RH60E
CRAWLER EXCAVATOR

OPERATION AND MAINTENANCE MANUAL

Shandong Ken Stone Heavy Machinery Co., Ltd.
South of National Highway 309#, Dingyuanzhai Town, Guanxian County, Liaocheng City, Shandong Province, China

ATTENTION

Topic: Maintenance and accessories precautions

1 First of all, thank you for choosing and using Ken Stone products.

2 When the equipment fails, it should be repaired by our company or designated maintenance company using genuine parts.

3 At present, there are counterfeit and illegal imported parts on the market, and unauthorized and untrained companies or individuals have repaired our products, causing many legacy problems and seriously affecting the performance and service life of the equipment.

4 In view of the above situation, we would like to ask our customers to pay attention to:

1) The use of non-genuine parts may not have a significant impact on the equipment in the short term, but it will definitely cause a series of adverse consequences in the future. In order to avoid equipment damage, performance degradation, and more serious losses, do not use non-genuine parts.

2) When purchasing parts, customers must purchase from our company or authorized agents to operate parts, and pay attention to identification. If there is any suspicious phenomenon, please contact our company for confirmation.

3) When customers need to repair the equipment, please contact our company or an authorized maintenance company.

4) If the equipment fails due to the use of non-genuine parts or repaired by unauthorized companies or individuals, our company will not be responsible for warranty services even within the warranty period.

5) With the improvement of products, the content of this manual may lag behind. Customers should contact our company or our authorized dealers to obtain the latest product information.

5 Thank you again for your usual business cooperation.

Shandong Ken Stone Heavy Machinery Co., Ltd.

SPECIAL NOTES

Topics: Special instructions for the use and maintenance of excavator fuel system

In order to make Ken Stone excavator create greater economic benefits for you, please read this article carefully.

Fuel quality is an important factor for the engine to obtain good performance, extend service life and achieve low emissions.

Diesel mainly provides the required energy for the diesel engine to work and provides cooling and lubrication for the precision parts in the fuel system. Most of the diesel supplied on the market can meet the use requirements of the diesel engine installed in Ken Stone excavator, but it must meet the requirements of performance indicators such as viscosity, cetane number, sulfur content, cloud point, water and sediment content. Among them, the performance indicators of viscosity, cetane number, cloud point and other indicators will generally not change after selecting the appropriate diesel brand, but the water and sediment indicators will exceed the standard due to improper transportation, storage, addition and maintenance, exceeding the specified content requirements (less than 0.05 volume percentage). Thereby aggravating the wear of the diesel engine fuel system, causing engine startup difficulties, power reduction, black smoke and other faults.

To this end, we respectfully ask all Ken Stone excavator users and operators to do the following:

1) Use diesel that meets the use requirements and do not use low-quality diesel produced by small smelters;

2) Take appropriate measures to reduce the mixing of water and impurities during diesel transportation, storage, and addition;

3) Strictly perform maintenance operations such as draining and replacing filters on the fuel system in accordance with the maintenance cycle specified in the "Operation and Maintenance Manual", and the drainage and filter replacement cycle can be appropriately shortened according to the operating environment.

Thank you again for choosing Ken Stone's products!

Shandong Ken Stone Heavy Machinery Co., Ltd.

RHINOCEROS

Operation and maintenance manual

RH60E RH60E-BS

Ken stone company aims to continuously bring more reliable and higher-quality products to the market. We will continuously improve our products according to market demand.

These improvements may be implemented at any time. If you need the latest information about the product, please contact your local dealer regularly. These information may include auxiliary configurations and optional configurations. If the machine you purchased does not include them and you have the purchase demand for this configuration, please contact your local Ken stone dealer.

The illustrations used in this manual are only for the purpose of describing the relevant parts of the machine in an image and may differ from the actual machine.

FOREWORD

This operation and maintenance manual is intended to provide the owner or operator with instructions for safe operation and maintenance of Ken Stone equipment. Please read and understand this operation and maintenance manual carefully before operating, inspecting and maintaining the equipment. If the relevant work is not performed in accordance with the requirements of this manual, a major safety accident may occur. Please place this manual in the cab so that it can be used at any time. If the operation and maintenance manual is lost or damaged, please order a copy from a Ken Stone dealer.

If you have any questions, please consult a Ken Stone dealer. This manual may contain optional configurations and attachments that are not installed on your excavator. Any modification not authorized or approved in writing by Ken Stone company will cause safety hazards.

Always use original Ken Stone parts or its authorized accessories.

Intended Use

This machine is intended for use under normal conditions as described in this manual. If the excavator is used for other purposes or in potentially hazardous environments, special precautions must be taken and appropriate additional equipment must be installed. Examples include, but are not limited to: falling object protection, work lights, etc. Do not engage in prohibited uses as described in this manual.

Engine and exhaust system maintenance

Proper inspection, maintenance and service are essential to keep the engine and machine systems functioning properly. This may include machine and engine components such as the fuel system, electrical system, air intake system and cooling system.

As the owner of a machine with a heavy-duty engine, it is your responsibility to perform necessary maintenance. This manual outlines the essential maintenance procedures. Do not disassemble or modify the exhaust system in a way that does not allow it to function properly.

Machine Capabilities

Do not exceed the machine's operating capabilities by modifying the machine or using unapproved attachments.

Exceeding the excavator's capabilities may adversely affect machine performance, such as stability, system certification (such as braking and steering), etc., and may result in death or serious injury. Contact a Ken Stone dealer for more information.

Accessories

These or other accessories must be approved by Ken Stone for use with this machine. Do not use unapproved accessories. Unapproved accessories not manufactured by Ken Stone are prohibited. For information on approved accessories and accessory manuals, consult your Ken Stone dealer.

- Bucket
- Breaker

•Quick hitch

•Vibration tamping

Note: For more information, please consult your Kenstone dealer.

Machine direction

In this manual, front, rear, left, and right refer to the position where the operator of the machine is sitting on the seat facing forward and the bulldozer is at the rear.

If the bulldozer is at the front, follow the opposite operation to move and turn the machine.

Serial no.

The product identification code is affixed to the frame below the upper platform.

This code is required for warranty and repair work.

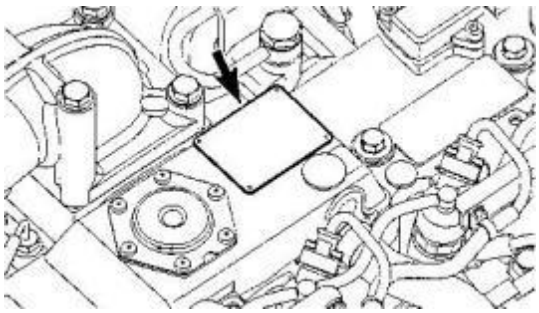
This code should be recorded and filed in case the excavator is stolen.

Engine serial no.

Engine nameplate

The engine data plate provides important information about the engine. The engine serial number provides information for repair and ordering parts. The engine data plate should not be altered unless approved by Ken Stone.

The engine nameplate and engine serial number are located on the cylinder head. Please provide the following engine data when contacting your Ken Stone dealer. When purchasing repair parts, the following nameplate information must be provided:



Safety Information

This manual and the safety signs and safety stickers on the machine explain how to operate, service, and maintain the machine. Safety signs and safety warning labels indicate the presence of potential hazards and describe the actions to be taken to avoid the hazard. Operators and maintenance personnel should read and understand these safety information and labels before starting operation or maintenance.

“⚠”Safety warning symbols

AVOID DEATH OR INJURY

BE PREPARED - Understand all operating and safety instructions.

This is a safety alert symbol. Wherever a safety sign appears in this manual or on the machine, you must be alert that personal injury or an accident could occur. Always observe safety precautions and follow recommended procedures.

Safety warning words

The words "Danger", "Warning" and "Caution" are used in this manual and on the safety labels on the excavator to indicate the presence and relative severity of hazards. All three indicate the presence of a safety risk. Regardless of which word appears next to the safety alert symbol, follow the indicated precautions whenever the safety alert symbol appears.

“⚠”Danger

Danger - Indicates an immediate and dangerous situation, used as a safety message and safety label. If not avoided, it will result in death or serious injury. It is also used to warn that the machine will be damaged if it is not operated or handled properly.

“⚠”Warning

Warning-Indicates a potentially hazardous situation and is used as a safety message and safety label. Failure to avoid may result in death or serious injury.

“⚠”Caution

Caution - Indicates a potentially hazardous situation and is used as a safety message and safety label. If not avoided, it may result in minor or fatal injury.

Other safety warnings and labels

In addition to the safety warnings, the following labels may also be used to indicate how to use the machine correctly and effectively.

Important

The contents of this label must also be followed to avoid damage to the machine or shortening its life.

NOTE: The word "NOTE" also indicates important information.

CONTENTS

SAFETY

Excavator Operating Instructions

“⚠”Danger

Improper use of excavators can cause serious injury and death. Failure to comply with safety rules during operation, maintenance, travel or loading can cause serious or even fatal injuries, or cause serious damage to the excavator and surrounding objects.

“⚠”Warning

The crawler excavators produced by our company are not designed and manufactured for driving and use on roads, and are mainly used for construction on closed roads and sites; when transferring operations, they should be loaded and transported by car or trailer. If it is necessary to drive on the road temporarily, relevant procedures should be handled in accordance with local laws and regulations and permission should be obtained before driving on the road.

For the safety of you and others, please carefully check various factors that may cause danger and minimize various hidden dangers.

The following pages are about safety rules

“⚠”Warning

Improper operation and maintenance of this machine may be dangerous and may result in serious injury or death.

Operators and maintenance personnel should read and understand this manual before starting operation or maintenance.

Keep this manual in the cab and organize all staff to study it regularly.

Failure to perform operation and maintenance work in the correct manner specified in this manual may result in accidents.

Before using the excavator, read the operating procedures and precautions listed in this manual.

If you use the machine for any prohibited non-intended purpose, you must ensure that people or property are safe.

If the manual is lost, damaged or illegible, contact Ken Stone dealers in time to order it. If you need to transfer this product, please transfer this manual together.

Excavators sold by Ken Stone comply with all relevant local laws and regulations. If you have any questions about this, please consult Ken Stone company or Ken Stone dealers before operation

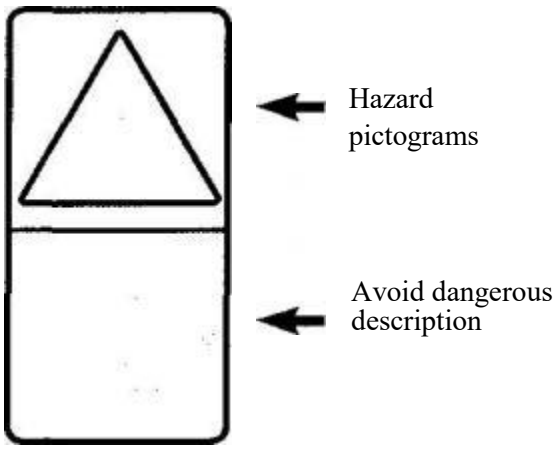
---

Safety Labels

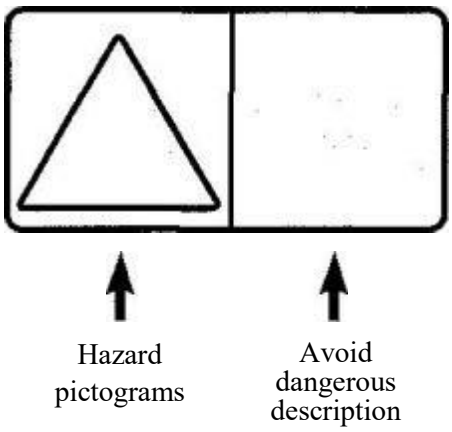
Safety warning labels attached to the machine are used to alert operators or maintenance personnel to potential hazards, the consequences of potential hazards, and the instructions or actions required to avoid hazards. The location and instructions of safety labels will be introduced in the next section. Please be familiar with all safety labels and their information. Make sure all safety labels are in their correct position and are clearly visible. If the safety label is damaged, missing, or the text and pictures are not clear, please clean or replace it. When cleaning the safety label, use a soft cloth, water and soap. Do not use solvents to clean safety labels. Gasoline or other harsh chemicals may destroy the adhesive that attaches the label to the machine. Remember, if the safety label is attached to a part that needs to be replaced, please apply a new safety label to the new replacement part.

This machine uses safety labels with and without text. The type and number of safety labels may vary by geographical region and machine model.

Vertical Arrangement



Horizontal Arrangement



Safety labels with warning words

Safety labels with warning words consist of a signal word, graphic and text information plate. In some cases, the graphic plate may not be part of the safety label.

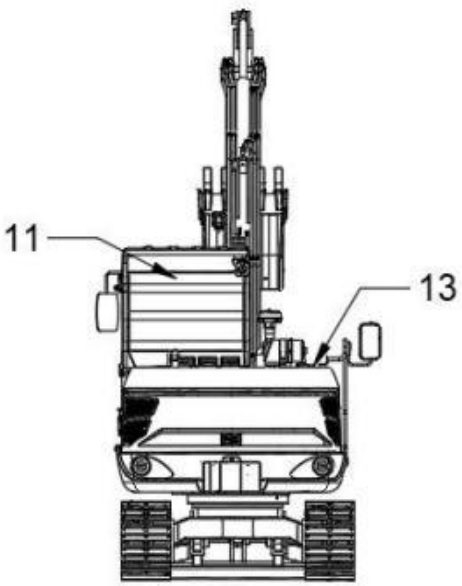
Safety labels without warning words

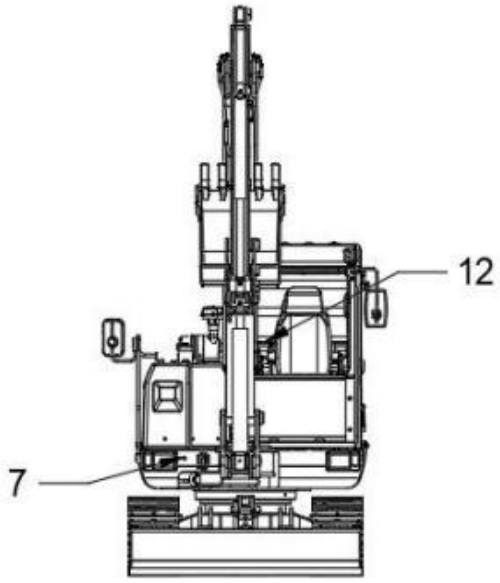
Safety labels without warning words consist of a hazard statement and a hazard avoidance statement. The hazard statement is located at the top or left, and the hazard avoidance message is located at the bottom or right, depending on their arrangement.

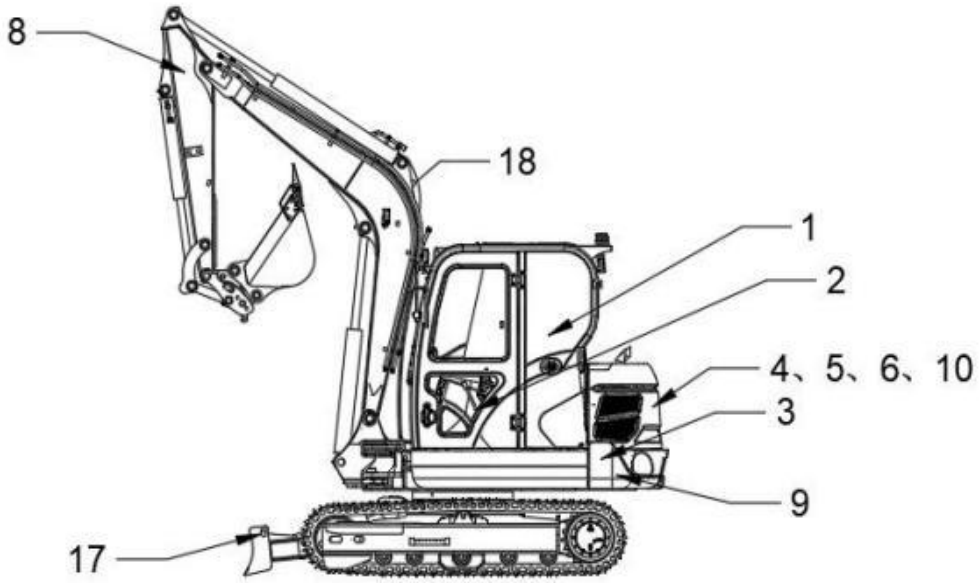
Hazard statements use black triangles and pictures to indicate the presence of hazards and potential consequences if not followed.

Hazard avoidance messages use graphics or prohibitory signs to identify the actions required to avoid the hazard.

It is impossible for Ken Stone to list all potential hazards in all working environments in advance. Therefore, the safety information in this manual and on the excavator cannot include all possible safety warnings. Therefore, if you perform operations not recommended by Ken Stone, you must ensure the safety of yourself and others and ensure that the excavator is not damaged. If you cannot ensure the safety of certain operations, please contact a Ken Stone dealer.


11
13


12
7


8
18
1
2
4、5、6、10
3
9
17

1.General hazard signs

"⚠"Warning

To avoid death or serious personal injury

- **Please read the operation and maintenance manual carefully before operation.**
- **Never use the excavator without instructions.**
- **If the machine or its accessories come into contact with power lines, electric shock may occur. Please keep a safe distance from the power lines during operation.**
- **Always wear your seat belt during operation.**
- **Before operation, honk the horn to warn people around you to leave and make sure everyone has left the work area.**
- **Interference of the attachment may cause death, serious injury or damage to the machine. Before operation, check and confirm the clearance between the attachment and the machine.**

•Keep pedestrians away from the turning area and driving path, and always look in the direction of travel.

·Make sure the rearview mirror and rearview camera (if equipped) are clean and working properly.

·Never operate the machine from other than the operating seat.

•To leave the excavator:

1) Lower the attachment and dozer blade (if equipped) to the ground and ensure all control levers are in the neutral position.

2) Engage the Park function.

3) Stop the engine and remove the key.

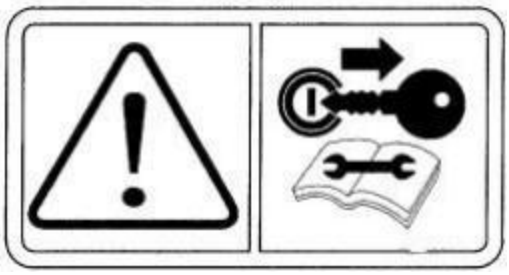
4) Place the safety lever in the locked position.

2.Warning label "Do Not Operate"

"⚠"Warning

To avoid death or serious personal injury

- **Stop the engine and remove the key.**
- **Attach a "Do Not Operate" warning tag to the control handle before servicing the machine.**
- **Do not operate the machine while inspection/maintenance is being performed.**



3.Keep away from dangerous area sign

"⚠"Warning

To avoid death or serious personal injury

- **Stay away from turnaround areas or walking paths.**
- **Always look in the direction of travel.**
- **Make sure there are no pedestrians or objects in the turnaround area.**

4.High temperature and high pressure liquid marking

"⚠"Warning

High temperature and pressure liquids may cause severe burns

- **Do not loosen or open the cap when the liquid is hot or under**
- **Before opening**

  1) Turn off the engine

  2) Wait for the machine to cool completely

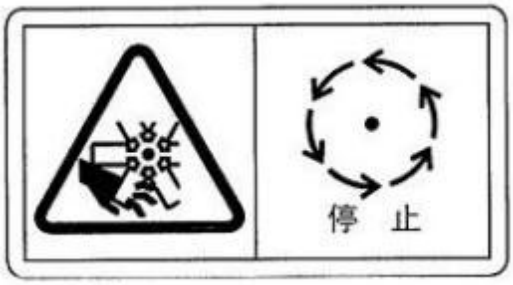
  3) Slowly move the cap to release the pressure

5. Rotating Parts - Fan Marking

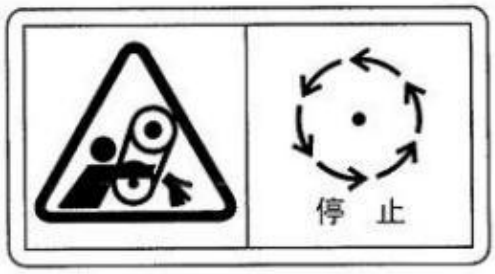
"⚠"Warning

Rotating fan can cause death or personal injury

- **When the engine is running, stay away from rotating parts such as the fan.**
- **Stop the engine before maintenance.**



6. Rotating Parts - belt



"⚠"Warning

Rotating belts can cause death or personal injury

- **When the engine is running, stay away from rotating parts such as belts.**
- **Stop the engine before maintenance.**

7. Battery explosion sign

"⚠"Warning

To avoid death or serious personal injury

- **Read and follow the battery care instructions in the Operation and Maintenance Manual.**
- **Keep away from arcs, sparks, flames and lighted cigarettes. Do not store metal objects (such as tools) or flammable materials around batteries.**
- **Wear safety goggles and rubber gloves when working with batteries.**
- **If contact with battery acid occurs:**

  1) Immediately rinse the skin with water and use baking soda or lime water to neutralize the acid.

  2) Rinse eyes with clean water for 10 to 15 minutes.

  3) Seek medical attention immediately.

8. Extrusion hazard sign

"⚠"Warning

To avoid death or serious personal injury

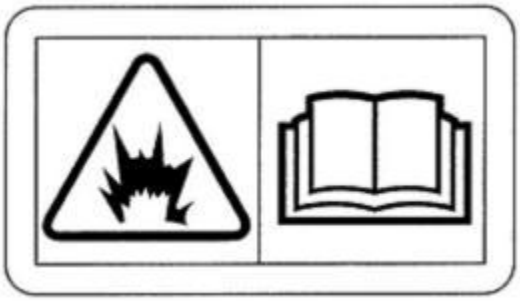
- **Keep away from the boom, arm and working equipment and maintain a safe distance.**

9. High pressure gases and liquids

"⚠"Warning

To avoid death or serious personal injury

- **Heating or impact can cause the accumulator to explode.**
- **Keep away from ignition sources.**
- **Do not weld or drill holes in the accumulator.**

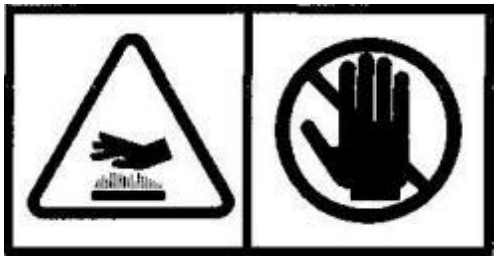


10. High temperature surface marking

"⚠"Warning

Hot surfaces can cause severe burns

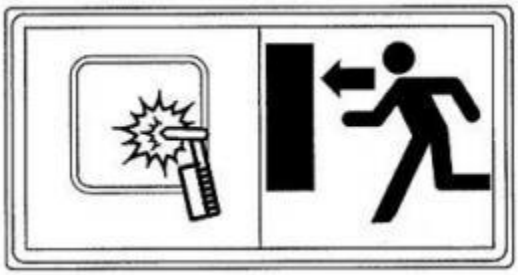
- **Do not touch hot surfaces and stay away from them.**
- **Wait until it cools down before repairing.**



11.Emergency exit signs

"⚠"Warning

In an emergency, use a glass breaker to break the glass and escape through the emergency exit.

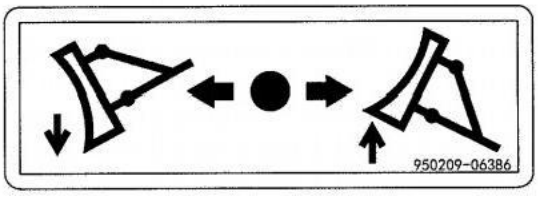


12.Bulldozer

"⚠"Warning

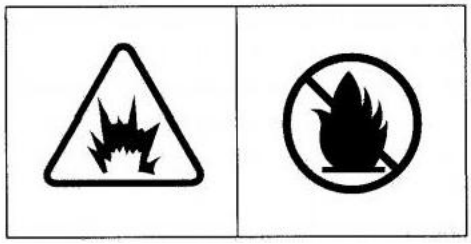
To avoid death or serious personal injury

- Check the position of the bulldozer blade before moving. When the bulldozer blade is in the front, operate the travel control device in the opposite direction of when the bulldozer blade is placed in the rear.
- Before moving, make sure there are no people or objects in the travel path. Never allow people to sit on the bulldozer blade. Sound the horn to alert workers and people around you that the machine will start to move.
- During driving, always make sure the road is clear.
- Be extra careful when reversing. Make sure the path behind the machine is clear and unobstructed.
- Operate the accelerator and brake pedals smoothly to avoid sudden starts or stops.



- Before leaving the driver's seat, be sure to lock all control systems and stop the engine to avoid danger from unexpected operation.

13.Explosion Hazard Signs

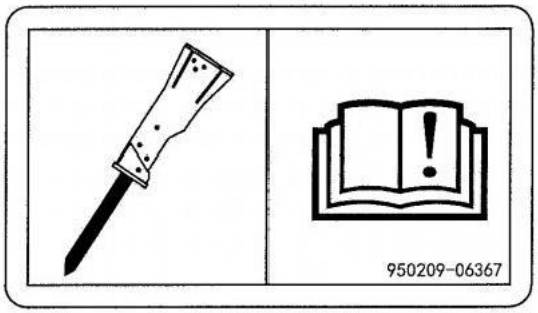


"⚠"Warning

To avoid death or serious personal injury

·No fireworks are allowed near the fuel filler port.

14.Hydraulic breaker (optional)

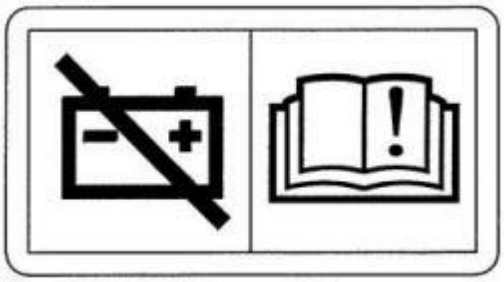


Important

Avoid damage to the hydraulic system

When selecting and using a hydraulic breaker, please strictly comply with the relevant regulations for hydraulic breakers in the operation and maintenance manual.

15.Battery disconnect switch label



Important

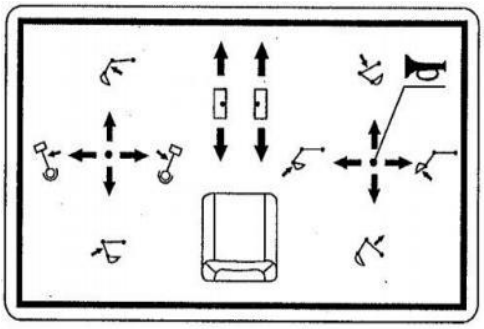
Avoid damage to electrical components

• Turning off the battery disconnect switch while the engine is running may cause damage to electrical components.

• The battery disconnect switch can only be turned off after the engine is completely stopped.

• The battery disconnect switch should be turned off when the equipment is parked and not in operation.

16.ISO Control Mode



"⚠"Warning

Avoid injury or death

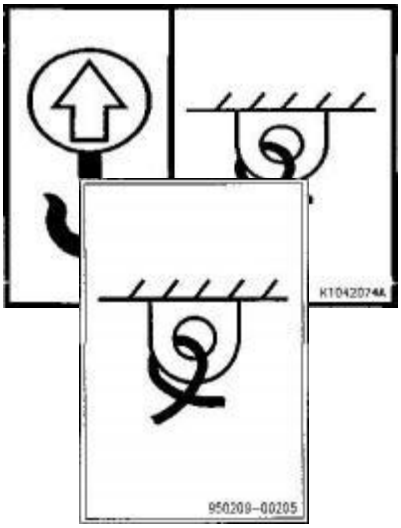
- **Read and understand the Operation and Maintenance Manual for more information.**
- **Refer to the "Operating Instructions" section of this manual for detailed information on the control functions of the joystick (operating handle).**

17.Lifting and tying identification

Determine the location of lifting and lashing points

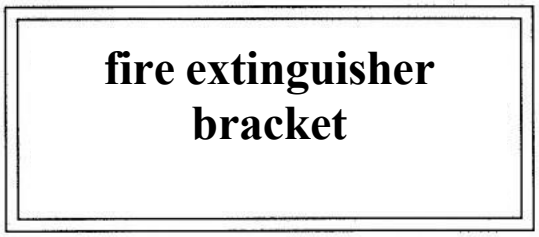
18.Bundle identification

Determine the location of the tie point

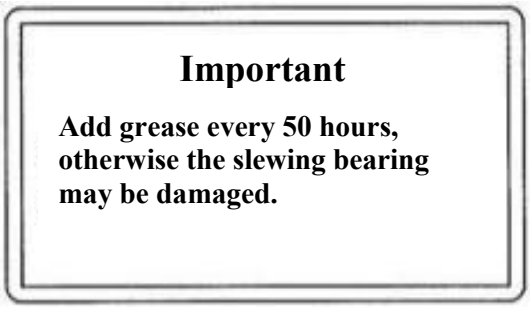


19.Fire extinguisher rack

Determine the location of the fire extinguisher bracket



20.Important tips for grease filling of slewing bearings



21.Gear shift reminder

Important

It is forbidden to change gears while the excavator is moving.

Gears must be changed when the excavator is completely stopped and the vehicle speed is zero, otherwise it may cause equipment failure.

22.Important tips for using fuel and other parts

Important

It is forbidden to use impure fuel and inferior fuel filter elements

●Please refer to the regulations in the "Operation and Maintenance Manual" and use high-quality fuel and pure KenStone filter

●If you do not use high-quality fuel, impurities in the fuel may cause the engine to malfunction in a short time and shorten its service life

Strictly check the drainage

●Before starting the engine, please drain the water in the fuel tank, oil -water separator, and fuel filter. Delayed drainage may cause the engine to malfunction in a short time

General safety matters

Safe operation is the operator's responsibility

Only trained and authorized personnel can operate and maintain the machine.

Follow all safety laws, regulations and instructions when operating or performing maintenance on the machine.

- Before entering the cab, remove dirt and oil from the soles of your shoes first, otherwise it is easy to slip when stepping on the pedals and cause an accident.
- Do not operate the machine if you are under the influence of drugs or alcohol. Operators who take prescription drugs must get medical advice to determine whether he or she can operate the machine safely.
- When working on the site with other people, make sure that all personnel understand the nature of the work and understand all hand gestures to be used.
- Make sure all guards and shields are installed in the correct position and repair or replace them immediately if damaged.
- Make sure you understand the use and maintenance of all safety function devices, such as safety bars, and use them correctly.
- Never disassemble, modify or disable any safety function device. And keep it in good working condition at all times.
- Before excavating, always check and understand the location of underground and overhead utility pipelines.
- Failure to use and maintain safety devices as instructed in this manual and the maintenance manual could result in death or serious personal injury.

Know your machine

Know how to operate your machine; know the purpose of all controls, instruments, signals, indicators and monitor displays; know the rated load capacity, speed range, braking and steering characteristics, turning radius and clearance. Remember that rain, snow, ice, soft sand, soft soil and slopes can change the operating capabilities of your machine.

The right work accessories

Only work attachments and options recommended by Kenstone should be used on Kenstone machines. When installing and using options, please read the instructions for the options and the general information about the options in this manual. Because we cannot predict, identify or test all options you may want to install on your machine, please contact Kenstone for information on the compatibility of the options and their optional tools authorized and approved in writing.

The options and option control systems need to meet the requirements of the machine so that it can be operated safely and reliably. Make sure all guards and shields on the machine and work attachments are in place.

Depending on the combination or type of work tools, there is a potential hazard that the work tools may interfere with the cab or other parts of the machine.

Before using unfamiliar work equipment, check for any potential interference and operate with caution. When you perform any maintenance, testing or adjustments on the options, stay away from the following areas: cutting edges, pinch points and crushing surfaces.

Never use the options as a work platform or lift.

To install auxiliary hydraulic components used by the options, please contact your Kenstone dealer. If you have questions about the compatibility of a specific option on your machine, consult your Kenstone dealer.

High pressure liquid

High pressure air or liquid can cause debris and/or fluid to be blown out, which can cause serious personal injury or death.

When you stop operating, the antifreeze, engine oil and hydraulic oil are still at their highest temperature and the radiator and hydraulic tank are still under pressure. Always wait until the temperature cools down before attempting to remove caps, drain oil or antifreeze, or replace filters or hydraulic lines.

When removing lines, always wear protective equipment and use shields to slowly loosen fittings.

When performing the above operations, always wait until the temperature cools down and follow the specified procedures. Failure to do so can result in serious personal injury or death.

When using compressed air and/or pressurized water for cleaning, wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective mask.

Pressure can accumulate in the hydraulic system and must be relieved before starting maintenance. Releasing accumulated pressure can cause sudden machine movement or movement of options. Released high pressure oil can cause hoses to burst or fluid to spray.

Fluid penetration can cause death or serious personal injury. If fluid gets into eyes or skin, seek medical attention immediately from a physician familiar with such injuries.

Observe all local laws and regulations regarding fluid handling.

To prevent hot antifreeze from spraying out, stop the engine and wait for the antifreeze to cool, using gloves to slowly loosen the cap to release pressure.

Splashing or falling objects

In workplaces where there is a potential danger of flying objects or falling objects hitting the cab, select and use protective equipment to adapt to different working conditions and provide additional protection for operators.

When working in mines, tunnels, deep foundation pits, and loose or wet surfaces, there is a risk of falling rocks or flying objects. The cab requires additional protective equipment such as an operator protection cover (OPG) or window guards. Contact your Kenstone dealer for information on available protective covers.

To protect personnel from being hit by flying objects, keep personnel away from the work area.

Personal Protective Equipment (PPE)

Do not wear loose clothing and accessories, and secure long hair. These items can snag on controls or other parts of the equipment.

Do not wear oily clothing, which is highly flammable.

Do not forget that hazards to your health may not be immediately apparent. Exhaust fumes and noise pollution, although invisible to the naked eye, can incapacitate or cause permanent damage. Respirators and/or earmuffs are required.

Wear a hard hat, safety goggles, mask, leather gloves, ear plugs, safety shoes and other protective equipment as needed.

When working on a machine, never use defective tools that break or slip, or that may not fully perform their intended functions.

Repair of machine failure

If any machine problem is found during operation and maintenance (noise, vibration, odor, incorrect measuring instrument, smoke, oil leakage, etc.), or an abnormal alarm is displayed on the instrument panel, stop the machine and take necessary corrective measures. Do not operate the machine until the problem is corrected.

Crushing and cutting

Keep objects away from the rotating fan blades, which can throw and cut objects.

Do not use tangled or frayed wire ropes, or wire ropes with any missing diameters. Wear leather gloves when handling wire ropes.

When striking a loose retaining pin, the retaining pin may fly out and cause serious personal injury. Make sure no one is in the area when striking the retaining pin.

To avoid injury to your eyes, wear safety goggles when striking the retaining pin.

Do not put your hands, arms, or any other part of your body between moving parts. If you must put them between moving parts, be sure to position and secure the work device so that it cannot move.

Before performing any operation or maintenance under a raised machine, properly support the machine.

If the control lever is operated, the clearance between the work device and the machine will change, which may cause serious damage or death or serious personal injury. Avoid areas where the clearance changes suddenly with machine movement or equipment operation, and avoid all rotating and moving parts. Unless otherwise instructed, do not attempt to make adjustments while the machine is in motion or the engine is running. Never rely on hydraulic cylinders to support raised equipment. Equipment can fall if controls are moved or if hydraulic lines are broken, loose, or disconnected.

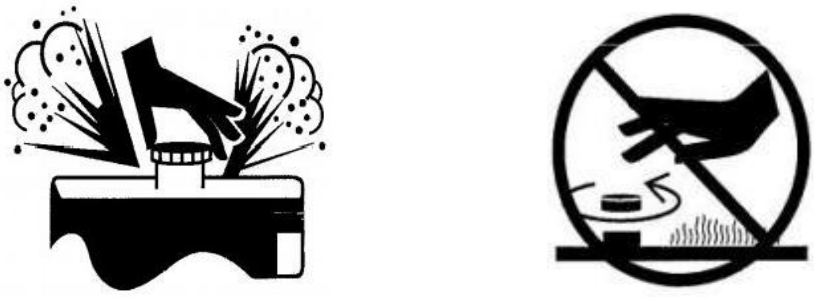
If it is necessary to remove guards for maintenance, always reinstall guards after the work is completed.

Hot Antifreeze and Oil - Scald Protection

Do not touch any part of a running engine. When you stop operating, the antifreeze, engine oil, and hydraulic oil are still at their highest temperature. The radiator and hydraulic oil tank are still under pressure and must be cooled down. Attempting to remove the caps, spray out the oil or antifreeze, or change the filter when hot may cause severe burns. Release all pressure in the air system, hydraulic oil system, lubrication system, fuel system, and cooling system before disconnecting any pipes, pipe joints, or related accessories.

To prevent hot oil or antifreeze from spraying, wait for the oil and antifreeze to cool down after stopping the engine, and use gloves to slowly loosen the caps to relieve the pressure.

To prevent hot oil or antifreeze from spraying, after stopping the engine, wait for the oil and antifreeze to cool, and using gloves, slowly loosen the cap to relieve pressure.



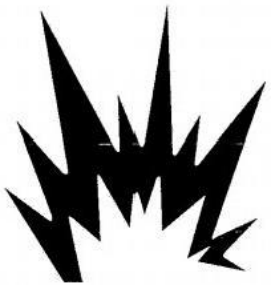
Fire and explosion prevention

All fuels, most lubricants, and some antifreeze mixtures are flammable and can cause fires resulting in death or serious personal injury and property damage. Flammable liquids leaking or splashing onto hot surfaces or electrical components can cause fires.

Inspect and remove all flammable materials, such as spilled fuel and oil, and stains, from the machine. Do not allow any flammable material to accumulate on the machine.

