

# MANUAL DE USUARIO

EXCAVADORA | ME60



**MICHIGAN**<sup>®</sup>

# PREFACE

This operation manual systematically covers the correct operation and use, the methods for overhaul and maintenance of this machine, and detailed notices.

Before operate this machine, make sure carefully read and fully understand this manual.

This manual should be attached with the machine for timely reference in case of any problem. Also, review this manual in periodical manner.

Please refer to the operation manual of engine in terms of the engine.

In case of damage or loss of this manual, please contact our company or the designated dealer of our company for subscription.

Make sure hand this manual over to the new owner in case of transfer of this machine.

The illustrations in this manual are just for obvious and clear instructions to the problems, instead of implicating all contents of the text.

Our company reserved all rights for machine modifications. Please understand that the contents of this manual may differ from the specifications of your machine due to machine improvements. Please contact our company or the service dealer periodically to obtain latest data.

This is the first issued version. We will appreciate corrections and editing suggestions from experts or readers may point out and correct our editing errors.

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# **SPECIAL STATEMENT OF EXCAVATOR FUEL SYSTEM OPERATION AND MAINTENANCE**

Please read this manual carefully in order to maximize the benefits.

Fuel quality is an important factor for excellent performance quality, extension of service life and efficient emission.

Diesel supplies the energy that is required by the diesel engine and supplies the cooling and lubrication for the precision components in fuel system. Most of the diesel in the market can meet the requirement of diesel engine. It must, however, meet the performance requirements such as viscosity, cetane number, sulfur content, cloud point, water and sediment content. Among them, viscosity, cetane number and cloud point in general will not change in case that suitable diesel is well chosen. However, water and sediment will exceed the prescribed content requirements (below 0.05 volume percentage) because of transport, storage and improper maintenance, which increases the wear of fuel system of diesel engine and results in the engine failure such as the difficulty in starting, decrease in power and black smoke.

Therefore, the users and operators need to do the following:

- Select the diesel that meets the requirements. Do not use the low-grade diesel;

- Take the appropriate measure during the transportation, storage and filling of diesel to reduce the mixture of water and impurities;

- Do the maintenance such as drainage, filter changing strictly in accordance with the maintenance cycle stipulated by the provisions in 'operation maintenance manual'. If necessary, please shorten drainage and the replacement cycle appropriately according to the working environment.

**ME60****OPERATION AND MAINTENANCE MANUAL**

Our company reserves the right to continually improve our products in order to make the best products as possible for the market. These improvements may be ready for implementation. However, for the products sold, we do not change the material. Please contact the distributors regularly for the latest material of the models that you are going to buy.

These materials may include accessories and optional parts with which your models may not be attached. If you need these accessories, please contact the distribution agency of our company.

The illustrations in this manual are just for obvious and clear instructions to related parts of the machine and may be different from the actual parts.

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**Appendix Operating Manual for Electronic Monitoring Meter**

**Proposal on Operation & Maintenance Manual Amendment**

# **Chapter I Introduction**

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## Literature Information

- The Operation & Maintenance Manual shall be placed in the file folder or the document bag at the back of seat in the cab.
- The contents about improvement and development may not be included in this Manual.
- The pictures in the Manual or some structure in the Figure or accessories may be different from those of your machine.
- Please read and comprehend the contents of this Manual thoroughly and keep it with the machine.
- When you have problems about the machine or this Manual, please consult domestic agent for the latest data.
- Once you have problems, opinions or find some error about the contents of this Manual, please contact our company via the "Proposal on Operation & Maintenance Manual Amendment" at the end of the Manual. (Note: The copied can be used.)

## Manual Structure

- This Manual consists of seven chapters: Introduction, Safety, Product Information, Product Operation, Product Maintenance, Option parts, and Appendix.
  - The information contained in the chapter "Safety" includes: The basic safety prevention measures; position and contents of warning label on the machine.
  - The information contained in the chapter "Product Information" includes: Some related data description of product.
  - The information contained in the chapter "Product Operation" includes: Information of instrument, switches, operating mechanism of machine, operating mechanism of work equipments, transportation and towing.
  - The information contained in the chapter "Product Maintenance" includes: The maintenance period for various parts of machine. The maintenance items listed in the maintenance period table shall be performed within the stipulated maintenance period. The items without stipulated period are listed in column of "Maintenance on demand".
  - The information contained in the chapter "Option Parts" includes:  
Some relevant information of option parts as well as related instruction.
  - The information contained in the chapter "Appendix" includes:  
Related profile and operation instruction of MCSS electronic control system.

## **Design Performance of Machine**

If the increased accessory or the weight after change exceeds the design performance of machine, it'll have adverse impact on the machine performance, including machine stability and system guaranteed performance such as braking, turning and roll-over protection architecture. For detailed data.

## **Certified Engine Maintenance**

The proper maintenance and repair is significant for normal operation of engine and machine. As the user of heavy-duty non-road diesel engine, the maintenance stipulated by the Manual shall be performed.

The staff without approval can't do the following work: repair, maintenance, sale, rent or sell any disassembled and changed device related with emission or system engine or machine.

Some system of machine and engine such as exhaust system, fuel system, electric system, inlet system and cooling system is related with emission, and the system can't be modified without approval.


## Use of the Turbocharged Engine

Turbocharger is a device by use of exhaust of engine to drive the turbine working. As the turbine often in the state of high-speed and high temperature, the temperature of turbine side is generally above 600°C. Therefore, in order to ensure the normal operation, proper use and daily maintain is very important. The major methods for daily maintenance are as following:

- 1) At the beginning of engine started, do not step on the accelerator pedal immediately but let the engine run idle for about 3mins, to increase oil temperature and its flowing property, in order to make the turbocharger get adequate lubrication, and then to increase engine speed. This is particularly important in the winter.
- 2) After running in high-speed for long time, do not stop the engine immediately. The reason was that after the engine starts to work, one part of engine oil is going to lubricate and cool for rotor bearing of turbocharger. If the high-speed running engine suddenly shuts down, it will cause the oil pressure rapidly drop to zero and interrupt the lubrication. Thus the heat inside the turbocharger can not be taken away, but to be transferred to the bearing housing, which would made the shaft "bite" its sleeve and damage the bearing and shaft at the time that the rotor is still rolling by inertia. In addition, when the engine abrupt stopped, with the high temperature of the exhaust manifold, the heat will be absorbed onto the housing of turbocharger, and turn the engine oil remained in the inside of turbocharger into carbon. And it will block the oil inlet port as the carbon increasing, and lead to the sleeve lack oil, rapid the abrasion between shaft and its sleeve. Therefore, before the engine stopped, let the engine run idle for about 3mins, to slow down the speed of turbocharger rotor, and make the internal heat fully discharged in order to decreased the temperature.
- 3) Pay much attention to engine oil selection. As the effects of the turbocharger, the quality and the volume of the air which entering into the combustion chamber are greatly improved, and have a higher compression ratio, so that the structure of the engine can be more compact and reasonable, thus to improve its work efficiency. Therefore, the turbocharged engine has features of high temperature, high speed, big power, big torque, and low-emission. And the components of turbocharged engine can be withstand higher temperature and greater impact, extrusion and other harsh conditions. Consequently, the engine oil for which wear resistance, high temperature, high film strength and high stability should be used.
- 4) Engine oil and oil filter must be kept clean to prevent debris from entering, because the fit clearance between the turbocharger shaft and its sleeve are very small, if the oil lubricating ability is lower, which will damage the turbocharger prematurely.
- 5) The air filter should be cleaned on schedule, in order to prevent impurities, such as dust, from entering the high-speed compressor, and resulting in instability of rotational speed or increasing the abrasion between the sleeve and seals.
- 6) Check the tightness of seal ring of the turbocharger frequently. If the tightness of seal ring is lower, the exhaust will enter into the lubrication system through the clearance, pollute the oil and increase the crankcase pressure. In addition, when the engine work with low speed, the engine oil also discharge from exhaust manifold through seal ring or enter into the

combustion chamber burning, resulting in excessive oil consumption or the phenomenon of "burning engine oil" .

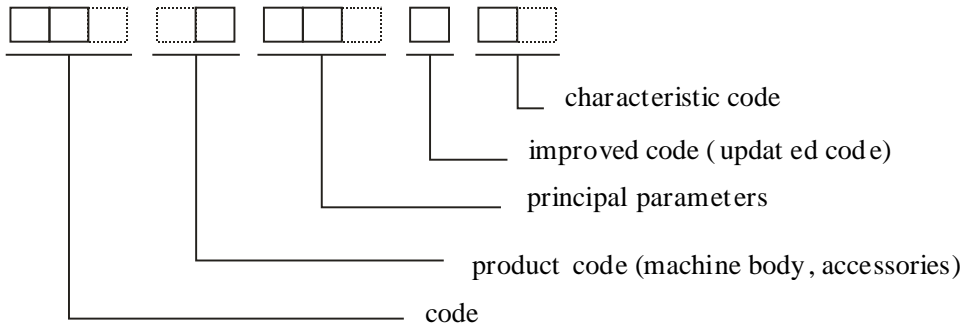
- 7) Check the turbocharger frequently for abnormal sound or abnormal vibration, as well as the oil pipe and fittings for leaks.
- 8) With high precision of rotor bearing, it is very strict with the maintenance and installation of the turbocharger. So come to the designated repair station for the professional service when the turbocharger is failure or damage.

 **Note** Refer to it when the machine installs the turbocharged engine.

## Product Information

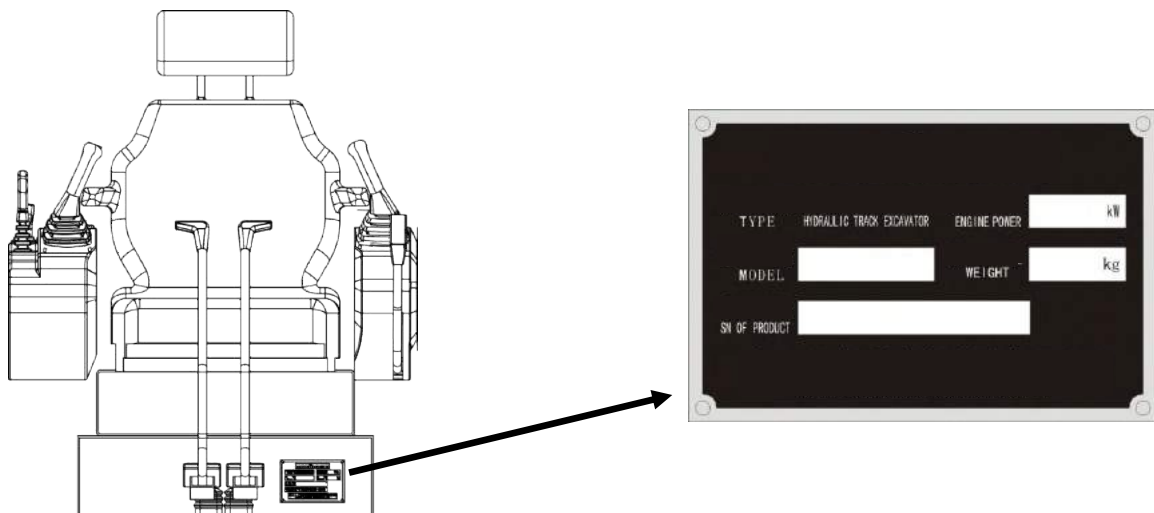
### Instruction of the product model

Product model consists machine body (accessories) product code, principal parameters, characteristic code and improved code.



### Machine nameplate

The machine nameplate is situated at the bottom right of driver's seat.



**Your Machine Information Table**

To make you know the basic information of our products conveniently and promptly, you can fill relevant information in the table below after you purchased our products, in order to refer and affirm.

|                                     |              |
|-------------------------------------|--------------|
| Machine model                       |              |
| Product identification number (PIN) |              |
| Engine serial number                |              |
| Agent name                          |              |
| Address                             |              |
| Maintenance staff                   |              |
| Tel/Fax                             |              |
| Service hot line number             | 400-100-6666 |

If you have any question, please call our customer service hot line number.



# Chapter II Safety



## WARNING


Please read and comprehend the cautions stated by the safety labels in this Manual and on the machine, when the machine is operated or repaired, these cautions must be abode by.

## Learn about Safety Information

- This is the sign to note safety.
  - When you see this sign, you shall be aware of the danger of staff injury.
  - Please abide by the proposed cautions and safe operation method.



## Comprehend Signal Terms

- On the safety label of machine, the terms indicating the extent or degree of injury such as DANGER, WARNING or CAUTION will be used with the sign of noting safety together.
- In order to separate machine protection from staff safety, this Manual adopts the term "IMPORTANT", if some dangerous state occurs, machine will be damaged.
-  "Note" indicates adding some explanation to certain part in relevant information.



- "DANGER" indicates the condition of direct danger. If this condition happens, death or severe injury will be caused.



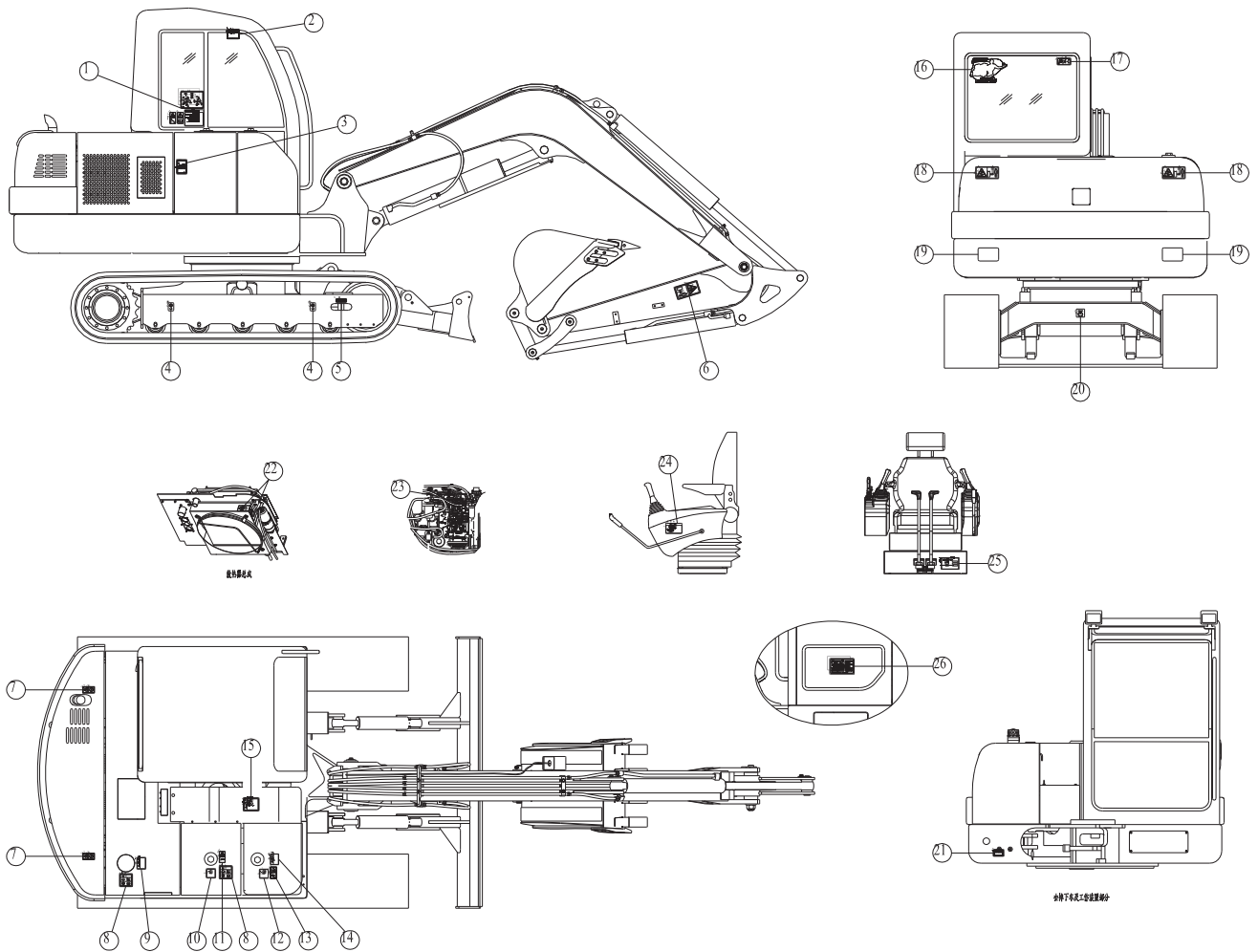
- "WARNING" indicates the condition of hidden danger. If this condition happens, casualty will be caused.
- "DANGER" or "WARNING" safety label is set near specific hazard position. Refer to "Caution" safety label for general safety measures.



