainer (5).
10. Use flat head screws (2) and stop washers (3) to install the tank cover (4).
    Tightening Torque: 23.5±1.98N·m {2.4±0.2kgf·m}
11. Start the engine, make it idle at low speed for a few minutes (5-7 minutes), perform the extension and rotation operations of each cylinder, return the machine to the hydraulic oil level inspection state, stop the engine, and inspect the oil level. In case the oil level is too low, replenish the oil.



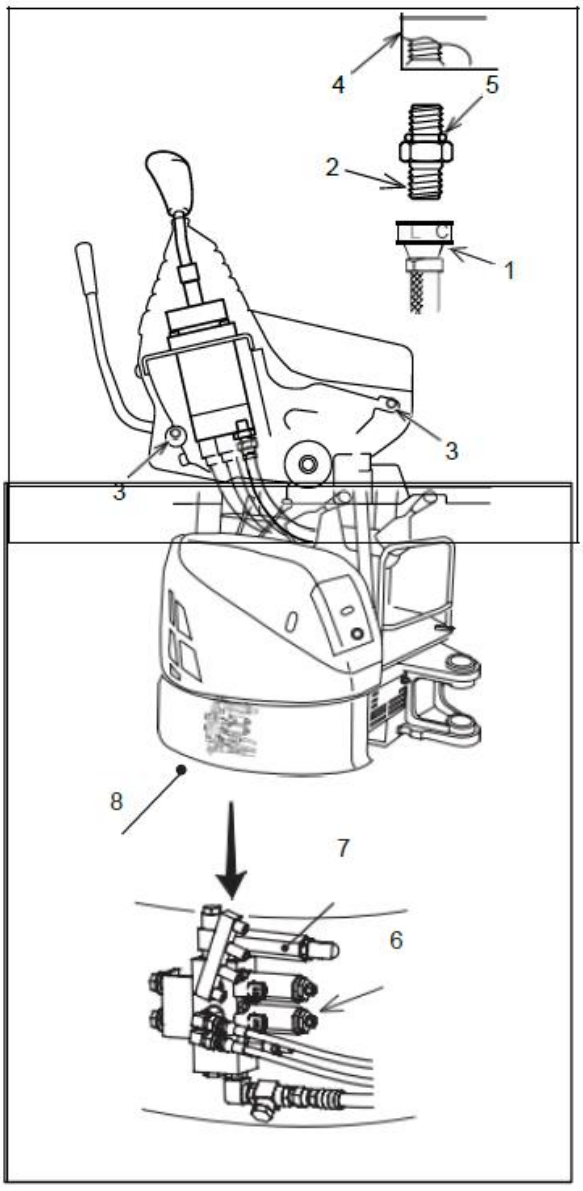
B. Cleaning of oil circuit filter of pilot valve and in-line filter of solenoid valve

Warning

- **Hydraulic circuits typically have internal pressure. Please don't perform inspection or conditioning before the internal pressure is released.**
- **When releasing the internal pressure of the hydraulic oil tank, please push the valve open from above the tank cover, so as to release the pressure in the hydraulic oil tank.**
- **Due to the fact that spilled hydraulic oil can be a cause of fire, please wipe it clean.**

Connectors with filters are installed on the "Port P" of left/right pilot valve and the "Port P" of left/right solenoid valve for operation and travelling. In case dust adheres to such filters, it will be difficult for the hydraulic oil to flow. In addition, in case dust enters the valves, malfunction may occur. Therefore, please remove the valves regularly for cleaning.

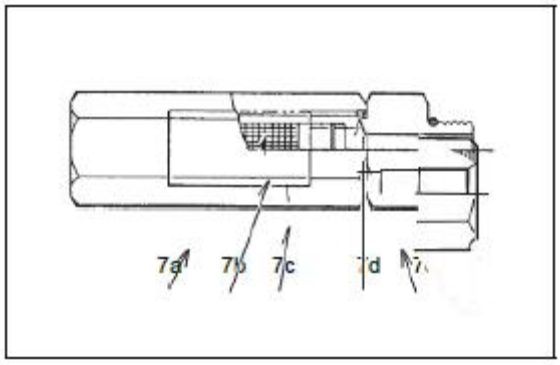
1. Please adjust the descending cut-off type safety lock rod to the "locked position" when the engine is stopped.
2. Bleed air from the hydraulic circuit by reference to Section **"Release of hydraulic oil and internal pressure of hydraulic system"**.
3. Loosen the bolts (3) of the two operation boxes and remove the protective device.
4. Remove the hose (1) connected to the "Port P" of the pilot valve (4), and then remove the connector (2) with filter. After removal, please install the plug onto the oil hole to prevent foreign matters from entering.
5. Please use light oil or blow air to clear away the dust adhering to the filter.
6. Inspect the O-ring (5) and replace it in case there are any scratches or damages.
7. After cleaning, please carry out assembling according to Steps 3 and 4 in the reversed sequence. Next, remove the in-line filter (7) of solenoid valve (6) for cleaning.
8. Please remove the right protective device (8).
9. After removing the hose, remove the in-line filter assembly (7) from the T-shaped joint connected to the solenoid valve (6). Thereafter, block the oil holes of the T-shaped connector and hose with plugs.



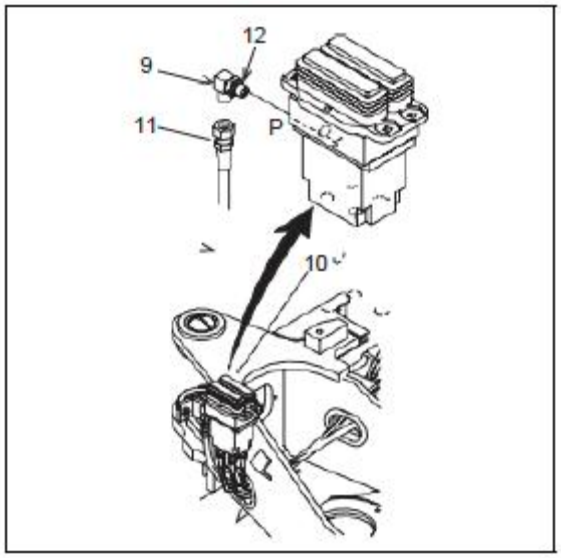
10. After removing the sleeve (7a) and oil port (7e), use a screwdriver to remove the strainer (7b).
11. Use light oil or blow air to clean the strainer (7b). Please also clean the inside of the sleeve (7a). At this point, inspect the O-ring (7d) and replace it with a new one in case there are scratches.
12. Use a screwdriver to install the strainer (7b) onto the oil port (7e), and then install it onto the in-line filter sleeve (7a).

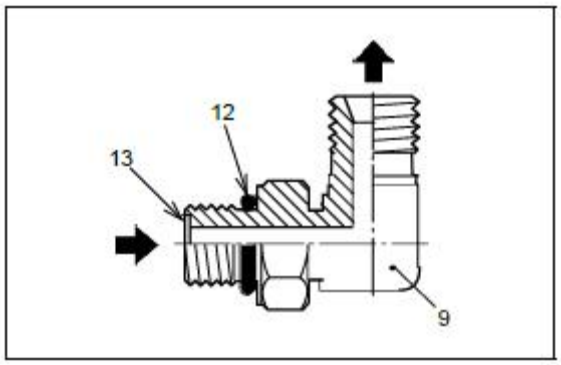
Tightening Torque: 59-78N·m {6-8kgf·m}

7a. Sleeve
7b. Strainer
7c. Label
7d. O-ring
7e. Oil port
7f. O-ring

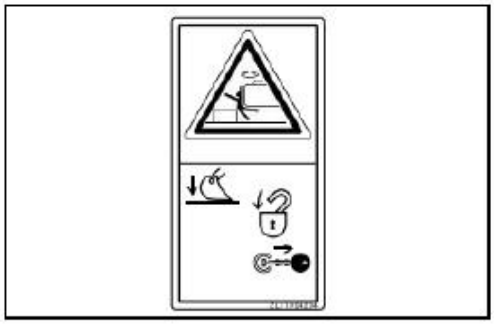


13. Remove the plug, install the in-line filter assembly (7) onto the T-shaped connector of the solenoid valve (6), and then install the hose (1). Next, remove the elbow (9) with filter of the travelling pilot valve (10) and clean it.
14. Remove the hose (11) connected to the "Port P" of the pilot valve (10), and then remove the elbow (9). Thereafter, please block the oil hole with a plug, so as to prevent foreign matters from entering.
15. For the dust and dirt accumulated on the inside of the elbow (9), please clear it away with light diesel oil or blown air from the installation side of the filter (13).
16. Inspect the O-ring (12) and replace it in case there are scratches.
17. After cleaning, please carry out installation in the reversed sequence of disassembly.
18. Please install the removed components such as the bottom plate and movable protective plate.





C. Replacement of hydraulic oil of motor with travelling reducer



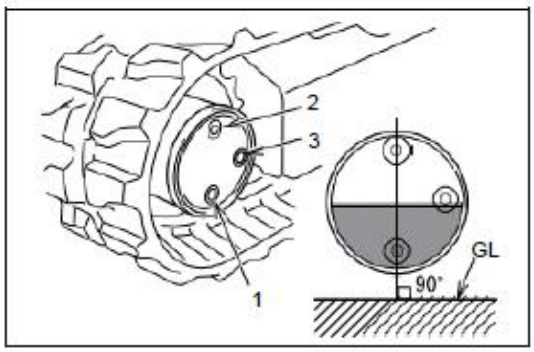
Warning

- **After travelling, the hydraulic oil in the machine is in a high temperature state. Please carry out operation after the temperature drops.**
- **When there is residual pressure in the travelling motor, the hydraulic oil and plugs may burst out. Please slowly loosen the plug, so as to release the pressure.**

Oil Container: container with the capacity of 1.0L or above
Approximately oil replacement volume: 0.7L
Please replace it only after the first 500 service hours.