Always follow the following:

- Fuel, oil, antifreeze, and hydraulic fluid can only be added in a well-ventilated area. Controls, indicators, and switches must be “off” when parking the machine. The engine must be shut off, and any flames, hot embers, auxiliary heating devices, or spark-causing equipment must be extinguished or turned off and away from the machine.
- Dust generated by repairing or grinding non-metallic hoods or fenders may be toxic and flammable and explosive. Repair these components in a well-ventilated area away from open flames and sparks, and wear a dust mask when grinding painted parts.



Maintenance

The components of the machine and some optional equipment are hot under normal operating conditions. The main sources of heat are the engine and exhaust system. The electrical system can be a source of arcs or sparks if damaged or not properly maintained.

Combustible debris (leaves, straw, etc.) must be removed regularly. If allowed to accumulate, flammable debris can cause a fire. Clean the machine frequently to avoid such accumulation. Combustible debris in the engine compartment is a potential fire hazard.

Daily inspection and cleaning of the operating area, engine compartment and engine cooling system is necessary to prevent overheating and fire hazards.

Operation

Do not use the machine where exhaust, arcs, sparks or hot components can come into contact with flammable materials, explosive dusts or gases.

Do not operate the machine near any open flame.

The exhaust hood (if equipped) protects hot exhaust components from oil or fuel spray in the event of a broken line, hose or seal. The exhaust hood must be properly installed.

Electrical System

Check all wires and connections for damage daily.

Keep battery terminals clean and tight, clean and tighten all electrical connections when repairing or replacing any damaged parts or loose or frayed wires.

Never place metal objects on the terminals to check the battery charge. Use a voltmeter or special tester.

Battery gas can explode and cause death or serious personal injury. Connect the battery and start according to the instructions in this manual.

Do not start or charge frozen or damaged batteries. Keep all open flames or sparks away from the battery. Do not smoke in the battery charging area.

Improper cable connections can cause explosions, resulting in death or serious personal injury. Refer to "Starting the Engine with an Auxiliary Battery" in the Operation and Maintenance Manual for the correct method. Do not charge frozen batteries, which can cause explosions.

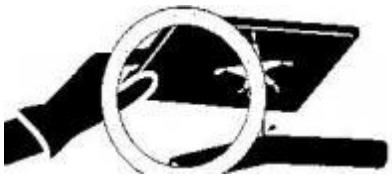
Media radios or other electrical devices in the cab must have fuses in the circuit.

Hydraulic system

Check hydraulic lines, hoses and fittings for damage, wear or leaks. Hydraulic lines and hoses must be properly laid out and adequately supported and secured with clamps. Leaks can cause fires. Never use an open flame or bare skin to check for leaks.

Tighten or replace any parts that show signs of leakage.

Check that all hoses and clamps, guards and cushions are securely connected. If they are loose, they may vibrate during operation and rub against other parts. This can cause damage to the hoses and cause high-pressure oil to spray onto hot surfaces, causing fires and death or serious personal injury. Clean spilled fluids frequently. Do not use gasoline or diesel to clean parts. Use commercial non-flammable solvents.



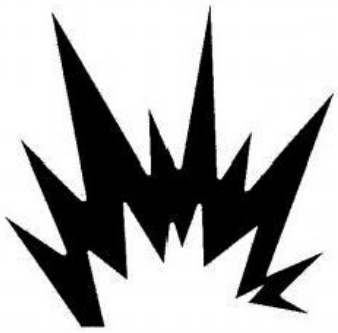
Adding fuel

Always use caution when refueling the machine. Fuel is flammable and may catch fire if near an open flame. Stop the engine and allow it to cool before refueling. Do not smoke when refueling the machine, do not refuel the machine near an open flame or sparks, and fill the tank outdoors.

Keep the caps on the fuel tank and other reservoirs tightly closed and kept tightly closed until the engine is started.

Store fuel and lubricants in properly labeled containers and away from unauthorized personnel. Store oily rags and all other flammable materials in protective containers.

Static electricity can produce dangerous sparks at the fuel filler nozzle. In very cold, dry weather or other conditions that may produce static discharge, keep the tip of the fuel filler nozzle in constant contact with the neck of the fuel tank nozzle to provide a ground. Always place plastic fuel containers on the ground before refueling.



Do not use acetaldehyde starting aids

Never use acetyl or starting fluids on any engine with a spark or grid-type manifold heater. These starting aids can cause an explosion and result in death or serious personal injury.

Connect the battery and start using the methods in this manual.

Welding and grinding

Always clean the machine and attachments before welding, set the battery cut-off switch to the "OFF" position, and unplug the wires from the electronic control unit (ECU). Cover rubber hoses, batteries, and all other flammable parts. Keep a fire extinguisher near the machine when welding.

Grinding or welding painted parts may produce toxic dust or gas. Grinding or welding painted parts must be done in a well-ventilated area. Wear a dust mask when grinding painted parts.

Dust generated by repairing non-metallic parts such as hoods, fenders, or covers may be flammable or explosive.

Repair such components in a well-ventilated area and away from open flames or sparks.

Do not weld on lines or tanks containing flammable liquids. Do not flame cut lines or tanks containing flammable liquids. Clean all such lines or tanks thoroughly with a non-flammable solvent before welding or flame cutting.

Fire

If a fire occurs:

• Do not attempt to move the machine or continue operating it.

• Turn the start switch to the "0" (off) position to stop the engine.

• Use handrails, guardrails, and steps to get off the machine.

• Get help or call the fire department immediately.

• When using a fire extinguisher, always aim at the source of the fire.

• If a backup fire extinguishing system is available, be familiar with its operating procedures.

Note: If a fire occurs, other fire-fighting procedures may be required depending on the operating conditions.

Fire extinguisher and first aid kit (emergency medical kit)

Fire Prevention Preparations:

• Make sure you have a fire extinguisher ready and read the label to make sure you know how to use it. It is recommended that a multi-purpose fire extinguisher of appropriate size (227 kg [5 lb] or larger) be placed in the cab. Regularly inspect and maintain fire extinguishers and ensure that all personnel on the job site are fully trained in their use.

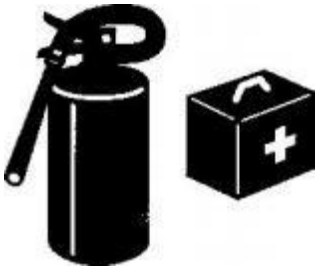
• Regularly inspect and maintain fire extinguishers.

• Follow the instructions on the fire extinguisher sign.

• Store a first aid kit in the storage room (right picture) and another on the job site, and regularly inspect and properly store the first aid kit.

• Keep emergency contact numbers for doctors, ambulance services, hospitals and fire departments readily available.

• A fire extinguisher rack is provided on the left side of the cab for the placement of fire extinguishers. Please bring your own appropriate fire extinguisher so that you can put out the fire in time when it occurs.



Electrical systems and electric shock

Never short-circuit the starting terminals or the battery. Short circuits will damage the electrical system and the engine's starting system.

Rollover protection

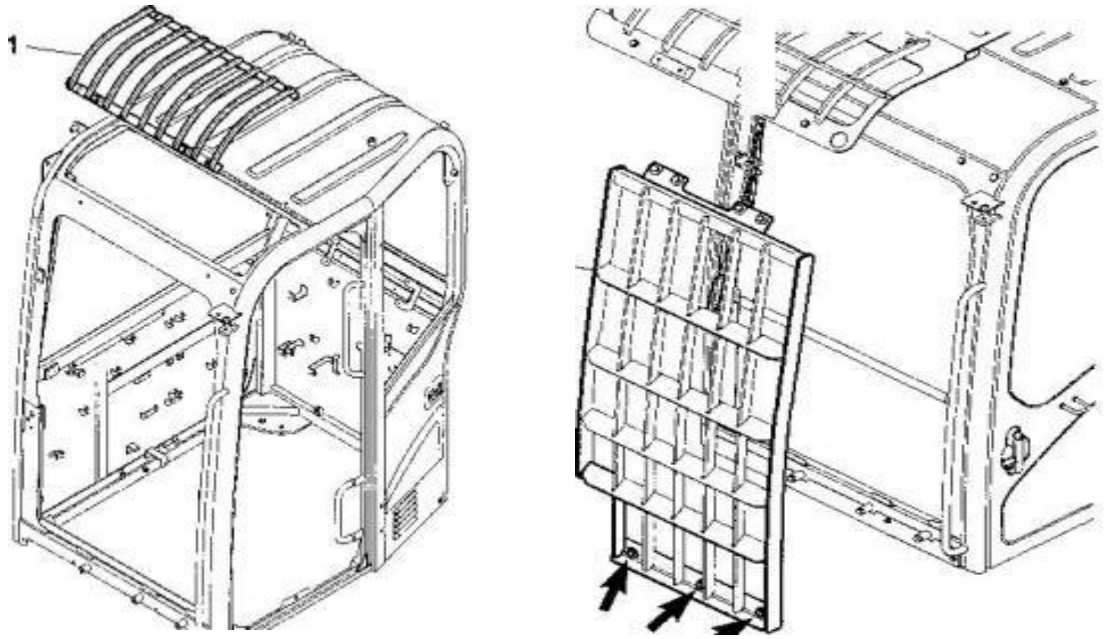
This machine is equipped with a cab rollover protection structure (TOPS) that complies with the Chinese standard GB/T19930-2005 "Laboratory testing and performance requirements for rollover protection structures of small excavators for earth-moving machinery", which can prevent the driver from being injured when the excavator tip over.

It is prohibited to modify the cab TOPS structure privately, such as drilling, welding, cutting, etc. to modify the cab. The protection performance of the cab TOPS structure that has been severely impacted or damaged needs to be re-certified. If necessary, the cab rollover protection structure (TOPS) needs to be replaced in time.

Protect the cab from falling objects (optional)

If necessary, the operator needs additional protection from falling or flying objects, and adequate protection should be installed on the cab.

The cab roof shield can prevent small objects from falling. Installing a shield on the cab roof can protect the operator from falling objects.



When working in mines, quarries and other areas where there is a risk of falling rocks, or when performing hammer operations, an Operator Guard (OPG) should be installed and the front glass should be coated with a composite coating. After installing the OPG, when the front window needs cleaning, loosen the bolts marked with arrows. Be sure to tighten the bolts when completed.

Never attempt to modify or modify any guard structure to strengthen the system by drilling, welding, reinstalling or relocating fasteners. Any serious impact or damage to the guard system requires a

complete inspection of the structure. It may be necessary to reinstall, recertify and/or replace the guard system.

Contact your Kenstone dealer for safety guards and/or recommendations to protect the cab from being hit by objects. Keep all other personnel on the site away from the excavator when operating the machine. If any glass on the machine is broken, replace it immediately.

Note: The previous instructions assume standard operating conditions, but additional protective devices may be required depending on the operating conditions of the workplace or local laws and regulations. Feel free to contact your Kenstone dealer for consultation.

Emergency exit at operating table

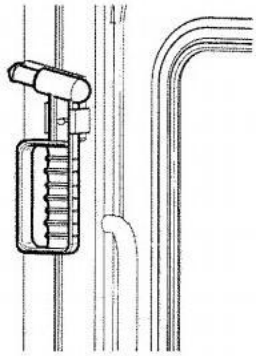
This machine is equipped with a glass breaker tool located on the left column of the cab. This tool can be used to break the glass and escape from the cab in an emergency. Please hold the handle firmly and use the tip to break the glass.

Be careful not to slip on the broken glass on the ground.

"⚠"Warning

Avoid death or serious injury

Protect your eyes when breaking glass.



Transportation

Observe national and local highway regulations

Before preparing for transportation on public roads or highways, please check the state and local restrictions on load weight, width and length.

The towing vehicle, trailer and load must comply with the regulations applicable to the transportation route. It may be necessary to partially disassemble the excavator to meet the specific conditions or driving restrictions of the work site. Please refer to the maintenance manual for information on partial disassembly. For information on loading, unloading and towing, please refer to the "Transportation" section of the Operation and Maintenance Manual. The machine can be disassembled into parts for transportation. Please contact your Kenstone dealer for assistance in disassembly.

Loading and unloading

To prevent the machine from tipping or overturning, be sure to do the following when loading and unloading the machine:

• Load and unload only on firm, level ground, keeping a safe distance from the edge of the road or steep slopes.

• Never use a work device to load or unload the machine, as the machine may fall or tip over.

• Always use a loading ramp of adequate strength and bearing capacity. Make sure the ramp is wide and long enough to provide a safe loading slope and take measures to prevent the ramp from shifting or falling off.

• Clean the ramp surface from grease, oil, ice, and loose materials. Remove dirt from the machine's chassis. Be careful on rainy days because the ramp surface is slippery.

• Turn the automatic idle switch (if equipped) to "off".

・Run the engine at low rpm and drive slowly.

• When on a slope, do not operate any control lever other than the travel lever.

• Never correct steering on a slope. If necessary, drive down the slope, correct the machine's direction, and then drive back up the slope.

•For machines equipped with a cab, always lock the door after loading the machine to prevent it from opening accidentally during transportation.

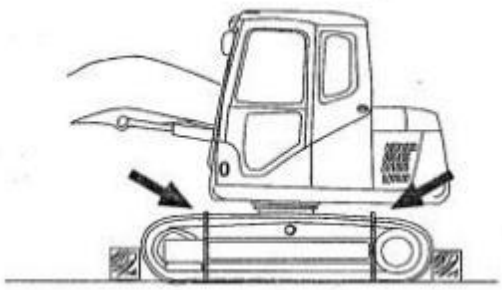
•When driving up or down a ramp, the center of gravity of the machine may change suddenly, causing it to detach from the ramp or trailer. This may happen at the joint between the ramp and the trailer. Drive slowly at this point.

Machine transportation

When transporting the machine on a trailer or truck, do the following:

The weight, transport height and overall length of the machine can change due to changes in the work attachments attached to it. Always check the dimensions of the machine and the dimensions of the work attachments before transporting.

When passing over structures or bridges on private land, check that the structures are strong enough to support the weight of the machine. Before driving on public roads, check with the relevant authorities and follow their instructions.



Operation

Always make sure you maintain your machine properly.

Before starting the engine

Machine Status

Before starting the engine for the first time each day, perform the following inspections and repairs on the machine as required. Death or serious personal injury could result if these inspections are not performed correctly.

• Check the levels of the antifreeze, fuel, oil, and hydraulic tanks, and check the air filter for obstruction and electrical wiring damage.

・Check the instrument panel for proper operation, the angle of the camera (if equipped) and rearview mirrors, and check that the safety lever is in the locked position.

・Check that the machine's operating and travel controls move freely and that the operating controls return to the neutral position when released.

・Check that attachments are properly connected and locked.

Make sure that the machine is equipped with a lighting system that provides adequate visibility and that the lights are operating properly.

Before moving the machine, check the position of the chassis. The normal travel position is with the dozer blade in the rear. If the dozer blade is in the forward position, the travel and steering controls must be operated in the reverse direction.

Before performing inspections, move the machine to an area free of obstructions and operate slowly without allowing personnel to get close to the machine.

Know the maximum operating dimensions of your machine.

Work site

Before you start operating the machine, thoroughly check the work area for any hazards, such as underground utility lines, overhead wires, loose ground, and excessive slopes.

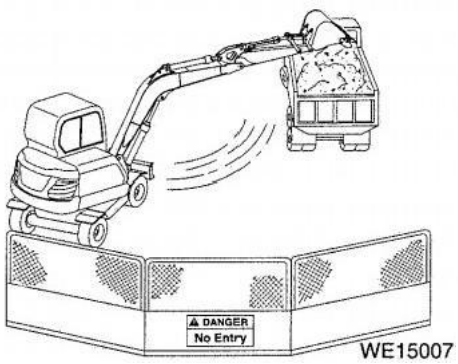
Before starting the engine and moving the machine, make sure no one is under, on, or around the machine.

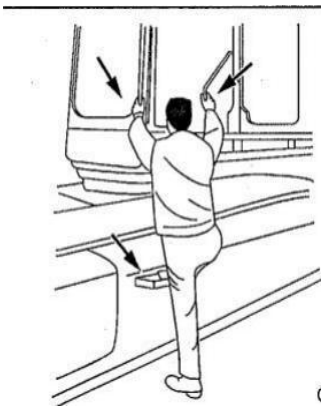
Know the width and length of your machine and work equipment. This allows for adequate clearance of the machine or work equipment near fences or near boundary obstacles.

Know the hand signals for the respective work area and the person authorized to give hand signals, and only follow hand signals given by one person.

When you need to operate on the street, designate one person to be responsible for work area traffic or erect a fence around the work area and post "No Entry" signs to protect pedestrians and vehicles, and take other measures to prevent people from approaching or entering the work area.

If people get too close to a moving machine, they may be hit or crushed by the machine, resulting in death or injury.





Up and down excavator

Before getting on or off the machine, wipe off any grease, oil or dirt on the handrails, guardrails, steps or footboards immediately. Always keep these areas clean, repair any damage and tighten any loose bolts. Do not jump on or off the machine, especially if it is moving, as this can result in death or serious personal injury.

When getting on or off the machine, always face the machine and maintain three points of contact (two feet and one hand or two hands and one foot) with the handrails, guardrails, steps and footboards to ensure that you can safely support your own weight.

Never put your hands on any control levers when getting on or off the machine.

Secure the door latches. If you hold the handrail on the inside of the door while moving on the footboards, and the door latch is not secure, the door will move and you will fall.

Use the points marked by the arrows in the figure to the right when getting on or off the machine.

Do not carry tools and supplies with you when installing or servicing the machine.

Cleaning

Remove all straw, wood chips, leaves, grass, paper and other flammable debris from the engine compartment, around the muffler and battery. Remove all dirt from the windows, mirrors, handrails and steps.

Do not leave tools or spare parts in the cab. Machine vibrations during operation can cause tools or spare parts to fall and damage or break control levers or switches. Tools and spare parts can become lodged in the gaps between control levers, causing unexpected machine movement, resulting in death or serious personal injury.

When entering the cab, always clean all dirt and oil from your shoes. If you operate the travel pedals with shoes that are covered in dirt and oil, your feet could slip off the controls, or dirt and debris could interfere with the proper operation of the control levers.

After using the ashtray (if equipped), make sure all matches and cigarettes are properly extinguished.

Clean the windows and work lights for good visibility.

Do not stick suction cups to the windows; suction cups act as lenses and can cause fires.

Do not bring flammable or explosive items into the cab, and do not place cigarette lighters around the cab. If the temperature in the cab is too high, there is a potential risk of the cigarette lighter exploding.

Secure all loose items such as lunch boxes and other items that are not part of the equipment.

Before operation

Check the condition of the seat belts and other mountings. Replace any worn or damaged parts. Do not install extensions on retractable seat belts. Adjust the seat so that the driver can lean back and both feet can reach the pedals.

Keep all doors and windows on the machine closed.

Adjust the operator's seat to a position that allows easy access to the machine and check the seat belts or mounting clamps for damage or excessive wear.

Adjust and clean the rearview mirrors so the operator can clearly see the area behind the machine from the seat.

Before getting up from the operator's seat, always secure the safety lever in the "locked" position. If the operating lever is accidentally moved without being locked, the machine may move suddenly, causing damage, death, or serious personal injury.

Seat belt

Check the seat belts for proper function every day.

If the machine is exposed to severe environmental conditions, check the seat belt system more frequently.

Perform the following checks and replace the seat belt system if necessary:

1. Check the seat belt, if the system is equipped with a retractor, pull the webbing completely out and check its entire length, looking for cuts, wear, age, dirt and hardening.
2. Check the buckle and lock for proper operation.
3. Make sure the locking plate is not excessively worn, deformed or the buckle is not damaged or the casing is not cracked.
4. Check the seat belt for proper retraction by stretching it. Check the seat belt retractor (if equipped).
5. Check the webbing in areas exposed to the sun's ultraviolet (UV) rays or where fine dust or dirt has accumulated. If the webbing's natural color fades in these areas and/or the webbing is filled with dirt, the strength of the seat belt may be reduced.

Note: For replacement of seat belt system parts, please contact your Kenstone dealer.

"⚠"Warning

To avoid death or serious injury

Failure to properly inspect and maintain seat belts and seat belt systems can result in a lack of safety protection for machine operators and can lead to death or serious personal injury.

Before fastening the seat belt, check that the belt retaining device is installed properly. If there is wear or damage, replace the seat belt. Fasten the seat belt and do not allow it to twist.

Always wear the seat belt when operating the machine.

Visibility Information

The rearview camera (if equipped) and rearview mirror help the operator see what is happening around the excavator, but they cannot cover all areas.

Note: These devices may vary from region to region, depending on local and regional laws and regulations. If the machine is moved or sold to another region or market, it is the owner's responsibility to ensure that the machine complies with all applicable regulations.

"⚠"Warning

To avoid death or serious injury

Failure to check and clear the area around the machine could result in death or serious injury. The operator should ensure that visibility aids (mirrors and cameras) are in proper working order.

Your machine may be equipped with visual aids such as mirrors or a rearview camera. Even with these aids, there may be blind spots around the machine that cannot be seen from the operator's seat. Keep other workers and passersby away from the work area. Operate with caution and always look in the direction of travel.

Adjust visual aids to best see around the machine.

When swinging the work attachment or backing up, press the camera button (if equipped) to change the display mode on the instrument panel, allowing you to check the rear and sides of the machine.

Before moving the machine, look around the work area and use the mirrors and instrument panel to confirm that no one is in the work area.

When operating or driving in areas with poor visibility, it may be impossible to confirm the conditions of the work area. Check and remove any obstacles around the machine that may damage it and keep other people away from the work area.

If there is a problem with the visual aid, repair it immediately. If it cannot be repaired immediately, do not use it and contact your Kenstone dealer to arrange for repair.

.If visibility cannot be ensured, use a flagger.

・Operators should pay careful attention to signals and follow the flagger's instructions.

•Signals should be given by only one flagger.

•When working in dark areas, turn on the work lights and headlights on the machine and set up additional lighting in the area.

•Stop operating if low visibility conditions exist, such as fog, snow, rain or sandstorms.

•Check the rearview mirrors and rearview camera (if equipped) on the machine before starting operation. Clean all dirt and adjust the field of vision to ensure good visibility.

When operating or driving in poor visibility conditions, follow the above work site rules.

It may not be possible to adjust all visual aids to see all the way around the machine. Therefore, additional precautions such as flaggers, roadblocks, etc. must be taken to keep other people away from the work site.

Assist starting or charge the battery

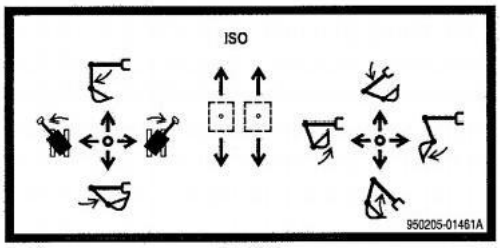
When starting the engine with a starting battery, follow these instructions to prevent explosion or fire:

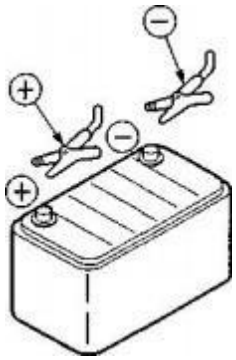
• Turn OFF all electrical equipment before connecting wires to the battery, including the electric switch on the battery charger or starting device.

• Do not allow the two machines to touch when starting from another machine or vehicle, and wear safety goggles and gloves when making battery connections.

•When using the auxiliary starting or charging, you must stay as far away from the battery as possible. Refer to the "Starting the Engine with the Auxiliary Starting Battery" section in the Operation and Maintenance Manual for the correct procedure.

•When installing the cable, first connect the (+) terminal, and when removing it, first disconnect the (-) terminal cable.





Start the engine

Wear your seat belt and sit in the seat to operate the machine.

Operate the controls only when the engine is running.

When operating the machine slowly in an open area, check that all controls and guards are operating properly.

• Read and understand the control mode before operating, and check that the machine's actions match those shown on the control mode label.

• Check that the working device, travel system, and swing system are operating properly.

• Check the machine for problems; check for unusual sounds, vibrations, high temperatures, odors, or improper pressure readings; check for any oil or fuel leaks.

• If a problem is found, stop operation and make appropriate repairs immediately.

Do not use a mobile phone in the cab while driving or operating the machine.

Do not stick your hands or head out of the window while operating the machine.

The boom and stick may cause the work attachment or optional parts to contact the chassis or cab. Always pay attention to the position of the work attachment.

• Do not attempt to start the engine by shorting the engine starting circuit. This may result in death or serious personal injury, or fire.

• When starting the engine, sound the horn to warn and alert people in the work area.

If a warning label or "DO NOT OPERATE" label is found attached to the working lever (joystick) or travel control lever, do not start the engine or move the lever.

Do not walk or stand under the raised boom unless it is properly supported.

Note: When starting the engine at low temperatures, "white engine exhaust smoke" will continue to appear in the exhaust pipe until the engine reaches normal operating temperature. In addition, due to water vapor inside the engine, white residue will form at the engine oil filler port. These conditions will not affect the performance of the engine or damage the engine or other exhaust system parts.

Turn or drive

As the operator of the machine, you should be aware of and follow local, state and regional laws and regulations when operating on public roads or highways.

When the dozer blade is in the rear, engage the forward gear and the machine moves forward.

Conversely, when the dozer blade is in the front, push the shift lever forward to move the machine backward.

It is important to remember that the machine is a large vehicle that moves slowly and can cause traffic delays compared to other vehicles.

Watch the traffic behind you so that vehicles can pass you.

Before operating the machine or work equipment, always follow the precautions listed below to avoid death or serious personal injury.

• Check all tracks to ensure that they are not damaged and remove all mud, rocks, etc. from the tracks.

• Slow down and stop the machine before changing direction from front to rear or rear to front

• Sound the horn to warn people in the area.

• Check that no one is around the machine in the work area. Because there is an area of limited visibility behind the machine, if necessary, slowly rotate the superstructure to check that no one is behind the machine before driving in reverse.

• When operating in areas with poor visibility, designate a flagger to direct traffic on the job site

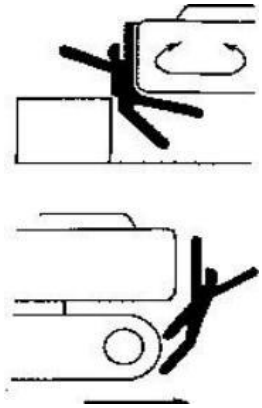
• Keep unauthorized personnel away from the machine's turning radius or travel path.

Be sure to follow the above precautions even if a travel alarm or rearview mirror is installed.

• Check that the travel alarm (if equipped) is working properly and that the rearview mirror is clean, undamaged and properly adjusted.

• Always lock the doors and windows of the cab in place (open or closed).

• In workplaces where there is a risk of flying or falling objects, or objects entering the cab, check that the doors and windows are securely closed. If the workplace requires or requires it, install additional protective covers.



Driving safety measures

It is forbidden to turn the start switch to the "O" (off) position while driving. It is dangerous if the engine stops suddenly while the excavator is driving.

It is forbidden to operate the working handle while driving.

It is forbidden to change the selected driving mode (fast/slow) while driving.

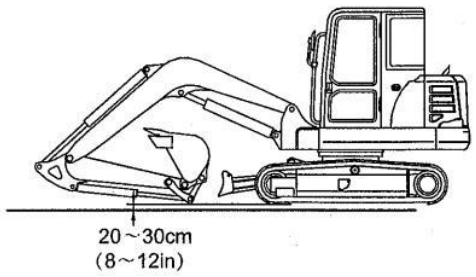
Never cross obstacles or slopes that may cause the excavator to tilt severely. Please bypass slopes or obstacles that may cause the excavator to tilt more than 10° to the left or right, and more than 30 degrees forward or backward.

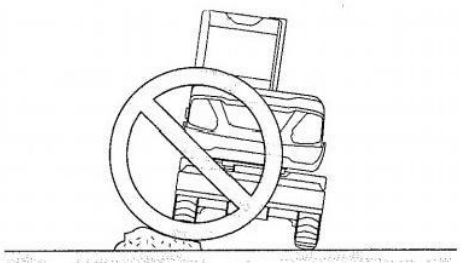
It is forbidden to make sudden turns. The working device may hit the ground and cause the excavator to lose balance.

When driving on rough ground, drive at a low speed and avoid sudden changes in direction. Always operate within the permissible water depth.

When driving over a bridge or a building on private land, first check whether the bridge or building can bear the weight of the excavator.

When driving on the road, first go to the local authorities for confirmation and comply with the requirements.





Excavating

The operator is responsible for all operations on public roads and when using the machine.

• Keep the load within the machine's reach while operating.

・The machine's movement will be affected when the center of gravity changes.

Always monitor the load and bring the load close to the machine before driving any distance or swinging the load.

When operating, set the tracks parallel to the curb to make it easier to drive away from the work area.

Do not suddenly lower, swing or stop the working device.

・Do not move the bucket over the heads of other people or over the driver's seat of other transport equipment or dump trucks. The load may spill or the bucket may hit the dump truck causing property damage or resulting in death or serious personal injury.

Driving on a slope

Never jump on an out-of-control excavator to stop it. Doing so could result in serious injury.

If you must use the machine on a slope, pile up soil to create a platform to keep the machine as level as possible.

Improper driving on steep slopes can cause the machine to tip over, roll over, or slide down the slope. Avoid operating the machine on slopes.

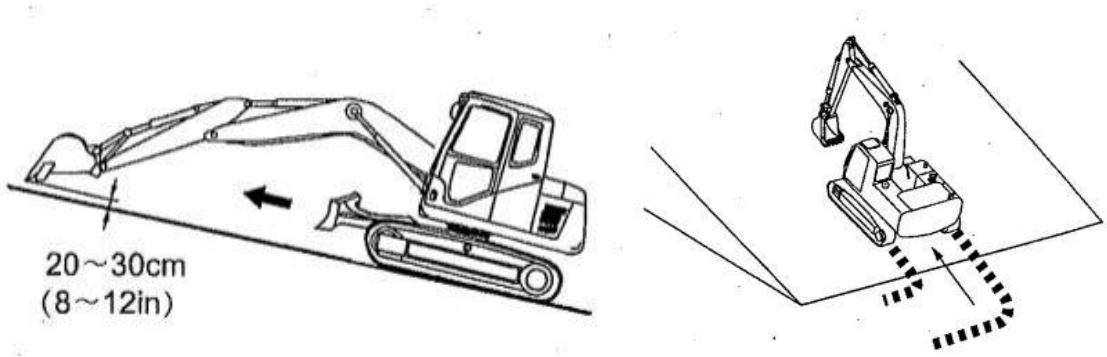
When on a mountain, riverbank, or slope, raise the bucket 20-30 cm (8-12 inches) above the ground. In an emergency, quickly lower the bucket to the ground to help the excavator stop moving.

Never drive on grass, fallen leaves, or slippery steel plates. Even a small slope can cause the excavator to slide sideways, so drive at a low speed and make sure the excavator is going straight up or down the slope.

Never change direction on a slope. This can cause the excavator to tip over or slide sideways. Drive the excavator straight up or down the slope whenever possible. Try to avoid driving the excavator across a slope.

If the machine shows signs of sliding down a slope, remove the load immediately and drive the machine off the slope.

Be careful to avoid any ground conditions that could cause the machine to tip over. Tipping can occur when you are working on a hill, bank, or slope. Tipping can also occur when you are crossing a ditch, ridge, or driving over an unexpected obstacle.



Traction

To avoid death or serious personal injury when towing, always do the following:

• Follow the instructions given in this manual.

• Use a wire rope of sufficient strength for towing.

• Place wooden blocks between the wire rope and the machine to protect the machine and wire rope from damage.

• Tow only light objects.

• Always use a hook. Keep it level and straight.

• Drive at a low speed.

• When preparing for towing with two or more people, determine the signals to use and follow them correctly.

• Always connect the wire rope to the left and right hooks and secure them in place.

• If the engine on the machine has a problem and cannot start or the brake system fails, always contact a Kenstone dealer.

• Never get between the towing machine and the towed machine during towing operations.

・Do not tow on steep slopes.

• When towing a machine, always use a wire rope with sufficient towing capacity.

• Do not use a wire rope that is twisted or worn, or has any diameter defects. Wear leather gloves when handling the wire rope.

• Make sure the hook eye and towing device are adequate to pull the load.

• Operate the machine slowly and be careful not to apply any sudden load on the wire rope.

Accessories

Never allow anyone to sit on any work attachment, such as a bucket, breaker, grab, etc. This creates a risk of falling or being injured, and can result in death or serious personal injury.

Continuous operation of the work lever (control handle) and failure to continuously move the attachment work lever (control handle) can cause the bucket to tip over. If it moves onto other workers in the cab or work area, it can cause death or serious personal injury.

When using a fork or grab, do not try to grab objects with the tip. If the grabbed object slips out, it can cause damage to the machine or cause personal injury.

Do not use the impact force of the work attachment for demolition work, which can cause damage to the work attachment, causing the crushed material to fly out or overturn, resulting in death or serious personal injury.

• Do not use work attachments or swinging motions to pull the load in any direction. If the load is loosened, it could cause sudden movement of the work attachment and result in death or serious personal injury.

With the engine off, lower the front working device

Before stopping the machine to lower the attachment, keep all personnel away from the area around the machine. The procedure used will vary depending on the type of attachment being lowered. Keep in mind

that most systems use high-pressure fluid or gas to raise or lower the attachment. This process causes high-pressure air or hydraulic pressure to be released.

Wear appropriate personal protective equipment and follow the appropriate instructions in the Operation and Maintenance Manual.

Engine Shutdown

After the machine is parked, let the engine run at low speed for more than 5 minutes before stopping the engine. This allows the engine to cool gradually.

Parking the machine

Avoid sudden stops or parking of the machine, whether or not it is the end of a working day. Park the machine on firm, level ground, away from heavy traffic areas and away from high walls, steep slopes and any areas with potential standing and flowing water. If parking on a slope is unavoidable, adjust the bucket to the downhill side and insert the teeth into the ground, and place blocks under the tracks to prevent the machine from moving.

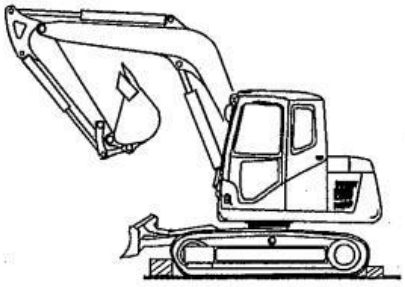
When parking on a public road, fences, signs, signs or lights must be provided and any other necessary signs must be posted to ensure that the machine is clearly visible to passing vehicles. Park the machine so that the machine, flags, signs and guardrails do not obstruct traffic.

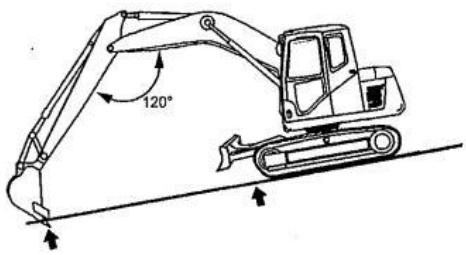
After parking the machine, the safety lever must be moved to the "locked" position, which disables all pilot control functions.

Always close the cab door and lock all equipment to prevent any unauthorized person from operating the machine.

Even when the engine is not running, the hydraulic system remains pressurized and the accumulator provides pressure to it. The pressure in the accumulator will decrease within a short period of time (about one minute). Hydraulic work tools and machine controls remain functional while the hydraulic system remains energized.

If moving any control causes the machine to move, this could result in death or serious personal injury. Always move the safety lever to the "locked" position before or immediately after stopping the engine.





Storage machine

If you store the excavator for more than one month, perform the following steps.

Terms	**Maintenance Required**
Clean	High pressure wash undercarriage and track assembly. Inspect for damaged, loose or missing parts.
lubricating	Perform all daily lubrication procedures.
	Apply a light coat of oil to exposed plated metal surfaces, such as hydraulic cylinder rods.
	Apply a light oil to all control levers, control valve spools, etc.
Battery	Disconnect the battery switch and remove the battery if necessary.
Cooling system	Check the antifreeze reservoir to ensure the antifreeze level in the system is at the correct level.
	Every 90 days, measure the protection level of the antifreeze using an ice point meter. Refer to the relevant regulations in the Operation and Maintenance Manual to determine the amount required for the cooling system. Add antifreeze as needed.
Hydraulic system	Start the engine once a month and follow the procedure listed in “Hydraulic System Warming Up” in the Operation and Maintenance Manual.

1. Complete the above steps.
2. Wash the machine and spray it with protective paint to avoid rust.
3. Treat exposed parts with rust inhibitor, lubricate the machine thoroughly and apply grease to unpainted surfaces.
4. Fill the fuel tank and hydraulic oil tank to the "FULL" mark.
5. Cover the exhaust pipe (when parked outdoors).
6. Make sure the antifreeze is the appropriate concentration for the lowest expected temperature.
7. Park the machine on level, firm ground without the risk of ice, landslides or flooding. Avoid parking the machine on a slope.

Remember the following measures to minimize the risk of theft:

· Remove the key from the start switch when the machine is unattended.

· Lock the cab door and all other doors after get off work.

· Disconnect the battery switch to cut off the current.

· Park the machine where the risk of theft and damage is minimized.

• Remove valuables such as mobile phones, computers, and wallets from the cab.

Inspection after long-term parking

• Levels of all fluids.

• Tension of all belts.

• Air filter.

• Battery and electrical connectors.

・Lubricate all lubrication points.

・Wipe grease from piston rods.

・Check for signs of nesting (i.e. birds, rodents, etc.)

• Check safety tags and replace if damaged, worn or missing.

• Inspect tracks.

Maintainance

Improper operation and maintenance can result in death or serious personal injury. Read the manual and safety decals before operating or maintaining the machine. Follow all instructions and safety messages.

“⚠”Warning

To avoid death or serious personal injury

Follow the instructions before operating or servicing the machine. Read and understand the Operation & Maintenance Manual and all markings on the machine. Follow the warnings and instructions in the manual when making repairs, adjustments or maintenance.

Check for proper function after making adjustments, repairs or maintenance. Untrained operators and failure to follow instructions can result in death or serious personal injury.

·Never service a Kenstone machine without the manual.