- "CAUTION" indicates the condition of potential hazard. If this condition happens, minor or moderate injury will be caused.
- "CAUTION" also has the meaning of noting safety information in this Manual.

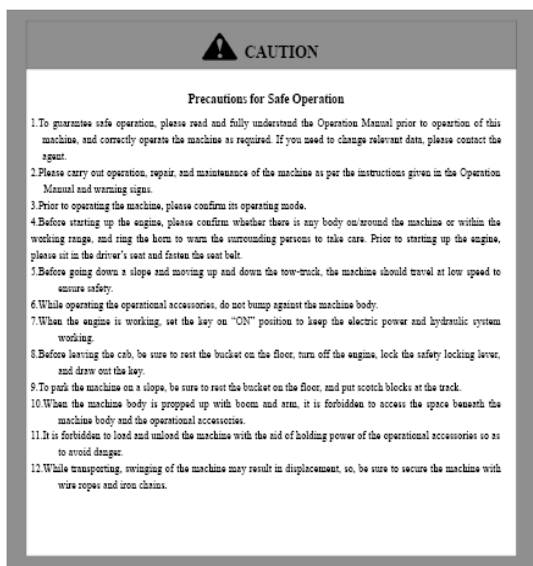
## Safety Mark and Label

- There are several special safety marks on the machine. This chapter will indicate their positions and describe the accident hazard. Please be familiar with these safety marks.
- Ensure you can distinguish all safety marks.
- If the text of safety mark isn't clear, please clean or replace the mark.
- If the safety mark is damaged, lost or the illustration isn't clear, the mark must be replaced.
- Please clean the safety mark with wiping cloth, water and soap. The solvent, petrol or strong chemical agent is forbidden for cleaning of safety mark. The adhesion of mark will be invalid due to solvent, petrol or strong chemical agent, thereby falling.
- If the replaced component has safety mark, ensure the new one also has safety mark.

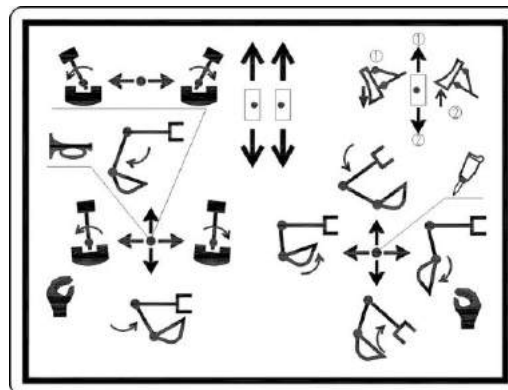


① Stick on the right window of cabin

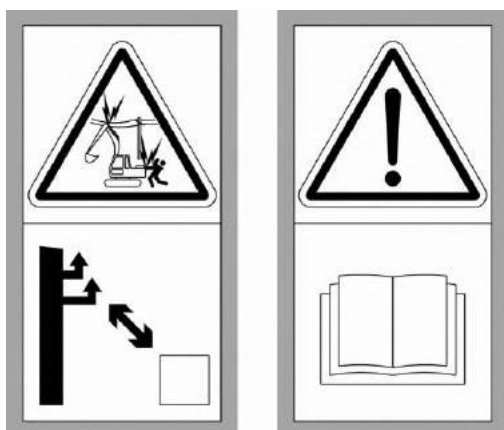
- Precautions for safe operation



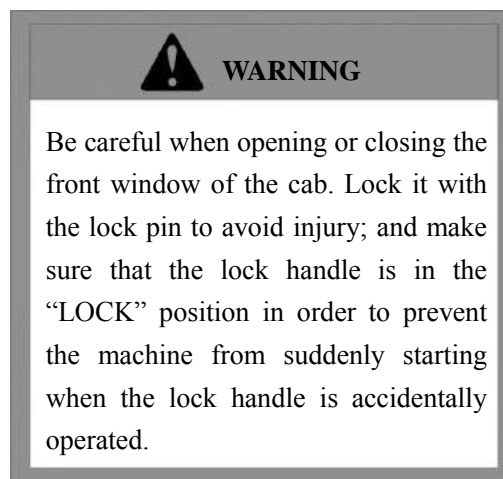
- Warning for broken or movable window



- Be aware of electric shock and reference book



- ② Warning for use of front widow



③ Check hydraulic oil level

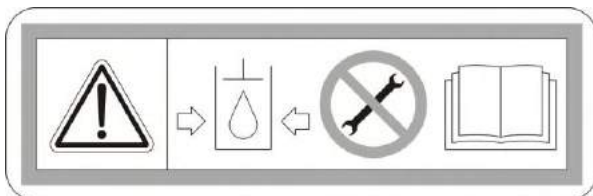


④ Lifting device



⑤ Warning for high-pressured cylinder

- Before releasing pressure, never remove any part to avoid injury.
- The relief valve can only be screwed out one turn at most.
- Please refer to the information in “Adjustment of Track Adjuster” in this Manual.



⑥ Caution of work equipment

When the machine is working, please keep away from it to prevent being crashed by work equipment.



### ⑦ Warning for falling

Danger of falling. Do not stand here.



### ⑧ Be aware of scald

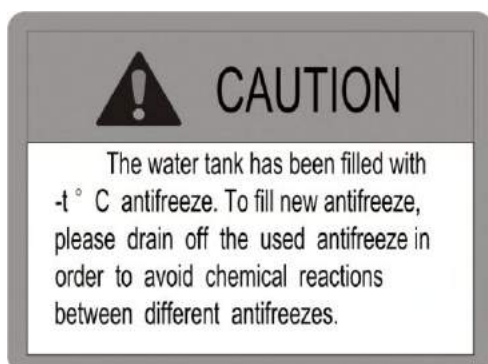
Hot coolant will cause serious scalds. If opening the cap is necessary, you should first turn off the engine and then slowly unscrew the cap to release pressure after the radiator cools down.



### ⑨ Notices for antifreeze replacement

The antifreeze is flammable and thus should be kept away from fire.

The antifreeze is poisonous. When replacing it, note not to splash it on your body. In case of contact with your eyes, please flush your eyes with plenty of water and seek medical attention immediately.



### ⑩ Hydraulic oil label



⑪ Cautions for hot coolant and hydraulic oil

Prevent scald due to hot coolant  
When the coolant is checked or discharged, prevent hot water or steam being ejected to cause scald.

Prevent scald due to hot oil  
When the oil is checked or discharged, prevent scald due to hot oil or hot component. Before the cover is removed, the heat radiator or hydraulic tank shall be cooled.



⑫ Diesel fuel label



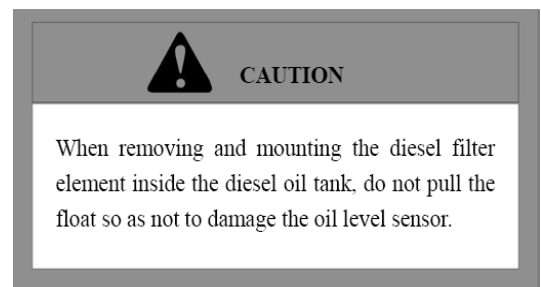
⑬ Prevent fire

Prevent the fire due to fuel or engine oil.

The fuel, engine oil, anti-freeze fluid and window cleaning liquid are very flammable and dangerous.

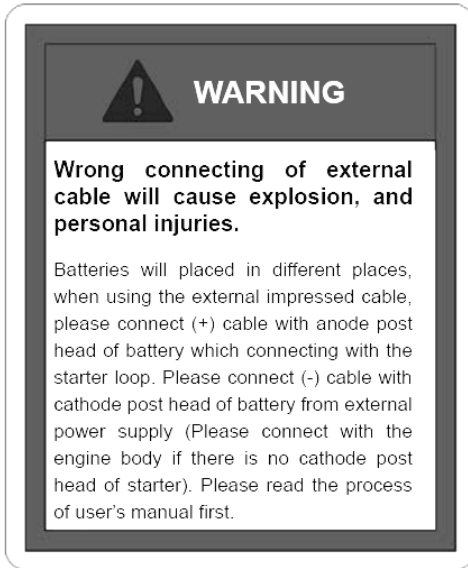


⑭ Precautions for replacement of diesel fuel filter elements



⑮ **Incorrect connection of the jump starting cable**

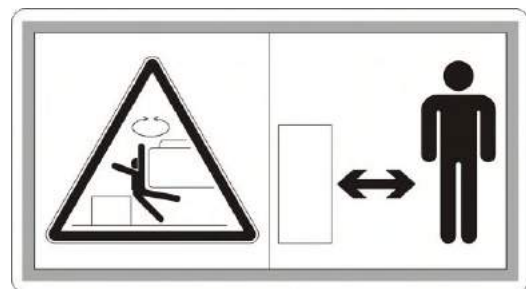
⑰ **Service hot line efficiency 100 label**



⑯ **Method of safe escape**



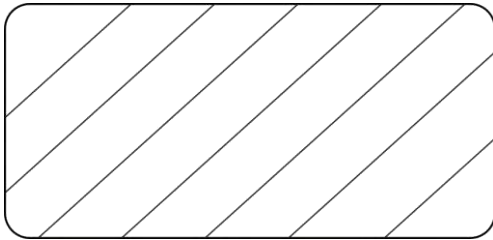
⑱ **Swing range is forbidden to enter**





⑲ Reflector Mark

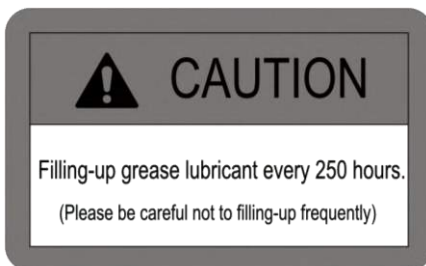
- Reflector mark sticks in pairs to the tow sides of the counterweight.
- The color is red, and it prevents people from being impacted when the machine is turning or revolving.



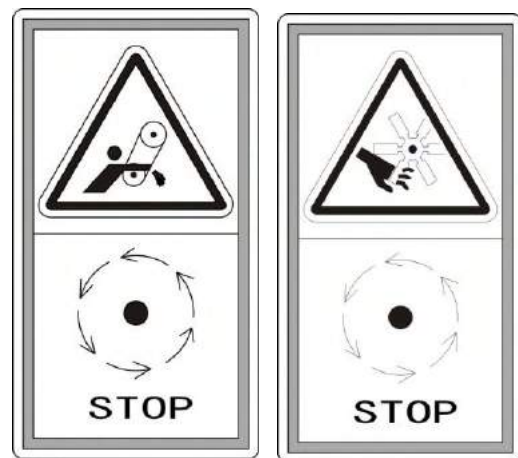
⑳ Machine towing label



㉑ Grease filling-up mark



- ㉒ Be sure to stop revolving in case of test and adjustment.



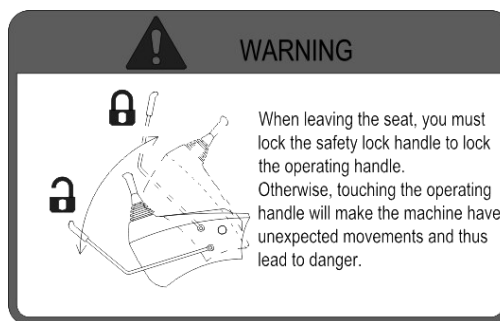
23 Engine nameplate



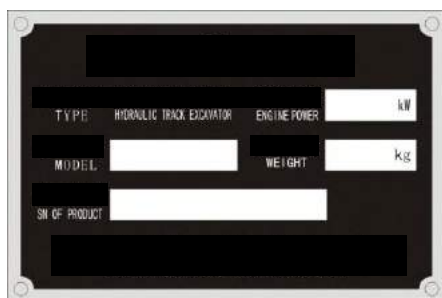
24 Warning for leaving seat

When leaving the machine, you must lock the safety lock handle.

In order to prevent unauthorized personnel from moving the machine, please securely close the cab door and lock all devices with keys.

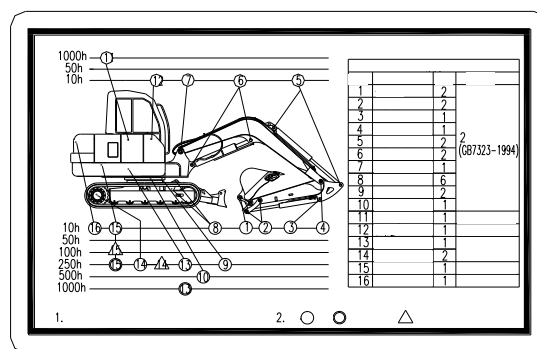


25 Machine nameplate



26 Lubrication diagram

Please refer to "Product Maintenance" for details.

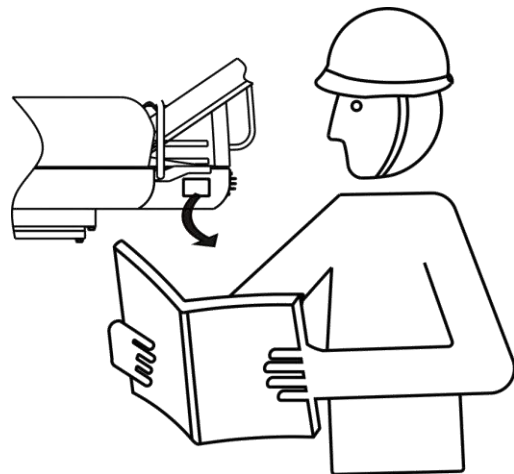


## Abide by Safety Instruction

- Please read and abide by all safety labels on the machine as well as the contents related with safety in this Manual.

When necessary, the safety label shall be installed, maintained and replaced.

- If the safety label or Operation Manual is damaged or lost, you shall ask your consignor to prepare a substitute, in the same way, you shall prepare a backup (used to describe machine model and serial number preparation).
- Learn how to operate and control machine correctly and safely.
- The machine can be only operated by the trained, qualified and named staff.
- Keep your machine in good condition.
  - If the machine is refitted without approval, it'll probably damage its function or reduce safety and influence machine service life.
- The safety instruction in the chapter "Safety" aims at describing basic safety procedure of machine. However, these relevant safety instructions won't probably involve every hazardous condition you will encounter. If you have problem, before the machine operation and maintenance is started, you shall ask for instruction from your foreman or named dealer.



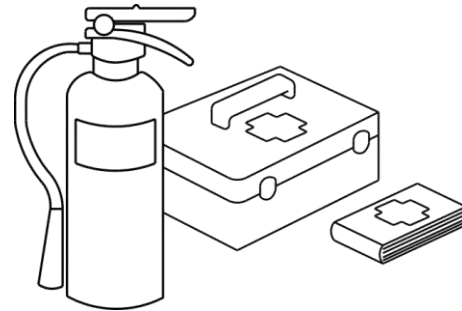
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## Compressed Air and Compressed Water

- The scrap or hot water will splatter due to compressed air or compressed water which will cause personal injury.
- When the compressed air or compressed water is used for cleaning, the protective clothing, protective shoes, goggles or face shield shall be worn.
- The maximum pressure of air used for cleaning must be below 0.2MPa.
- The maximum pressure of water used for cleaning must be below 0.25MPa.

## Preparation for Emergency

- Preparation shall be made for fire or accident.
  - The first aid box and fire extinguisher shall be prepared at accessible place.
  - Read and comprehend the instruction on the fire extinguisher thoroughly, and the fire extinguisher shall be used correctly.
  - In order to ensure the fire extinguisher can work at the required time, the fire extinguisher shall be checked and maintained in accordance with the technical specification of fire extinguisher Operation Manual and proper interval.
  - The rules for emergency shall be made to handle fire and accident.
  - The emergency telephone number of doctor, ambulance, hospital and Fire Company shall be prepared beside your telephone.