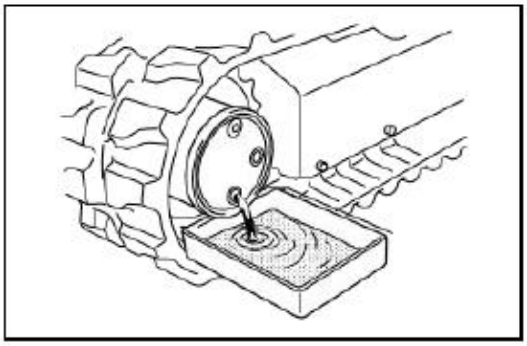
1. Please stabilize the machine on a flat surface and press the plug of the DRAIN port (1) downwards.

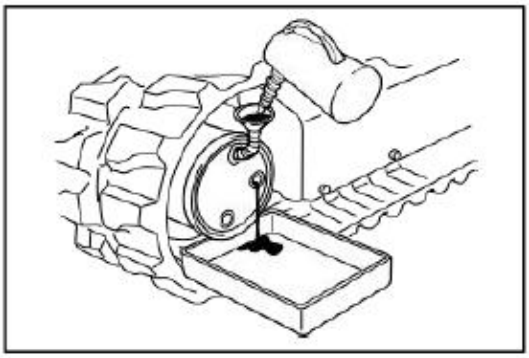
2. Please place a container for receiving oil under the plug of DRAIN port (1).



Oil drain

3. Use a hex wrench to slowly remove the plug from the FILL port (2) and LEVEL port (3), remove the plug from the DRAIN port (1) and then drain the oil into the receiving container.
4. Please wrap the plug of the DRAIN port (1) with sealing tape and tighten it securely.
5. Slowly replenish the oil from the FILL port (2) until the gear oil overflows from the LEVEL port (3). Regarding the transmission device oil used, please refer to the **"List of Lubricating Greases Added"**.





6. When the transmission device oil overflows from the LEVEL port, please wrap the plugs (2) and (3) with sealing tape and tighten them firmly. Please wipe off any oil adhering around the plugs.

7. Please make the machine travel slowly and confirm whether the hydraulic oil is leaking.

In case the discharged oil contains foreign matters such as metal powder and metal sheets, please contact our sales agent.

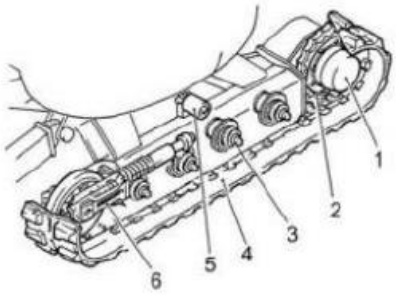
D. Gear oil for load bearing wheels, guiding wheels, and chain supporting wheels of crawler beam

⚠Warning

In order to adjust the tension of crawler shoes or disassemble and condition crawler shoes, when loosening the lubricating grease injection port, please gradually discharge the lubricating grease by rotating the lubricating grease injection port within one turn, because the high-pressure lubricating grease may enter the lubricating grease cylinder of track spring.

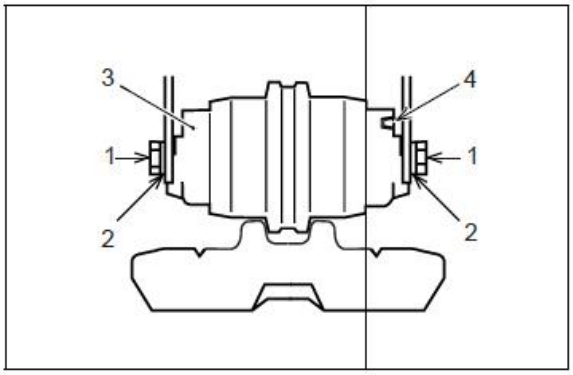
When applying various gear oils to load bearing wheels and guiding wheels, please remove the crawler beam and replenish the oil. The following is an explanation of the dismantlement/installation methods for each device and the replacement methods of gear oil. In addition, please refer to the **"List of Lubricating Greases Added"** for the name and amount of oil to be replaced.

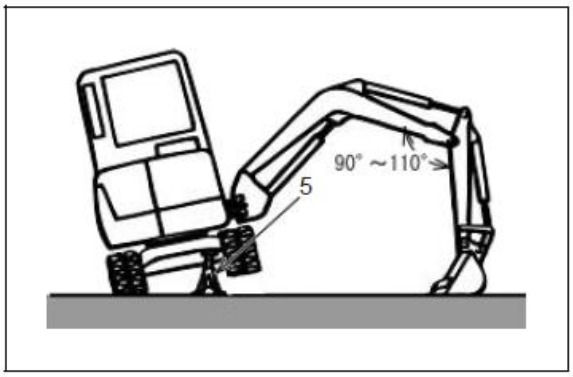
1. Travelling motor
2. Driving sprocket
3. Load bearing wheel
4. Crawler shoe
5. Chain supporting wheel
6. Guiding wheel



D.1 Load bearing wheel

1. Please relax the rubber crawler shoe on the side where the gear oil is to be replaced by reference to **Page 4-23**.
2. Loosen the flat head screw (1) used to tighten the load bearing wheel slightly (about 1 turn).
3. Start the engine, use the boom and bucket arm to make the bottom of the bucket touch the ground on the side where the gear oil is to be replenished to the load bearing wheel, and then lift the machine body.
4. Please stop the engine, and use a safety strut (5) to support the machine.
5. Please remove the fixing flat head screws (1) and washers (2) on the inner and outer sides of the crawler beam, and then remove the load bearing wheel (3).
6. Please use a hex wrench to remove the oil filling port plug (4) and drain the old gear oil.
7. Please add the specified amount (35cc) of gear oil from the oil filling port.
8. Please wrap the plug (4) with sealing tape and tighten it securely. Please wipe off any oil adhering around the plug.
9. After applying the thread sealant # 262 to the screw part of bolt (1), please temporarily fix the load bearing wheel (3) onto the crawler beam.
10. Please remove the safety strut supporting the machine, fully lower the machine body onto the ground, and tighten the flat head screw (1).
Tightening Torque: 208±21.4N·m {21±2.1kgf·m}
11. Please lift the machine to adjust the tension of the crawler shoes.





Load bearing wheel

D.2 Guiding wheels

When replacing the gear oil of guiding wheel, please remove the rubber crawler shoes on the replacement side.

⚠Warning

When dismantling and installing the rubber crawler shoes, the machine body on the dismantlement/installation side shall be lifted. In case of mis-operation, the machine may fall and causing danger. Therefore, please don't perform any operation other than dismantlement/installation of crawler shoes during the work.

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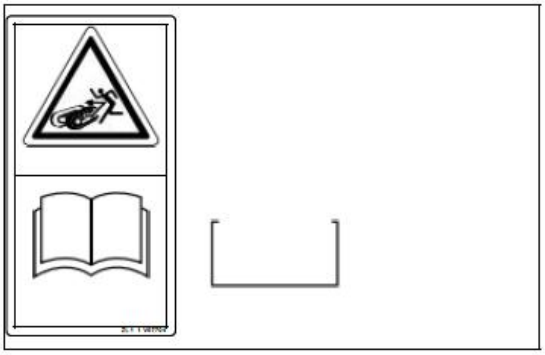
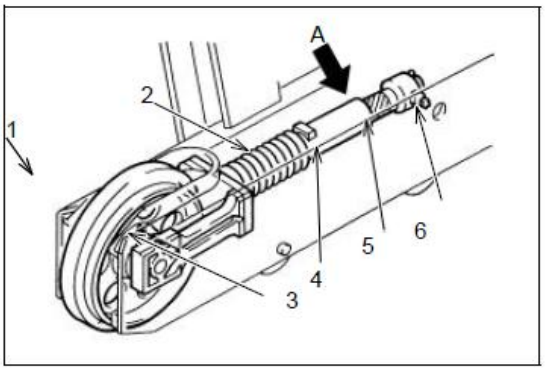
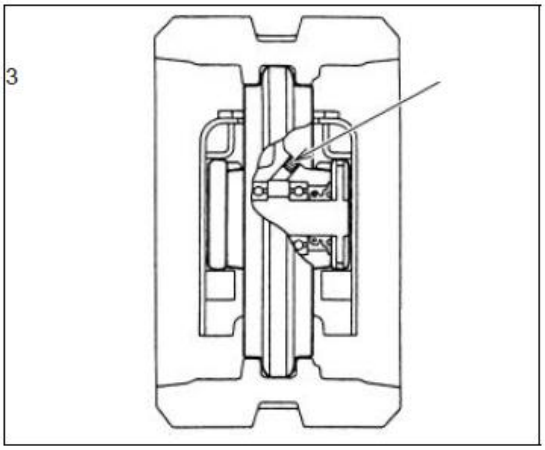
1. Remove the rubber crawler shoes. (For the replacement of crawler shoes, please refer to Section **"Dismantlement of rubber crawler shoes"** and use a safety strut to support the machine body.) Stop the engine.
2. Pull out the guiding wheel (1) and guiding wheel adjuster (2) from the crawler beam. Weight of guiding wheel + guiding wheel adjuster = approximately 56kg
3. Use a hex wrench to remove the guiding wheel oil filling port plug (3) and drain the old gear oil.
4. Please replenish the specified amount (80cc) of gear oil into the oil filling port.