·Always lower the bucket and dozer blade to the ground before performing any maintenance.

·Lift and support the excavator using the correct procedures.

·Cleaning and maintenance are required every day.

•Welding or grinding of painted parts must be done in a well-ventilated area.

•Grinding of painted parts may produce toxic dust or gas, please wear a dust mask.

•When the engine must be running for maintenance, ensure good ventilation.

• The exhaust system must be strictly controlled. Harmful exhaust fumes can cause death or serious personal injury.

• Stop the engine and allow it to cool before checking the fluid. Remove flammable fluids from the engine.

• Never repair or adjust the machine with the engine running unless instructed to do so in this manual.

• Avoid contact with high-pressure fuel or leaking hydraulic fluid. These fluids can penetrate the skin or eyes.

• Never add fluid while the engine is running, smoking, or near an open flame.

• Keep your body, jewelry, and clothing away from moving parts. Do not touch electrical, hot parts, and the exhaust system.

• Wear eye protection when the engine is running or when using tools. Protect against battery acid, compressed springs, pressurized fluids, or flying debris. Use standard eye protection when welding.

·Lead-acid batteries can produce flammable and explosive gases.

• Keep arcs, sparks, flames, and burning tobacco away from batteries.

• Contact with battery acid can burn skin or eyes.

• Wear protective clothing. If acid comes in contact with your body, rinse with water. In case of eye contact, rinse well with water and seek immediate medical attention from a physician familiar with this type of injury.

·The simple maintenance procedures given in this manual can be performed by the machine owner or operator without any special technical training. The maintenance procedures not in this manual must be performed only by qualified maintenance personnel, and original Kenstone parts must be used.

・Only authorized personnel can repair and maintain the machine. Do not allow unauthorized personnel to enter the work area.

・Lower the working device and stop the engine before performing maintenance.

•Park the machine on a solid and level ground.

•Turn the start switch to the "ON" position and keep the safety lever in the "unlocked" position. Operate the working lever (joystick) back and forth 2 to 3 times through the full stroke to eliminate the internal pressure in the residual hydraulic circuit, and then move the safety lever to the "locked" position.

•Check that the battery relay is "off" and the main power is off. (After "turning off" the engine, wait for about one minute after removing the start switch key and press the horn switch. If the horn does not sound, the main power is off)

・Place a car block under the track to prevent the machine from moving.

To prevent injury, do not perform maintenance while the engine is running. If maintenance work must be performed while the engine is running, it must be performed by at least two workers and the following points must be met during maintenance work

-One worker must always be seated at the operator's station and ready to stop the engine at any time. All workers must keep in touch with other workers.

-When performing maintenance work near fans, fan belts or other rotating parts, there is a potential risk of being caught in the rotating parts. Keep hands and tools away.

• Do not drop or insert tools or other objects into a rotating fan or fan belt. Parts can fall off and hit people.

• Do not touch any control levers or control pedals. If any control levers or control pedals must be operated, be sure to give other people a warning signal to instruct them to leave.

• Wear hearing protection when performing engine maintenance and when being exposed to engine noise for a long time.

• If the noise generated by the machine is too loud, it can cause temporary or permanent hearing problems.

Do not smoke when repairing the air conditioner or if there is a refrigerant gas leak.

• Contact of smoke from flames or gases from cigarettes with air conditioner refrigerant can cause death or serious personal injury.

• Never put service fluid in glass containers; drain all fluids into appropriate containers.

• Unless otherwise instructed, service work should be performed with the unit in the service parking position.

・Dispose of old fluids and filters in accordance with local laws and regulations.

Warning Labels

Attach or hang a "Do Not Operate" warning label near the control handle in the cab to warn others that the machine is undergoing repair or maintenance work. Attach it to other areas of the machine as needed. Keep the safety lever in the "locked" position.

"Do Not Operate" warning labels are available from your Kenstone dealer.

·Always hang a "Do Not Operate" warning label on the working device control lever in the cab to warn others that you are performing repair or maintenance work on the machine. Attach additional warning labels to the machine if necessary.

•When the warning label is not in use, store it in the tool box, or if there is no tool box, keep it in the storage bag of the owner's manual.

•Operating the control levers or control pedals while you are performing service or maintenance work can result in death or serious personal injury.

Before servicing or repairing the machine, attach a "Do Not Operate" warning label to the start switch or controls. Warning labels are available from your Kenstone dealer.。

Clean

Clean the machine before inspection and maintenance.

If the machine is dirty, hands and feet are tightly held or the standing position is difficult to confirm when performing inspection and maintenance, you may slip and injure yourself on the steps and work platform areas.

When cleaning the machine, do the following:

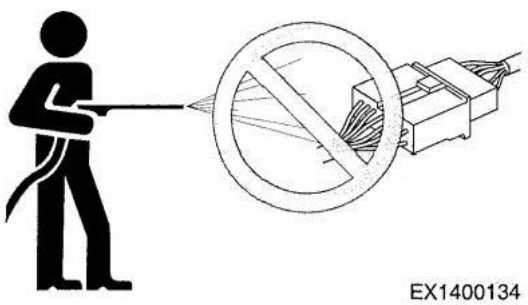
· Wear shoes with non-slip soles to prevent slipping or falling.

• Wear safety goggles and protective clothing when cleaning the machine with high-pressure steam or water.

· Do not spray water directly on electrical components (sensors, connectors). If water enters the electrical system, it will cause operational failure.

• Pick up all tools or other items scattered on the work site. Wipe off all grease or oil to prevent slippery substances from causing trips or slips.

• The cab roof window is made of polycarbonate material, please use tap water to clean it. Avoid using organic solvents such as benzene, toluene or methanol for cleaning, which can cause chemical reactions that will dissolve and damage the window.



Proper tools and clothing

Only suitable professional repair tools should be used. If inferior or damaged tools such as chisels or hammers are used, the hammer head may fall off and hit the repairer in the eyes or face, causing serious personal injury.

Disassembly precautions

When using a hammer to remove pins, pins may fly out or metal parts may break. Be sure to follow these points:

• Hitting hard metal pins, bucket teeth, cutting edges or bearings with a hammer may cause parts to fly out and cause serious personal injury. Always wear safety goggles and leather gloves, and keep other people away from the work area.

Use of lighting

When checking fuel, engine oil, battery electrolyte, window washer fluid or antifreeze, always use lighting equipment to prevent arcing or sparks from causing fire or explosion, which could result in death or serious personal injury.

Fire and explosion prevention

Fuel, most lubricants, and some antifreeze mixtures are flammable. Flammable liquids leaking or splashing onto hot surfaces or electrical components can cause a fire resulting in property damage, death, or serious personal injury.

Store all fuel and lubricants in labeled and approved containers and keep all unauthorized persons away.

Store oily rags and other flammable materials in protective containers.

Tighten all fuel and oil caps.

Do not smoke while refueling the machine or in the refueling area.

Do not smoke in the battery charging area or areas containing flammable materials. Clean and tighten all electrical connectors. Check electrical wiring daily for loose or frayed wires. Tighten any loose wires before operating the machine, and repair or replace any frayed wires.

Clean the engine compartment, exhaust system, and hydraulic lines of all flammable material and debris.

Preventing burns

Before checking the antifreeze level in the radiator, stop the engine, allow the engine and radiator to cool, and then check the antifreeze. If the antifreeze level in the antifreeze subtank is close to the upper limit, there is enough antifreeze in the radiator.

Before removing the radiator cap, use gloves to slowly loosen the radiator cap to release the internal pressure.

If the antifreeze level in the antifreeze subtank is below the lower limit, add antifreeze.

The alkali contained in the cooling system can cause personal injury. Do not allow alkali to contact the skin, eyes, or mouth.

Allow the cooling system components to cool before draining the system.

Hot oil and hot components can cause personal injury. Do not allow hot oil and hot components to contact the skin.

Only bleed the hydraulic tank after the engine has stopped and the hydraulic tank has cooled. Use gloves to slowly open the hydraulic tank breather to release the pressure.

Before disconnecting any lines, hoses, pipe fittings, or related components, release all pressure in the hydraulic oil system, fuel system, and cooling system.

Batteries emit flammable gases that can explode and cause fire.

Do not smoke when checking battery electrolyte level. Electrolyte is an acid and can cause personal injury; do not allow electrolyte to come into contact with skin or eyes.

Always wear safety goggles and a face shield when working with batteries.

Fluorine rubber

Be extremely careful when you suspect you may have to handle rubber containing fluorine compounds. Certain seals that must withstand high operating temperatures (e.g. in engines, transmissions, axles, hydraulic motors and pumps) may be made of fluorine-containing rubber. When exposed to high temperatures (fire), hydrogen fluoride and hydrofluoric acid are formed. This acid is very corrosive and cannot be washed or washed off the skin. It can cause severe burns that take a long time to heal.

After contact with the acid, several hours may pass before any symptoms appear. There may not be any immediate symptoms, which usually means that the injured tissue must be surgically removed. The acid may remain in the parts of the machine for years after the fire.

If swelling, redness or tingling occurs, the suspected cause may be contact with heated fluorine-containing rubber. Contact a doctor immediately. If the machine or part of the machine is exposed to fire or extreme heat, it must be handled by specially trained personnel. All handling of the machine after a fire must be done with thick rubber gloves and goggles.

After the work is completed, the gloves must be washed in lime water and then discarded.

Rubber and Plastics

When polymer materials burn, they form compounds that are hazardous to health and harmful to the environment. Scrap rubber and plastics must never be burned. Extra precautions must be taken when repairing machines that have been exposed to fire or extreme heat.

If gas cutting or welding is to be carried out near such materials, the following safety instructions must be followed:

• Protect the material from heat.

• Use protective gloves, safety goggles and an approved respirator.

Environmentally harmful waste

Painted parts or parts made of rubber or plastic must never be burned but must be disposed of at an approved waste treatment plant. Batteries, plastics and anything else suspected of being harmful to the environment must be disposed of in an environmentally friendly way.

Post-Fire Checklist

The following protective measures must be observed when handling machines that have been damaged by fire or exposed to extreme heat:

Use thick gloves made of rubber and wear goggles that must protect your eyes.

Never touch burnt components with bare hands because there is a risk of contact with molten polymer materials. First clean the machine thoroughly with plenty of lime water.

Seals (O-rings and other oil seals) must be handled because they are made of rubber containing fluoride. Discard gloves, rags, etc. that are suspected of having come into contact with burnt fluorine rubber.

Welding repair

“⚠”Warning

When disconnecting or connecting the connector between the ECU and the engine or the connector between the ECU and the machine, always disconnect the battery to prevent damage to the ECU. If this step is not followed, the ECU will be damaged and/or the engine will not function properly.

When performing welding repairs, welding should be performed in appropriate locations and repairs must be performed by qualified welders. Welding operations may pose potential hazards, including gas generation, fire or electric shock. Do not allow unqualified welders to perform welding work.

Qualified welders must do the following:

• To prevent battery explosion, turn the battery switch to the "off" position and remove the battery harness terminals.

・Disconnect the connector between the ECU and the machine and the connector between the ECU and the engine.

• To prevent the generation of toxic gases, remove the paint on the welding location.

• If hydraulic components, pipes, or ports near them are heated, flammable gases or fumes may cause explosions or fires. To prevent this, protect and isolate these components from overheating.

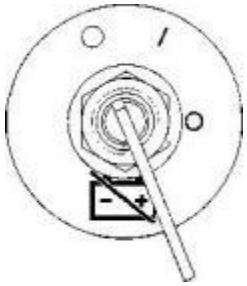
・Do not weld on pipes or tubes containing flammable liquids, and do not flame cut pipes containing flammable liquids. Before welding on pipes or tubes or flame cutting pipes or tubes, clean them thoroughly with non-flammable solvents to ensure that the pressure in the pipes will not cause the components to rupture.

• If rubber hoses or pipes under high pressure are directly heated, they may burst suddenly, so they should be covered and isolated with a fireproof cover.

• Wear protective clothing.

• Ensure good ventilation.

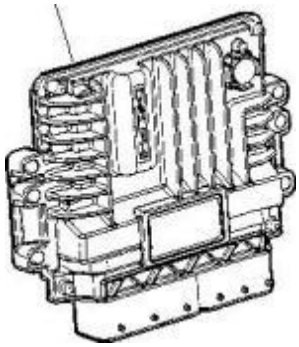
・Remove all flammable items and ensure fire extinguishers are available.



Preparation work for welding of vehicle body structure

To prevent welding from damaging the machine, follow these steps:

1. Turn the battery switch to the "disconnect" position.
2. Remove the battery terminal harness.
3. Remove the ECU harness.
4. Perform welding.
6. Connect the battery harness.
7. Clean the battery box area.
8. Turn the battery disconnect switch to the "connect" position.
9. Close the battery box cover.



Counterweight and Front Unit Removal Warning

“⚠”Warning

To avoid death or serious injury

Removal of the machine counterweight, front option or any other part will affect the stability of the machine, which could cause unexpected movement and result in death or serious personal injury.

Never remove the counterweight or front option without the upper and lower bodies in alignment.

Once the counterweight or front option is removed, do not rotate the upper body.

Locking access cover

When the inspection door is opened for maintenance, use the locking rod to secure the door to prevent it from accidentally falling or rotating due to wind or movement of the machine.

Working on the machine

When performing maintenance work on the machine, keep the area around your feet clean and free of debris and debris to prevent tripping and falling. Be sure to do the following:

• Do not spill oil or grease.

• Do not scatter tools.

• Watch your step when walking.

• Never jump off the machine. When getting on or off the machine, use steps and handrails and maintain three points of contact (two feet and one hand or two hands and one foot) to support yourself.

• Wear protective clothing if the work requires it.

・To prevent injuries from slips or falls, when working on covers or hoods, never stand or walk on areas other than those equipped with non-slip mats.

• If it is necessary to work under a raised machine, use supports that are sufficient to support the weight of the machine and work equipment and secure them securely.

・Do not work under the machine if the track shoes are lifted off the ground and when the machine is supported only by the work equipment. If any control levers are moved or the hydraulic system is damaged, the work equipment or machine can fall suddenly, causing death or serious personal injury.

Accumulator

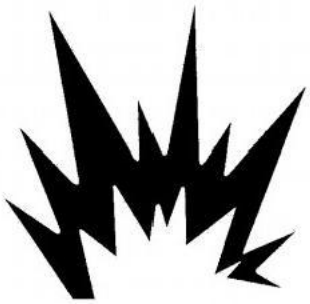
The pilot control system is equipped with an accumulator. For a short period of time after the engine is stopped, the pressure stored in the accumulator allows the hydraulic controls to actuate. Any control movement will cause the selected parts to move under the action of gravity. Before performing maintenance, release the pressure in the system as described in "Handling of Accumulators" in the Operation and Maintenance Manual. The accumulator uses high-pressure nitrogen. If not handled properly, the accumulator can explode and cause death or serious personal injury. Be sure to observe the following precautions:

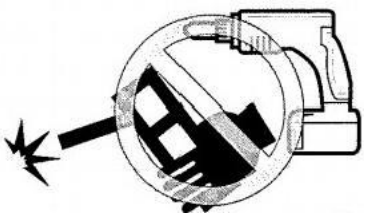
・Do not drill or punch holes in the accumulator or expose it to any flame, open flame or external heat source.

・Do not weld on the accumulator.

•When disassembling or servicing the accumulator, or handling the accumulator, the nitrogen must be released properly. Contact your Kenstone dealer for assistance.

•When working on the accumulator, wear safety goggles and leather gloves. Hydraulic fluid under pressure can penetrate the skin and cause death or serious personal injury. If fluid enters the eyes or skin, seek medical attention immediately.





Compressed air

• When using compressed air to clean filters, radiators or other components, there is a risk of solid particles flying, which can cause serious personal injury.

• Always wear goggles, dust masks, leather gloves and other protective equipment.

Support and blocking of working devices

Do not leave the work device suspended or unsupported under load or loading.

Lower the work device to the ground before leaving the operator's seat.

Do not use hollow, cracked or unstable supports.

Do not work under any equipment supported only by a jack.

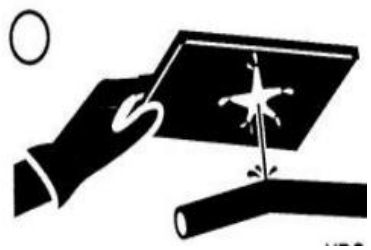
High pressure lines and hoses

When inspecting or replacing high-pressure lines or hoses, check to make sure that pressure has been released from the circuit. Failure to release pressure can result in death or serious personal injury.

- Always do the following:

・Wear protective glasses and leather gloves.

・Fluid leaking from hydraulic hoses or pressurized components is difficult to see but has enough force to penetrate the skin to cause death or serious personal injury. Always use a board or cardboard to check for suspected hydraulic leaks, never use bare hands or exposed fingers, and wear safety goggles.



• Never bend high-pressure lines, do not knock high-pressure lines, and do not install bent or damaged lines, tubes or hoses.

• Make sure all clamps, protective covers and heat shields are properly installed to prevent vibration during operation, friction with other components, and excessive heat generation.

Replace hoses or components if any of the following problems are found:

-Damaged or leaking hose fittings.

-Worn, damaged, cut hose fittings, or any hose with exposed wires.

-Hose ruptures at any location.

-Hose is twisted or broken.

-Foreign objects are embedded in the hose.

-Hose is deformed.

-Connecting parts are damaged or leaking.

When the engine is running, high pressure will be generated inside the engine fuel line. Before checking and maintaining the fuel line system, you need to wait at least thirty seconds after turning off the engine to allow the internal pressure to drop and use a breather to release the residual pressure.

Hydraulic oil or fuel leaking from the high-pressure pipeline can cause fire or uncontrolled machine operation, which may cause death or serious personal injury. If loose bolts are found, stop working and tighten to the specified torque. If any damaged hoses are found, stop working immediately and contact your Kenstone dealer to replace the parts.

Battery

Prevention of battery hazards

The battery electrolyte contains acid that produces hydrogen gas, which is extremely explosive and can cause death or serious personal injury or fire if not handled properly. Do not allow the electrolyte to come into contact with your skin or eyes, and always wear safety goggles and protective clothing when servicing the battery. Wash your hands after touching the battery and connectors, and it is recommended to use acid -resistant gloves. Be sure to follow the following precautions.

• Do not smoke or carry any open flames near the battery.

• When handling the battery, always wear safety goggles, protective clothing, and acid-resistant gloves.

• If battery electrolyte spills on yourself or clothing, immediately flush the area with water.
• If electrolyte gets into eyes, immediately flush with plenty of water and seek medical attention.
• If you accidentally drink battery electrolyte, call a poison prevention center and seek emergency treatment from a doctor familiar with this type of injury.
• When cleaning the surface of the battery, wipe it with a clean, damp cloth. Never use gasoline, thinner, or any other organic solvent or cleaning agent.
• Always remove the battery from the machine before charging.
・Tighten the battery cap.
• If the battery electrolyte freezes, do not charge the battery or start the engine with other power sources, which may cause the battery to explode and cause a fire.
• Before charging the battery or starting the engine with other power sources, be sure to thaw the battery electrolyte first and check that there is no battery electrolyte leakage.
• Before servicing or using the battery, turn the start switch to the "0" (off) position.
Because of the potential for sparks, be sure to do the following:
• Do not allow tools, rings, or other metal objects to touch the battery terminals, and do not place tools or other metal objects near the battery.
• Before disconnecting the battery terminals, wait approximately one minute after turning the engine start key to the “0” (off) position to ensure that the ground terminal is disconnected; begin with the negative (-) terminal. Instead, when making connections, start with the positive (+) terminal, then the ground (-) terminal, ensuring that all terminals are tightly connected.
• When charging the battery, flammable hydrogen gas is produced. Before charging, the battery must be removed from the machine, placed in a well-ventilated area, and the battery cap removed.
• After charging, return the battery to the machine and secure the battery cap.
When repairing or welding an electrical system, wait approximately one minute after turning the engine start key “off” before disconnecting the negative (-) battery terminal to terminate the flow of current.

Working environment and conditions

Work areas that require extra attention

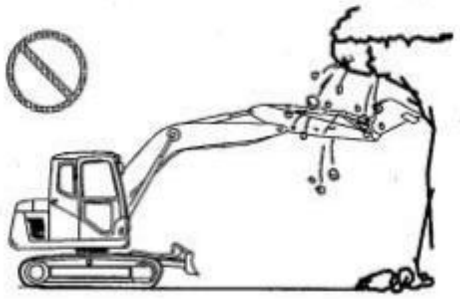
• Do not work too close to the edge of docks, ramps, etc.

• Do not work too close to the edge of steep slopes or steep walls. Be careful when working in areas where the machine may tip over.

• Do not work on soft ground or near banks that may collapse or on ground that cannot support the weight of the excavator.

• Observe changes in ground and walking conditions after rain or weather changes.

Digging under an overhang



Do not perform excavation work under overhangs as this could result in collapse.

• Do not perform overhead demolition work as this could result in broken objects and debris falling on top of the machine causing death or serious personal injury, or property damage.

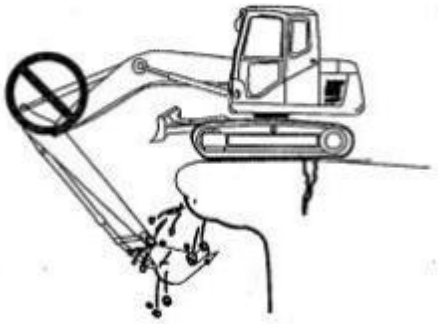
Digging Deeper

Do not dig deep under the front of the machine. The ground under the machine could collapse and cause the machine to fall, resulting in death or serious injury.

Working with a load on soft or uneven ground could result in tipping or injury, and traveling without a load could also be dangerous.

Never rely on a jack or other defective support when digging. Block the tracks in front and behind to prevent any movement.

Using the machine for other purposes could also result in malfunctions.



• Do not dig deep under the front of the machine. This could result in death or serious injury, or property damage.

• When working on top of a building or other structure, check that the structure can support the weight of the machine and work equipment. If the building structure collapses, death or serious injury could result.

Steep wall or edge

When working near the edge of a ditch or a steep wall, the machine may tip over, which could result in death or serious personal injury. Always wear a safety belt.

Before working, check the ground conditions at the work site to prevent the machine from falling or tipping over, and to prevent ground, mine, or river bank collapse. Do not drive too close to the edge of a steep wall.

Poor visibility

To achieve good visibility, be sure to do the following:

• When working in a dark environment, connect the work light and headlight to the machine, and if necessary, set up additional lighting at the work site.

・Stop working when visibility is poor, such as fog, clear sky, snow, rain, etc., and resume operation after visibility improves.

To avoid hitting other equipment and damaging other property, be sure to do the following:

• When working in tunnels, on bridges, under power lines, or when parking the machine or performing other operations in places with limited height, be careful not to hit and damage other equipment or property.

• When working in confined spaces, indoors, or crowded areas, operate the machine at a low speed to prevent hitting objects.

• Do not swing the bucket over the head of the worker or over the cab of a dump truck.

Soft ground

Do not work on soft ground or near the edge of steep walls, overhangs and deep trenches. The ground may collapse under the weight of the machine, causing the machine to fall or tip over.

Check ground conditions before starting to work with the machine. If the ground is soft, reposition the machine before operating.

Never dump excavated material too close to the edge. How far from the edge of the trench you must dump excavated material depends on the soil type and moisture content. If you dig into loose clay, place it at least 5m (16ft) from the edge.

If you dump excavated material too close to the edge, its weight can cause landslides.

Thawing of frozen soil, rain, traffic, pile driving and blasting are other factors that increase the risk of landslides.

Soft ground can easily collapse under the weight of the machine.

When working on loose or unstable ground, it is important not to dig too deep and to reposition the machine carefully. If the ground begins to collapse, do not panic and do not raise the bucket. Lower the work attachment to improve the stability of the machine.

Do not dig under the machine if there is a risk of creating a landslide.

High voltage cable

Do not drive or operate a machine near power lines or overhead wires. There is a risk of electric shock and property damage, death or serious personal injury. Do not allow the bucket or other attachments to come into physical contact with power lines, as the current can cause electric shock.

Use flags and hand signals to keep operators away from power lines that cannot be seen. When operating a machine in a work area near power lines, be sure to do the following:

• Determine the voltage of the power lines and the minimum distance to stay away from the power lines. Refer to the table below for the minimum distance when working near power lines. Being too close to the power lines can cause strong electric shock and cause death or serious personal injury.

• Be sure to contact the responsible power company before starting work near high-voltage power lines.

Voltage	Min. distance
6.6 kV	3m (9'10″)
33.0 kV	4m (13'1″)
66.0 kV	5m (16'5″)
154.0 kV	8m (26'3″)
275.0 kV	10m (3210″)

Underground operations

If digging in underground locations or buildings, make sure there is enough space to work, as well as adequate ventilation.

Special equipment and engines may be required in some countries, contact your Kenstone dealer for more information.

Check that there is enough space for the machine and material.

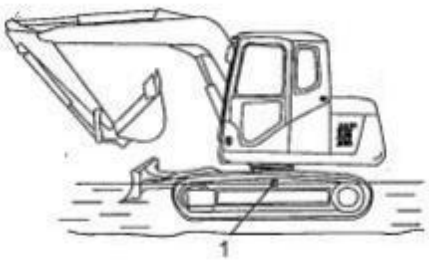
Move slowly.

Make sure to contact the agency or company responsible for underground cables, utilities and electrical lines and follow their instructions.

Take into account all cables on site.

Underwater operations

Note: Do not exceed the maximum permissible water depth. The water level must not be higher than the center of the carrier sprocket (1, right figure).



After working in water, lubricate all lubrication points on the chassis as they are always under water. (especially the bucket pins)

Make sure the foundation at the work site is strong enough to prevent the machine from sinking and the water depth from exceeding the center line of the sprocket.

Working in a contaminated environment

When working in areas that are contaminated or present health risks, please check local regulations and contact your Kenstone dealer to assist in determining the need for additional safety precautions.

Operation under extreme conditions

Working in extremely cold conditions

In extremely cold weather, avoid sudden driving movements and stay away from even gentle slopes, as the machine may slide down the slope.

Snow accumulation can hide potential hazards, operate with caution and remove snow first.

It may be necessary to preheat the engine for a short period of time to avoid sluggish operation or reduced working capacity. In extremely cold temperatures, the jolting and impact loads caused by the boom or attachment hitting or bottoming out can cause severe vibrations, and it is necessary to reduce working speed and workload.

If the machine is operated in extremely cold weather, certain precautions must be taken. Please perform the following checks to ensure that the machine can operate at these temperatures.

1. Preheat the engine before starting. After preheating, wait 3-4 seconds until the battery voltage recovers before starting the engine.

2. Charge the battery fully to prevent freezing. If you want to add steam storage water to the battery, run the engine for at least one hour to mix the electrolyte. When the temperature is below -10°C, the starting performance of the battery will be reduced accordingly.

“⚠”Warning

Battery explosion can cause serious injury or death.

Never heat the battery directly with an open flame.

3. Keep the engine in good condition to ensure starting and good performance in adverse weather conditions.

4. Use engine oil and fuel of the correct specifications for the ambient temperature.

5. Always fill the fuel tank completely after the operation is completed. If the fuel filter freezes, the fuel supply may be interrupted. Drain the water from the tank and drain the water from the filter regularly, and replace the filter regularly.

To prevent fuel line clogging due to fuel waxing, make sure the wax formation point of the fuel is below the ambient temperature.

6. Lubricate the entire machine according to the "Lubrication and Maintenance Chart" in the Operation and Maintenance Manual.

“⚠”Warning

A fuel tank explosion could result in serious injury or death. Never attempt to heat the fuel tank with an open flame.

7. Start the engine and allow it to reach normal operating temperature before operating.

• If dirt and ice accumulate on any moving parts while the machine is idle, heat and melt these materials before attempting to operate the machine.
• Carefully operate the hydraulic components until they reach a temperature that allows them to operate normally.
• Check all machine controls and functions to ensure they are functioning properly.
8. A spare air filter must be stored in the cab to replace the filter element that may freeze and cause engine airflow restriction.
9. Clean all mud, snow and ice to prevent freezing. If possible, cover the machine with a tarp, keeping the ends of the tarp from freezing to the ground.

Working in extremely hot conditions

Continuous operation of the machine at high temperatures can cause the machine to overheat. Always monitor the temperature of the engine and hydraulic system, and stop the machine to cool it down if necessary.
1. Check and repair the fan and radiator frequently. Check the antifreeze level in the radiator, and check whether the dust screen and the radiator fins are blocked.
• At extremely high temperatures, scale and rust will appear faster in the cooling system, and the antifreeze must be replaced every year.
• If necessary, flush the cooling system regularly to keep the circuit unobstructed. High-alkali water should be avoided as this will increase the formation of scale and rust.
2. Check the battery every day to see if it meets the requirements. If the battery is left at high temperatures for a long time, its self-discharge rate is high. If the machine is to be left for several days, disassemble the battery and store it in a cool place.
3. Repair and maintain the fuel system according to the instructions in the "Check the Fuel Level" and "Check the Fuel System Leak" in the Operation and Maintenance Manual. Check the water content before filling the tank.
4. Perform lubrication and maintenance work according to the "Lubrication and Maintenance Chart" in the Operation and Maintenance Manual and the lubrication label on the machine.
5. Do not leave the machine in the sun for a long time. If possible, park the machine under a cover to protect it from the sun, dirt and dust.
• Cover the machine if there is no suitable shelter to protect the engine compartment and hydraulic system from dust and debris.
• In hot, humid climates, any part of the machine will corrode, and corrosion will accelerate during the rainy season. Rust and paint bubbles will appear on the metal surface, and fungi will grow on other surfaces.
• Protect all unpainted exposed surfaces from corrosion with an anti-corrosion lubricant film. Protect cables and electrode terminals from corrosion with insulating compounds. Apply paint or appropriate rust inhibitors to damaged surfaces to prevent rust and corrosion.

Working in dusty areas

Operating the machine in any area will cause dust. However, in dusty or windy areas, additional precautions must be taken.

1. Keep the cooling system fins and heat dissipation area clean, if possible, clean with compressed air as often as possible.

"⚠"Warning

To avoid death or serious injury

Wear goggles when using compressed air to prevent facial or eye injuries.

2. When repairing the fuel system, be careful to prevent dust and sand from entering the fuel tank and pipes.

3. Regularly maintain the air filter, check the air blockage indicator and clean the dust valve every day to prevent dust and sand from entering the engine components and engine compartment as much as possible.

4. If lubricating and maintaining the machine, clean all lubricating parts before applying lubricant. Lubricating oil mixed with sand will become very rough and accelerate the wear of parts.

5. Protect the machine from dust and sand as much as possible. Park the machine under a cover to prevent dust and sand from damaging the device.

Working in rainy or wet conditions

Working in rainy or wet conditions will follow very similar procedures to those listed above for extremely hot working.

Apply an anti-corrosion lubricant to all exposed surfaces. Pay special attention to damaged or unpainted surfaces, covering any signs of paint cracks and chips as much as possible to prevent the effects of corrosion.

Working in salt water areas

Salt water and mist spray are extremely corrosive. When working in salt water areas or near snow, observe the following precautions:

1. When exposed to salt water, dry the machine thoroughly and rinse with fresh water as soon as possible.

2. Apply anti-corrosion lubricant to all exposed surfaces and pay attention to damaged painted surfaces.

3. Repair all painted surfaces.

4. Lubricate the machine according to the procedures specified in the "Lubrication and Maintenance Chart" in the Operation and Maintenance Manual, shortening the lubrication maintenance interval as appropriate.

5. Check the operating controls and ensure that they function properly and return to the "neutral" position when released.

Working at high altitudes

The instructions for high altitude operation are the same as those provided for extreme cold operation. When operating at high altitude, the engine fuel and air mixture ratio can be adjusted according to the corresponding altitude.

Check the engine operating temperature for signs of overheating. The radiator cap must be sealed tightly to maintain pressure in the cooling system.

• Before operating the control levers, warm up the machine thoroughly. If the machine is not thoroughly warmed up, the machine will move slower.

• If the battery electrolyte is frozen, do not charge the battery or start the engine by other means. It may cause battery explosion or fire.

• Before charging or starting the engine with an auxiliary battery, thaw the battery electrolyte and check for any electrolyte leaks before starting.

Working during lightning storms

Do not enter or exit the machine during a lightning storm.

・If you leave the machine, stay away from it until the storm passes.

•If you are in the cab, keep the machine stationary and remain seated until the storm passes without touching the controls or anything metal.

Exhaust ventilation

Engine exhaust can cause unconsciousness, loss of alertness, and loss of judgment, which can result in death or serious personal injury. Ensure adequate ventilation before starting the engine in any enclosed area. Check and be aware of all windows and doors that can be opened or ductwork that can be used for exhaust and ventilation to avoid exposing others to harmful exhaust.

Ventilation of enclosed areas

If it is necessary to start the engine in a closed area, or handle fuel, flush oil, or spray paint, open doors and windows to ensure adequate ventilation to prevent exhaust gas poisoning.

The combustion waste contained in diesel engine exhaust can be harmful to your health.

Always operate the engine in a well-ventilated area.

Asbestos Information

“⚠”Warning

To avoid death or serious injury

Avoid exposure to dust containing asbestos because it can cause death or serious damage to the lungs or other organs (lung cancer or other cancers).

Asbestos dust can be harmful to your health if inhaled. Materials containing asbestos fibers may be found in the workplace, and breathing air containing asbestos fibers can eventually lead to serious or fatal lung damage or diseases such as lung cancer and other cancers, asbestosis. To prevent lung damage caused by asbestos fibers, follow these precautions:

• Use a certified respirator suitable for asbestos environments.

• Clean with water to reduce dust.

・Always follow any regulations regarding the workplace and work environment.

・Avoid painting or grinding materials containing asbestos.

・Use a vacuum cleaner equipped with a high-efficiency particulate air filter.

・Follow local laws and regulations that apply to the workplace.

・Stay away from areas that may contain asbestos particles.

Silica Dust Information

“⚠”Warning

To avoid death or serious injury

Avoid exposure to dust containing crystalline silica particles because it may cause serious lung damage (silicosis).

Cutting or drilling concrete containing gravel or rock containing quartz can result in exposure to silica dust. Do not exceed the permissible limit (PEL) for silica dust established by OSHA or other workplace rules, regulations, or laws. Use vacuum cleaners, water sprays, or other means to control dust. Silica dust can cause lung disease.

Handling of dangerous goods

Contact with used motor or gear oil can be a health hazard. Wipe the oil off your hands and wash off any remaining residue.

Used motor or gear oil is an environmental pollutant and can only be disposed of in approved recycling facilities. To prevent environmental pollution, be sure to do the following:

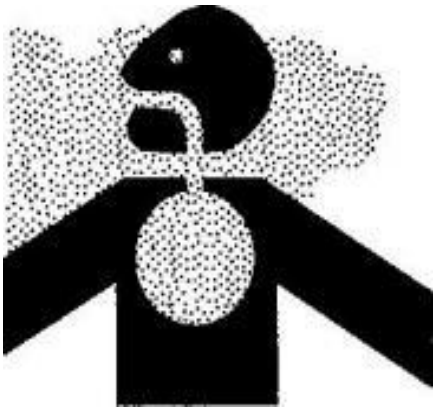
• Never pour waste oil into sewer systems, rivers, etc.

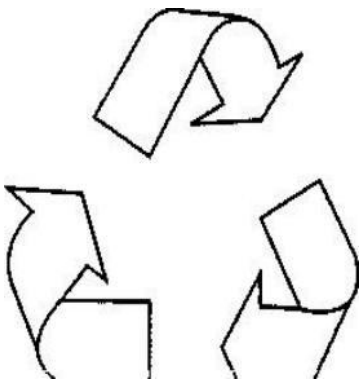
• Always put the oil discharged from your machine into an approved, leak-proof container and never drain the oil directly onto the ground.

• Observe applicable laws and regulations when handling hazardous materials such as oil, fuel, solvents, filters and batteries.

Improper waste disposal can harm the environment. Potentially hazardous liquids must be handled in accordance with local laws and regulations.

Use all cleaning fluids with caution.