## Wear Protective Clothing

- Wear proper clothes and safety articles.

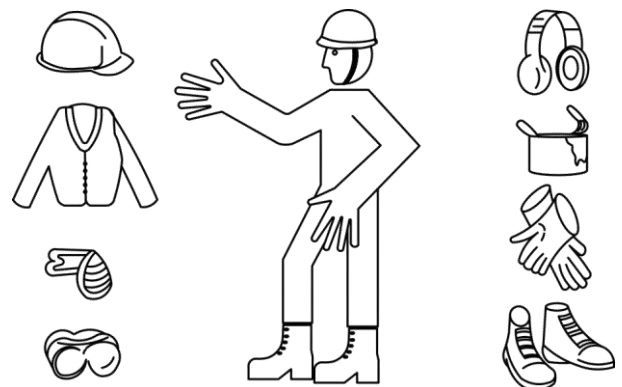
You will probably need the following:

- Hard helmet
- Safety shoes
- Safety glasses, goggles and face shield
- Safety gloves
- Hearing protective equipment
- Protective clothes
- Rain-proof article
- Gauze mask or filtering face mask

Correct equipment must be worn, and wear proper working clothes. Don't have the mind of fluke.

- Avoid wearing loose clothes, jewelry or other things which will hook joystick or other components of machine.

- The operator shall be concentrated on machine operation. Don't listen to the radio or the music with earphone when operating.



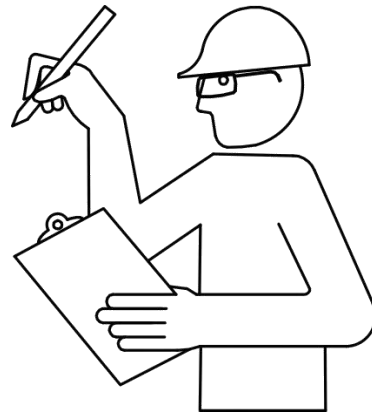
## Noise Prevention

- The hearing will be damaged or lost in the environment of big noise for long time.
  - Wear proper hearing protective article such as ear muff or earplug to prevent harmful or uncomfortable big noise.
  - The noise of excavator main comes from engine. The noise divides into two kinds: the driver's ear noise and outer radiation noise.
  - Level of noise (driver's ear noise): less than 83 dB.



## Check Machine

- Before the machine is started every day or per shift, go around the machine to check the machine thoroughly to prevent personal injury.
  - When going around the machine to check it, the check contents must include the whole gist in the chapter of "Check before startup".



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## General Advance Cautions for Cabin

- Before entering the cab, the dirt or engine oil on the sole of working shoes shall be removed thoroughly. For any control device such as foot pedal, if the worker's shoes are pasted with dirt or engine oil, when he/she operate the foot pedal, the foot will slide off the foot pedal to cause personal accident.
- Don't put bottle in the cab. Don't paste any transparent ornament on the window because it can focus sunlight to cause fire.
- When operating the machine, the driver can't listen to the radio, can't enjoy music with earphone or using mobile telephone in the cab.
- Keep the machine away from flammable or explosive substance.
- The ashtray shall be covered when it's used so as to extinguish match or cigarette end.
- Don't leave cigarette end in the cab. When temperature in the cab rises, the cigarette end will probably cause explosion.
- Don't put the part or tool around the operator's seat. They shall be stored at specified position.

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## Safety Precaution of Construction Site

Before starting work, you should make a thorough inspection of any unusual circumstances occurred on the construction site.

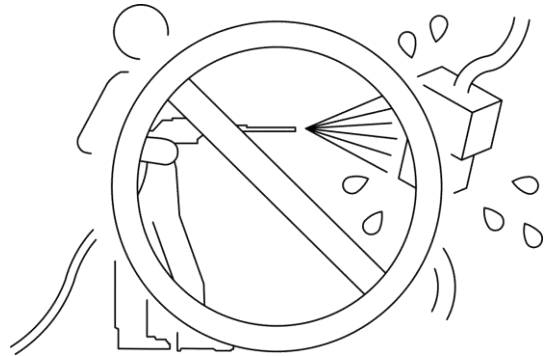
- When work near the roof with grass, dry leaves, hay and other combustibles, you should be cautious, because it is easy to have a fire hazard.
- Check the rock formation and the conditions around the construction site to determine the safest way to work. Don't work in areas where have the risk of landslides or fallen stones or underground areas.
- Waterways, gas pipeline or high voltage circuit may be buried below the construction site, please contact with the public utilities and to identify the location. Be careful not to damage or cut any pipe or line.
- Check the condition site to find whether exist harmful gases. If the air contains with harmful gases, stop to work and hang a signboard in prominent position indicated" there are harmful gases, prohibit the construction ".
- To take measures to prevent any unauthorized person to enter the work area. When working on the road, there must be signaler of the topography and the erection of barricades in order to ensure the safe passage and walking.
- Crossing or working in shallow water or in soft ground, make sure to check the shape and condition of the bedrock before starting operation.
- Before operating in water or crossing the river, check the riverbed and the water depth and flow. Do not exceed the allowable depth of water operations.

## **Safety Device**

- Ensure all the shields and covers are in position. If the shield and cover is damaged, repair it immediately.
- Learn about the use method of safety device and use it correctly.
- Don't disassemble any safety device and keep them in good condition.
- This machine is fitted with the ROPS, which can effectively reduce the possibility of the cab to be squeezed, so as to protect the safety of the operator when the machine overturned.
- The guard rail can be installed on the cab, and it is optional when users buy the machine.
- Machine with the protective structure attached should be chosen in the working conditions of falling dangerous.

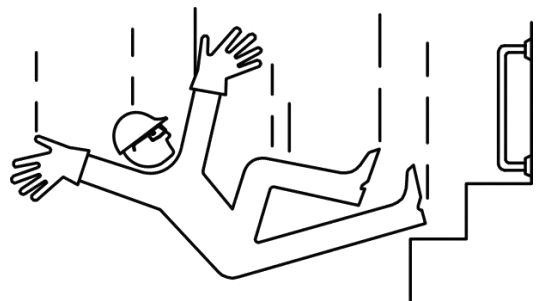
## Keep Machine Clean

- If water enters electric system, the system will be probably out-of-work or fail. Don't flush the electric system with water or steam (sensor, connector).
- If the machine is checked and maintained if there is mud or oily soil, the staff will probably slip and fall or the dirt will probably enter eyes. Keep machine clean all the time.



## Use Handrail and Ladder

- Falling is one the major reasons to cause injury.
  - When you get on and off the machine, face the machine and use the ladder and handrail together.
  - Don't use any joystick as handrail.
  - Don't jump on and off the machine. Don't get on or off the moving machine.
  - When getting on and off the machine, note the platform, ladder and handrail are slippery.





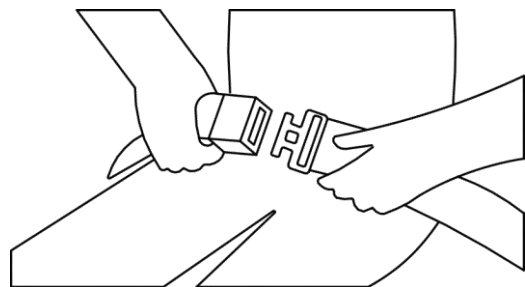
## Regulate the Operator's Seat

- If the seat isn't regulated well, the operator's body or hands will feel fatigue to cause operating failure.
  - The operator shall regulate the seat when operating different machine.
  - When the operator's back is against the seat back, the foot pedal shall be stepped down thoroughly and all the joysticks can be operated correctly.
  - If not, the seat shall be moved forward or backward, and then check it again.



## Fasten Seat Belt

- If machine rolls over, the operator will be probably injured and/or thrown out of cab. Furthermore, the operator will be probably pressed by the roll-over machine to cause severe injury or death.
  - Before machine is operated, check the belt, snap ring and component of safety belt thoroughly. If any one is damaged or worn, the safety belt or other component shall be replaced before machine is operated.
  - When machine is working, the operator shall fasten the safety belt all the time, to reduce the injury opportunity due to accident as possible.
  - Our company suggests the safety belt be replaced every 3 years.

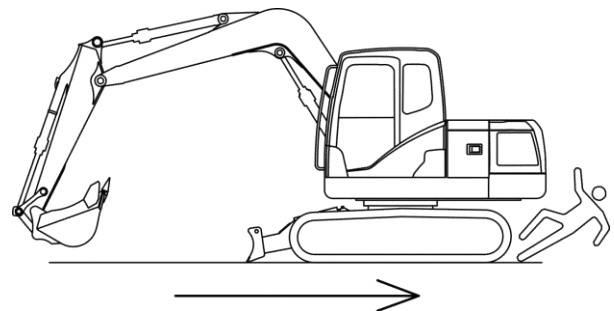


## Ensure Favorable Sight

- In order to operate or travel machine safely, check whether there is worker or obstacle in surrounding area of the machine, and then check the working place. The following procedure shall be abode by.
  - When working in dark place, switch the working lamp and head lamp of machine on, when necessary, set auxiliary lighting in the working place.
  - If sight is poor due to fog, snow, rain or dust, operation shall be stopped.

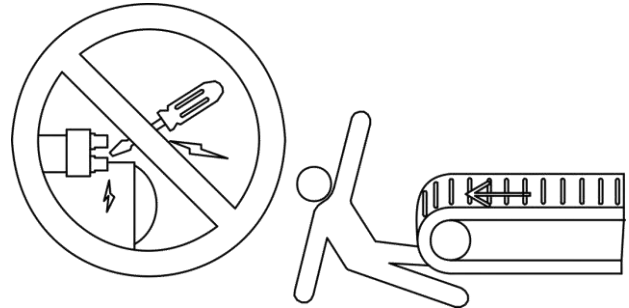
## Move and Operate Machine Safely

- The staff nearby will be knocked down.
  - Pay special attention to not knocking down the staff nearby. Before the machine is moved, turned or operated, the position of staff nearby shall be confirmed.
  - The travel alarm and horn shall be under working condition (if these devices are available). When the machine is moved, the staff nearby shall be warned.
  - When the machine travels, swings or operates in narrow area, it shall be instructed by signal man. Before the machine is started, the hand signal shall be coordinated.



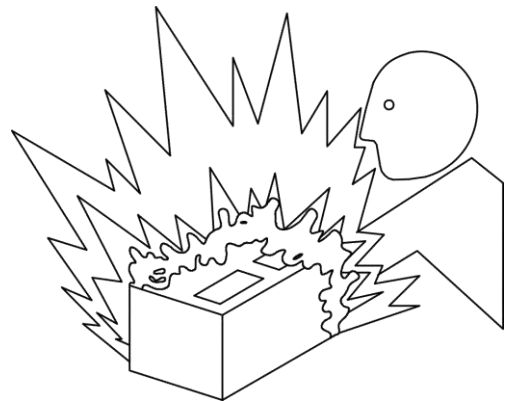
## Operation is Only Performed on the Operator's Seat

- Improper engine start procedure will probably cause out-of-control of machine and then cause severe injury or death.
  - The driver can only start the engine sitting on the seat.
  - The engine can't be started standing on the track or ground.
  - The engine can't be started via the short-circuit of starter terminal.
  - Before the engine is started, all the joysticks are set for neutral position.



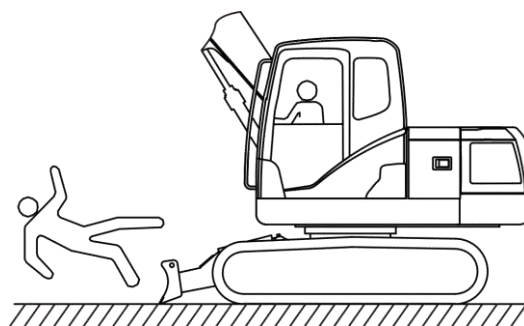
## Engine Starting with Jump Start Cable

- The battery gas will be explosive to cause severe injury.
  - If the engine must be started via jump start cable, the related instruction in the chapter of "Product Operation" must be abode by.
  - The operator must sit on the seat so that the machine can be controlled when the engine is started. The start via jump start cable is performed by two persons.
  - The frozen battery can't be used.
  - If the correct jump starting procedure isn't abode by, it'll cause battery explosion or out-of-control of machine.



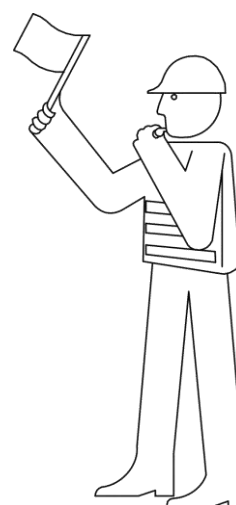
## The Passenger Shall Leave Machine

- The passenger on the machine will be injured such as being impacted by object and thrown out of the machine.
  - Only the operator is allowed to be on the machine. The passenger shall leave machine.
  - If passenger disturbs operator's sight, the machine will be operated unsafely.



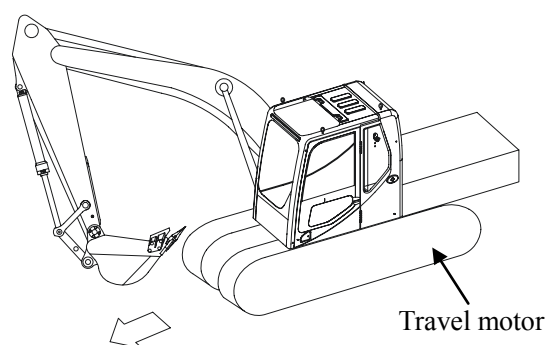
## Signal Shall be Specified When Multiple Machines Operate Simultaneously

- For the work including several machines, the signals known by all participants shall be specified. Meanwhile, a signal man shall be appointed to coordinate working place. All the staves must obey the command of signal man.



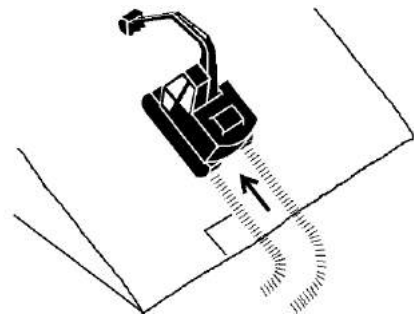
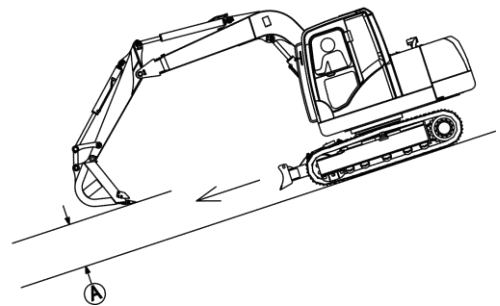
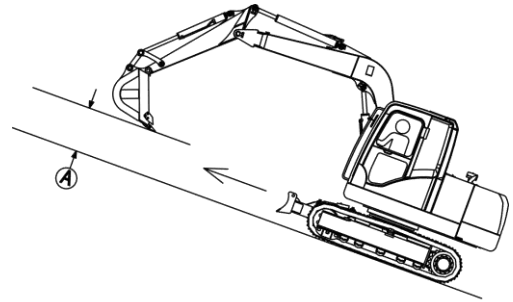
## Confirm Travel Direction of the Driven Machine

- The wrong operation of travel pedals/travel levers will cause severe injury or death.
  - Before the machine is driven, ensure the position of undercarriage corresponding to operator. If the travel motor is in the front of cab, when travel pedals/travel levers are operated forward, the machine will move backward.
  - As far as possible to make the front idler of the machine located in front of the cab. If the direction of cab and front idler are placed in the opposite position in long term, it will cause the damage of the machine.