5. Wrap the plug (3) with sealing tape and tighten it securely. Please wipe off any oil adhering around the plug.
6. Please apply grease to the plunger (4), cylinder (5), and sliding surface (A) of the guiding wheel adjuster (2).
7. Please install the crawler beam on the outer position facing the grease injection port (6) of guiding wheel adjuster (2) and plug (3) at the lubrication point of the guiding wheel.
8. Please install rubber crawler shoes.
9. Please adjust the tension of the rubber crawler shoes. After confirming the engagement and tension of the guiding wheels, remove the safety strut that supports the machine and lower the machine body.



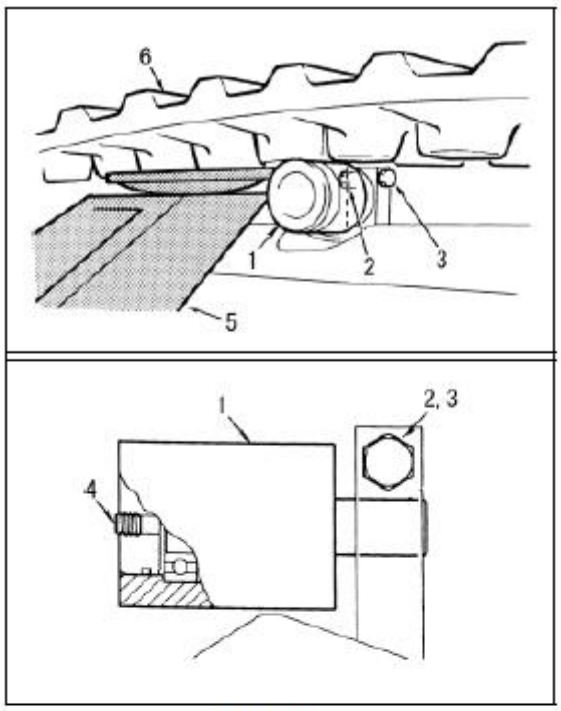




Guiding wheel

D.3 Chain supporting wheels

1. Please confirm the shutdown state after stopping the engine.
2. Relax the rubber crawler shoe (6) on the side where the gear oil is to be replaced.
3. Please use a hydraulic jack (5) to push the crawler shoe upwards.



Chain supporting wheel

4. Please remove the nut (2) and flat head screw (3) that fix the supporting part of the rotating shaft of the chain supporting wheel (1). Remove the chain supporting wheel (1).
5. Use a hexagonal wrench to remove the oil filing port plug (4) and drain the old gear oil.
6. Please replenish the specified amount (45cc) of gear oil to the oil filling port.
7. Wrap the plug (4) with sealing tape and tighten it securely. Please wipe off any oil adhering around the plug.
8. Please carry out installation in the reversed sequence of dismantlement, apply screw sealant (equivalent to Loctite locking adhesive # 262) to the thread part of the flat head screw (3) and tighten it.

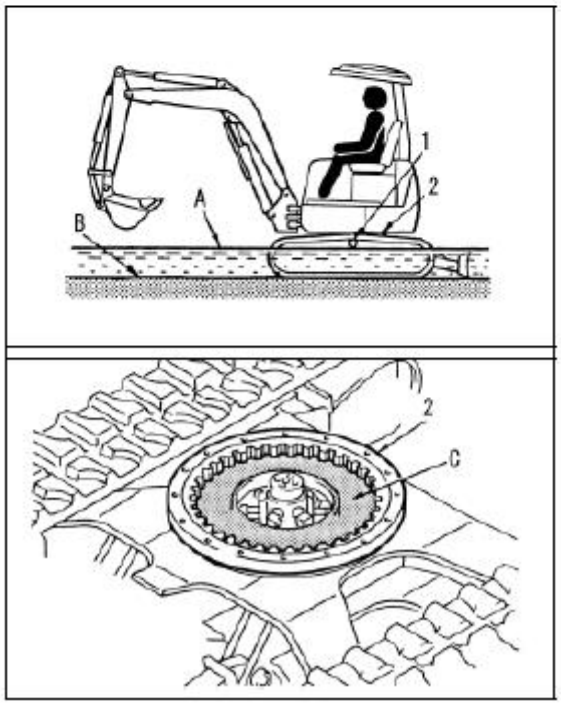
Tightening Torque: 66±7N·m {6.7±0.7kgf·m}

E. Replacement of oil for rotating grease tank

Mixing a small amount of water into the grease will make it turbid. In case the components near the rotating bearing have been repeatedly immersed in water, in addition to the rotating bearing, the grease in the grease tank may also age. In case the grease ages, the small gears of the rotating motor and the gears inside the rotating bearings may get damaged. Please contact our company's sales agent, so as to determine whether the grease has to be replaced.

1. Chain supporting wheel
2. Rotating bearing

A. Water surface
B. River bottom
C. Grease



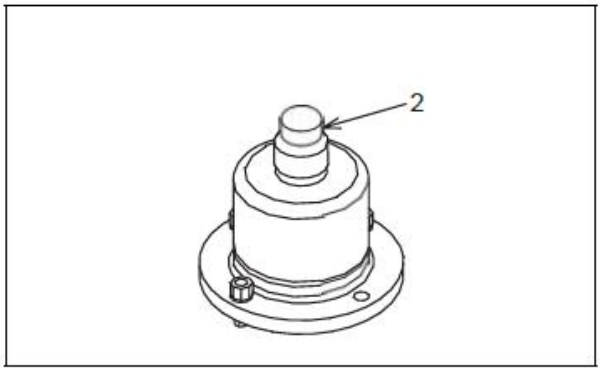
4.18 Conditioning Every 5,000 Hours

Please carefully read and fully understand **Section "Basic Safety Precautions"** on **Page 1-3** before proceeding with the operation and conditioning. During the implementation of this conditioning, please also implement "Conditioning Every 8 Hours", "Conditioning Every 50 Hours", "Conditioning Every 250 Hours", "Conditioning Every 500 Hours", and "Conditioning Every 1,000 Hours".

A. Replacement of hydraulic oil

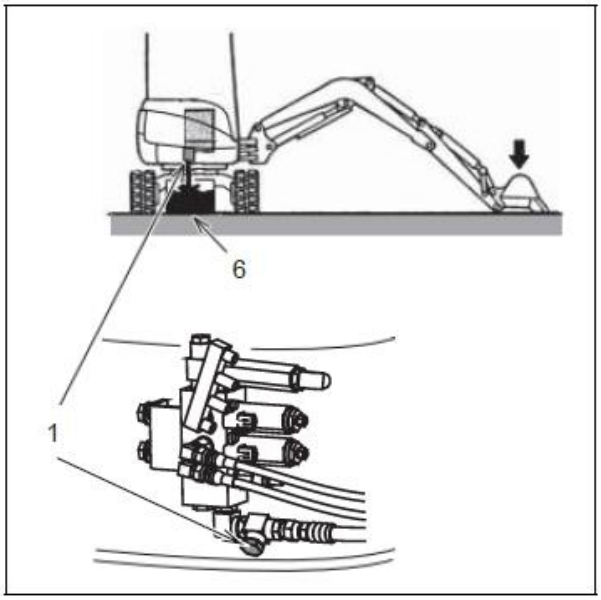
⚠Warning

- **The oil in the hydraulic oil tank is in a high temperature and high pressure state, which is very dangerous. When removing the outer cover, please stop the engine and remove the air bleeding valve, so as to release the pressure in the tank.**
- **After the engine has just been started, the oil temperature is very high, posing a risk of burns. Please wait until the temperature drops before proceeding with the operation.**



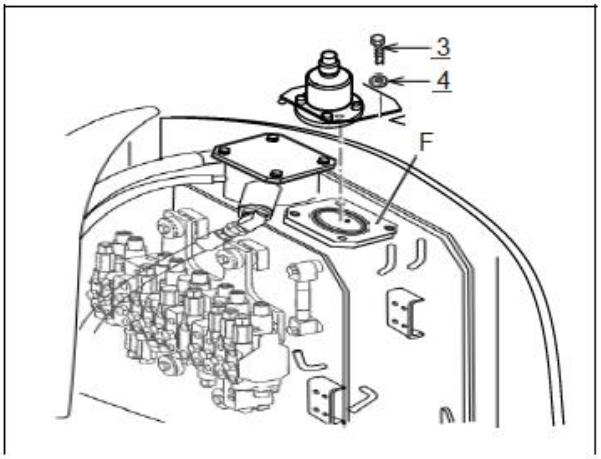
Important

When the hydraulic hammer is installed, the aging of hydraulic oil is usually more severe than that when the bucket is installed for excavation operation. Therefore, please maintain the machine according to the inspection and maintenance items for use of hydraulic crusher.