OPERATION

The "Operation Controls" section consists of the following:

1. "Parts Introduction"
2. "Cab"
3. "Switches"
4. "Instrument Panel"
5. "Heating and Air Conditioning"
6. "Fuse Box"
7. "Other Electrical Equipment"
8. "Door Side Lock"
9. "Emergency Window Breaking Tool"
10. "Fire Extinguisher Bracket"

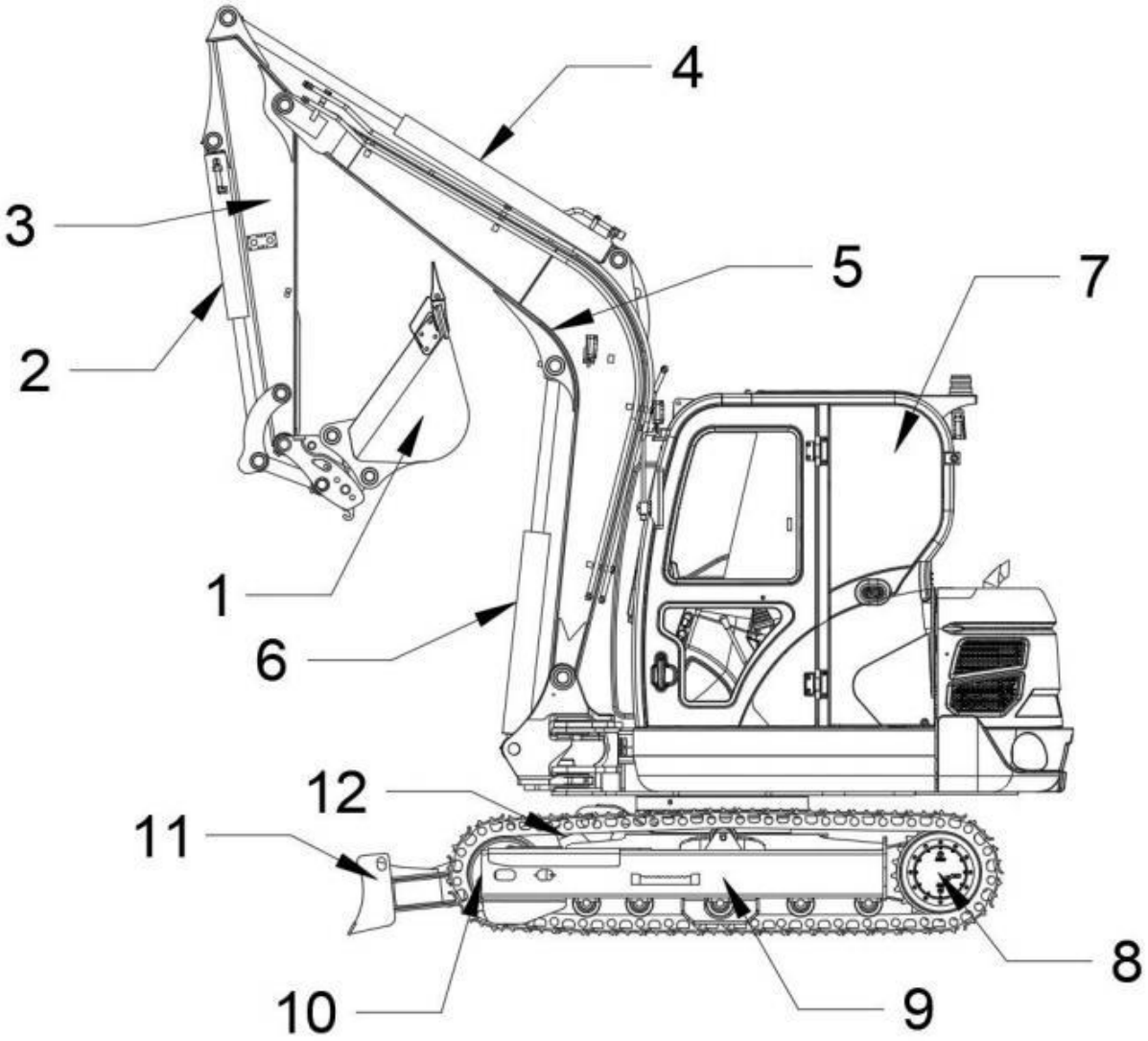
This section uses pictures and text to explain the location of control switches, instrument buttons, etc. and briefly describes their operating functions, etc.

When a machine fault is detected, a warning symbol will appear on the instrument panel, and the operator must understand these functions to ensure normal operation of the machine.

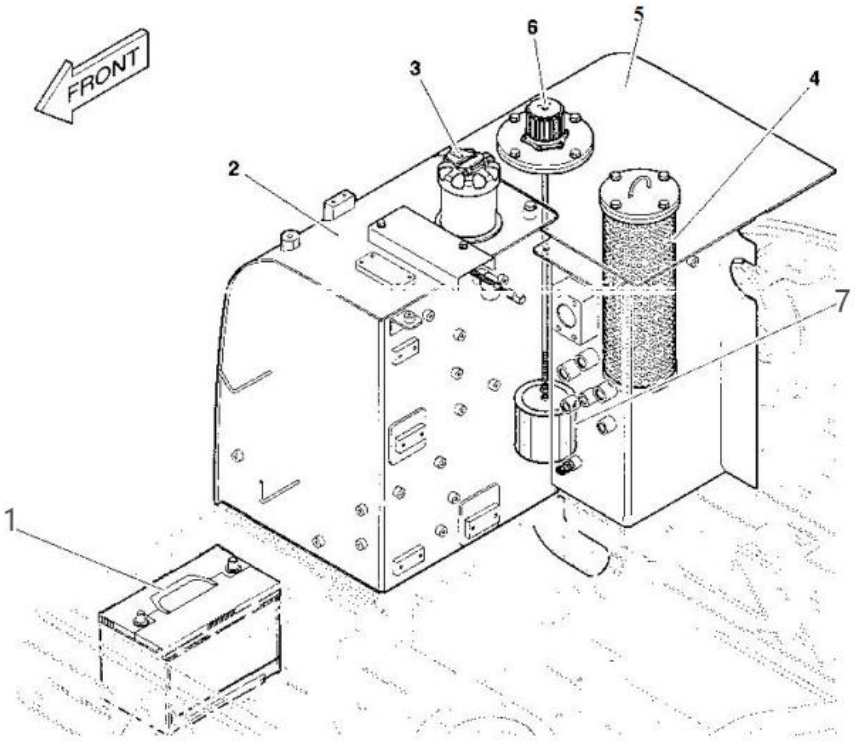
"⚠"Warning

When one or more warning symbols appear on the instrument panel, stop operation immediately. Check and correct machine malfunctions before continuing operation.

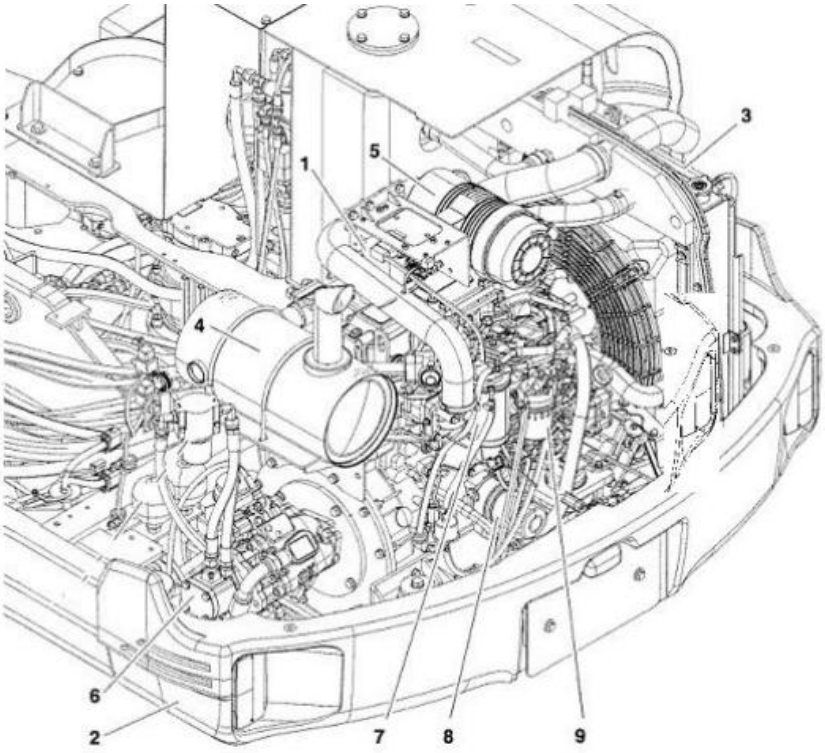
Parts Introduction



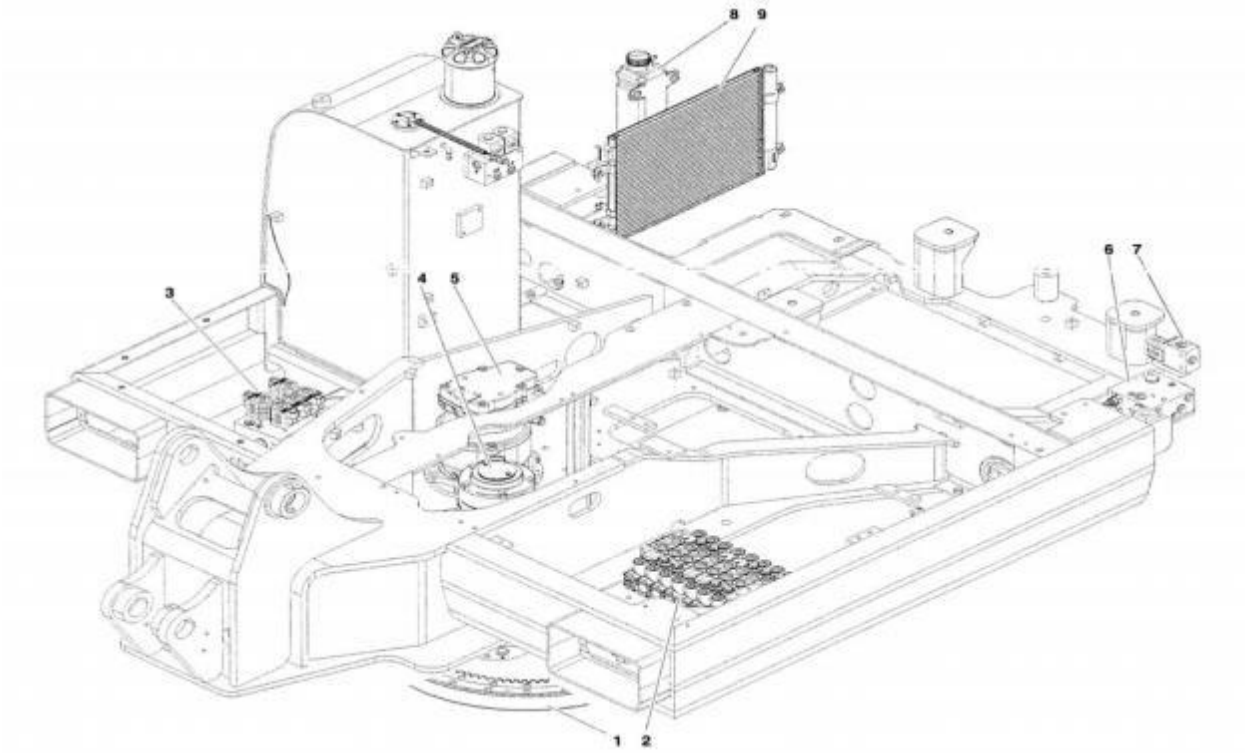
1-bucket, 2-Bucket cylinder, 3-Arm, 4-Arm cylinder, 5-Boom, 6-Boom cylinder, 7-Cab, 8-Drive wheel, 9-Chassis, 10-Guiding wheel, 11-Bulldozer, 12-Bulldozer cylinder



1-Battery, 2-Fuel tank, 3-Fuel filler port, 4-Oil return filter, 5-Hydraulic oil tank, 6-Breathing valve, 7-Oil suction filter

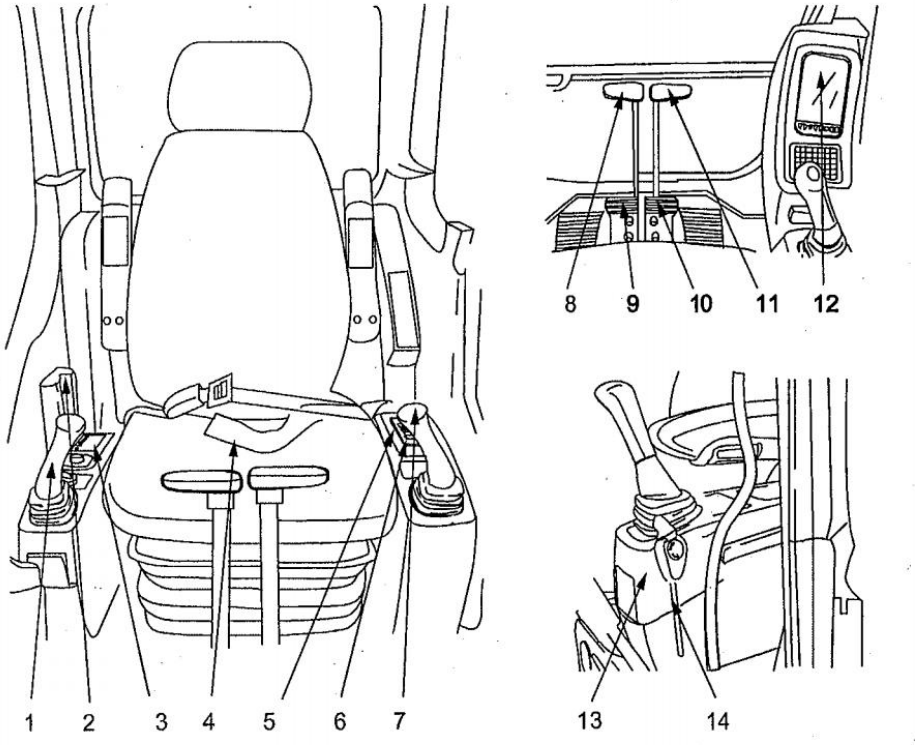


1-Engine, 2-Counterweight, 3-Radiator, 4-Muffler, 5-Air filter, 6-Main pump, 7-Fuel filter, 8-Oil filter, 9-Oil-water separator



1-Slewing support, 2-Control valve, 3-Pilot supply valve, 4-Center joint, 5-Slewing motor, 6-Brake supply valve, 7-Solenoid valve (optional), 8-Auxiliary water tank, 9-Condenser

Cab



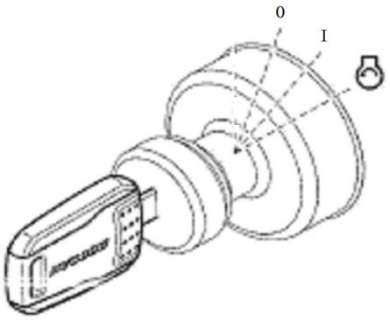
1-Right operating handle/horn, 2-Bulldozer operating handle, 3-Start switch, 4-Seat, 5-Air conditioning air volume switch, 6-Air conditioning cold air switch, 7-Left operating handle, 8-Left walking lever, 9-Left walking pedal, 10-Right walking pedal, 11-Walking lever, 12-Instrument, 13-Operation box, 14-Safety lock control lever

Switches

1.Start switch

The start switch, which is used to start or stop the engine, has four positions.

O: When the switch is in this position, the engine is turned off and the electrical system is powered off. In this position, the engine is turned off, but the lights inside the cab can still work.



I: Turn the switch to this position to energize the equipment electrical system. All indicator/warning lights on the instrument panel will light up for about two seconds. After that, except for the battery charge warning light and the oil pressure warning light, other warning lights should go out.

Note: Preheat indicator light - Whether preheating is performed depends on the temperature of the antifreeze. When the engine antifreeze temperature is low, the preheat indicator light will remain on until the preheat cycle is completed. It takes about 20 seconds for the preheat cycle to complete, and then the indicator light will go out. When this light goes out, the engine can be started.

: Turn the switch to this position and the engine starts.

When the engine is running, immediately release the key to return it to the "I" position.

To avoid damaging the starter motor, the key should not be in the start position for more than 15 seconds.

"⚠"Warning

Avoid injury or death

Do not use starting fluid. Preheating the system may cause the starting fluid to explode. If the engine does not start after the start switch is turned to the start position, please find the cause. If you want to start again, you must first turn the start switch back to the "O" position and then turn the start switch again.

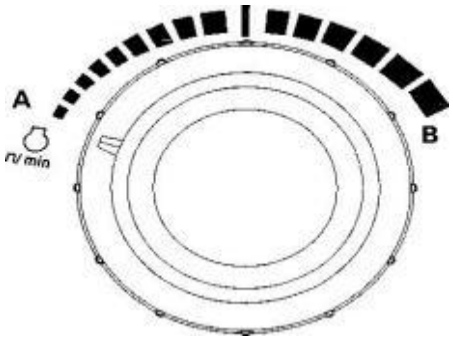
2. Engine emergency shutoff switch

If the engine cannot be turned off using the start switch, the engine emergency stop switch can be used.

Press the button (emergency stop) position to stop the engine. After the engine is turned off, pull up the button and the switch returns to its original position.

1. When the button is pulled up, the engine emergency stop system is in the off state.
2. When the button is pressed, it means that the "emergency stop" mode is selected. The engine will stop.

3. Engine speed control knob (throttle knob)

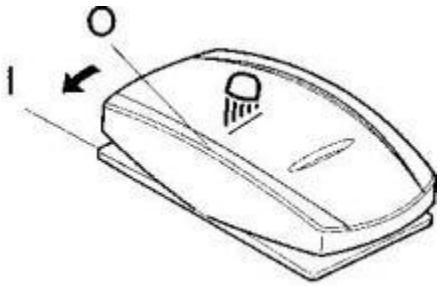


This knob is used to control the engine speed. When turned clockwise, the engine speed increases; when turned counterclockwise, the engine speed decreases.

A. Idle speed (lowest engine speed)

B. High speed (highest engine speed)

4. Work light switch



This switch is used to turn the lights on/off.

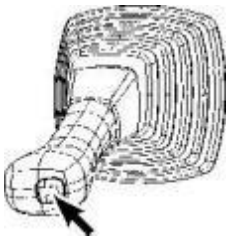
0. In this position, all lights are off.

1. In this position, all instrument panel lights and control switches are on.

Important

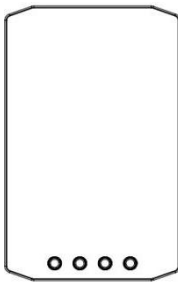
Do not leave any lights on when the engine is not running. Leaving a light "on" with the engine stopped will also continue to discharge the battery.

5. Breaker button (optional)

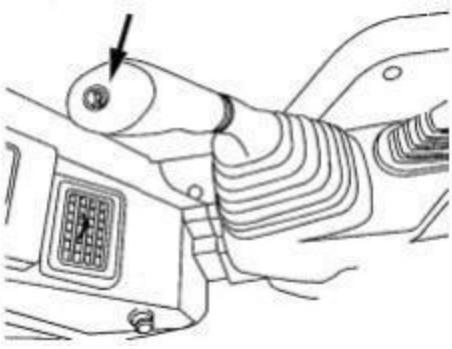


On the right operating handle, press the button and the crusher will start working.

6. Instrument



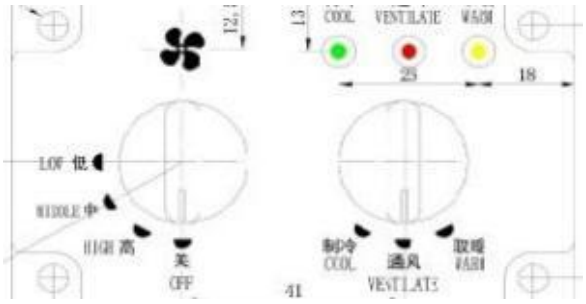
7.Horn switch



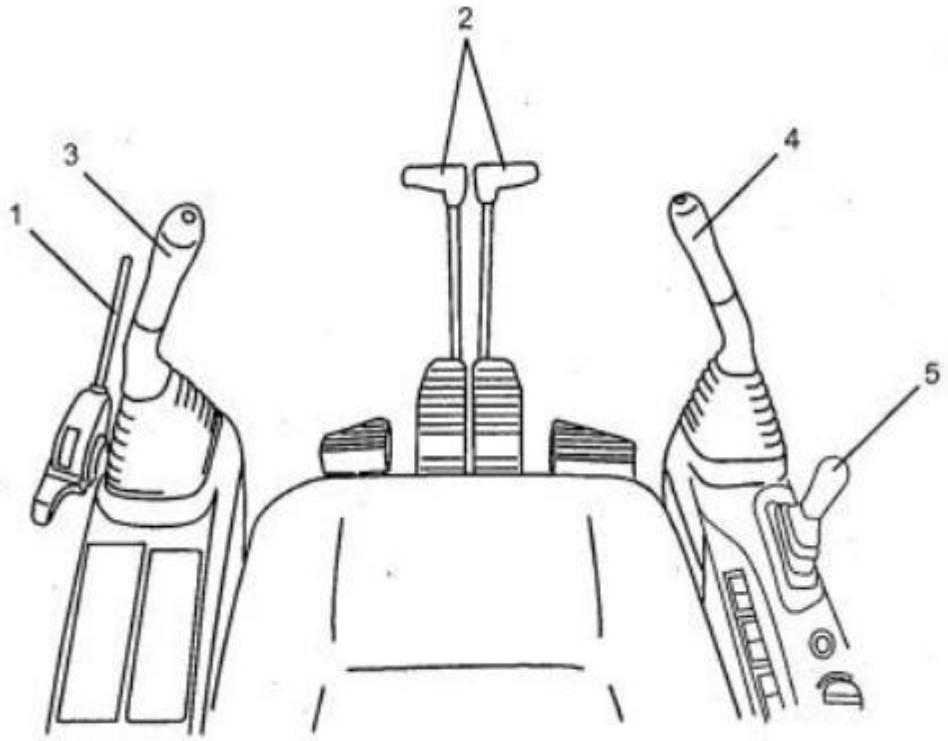
On the right joystick, press the button to sound the horn.

8.Heating and air conditioning control panel

This control panel is used to control the air conditioning and heating in the cabin.



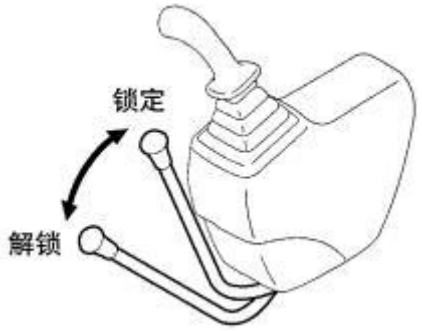
Walking operation



1-Safety lock lever, 2-Travel joystick, 3-Left pilot joystick, 4-Right pilot joystick, 5-Bulldozer lever

1.Safety lock lever

The safety locking lever is a device that locks the working device, slewing, traveling and attachment operating levers.

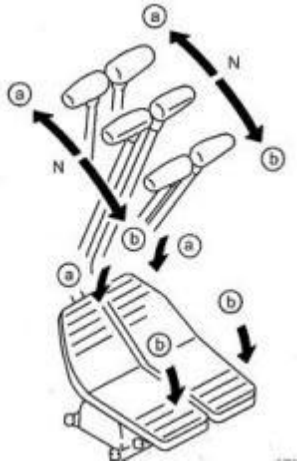


2.Travel joystick

The travel lever and travel pedal (right figure) are used to operate the machine to travel and change the travel direction of the machine.

[a] Forward: Push the joystick forward (or press the front of the pedal)

[b] Reverse: Pull the joystick backward (or press the rear of the pedal)

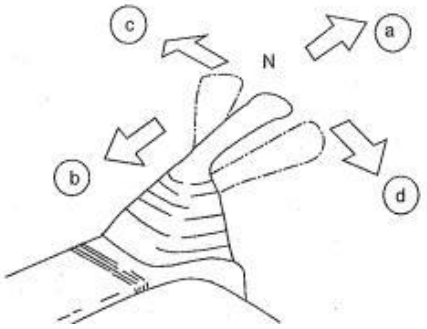


[N] The machine stops (the joystick and pedal return to the center position)

Note: Before operating the travel lever or pedal, confirm the position of the drive wheel. Make sure the drive wheel is at the rear of the machine. If the drive wheel is at the front of the machine, the machine moves backward when the travel lever is pushed forward.

3.Pilot joystick

The left operating handle is used to operate the boom and the upper body.



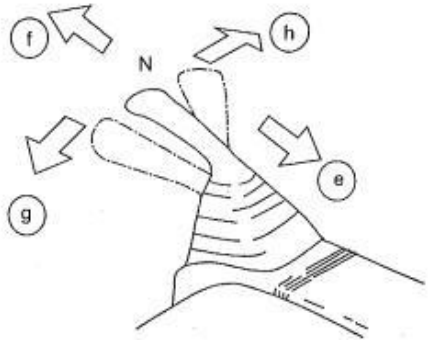
Boom operation/swing operation

[a] Boom unloading [b] Boom digging

[c] Swing left [d] Swing right

N (neutral): The upper body and the boom remain in place.

The right operating handle is used to operate the boom and bucket.



Boom operation/bucket operation

[e] Boom raising [f] Boom lowering

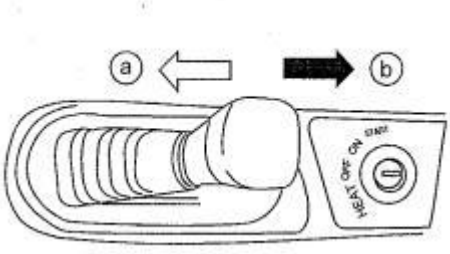
[g] Bucket digging [h] Bucket unloading

N (neutral): The boom and bucket remain in place.

Note: When the operating handle is released, it will automatically return to the neutral position and the machine function will stop. Note: Moving the operating handle in a diagonal direction can achieve two functions at the same time, making a compound action.

4.Bulldozer lever

There is a bulldozer operating handle on the right side of the cab seat. Push the operating handle forward to lower the bulldozer, and pull the operating handle backward to raise the bulldozer.

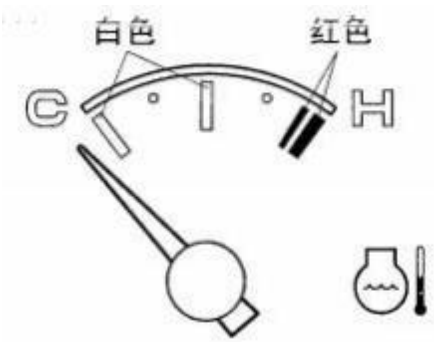


[a]: Forward (bulldozer lowers)

[b]: Backward (bulldozer rises)

Instrument Panel

1.Engine water temperature display area



Indicates the temperature of the engine antifreeze.

-White zone (□): Indicates that the temperature is at normal temperature.

-Red zone (■): When the engine overheats to the red zone, the warning symbol on the right will light up. Stop operation immediately and let the engine run at a low speed until it returns to the normal range. Then turn off the engine after idling for 5 minutes and find the cause of the fault.

After the engine is turned off, check the antifreeze level, whether the fan belt is loose, and whether there is debris around the radiator.

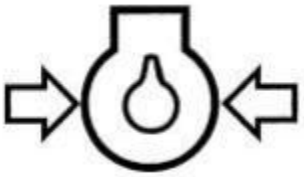
2.Fuel level display area

Displays the amount of fuel in the tank when the equipment is level.

-White area (□): The fuel level is adequate.

-Red area (■): Indicates that the fuel is low and the right warning light is on. In this case, refill the tank with fuel immediately. Check the fuel level on a firm, flat surface.

3.Oil pressure warning light



If the oil pressure is too low, the light will come on.

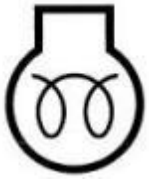
The light on the start button "I" will come on and will automatically go off after the engine starts.

When the alarm light comes on or the buzzer sounds during operation, stop the machine immediately to check the lubrication system. Note that if you continue to operate with the alarm light on, the engine will be seriously damaged.

Caution

Continuing to operate when this light is on may result in serious engine failure.

4.Engine preheat indicator light

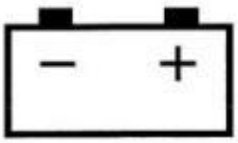


In cold weather, this light comes on to indicate that the engine preheating system is operating.

When this light goes off, it means the engine heating cycle is complete.

5.Charging warning light

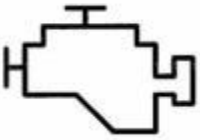
This warning light will light up when the start switch is in the energized position, and will go out after the machine is started. If the light does not go out, shut down the engine immediately and determine the cause of the fault.



6.Check Engine Warning Light

This indicator light comes on when there is an engine malfunction.

Note: If this light comes on, shut down the engine immediately and repair the malfunction.



7.Oil and water separation warning light

When the oil-water separator is full of water, this indicator light will come on. When this light comes on, the water in the oil-water separator should be drained as soon as possible.

8.Air filter clogging warning light (mechanical indicator light)

The light comes on when the air filter is clogged.

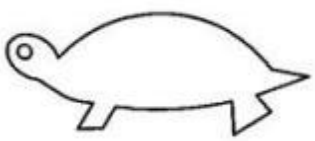
If the light comes on, clean the outer filter first. If the warning light does not go out after cleaning, replace the inner and outer filters.

9.High speed indicator light

This indicator light comes on to indicate that a high travel speed is selected.

10.Low speed indicator light

This indicator light comes on to indicate that a low travel speed is selected.



Fuse box

There is a fuse box behind the right side of the seat. Fuses protect electrical equipment from overload or short circuit.
The nameplate attached to the fuse box cover shows the function and current value of each fuse.
Spare fuses are installed inside the fuse box cover.
(One each for 10A, 15A, 20A and 30A)
If the fuse of the component is damaged, replace the fuse.
If the new fuse is still disconnected, check the circuit and repair it.

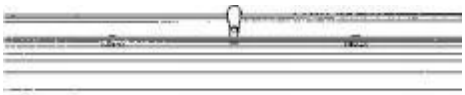
"⚠"Caution

Avoid injury or death

Always replace old fuses with fuses of the same type and capacity that were removed. An incorrect fuse could cause damage to the electrical system or result in fire, death, or serious injury.

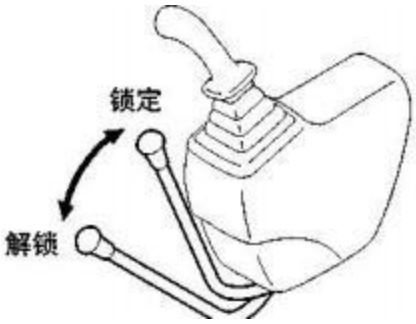
Other electrical parts

Cab ceiling light



This light is mounted on the top of the cab.
This light can be turned on regardless of the start switch position.
Note: If this light is turned on for a long time when the engine is not running, the battery will be discharged.

Pilot cut-off switch

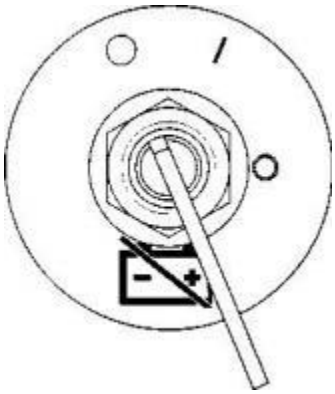


This switch disables the front work device operating lever when the safety lever is in the locked position.
When the operating lever is disabled, digging/operation etc. cannot be performed.

Battery disconnect switch

There is a battery disconnect switch in the battery box.
If the vehicle is not powered on, first check whether the battery disconnect switch is in the "ON" position (I in the right figure).

When the battery disconnect switch is in the "OFF" position, the entire vehicle equipment is in a power-off state.
When repairing the equipment, please disconnect the battery disconnect switch first to avoid accidents.
When the equipment is parked and not in operation, please disconnect the battery disconnect switch.
Before starting the engine, turn on the battery switch.

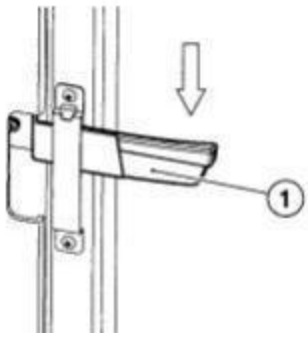


Cab door side lock

1. The door side lock (1, right picture) is used to secure the cab door to the outside of the cab when the door is open.

Note: When the excavator is not in use, keep the door closed and locked.

2. To release the door from the side of the cab, press down the cab door locking lever (1, right picture). The locking lever is located on the left side of the cab seat.



Emergency glass breaking tool

The excavator is equipped with a glass breaker tool, which is located on the left column in the cab.
In an emergency, the driver needs this tool to break the glass and escape from the cab.
Hold the handle tightly and smash the glass with the sharp end.

"⚠"Warning

Be sure to protect your eyes when breaking glass.

Fire extinguisher bracket

The excavator is equipped with a fire extinguisher bracket, which is located on the left column in the cab. Please prepare a fire extinguisher in advance and store it here.
The lock rod is on the left side of the cab seat.

OPERATION

New machine operation instructions

All Kenstone excavators are inspected before leaving the factory. However, operators are still required to follow the following steps during the initial running-in period. Failure to follow these steps may result in damage to the machine or reduced performance.

Working hours	Loading
First 50 hours of work	Maintain about 80% of full load (engine speed: 80% of rated speed)
After 50 hours work	Full load

If the machine is used at full capacity before the running-in period, it may affect the service life and overall performance of the machine.

Notes:

1. Check for leaks in antifreeze, fuel, engine oil and hydraulic oil every day.

2. Check all lubricants or lubricants every day and add appropriate lubricants or lubricants as needed.

3. During operation, monitor all instruments and dashboards at any time.

4. Avoid excessive engine load.

5. Keep the load below 80% before the engine and other components reach operating temperature.

6. Pay attention to whether the working device is normal during operation.

7. Check whether the parts are loose or damaged during transportation.

8. Check whether the wires or terminals are loose, whether the instruments are working, etc.

9. When replacing new parts on the machine, first replace the lubricant once.

10. Check whether the track, sprocket, tensioner and guard plate are normal every day.

Start and stop of the engine

Normal check

“⚠”Warning

To avoid severe personal injury or death

If flammable materials such as leaves or paper are allowed to accumulate on hot parts, such as the engine muffler, it may cause a fire. Leakage of fuel, lubricating oil and hydraulic oil may cause a fire. Please clean the machine before operating it, remove all flammable materials on the machine, and repair the machine in advance.

Before starting the engine, check the following items. If any problems are found, repair them before operating the machine.

1 .Overall inspection

Check working devices, cylinders, connecting rods and hoses for damage, wear, cracks and oil leaks.

Check chassis for damage, wear, cracks and loose bolts.

Check doors, handrails, guardrails and steps for problems and loose bolts.

Clean and inspect the cab's glass, rearview mirrors, rearview camera (if equipped) and working lights.

Clean and inspect the dashboard, switches and control panels in the cab.

2.Clean

Remove dirt and debris from around the engine, radiator, and battery.

Check and remove flammable materials from around the muffler, battery, or other high-temperature components.

Clean and inspect the condenser and radiator fins.

3.Engine system

Check for antifreeze and oil leaks around the engine and cooling system.

Check the engine exhaust system.

4.Fuel system

Drain water and sediment from the fuel tank and water separator.

Check the fuel system for fuel leaks.

5.Hydraulic system

Check for hydraulic fluid leaks, damaged lines and hoses, and interfering components.

6.Electric system

Check for damaged wiring harnesses and loose or missing plug-ins.

7.lubricating

Perform all routine maintenance and scheduled repairs. Perform maintenance based on the readings shown on the hour meter.

8.Safety

Walk around the machine to check. Before starting the engine, make sure no one is under the machine or performing any maintenance work on it.

9.After starting the engine

Check that all operating devices and controls are in proper working order and operate normally. Stop operation and correct any malfunctions before continuing.

10.Drivetrain

Check whether the transmission system has abnormal noise, looseness, etc.

Check before starting the engine

Before starting the engine, check the following items. If any problems are found, repair them before operating the machine. If the oil, fuel or antifreeze level is below the "LOW" mark, add more.

1. Lubricate the boom, stick and front attachment pins with grease.
2. Check the engine oil level.
3. Check the hydraulic oil tank level.
4. Check the fuel level.
5. Clean the radiator screen.
6. Check the cooling system and fill with antifreeze as needed.
7. Check the window washer fluid level.
8. Check the bucket teeth and side teeth for signs of wear.
9. Check the engine fan blades.
10. Check the air intake system.
11. Check the seat belts for any damage and proper operation.
12. Check the structural parts for cracks and defective welds.
13. Check the operation of all switches.
14. Check the operation of all exterior lights, horn, travel siren/swing siren (if equipped), rearview camera (if equipped) and console indicator lights.

Starting the engine with an external power source

"⚠"Warning

To avoid severe personal injury or death

1. Batteries generate explosive gases when in use or charging. Keep flames or sparks away from the battery area.

2. Charge batteries in a well-ventilated area.

3. Always wear eye protection when starting a machine with auxiliary wires.

4. Improper auxiliary starting procedures could cause an explosion, resulting in death or personal injury.

5. Assist start the machine on a dry ground or concrete cement floor. Do not assist start the machine on a steel floor, as the floor is always grounded.

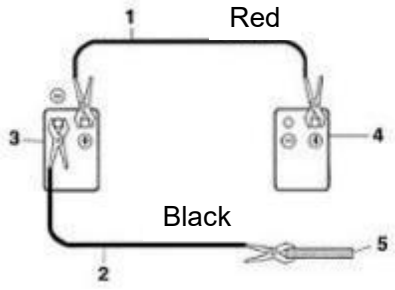
6. When assist starting from another machine, make sure the machines are not touching each other.

7. Always connect the positive (+) terminal of the auxiliary battery to the positive (+) terminal of the feed battery first. Then connect the negative (-) terminal of the auxiliary battery to the frame of the machine.

8. Connect the positive terminal first when installing the cable and disconnect the negative terminal first when removing the wire.

When the engine cannot be started due to battery power supply, connect the wire to the auxiliary battery to start the engine. The connection method is as follows:

1. Turn off the engine with the auxiliary battery.
2. Connect one end of the red wire to the positive pole of the excavator battery and the other end to the positive pole of the boost auxiliary battery.
3. Connect one end of the black wire to the negative pole of the auxiliary battery and the other end to the upper frame of the excavator and away from the excavator battery.
4. After starting the engine, remove the negative pole first when removing the wires.



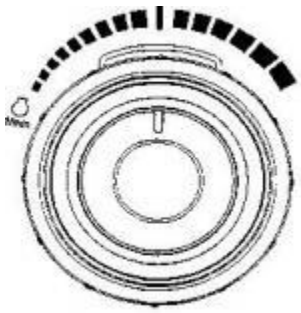
Hydraulic system heating up

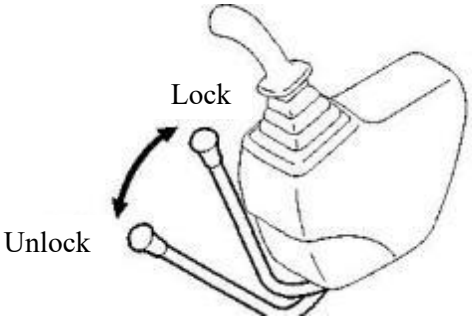
Important

If a problem or abnormal operation occurs, stop the engine immediately. Especially in cold weather, let the excavator reach normal operating temperature before starting work.

The normal operating temperature of hydraulic oil is 50 ~ 80 ° C (120-175 ° F). Make sure to follow the steps listed here for warming up the hydraulic system.