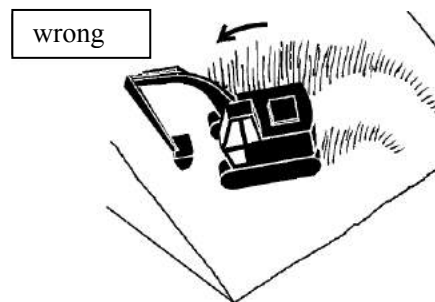


## Drive Machine Safely

- Before the machine is moved, confirm the direction of pushing travel pedals/travel levers.
  - Ensure the machine passes by all barriers.
  - Avoid crossing barrier. The soil, rock fragment and/or broken material will be probably scattered around the machine. No one is allowed to stand around the machine when machine moves.
- The machine will skid or roll over on the slope, and severe injury or death will be probably caused.
  - When the machine travels on the slope forward or backward, the bucket shall face the travel direction and about (200 ~ 300)mm (A) above ground.
  - If the machine skids or is unstable, lower the bucket on the ground and stop machine.



- If the machine crosses slope or turns on the slope, it'll probably skid or roll over. If the machine has to make a turn, the direction can be changed after it's moved on the level ground to ensure safe operation. **when**

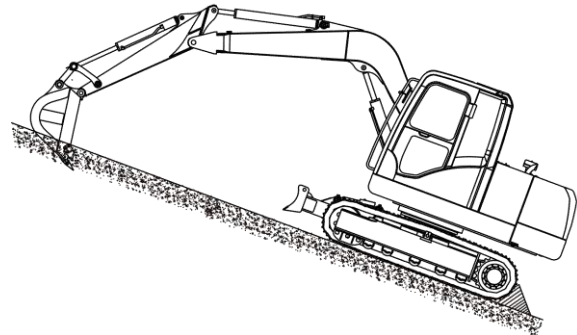
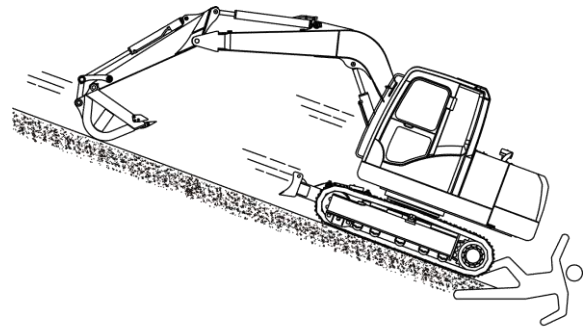


## Avoid Being Injured Due to Roll-over Accident of Machine

- If the staff attempts to get on or block the moving machine, severe injury or death will be caused.
- This machine is fitted with the ROPS, which can effectively reduce the possibility of the cab to be squeezed, so as to protect the safety of the operator when the machine overturned.

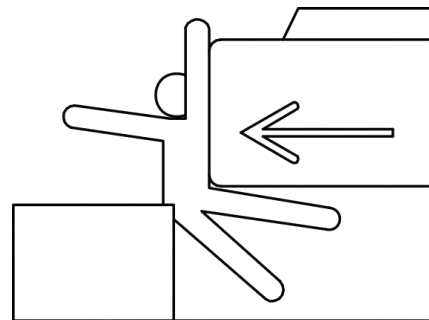
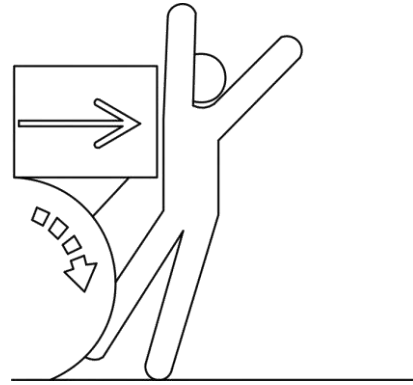
In order to avoid roll-over, please refer to the following operations.

- Select one level ground suitable for machine parking.
- Don't park the machine on the slope.
- Lower the bucket and/or other working tool on the ground.
- Turn the auto-idle/acceleration selector and H/P mode switch to OFF position.
- Run the engine idle for 5 minutes with low-speed and no load to cool the engine.
- Stop the engine to take out the key from the key switch.
- Pull the hydraulic lockout control to "Lock" position.
- Wedge the two tracks and lower the bucket on the ground. If the machine has to stop on the slope, the bucket tooth shall be inserted into the soil.
- Position the machine to prevent roll-over.
- When the machine is parked, a rational distance shall be provided with other machine.



## Avoid Being Injured Due to Reverse and Swing Accident

- When the machine reverses or the superstructure slew platform swings, if there is staff near the machine, he/she will be impacted or squeezed to cause severe injury or even death. To avoid accident due to machine reverse or swing:
  - You shall look around before reverse or machine swing. All the staves nearby shall leave.
  - Keep the travel alarm at working state (if this device is available). Note the nearby staves entering the working area. Before the machine is moved, the staves nearby shall be warned with horn or other signal.
  - When the sight is blocked at reverse, signal man shall be arranged. Note the signal from the signal man. When the working condition needs signal man, the hand signal shall conform to local provision.
  - The machine can be only operated when the signal man and machine operator fully comprehend the signals.
  - Learn about the meanings of all flags, signals and signs used during the work, and confirm who can give signal.
  - Keep the window, mirror and lamp clean and in good condition.
  - The dust, rain and fog will reduce the visibility. The machine shall reduce speed and use lighting due to visibility reduction.
  - Read and comprehend all the instructions in "Operation & Maintenance Manual".



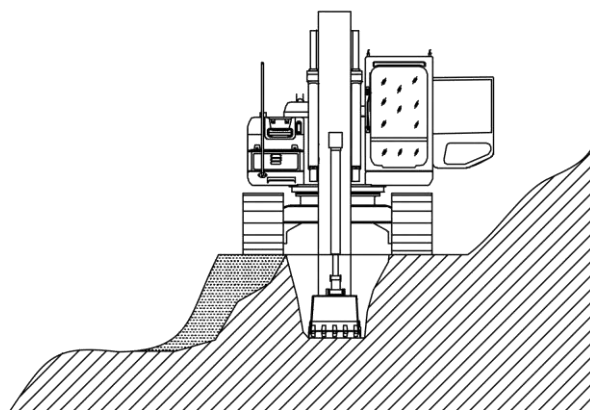
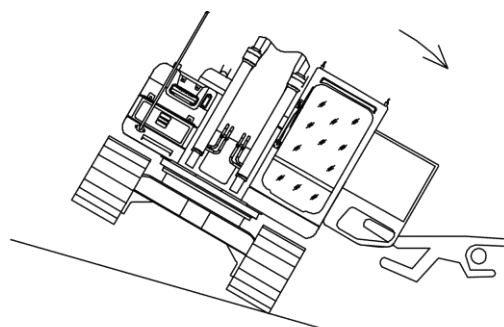
## Avoid Roll-over

Don't attempt to jump off the inclined vehicle, it'll cause severe injury or life danger. The speed of vehicle roll-over is faster than your jumping speed. Fasten the seat belt.

- When the machine is operated on the slope, the danger of roll-over will happen frequently to cause severe injury or even death.

To avoid roll-over: Pay special attention to the following before operating machine on the slope.

- Level the working area of machine.
  - Lower the bucket on the ground and approach the machine.
  - Reduce working speed to prevent roll-over or skidding.
  - Avoid changing direction when traveling the slope.
  - If the machine has to cross on the slope, the slope can't exceed 15°.
  - When the swing is performed with load, the swing speed can be reduced as required.
- Handle the machine with care on the freezing ground.
    - The ground will be softened due to temperature increase so that the machine will travel unstably.





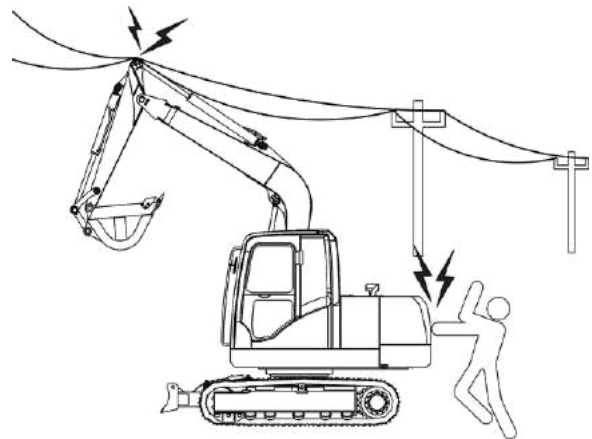
## Avoid Wire

If the machine or working device can't be kept a safe distance with the wire, severe injury or even death will be caused.

When the machine is operated near wire, any part or load of machine can't be moved to the range of 3m plus double length of wire insulator to the wire.

Check and abide by relevant local rules.

If the land is wet, it'll enlarge the area for electric shock of staves, so the staves nearby and coworkers shall leave site.



## Lifting the Machine

Before lifting the machine, please refer to the description about approximate weight of the machine in the section of "Product Information".

Don't lift the machine when people are in it.

Before lifting the machine, ensure that it is parked on level ground, and the hydraulic lockout control lever is kept in the "LOCK" position, in case of the machine to move unexpected in the process of lifting.

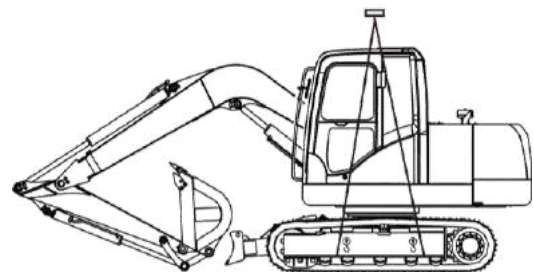
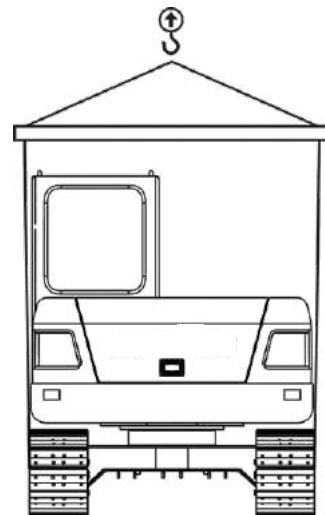
Use the appropriate sling rope to lift.

When lifting the machine, you should lift undercarriage body instead of footstep. Put the sling rope through the position that the lifting mark posted on and lifting. Shown as the figure.

Stop lifting for a time when the machine leave off the ground, while keep lifting slowly when the machine stably.

Adjust the rope lifting angle, and let it the range of 30 ~ 40°, and then rise the machine slowly.

Stop lifting for a time when the machine leave off the ground, while keep lifting slowly when the machine is stable.



## Lifting Objects



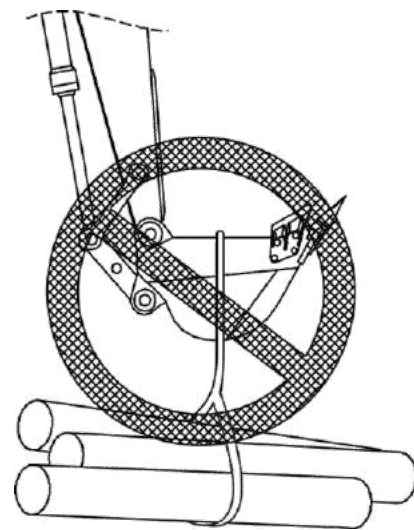
### WARNING

When lifting objects, the machine should be equipped with a loading hook. The machine leaves the factory is not equipped with the loading hook, so anyone is not allowed to lift objects by using the machine's work equipment.

When users need to lift objects, please contact with the dealer. The lifting device is not allowed to be welded onto the machine privately.

Safety precautions on lifting objects:

- When the machine is equipped with a lifting device to lift goods, be sure to comply with local regulations.
- Do not use damaged chains or abrasive steel rope, slings or ropes.
- Do not operate on solid and flat ground.
- Do not suddenly rotate or stop the excavator, for the stability of the machine would be decreased.
- Do inspect the security of the working region, and ensure that no one else is still in the region.
- Be sure to confirm that the loading should be in the allowable range of the hook's base. The lifting capacity of the machine refers to the smaller one between rated stable lifting capacity or rated hydraulic lifting capacity. Rated stable lifting capacity is 75% of tipping load, and rated hydraulic lifting capacity is 87% of hydraulic lifting capacity. To determine the load value of the machine loaded with the diameter of the steel rope. And the lifting capacity also changes with the soil properties, such as viscosity, dry, moisture content, and sand content.
- Never hang up chains or lifting devices onto the bucket tooth, for the bucket tooth may fall off, and the object may drop off.

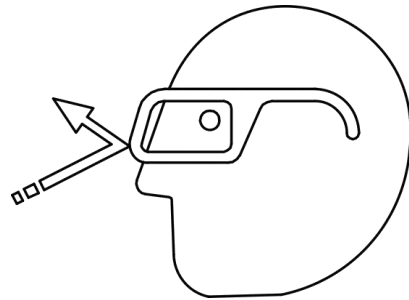


## **Notes of Loading Logs**

- Please provide a warning and command staff when loading logs.
- In the process of loading logs, please as careful as possible to avoid the machine instability and rollovers.
- In the process of loading logs, try to avoid sudden braking or turning.
- When loading logs, make sure to fix in its gravity position, in order to avoid shaking and falling or even causing casualties when machine moves.
- When grasping and moving the logs, keep an appropriate distance between the materials and the cab, so as not to cause personal injury.
- When loading logs, ensure that it has installed the safety protective structures on the front and the top of the cab to assurance the driver's safety.

## Prevent the Ejected Scrap

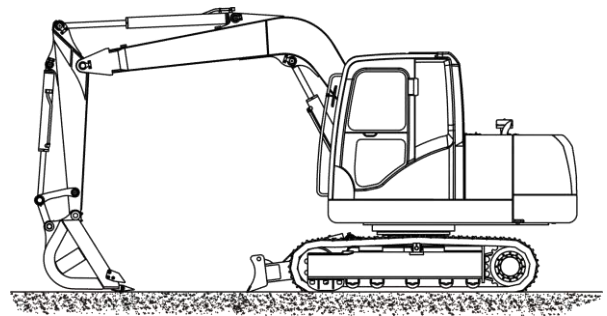
- If the scrap hits eyes or any part of body, severe injury will be probably caused.
  - Prevent the injury due to metal block or scrap; wear goggles or safety glasses.
  - Before any article is knocked, the staff nearby shall leave working area.
  - When the machine is operated in the breaking work mode or worked under the condition of ejected scrap, it must install the protective net on the machine in order to avoid personal injury.



## Park the Machine Safely

In order to avoid accident:

- Park the machine on the solid and even ground.
- Lower the bucket on the ground.
- Turn the auto-idle/acceleration selector and H/P mode switch to OFF position.
- Run the engine idle for 5 minutes with low speed and no load.
- Turn the key switch to OFF to shut down the engine.
- Take out the key from the switch.
- Drag the hydraulic lockout control to LOCK position.
- Close the window, skylight and cab door.
- Lock all the accessible doors and engine compartment.



## Handle Liquid Safely - Avoid Fire

- Handle fuel with care because it's highly inflammable material. If the fuel catches fire, it'll cause explosion and/or fire so as to cause severe injury or death.
  - When smoking or approaching naked fire or sparkle, don't fill oil. (Smoking or fire is forbidden when filling oil to the machine)
  - The engine shall be shut down before filling oil to the machine.
  - The fuel shall be filled outdoors.

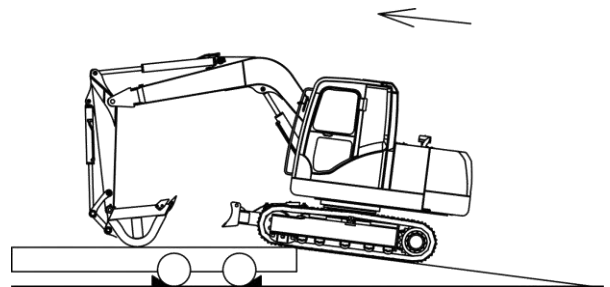


- All the fuel, most of lubricating grease and some coolant are inflammable.
  - Store the inflammable fluid at the place without fire risk.
  - Don't burn or punch the pressure container.
  - Don't store the oily wiping cloth, it'll probably catch fire or cause spontaneous fire.
  - The oil filler cap of fuel and engine oil shall be tightened.