- Waste oil container: container with the capacity of 40L or above
- Oil replacement volume: 38L

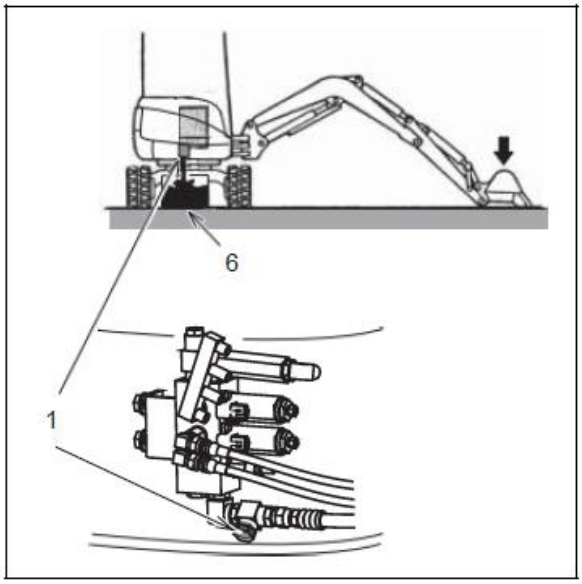
1. Select a level and solid location, and rotate the upper rotating body of the machine, until the oil drain plug (1) at the lower portion of the hydraulic oil tank is located at the middle of the crawler shoe.
2. Retract the bucket arm cylinder and bucket cylinder, make the bucket and scraper (only for machine equipped with scraper) touch the ground, and then stop the engine.
3. Place the safety rod in the "locked position".
4. Clean the surroundings of the oil tank cover, so as to prevent foreign matters from falling into the hydraulic oil tank.
5. Remove the air bleeding cover (2) from the hydraulic oil tank, and press the valve for multiple times (5-7 times), so as to release the pressure in the hydraulic oil tank.
6. Remove the bolt (3), locking washer (4), and cover plate (5) from the hydraulic oil tank.



Be careful not to drop bolts or other objects into the hydraulic oil tank.

7. Use an oil pump to drain the hydraulic oil into a container.

8. After the pressure in the hydraulic oil tank is released, please place the oil receiving container (6) under the water drain plug (1). Use a screw wrench (27mm) to unscrew the water drain plug (1) and drain the hydraulic oil.



Important

Please dispose of the waste hydraulic oil according to local environmental regulations.

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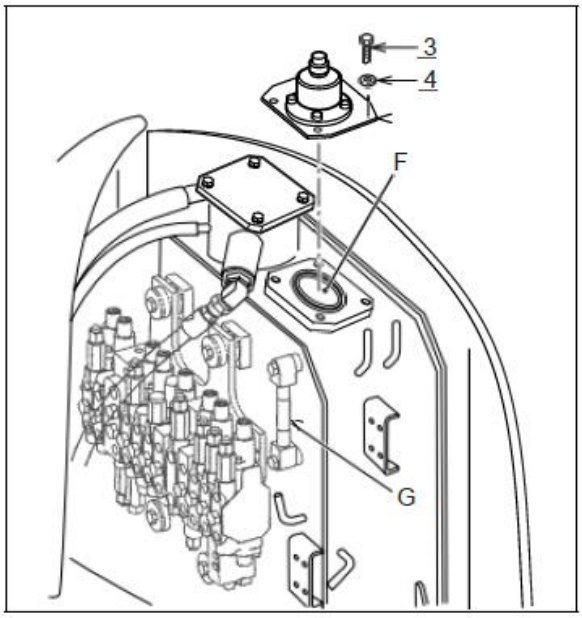
9. Please tighten the water drain plug (1).
   Tightening Torque: 73.5±5N·m {7.5±0.5kgf·m}
10. Replenish the oil from the oil filling port (F) on the upper portion of the hydraulic oil tank. When replenishing the oil, use the oil level confirmation glass tube (G) to confirm the oil level.
11. Use the flat head screw (3) and stop washer (4) to install the tank cover (5).
    Tightening Torque: 23.5±1.98N·m {2.4±0.2kgf·m}
12. Start the engine and make it idle at low speed for a few minutes (5-7 minutes), extend and retract each cylinder and rotate the machine, and then return to the standard posture for inspection on hydraulic oil. At this time, stop the engine and inspect the oil level. In case it is too low, please replenish the oil.



5. Transportation

5.1 Road Transportation

• Before preparing for transportation, please confirm the weight, full height, full width, full length, travelling speed, and grounding of machine by reference to Section "Main Components Carried" below.

A. Loading/unloading method

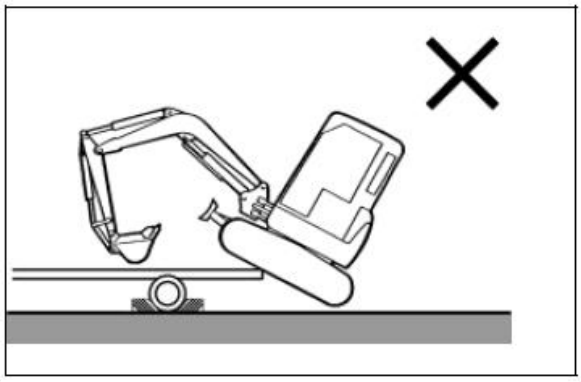
⚠Warning

- **For loading and unloading, please make the machine travel at low speed.**
- **Loading or unloading the machine by using attachment is dangerous. Therefore, please don't perform similar operations.**
- **Please don't operate joysticks other than travelling rod when the machine is on the springboard.**
- **Due to the rapid shift of the center of gravity at the junction between the machine and the springboard, please carry out operation carefully.**

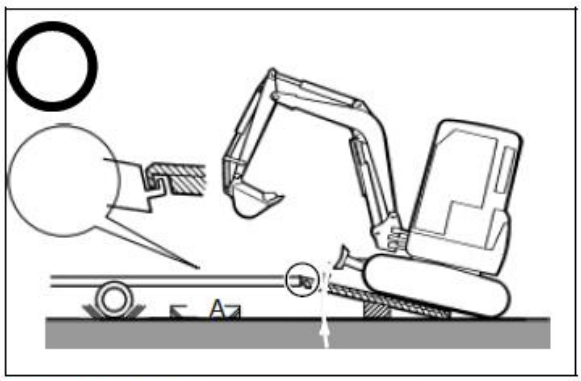
1. Please load and unload he machine on a flat road surface if possible.
2. Please use a springboard that has sufficient length, width, strength, and slope. Please control the angle (A) between the ground and the springboard below 15°. Additionally, due to slippery conditions such as rain, please implement anti-slip measures.
3. Before boarding the springboard, please confirm whether the machine body and the springboard is in a straight state, and make the machine travel slowly. Lift the bulldozer board and be careful not to touch the trailer with the attachment. Please load and unload the machine in a lowered state if possible.
4. Please load the machine from the front when there is an attachment, and from the rear when there is no attachment.
5. Please load the machine correctly into the designated position on the trailer.

• Please investigate the road width, bridges, pavement condition, and traffic flow on the planned route in advance

• In case it is required to obtain permits from competent authorities regarding road transportation, please obtain such permits.

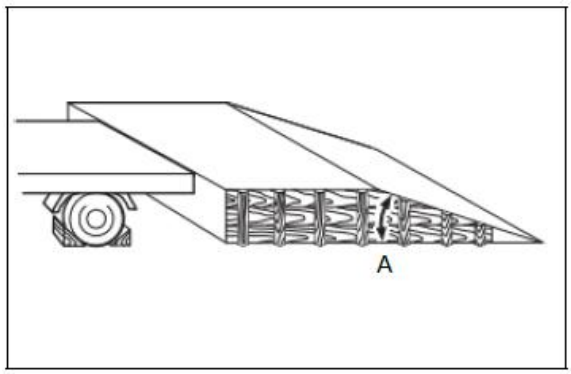


Loading/unloading with attachment



Loading/unloading with springboard

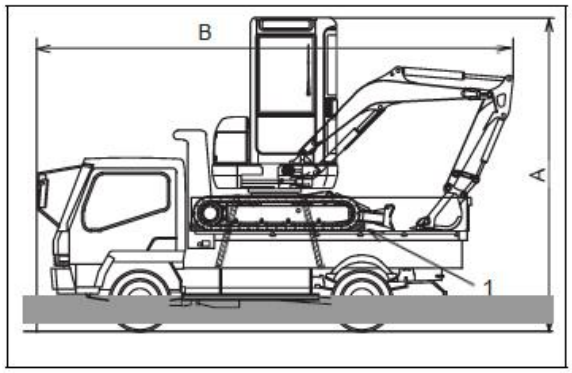
B. Use of Platform or Soil Pile



1. The width of the soil pile shall take into account the width of the machine. Please ensure that the width is sufficient.
2. Please reinforce the surroundings of the soil pile and avoid causing the bearing surface to crack or the machine to overturn during loading or unloading process. Especially to prevent collapse around the bearing surface, please carry out reinforcement by using the methods such as pile driving if necessary.
3. Please adjust the height of the platform or soil pile to match the height of the trailer's carriage.
4. Please load the machine from the front when there is an attachment, and from the rear when there is no attachment.
5. Please load the machine correctly into the designated position on the trailer.

A. Less than 15°

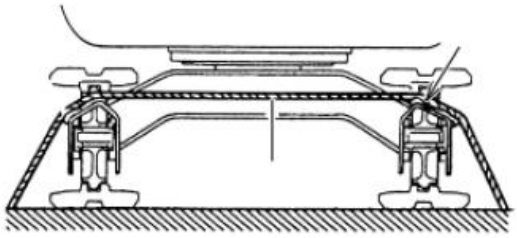
C. Fixation of machine



After loading the machine into the designated position, please fix the machine according to the following steps.

1. Please lower the bulldozer board.
2. Please straighten the bucket and the bucket arm cylinders, and slowly lower the boom in the straightened state.

1. Brake wedge
   A. Full height
   B. Full length



In order to prevent damage to the bucket cylinder during transportation, please use square material to support the end of the bucket, rather than let it touch the ground.