1. Run the engine at medium speed without load for about 5 minutes.
2. Move the safety handle to the "unlocked" position.
3. Slowly cycle the boom, stick and bucket cylinders five times without load to circulate the hydraulic oil in the system for five minutes.
4. Check the clearance and fully raise the front attachments such as buckets. Swing the excavator three times clockwise and then three times counterclockwise.
5. Operate the excavator to move forward/reverse at a low speed for a distance.





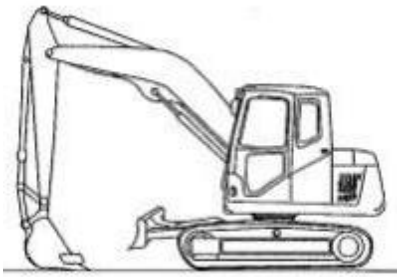
Hydraulic system heating-up in cold weather

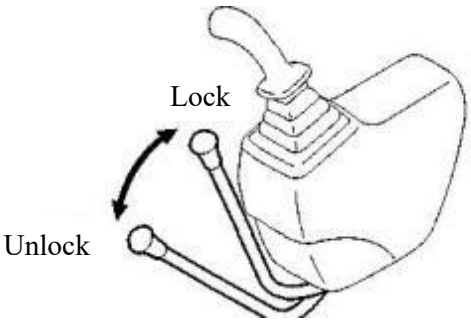
1. Set the engine speed adjustment knob to "lowest" speed and run for 5 minutes (no load operation).
2. Set the engine speed range to medium speed and run the engine without load for about 5 minutes.
3. Set the safety lever to the "unlocked" position.
4. Cycle the boom, stick and bucket slowly five times without load to circulate the hydraulic oil through the system for five minutes.
5. Set the engine speed to "high".
6. Repeat step 4. If the working speed is still slow, continue to operate carefully because the machine function may be unstable.
7. Check the space and raise the front attachment completely. Turn slowly three times clockwise and three times counterclockwise.
8. Operate the excavator to move forward/reverse at a slow speed for a distance.

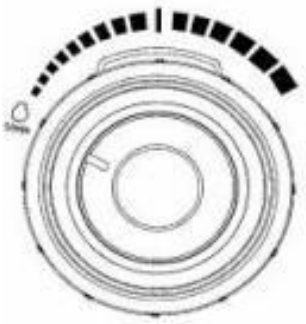
Stop the engine

NOTE: Allow the engine to idle for at least 5 minutes before stopping it. If it is not allowed to idle, a heat surge can cause engine damage. Allowing the engine to idle allows the engine to cool.

1. Park the machine on a level and solid surface.
2. Lower the bucket and dozer blade to the ground.
3. Lift the safety lever up and put it in the "lock" position.
4. Run the engine at no load and low idle for 5 minutes.
5. Turn the start switch to the "ACC" and "O" positions in sequence to shut down the engine.
6. Remove the key from the start switch.







Check and confirm after shutting down the engine

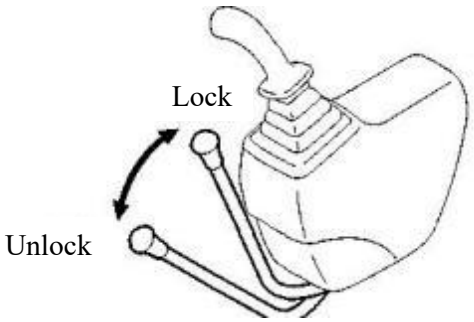
1. Turn on the parking function.
2. If there is a leak of antifreeze or oil, etc., repair the excavator.
3. Check the front accessories and chassis appearance for abnormalities. Repair the problems that occur.
4. Fill the fuel tank and drain the water in the fuel system.
5. Clear the flammable materials accumulated in the engine compartment, such as leaves and paper scraps.
6. Clear the dirt and other debris on the lower structure and crawler tracks.

Make sure all steps and handrails are clean, and keep the cab clean.

Safety lever

When moving the safety bar, be careful not to knock down the operating handle.

1. Pull up the safety bar and make sure that the safety bar is "locked" in the raised position. When the safety bar is in the "locked" position, the front working device and rotation will not work.



"⚠"Warning

When leaving the operator's seat, move the safety lever to the "LOCK" position and stop the engine to prevent accidental activation of the operating levers and control switches.

2. Push the safety lever down to the "unlock" position. The excavator can work normally only when the safety lever is in the "unlock" position.

NOTE: While the engine is not running, moving the work lever (joy handle) will cause the work equipment to move when the safety lever is in the "unlocked" position and the start switch is in the "live" position.

Driving

1. Before moving the machine, make sure that the direction you want to travel is consistent with the travel control pedal/lever. When the travel motor is at the rear, step on the front of the travel pedal or push the travel lever forward and the machine will move forward.
2. Choose flat ground as much as possible. Drive the machine in a straight line as much as possible, and change direction slightly and gradually.
3. Before traveling, check the strength of the bridge and roadbed. Strengthen them as needed.
4. In order not to damage the road surface, use wooden boards. When traveling on asphalt roads in summer, drive carefully.
5. When crossing tracks, use wooden boards to avoid damaging the tracks.
6. Do not let the machine come into contact with wires and bridge edges.
7. When crossing a river, measure the depth of the river with a bucket and cross the river slowly. Do not cross the river when the water exceeds the upper edge of the sprocket.
8. When traveling on uneven terrain, reduce the engine speed. Select a low travel speed. A slower speed will reduce the possibility of damaging the machine.
9. Avoid operations that may damage the tracks and undercarriage components.

Operating instruction

1.Precautions when moving the excavator

Before operating the steering lever, check the direction of the crawler frame.

If the drive wheel is in the front, the operation of the travel lever is opposite.

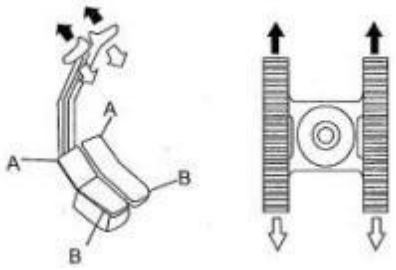
Turn the throttle control knob clockwise to the high speed position to increase the engine speed.

Note: Standard travel position: the guide wheel is at the front of the machine and the travel motor is at the rear. If the travel motor is at the front of the machine, the control direction of the travel pedal will be opposite to the travel direction of the machine. Be sure to confirm the position of the travel motor before traveling. When traveling long distances, please rest for 5 minutes every 20 minutes to avoid damaging the travel motor; for smooth operation, a damper is set on the operating lever. In cold weather, the operating force of the operating lever will increase. At this time, you can operate the travel lever several times when the safety lock control lever is in the locked position.

2.Driving the machine using pedals

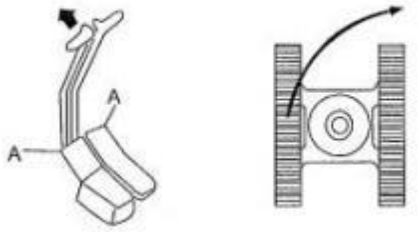
a To walk forward: Press down on the front part A of both pedals.

b To walk backward: Press down on the rear part B of both pedals.

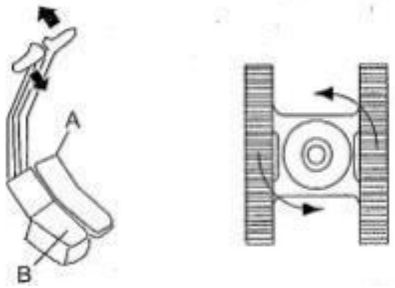


c Turn right: Press the front part of the left pedal A.

d Turn left: Press the front part of the right pedal A.



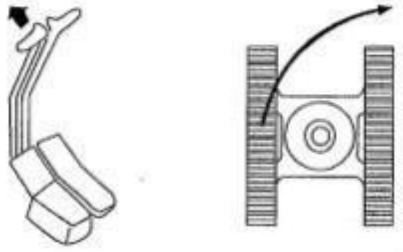
e Rotation in place (self-rotation): Step on the front of one pedal A and the back of the other pedal B



3. Use the joystick to drive the machine

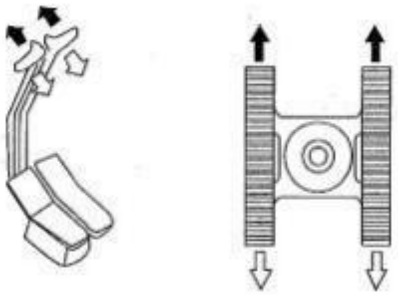
a Walking forward: Push the two walking poles forward.

b Walking backward: Pull the two walking poles backward.

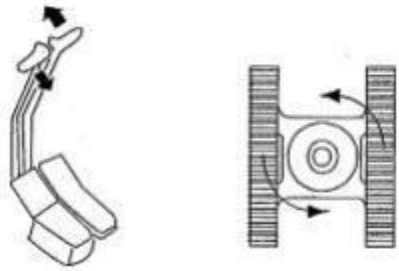


c Turn right: Push the left travel lever forward.

d Turn left: Push the right travel lever forward.

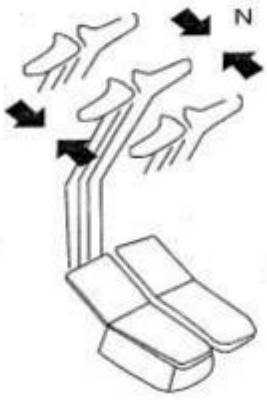


e Rotate in place (self-rotation): Push one side of the travel joystick forward and pull the other side of the travel joystick backward



4.Stop the machine

Avoid sudden stops during the machine's travel. There should be enough space when parking. Put the left and right travel levers in the middle position, and the travel brake will automatically be in the braking state to stop the machine.



Operating joystick (ISO mode)

"⚠"Warning

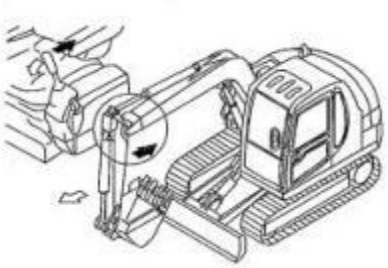
Prevent injury or death

Check the surrounding area before turning around and keep other people away.

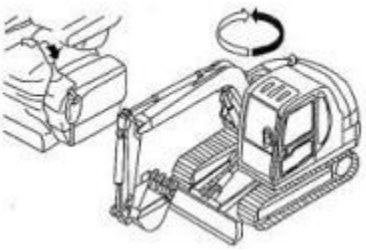
Note: When starting work, move the handle slowly and check the front working device and the rotation action.

The handle of this excavator complies with ISO standards. Do not change the valves, hoses and other parts, otherwise the standard configuration will be changed. The relationship between the boom, dipper arm, bucket and rotation direction and the operating handle is as follows:

1. Arm Control: Move the left stick forward or backward to operate the stick.



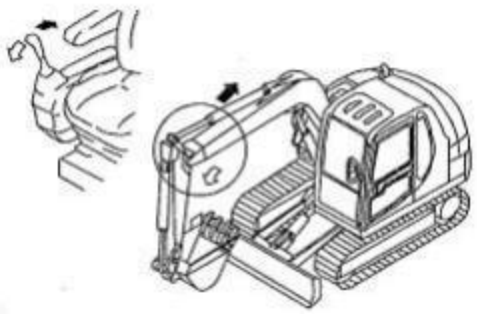
2. Swing control: Move the left operating lever to the left or right to swing the upper body



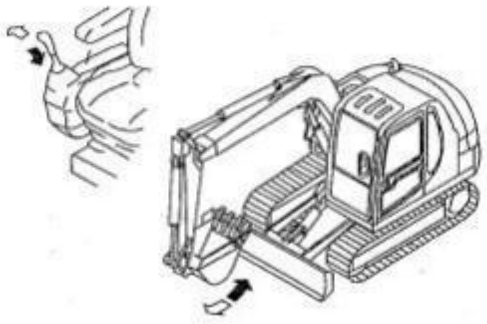
NOTE: Swing Park is spring-applied and hydraulically released. Park will be maintained when the handle is in the "Neutral" position or the engine is stopped.

Note: The pause phenomenon when the bucket arm moves is not a malfunction of the excavator. It is because when the bucket arm moves, the weight will increase the speed of movement, causing insufficient oil supply. It is not a mechanical failure, but a normal phenomenon in the use of the excavator.

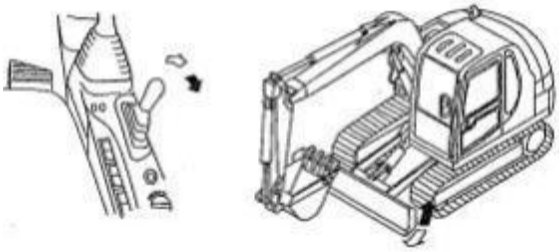
3.Boom control: Move the right working device joystick forward or backward to operate the boom



4. Bucket Control: Operate the right travel joystick left or right to operate the bucket.



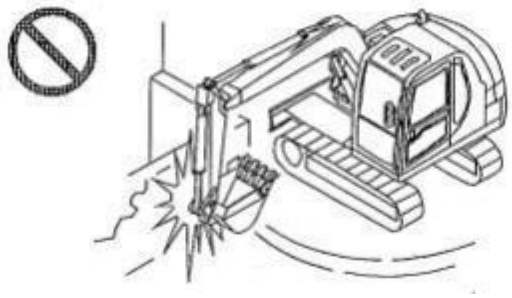
5. Bulldozer control: Push forward or pull backward the bulldozer joystick to operate the bulldozer



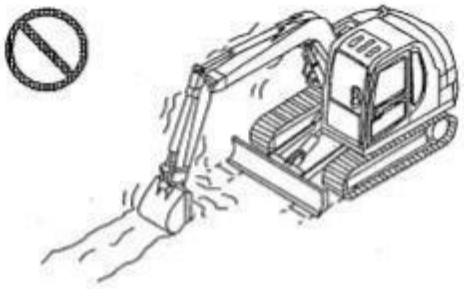
Note: Even if the engine is stopped, the operating handle can still lower the front device to the ground when the start switch is turned to the "ON" position.

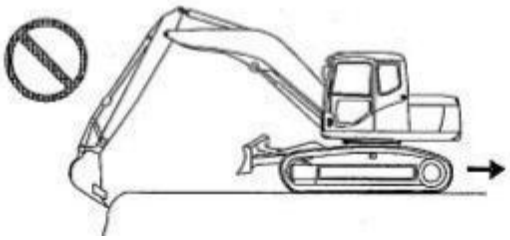
Prohibited Operations

1. Do not use the rotational force to compact the ground or crush objects. Doing so is not only dangerous, but will also significantly shorten the service life of the machine.

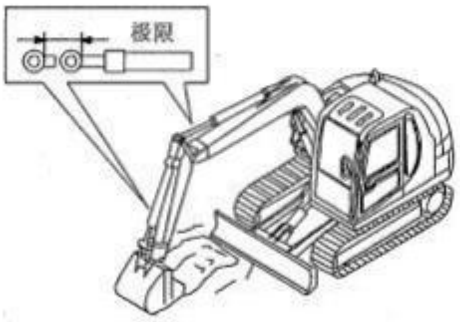


2. Do not insert the bucket into the ground and use walking force to dig, as this may damage the machine or working device.

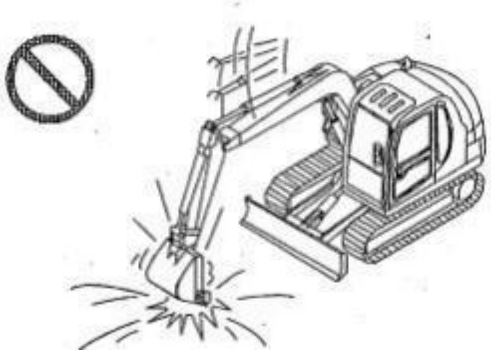




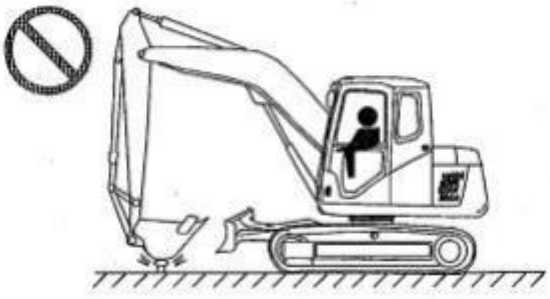
3. If the working device is used and subjected to some external force when the cylinder piston rod is operated to the end of its stroke, the hydraulic cylinder will be damaged and personal injury will be caused. Avoid operating when the hydraulic cylinder is fully retracted or fully extended.



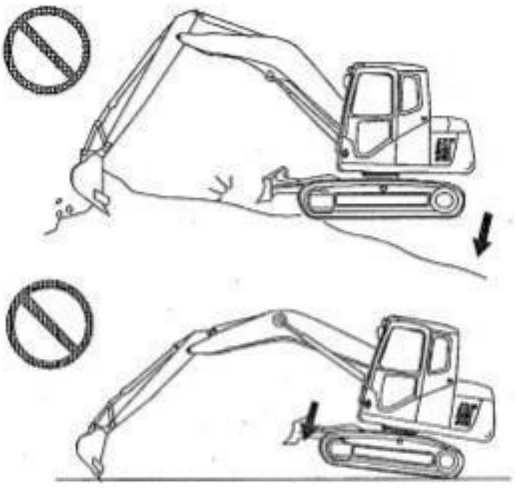
4. Do not use the downward force of the bucket for digging, hand pick, crushing or piling operations. This will significantly shorten the service life of the machine.



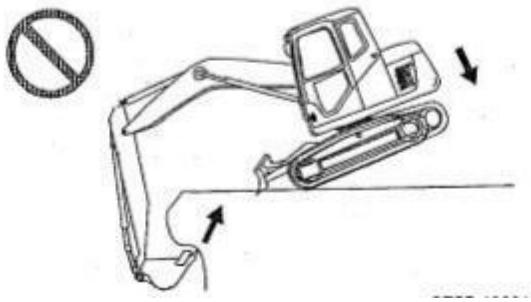
5. To avoid damage to the hydraulic cylinder, do not hit the ground with the bucket or tamp it with the bucket when the bucket cylinder is fully extended (bucket is fully retracted).



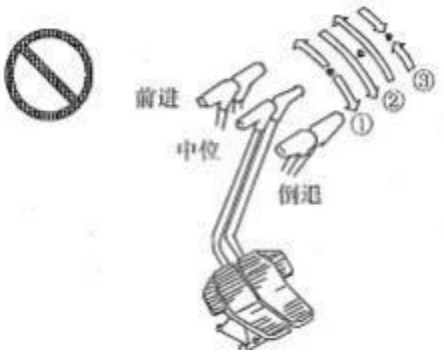
6. Do not use the force generated by the machine's own weight to dig.



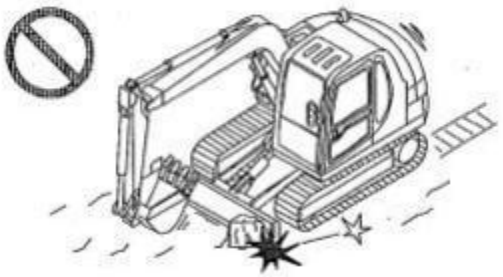
7. It is better to crush the material by other means first and then excavate it. This will not only reduce the damage to the machine but also be more economical.



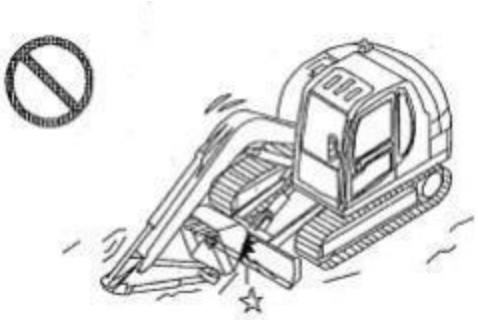
8. Do not make sudden changes in the travel lever, as this will cause a sudden start.
Avoid sudden changes in the lever from forward to reverse (or reverse to forward).
Avoid sudden changes in the travel lever, such as sudden stops from high speed (releasing the travel lever).



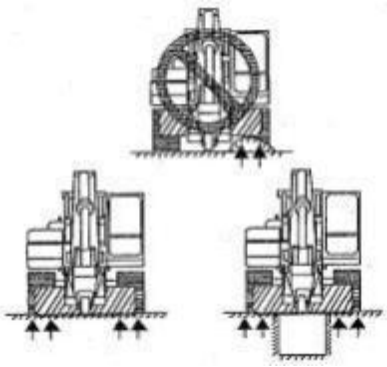
9. Be careful not to hit the bulldozer against rocks or shoulders, as this may cause premature damage to the bulldozer or cylinder.



10. When the working device is put into walking or transporting state, be careful not to let the bucket hit the bulldozer.



11. When using a bulldozer as an outrigger, do not support the machine by the end of the bulldozer



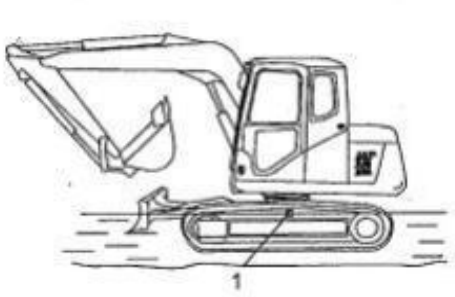
12. Permissible water depth

Do not operate the machine in water that exceeds the centerline of the carrier roller [1].

Add grease to parts that have been submerged for a long time until the used grease is completely squeezed out (especially around the bucket pin).

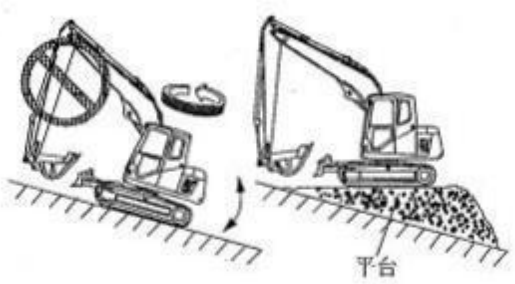
Make sure the foundation at the work site is strong enough to prevent the machine from sinking into the water depth exceeding the centerline of the carrier roller.

When operating in this environment, check the position of the machine frequently. If necessary, reposition the machine.

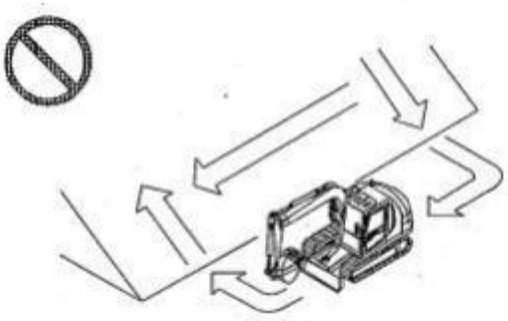


Avoid submerging the slewing bearing, slewing gear and central slewing joint.
If the slewing bearing, slewing gear and central slewing joint are submerged, remove the drain plug to drain the mud and water, clean the slewing area and install the plug. Lubricate the slewing internal gear and slewing bearing.

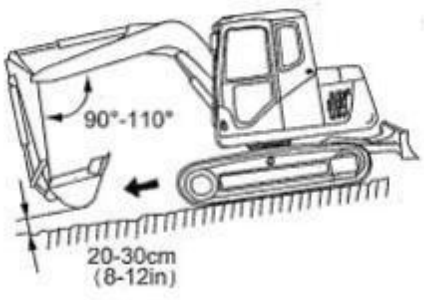
13. Walking on a slope



When working on a slope, turning or operating the working device will cause the machine to lose balance and overturn, so such operations should be avoided.
It is very dangerous to turn the bucket downhill when it is loaded. If such an operation is required, use a platform on the slope to keep the machine level during operation.
Do not walk on a steep slope. There is a risk of overturning.
Do not walk downhill backwards.
Do not turn on a slope or walk across a slope. Be sure to turn and other operations on flat ground to ensure safety.
When walking uphill, if the track shoes slip or the track force alone cannot go uphill, do not use the pulling force of the bucket arm to help the machine go uphill. This may damage the machine.
Never try to go up or down a slope with a slope greater than 30°, and never try to cross a slope with a slope greater than 15°.



When going down a steep slope, use the travel lever and the accelerator to maintain low speed. When going down a steep slope with a slope of more than 15°, adjust the working device to the state shown in the right figure and reduce the engine speed.



Do not attempt to turn on a slope. The machine may slip or tip over. Turn only on very gentle slopes with firm ground.

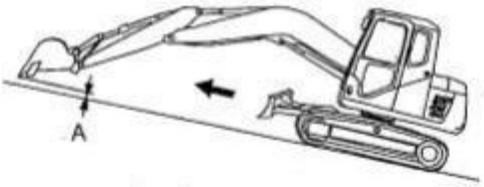
Avoid crossing slopes as much as possible; the machine may slip or tip over.

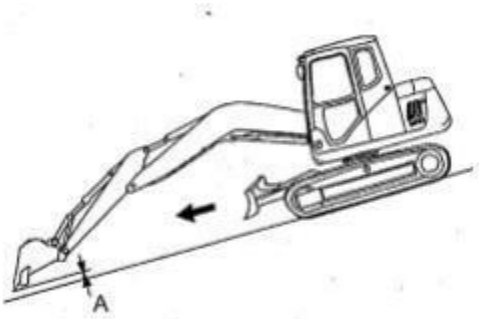
Avoid swinging the upper vehicle on a slope, and never try to turn it downhill. The machine may fall over. If you must turn it downhill, operate the upper vehicle and boom carefully at a slow speed.

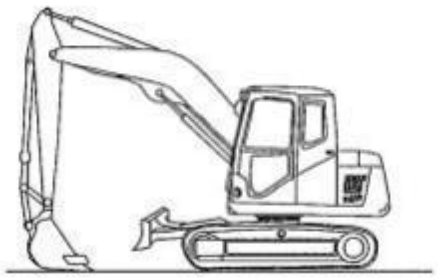
If the engine stalls on a slope, immediately lower the bucket to the ground, put the operating levers and handles in the neutral position, and restart the engine.

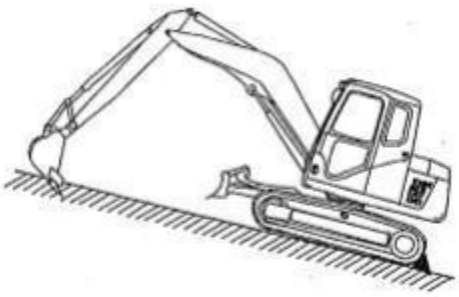
Before going up a steep slope, be sure to fully warm up the machine. If the hydraulic oil is not fully warmed up, the machine may not perform to its full potential.

Avoid crossing the slope. When walking on a slope, the tracks should face uphill. When going up and down a slope, keep the bucket facing the direction of travel and about 20~30cm off the ground (as shown in A). If the machine starts to slip or become unstable, lower the bucket immediately.









Excavator parking

1. Normal parking

1) Drive the machine onto a firm, level surface.

2) Lower the bucket to the ground.

3) Turn the throttle control knob counterclockwise to the limit position (low-speed no-load position). Run the engine for about 5 minutes to allow the engine to cool.

4) Set the safety lock lever to the locked position.

5) Turn the start switch to the [OFF] position and remove the key from the start switch.

6) Close the windows, skylight and cab door.

Note

Protect the electrical components of the cab on rainy days. When parking the machine, be sure to close the windows, skylight and cab door.

2. Parking the machine on a slope

If it is unavoidable to park the machine on a slope:

1) Insert the bucket teeth into the ground.

2) Return each operating lever to the neutral position and pull the pilot control switch to the locked position.

3) Use blocks to support the tracks on both sides.

Warning: Avoid parking the machine on a slope to prevent

the machine from tipping over and causing casualties!

Traction

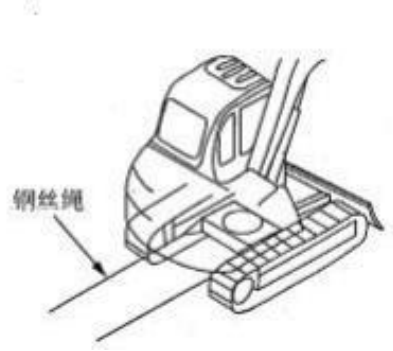
When towing the machine, use a wire rope of sufficient strength.

To avoid serious injuries or fatalities, do not use damaged chains, worn cables, hooks, belts or ropes to tow the machine.

Do not apply sudden loads to the wire rope.

If the machine is stuck in the mud and cannot be driven out by its own power or when using the excavator's towing bar to tow heavy objects, use the wire rope as shown in the right figure.

A wooden block should be placed between the wire rope and the machine body to prevent damage to the wire rope and the machine body. At this time, do not use a light load towing hook.



Hydraulic breaker (if equipped)

Important

If the hydraulic breaker and pipelines installed are not certified by Kenstone, serious failures may occur that are not covered by the warranty.

Selection of hydraulic breaker

If installing a hydraulic breaker, the stability of the equipment should be considered and whether it is suitable for such a modification. The appropriate pressure and flow should also be considered. Please consult your Kenstone dealer.

Hydraulic hoses and lines for breakers

1. When installing a hydraulic breaker, follow the instructions provided with the attachment.
2. If the breaker is removed from the excavator, plug the hose and pipe joints with plugs to prevent foreign matter from entering the hydraulic system.
3. Plug or cover the joints and accessories on the breaker to prevent contamination.
4. Before starting operation, check all pipes and hydraulic joints for signs of leaks or looseness.

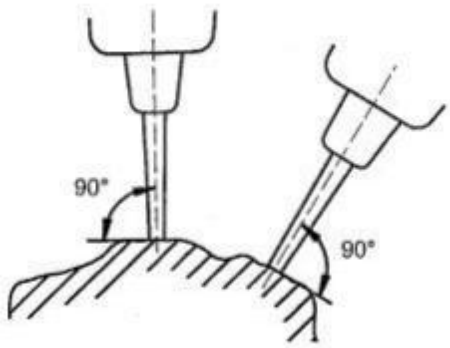
Precautions when using hydraulic breaker

Be sure to read and understand the instructions for using the breaker.

Check all mechanical damage and hydraulic pipe connections.

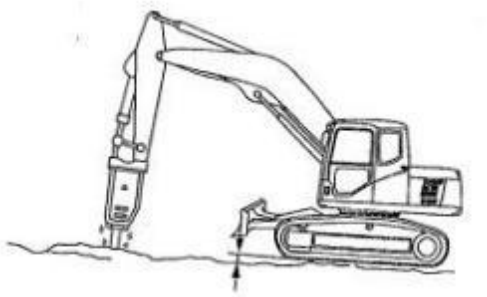
When installing a hydraulic breaker, be careful to choose the right location when connecting the pipe.

1. Press the drill rod vertically against the surface of the object to be broken (as shown in the figure).



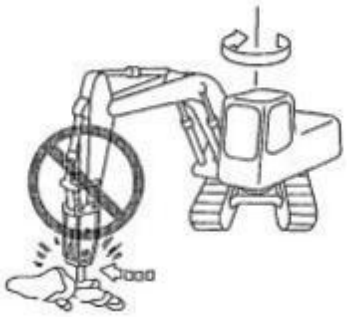
2. When striking, press the drill rod tightly and lift the machine.

Note: Do not lift the machine too high.



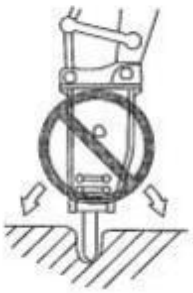
3. When operating the cylinder, the piston rod should not reach the end of the stroke.

4. Do not swing the hammer towards rocks, buildings, concrete, etc

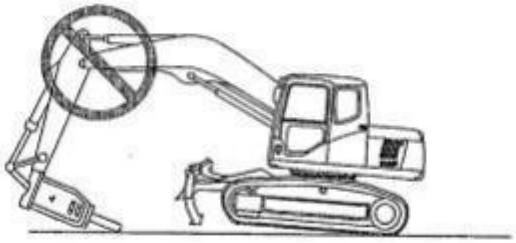


5. Do not move the drill rod while striking.

6. Do not twist the drill rod when drilling holes in the ground.



7. Do not extend the bucket cylinder to the maximum position when lifting the machine.



Long-term storage

When the machine is out of service and stored for more than 30 days, steps must be taken to protect the machine.

Leaving the machine outdoors and exposed to the elements will shorten its service life. The cover will protect the machine from rapid temperature changes and reduce condensation in hydraulic components, engine, fuel tank, etc. If it is not possible to place the machine in a cover or indoors, cover it with a tarpaulin. Check that the storage location is not subject to flooding or other natural disasters. After the machine is parked and the engine is stopped, do the following:

Before storage

• Check for damaged, loose or missing parts.

• Repaint necessary areas to prevent oxidation.

• Clean all parts of the machine.

• Store the machine indoors in a stable location. If stored outdoors, cover with a waterproof tarp.

• Perform lubrication procedures on all lubrication points.

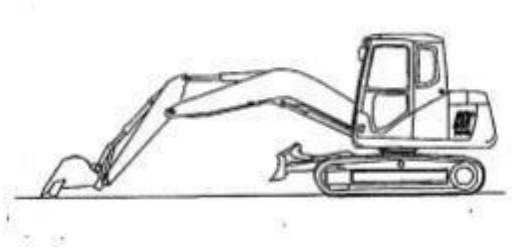
• Apply a light coat of oil to exposed plated metal surfaces (such as hydraulic cylinder rods, etc.) and all control linkages and control cylinders (control valve spools, etc.).

• Remove the battery from the excavator and store it fully charged.

• Check the antifreeze reserve tank and radiator to ensure that the antifreeze level in the system is correct. Make sure the antifreeze concentration is sufficient to cope with the lowest temperatures expected during storage.

• Seal all external openings (such as engine exhaust, crankcase and hydraulic vents, fuel vent lines, etc.) with tape wide enough to cover the opening, regardless of size.

Note: When sealing with tape, be sure to extend the tape 1 inch (25 mm) away from the opening to ensure a good seal.



Storage period

•Start the engine once a month and follow the “Hydraulic System Warming Up” procedure listed in this manual.

NOTE: Remove all seals from the machine (such as crankcase and hydraulic breathers, engine air intake, fuel tank breather line, etc.).

• After “hydraulic system warm-up” run the travel, swing and digging hydraulic functions two or three times to lubricate. Apply a new film of oil to all moving parts and components after running. At the same time charge the battery and lubricate the axle etc.

• Every 90 days, measure the antifreeze protection fluid using a hydrometer. Refer to the antifreeze/antifreeze protection fluid chart to determine the protection fluid of the cooling system. Add antifreeze as needed.

After storage

• Remove all grease from the hydraulic cylinder rod before operating the working device.

• Add grease and oil to each lubrication point.

• Adjust the belt tension of the fan and engine.

• Connect the charged battery.

• Check the condition of all hoses and joints.

• Check the oil level of engine oil, fuel, antifreeze and hydraulic circuit oil. If there is water in the oil, replace all the oil.

• Replace all filter elements.

• Check for signs of nesting. (such as bird nests, rodents, etc.)

• When restarting the engine after long-term storage, cancel the automatic warm-up operation according to the following steps:

1. Turn the start switch to the [ON] position.
2. Turn the throttle control knob to the high speed [MAX] position and keep it in this position for at least 3 seconds. Then turn it to the low speed [MIN] position and start the engine.

Regular maintenance

In order to keep the excavator in normal working condition, it is necessary to maintain and inspect the excavator.

Maintenance information

This section provides information on how to properly maintain the machine. Therefore, be sure to read and understand all safety information, warnings, and instructions before performing any operation or maintenance.

Read the timer time

Check the timer reading daily to see if any maintenance work is needed.

Kenstone original accessories

Please use genuine Kenstone parts as replacement parts as specified in the parts manual for this product.

Kenstone genuine lubricant

If the machine needs to be lubricated, please use genuine Kenshi lubricating oil. Lubricating oil with a specific viscosity should be selected according to the ambient temperature.

Windshield washer fluid

Use a special glass cleaning fluid and be careful not to get any dust in it.

Fresh, clean lubricant

Use clean lubricating oil and grease. Keep the oil tank and grease container clean to prevent foreign matter from entering.

Check and replace drained oil and used filters

After changing the engine oil or filter, check the engine oil and filter for metal particles and foreign matter. If a large amount of metal particles or foreign matter is found, corrective measures should be taken to resolve the problem.

Fuel Filter

If the machine is equipped with a fuel filter, do not remove it when refueling.

Check the hydraulic system, fuel system, cooling system, etc.

Perform daily checks to confirm there are no oil leaks.

Do not drop debris into the machine.

•When opening the inspection window or the fuel tank filler for inspection, be careful not to drop nuts, bolts or tools into the machine.

•If parts or tools are dropped into the machine, it may cause damage to the machine and/or cause it to not operate. If you drop something into the machine, be sure to remove it immediately.

Dusty construction site

When working in a dusty workplace, take the following measures:

• Clean the radiator fins and other heat dissipating parts such as the intercooler frequently, and be careful not to let the fins become clogged.
• Replace the fuel filter more frequently.
• Clean electrical components, especially the starter and generator, to avoid dust accumulation.
• When checking and changing the oil or filter, move the machine to a dust-free place and take care to prevent dust from entering the system.

Avoid mixing lubricants

If you need to add a different brand or grade of lubricant, drain all the old oil before adding the new brand or grade of oil.
Never mix different brands or grades of lubricants. It is recommended to use Kenstone original lubricants.

Locking the access cover or side door

Securely lock the inspection cover or side door with the lock lever. If inspection or maintenance is performed with the inspection cover or door unlocked, it may fall or close and cause personal injury.

Hydraulic system - exhaust

When repairing or replacing hydraulic components or removing and reinstalling new hydraulic lines, you must bleed air from the hydraulic circuit. Refer to the “Bleeding the Hydraulic System” section of this manual for more information.

Hydraulic hose installation

• When disassembling parts with O-rings or gasket seals, clean the mounting surface and replace with new seals. When doing this, be careful not to forget to assemble the seals.
• When installing the hose, do not twist or bend it hard, which will extend its service life and prevent damage to the hose.