## Safe Transportation

- When the machine is loaded and unloaded from one truck or trailer, the danger of roll-over will exist.
  - When this machine is transported on public road, local rules shall be abode by.
  - When this machine is transported, proper truck or trailer shall be provided.
- When this machine is loaded and unloaded, note the following items:
  - 1) Select the solid and even ground.
  - 2) The loading platform or gangway shall be used.
  - 3) When the machine is loaded and unloaded, signal man shall be arranged.
  - 4) When the machine is loaded and unloaded, set the auto-idle/acceleration selector and H/P mode switch for OFF position, to avoid increasing speed accidentally due to unconsciously operating certain one joystick.
  - 5) The low-speed mode of travel mode switch shall be selected. When high-speed is selected, the travel speed will be increased automatically.
  - 6) When the machine travels on the gangway forward or backward, turning will be forbidden because it's very dangerous. If turning is required, the machine must return to the ground or truck body, regulate travel direction and then travel again.
  - 7) When the machine travels on the gangway forward or backward, only the travel control can be operated, other joysticks can't be operated.
  - 8) There is a projection at the joint of gangway top and truck body. Cross this place with care.
  - 9) When the slew platform of superstructure swings, the injury due to machine roll-over shall be prevented.
  - 10) Keep the arm at the retractile position, rotate the slew platform of superstructure slowly to keep optimal stability of machine.
  - 11) When loading the model of ultra-long boom and arm excavator, the angle between ground level and the platform or springboard of the track or trailer is can not exceed 12°. If it needs to support by its work equipment, we must consider the support position of the work equipment, to ensure that the work equipment (boom, arm, bucket) is safe and reliable for preventing damage.
  - 12) Connect the chain or steel cable on the machine frame reliably.



### Fixing Machine

- 1) Set the hydraulic safety lockout control lever for the "**LOCK**" position.
- 2) Stop the engine, take off the key.
- 3) Close the battery disconnect switch.
- 4) Close and lock the doors and windows in the cab.
- 5) Cover the access hole and the exhaust pipe on the machine, to avoid damage to the machine during transport.
- 6) Fix the machine firmly with steel rope, to make it can not move.



### CAUTION

Please first read the relevant laws and regulations of the local place before transport. Select the appropriate transport routes according to the size of the machine, the right picture shows the diagram of this model. The detailed parameters please refer to the "**Product Information**" in third chapter of this manual.

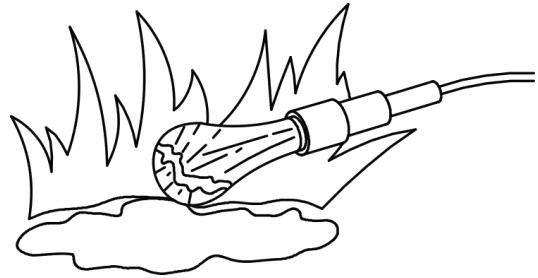
## Implement Safety Maintenance

- In order to avoid accident:
  - Learn about maintenance procedure before work is started.
  - The working area shall be kept clean and dry.
  - Don't spray water or steam in the cab.
  - The machine can't be lubricated and maintained when it's moved.
  - The hand, foot and clothes shall be kept away from power-driven parts.
- Before machine maintenance is started, the following shall be performed:
  - 1) Park the machine on the even ground.
  - 2) Lower the bucket on the ground.
  - 3) Set auto-idle/acceleration selector for OFF position.
  - 4) Run the engine idle for 5 minutes with low speed and no load.
  - 5) Turn the key switch to OFF position to shut down the engine.
  - 6) Operate each joystick for several times to release the pressure in the hydraulic system.
  - 7) Take out the key from the switch.
  - 8) Hang the "No operation" plate on the joystick.
  - 9) Pull the hydraulic lockout control to "Lock" position.
  - 10) Cool the engine.
    - If certain one maintenance procedure has to be performed when the engine is running, the machine shall be watched.
    - If the machine has to be lifted, the angle between boom and arm shall be kept within  $90^{\circ}\sim 110^{\circ}$ . For all the machine components which must be lifted for maintenance, they must be supported reliably.
- Don't work under the machine lifted by boom.
- Some parts shall be checked regularly, repair or replace them as required. Please refer to related contents of the chapter "Maintenance" in this Manual.
- All the parts shall be kept in good condition and installed correctly.
- If the component is damaged, repair it timely. The worn or damaged part shall be replaced. Remove the accumulative grease, engine oil or dirt.
- When the parts are cleaned, the unflammable clean oil shall be used all the time. The part or surface can't be cleaned with the highly inflammable oil such as fuel or petrol.
- Before the electric system is regulated or the machine is welded, the battery grounding cable (-) shall be disconnected.
- The working place shall be provided with sufficient lighting unless the place is very safe.



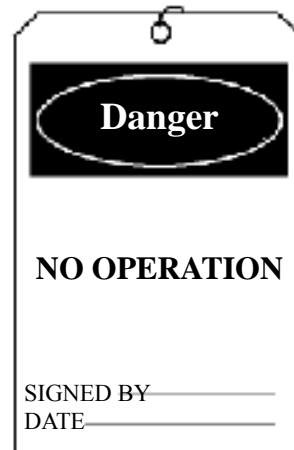


- When working inside the machine or below the machine, safe portable lamp shall be used.
- Check whether the bulb has been covered by wire cover. The hot filament in the broken bulb by accident will ignite the overfilled fuel or engine oil.
- The working area shall be displayed thoroughly. When working inside of machine or below the machine, the service lamp shall be used.
- The working lamp shall be used to protect guard. Prevent the overfilled engine oil, oil anti-freezing agent or window detergent catching fire due to broken bulb.



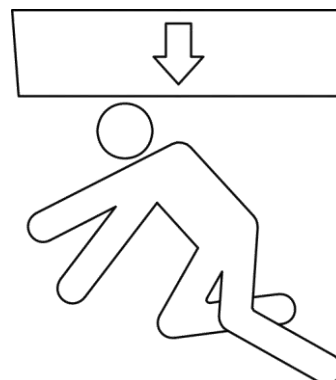
### No Operation Tag

- Severe injury will be caused due to accidental operation of machine.
  - Before you service the equipment or before you repair the equipment, attach a warning tag of "No operation" to the start switch or to the controls.



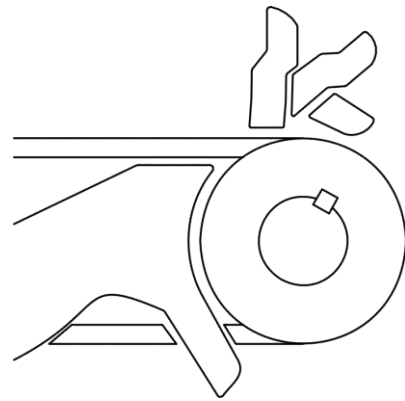
### Support Machine Correctly

- Never work on the unsafe and unreliable machine.
  - Before you get on the machine, the accessories must be lowered on the ground.
  - If you have to work on the lifted machine or accessory, the machine or accessory must be supported reliably. The machine can't be supported on the slag brick, hollow tile or the bearer which will be broken due to continuous load. Never work on the machine only supported by one jack.



## Keep Distance with Rotating Component

- Severe injury will be caused due to being entangled by rotating component.
  - In order to avoid accident, prevent the hand, foot, clothes, jewelry and hair being entangled when working around the rotating component.

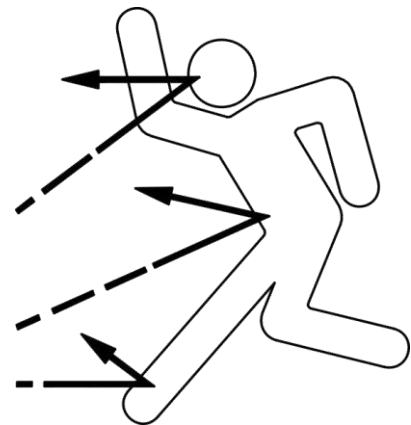


## Prevent Part Being Ejected

- The lubricating grease in the track regulator is under high pressure.

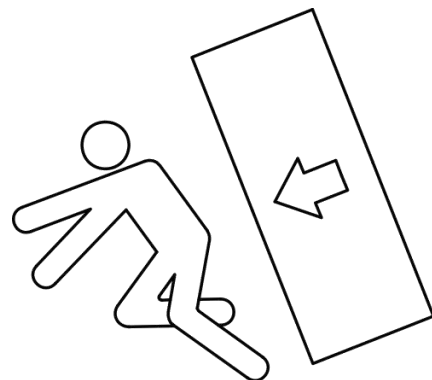
If the following cautions are not abided by, the severe injury, blindness or even death will be probably caused.

- Don't attempt to disassemble grease fitting or valve assembly.
- Because the part will be probably ejected, keep the body and face away from the valve.
- The travel reduction device is under pressure.
  - Because the part will be probably ejected, keep the body and face away from the air drain plug to prevent being injured. The gear oil is hot.
  - After the gear oil is cooled, unscrew the air drain plug to release pressure.



## Store Machine Accessories Safely

- The stored machine accessories such as bucket, hydraulic hammer and dozer will probably fall to cause severe personal injury or even death.
  - These accessories and devices shall be stored safely to prevent falling. Keep children and staves nearby away from the storage area.



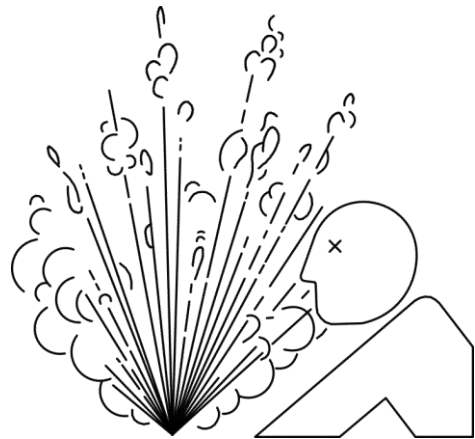
## Tools Shall be Used Properly

- The tools shall be suitable for the work.
  - Danger will be probably caused by using improper tools, parts and working procedure.
  - When some part is fastened or unfastened, the tool with correct size shall be used to prevent injury due to slip of wrench.
  - Only the part recommended by our company is used.

## Avoid Burn

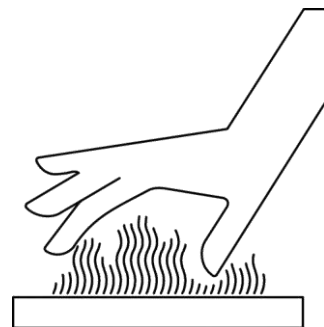
### Hot Injected Fluid

- After the machine is operated, the engine coolant will be hot and has pressure. The pipe of engine, heat radiator and heater contains hot water or steam. If the skin contacts the overfilled hot water or steam, severe burn will be caused.
  - In order to prevent being injured by the ejected hot water, before the engine is cooled, don't remove the top cover of heat radiator. When the cover is opened, rotate cover slowly until it stops. After pressure is released thoroughly, remove the top cover.
  - The hydraulic oil tank contains pressure. Similarly, the top cover can be only removed after pressure is released thoroughly.



### Hot Liquid and Surface

- The engine oil, gear oil and hydraulic oil will become hot when working. The engine, hose, pipeline and other parts will also become hot.
  - Any maintenance or check can be started after the oil and component is cooled.

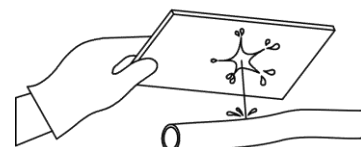
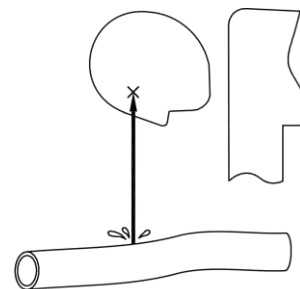
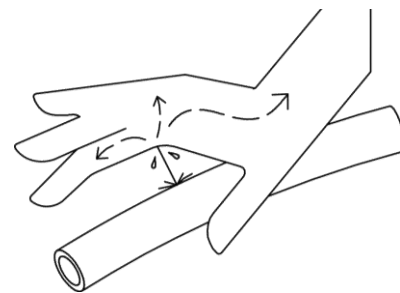


## Replace the Rubber Hose Regularly

- The rubber hose containing inflammable fluid will be probably broken caused by pressure due to aging, fatigue and scrape. The quality deterioration degree of rubber hose due to aging, fatigue and scrape is hard to be judged relying on simple check.
  - Replace the rubber hose regularly.
- If the rubber hose isn't replaced regularly, it'll probably cause fire eject liquid on the skin, or the accessory at the front end falls on the staff nearby, so as to cause severe burn, gangrene, severe injury or even death.

## Avoid High Pressure Liquid

- The ejected diesel fuel or hydraulic oil due to pressure will penetrate skin or eyes, to cause severe injury, blindness or death.
  - In order to avoid this danger, the pressure can be released before the hydraulic pipeline or other pipeline is disconnected.
  - All the joints shall be tightened before pressure is increased.
  - Use one piece of sheet paper to find leakage, the hands and body shall be prevented being injured by compressed liquid. Wear face mask or goggles to protect eyes.
  - If accident happens, see the doctor who is familiar with the injury of this kind. After any liquid enters skin, it shall be removed via surgical operation within several hours, else mortification will be caused.



## Prevent Fire

### Check Oil Leakage

- The leakage of fuel, hydraulic oil and lubricating grease will probably cause fire.
  - Check whether there is oil leakage due to lost or loosened clip, knotted hose, friction of pipeline or hose, damage of oil cooler, loosening of oil cooler flange bolt.
  - Fasten, repair or replace any lost, loosened or damaged clip, tube, hose, oil cooler and oil cooler flange bolt.
  - Don't bend or knock the pressure duct.
  - Don't assemble the bent or damaged pipeline, tube or hose.

### Check Short Circuit

- Short circuit can cause fire.
  - Check and fasten all the electric connection.
  - Before work is started, check whether there is loosened, knotted, hardened or cracked cable and wire.
  - Before work is started, check whether terminal cover is lost or damaged.
  - If the cable or wire is loosened or knotted, don't start machine.

### Remove Inflammable Material

- The spilled fuel and lubrication oil as well as refuse, lubricating grease, scrap, accumulated coal slack and other inflammable matter will probably cause fire.
  - In order to prevent fire, the machine shall be checked and cleaned every day, and the spilled or accumulated inflammable matter shall be removed immediately.

### Check the Key Switch

- Once fire happens, if the engine can't be stopped, fire will become bigger to influence fire extinction.
  - Before the machine is operated every day, the function of key switch shall be checked:
    - 1) Start the engine and run it under low speed or idle speed.
    - 2) Turn the key switch to OFF position to confirm the engine can be stopped.
  - If any abnormal condition is found, it must be repaired before machine operation.

## Leave Machine When Fire Happens

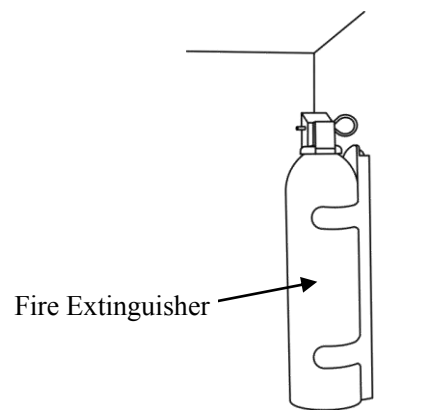
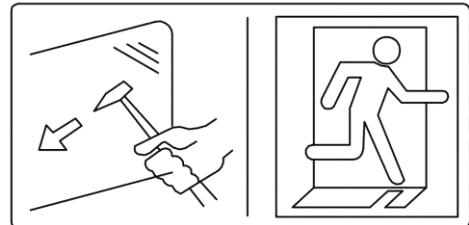
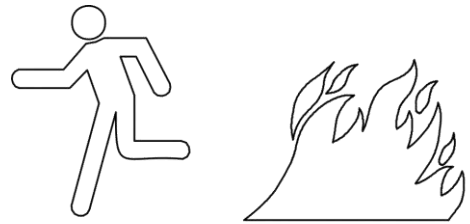
- If fire happens, the machine can be left according to the following methods:
  - If time permits, turn the key switch to OFF position to stop machine.
  - If time permits, you can use fire extinguishers. The fire extinguisher hangs on the left rear pillar of the cab. The machine is equipped with simplified dry powder fire extinguishers.