---

3. Please adjust the descending cut-off safety locking rod to the "locked position".
4. Please turn off all switches and remove the key. Please lock the cab door tightly.
5. During transportation, please install brake wedges at the front and rear of the bulldozer board to prevent the machine from swinging, and use suitable steel cables to securely fix it.

1. Steel cable

A. Corner block.

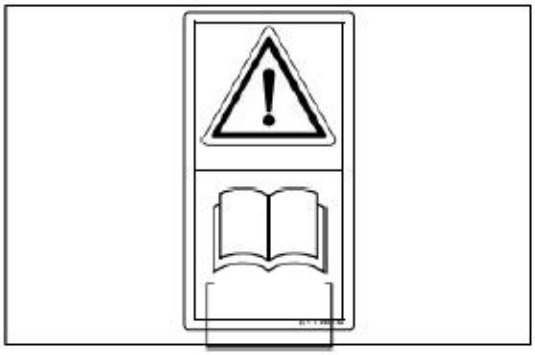
5.2 Key Points for Lifting of Machine Body

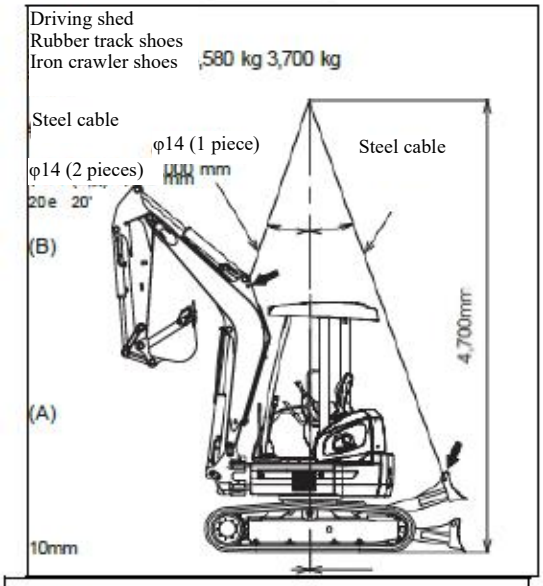
Warning

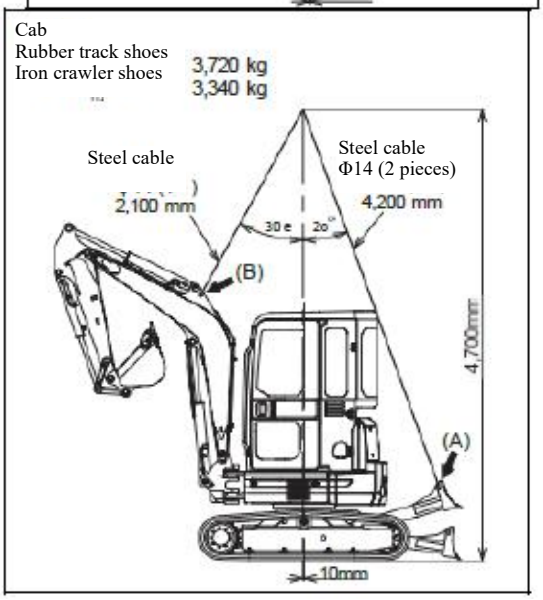
- **Please use the steel cables with sufficient strength during lifting operation based on the weight of the machine body.**
- **In case there are errors in the lifting method and the hanging method of steel cable, the movement of the machine during lifting may cause personal accidents and machine damage.**
- **Please don't apply sharp loads to the lifting cables and tools.**
- **When lifting the machine in joint operation, please transmit the command signals to each other for operation.**
- **Please don't enter the lower part and surrounding area of the machine during lifting operation.**

Please lift the machine on a flat surface.

1. Please operate the joystick so that each attachment is in the posture as shown in the figure.
2. When rotating the boom with the maximum rotation diameter, please operate the boom pedal to adjust the boom to a straight state.
3. After stopping the engine, please confirm that there is nothing around the driver's seat. Adjust the descending cut-off type safety lock rod to the "locked position" and get off the machine.
4. Please install shackles with pins in the lifting holes (A) at both ends of the crawler and hang the steel cables.
5. Please install a shackle with pin at one location on the boom (B) and hang the steel cable.



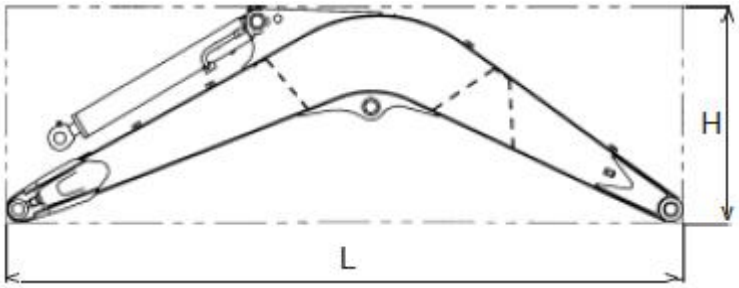




5.3 Main Components Carried

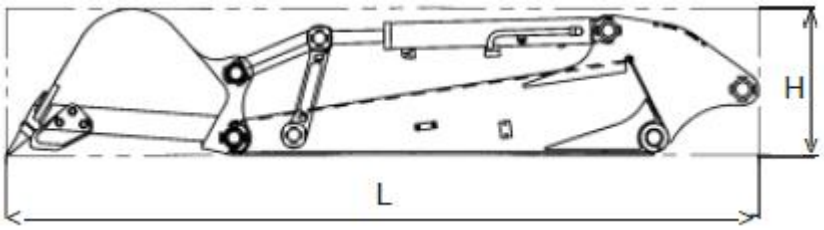
A. Main components of boom

Full length x full height x full width L × H × W	**(mm)**	**2,594 × 810 × 222**
Mass	**(kg)**	**218**



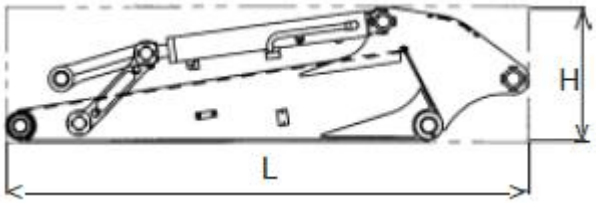
B. Main components of bucket arm and bucket

Full length x full height x full width L × H × W	**(mm)**	**2425 × 537 × 600**
Mass	**(kg)**	**280**



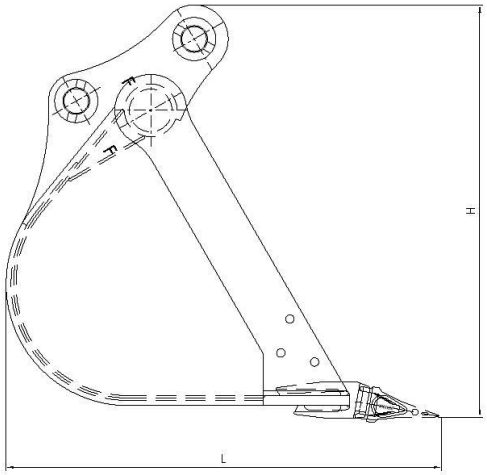
C. Main components of bucket arm

Full length x full height x full width L × H × W	**(mm)**	**1748 × 400 × 140**
Mass	**(kg)**	**123**

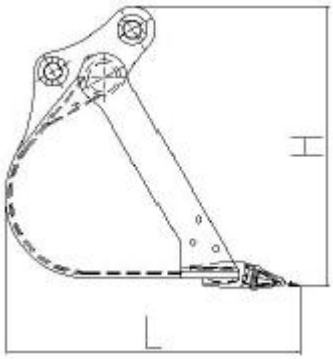


D. Main components of bucket

Capacity of bucket	**(m3)**	**0.12**
Full length x full height x full width L × H × W	**(mm)**	**702 × 665 ×565**
Mass	**(kg)**	**81.8**



※ The bucket capacity inside () represents that of old JIS.

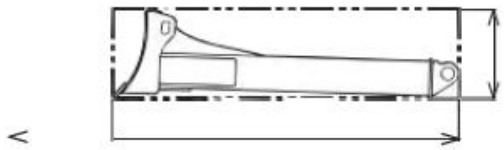


E. Main components of bulldozer board

Full length x full height x full width L × H × W	**(mm)**	**1333×332×1,750**

H

L



6. Optional Parts

6.1 Optional Parts and Attachments

6.1.1 Selection of Hydraulic Hammer and Hydraulic Pliers

When the hydraulic hammer and hydraulic pliers which are most suitable for operation are installed, please consider the suitability for stability, impact force, and hydraulic oil volume of the machine.

Caution: For other optional accessories such as quick change connector, and multifunctional drill, please refer to the accompanying user manual. This Section only provides the examples for hydraulic hammers and hydraulic pliers.

6.1.2 Before Use of Hydraulic Hammer

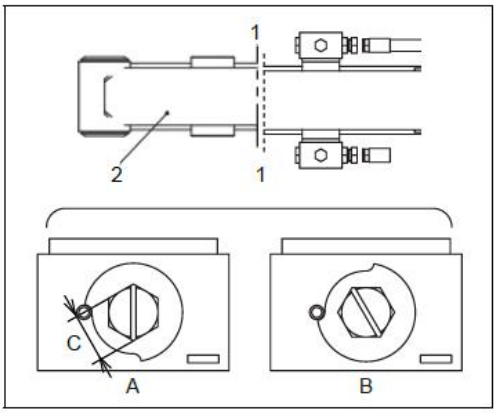
- For the construction of piping and pre-reinforcement of bucket arm required for installation of hydraulic hammer nd hydraulic pliers, please discuss with our sales agent.
- Before using hydraulic hammer and hydraulic pliers, please carefully read the manufacturer's user manual and the "Precautions for Operation" described later. Please be careful not to damage the excavator, hydraulic hammer, and hydraulic pliers, so that their functions can always be fully utilized.