Inspection and maintenance work after completion

After the machine inspection and maintenance work is completed, check to prevent operating problems. Always do the following:
• Post-operation inspection (engine stopped)
-Has any inspection and maintenance point been forgotten?
-Has all inspection and maintenance items been performed correctly?
-Has any tool or part fallen into the machine? If the part falls into the machine and gets stuck in the relative movement structure, it may cause damage to the machine.
-Has any antifreeze or oil leaked? Are all nuts and bolts tightened?
• Inspection when the engine is running.
-When the engine is running, pay attention to safety.
-Has the inspection and maintenance items worked properly?
-Has any fuel or oil leaked when the engine speed is increased?

Safety precautions

1. Ensure that the hydraulic safety levers are locked and a "Do Not Operate" warning label is placed on the machine to indicate that the machine is being serviced to prevent any unauthorized operation.
2. Clean up any spilled oil, especially around the engine.
3. Inspect all fuel lines to ensure that the fittings, pipes, filters and O-rings are tight and show no signs of leakage, wear or damage.
4. If the inspection or test procedure requires the engine to be running, ensure that all unauthorized personnel are away from the machine.

Preparation before machine maintenance

Before starting maintenance work, park the machine using the following steps (except for maintenance work that requires the machine to be positioned differently).

1. Park the machine on firm, level ground.
2. Lower the bucket or work attachment to the ground.
3. Move the safety lever to the locked position and raise the stand.
4. Run the engine at low speed for 5 minutes to allow the engine to cool.
4. Turn the start switch to the "0" position, turn off the engine, and remove the key.
5. Before starting maintenance work, hang a warning sign on the cab door or work handle to warn others not to operate the machine.

Maintenance and treatment

Entering/leaving/climbing onto the machine

“⚠”Warning

Prevent injury or death

Do not jump on or off the machine. Do not get on or off the machine while it is running.

Never hold the joystick to get on or off the machine.

Use handrails and steps when entering, exiting or climbing the machine.

Use a three-point grip, either both hands and one foot or two feet and one hand.

Always face the machine.

Always wipe dirt and oil off all pedals, handrails, guardrails and shoes, especially when cleaning windows, mirrors and lights.

Before getting on the machine, wipe your boots clean and your hands clean. Always wear appropriate footwear.

Handling oil, fuel and antifreeze

Lubricating oil

•Under extremely severe conditions (high temperature, high pressure, etc.), the oil used in the engine and hydraulic system will deteriorate. Always use oil that matches the grade recommended in this manual and the maximum and minimum ambient temperatures. Even if the oil is not dirty, always change the engine oil, etc. at the specified intervals.

•When handling oil, be careful to prevent the entry of any impurities (water, metal particles, dust, etc.).

•Problems in machine operation may be caused by impurities in the oil.

・When storing or refueling, pay special attention to not let any impurities enter.

•Do not mix oils of different grades or brands.

Always add the specified amount of oil.

•Too much or too little oil can cause malfunctions.

•If the oil in the machine is not clean, water or air may enter the system. In this case, contact a Kenstone dealer.

•When changing the oil, always change the relevant filter at the same time.

Fuel

To ensure good fuel consumption characteristics and exhaust characteristics, the engine installed on this machine uses an electronically controlled high-pressure fuel injection device. The device uses high-precision parts and lubrication systems. If low-viscosity fuel with low lubrication ability is used, the durability of the fuel injection device may be affected.

• To prevent moisture in the atmosphere from condensing inside the fuel tank to form water, be sure to fill the tank after completing a day's work.

• The fuel pump is a precision component and will not work properly if fuel containing water or dirt is used.

• When storing or adding fuel, be careful not to let impurities enter.

• Be sure to follow the national fuel-related standard documents and select fuel of different grades according to the ambient temperature.

- If the fuel is used at a temperature lower than the specified temperature, the fuel will condense and solidify.

- If the fuel is used at a temperature higher than the specified temperature, the viscosity will decrease, which may cause performance problems.

• Before starting the engine, or 10 minutes after adding fuel, drain the sediment and water at the bottom of the fuel tank.

• If the engine fuel is exhausted or the fuel filter is replaced, the air must be discharged from the circuit.

•If there is any foreign matter in the fuel tank, clean the tank and fuel system.

Important

Use low-sulfur diesel.

Using fuel with a higher sulfur content may have the following disadvantages:

• Reduced engine efficiency and durability

• Increased wear

• Increased corrosion

• Increased deposits

• Reduced fuel economy

• Shorter oil change intervals (more frequent oil changes)

• Increased overall operating costs

Note: Failures caused by using improper fuel are not the responsibility of the Kenstone factory. Therefore, the repair costs are not covered by the Kenstone warranty.

Grease

• Grease is used to prevent adhesion and noise at the joints of the relatively moving parts.

• Excavators are used under heavy load conditions. Always use grease recommended by Kenstone and follow the replacement intervals and recommended ambient temperature given in this manual.

• When applying grease, be sure to wipe off all the old grease that has been squeezed out.

• The old grease must be wiped off, otherwise the sand or dust on the grease will cause wear of the relatively rotating parts.

Antifreeze

• Antifreeze has the important functions of preventing corrosion and freezing. Even in areas or seasons with high freezing temperatures, antifreeze must be used. The machines are equipped with Kenstone antifreeze, which has excellent anti-corrosion, antifreeze and cooling performance and can be used continuously for 2 years or 4000 hours. Therefore, it is recommended to use genuine Kenstone antifreeze.

• If there is a need to dilute the antifreeze, please use steamed water, but it is not recommended. Natural water, such as river water or well water (hard water), contains a lot of minerals (calcium, magnesium, etc.), which makes it easier for the engine or radiator to scale. Once the scale is deposited in the engine or radiator, it will be extremely difficult to remove.

• When using antifreeze, be sure to follow the precautions in this manual.

• Antifreeze is flammable, so be sure to keep away from open flames.

• Kenstone antifreeze has been mixed in proportion, so do not add steamed water.

• If the engine is overheated, you must wait until the engine cools down before adding antifreeze.

•If the antifreeze level is low, air can enter the cooling system causing high temperatures and corrosion problems.

•Never mix lime (hard water), salty or hydrated metal materials with antifreeze.

Filter

•Filters are extremely important safety parts, they prevent impurities in hydraulic oil, fuel and air lines from causing problems.

All filters must be replaced regularly. When working under severe conditions, the filters should be replaced at a shorter interval than the recommended replacement period.

• Never try to clean filters (cartridge type) and use them again. Always replace with new filters.
• When replacing filters, check if there are any metal particles attached to the filter. If any metal particles are found, contact a Kenshi dealer.
• Do not open the packaging before replacing the new filter in advance, and always use a genuine Kenshi filter.

Electrical system maintenance

·If electrical equipment becomes wet or the sheath of the wires is damaged, it will cause an electrical short circuit and cause the machine to operate improperly. Do not wash the inside of the cab with water. When washing the machine, be careful to prevent water from entering the electrical components.
• The electrical system needs to be serviced by: checking the fan belt for damage or wear, and checking the battery electrolyte level.
• Do not install any electrical components not specified by Kenstone.
- External electromagnetic interference can cause the control system controller to malfunction. Before installing a radio receiver or other wireless equipment, contact a Kenstone dealer to prevent electromagnetic interference.
• When working in salt water areas or in snow or snow cycles, pay attention to cleaning the electrical system to prevent corrosion.
• When connecting electrical appliances, connect them to a dedicated power outlet.

Recommended fuel, antifreeze and lubricants

•Lubrication is an important part of preventive maintenance and the instructions in this manual must be followed to keep the machine in optimal condition for a long time.
•Failure to follow these recommendations may result in shortened life or excessive wear of the engine, drivetrain, cooling system and/or other parts.
•Other lubricants available on the market may be beneficial to the machine, but they may also cause harm. Kenshi does not recommend the use of other brands of lubricants.
•When starting the engine at temperatures below 0°C (32°F), always use the recommended multi-grade lubricant even if the ambient temperature may rise during the day.
•If the machine is operated at temperatures below -20°C (-4°F), specific equipment is required, please contact your Kenshi dealer.
•Only use API CI-4 or ACEA E5, E7 grade engine oil.

Lubricating

Lubrication is an important part of preventive maintenance. If the machine is lubricated and maintained in the prescribed manner, the service life of the machine and its components can be greatly extended.
Before applying grease, wipe grease fittings and grease guns to prevent particles such as sand and dust from penetrating the components.

Recommended lubricant oil table

It is strongly recommended to use the original products of Kenstone. If other brands of products are used, the excavator may be damaged.

Storage location	Oil	Ambient temperature
		-58 -40 -22 -4 14 32 50 68 86 104 122° F
		-50 -40 -30 -20 -10 0 10 20 30 40 50°C
Oil sump	Engine Oil[5)]	SAE 5W-40Z' / SAE 10V\-30 / SAE 1(W-40[3'] / SAE 5W-40[41]
Hydraulic oil tank	Hydraulic oil[6)]	ISO VG.15 / ISO VG.32 / SO / ISO VG.68
Fuel tank	Fuel	ASTM D975 No.2 / ASTM D975 No.1 / GB0# / GB-10# / GB -20# / GB -35# / GB-5 0#
Gearbox	Gear Oil	SAE 8DW-90 and GL5
Drive axle	Gear Oil	SA E90 / SAE 8DW-90 和 GL5 / SAE 140

Storage location	Oil	Ambient temperature
		-58 -40 -22 -4 14 32 50 68 86 104 122° F
		-50 -40 -30 -20 -10 0 10 20 30 40 50 °C
Grease nipple	Grease	**Multi-purpose lithium grease** 1 1 1 1
Cooling system	Antifreeze	Add antifreeze
1.Original equipment		
2.5W40 - recommended for use in low temperatures below -20 °C		
3.10W40-Original car equipment, it is recommended to use Kenshi genuine engine oil		
4.15W40 - It is recommended to use Kenstone genuine engine oil		
5.Engine oil - Engine oil must comply with API CI-4		
6.Note that the mixing ratio is for reference only and is not an absolute standard		
API: American Petroleum Institute		
ACEA: European Automobile Manufacturers Association		
ASTM: American Society for Testing and Materials		
ISO: International Organization for Standardization		
NLGI: National Lubricating Grease Institute		
SAE: Society of Automotive Engineers		
GB: Chinese National Standard		

Do not mix oils (engine oil, etc.) from different manufacturers. Kenstone recommends using original lubricants.

Lubricants (engine oil, etc.) should be selected according to climatic conditions. Different types of oils are used in different ambient temperatures. If the selected oil is inconsistent with the ambient temperature, it will cause equipment failure. Different grades of fuel should be selected according to different ambient temperatures, especially in winter, and the appropriate fuel should be selected according to the lowest ambient temperature.

Oil capacity

Parts		Capacity
Engine	Engine oil	11.6L
	Antifreeze	10L
Fuel tank		100L
Hydraulic oil	Tank	72L
	System	140L
Driving motor		2*1.3L

Maintenance cycle

Maintenance cycle table												
Item	Inspection items	Maintenance	Qunt.	Maintenance cycle								
				10	50	150	250	500	1000	1500	2000	4000
1A	Boom arm connecting pin	Grease	7	F100			W10					
1B	Bucket connecting pin	Grease	5	F100	W10							
2	Slewing bearing	Grease	3									
3	Slewing gear ring	Grease	1									
4	Front axle steering knuckle	Grease	4									
5	Engine oil	Motor oil	11.6L	V								
6	Hydraulic oil	Hydraulic oil	72L	V								
7	Fuel tank	Diesel	100L	V, D								
8	Radiator	Antifreeze	10L	V								PG
9	Oil-water separator	Filter	1	D				C				
10	Hydraulic oil return filter	Filter	1				F					
11	Brake filter	Filter	1				F					
12	Hydraulic oil suction filter	Filter	1									C
13	Engine oil filter	Filter	1									
14	Fuel filter	Filter	1									
15	Fuel tank cap	Filter	1									
16	Air filter (external)	Filter	1				C					
	Air filter (internal)	Filter	1									
17	Air conditioning filter	Grease	1					C				
18	Bulldozer pin	Filter element	4	F100	W10							
19	Hydraulic oil tank breather	Maintenance	1									
	Air conditioning condenser core							C				
	Radiator core							C				
	Oil cooler core							C				
V: Maintenance and oiling												
C: Cleaning D: Water removal												
F: Only for the first change.												
F100: Within the first 100 hours of operation, once every 10 hours.												
W10: If working in water, once every 10 hours.												
PG: Propylene glycol-Kenstone original antifreeze solution (replace according to this cycle).												
:Replace according to the cycle.												
Note: For more maintenance items, see the list in "Maintenance Cycle".												

Maintenance items	
Every 10 hours/Daily maintenance	
Lubricate dozer pins (first 100 hours)	
Lubricate boom, stick and front attachment pins (first 100 hours)	
Check engine oil level	
Check hydraulic tank level	
Check hydraulic system for leaks	
Check fuel level	
Check fuel system for leaks	
Check water separator and drain if necessary	
Check engine cooling system and add antifreeze	
Check window washer fluid level	
Check teeth and side teeth for wear	
Check cooling fan blades	
Check air intake system	
Check seat belts for proper operation	
Check structural parts for cracks and defective welds	
Check all switches for proper operation	
Check pilot safety lever for operation	
Check mirrors for damage and adjust and clean as necessary	
Check operation of all exterior lights, horn and console indicators	
Start engine, check engine starting performance and exhaust color for operating temperature, check for abnormal sounds	
Check all operating controls and machine movements for proper operation.	
Check and clean radiator dust screen	
Check pipes and hoses	
Every 50 hours/weekly maintenance	
Perform all 10-hour/daily maintenance and inspection items	
Lubricate swing bearing	
Lubricate dozer pin	
Lubricate front axle pin	
Clean fuel tank of water and debris	
Inspect engine fan belt for cracks, wear and proper tension (after first 50 hours)	
Inspect for loose and missing nuts and bolts	
Lubricate bucket attachment pin	
Maintenance every 250 hours/month	
Perform all 10-hour/daily, 50-hour maintenance and inspection items	
Lubricate boom and stick pins	
Inspect engine fan belt for cracks, wear and tension	
Inspect engine fan belt for wear	
Change engine oil and oil filter	
Clean air filter outer element	
Replace hydraulic oil return filter element (after first 250 hours)	

Replace brake filter (after first 250 hours)	
Inspect front unit locking pins and bushings for wear	
Inspect batteries	
Inspect for loose and missing nuts and bolts	
Inspect fuel system hose clamps	
Maintenance every 500 hours/every 3 months	
Perform all 10-hour/daily, 50-hour, 150-hour and 250-hour maintenance and inspection items	
Lubricate swing gear ring	
Lubricate drive shaft	
Clean water separator	
Replace fuel filter	
Replace brake filter	
Clean radiator, oil cooler and air conditioning condenser	
Maintenance every 1000 hours/every 6 months	
Perform all 10-hour/daily, 50-hour, 250-hour and 500-hour maintenance and inspection items	
Replace hydraulic tank air breather filter element	
Replace fuel tank cap filter element	
Inspect and adjust engine**	
Replace air conditioning filter element	
Inspect air conditioning refrigerant**	
Replace hydraulic oil return filter element	
Replace air filter inner and outer filter elements	
Maintenance every 2000 hours/year	
Perform all 10 hour/daily, 50 hour, 250 hour, 500 hour and 1000 hour maintenance and inspection items	
Inspect generator and starter motor**	
Inspect all rubber anti-vibration mounts	
Perform periodic tests and record results**	
Inspect excavator for cracked or open welds or other structural damage	
Check torque on major bolts**	
Maintenance every 4000 hours/every two years	
Perform all maintenance and inspection items every 10 hours, every 50 hours, every 250 hours, every 500 hours, every 1000 hours and every 2000 hours	
Main parts - regular replacement	
Replace radiator antifreeze	
Replace hydraulic oil and clean oil suction filter	
12000 hours/maintenance every 6 years	
Hose service life limit (European standard IS. 8331 and EN982 CEN)	

Initial 50 hours maintenance (only after the first 50 hours)

Perform the following maintenance only after the first 50 hours of use of a new machine.

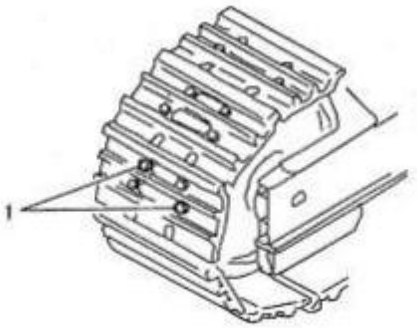
- Add oil to the engine oil pan and replace the oil filter
- Fuel filter - Replace
- Engine valve clearance - Check/adjust

Contact an authorized dealer of Kenstone for inspection, maintenance, and when special tools are required.

For details on replacement or maintenance methods, see the "Maintenance every 500 hours and 2000 hours" section.

When needed

1. Track shoe bolts - check/Tighten



If the bolt [1] is loose, tighten it immediately to prevent the bolt [1] from breaking during normal operation of the machine and causing an accident.

a. Metal track shoe bolts - check/tighten

- Tighten the bolts, and then check whether the nuts and track shoes are in close contact with the link contact surface.

  Torque:

  SY55/60/65C:185+29N-mSY75/85195C:280+29N-m
- After checking, tighten again 90°±10°.

b. Tightening sequence

Tighten the bolts in the order shown in the right figure.

After tightening, check whether the nuts and the matching table of the track plate and the chain link are in close contact.

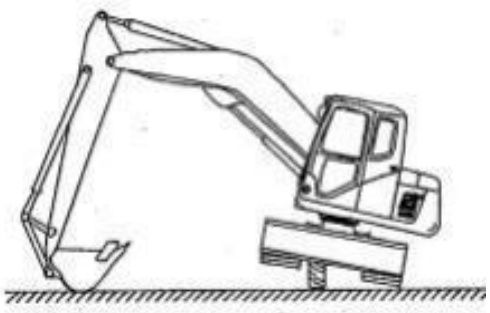
2. Track Tension - Check/Adjust

The wear of the pins and bushings of the lower body varies with the working conditions and soil type. Therefore, in order to maintain the standard tension, the track tension should be checked frequently. Inspection and maintenance should be carried out on flat ground.

Check

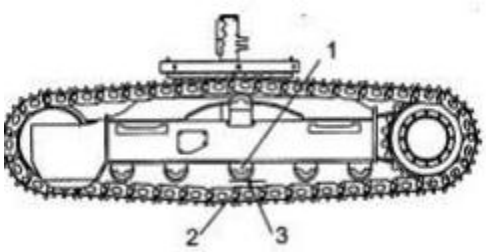
a. Run the engine at a low total speed, move the machine forward a distance equivalent to the length of the crawler track on the ground, and then stop the machine.

b. Support the bucket sideways on the ground and suspend one side of the belt.



c. Place the ruler [3] between the middle roller [1] and the belt [2].

d. Measure the sag between the roller tread and the track link surface。



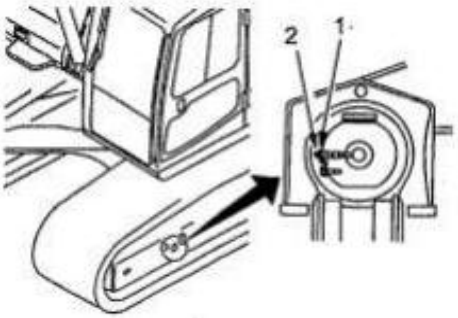
Adjust

“⚠”Warning

Do not loosen the screw plug [1] more than one turn to prevent it from flying out under high pressure and causing danger.

Do not loosen any parts other than the screw plug [1]. Do not face the installation direction of the screw plug [1].

Never attempt to remove the track or track adjuster, as the high-pressure grease in the track adjuster is dangerous.



Tighten the track

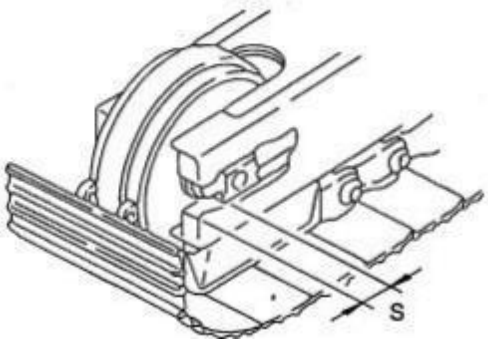
Prepare a grease gun.

a. Use a grease gun to add grease through the grease nozzle [2]. (The grease nozzle [2] is integrated with the screw plug [1].

b. When checking the track tension, slowly move the machine forward 7~8m (23ft~26tt3in)

c. Check the track tension again; if the tension is not appropriate, adjust it.

d. Continue to add grease until the dimension S is zero. If the tension is still loose, the pin and the pin sleeve may be excessively worn and need to be reversed or replaced. If necessary, please contact the authorized agent of Kenstone Heavy Industry.

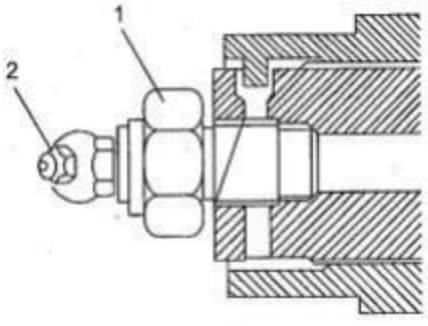


Loosen the track

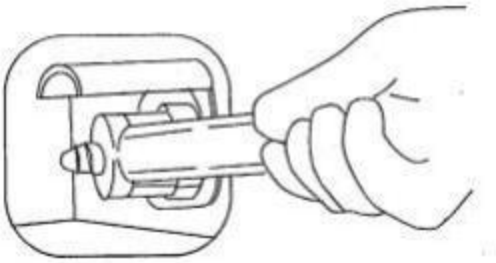
Before loosening the track, remove foreign objects such as gravel or mud between the sprocket and the track chain.

To prevent the grease in the tensioning cylinder from spraying out, slowly loosen the valve [1]. When loosening the valve [1], do not face your body or face toward the valve [1].

Do not loosen the grease nozzle [2]



a. When loosening the track, slowly rotate the valve [1] counterclockwise, and the grease will be discharged from the grease outlet.
b. Turn the valve [1] 1 to 1.5 turns to loosen the belt.
Note: If the grease cannot be discharged smoothly, lift the track off the ground and slowly turn the track.
c. After obtaining the appropriate track sag, tighten the valve [1] clockwise to 47N m (15kgf-m).
Note: If the track is still too tight after turning the valve [1] counterclockwise, or if the track is still too loose after adding grease to the grease nipple [2], these are abnormal phenomena. You should contact the authorized agent of Kenstone Heavy Industry immediately.

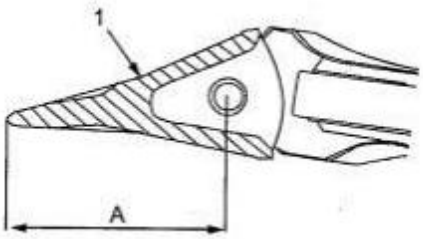


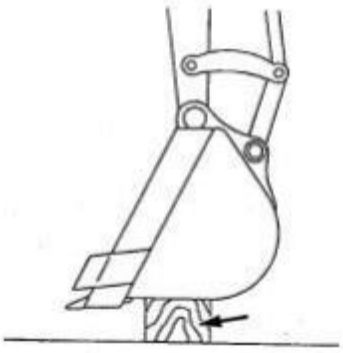
3. Bucket teeth - replacement

"⚠"Warning

When replacing the bucket teeth, place the working device in a stable state, then turn off the engine and firmly lock all operating levers and control handles. Otherwise, there will be danger due to misoperation.
If the lock pin is knocked out with excessive force, there is a risk of the lock pin flying out. Check that there are no people in the surrounding area.
When performing the replacement operation, there will often be flying pieces, so wear safety glasses, gloves and other protective equipment.

Replace the bucket teeth before the bucket tooth seat wears.
If the wear of the bucket teeth exceeds the design use limit [A] shown below, the bucket teeth should be replaced [1].



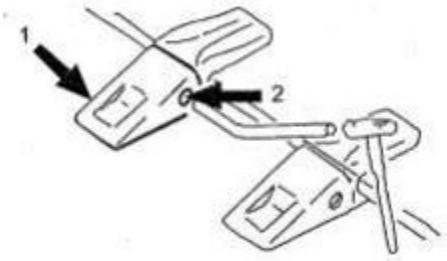


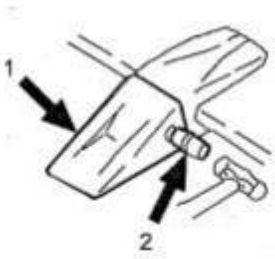
a. Place the bottom of the bucket on blocks so that the pins can be removed. Check that the working device is stable, and then place the safety lock lever in the locked position. Place the bottom of the bucket horizontally.

b. Place a metal rod on the pin head and hit the metal rod with a hammer to knock out the pin [2]. Remove the bucket tooth [1].

Note: Use a metal rod with a diameter slightly smaller than the pin.

c. Clean the mounting surface. Install the new bucket tooth [1] into the tooth seat, push the pin [2] in part by hand, and then use a hammer to knock the pin in and lock it to install the bucket tooth on the bucket.

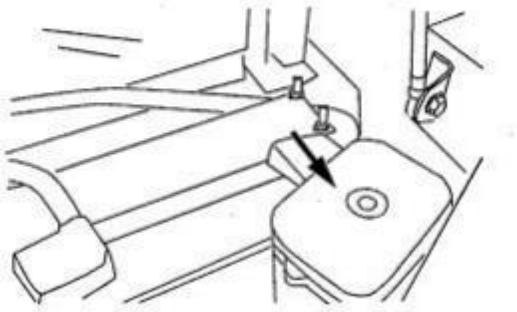




4.Windshield washer fluid level - check and refill

During each routine maintenance of the whole machine, check and replenish the washing liquid, turn on the washer switch to check the working condition.

When the washing liquid is insufficient, the sprayed washing liquid will contain bubbles. In this case, check the liquid level in the reservoir (located in the left maintenance door of the machine). If necessary, add washing liquid.



a. Open the machine maintenance door to see the reservoir;

b. Open the reservoir cover, add washing liquid, and close the cover tightly;

c. Turn on the washer switch to check whether the water spray is normal.

Note: When adding washing liquid, be careful not to let dust enter.

Mixing ratio of pure washing liquid and water

Select the mixing ratio according to the ambient temperature. Dilute the washing liquid with water according to the proportion in the table below before filling.

Note: There are two types of washing liquid: for -10℃ (14 °F) (general purpose) and for -30℃ (-22 °F) (cold areas), which are selected according to the operating area and season.

5.Refrigerant Level - Check

“⚠”Warning

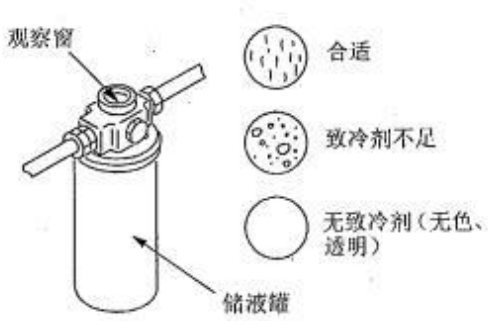
If the refrigerant gets into your eyes or onto your hands, it may cause blindness or frostbite, so do not touch the refrigerant. Do not loosen any parts of the refrigerant pipes.

Do not allow any open flames to approach the area where the refrigerant gas is leaking.

If there is a lack of refrigerant (R134a), the cooling performance will be very poor.

When the engine is idling at high speed, operate the air conditioner in a strong cooling state, and there should be

no bubbles in the observation window (inspection window) installed in the condenser storage tank.
Refrigerant flows and there are no bubbles: suitable
Refrigerant flows and there are bubbles (bubbles pass continuously): insufficient refrigerant
Colorless, transparent: no refrigerant
Note: If there is insufficient refrigerant, please contact the Kenstone Heavy Industry Investment Agent to add refrigerant.



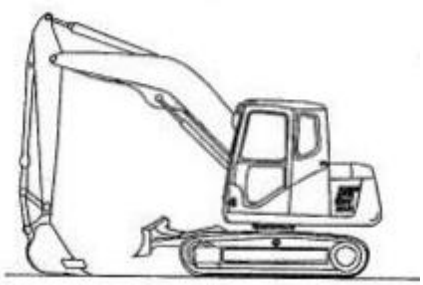
Inspection during the idle season

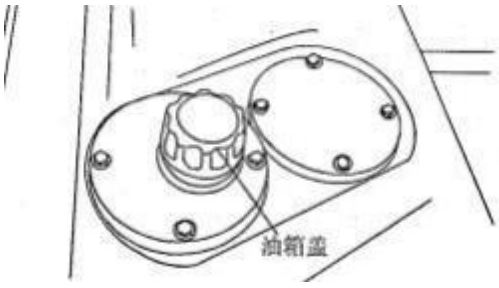
When the air conditioner is not used for a long period of time, operate it for 3 to 5 minutes once a month to lubricate the compressor parts.

6. Methods for releasing internal pressure of hydraulic oil circuit

“⚠”Warning

The hydraulic oil circuit is always under pressure, so when checking or replacing pipes or hoses, release the pressure in the oil circuit. If the pressure is not released, the high-pressure oil will spray out and cause serious personal injury.
After turning off the engine, the parts and oil are still at high temperatures, which may cause burns. Wait for the temperature to drop before starting operation.
1) Park the machine on a level, solid ground.
2) Within 15 seconds after stopping, turn the start switch to the [ON] position and fully operate the operating lever and control handle (working device, travel) in all directions to release the internal pressure.
3) Unscrew the butterfly nut of the breather valve on the oil tank and press the exhaust button to release the internal pressure.





Maintenance every 150 hours

At the same time, maintenance should be carried out every 50 hours.

1. Lubricate the boom, dipper and bucket connecting pins

Lubricate every 10 hours for the first 100 hours, and every 50 or 250 hours thereafter.

Note: If operating or working in water, the front working device pin must be lubricated every day/every 10 hours.

Check the oil level

“⚠”Warning

To prevent injury or death, wait for the engine to cool before checking the oil level to avoid burns from touching hot engine parts.

Note: When checking the oil level, use the dipstick. Always remove it and wipe it clean before making the last oil level check.

1. Stop the engine and wait 15 minutes. This allows all the oil to flow back into the oil pan.
2. Remove the dipstick (1, right) and wipe it clean with a clean cloth.
3. Fully insert the dipstick into the dipstick tube and remove it.
4. The engine oil level must be between the "HIGH" and "LOW" markings on the dipstick.

Note: If the oil level is above the "HIGH" mark on the dipstick, some oil must be drained to bring it to the correct level. If the oil level is below the "LOW" mark, add oil through the engine oil filler port.

Check the hydraulic oil tank level

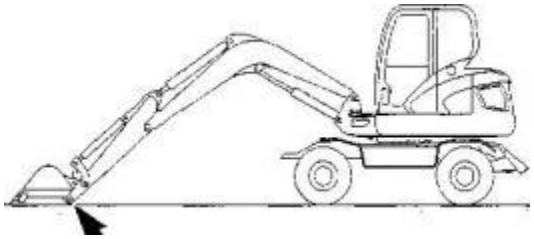
"⚠"Warning

Avoid injury or death

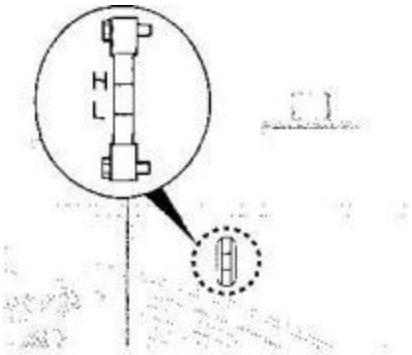
The hydraulic oil will become hot after the machine is running. Allow the system to cool sufficiently before servicing any hydraulic components.

The hydraulic oil tank is under pressure. Slowly lift the breather and tilt it to release the pressurized air.

1. Park the machine on a firm, level surface, lower the boom and place the bucket on the ground.



2. Reduce the engine speed to "low idle".
3. Move the safety lever to the "lock" position.
4. Ask another person to open the access door and check the hydraulic oil level gauge. The oil level must be between the marks.
5. If the oil level is below the "L" mark, add oil.

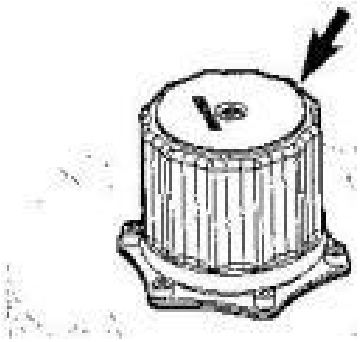


A. Stop the engine.

B. The hydraulic oil tank is under pressure. Slowly lift the breather to release the pressurized air.

C. Remove the top cover of the hydraulic oil tank and add oil.

Do not fill the oil above the "H" mark. Overfilling the hydraulic oil tank will cause expansion due to oil return, resulting in damage to the machine.



Important

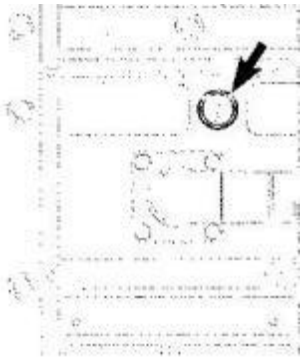
When replenishing hydraulic oil, you must use hydraulic oil of the same brand and model as the hydraulic system.

If the oil level is above the "H" mark, drain the oil.

A. Stop the engine and wait for the hydraulic oil to cool.

B. Remove the cover at the bottom of the hydraulic oil tank.

C. Remove the drain plug at the bottom of the tank and use a hose to drain the excess oil into a designated container.



Important

Please pay attention to environmental protection and dispose of waste oil/waste liquid in accordance with local laws and regulations. Remove the oil drain hose and plug it with a plug to protect it from contamination.

Check the hydraulic system for leaks

Perform daily checks to ensure that there are no signs of leakage in hoses, pipes, fittings, cylinders and hydraulic components. If any leaks are found, determine the cause and repair it.

Check the fuel level

"⚠"Warning

To avoid death or serious personal injury

Take extreme safety precautions when refueling to prevent explosion or fire. If a fuel spill occurs, clean up the spill immediately.

"⚠"Warning

To avoid death or serious personal injury, always stop the engine when refueling.

1. At the end of each day, fill up the fuel tank. Add fuel through the fuel filler cap.

Note: Only low sulfur diesel (LSD) can be used, and different grades of fuel should be selected according to the minimum ambient temperature.

2. Before refueling, make sure the fuel gun touches the fuel tank filling port to ensure grounding.

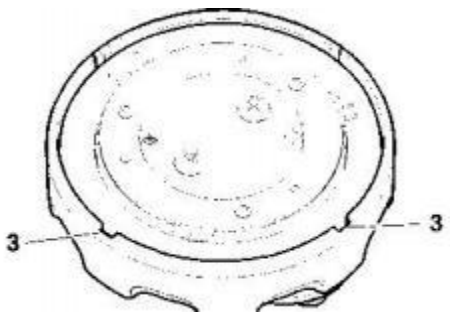
3. Check the amount of fuel in the tank using the fuel gauge on the dashboard.

4. Do not overfill the tank.

5. Tighten the cap after refueling.

NOTE: If the vent hole in the cap becomes clogged, a vacuum may form in the tank, preventing fuel from flowing to the engine. Keep the hole in the fuel cap clean.

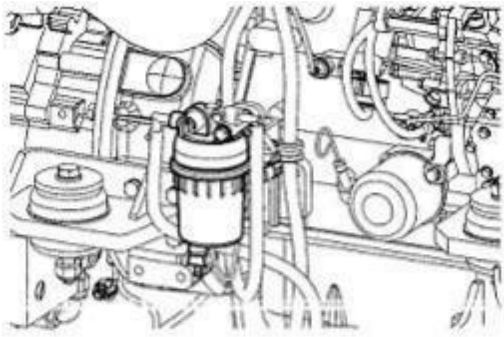
NOTE: Be careful not to allow the fuel level gauge on the fuel tank (if installed) to be damaged by oil contamination.



Check the fuel system for leaks

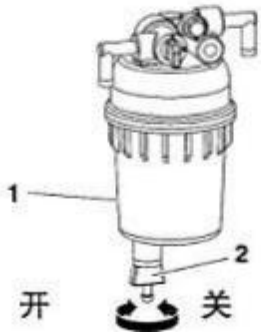
Check the engine compartment to verify that there are no leaks in the fuel system. If any leaks are detected, determine the source and repair it.

Check the oil-water separator and drain if necessary



1. The fuel water separator is inside the engine compartment.
2. Open the engine hood and find this part.
3. Turn the switch of the fuel water separator to the "off" position.
4. Use the knob below to drain the water inside.
5. After draining, turn on the switch on the top of the fuel water separator.

Note: Please comply with local environmental laws and regulations to dispose of the discharged liquid.

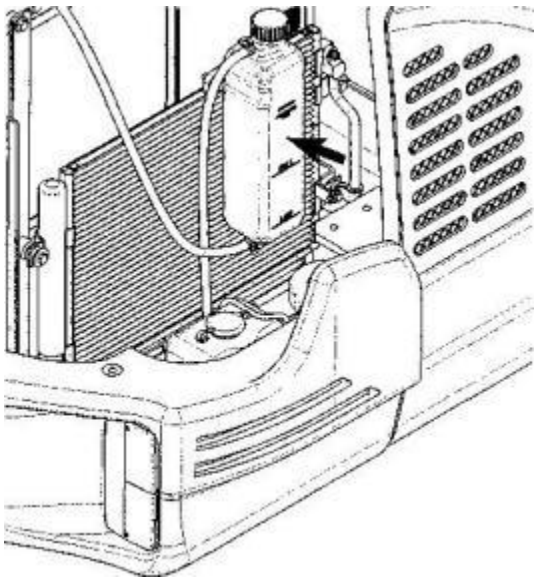


Check the engine cooling system and add antifreeze

“⚠”Warning

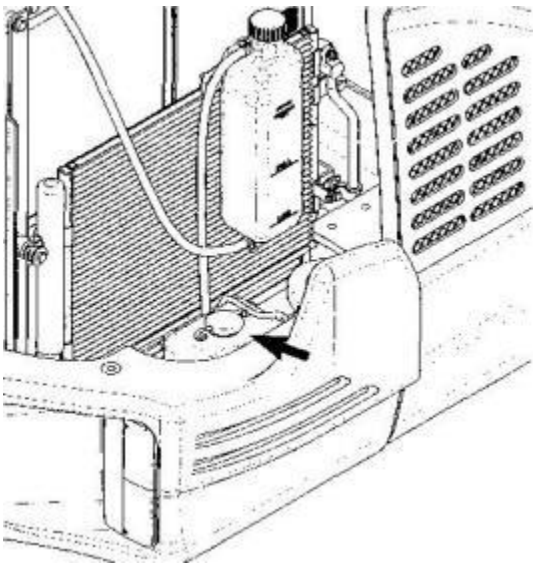
Avoid injury or death

Allow the engine to cool before loosening the radiator cap. Loosen the cap slowly to relieve pressure.
If cleaning the radiator with the engine running, lock the safety lever and hang a sign on the lever to remind you that service work is being performed. Do not remove the radiator cap unless necessary.
Check the antifreeze level in the antifreeze auxiliary tank.