### Use Of Fire Extinguisher

- 1) Remove the fire extinguisher from its bracket.
- 2) Grip the fire extinguishers, pull out the pin.
- 3) Press the lever, to jet align the flame roots.

**Note** The fire extinguisher is one-time use, refillable are not allowed.

- Leave machine.
- In case of emergency, if the door or front window of cab can't be opened, break the back and front window with break hammer and then escape.



## Be Aware of the Discharged Fume

- Prevent choke. The fume discharge by the engine will cause disease or death.
  - If the machine has to be operated in the building, ventilation must be sufficient. Or remove the fume with extended exhaust pipe, or open the window to introduce sufficient ambient air to the working area.

## **Advance Cautions for Welding and Polishing**

- Welding parts on the excavator is not allowed.
  - If welding without permission cause damage, does not undertake any responsibility
  - If it's necessary to weld, please tell and get the permission before welding.
- Welding can generate smoke and/or sparkle.
  - When welding is performed, the place with fine ventilation and preparation shall be ensured. Before welding is performed, the inflammable substance shall be stored in a safe place.
  - Welding can be only performed by professional worker. The non-professional worker can't perform welding.
- Perform polishing on the machine will cause fire. Before polishing is performed, the inflammable substance shall be stored in a safe place.
- After welding and polishing is completed, check whether abnormal condition such as smoke exists in the surrounding environment of welding area.

## **The Paint Shall be Removed before Welding or Heating**

- When the electric welding and brazing is performed or welding saw is used, the paint will generate hazardous gas due to heating. Disease will be caused by inhaling these gases. Prevent generating poisonous gas or dust.
  - All the works shall be done outdoors or in the place with fine ventilation. The paint or solvent shall be handled properly.
  - The paint shall be removed before welding or heating:
    - 1) If the paint is polished by emery paper or grinding wheel, prevent inhaling dust. Accordingly, wear qualified gauze mask.
    - 2) If solvent or paint remover is used to remove paint, the paint remover shall be removed with soap and water before welding. Move the container containing solvent or paint remover and other inflammable materials out of the working site. Before welding or heating is started, at least 15 minutes shall be spent on gas ventilation.

## Avoid Heating Near Pressured Liquid Pipe

- The heating near the pressure pipe will probably generate inflammable vaporific substance which will severely burn yourself and staves nearby.
  - Don't perform electric welding, brazing or use welding saw near the pressure liquid pipe or other inflammable material to prevent the object being heated.

When the heat exceeds critical combustion zone, the pressure liquid pipe will be cut off at any moment. Before electric welding and brazing is performed, the temporary fire-proof isolating device can be set to protect hose or other materials.



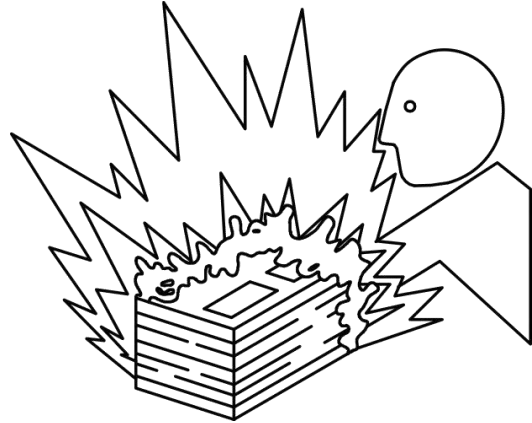
## Prevent the Pipe Containing Inflammable Fluid Being Heated

- Don't perform welding or flame cutting to the pipe containing inflammable fluid.
- Before welding or flame cutting is started, these pipes shall be thoroughly cleaned with non-flammable solvent.



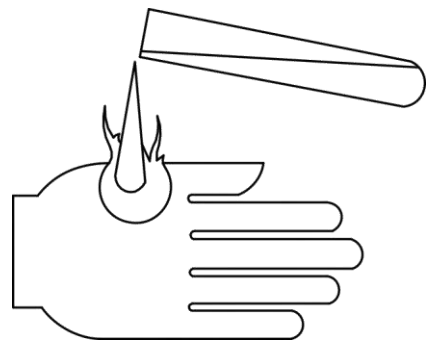
## Prevent Battery Explosion

- The battery gas can be explosive.
  - Keep the sparkle, lighted match and naked fire away from battery top.
  - The metal can't be placed at the electrodes of both sides when battery is charged. The voltmeter or gravimeter is used.
  - Don't charge the frozen battery, or it'll probably cause explosion. The battery temperature shall be increased to 16°C (60°F).
  - When the battery electrolyte is lower than standard, don't use the battery or charge it continually. This battery will probably cause explosion.
  - The electric spark will be generated by unscrewing terminal. All the terminals shall be tightened.
- The battery electrolyte is poisonous. If the battery is exploded, the battery electrolyte will be probably splashed into the eyes to cause blindness.
  - When the specific gravity of electrolyte is checked, wear the goggles.



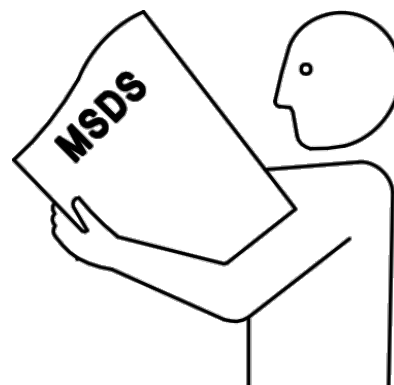
## Maintain the Air-conditioning System Safely

- If the refrigerant is splashed on the skin, it'll cause partial frostbite.
  - When the air-conditioning system is maintained, refer to the correct use method of refrigerant container.
  - The reclaiming and re-circulating system shall be used to prevent refrigerant being discharged into the air.
  - Prevent the refrigerant vapor contacting skin.



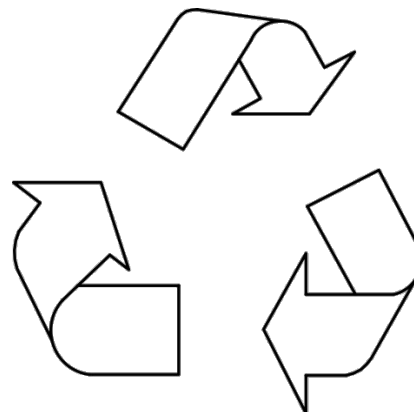
## Handle Chemicals Safely

- The exposed hazardous chemicals will cause severe injury. The chemicals with potential hazard used on the machine include lubricant, coolant, paint and binder.
  - The Material Safety Data Sheet (MSDS) includes detailed introduction to chemicals: hazard to body and health, safety measures and emergency reaction technology.
  - Before any work is started, MSDS shall be referred to for the harmful chemicals. Accordingly, you can confirm which is dangerous and how to do this work safely. Then use the recommended equipment according to the procedure.



## Dispose Refuse Correctly

- If the refuse is disposed improperly, it'll threaten the ecological environment. The potential hazardous wastes generated equipment include oil, fuel, coolant, brake fluid, filter and battery and so on.
  - When liquid is discharged, use the leak proof container. Don't use food or beverage container, it'll cause someone to drink by mistake.
  - Don't pour the waste liquid on the ground, into the sewer or any water source.
  - If the air-conditioner refrigerant is leaked into the air, the atmosphere of the Earth will be damaged. The government can requires one air-conditioner service center with license to reclaim and recycle air-conditioner refrigerant.
  - Acquire the correct method of recycling or waste disposal from local environmental protection center or recycling center.



## **Prevention for Danger of Asbestos Dust**

- If the asbestos dust in the air is inhaled, lung cancer will be caused. When doing dismantlement work is performed or the industrial waste materials are disposed on the working place, the danger of inhaling asbestos will exist.

The following rules shall be abode by:

- When cleaning is performed, spray dust to reduce dust, don't clean with compressed air.
- If the air probably contains asbestos dust, the machine must be operated in front of the asbestos dust and all the staves shall wear qualified gauze mask.
- During the operation process, other people can't approach.
- The rules, provisions and environment standards of working place shall be abode by.

## **Before the Machine is Returned to the User**

- After maintenance or repair is completed, the following shall be confirmed:
  - The machine function shall be normal especially safety system.
  - The worn or damaged part has been repaired or replaced.

# **Chapter III**

## **Product Information**

## Product Features

- **Strong power system**

The machine is equipped with an energy-conserving, environment-friendly, low-noise, water-cooled, direct injection 4TNV98-ZSLK engine, conforming to Euro III A emission standard.

- **Advanced hydraulic system**

- It is equipped with a pump load independent flow distribution control system (LUDV) unrelated to the load pressure. It has increased the stability of machine, and improved work efficiency, sensitivity as well as operating comfort significantly.
- New LUDV system is able to fine control the actions of each group of spool of multiple unit valve, and to distribute engine power as the largest proportion according to the system needs, so as to realize the best match under the variety of work conditions or working load, and resulting in the largest operation efficiency, as well as improve the operational stability and reliability of the excavator.

- **Excellent computer monitoring system**

- Operation parameters of the machine, such as engine speed, coolant temperature, engine oil pressure, fuel level, real-time and historical faults, may be displayed in the liquid crystal monitor.

- **Multi-function comfortable luxury cab environment**

- The spacious and multi-function cab designed according to ergonomics enhances comfort for operator.
- The luxury suspension seat can be regulated to provide optimal comfort for driver.
- The mounting seat of cab adopts silicone oil & rubber material, it can both reduce the

vibration and noise in the cab and greatly reduce the driver's fatigue, tremendously enhancing work efficiency.

- Adopt low-noise-level engine and paste noise-absorbing sponge on the engine room wall, to reduce the impact of noise on cab and surrounding environment, so that nighttime construction can be realized.
- The high-power air-conditioner and multi-hole circulating system enhance the refrigeration and heating capacity, to ensure comfortable temperature in the cab.
- The lamp on both sides of the frame can effectively give surrounding people the safety warning at the time of machine to do rotary action.

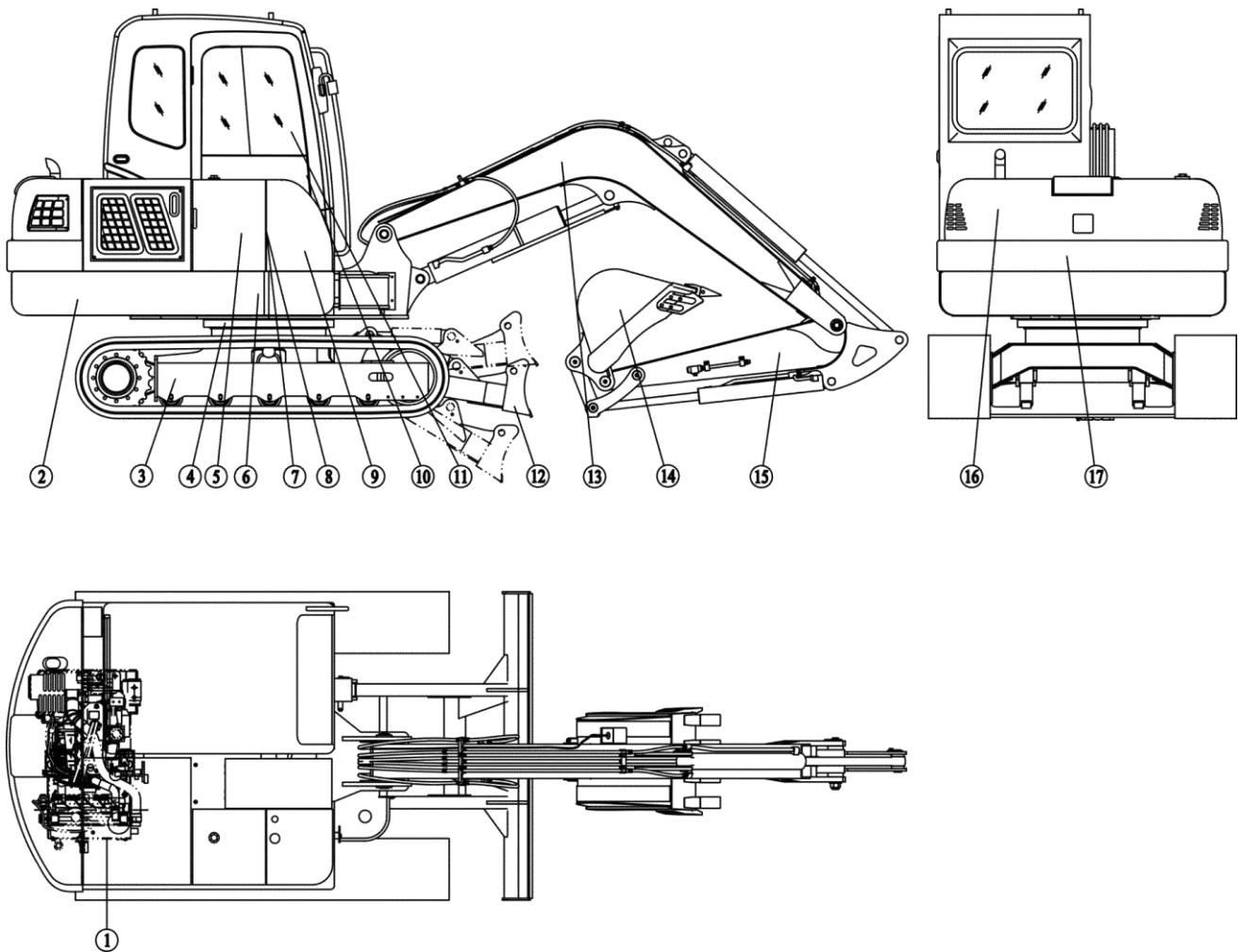
- **Convenient maintenance system**

- Three side doors can be opened, so that each maintenance point can be accessible when routine inspection and maintenance are performed.
- The label of maintenance point is clear and simple, convenient for operation.
- Adopt high-efficiency and double filter element air filter, to ensure the air supply quality of engine.
- The oil water separator two-stage fuel filter can filter the fuel several times, to ensure the oil supply quality of engine.
- The hydraulic circuit is equipped with high-quality hydraulic oil filter which can extend the service life of hydraulic element.

## **Main Uses and Scope of Application**

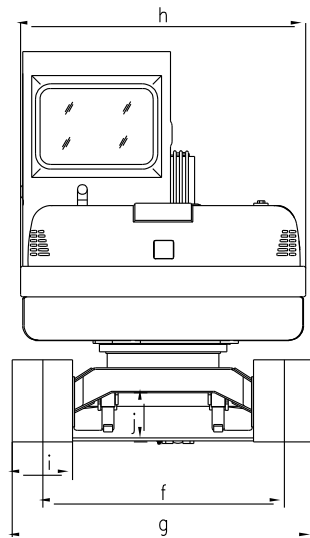
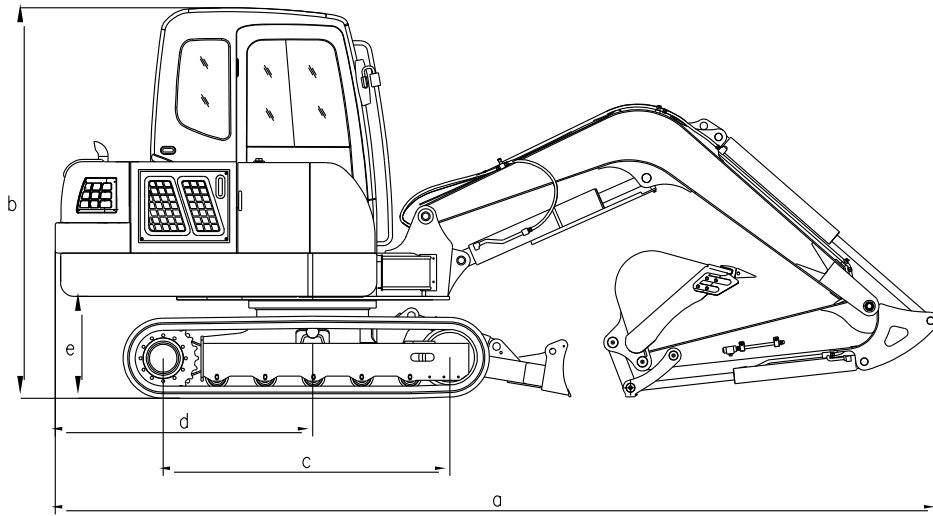
The hydraulic excavator belongs to an earthwork construction machine featured by strong function and wide application scope. The excavator can be used for excavation, loading and unloading; the standard working equipment is used for soil below III, after special attachment is configured, it can be used for crushing, dismantle, timber grabbing and steel material grabbing; moreover, it also has the function of bulldozing and loading.