6.1.3 Connection of Hydraulic Circuit for Attachment

When connecting the hydraulic hammer and hydraulic pliers, please follow the following steps.

1. Please remove the plug (1) from the brake valve piping. Please be careful not to lose the parts (plugs) that have been removed from the 2 positions (left and right), and don’t damage them.
2. Please connect the piping of hydraulic hammer to the part from which the plug is removed in 1 above.
    1. Plug
    2. Bucket arm
    A. Locked position
    B. Released position
    C. 19mm (2-sided width)

    Caution: The connecting ball valve may be replaced with a lever ball valve.



Brake valve

Remarks

A throttle valve is a valve that stops the flow of hydraulic oil.

- **Locked: The flow of hydraulic oil is stopped.**
- **Released: The hydraulic oil flows.**
- **When installing /dismantling the hydraulic hammer and hydraulic pliers, please set the throttle valve to the locked position. Please install the plug after removal.**

6.1.4 Impurities and Hydraulic Oil

When the machine is not equipped with a hydraulic hammer, please install plugs in the hoses at the front end of the bucket arm and the hoses on one side of the hydraulic hammer, so as to prevent dust, and moisture from entering the piping.
Before starting the operation, please inspect the looseness of the pressure plate fixing the attachment piping, inspect the looseness of the flat head screw fixing the hose pressure plate, and inspect whether there is any oil leakage at the connections of hoses.

6.1.5 Key Points for Operation

A. Circuit shared by hydraulic pliers and hydraulic hammer

For this machine, there is a specification where a circuit is shared by hydraulic pliers and hydraulic hammers. When operating, please use the operating pedal located in the front left position of the driver's seat. In addition, please appropriately switch between hydraulic pliers and hydraulic hammer by reference to the instructions related to on-way valve below.

B. Operating pedal

Caution

The action may vary due to different specifications. Please read these Operating Instructions carefully and then carry out operation.

Release the locking device on the left front pedal flap of the driver's seat and perform the pedal operation.

Caution

In case you accidentally step on the pedal while working, serious injury may be caused. Please don't place your foot on the pedal other than during pedal operation.

Hydraulic hammer

Pressing Direction	Action
Neutral position of pedal	The hydraulic hammer will not act
Left/right part of pedal	The hydraulic hammer will act, being released and stopped

Shredder/thumb clamp/crusher

Pressing Direction	Action
Pressing the pedal leftwards (A)	Shredder/thumb clamp/crusher (opened)
Pressing the pedal rightwards (B)	Shredder/thumb clamp/crusher (closed)

Pedal locking device

Device used to lock the operating pedal

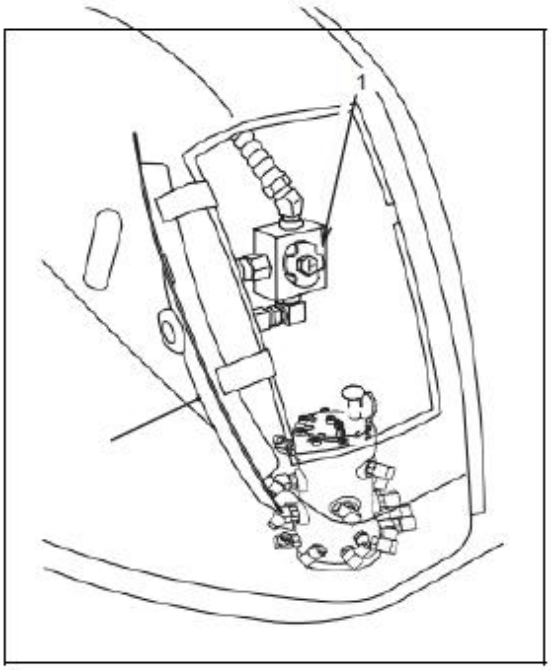
Caution

When it is unnecessary to operate hydraulic hammer or hydraulic pliers, please adjust the pedal locking device to the locked position. An unlocked operating pedal may pose a significant risk of injury due to accidental contact.

6.1.6 Key Points for Switching of One-way Valve

For machine equipped with hydraulic pliers and hydraulic hammer, since a one-way valve is installed on the main circuit, it is necessary to switch the one-way valve at a suitable position.

1. One-way valve 2. Cover



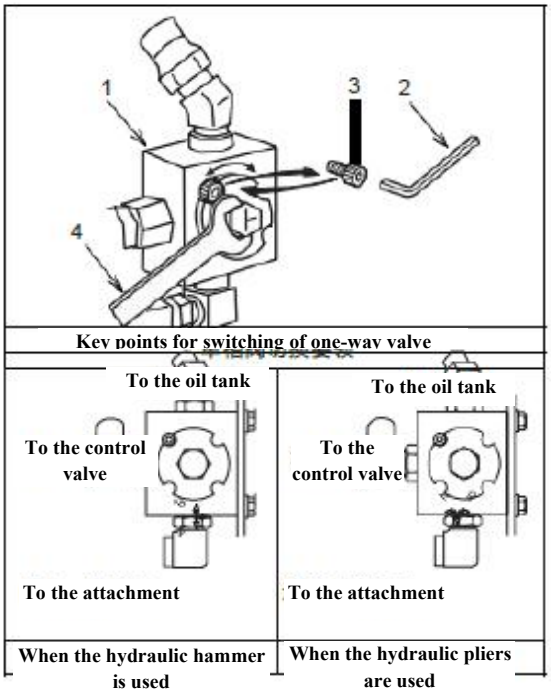
Remarks

- **In case the switching of one-way valve is not appropriate, the operational efficiency will be law due to poor movement, and the machine may get damaged. Therefore, please switch it appropriately.**
- **Please switch the one-way valve regularly once to twice a month.**

A. Key Points for Switching

Remarks

Please stop the engine, ensure that the attachment stably touches the ground, and then carry out the switching operation.



1. One-way valve (main circuit)
2. Spiral bolt (5mm)
3. Flat head screw
4. Wrench (2 sides with a width of 24mm)

1. Open the protective device on the right side of the machine, and a one-way valve (1) can be found.
2. Use the spiral bolt (2) to remove the flat head screw (3).
3. Use the wrench (4) to rotate the flat head screw (3) at the designated position and remove it.
   Description of markings on one-way valve
   B: Hydraulic hammer
   N: Hydraulic pliers (crusher)
4. Please close the valve cover.

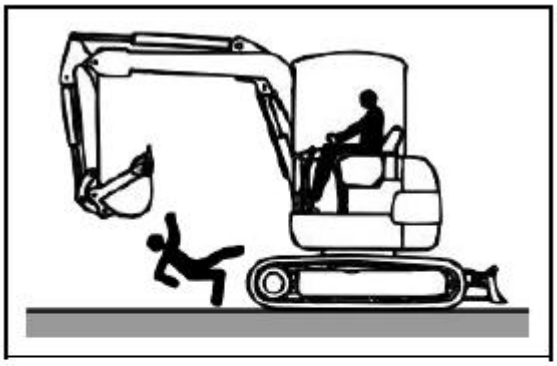
6.2 Precautions for Use

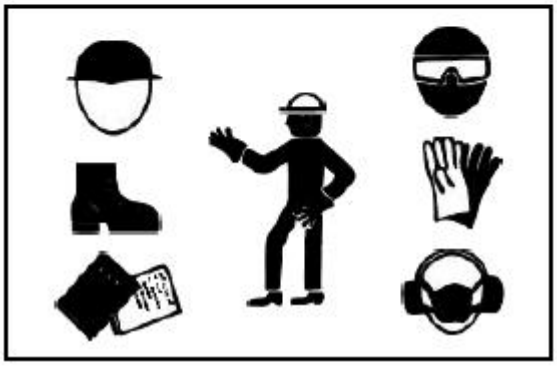
It is prohibited for any person other than the driver to ride the machine

Please don't let any person other than the driver to ride the machine; otherwise, personal accident may occur. Therefore, please absolutely prohibit it.

Use of protective equipment

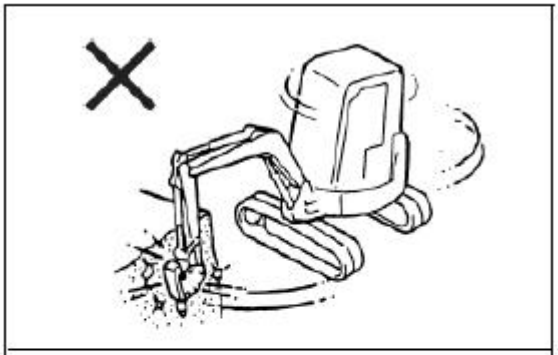
When operating an attachment which may cause debris to scatter, in order to prevent the flying debris from hitting the driver, please install mechanical protective equipment and close the cab windows during operation. In addition, the driver and people around the machine must wear safety boots, helmets, gloves, face shields, or goggles.





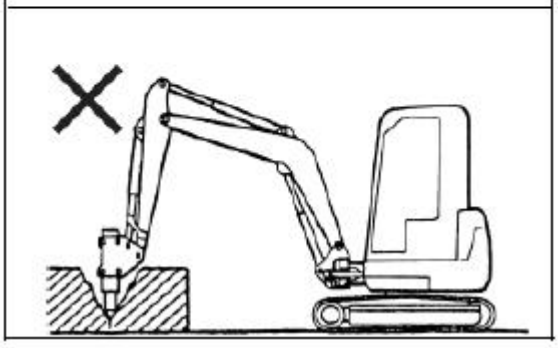
Horizontal striking is prohibited!