1. With the engine cold, remove the radiator cap and check the antifreeze level in the radiator. Do not rely on the antifreeze level in the antifreeze subtank. Fill the radiator as needed.
2. Check to make sure the antifreeze delivery pipe from the subtank to the radiator is unobstructed and not blocked or flattened.

3. Check the level in the antifreeze subtank. The normal level must be between the "FULL" and "LOW" marks.
4. If the antifreeze is below the "LOW" mark, add 50% genuine antifreeze to the subtank.



Check the windshield washer fluid level

1. Open the inspection door and check the fluid level in the windshield washer fluid tank.
2. If the washer fluid is low, open the filler cap and add fluid.

NOTE: Use an all-season washer fluid; this will prevent ice from forming during cold weather.

Check whether the bucket teeth and side teeth are worn.

1. Check the bucket teeth daily to ensure that they are not worn or broken.
2. Avoid excessive wear of the bucket teeth that may expose the tooth seat.

Note: This instruction is only for buckets produced by Kenstone.

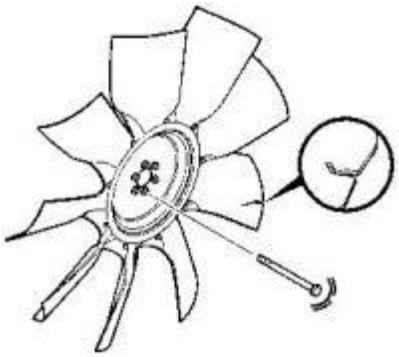
Check the cooling fan blades

"⚠"Warning

To avoid death or serious personal injury

Fan blade failure could result in serious injury or death. Never pull or pry on the fan, which could damage the fan blades and cause the fan to fail.

Check the cooling fan daily. Check for cracks, loose bolts, bent or loose blades, and contact between the blade tip and the fan guard. Check the fan to make sure it is securely installed. Tighten the bolts if necessary and replace any damaged fans.



Check the air intake system

"⚠"Safety

▪Hot engine parts can cause burns.

▪Avoid contact with hot engine parts.

1. Park the excavator on solid, level ground and lower the bucket to the ground. Pull the safety lever to the locked position and turn off the engine.

2. Check the engine air intake hose and hose clamp for damage and tighten them.

3. If damaged, bent or loose, replace, retighten or contact a Kenstone dealer.

4. If equipped with an air pre-cleaner, check the amount of dust inside and remove it.

Unfiltered gas can cause serious damage to the engine.

If you find a leak or defect in the air intake system, do not start the engine.

Check structural parts for cracks and defective welds

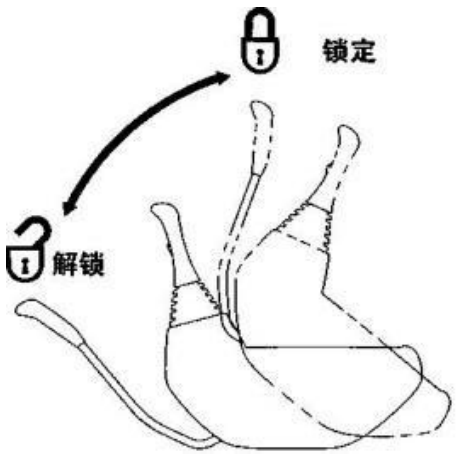
During routine inspection and lubrication of the machine, inspect the machine for any visible damage. Repair or replace any damaged parts before operating the machine.

Check the operation of all operating switches

Before starting the engine, check the operation of each switch.

Check the operation of the pilot safety lever

The safety lever is a movable part that can disable the control functions of the working device, rotation, etc. When the safety lever is moved upward to the "locked" position, the working device and rotation functions will not be able to operate. When the safety lever is moved downward to the "unlocked" position, the working device, rotation, etc. can be operated.



"⚠"Warning

To avoid death or serious personal injury

When the safety lever moves upward to the "locked" position, the working device and the rotary action cannot be operated.

If the control fails, please contact the Kenstone dealer immediately and do not modify the system.

Safety bar inspection and maintenance

1. Check and keep other people away from the work area. Sit in the cab seat and fasten your seat belt.

2. Start the engine and move the safety lever down to the "unlocked" position.

3. Operate the full range of motion control handles to check whether the boom, dipper stick, bucket (or other optional parts) and slewing functions are normal. In addition, check whether the travel device is normal.

Note: The hydraulic system must be preheated to operating temperature.

4. Raise the boom and dipper stick so that the bucket (or other attachment) is about 1m off the ground.

5. Move the safety lever up to the "locked" position. When operating the control handle, there should be no movement of the boom, dipper stick and front attachment.

6. Move the safety lever down to the "unlocked" position. Raise the boom so that the bucket (or other attachment) is about 3m (10ft.) off the ground. Use the control handle to slowly lower the boom. While the boom is lowered, move the safety lever up to the "locked" position. The movement of the boom should stop. Repeat these steps for the stick, bucket (optional), and swing system.

7. Lower the front working device to the ground and stop the engine.

NOTE: If the safety lever does not disable the working device as described above or if any parts are damaged, bent or missing, contact a Kenstone dealer immediately for service and do not modify the system.

Check mirrors for damage and adjust and clean as necessary.

Check all exterior lights, horns, console indicators.

Working condition of lights and instrument panels.

1. Turn the engine start switch to the "I" (live) position and observe all indicator lights.
2. Service any lights that are not currently "on".
3. Sound the horn and service or replace as necessary.
4. Turn on and inspect all exterior service lights. Replace any burned out bulbs or those with cracked or broken housings, etc.

Start the engine, check the starting ability, observe the exhaust color at start-up and normal operating temperature, check for any abnormal sounds

Check all operating controls and machine movements for normal operation

Important

Cold weather operations require operators to fully preheat the hydraulic system before starting construction work. Follow all preheating instructions listed in the Operating Instructions section of this manual. Ensure that the hydraulic oil is circulated to all components, including cylinders, swing motors, and travel motors. Cold hydraulic oil in the lines and components needs to be preheated before starting full-scale operations. Failure to do so may damage the cylinder or hydraulic motor.

1. Operate all control levers at rated engine speed.
2. Follow cold weather hydraulic system warm-up procedure.
3. Note any slow operation and unusual movements. Determine cause and repair before operating.

Check and clean the radiator dust screen

Important

If the excavator is operated in a dusty place, the dust screen should be checked every day. If there is dust or other debris, it should be cleaned up.

"⚠"Warning

To avoid death or serious personal injury

If using compressed air or water to clean the dust screen, wear safety goggles to protect your eyes.

1. Loosen the butterfly nut and remove the dust screen.

2. Clean with compressed air or water.

Check the pipes and hoses

1. Check the brake system pipes and hoses to ensure they are free of damage and wear.

2. If any brake or steering hoses are damaged, replace them immediately.

Drain water and sediment from the fuel tank

1. Perform this step before operating the machine.

2. Drain the water and sediment from the bottom of the fuel tank into the specified container.

Note: Dispose of the drained fluid in accordance with local laws and regulations.

Note: To prevent moisture from the atmosphere from condensing inside the fuel tank and forming water, always fill the tank after completing a day's work.

Check the engine fan belt for cracks, wear and tension (first 50 hours)

Check after the first 50 hours of operation and every 250 hours thereafter.

Check for loose or missing nuts and bolts

Check all nuts and bolts after the first 50 hours of operation. Check every 250 hours thereafter.

Lubricate the bucket connecting pin

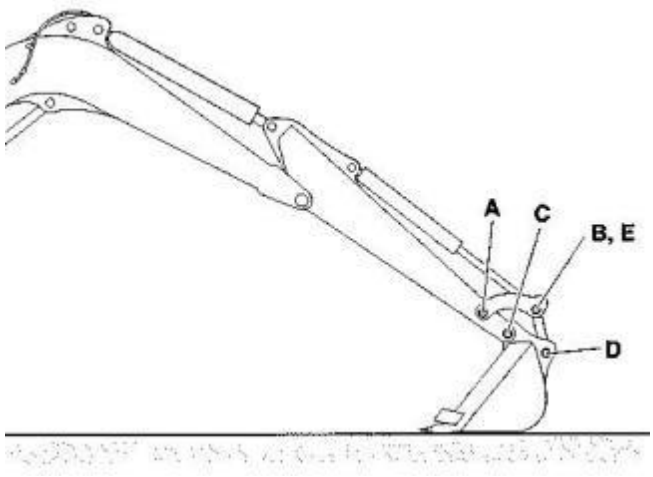
Lubricate every 10 hours for the first 100 hours and every 50 hours thereafter.

Note: If running or working in water, the bucket connecting pin must be lubricated every day/every 10 hours.

1. Park the machine on a solid and level ground as shown in the figure, lower the bucket to the ground, and then stop the engine.

2. Press the grease fitting and inject grease into the lubrication point with a grease gun.

3. After lubrication, clean out the old grease.



No.	Name	No.	Name
A	Bucket rod connecting pin	D	Bucket push rod connecting pin
B	Connecting rod pin	E	Bucket cylinder piston rod pin
C	Bucket rod bucket connecting pin		

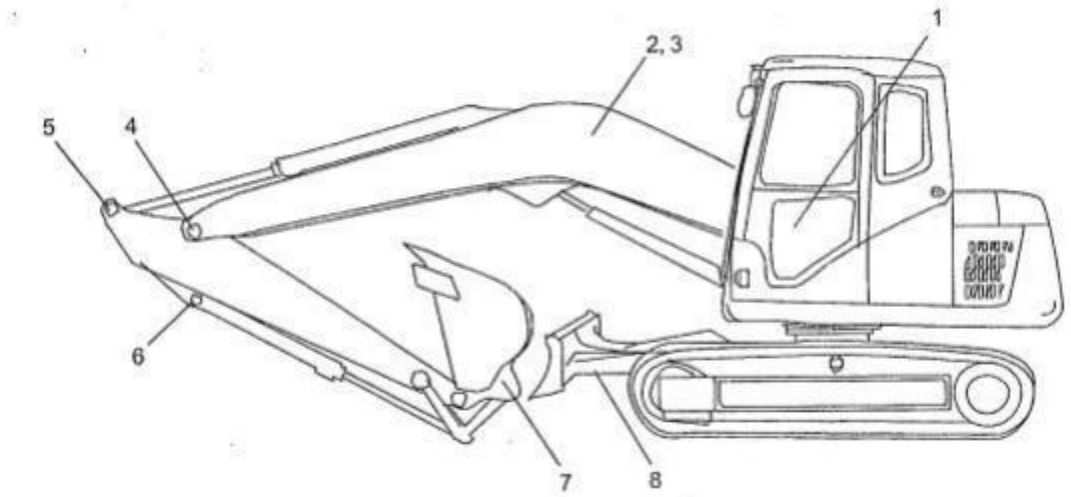
Every 250 hours/monthly maintenance

Perform all 10 and 50 hour maintenance items

Lubricate boom and arm pins

If the machine is traveling or operating in water, the front unit should be greased every 10 hours.

1. Park the machine on a firm and level surface as shown in the figure below, lower the bucket to the ground, and stop the engine.
2. Press the grease fitting and inject grease into the lubrication point with a grease gun.
3. After lubrication, remove the old grease.



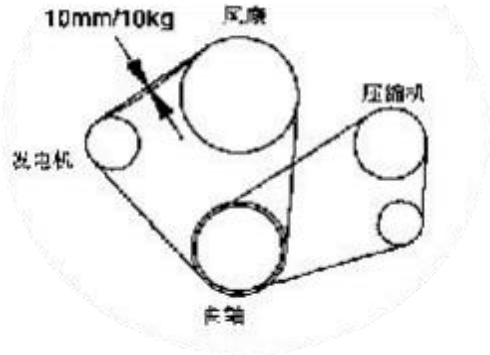
No,	Name	No.	Name
1	Boom root pin	5	Arm cylinder piston rod connecting pin
2	Boom cylinder root pin	6	Bucket cylinder root pin
3	Arm cylinder root pin	7	Bucket and connecting rod pin
4	Boom arm connecting pin	8	Bucket blade pin

Check belt tension (both belts)

A loose fan belt may cause engine overheating, poor charging and/or premature belt wear. A tight belt may damage the water pump, generator bearing or belt.

1. Check

After the engine is turned off, press the middle of the belt with your finger. If the pressure is 10mm, it is normal.



2. Adjustment

If it is not appropriate, use the tensioning device to adjust the belt tension.

Check the engine belt for wear

"⚠"Warning

When the engine is running, make sure that the engine fan and the fan drive belt do not interfere with each other. Friction between the rotating fan and the belt can cause damage.

"⚠"Warning

When checking, adjusting or replacing the belt, be careful to prevent the engine from starting accidentally. Make sure the start switch is in the "OFF" position and hang a warning sign on the control lever.

1. Replace belts that are badly worn, oily or cracked in a timely manner.

These will affect the normal function of the belt. Check the belt with the naked eye for cross cracks. Transverse cracks (in the direction of the belt width) are allowed. Longitudinal cracks (in the direction of the belt length) that intersect with transverse cracks are not allowed. If the belt is worn or incomplete, please replace the belt.

2. Before installing the belt, make sure that all pulley grooves are clean and not worn. If the pulley is worn, replace the pulley.

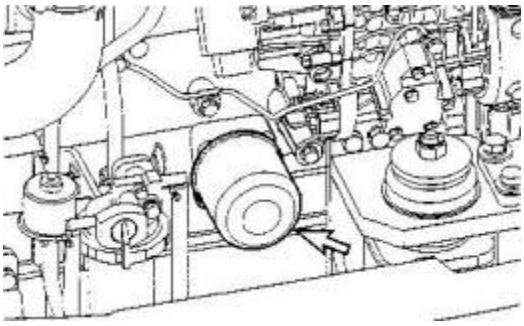
3. After installation, please align the belt.

4. Do not force the belt into the pulley groove with a screwdriver or pry bar.

Changing the engine oil and filter

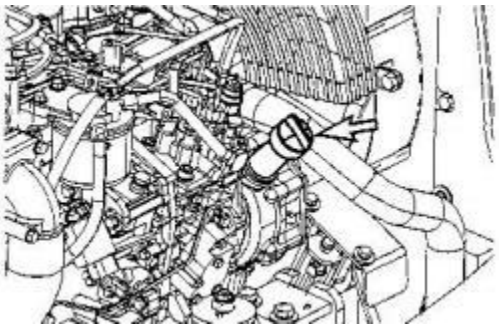
Allow the engine to cool before changing the oil and filter to avoid burns.

1. Park the excavator on a firm, flat surface. Place a larger container under the engine. Remove the cover at the bottom of the oil pan and install a hose to drain the engine oil. After draining, remove the hose and install the cover.



2. Use a filter wrench to replace the engine oil filter. The engine oil filter is a spin-on type, with the filter element shown in the right figure. Remove and discard the old filter.

3. Install the new filter. Apply a small amount of oil around the filter gasket. Manually screw the filter onto the engine until the gasket contacts, and then use a wrench to turn the filter 1 turn with a torque of 2.2kgf.m.



4. Fill the engine with original oil through the oil filler port.

5. Start the engine. Run the engine at "low idle" for 5 minutes and check the engine oil pressure indicator.

6. Stop the engine. Check the filter for signs of leakage.
Recheck the oil level after 15 minutes.

Clean the air filter outer element

Note: Clean the air filter outer element every 250 hours of operation.

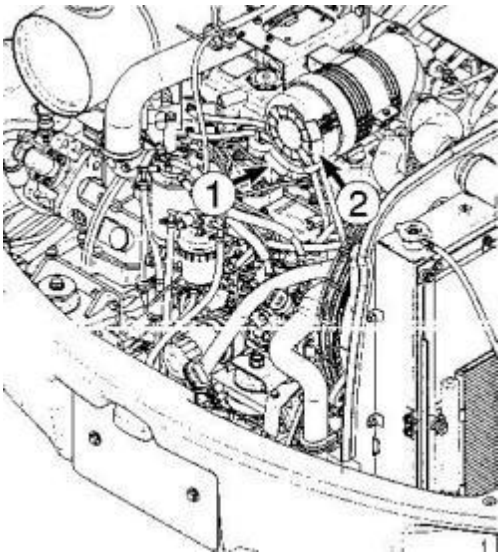
Note: If the air filter blockage warning light on the instrument panel comes on, the air filter must be repaired.

Note: When working in a dusty environment, the maintenance interval must be shortened.

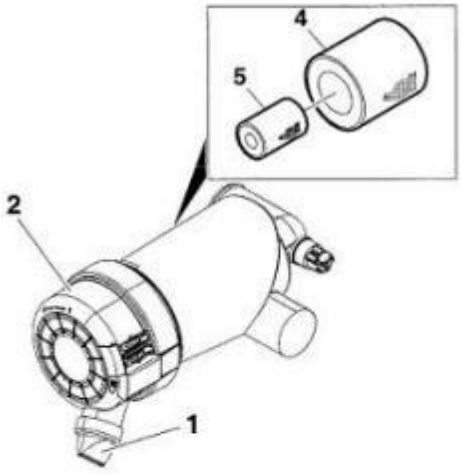
"⚠"Warning

To avoid death or serious personal injury

Never clean or attempt to remove the air filter if the engine is running. If using compressed air to clean the filter, ensure that appropriate eye protection is worn.



1. Locate the air filter assembly.
2. Remove and clean the rubber dust nozzle (1, right) at the bottom of the air filter cover (2). Check if the sealing lip is worn or damaged. Replace the valve if necessary.
3. Rotate the filter cover (2, right) to the unlocked position.
4. Remove the outer filter element (4, right) of the air filter, but do not remove the inner filter element (5, right).
5. Use compressed air to blow the outer filter element from the inside to the outside to clean it. Be careful not to exceed 205Kpa (30PSI).
6. Inspect the outer filter using light. If you find small holes or thin parts on the filter element after cleaning, replace the outer filter element.
7. Clean the inside of the air filter body and the inside of the air filter cover. Do not use compressed air.
8. Install the outer filter element and air filter cover.
9. Install the filter cover and make sure it is rotated into place.



Note: If the air filter clogging indicator light is still on after cleaning the outer filter, the outer and inner filters must be replaced. The inner filter cannot be cleaned.

Replace the hydraulic oil return filter (after the first 250 hours of operation)

Note: Replace the hydraulic oil return filter after 250 hours of initial operation and every 1000 hours thereafter.

Replace brake filter (after first 250 hours)

Note: The brake filter should be replaced after the first 250 hours of operation and every 500 hours thereafter.

Check the pins and bushings of the front working device for signs of wear. Check the battery. Check for loose or missing bolts and nuts. Check for loose hose clamps in the fuel system. Check and clean the front and rear axles and the transmission breather.

Maintenance every 500 hours/every 3 months

Perform all 10-hour, 50-hour and 250-hour maintenance and inspection items

Lubricate the swing gear ring

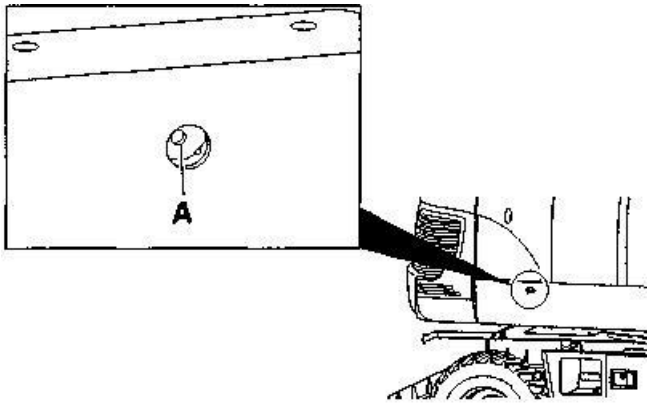
"⚠"Warning

Avoid injury or death

The maintenance work of lubricating the swing gear ring and pinion must be performed by the same person.

1. Lower the bucket and dozer blade to the ground.
2. Lift the safety handle to the locked position.
3. Allow the engine to idle at the lowest speed for 5 minutes without operation.
4. Turn the key to the "O" position to stop the engine.
5. Remove the key.
6. Use a grease gun to inject grease through the grease joint (A).
7. Lift the bucket to about 20 cm above the ground and rotate the upper rotating body about 90 degrees four times to stop, filling each time.

NOTE: If water or other contaminants are found, remove the bottom access cover to thoroughly clean the ring gear.

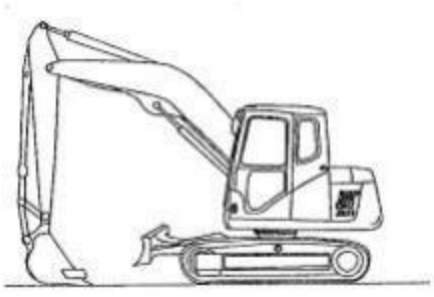


Oil level in travel reducer - check/refill

"⚠"Warning

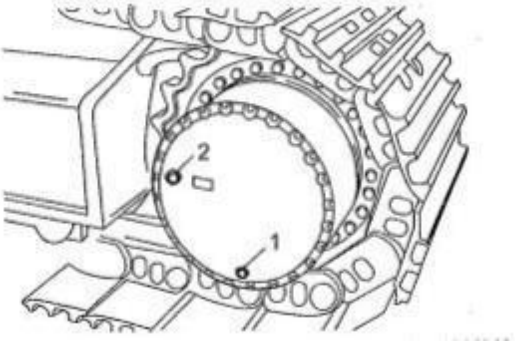
After shutting down the engine, wait for the oil temperature to drop before restarting the machine to prevent burns.

If there is residual pressure in the tank, slowly loosen the plug to release the pressure to prevent danger.



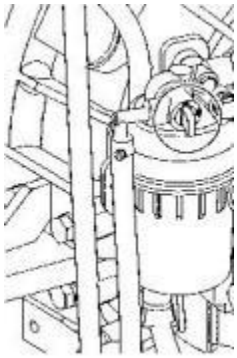
1. Park the machine on a level surface.
2. Turn the travel motor until the drain plug [1] is in the lowest position.
3. Lower the bucket to the ground.

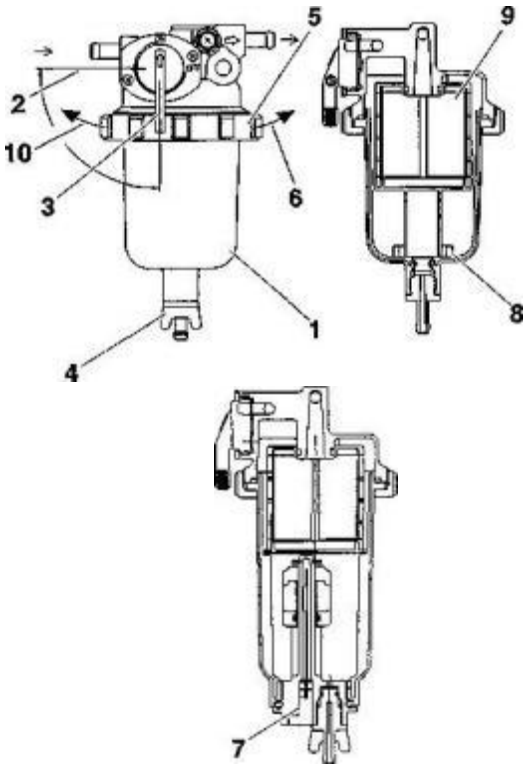
4. Turn the throttle control knob to the MIN position.
Run the engine at low speed for 5 minutes.
5. Turn off the engine and remove the key.
6. Put the safety lock lever in the locked position and check the oil level after 10 minutes.
7. After the gear oil has cooled, slowly loosen the filler (FILL/7LEVEL) plug
[2] to release the pressure.
8. Check the oil level through the filler port. The oil must reach the bottom of the hole.
If necessary, add oil until the oil overflows the oil level check plug hole.
9. Wrap the thread of the plug with sealing tape, insert the plug [2], and tighten the plug [2] to 49N·m.
10. Check the gear oil level of the other travel reduction device.



Cleaning the oil-water separator

1. Place a dedicated waste fuel container under the oil cup.
2. Turn off the fuel valve.
3. Loosen the drain valve (4, right picture) and drain the diesel.
4. Remove the oil cup (1, right picture).
5. Carefully remove the oil cup to prevent fuel from leaking. Wipe up any spilled fuel.
6. Remove the float (8, right picture) from the oil cup. Pour the contaminants into a container and dispose of them properly.
7. Clean the filter element (9, right picture) and the inside of the oil cup. Replace the filter element if it is damaged.
8. Install the O-ring on the filter element and the filter holder.
9. Fix the float in the oil cup.
10. Check the O-ring and replace it if necessary.
11. Install and fix the oil cup with a torque of 1.5 - 2.0 kgf.m.
12. Turn off the drain valve.
13. Turn on the fuel valve.





14. Use the bleed plugs on the electronic oil pump and the oil-water separator to bleed air.

15. Check for leaks and repair if any.

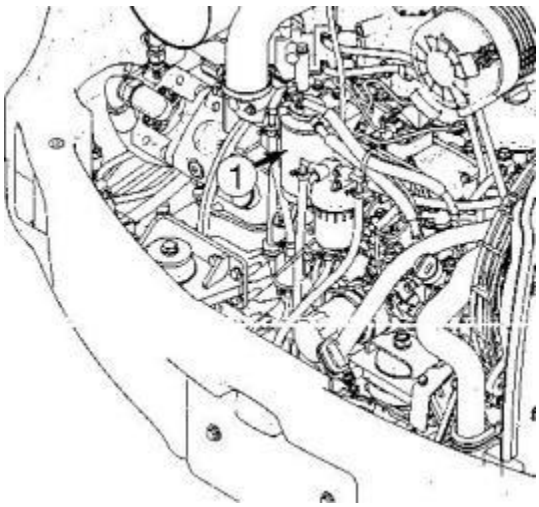
Replace the fuel filter

"⚠"Warning

To avoid injury or death

Wait for engine to cool before changing filter.

Beware of fire risk, no smoking.



1. Find the fuel filter in the engine compartment.

2. Turn off the fuel switch of the water separator. Open the engine cover to see the fuel filter.

3. Place a small container under the fuel filter.

4. Remove the fuel filter from the filter seat (1, right picture). Discard the old fuel filter.

Note: When handling the discharged oil, comply with local environmental protection laws and regulations.

5. After cleaning the fuel filter mounting surface, apply some fuel to the gasket of the filter element. Tighten the filter to the right by hand until the filter contacts the mounting surface, and continue to tighten with a wrench with a torque of 20 ~ 24N • m or one more turn. .

Note: Apply a layer of oil to the gasket of the fuel filter.

6. Turn on the fuel switch of the water separator and pump oil into the fuel system.

Note: After installing the new filter element, fill the filter element with the electronic pump by leaving the start switch in the power-on position for a period of time.

Fuel System Venting

If air is left in the engine's fuel line, it may cause the engine to run erratically.

Air may directly affect the engine's ability to start, possibly causing the engine speed to increase suddenly.

If the excavator has just run out of fuel, or if the fuel filter has just been replaced, it may be necessary to vent the air using the following steps:

1. Turn the start switch to the "I" position for 10~15 seconds. This will allow the electronic fuel pump to fill the fuel system.

2. Do not start the starter motor while pumping fuel.

Note: If it cannot start, repeat step 1.

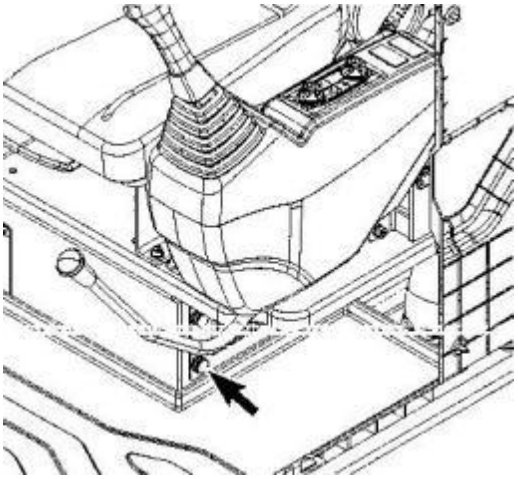
Cleaning the air conditioning filter

1. Unscrew the 4 fixing bolts that secure the filter cover at the bottom of the driver's seat and remove the cover.

“⚠”Caution

All maintenance and inspections of the air conditioning system must be performed with the start switch in the "0" (off) position.

If using compressed air to clean the filter, make sure to wear appropriate eye protection.



2. Remove the filter element and clean it with compressed air.

3. If it cannot be cleaned, replace it with a new one.

4. After reassembling the filter element, install the cover and tighten the bolts.

Cleaning radiators, oil coolers and condensers

“⚠”Warning

Using compressed air or water for cleaning can cause serious injury. Always wear goggles, a mask, and safety shoes during cleaning. Keep bystanders away from the work area.

1. Open the engine hood.

2. Loosen the butterfly bolts, remove the dust screen, and clean the dust screen.

3. Clean the outside of the radiator and oil cooler with compressed air or water. Clean in the opposite direction of the fan airflow first, then clean from the other side.

4. Clean the condenser.

5. Check the radiator core for damage, leakage, etc.

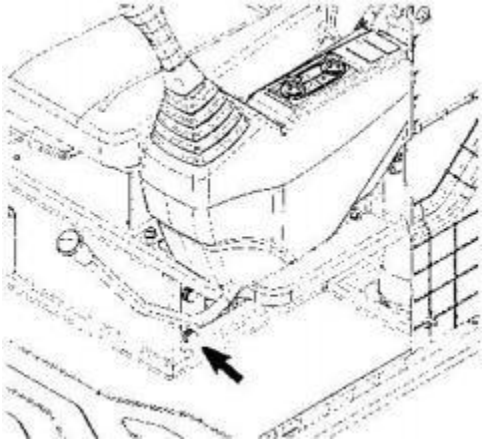
6. Install the dust screen.

Replace the air conditioning filter

The excavator is equipped with an air filter system that can filter out dust and dust particles to prevent unclean air from entering the cab. This filter must be cleaned.

Note: If in a dusty environment, it must be cleaned and replaced more frequently.

If the filter is damaged, please replace it with a new filter element.



1. Unscrew the 4 fixing bolts that fix the filter element cover at the bottom of the driver's seat and remove the cover.

2. Remove the filter element.

3. Replace the new filter element.

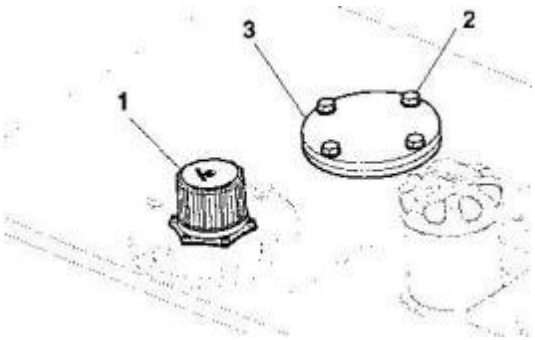
4. After reassembling the filter element, install the cover
and tighten the bolts.

Check the air conditioning refrigerant

This work is done by a Kenstone dealer.

Do not smoke when servicing or recharging the A/C system.
Contact with refrigerant can cause frostbite. Wear protective glasses and gloves when opening refrigerant lines.
Consult your Kenstone dealer to service or recharge your A/C refrigerant. Overcharging refrigerant can result in dangerously high pressures and poor cooling. Too little refrigerant can cause compressor damage.
Always keep refrigerant at the correct level.

Maintenance every 1000 hours



Replace the hydraulic oil breather filter element

Replace the air conditioning filter element

Replace the hydraulic oil tank return filter

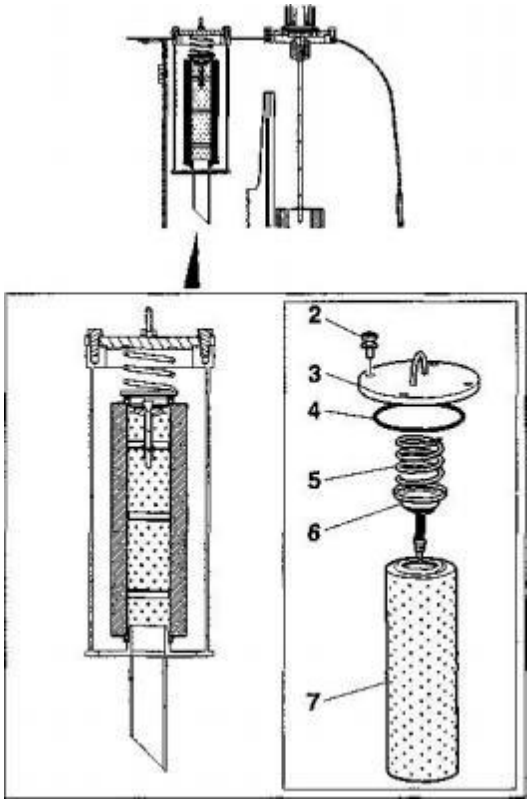
NOTE: Replace the hydraulic oil return filter after the first 250 hours of operation or after reassembly, and then every 1000 hours.

"⚠"Warning

To avoid death or serious personal injury

The hydraulic fluid will be hot after the machine has been running. Allow it to cool before servicing any hydraulic system components.

The hydraulic oil tank is under pressure. Tilt the breather upward slightly to allow the compressed air to escape. After the pressure is relieved, remove the service cap or drain the water from the tank. Be sure to remove any dirt or water from the top of the hydraulic oil tank, especially around the filler and filter ports.



1. Park the machine on a firm, level surface. Lower the front attachment to the ground and shut off the engine.
2. Tilt the breather (1, top) slightly upward to release the internal pressure.
3. Remove the bolts (2, right) and the inspection cover (3). Remove the O-ring (4), spring (5), bypass valve (6) and filter element (7).
4. Remove the filter element and discard.

Note: Used filter elements should always be disposed of in accordance with local laws and regulations.

5. Install a new filter element and O-ring. Install the bypass valve and spring. Install the inspection cover.
6. Run the engine at "low idle" for 10 minutes to remove air from the circuit.
7. Check the hydraulic oil tank level. Add oil if necessary.

Replace the air filter inner and outer filter

Never clean or attempt to remove the air filter while the engine is running.

NOTE: Replace the outer filter element after 5 cleanings or every 1000 hours of operation. Replace the inner filter element whenever a new outer filter element is installed.

1. Open the machine hood, rotate the air filter cover and remove it.
2. Remove the dust discharge valve from the air filter cover.

Note: Check the dust discharge valve sealing lip for wear or damage. Replace it if necessary. Install the dust discharge valve so that its lip is parallel to the cover.

3. Hold the outer filter element and gently shake it up and down. Shake the filter element to pull it out. Then remove the inner filter element.
4. Wipe the dust and debris inside the air filter cover and air filter housing.
5. Then install the new inner filter element. A properly inserted inner filter element will not move.
6. Push the new outer filter element directly into the air filter housing.
7. Install the air filter cover.

Note: Replace the inner filter element at the same time as the outer filter element. Do not reuse the inner filter element.

Note: If the outer filter element and cover are installed without the inner filter element installed correctly, the outer filter element will be damaged.

Maintenance every 2000 hours/year

Perform all 10, 50, 250, 500 and 1000 hour maintenance items

Lubricating oil in travel reducer--replacement

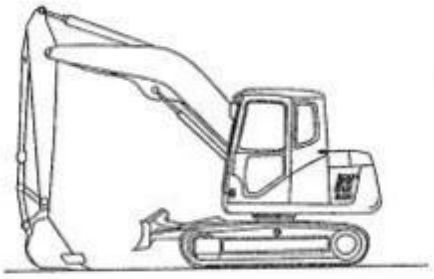
After the engine is turned off, the oil is still hot and may cause burns. Wait until the oil temperature drops before re-operating to prevent burns.

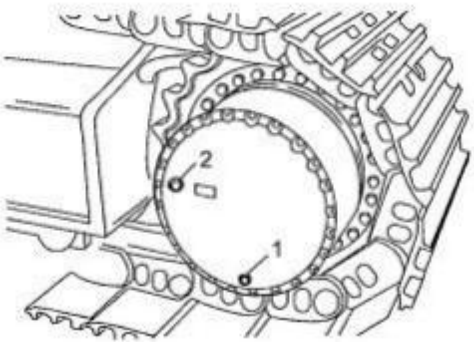
If there is residual pressure in the tank, the oil or the plug may fly out. Keep your body and face away from and away from the air release plug. Slowly loosen the plug to release the pressure.

1. Park the machine on level ground.
2. Turn the travel motor until the drain plug [1] 2 is in the lowest position.
3. Lower the bucket to the ground.
4. Lower the throttle control knob to MIN. Run the engine at low no-load speed for 5 minutes.
5. Turn off the engine and remove the key from the start switch.
6. Set the safety lock lever to the "lock" position.
7. After the gear oil cools, slowly loosen the filler (FILL/LEVEL) plug [2] to release the pressure.
8. Check the oil level through the filler port. The oil must reach the bottom of the hole.