## Machine Profile



| No. | Name                 | No. | Name                 | No. | Name                |
|-----|----------------------|-----|----------------------|-----|---------------------|
| ①   | Power system         | ⑦   | Air-condition system | ⑬   | Boom ass'y          |
| ②   | Platform ass'y       | ⑧   | Electrical system    | ⑭   | Bucket ass'y        |
| ③   | Undercarriage ass'y  | ⑨   | Fuel tank            | ⑮   | Arm ass'y           |
| ④   | Swing driving system | ⑩   | Operator's cab       | ⑯   | Out pannel ass'y    |
| ⑤   | Hydraulic oil tank   | ⑪   | Operator's seat      | ⑰   | Counterweight ass'y |
| ⑥   | Hydraulic system     | ⑫   | Dozer blade ass'y    |     |                     |

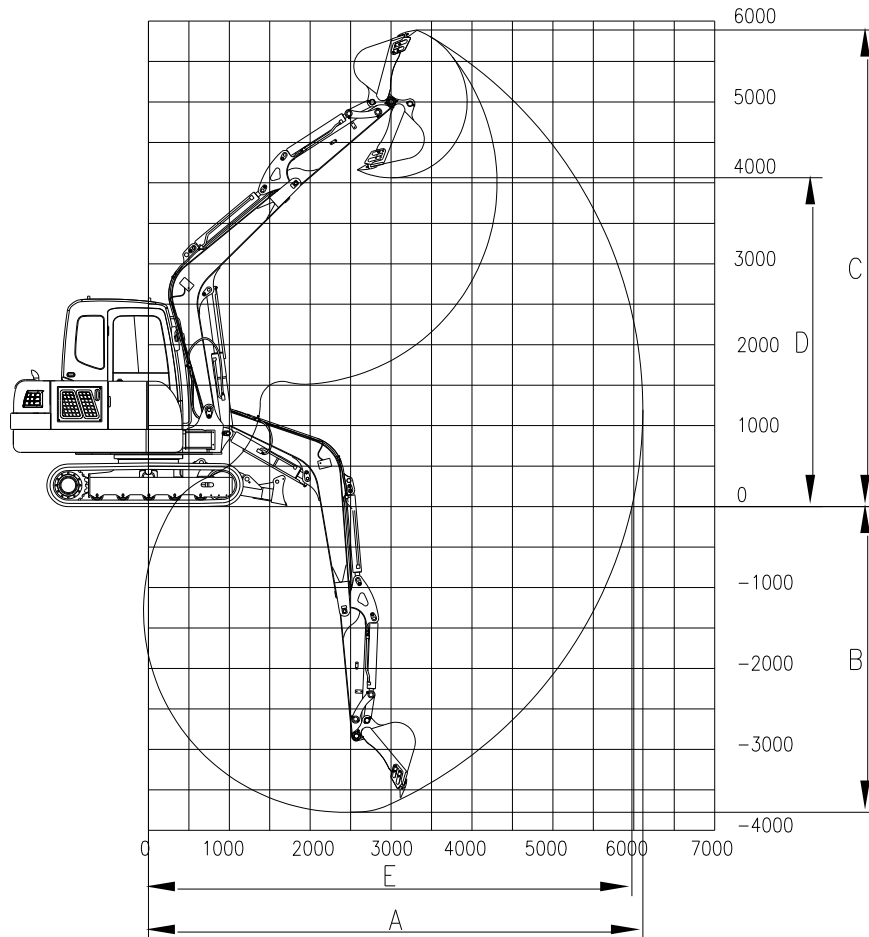
## Specifications



|   |                                  |           |
|---|----------------------------------|-----------|
| a | Overall Length                   | 5671 (mm) |
| b | Overall Height                   | 2631 (mm) |
| c | Tumblers Distance                | 1900 (mm) |
| d | Radius, Swing Center to Rear End | 1640 (mm) |
| e | Counterweight Ground Clearance   | 678 (mm)  |
| f | Track Gauge                      | 1600 (mm) |
| g | Overall Width                    | 2000 (mm) |
| h | Width of Upper Structure         | 1990 (mm) |
| i | Track Shoe Width (Standard)      | 400 (mm)  |
| j | Min.Ground Clearance             | 323 (mm)  |



## Working Range



|   |                                  |           |
|---|----------------------------------|-----------|
| A | Max.Digging Radius               | 5946 (mm) |
| B | Max.Digging Depth                | 3812 (mm) |
| C | Max.Digging Height               | 5965 (mm) |
| D | Max.Dumping Height               | 4071 (mm) |
| E | Max.Digging Radius on the Ground | 5811 (mm) |

## Performance Parameters

|                  |                                 |              |                   |
|------------------|---------------------------------|--------------|-------------------|
| Complete machine | Approximate Weight              | 6000         | (kg)              |
|                  | Bucket Volume                   | 0.23         | (m <sup>3</sup> ) |
|                  | Bucket Volume Range             | 0.1~0.31     | (m <sup>3</sup> ) |
|                  | Pressure to the Ground          | 32           | (kPa)             |
|                  | Travel Speed (Low/High)         | 2.5/5.0      | (km/h)            |
|                  | Rotation Speed                  | 11           | (rpm)             |
|                  | Gradeability                    | 35           | (°)               |
| Engine           | Model                           | WP3.2G50E311 |                   |
|                  | Power                           | 36.8/2200    | (kW/rpm)          |
|                  | Displacement                    | 3.17         | (L)               |
|                  | Fuel Tank Capacity              | 135          | (L)               |
| Hydraulic system | Work Pressure                   | 24.5         | (MPa)             |
|                  | Flow                            | 151          | (L/min)           |
|                  | Hydraulic Tank Capacity         | 80           | (L)               |
| Digging force    | Max. Bucket Digging Force       | 40           | (kN)              |
|                  | Max. Arm Digging Force          | 28           | (kN)              |
| Dozer blade      | Bulldozer Size (width×height)   | 2000×370     | (mm)              |
|                  | Work Range (Ground/Underground) | 366/386      | (mm)              |

# Chapter IV

# Product Operation



**WARNING**

Before this chapter is read, please read  
and comprehend the contents of Safety.

## Before Engine Started



### WARNING


Before starting the machine, you must comply with the following items. Failure to comply with these requirements may result in serious injury accident.

- Before starting the engine, you should read this manual and understand the security label marked on the machine.
- Before operating the machine, ensure that the operator is clear-headed. Do not operate the machine with the influence of alcohol, drugs or other effects.
- To wear appropriate clothes.
- Inspect the surroundings and the undercarriage of the machine, to check whether it is in the conditions of dirt accumulation, loose bolts, oil leaks, coolant leaks, parts damage or abrasion.
- Inspect the conditions of work equipments and hydraulic components.
- Please check lubricating oil level, coolant level and fuel level. And please read "Technical Maintenance Outline" in chapter five of this manual to get the details.
- Adjust operator's seat to control levers or pedals comfortable and safely.
- Check work lights, back mirrors and window wiper of this machine to see if they can work properly.
- Check and confirm the machine without any leakage.

## When the Time of Starting the Engine

- When the time of starting the machine, be sure to sit on the operator's seat in the cab and fasten your seat belts.
- Check the machine's monitor and controller to see if they can work properly.
- Confirm there is no one around the machine and press the horn button to warn.
- Set the hydraulic safety lockout control lever for "Unlock" position and start the machine.

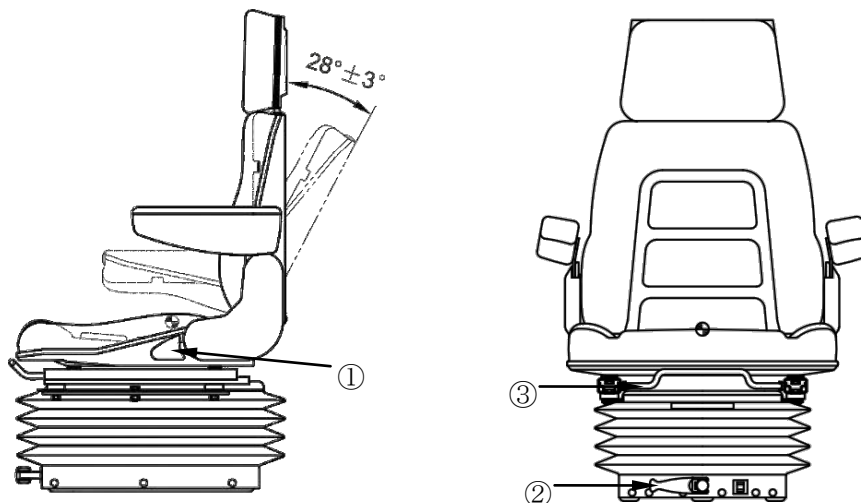
## Seat Adjustment and Check of Seat Belt

 **Note** Before each shift or driver is changed, the seat shall be regulated.

- When the driver's back is against the seat back, regulate the seat so that the driver can step down the foot pedal thoroughly. The driver can regulate the seat forward or backward.
- Ltd, it has been equipped with seat belt and seat belt device. When the seat belt and seat belt device are assembled, both of them conform to the “ISO 6683”, the seat conforms to “ISO 7096 EM6” standard and “ISO 3795” Standard for the flammability of automotive interior materials.
- Check the fixed part of safety belt. If the fixed part is worn or damaged, it shall be replaced. Keep the fixing bolt being fastened.
- Before the engine is started, please fasten the seat belt.

## Seat Adjustment

- ✎ **Note** Before driving the machine, please adjust the seat for easy to operate control levers and switches. Do not adjust the seat when operating the excavator.



### ① Backrest angle adjustment handle

Backrest angle stepless adjustment range is  $28^\circ$ , and can be folded forward.

### ② Weight Adjustment Handle

By turning the weight adjustment handle, the suspension changes. Adjust the number of scale to match the driver's weight.

Adjustable range : 50kg~130kg.

When the weight adjustment handle is rotated, the weight adjustment indicator panel will display the corresponding figures represent the corresponding weight.

### ③ Front/Rear Adjustment Handle

The seat is equipped with front and rear adjustment handle. By pulling the handle to adjust the seat to the appropriate location, then release the handle.

The front and rear effective stroke of seat slide is 130mm;

The amplitude of adjustment for each level is 10mm.

## Start of the Engine

### Starting the Engine



#### CAUTION

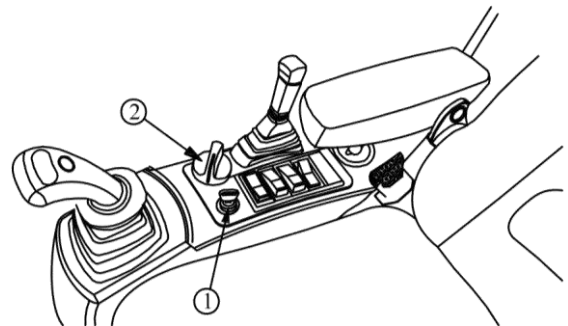
- Make sure that there are no persons staying around the machine, sound the horn, and start up the engine;
- Always sit on the operator's seat to start the engine.

#### IMPORTANT

- Be sure not to turn the key for over 10 seconds when starting motor. If the key is kept in the starting position for too long time, the motor may be burnt. If the engine fails to be started, firstly turn the key back to the OFF position and try again after 30s.

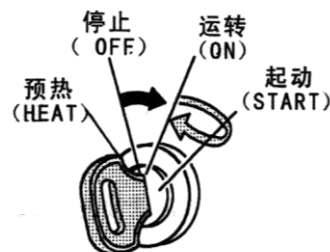
#### Normal Start

- 1) Pull the engine accelerator control lever from its low-speed position to its high-speed position slightly;
- 2) Turn the starting switch key to the position ON to start up the engine;
- 3) After starting, release the key, and the key may automatically return to its position ON.



#### Low-temperature Start

- 1) Pull the engine accelerator control lever from its low-speed position to the mid-position of high-speed;
- 2) Turn leftward the key to its HEAT position to start heating, and the HEAT indicator goes on; you'd better wait till the indicator goes off (about 15 seconds); When the key is turned to the HEAT position, engine oil pressure alarm lamp and battery charge alarm lamp go on, the buzzer beeps continuously, and these are normal phenomena;
- 3) When the HEAT indicator in the display goes off, turn the key to its START position to start up the engine;
- 4) After starting, release the key, and the key may automatically return to its position ON;
- 5) Pull the engine accelerator control lever back to its low-speed position for warming up.



---

## Engine Start with Jump Start Cable



### WARNING

- The wrong battery maintenance will cause personal injury.
- Prevent sparkle approaching battery. Sparkle will cause gas explosion.
- Prevent the end of jump-cable being contacted or touching machine.
- When the battery electrolyte level is checked, smoking is forbidden.
- The electrolyte belongs to acid, if it contacts skin or eyes, personal injury will be caused.
- When the machine is started via the jump-cable, please wear safety glasses.
- Inappropriate jump-start will cause explosion and personal injury.
- The battery anode (+) of jump supply must be connected to the battery anode (+), connect the battery cathode (-) of jump supply to the battery cathode (-).
- When the engine is started with jump-cable, only the power same as the voltage of machine to be started.
- Please switch off all the lamps and utilization equipment on the starter. Else when the power is switched on, they will start working.



### CAUTION

- When the machine is started via jump-cable, in order to avoid damaging engine bearing and circuit, prevent the machine to be started being contacted with the machine with jump supply.
- Before jump-start, the battery break switch shall be ON (closed), to prevent the electric element on the machine to be started being damaged.
- Check the rated voltage of machine battery and starter, and only the same voltage can be used for jump-start. If the electric arc cutting machine or higher voltage is used, the electric system will be damaged.
- After jump-start, the fully discharged maintenance-free battery can't be only charged by the generator. These batteries must be charged with battery charger to proper voltage. Lots of rejected batteries can be also charged.



**Specific operating procedures are listed as follows:**

- 1) For a faulty machine, firstly identify the cause of disability to start the engine.
- 2) For a normal machine, rest the instrument on the ground. Push all control levers to "HOLD" position. Push the hydraulic start control lever to the "LOCK" position.
- 3) Turn the ignition switch of the machine to be started to the "OFF" position to disconnect all electrical devices.
- 4) Turn the battery circuit breaker of the machine to be started to the "ON" position.
- 5) Move the machine as the power supply near the machine to be started to enable the jumper cable to be connected to the machine started. However, both machines shall not be in contact with each other.
- 6) Stop the engine of the machine as the power supply. If an auxiliary power supply is used, be sure to disconnect the charging system.
- 7) Make sure the battery caps of both machines are tightened and placed properly. Make sure the battery of the machine to be started does not freeze. Make sure the batteries do not lack electrolyte.
- 8) The positive terminal of the jumper cable is red. Connect one positive terminal of the jumper cable to the positive post of the battery. Some machines do not have a battery pack.
- 9) Connect the other positive terminal of the jumper cable to the positive post of the power supply.
- 10) Connect the other negative terminal of the jumper cable to the negative post of the power supply.
- 11) Connect the other negative terminal of the jumper cable to the frame of the machine to be started. Never connect the jumper cable to the post of the battery. Do not let the jumper cable touch the cable of the battery, fuel pipe, hydraulic pipe or any moving part.
- 12) Start the engine as power supply machine or connect the charging system of the auxiliary power supply.
- 13) Before starting the machine to be started, wait at least 2min so that the battery on the machine to be started can be partially charged.
- 14) Start the engine of the machine to be started.
- 15) After the engine to be started is started, immediately end the jump starting procedure in the reverse order.
- 16) Conduct a failure analysis to the starting system or the charging system on the machine started.
- 17) The machine equipped with accumulator in the control lines. The accumulator in the control lines is a pressure storage device. After equipped with this accumulator, the machine can also be operated the control lines within 60 seconds even the engine is stopped. Therefore, by operating the joystick control levers, the work equipments can be lowered down by its gravity action within 60 seconds.