In case the side and back of the hydraulic hammer collide with the rock surface, not only the hydraulic hammer but also the boom and bucket arm may get damaged. Therefore, please avoid it as much as possible. When using the hydraulic hammer to strike rock, please carry out the striking correctly.



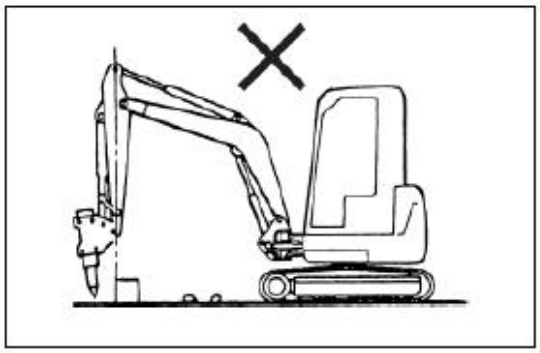
Don’t use the hydraulic hammer to carry out forcible cutting operation!

In case the hydraulic hammer is used to forcibly cut open rocks and concrete, not only the hammer body but also the boom, bucket arm, and cylinder may get damaged. Therefore, please avoid it as much as possible.



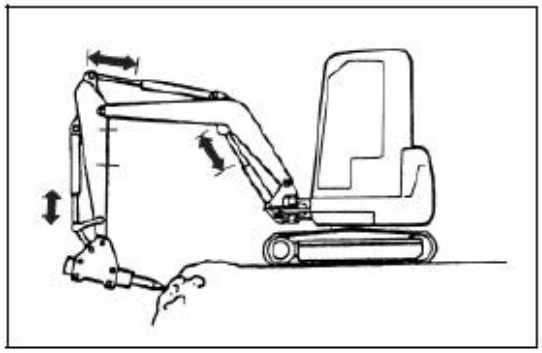
It is prohibited to carry out operation in the posture that the bucket arm is vertical!

Facing the ground and carrying out operation in the posture that the bucket arm is vertical may cause significant shaking of the bucket arm cylinder. Therefore, please avoid it as much as possible. In case the piston rod seal and piston are damaged, oil leakage may occur.

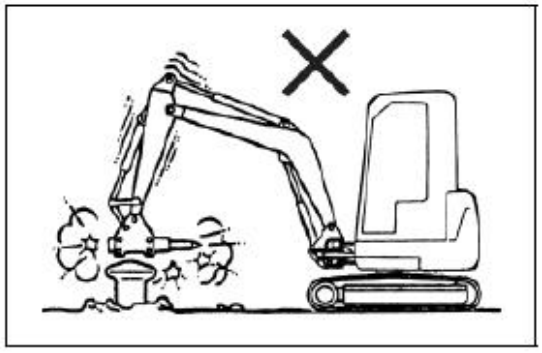


It is prohibited to carry out operation at the end of cylinder stroke!

For cylinder, please carry out operation with a slight margin from the end of its stroke. Using the end of stroke may cause a large load on the cylinder and the machine body, significantly shortening the service life of cylinder and attachment.



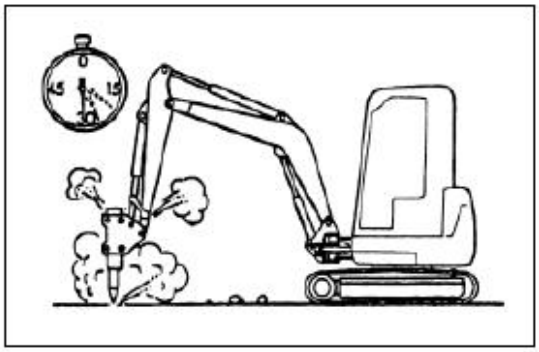
Please don’t use hydraulic hammer outside of crushing operation.



Please avoid continuous striking for more than 30 seconds!

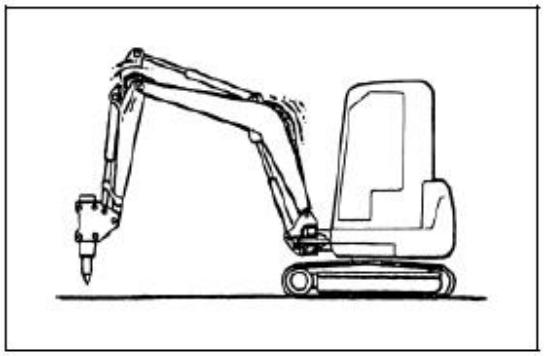
In case the same position cannot be cut by continuously striking for more than 30 seconds, please change the striking position.

Please avoid continuous striking; otherwise, the hydraulic oil temperature will rise, resulting in malfunction of battery and aging of cylinder seals.



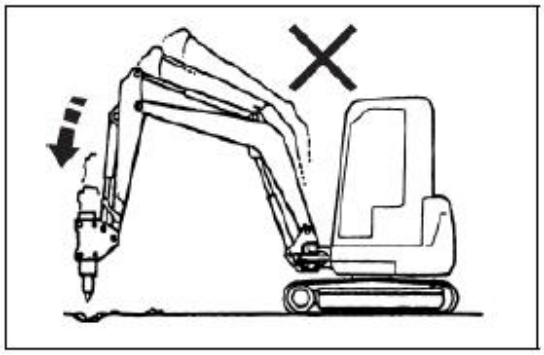
Suspend the operation when the hose is shaking!

Abnormal shaking of hydraulic hose will cause damage to the accumulator. Please suspend the operation and contact the nearest sales agent.



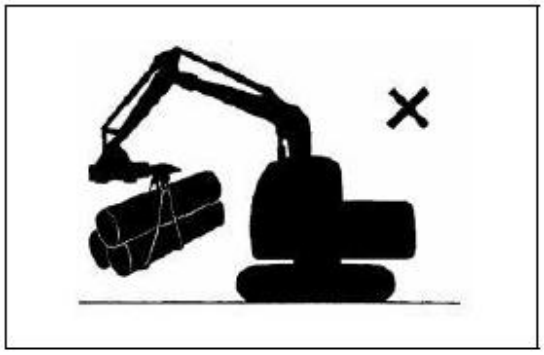
Use of falling force is prohibited!

Please absolutely avoid using a hydraulic hammer to cut open rocks; otherwise, various parts may get damaged.



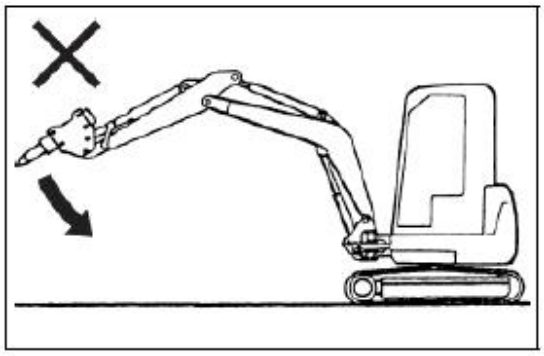
Lifting is strictly prohibited!

Please don't use this machine for lifting operation.
Please carry out operation with safety as the top priority.



It is strictly prohibited to make the bucket arm cylinder move at high speed to the end of its stroke

During the lowering of bucket arm, in case the bucket arm cylinder moves at high speed to the end of its stroke, it may be damaged due to impact force. Therefore, during operation, please don't make the bucket arm cylinder move at high speed to the end of its stroke.



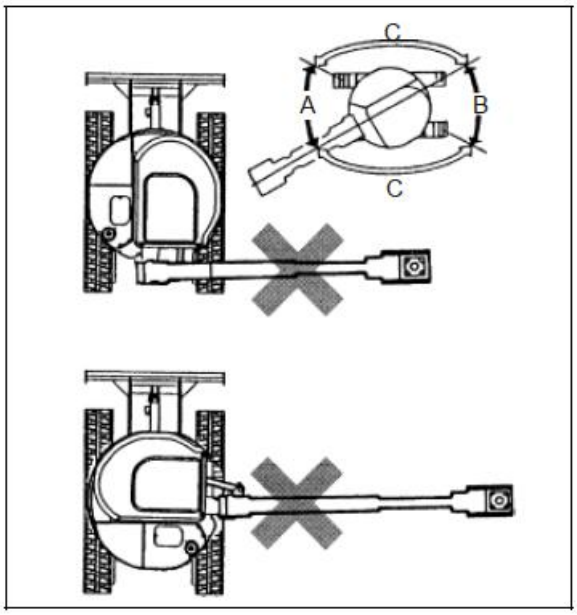
It is prohibited to operate the hydraulic hammer in a rotating or axial rotation posture!

⚠Warning

Please don't operate the hydraulic hammer in the rotation or axial rotation posture, but rather in the forward or backward posture.

In case the posture shown in the right figure is used, the machine will be unstable and may tip over. Please never operate the hydraulic hammer in this posture.

A. Forward: OK
B. Backward: OK
C. Horizontal operation: prohibited



Remarks

- **When using an attachment other than hydraulic hammer, please also carry out operation by reference to the "Precautions for Use of Hydraulic Hammer".**
- **When using hydraulic hammer, please use a reinforced bucket arm. Operating the hydraulic hammer with a standard bucket arm may cause damage to the bucket arm.**

6.3 Checklist for Regular Inspection and Maintenance

The dirt and aging of hydraulic oil can become the cause of poor operation of control valve, early friction and burn marks of hydraulic pump, and failure of hydraulic circuit. When the hydraulic hammer is installed, the aging of hydraulic oil is usually more severe than that when the bucket is installed for excavation operation. Therefore, please replace the filter element and hydraulic oil as soon as possible by reference to the checklist for regular inspection and maintenance as given follows.