If necessary, add oil until the oil overflows the oil level check plug hole.

9. Wrap the thread of the plug with sealing tape, install the plug [2], and tighten the plug [2] to 49N·m.
10. Check the gear oil level of the other travel reduction device.





Hydraulic oil suction filter element - clean or replace

After shutting off the engine, components and oil are still hot and may cause burns. Wait until the temperature drops before cleaning the hydraulic tank filter.

1. Park the machine safely

For easy access, turn the upper vehicle 90 degrees and park the machine on level ground.

Position the machine with the arm cylinder fully retracted and the bucket cylinder fully extended.

2. Lower the bucket to the ground.

3. Lower the throttle control knob to MIN. Run the engine at low no-load speed for 5 minutes.

4. Turn off the engine and remove the key from the start switch.

5. Put the safety lock lever in the locked position.

6. Loosen the fixing bolts and remove the oil suction cap.

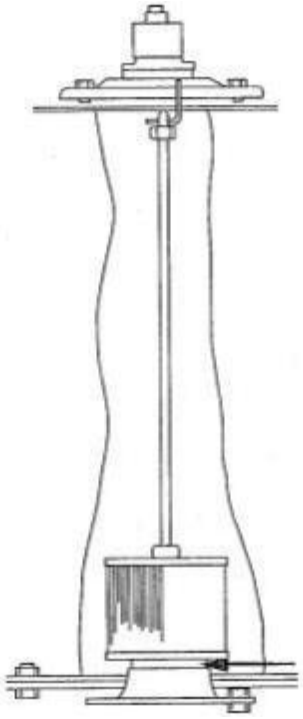
7. The oil suction cap may fly out due to the elastic force, so press the cap down when removing the bolts.

8. Pull out the upper end of the rod and remove the spring and filter element.

9. Remove any dirt from the filter element and rinse it in clean diesel or washing oil. If the filter element is damaged, replace it.

10. Reinstall the filter element and insert it into the protrusion in the fuel tank, as shown in the right figure.

11. When assembling, make sure the protrusion under the cover holds the spring and then tighten it with bolts.



Alternator and Starter Motor - Check

The brushes may be worn or the bearings may have run out of grease. Contact a Kenstone authorized dealer for inspection or repair.

If the engine is started frequently, it should be inspected every 1000 hours.

Engine valve clearance - check/adjust

Since special tools are required to remove and adjust components, please contact an authorized dealer of KS Heavy Industries for this check/adjustment.

Maintenance every 4000 hours/every 2 years

Perform all 10, 50, 250, 500, 1000 and 2000 hour maintenance items

Main components-periodic replacement

In order to ensure the safety of the excavator, it is necessary to carry out periodic inspections. At the same time, in order to enhance safety, the following parts should be replaced. These parts are prone to wear, heat or decay. Regardless of whether these parts are obviously damaged, they should be replaced according to the specified period.

Key Parts		Name	Time
Engine		All fuel hoses	4000 hours/every 2 years
		Heating hoses	
		Heating hoses	
		Air conditioning hoses	
Hydraulic system	Main body	Hydraulic pump suction pipe	
		Hydraulic pump outlet pipe	
		Pump side branch hoses	
		Swing motor pipes	
		Travel motor pipes	
	Working device	Boom cylinder hoses	
		Arm cylinder hoses	
		Bucket cylinder hoses	

Replace antifreeze

Note: Antifreeze of different brands cannot be mixed together.

"⚠"Warning

To avoid death or serious personal injury

Allow the engine to cool before loosening the radiator cap. Loosen the cap slowly to relieve pressure. If cleaning the radiator with the engine running, lock the safety lever and hang a sign on the lever to remind you that service work is being performed. Do not remove the radiator cap unless necessary. Check the antifreeze level in the antifreeze auxiliary tank.

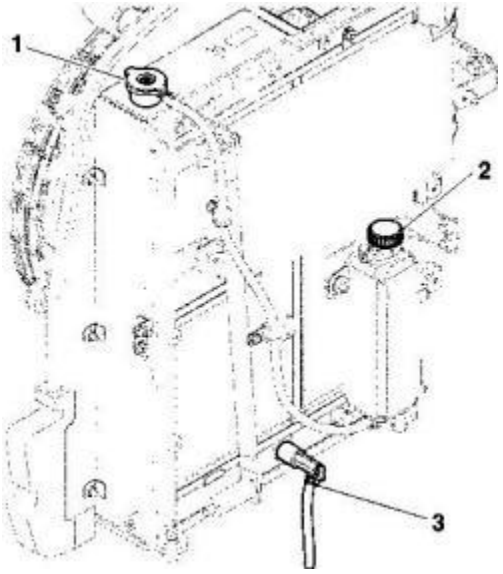
Important

Do not mix antifreeze from different manufacturers. If mixed, foreign matter that damages the system may be produced. Therefore, it is recommended to use genuine Kenstone antifreeze. In order to achieve

the best cooling performance, the proportion of antifreeze accounts for 50%. Cooling with water alone will corrode the engine cooling system.

In severe cold working conditions, the performance of the antifreeze should be checked frequently to see if it is suitable for the weather, and then the replacement cycle of the antifreeze should be determined.

1. Slowly open the radiator cap (1, right) to release the pressure.
2. Place a container under the radiator and open the drain valve (3, right). Note: Dispose of old oil in accordance with local environmental laws and regulations.
3. Fill the cooling system with flushing solution.
4. Run the engine at low idle until the engine fluid temperature reaches the "white zone". Let the engine run for another 10 minutes.
5. Cool the engine.
6. Drain the flushing solution and fill the system with water.
7. Run the engine again to circulate the water completely.
8. After the engine has cooled, drain the water and add antifreeze to the system at a temperature appropriate to the ambient temperature.
9. Run the engine without the radiator cap installed to purge the air from the system, then fill with antifreeze.
10. Drain and fill the auxiliary water tank with antifreeze.



Replace hydraulic oil and clean oil suction filter

"⚠"Warning

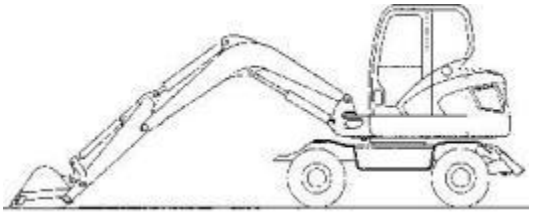
To avoid death or serious personal injury

The hydraulic fluid will be hot after the machine has been operated. Allow it to cool before servicing any hydraulic system components.

The hydraulic oil tank is under pressure. Tilt the breather upward slightly to allow the compressed air to escape. After relieving the pressure, remove the service cap.

NOTE: Depending on the type of digging, the working environment (extreme heat or dust) and other front attachments used (breakers, etc.), the hydraulic oil may need to be changed more frequently. Dispose of used oil in accordance with local regulations.

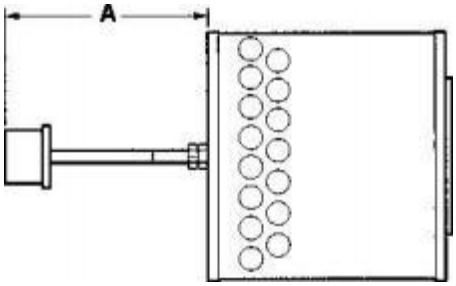
1. Park the machine on a firm, level surface. Lower the boom and place the bucket on the ground as shown in the figure on the right.



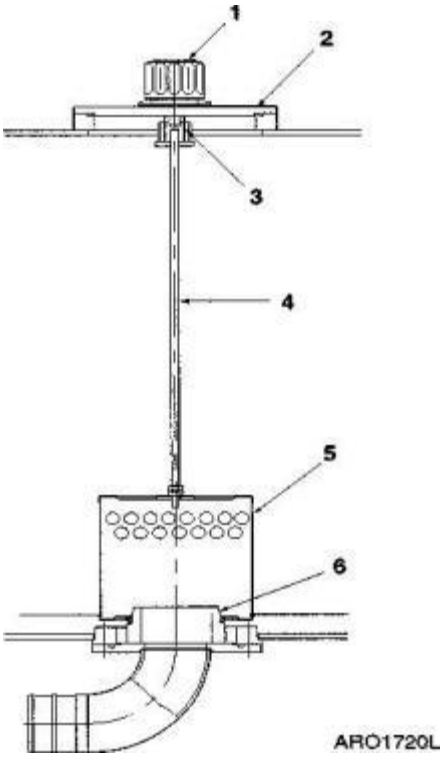
2. Move the safety lever to the "locked" position.
3. Turn off the engine.
4. Lift the breather (1, figure on the right) upward to release the compressed air in the hydraulic tank.
5. Drain the hydraulic oil from the tank into a suitable container. After draining the tank, install the drain plug.

Note: Be careful when removing the drain plug as the oil will spray.

Note: Dispose of old oil and filters in accordance with local laws and regulations.



6. Carefully remove the bolts and cover (2, figure on the right) from the top of the hydraulic tank. There is a spring (3, figure on the right) under the cover that will push the cover up.
7. Remove the filter (5, figure on the right) by pulling the mounting lever (4, figure on the right).
8. Clean the filter inside and outside. If the filter is damaged, replace it.
9. Place the filter (5, right) on the raised part of the suction pipe (6, right). Note: The measurement "A" is 475 mm.
10. Fill the hydraulic oil tank and check the level using the oil level gauge on the side of the tank.
11. Install other parts.
12. Bleed the hydraulic system after changing the hydraulic oil.



Maintenance every 12,000 hours/every six years

Hose life limit (standards ISO 8331 and EN982 (CEN))

Regulations state that the life of any hydraulic hose should not exceed 6 years. Kenstone recommends the following:

•Hydraulic hoses should not be stored for more than 2 years before being thrown away or installed on a machine.

・Hose installed on a machine should not exceed 6 years. Hoses that have exceeded the permitted life must be replaced regardless of appearance/wear.

.Always store hoses in a dark place, with a maximum relative humidity of 65%, at a temperature between 0°C (32°F) and 35°C (95°F), but as close to 15°C (59°F) as possible, and away from copper or ozone-producing pipes, etc.

Electrical System

Note: Do not disassemble electrical or electronic components. Consult your Kenstone dealer before repairing.

Battery

"⚠"Warning

To avoid death or serious personal injury

The battery electrolyte contains sulfuric acid, which can quickly burn the skin and burn through clothing. If acid splashes on yourself, immediately flush the area with water.

Battery acid can cause blindness if splashed into the eyes. If acid splashes into the eyes, immediately flush with plenty of water and seek professional medical attention immediately. If acid is accidentally ingested, seek medical attention immediately.

Always wear safety goggles when using or inspecting batteries. Batteries can produce hydrogen gas, which poses a risk of explosion. Do not smoke or do anything near batteries that could cause sparks.

Before using the battery, stop the engine and turn the start switch to the "0" (off) position.

Avoid shorting the battery terminals due to accidental contact with metal objects (such as tools).

When removing or installing, check which is the positive (+) terminal and which is the negative (-) terminal.

When removing the battery, disconnect the negative (-) terminal first. When installing the battery, connect the positive (+) terminal first.

If the terminal is loose, poor contact may cause sparks and explosion. When installing the terminal, please install the terminal firmly.

Cold Weather Batteries

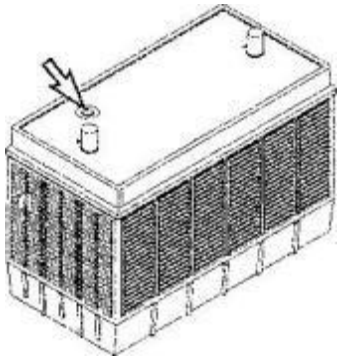
In colder weather, the battery will have a greater charge drain when used to warm up and start a cold engine. The lower the temperature, the worse the battery performance.

In extremely cold weather, the battery can be removed at night and placed in a warm place. This will help it maintain higher performance.

Check the battery electrolyte level

This machine has 1 maintenance-free battery.

When the charge indicator turns white, it indicates a low electrolyte condition due to leakage or a charging system malfunction. Determine the cause of the malfunction and replace the battery immediately.



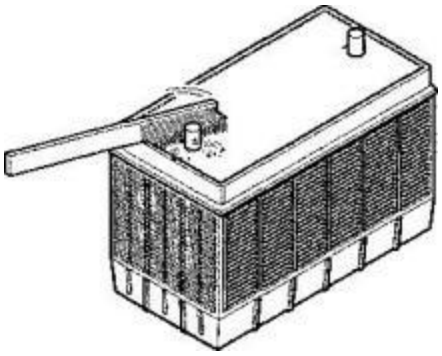
Check charging status

- Green: Fully charged
- Black: Insufficiently charged.

• White: Replace the battery.

Check the electrodes

Make sure the battery is securely fastened in the battery box. Clean the battery terminals and battery cable connectors. A solution of baking soda and water will neutralize the acid on the battery surface, terminals, and harness connectors. Apply petroleum jelly or grease to the connectors to help prevent corrosion.

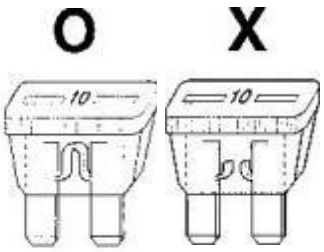


Replace the battery

When the charging indicator turns white, replace the battery.

Safety

1. The fuses in the fuse box are used to protect various circuits and their components from damage, see the picture on the right. The fuses used are standard automotive fuses.
2. If the fuse blows, determine the cause and repair any electrical faults.
3. Do not insert a higher current fuse into a lower current slot, as this may cause serious damage to electrical components or cause a fire.



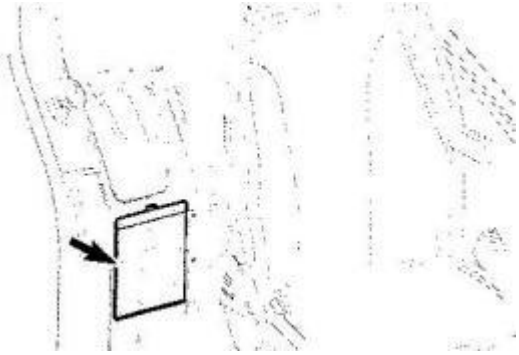
Note: Before replacing the fuse, be sure to turn the start switch to the (off) position.

Fuse Box

There is a fuse box on the right rear side of the seat (right picture). Fuses protect electrical equipment from overload or short circuit.

The fuse box is enclosed with a label indicating the function and amperage of each fuse. Spare fuses are installed on the inside of the fuse box cover. (One each for 10A, 15A, 20A and 30A)

If the fuse is blown, replace it. If the new fuse still burns out, check and repair the circuit.



"⚠"Warning

To avoid death or serious personal injury

Always replace the removed fuse with a fuse of the same rating as the one removed; otherwise, electrical failure or fire may result.

Engine Cooling System

Antifreeze type

Propylene glycol - Kenshi genuine antifreeze (can be used in all seasons) Ethylene glycol is a substance that is extremely harmful to humans, animals and the environment. The discharge of antifreeze must comply with local laws.

There is no standard for the color of antifreeze. Other brands of antifreeze may have the same color. Please check the label on the container and use genuine antifreeze.

Note: Do not mix antifreeze from different manufacturers, otherwise, the performance may decrease. It is recommended to use Kenshi original antifreeze. In extreme temperatures, the performance of the antifreeze must be checked frequently and the replacement cycle of the antifreeze must be adjusted as needed.

Ambient temperature	Special water ratio	Antifreeze ratio
-20℃	67%	33%
-25℃	60%	40%
-30 ℃	56%	44%
-35℃	50%	50%

Overview

Keeping your engine's cooling system in good working order has many benefits for keeping your machine in good working order. A properly functioning cooling system will improve fuel efficiency, reduce engine wear, and extend the life of parts.

Always use genuine Kenstone antifreeze in the radiator, just add it directly. Contaminants in tap water can neutralize the preservative and cause engine failure. Water from streams often contains dust, minerals and/or organic matter, which can settle in the cooling system and affect cooling efficiency. Therefore, it is recommended to use Kenstone antifreeze.

The antifreeze should be checked every 500 hours.

High engine temperatures are usually caused by bent or clogged fins. Compressed air or water can be used to clean the fins. When straightening bent fins, be careful not to damage the tubes or break the joints between the fins and the tubes.

“⚠”Warning

To avoid death or serious personal injury

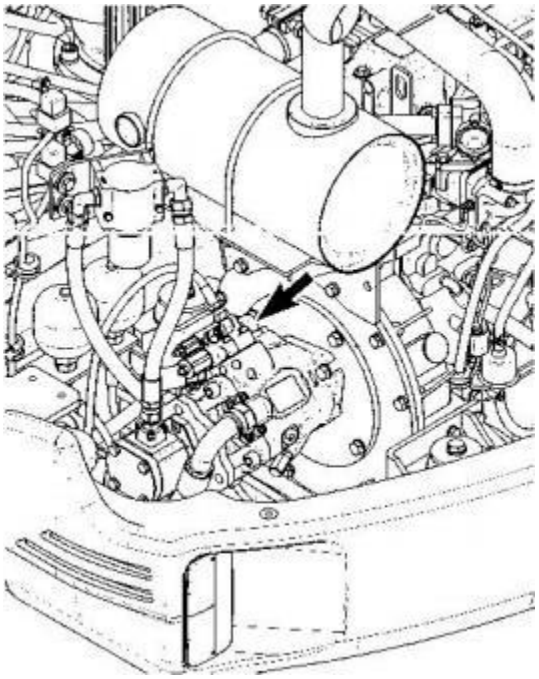
The pressure of compressed air should not exceed 2kgf/cm2(28psi). Always wear goggles when using compressed air.

When the engine is overheated and the water level is low, never fill the radiator with cold antifreeze, as this may cause damage to the engine cylinder head.

Hydraulic system exhaust

Main pump

Note: If the pump is operated with insufficient oil, damage may result. Bleed the air from the hydraulic system after changing the oil.



1. After turning off the engine, remove the hose at the arrow in the right figure to check whether there is hydraulic oil.
2. If there is no oil, please add it.
3. Pre-tighten the hose, start the engine, and run the engine at low speed for a few minutes.
4. Slowly loosen the hose until the hydraulic oil flows out of the plug. This indicates that the air has been released.
5. Tighten the joints and hoses, and then check the oil level in the hydraulic oil tank. If it is not enough, please add it.

Cylinder exhaust

Important

If you run the cylinder at "high speed" after bleeding the hydraulic system or reassembling the cylinder, you may damage the piston seal. Always bleed the cylinder at "low speed" and slow moving engine speed.

1. Run the engine at a low speed. Extend and retract each cylinder 4 to 5 times, so that the piston moves in the middle of the stroke, leaving at least 100mm at both ends.
2. Extend and retract each cylinder fully 3 to 4 times.
3. Repeat the above steps until the cylinder extends and retracts smoothly.

General exhaust

1.After bleeding air from all components, shut off the engine and check the hydraulic oil level. Fill the hydraulic oil tank to the "H" mark on the oil level gauge.

2.Start the engine, operate all control levers again, and run the engine for 5 minutes to ensure that all systems are bled. Turn the engine speed to "low speed" and check the hydraulic oil level again. Add oil if necessary.

3. Check for hydraulic oil leaks and clean all filling and bleeding locations.

Air conditioning system

Note: Clean the air conditioning filter.

Check the air conditioning hose

Check the hose for cracks or damage.

"⚠"Caution

Prevent injuries

When a leak occurs, dust will accumulate at the leak.

Consult your Kenstone dealer.

Check the condenser

Check the condenser for dust or debris. Clean as needed.

Check the magnetic clutch

Check the magnetic clutch for dust or interference. Press the air conditioning switch "AC" to activate the magnetic clutch and check the magnetic clutch.

Check the belt tension

Check bolts and nuts

Check the tightness of the bolts and nuts after the first 50 hours of operation and every 250 hours thereafter. If they are loose, retighten them according to the table below. When replacing new products, be sure to use bolts and nuts of the same grade.
Be sure to use a calibrated torque wrench.

Important

Clean all fasteners before tightening. If the weight is loose, contact your Kenstone dealer.

No.	Points to check	Bolt size (mm)	Qunt.	Tool size	Torque kgf • m
1	Connecting bolts between engine support leg and engine	10	18	17	6.5
2	Connecting bolts between engine mounting support leg and frame	14	4	22	18
3	Radiator mounting bolts	12	4	19	11
4	Hydraulic oil tank mounting bolts	12	4	19	11
5	Fuel tank mounting bolts	12	4	19	11
6	Pump mounting bolts	12	2	19	11
7	Control valve mounting bolts	8	4	13	3
8	Swing motor mounting bolts	16	8	14 (Hexagon socket)	27
9	Cab fastening nut	12	4	19	11
10	Connecting bolts between reinstallation bearing and upper frame	16	24	24	27
11	Connecting bolts between swing bearing and lower frame	16	24	24	27
12	Mounting bolts of rear axle	20	8	30	45 ~ 50
14	Mounting bolts of travel motor	12	4	10	10
15	Mounting bolts of shock absorber cylinder	16	8	14	25
17	Counterweight bolts	20	3	30	55

Maintenance under special conditions

Condition	Maintenance Required
Working in mud, water or rain.	Perform a walk-around inspection to check for loose parts, obvious damage to the excavator, or fluid leaks.
	After completing an operation, clean the excavator of dirt, rocks, or debris. Check for damaged open welds or loose parts.
	Perform daily lubrication and maintenance.
	If working in salt water or other corrosive materials, be sure to flush affected accessories with fresh water.
In extremely dusty or hot environments.	Clean or replace air filters more frequently.
	Clean radiator and oil cooler fins to remove ingress of dirt and dust.
	Clean fuel system water separators and replace fuel filters more frequently.
	Inspect and clean starter motors and generators as required.
Working on rocky surfaces.	Inspect chassis and drivetrain for damage or excessive wear.
	Inspect for loose or broken devices or bolts.
	Inspect front work attachments more frequently for damage or excessive wear.
	Install roof guards and front guards as required to protect against falling rocks.
In extremely cold weather.	Use appropriate fuel for temperature conditions.
	Using a hydrometer, check the antifreeze to ensure it provides adequate freeze protection.
	Check the condition of the batteries. In extremely cold weather, remove the batteries and store them in a warm place.
	Clean up accumulated dirt as soon as possible to prevent ice from forming on the chassis and causing damage.

TRANSPORTATION

1. Transportation Methods

When transporting the machine, first understand and comply with all local regulations.

When transporting by trailer, confirm the length, width, height and load capacity of the trailer.

Check the conditions of the transportation route in advance, such as size, weight restrictions and traffic regulations.

Sometimes it is necessary to disassemble the machine to meet local size or weight restrictions.

Note: The transportation weight and size may vary depending on the type of track shoes and working devices installed.

2. Loading and unloading

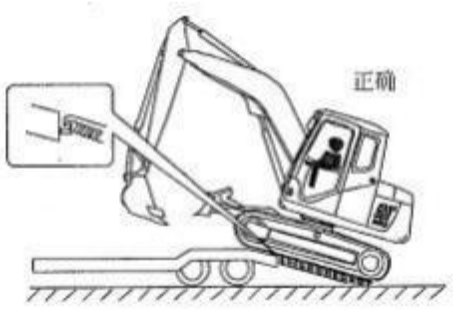
When loading and unloading the machine, be sure to turn off the automatic total speed switch to avoid a sudden increase in the machine speed caused by inadvertent operation of a control lever.

Adjust the throttle control knob to the MIN position to avoid danger caused by high-speed operation of the machine.

When loading and unloading the machine, choose a solid and flat ground. Keep a safe distance from the edge of the road.

Use ramps with sufficient width, length, thickness and strength, with a maximum installation slope of 15". When using piled soil slopes, compact the soil completely and take measures to prevent the slope from collapsing.

Avoid turning when driving up or down the slope. If necessary, return to the ground or trailer bed first, then correct the direction of travel and then pass the slope.



The intersection of the top of the slope and the trailer bed is a protrusion, so drive over it carefully.

Prevent the machine from tipping over and causing injuries when the upper vehicle is swung. Retract, lower the bucket rod and slowly swing the upper vehicle for optimal stability.

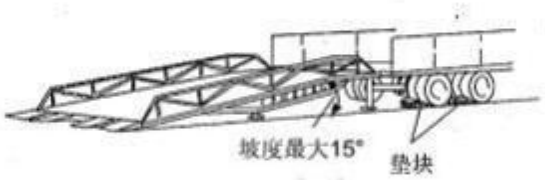
When the machine is driving on the slope, do not operate any other control lever except the travel control lever.

Before loading and unloading, thoroughly clean the slope or loading and unloading platform and trailer bed. Slopes,

loading and unloading platforms and trailer beds that are stained with oil, mud or ice are slippery.

Loading

Note: Load and unload the machine on firm, level ground, keeping a safe distance from the edge of the road.



When using a ramp or loading platform, place blocks under the wheels.

The ramp must be wide enough. Always keep the inclination of the ramp less than 15 degrees.

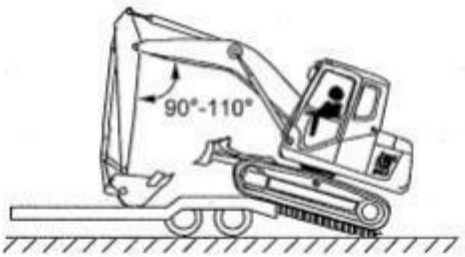
The loading dock must be wide and strong enough to support the machine and have a slope of less than 15 degrees.

In cold weather, always warm up the machine before loading or unloading.

The following rules should be followed when loading:

1. The direction of the machine is as follows:

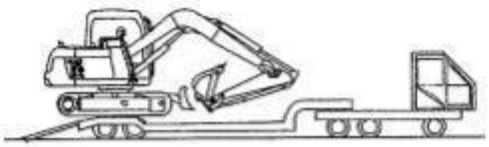
With working device: Place the working device at the front and move forward. Support the flat surface of the bucket on the trailer, and the angle between the bucket rod and the boom should be between 90 and 110 degrees.



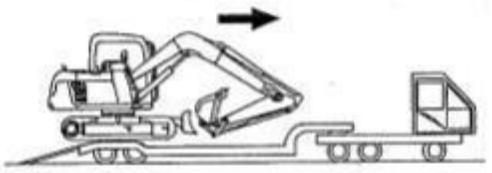
2. The center line of the machine should correspond to the center line of the trailer.

3. Slowly drive the machine onto the slope.

4. When the machine begins to tilt toward the trailer flatbed, support the bucket on the trailer and slowly move forward until the crawler tracks are all on the trailer and firmly in contact with the flatbed.



5. Lift the bucket slightly, retract the bucket rod and keep it below, and slowly turn the upper vehicle 180 degrees. Lower the bulldozer.



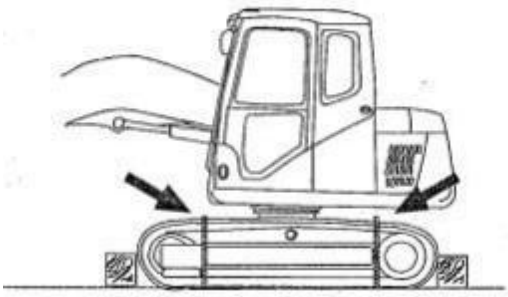
6. Fully extend the bucket and bucket rod cylinders, and slowly lower the boom.

7. To prevent damage to the bucket cylinder during transportation, place a wooden block on one end of the bucket cylinder to prevent contact with the bottom plate.

8. Stop the engine and remove the key from the switch.
9. Operate the travel lever several times until the pressure in the hydraulic cylinder is completely released.
10. Put the safety lock lever in the "lock" position.
11. Close the windows, ventilation skylight and door of the cab, and cover the exhaust port to prevent wind and rain from entering.

Fixed machine

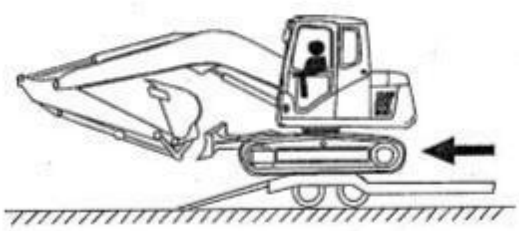
Note: Put away the radio antenna. Remove the rearview mirror.
Securely tie the removed parts to the trailer.
To prevent damage to the bucket cylinder during transportation, place wooden blocks at one end of the bucket cylinder to prevent it from touching the bottom plate.
After loading the machine onto the trailer, follow the steps below to secure the machine.
1. Extend the bucket and arm cylinders fully, then slowly lower the boom.
2. Turn off the engine and remove the key from the start switch.
3. Put the safety lock lever in the "locked" position.
4. Lock the cab, side doors, battery box cover and engine hood.
5. Place pads under both ends of the track to prevent the machine from moving during transportation, and tie the machine with chains or wire ropes.



Note: Tie the chain or rope to the frame of the machine, and do not cross or press the chain or cable on the hydraulic line or hose. Secure the machine firmly to prevent it from sliding to one side during transportation.

Unloading

1. Loading and unloading can only be done on a solid and flat surface, keeping a safe distance from the edge of the road.
2. Brake the trailer appropriately and place pads under the tires to ensure that the trailer does not move. Then install a ramp between the trailer and the machine.



Make sure that the ramps on both sides are on the same level. The maximum slope of the ramp should not exceed 15". Adjust the distance between the ramps to match the center of the crawler tracks.

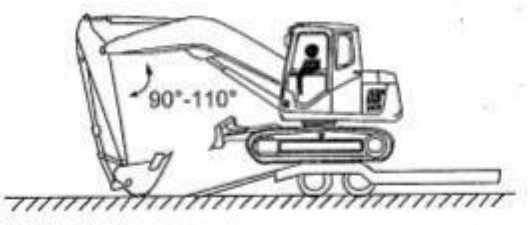
3. Remove the chains or wire ropes that secure the machine.

4. Start the engine.

5. Set the safety lock lever to the free position.

6. Raise the working device, put the bucket under the boom, and then slowly move the machine.

7. When the machine moves over the rear wheels of the trailer and moves toward the ramp, stop moving the machine.



8. Adjust the angle between the bucket and the boom to 90~110°, with the flat surface of the bucket supported on the ground, and then slowly move the machine into the ramp.

9. When the machine moves to the ramp, slowly operate the boom and bucket, and carefully lower the machine until it is completely off the ramp.

Note: The intersection of the rear end of the trailer flatbed and the inclined surface is a protrusion, so drive over it carefully.

Prevent possible damage to the working device. When unloading, always keep the angle between the bucket and the boom at 90°. Unload the vehicle with the bucket retracted It may cause damage to the machine. Do not allow the bucket to collide violently with the ground to avoid damage to the hydraulic cylinder.

Lifting machine

When lifting the machine, follow the steps below on a flat surface:

1. Start the engine, raise the bulldozer, and rotate the upper body so that the working device is at the rear of the machine.

2. Fully extend the boom and bucket hydraulic cylinder. Lower the boom until the bucket touches the ground.

3. Set the safety lock lever to the "locked" position.

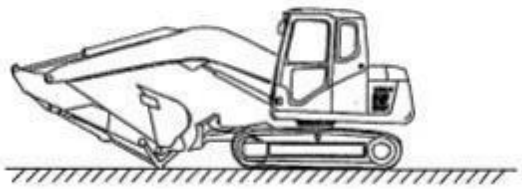
4. Turn off the engine and remove the key from the start switch.

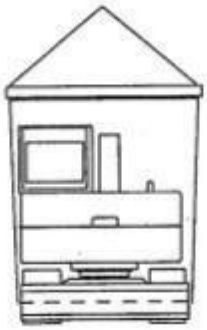
5. To avoid damage to the machine, use a steel cable (or support rod) of appropriate length and protective materials.

6. Drive the crane to the appropriate lifting position.

7. As shown in the figure, pass the steel cable under the two side frames. Install the steel cable on the crane.

8. Please use lifting equipment above 80T and corresponding steel cables for lifting.



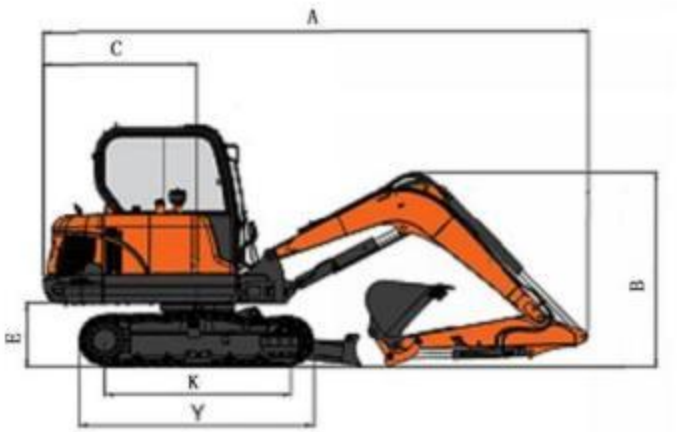


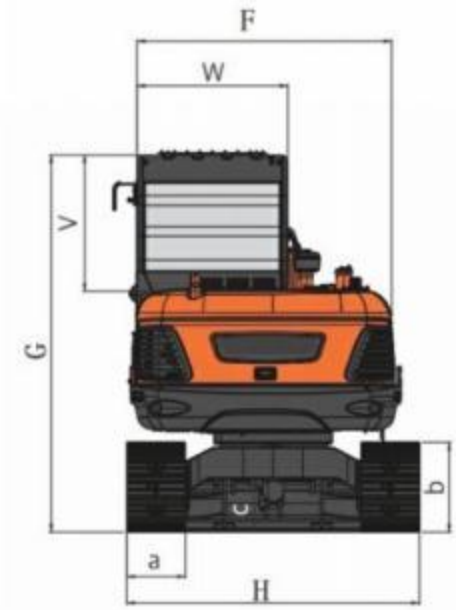
SPECIFICATION

Basic specification

Model				RH60E
Machine weight				5.8 ton
Bucket	SAE（PCSA)			0.21 m^3
Performance	Speed	Forward	Low(1)	0～10Km/h
			High(II)	0～30 Km/h
		Backward	Low(1)	0～10 Km/h
			High（II）	0～30 Km/h
	Swing speed			9 rpm
	Digging force		Arm	2.8 ton
			Bucket	4.5 ton
	Theoretical climbing ability			35°
	Minimum turning radius			4.85 m
Engine	Model			Yanmar 4TNV98
	Type			Water-cooled - 4 cylinders
	Rated power			39Kw/2200rpm
	Maximum torque			188.2-205 N.m/ 1650(± 100) rpm
	Fuel tank capacity			120L
Hydraulic pump	Type			Variable piston pump
	Relief pressure			23Mpa
	Displacement			149.6L/min
	Hydraulic oil capacity		Tank	72L
			System	140L
Travel system	Drive system			Hydraulic drive/2 speeds forward and reverse

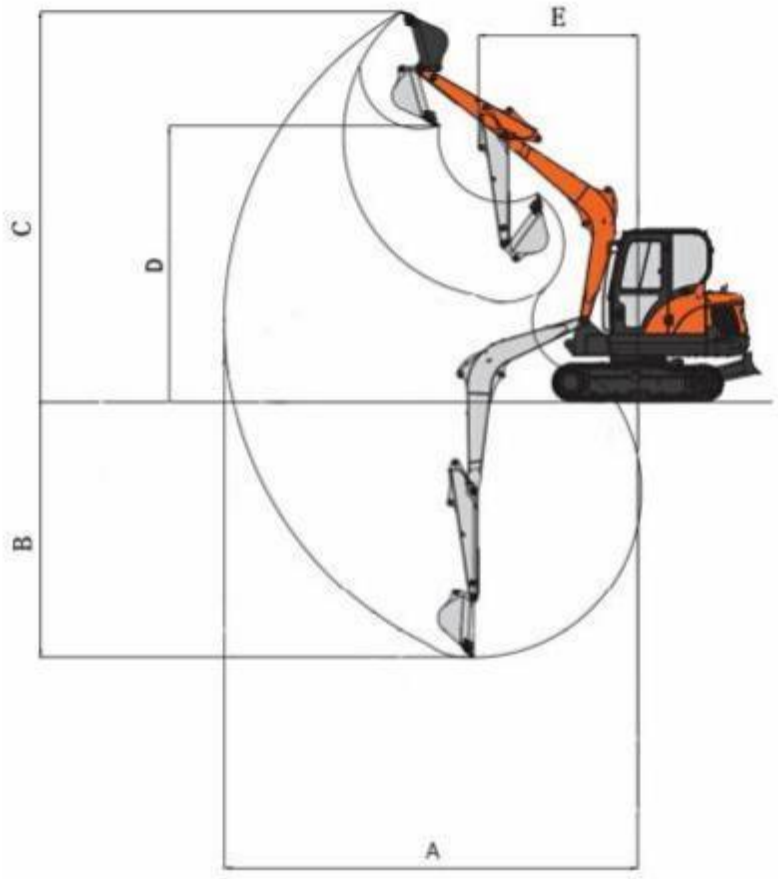
Dimensions





Item	Name	Dimension
		3.0 m Boom
		1.6 m Arm
A	Length	5850mm
B	Height	2040mm
C	Rear end turning radius	1650mm
V	Cab height above fuselage	920mm
E	Counterweight ground clearance	685mm
F	Upper platform width	1860mm
G	Cab height	2590mm
H	Lower frame width	1880mm
K	Wheelbase	1990mm
Y	Track length	2450mm
a	Track width	400mm
b	Track height	615mm
c	Body ground clearance	360mm

Scope of work



Item	Name	Dimenson
		3.0mBoom
		1.6 marm
A	Maximum digging range	6135mm
B	Maximum digging depth	3800mm
C	Maximum cutting height	5795mm
D	Maximum unloading height	4110mm
E	Minimum turning radius	2370mm

ENVIRONMENTAL PROTECTION

Environmental Protection

When maintaining the excavator, if any pipes, joints or other related parts are disassembled, antifreeze, oil, fuel, butter, electrolyte and other substances that may cause environmental pollution should be collected in special containers.

At the same time, these pollutants should be disposed of in designated authorized places, and their disposal must comply with local laws and regulations.