Inspection and Maintenance Items	Oil Replenishing Location	Replacement Interval (hours)		
		First Time	Second Time	Regular
Hydraulic oil	Hydraulic oil tank	—	—	1,000 hours
Return oil filter element component	Hydraulic oil tank	50 hours	200 hours	200 hours

7. Fault Causes and Countermeasures

Please quickly investigate the cause of abnormalities and carry out adjustment and conditioning, so as to prevent faults before they occur.
In case any abnormality is ignored and the machine is still driven in this situation, it may become the cause of greater fault, so that major disasters and accidents may occur and result in casualties.
In case any fault occurs, please investigate the following items and carry out adjustment and repair accordingly.
When the cause is unknown, please consult with the nearest service provider designated by us.
In addition, it is strictly prohibited to adjust, dismantle, or repair the engine, hydraulic components, and electronic components on your own. Please entrust the service provider designated by us.

Category	Symptom	Cause	Countermeasure
Engine	1. The output is insufficient	● The electrical system is abnormal ● The viscosity of engine oil is inappropriate ● The quality of fuel is poor ● The intake of air is insufficient (The air filter is clogged) ●The cooling effect of the radiator is insufficient (overheated) ● The valve clearance is incorrect ● The function of injection pump is poor ● The spray effect of the nozzle is poor ● The injection time is inappropriate ● The compression pressure is insufficient (Wear of cylinders and piston rings)	● Repair or replacement ● Replacement of engine oil with viscosity suitable for temperature ● Replacement of high-quality fuel ● Cleaning or replacement of filter element ● Cleaning of inside of cooling system or replacement of component ● Adjustment ● Adjustment or replacement ● Adjustment or replacement ● Adjustment ● Dismantlement and repair or replacement of component
	2. The engine is not running smoothly	● The governor system is abnormal ● The engine controller related components rust or malfunction. ● The automatic speed regulating motor is damaged	● Adjustment or replacement ● Dismantlement and repair or replacement of component ● Repair or replacement of component
	3. The color of engine exhaust is white or blue	● The fuel level is too high ● The viscosity of engine oil is too low ● The cooling effect of radiator is excessive ● The injection time is inappropriate ● The compression pressure is insufficient	● Drain of oil to normal oil level ● Replacement of engine oil with viscosity suitable for temperature ● Covering of radiator or replacement of component ● Adjustment ● Dismantlement and repair or replacement of component
	4. The color of engine exhaust is black or dark gray	● The fuel level is too low ● The valve clearance is inappropriate ● The function of injection pump is poor ● The compression pressure is insufficient ● The intake of air is insufficient (The air filter is clogged)	● Replacement of high-quality fuel ● Adjustment ● Adjustment or replacement ● Dismantlement and repair or replacement of component ● Cleaning or replacement of filter element
	5. The fuel consumption is excessively high	● The function of injection pump is poor ● The spray effect of nozzle is poor ● The injection time is inappropriate ● The fuel is inferior ● The compression pressure is insufficient ● The intake of air is insufficient	● Adjustment or replacement ● Adjustment or replacement ● Adjustment ● Replacement of high-quality fuel ● Dismantlement and repair or replacement of component ● Cleaning or replacement of filter element
	6. The engine oil consumption is excessively high	● The engine oil level is too high ● The viscosity of engine oil is too low ● The engine oil leaks ● The piston ring in cylinder is worn	● Drain of oil to normal oil level ● Replacement of engine oil with viscosity suitable for temperature ● Tightening, and if necessary, replacement of component ● Dismantlement and repair or replacement of component

Category	Symptom	Cause	Countermeasure
Engine	7. The engine is overheated (The engine cooling water temperature lamp comes on)	● The fan belt is loose ● The cooling water is insufficient ● The water pump malfunctions ● The thermostat malfunctions	● Adjustment ● Replenishment ● Replacement ● Replacement
	8. The engine oil pressure is incorrect (The engine oil pressure lamp comes on)	● The engine oil level is too high ● The viscosity of engine oil is too low ● The engine filter element is clogged ● The engine oil pressure pump malfunctions ● The engine oil pressure regulating valve malfunctions	● Drain of oil to normal oil level ● Replacement of engine oil with viscosity suitable for temperature ● Replacement of filter element ● Adjustment or replacement ● Adjustment or replacement
Engine accessories	1. The water temperature is too high (The engine cooling water temperature lamp comes on)	● The cooling water is insufficient ● The tension of fan belt is insufficient ● The hose is damaged ● The thermostat malfunctions ● The water temperature gauge malfunctions ● The radiator is clogged	● Replenishment ● Adjustment ● Replacement ● Replacement ● Replacement ● Cleaning
	2. The battery cannot be charged	●The pole plate of battery is damaged ● The grounding is incomplete ● The AC generator malfunctions ● The regulator malfunctions	● Replacement ● Repair ● Repair or replacement ● Repair or replacement
	3. The battery discharges immediately after being charged	● A part of the wiring is short circuited ● The partition inside the battery is short circuited ● There is excessive sediment inside the battery	● Repair or replacement ● Repair or replacement ● Cleaning
Joystick	1. The operation/travelling joystick cannot control the movement	● The plot valve fails ● The connecting rod rusts	● Repair or replacement ● Replacement
	2. The operation/travelling joystick has large clearance, and tilts in the neutral position.	● The plot valve fails ● The connecting rod is worn ● The flat head screws used to fix the pilot valve are loosened	● Repair or replacement ● Repair or replacement ● Tightening
Hydraulic devices	1. The attachment, rotation mechanism, and travelling mechanism cannot work	● The pump fails ● The working oil level is too low ● The oil inlet pipe and hose are damaged ● The gear pump is damaged	● Repair or replacement ● Replenishment ● Repair or replacement ● Repair or replacement
	2. The force of attachment, rotation mechanism, and travelling mechanism is insufficient	● The function of pump is low due to wear ● The set pressure of control valve, main overflow valve, and overload overflow valve is low ● The working oil level is too low ● Foreign matters adhere to the oil inlet filter element in the hydraulic oil tank ● Air is sucked from oil inlet side	● Replacement ● Adjustment ● Replenishment ● Cleaning ● Tightening
	3. The joystick on one side cannot be moved or lacks sufficient force	● The control valve malfunctions ● The piping joint is loosened ● The O-ring on piping joint is damaged ● The pump fails ● The pilot valve fails ● The pilot piping system malfunctions	● Repair or replacement ● Tightening ● Replacement ● Repair or replacement ● Replacement ● Repair or replacement

Category	Symptom	Cause	Countermeasure
Hydraulic devices	4. Only one operation cannot be achieved	● The control valve core is damaged ● Foreign matters enter the valve core ● The piping and hose are damaged ● The piping joint is loosened ● The O-ring on piping joint is damaged ● The controller is damaged ● The pilot valve fails ● The pilot piping system malfunctions	● Replacement ● Repair or replacement ● Repair or replacement ● Tightening ● Replacement ● Repair or replacement ● Replacement ● Repair or replacement
	5. The cylinder does not work or the force is insufficient	● The inside of cylinder and oil seal are damaged ● The oil leaks due to damage to cylinder and piston rod	● Repair or replacement ● Repair or replacement
	6. The descent of cylinder is relatively large when the machine is parked	● The sealing part of piston rod is damaged or worn ● The control valve core is abnormally worn ● The function of main overflow valve or overload overflow valve is low	● Repair or replacement ● Replacement ● Adjustment or replacement
	7. Single-side travelling or both-side travelling cannot be achieved	● The central joint of rotation mechanism fails ● The travelling motor is damaged ● The parking brake is not properly released	● Repair or replacement ● Repair or replacement ● Repair or replacement
Travelling	1. The machine cannot travel normally	● The crawler chain is excessively tensioned or too relaxed ● The oil level of guiding wheel and roller is too low ● The base is deformed ● Stones, sand and soil are embedded into crawler shoes ● The parking brake malfunctions	● Adjustment ● Replenishment ● Repair or replacement ● Repair ● Repair
Rotation	1. The machine cannot rotate	● The rotating motor is damaged ● The rotating parking brake malfunctions ● The rotation reducer is damaged ● The pilot valve fails ● The pilot piping system malfunctions	● Repair or replacement ● Repair or replacement ● Repair or replacement ● Replacement ● Repair or replacement
	2. The rotation is not smooth	● Air enters the system ● The rotating gears are worn ● The rotating bearings are damaged and the steel balls are worn ● The lubricating grease is insufficient	● Air bleeding ● Repair or replacement ● Repair or replacement ● Replenishment of lubricating grease
Mode switching	1. The machine cannot be switched to travelling at 2nd speed	● The travelling speed 2 switch is damaged ● The solenoid valve is damaged ● The cable loop wiring is damaged or broken ● The pilot piping system malfunctions	● Replacement ● Repair or replacement ● Repair ● Repair
	2. The machine cannot be switched to working mode	● The switch for switching the working motor is damaged ● The solenoid valve is damaged ● The wiring is damaged or broken ● The pilot piping system malfunctions	● Replacement ● Repair or replacement ● Repair or replacement ● Repair
	Others	● The fault is accompanied by abnormal sound, vibration, odor, and other phenomena. ● Please always pay attention while driving.	—

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