## After Engine Start



### CAUTION

- The engine shall run with low speed before the engine oil pressure indicator lamp is off.
- If the indicator lamp isn't off within 10s, the engine shall be stopped, and the reason shall be found before the engine is started again. If the engine is restarted without eliminating fault, the engine will be damaged.

**Note** Before the hydraulic control unit works, the hydraulic lockout control must be set for "Unlock" position.

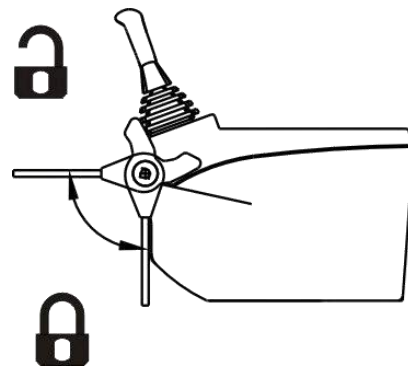
- 1) The engine shall run for 5 minutes with low idle speed to preheat the engine. Push and pull the tooling joystick at the middle position to accelerate preheating of hydraulic part.

When the machine is preheated with idle speed, please refer to the following proposals:

- If the temperature is above 0°C, the engine will be preheated about 15 minutes.
- If the temperature is below 0°C, the engine will be preheated about 30 minutes.
- If the temperature is below -18°C or the hydraulic function is delayed, longer preheating time will be needed.

- 2) When the hydraulic oil is preheated, the engine speed knob shall be turned to medium speed and runs for about 5 minutes, and move the bucket joystick from "Bucket dumping" position to "Hold" position.
- 3) Turn the engine speed knob to the maximum engine speed and repeat the above procedure, so that the hydraulic oil can reach oil drain pressure and the hydraulic oil can be preheated faster.
- 4) Operate all joysticks in cycle so that the hot hydraulic oil can flow into each cylinder and oil pipe.

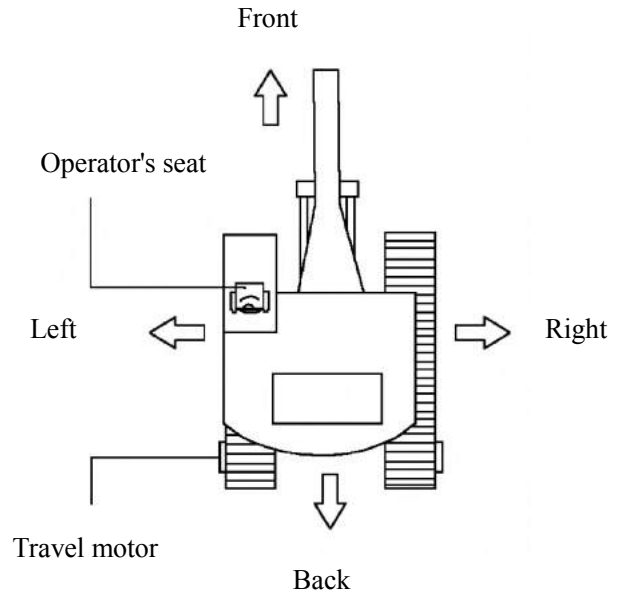
- 5) Note each instrument and indicator at any moment when working.



## Excavator Operation

### Direction

The direction of back, front, right and left indicated in this Manual is confirmed based on that cab is in the front and travel motor is at the back.

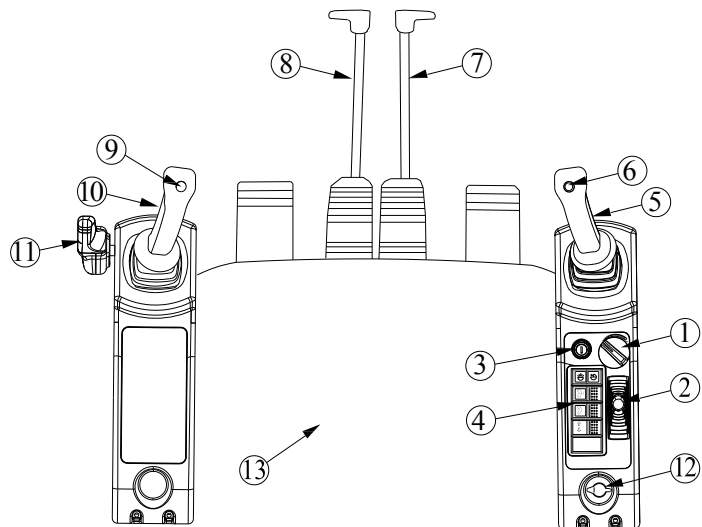


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## Operator Controls

### ● Pedal and control lever

- ① Throttle control knob
- ② Dozer blade control lever
- ③ Inspect socket
- ④ Throttle control lever
- ⑤ Joystick control, R.H.
- ⑥ Hydraulic button
- ⑦ Travel control, R.H.
- ⑧ Travel control, L.H.
- ⑨ Horn button
- ⑩ Joystick control, L.H.
- ⑪ Hydraulic lockout control lever
- ⑫ Key switch
- ⑬ Seat



- **Monitor**

- Used for monitoring the operation parameters of the machine. It's installed on the upright post located to the right front of the seat.
- Refer to "Operating Manual for Electronic Monitoring Meter" for details.



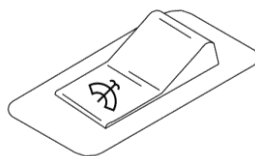

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**Switch combination**

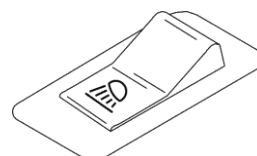
The switch combination is installed on the right handrail box in the cab.



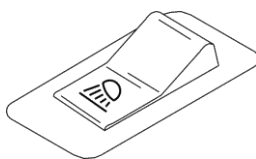
Winder Wipe



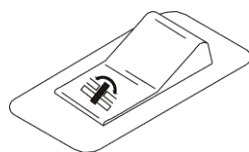
Winder Washer



Work Lamp



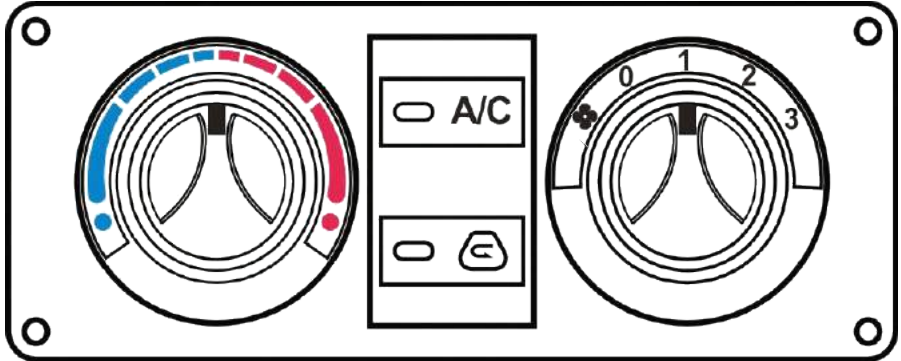
Platform Lamp



Swing Switchover

- **Air-conditioner**

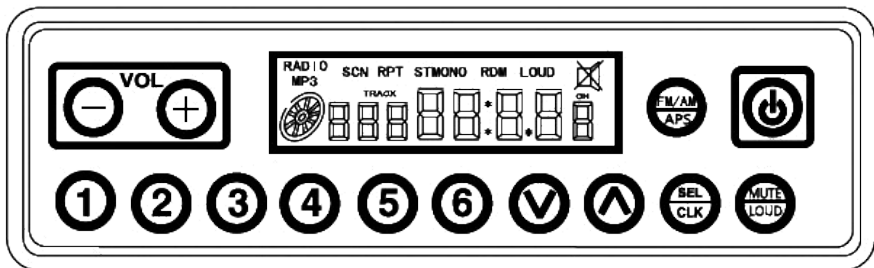
- The air-conditioner regulator is located on the interior trimming panel that lies to the right of the seat.
- Refer to related contents of the next section "Use of Air-conditioner" for specific operation.



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- **Radio**

- The radio control panel is located on the interior trimming panel that lies to the right of the seat.
- Refer to related contents of the next section "Use of Radio" for the specific operation.



● **Monitor**

- Panel function diagram



## Trial Run of New Machine

The new machine needs 100h trial run test. During the period of trial run, the machine shall be used and maintained well.


- Note running status of engine
  - 1) Run the engine with standard load, to avoid engine overload.
  - 2) Check the indicator lamp and indicator gauge when running the engine.
- Every 8h or every day
  - 1) Implement 8h or daily maintenance.
  - 2) Check whether liquid is leaked.
  - 3) During the period of trial run or working in the muddy water, the pin shaft of working device shall be lubricated every 8h.
- After the initial 50h
  - 1) Implement 50h maintenance.
  - 2) Check the vulnerable metal component torque.
- Check before startup
  - 1) Check instrument

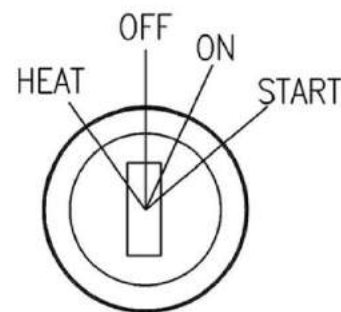
After the power main switch is closed, turn the key switch to ON position.
  - 2) Liquid level check

Check whether the hydraulic oil level, engine cooling water level and engine oil level is normal one by one. If the level is abnormal, add or reduce oil or water to reach normal position. This check can't substitute daily check.

## Engine Operation

**Machine power on:** Switch the power of machine on: open manual power main switch

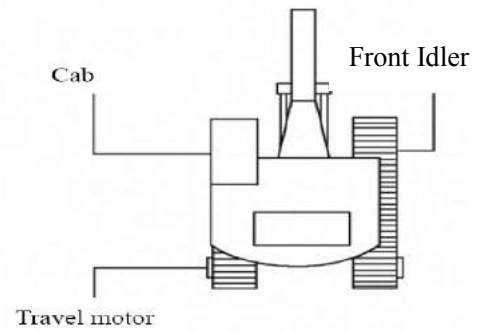
- Start the engine
  - Turn the key switch to ON position.
  - Turn the key switch to start the engine. Release the key and the switch will return to ON position.
-  **Note** In order to avoid damage of starter, the motor starter can't be operated over 10s every time. If the engine isn't started, please turn the key switch to OFF position and then try it again after 30s.
- Shut down the engine
- Park the machine on the level ground and lower the bucket on the ground.
- Run the engine with idle speed for 5 minutes.
- Turn the key switch to OFF position and take out the key.
- Lock all the controls at neutral position.
- Pull the hydraulic lockout control and set it for "Lock" position.



OFF—Power off  
ON —Power on  
START—Start up  
HEAT —Preheat

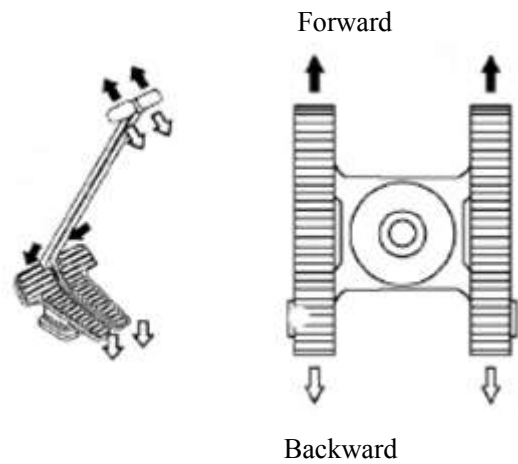
## Driving Machine

- When the machine travels for long distance, please rotate the cab so that the travel motor is at the back.
- When the machine travels on the slope downwards, please control the foot pedal slowly.



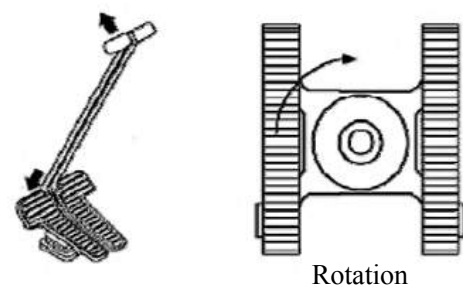
- **Travel**

- When the machine travels straightly, push and pull the control foot pedal backward or forward. The bigger the distance between control foot pedal is, the faster the travel speed is.
- When the travel foot pedal or travel control is at middle position, the travel brake will be stopped automatically.

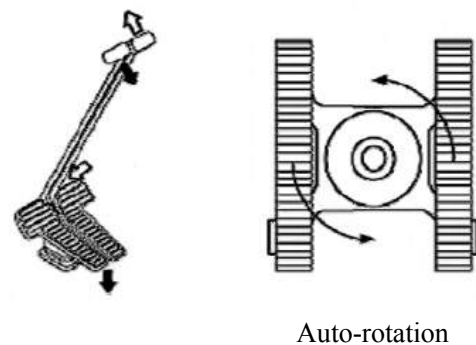


- **Rotation**

- Single side rotation: when only one track is operated backward or forward, the machine will turn around taking the still track as swing shaft.



- Auto-rotation: when one track is operated forward and the other one track is operated backward, the machine will rotate taking the center point as axis.





● **Travel speed control**

- When traveling on the slope downwards, the machine will be operated with low speed (tortoise) mode, the travel speed can't be changed to high speed (rabbit) mode.
- High speed (rabbit) or low speed (tortoise) can be selected via the travel speed switch of monitor.

- When the machine travels on the slope or in narrow space, please select low speed (tortoise) mode.



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● **Drive the machine with care**



**CAUTION**

- When the machine is moved, rotated or operated within narrow place, a signal man shall be arranged.
- The hand signal shall be confirmed before the machine is started.

- In cold area, the machine shall be parked on solid ground to prevent the track being frozen with the ground.

Remove the scrap on the track and track frame.

If the track is frozen with the ground, the track can be lifted by the boom, rotate the machine with care to prevent damage of driving wheel and track. If the engine is to be shut down with load, the load shall be removed and start the engine immediately. Before load is applied, the engine shall be run with the speed of 1200 r/min for 30s.

- Before the machine travels, please confirm the relationship between travel direction and travel foot pedal or control.
- Select even route as possible. Travel straightly as possible and perform tiny gradual change in direction.

- Check the strength of bridge deck and roadbed. If necessary, they must be strengthened.
- In order not to damage road, wood plate shall be used. When the machine is operated on the tar road in summer, drive it carefully.
- When the machine crosses rail, wood plate shall be used to prevent damaging rail.
- Prevent the machine touching wire or bridge edge.
- When the machine crosses river, the bucket shall be used to measure depth of river and crosses the river slowly. When the depth of river exceed the top edge of carrier roller, don't cross the river.
- When the machine travels on uneven road, the engine speed shall be reduced to travel with low speed. The lower speed will reduce the possibility of machine damage.
- Avoid the operation which will probably damage track and undercarriage components.
- In freezing weather, before the machine is loaded and unloaded, the snow and ice at the bottom of track shall be removed, to prevent skidding of machine.

## Parking Machine

- 1) Park the machine on the level ground and lower the bucket on the ground.
- 2) Reduce the engine speed to idle speed.
- 3) Run the engine with idle speed for 3 minutes.
- 4) Turn the key switch to OFF position to shut down the engine. Take out the key from the switch.
- 5) Pull the hydraulic lockout control to "Lock" position.

### IMPORTANT

Prevent the electric element in the cab being influenced by bad weather.

When the machine is parked, the window, roof ventilator and cab door shall be closed.

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## Long-term Storage

### Before storage



### CAUTION

When the machine is stored, regulate the machine to the posture as the right Figure to protect cylinder piston rod. (Prevent rusting of cylinder piston rod)

When the machine is stored for long time, perform according to the following procedure:

All the components shall be cleaned and flushed, and then store the machine in the room. If the machine has to be stored outdoors, level ground shall be selected and cover the machine with cloth.

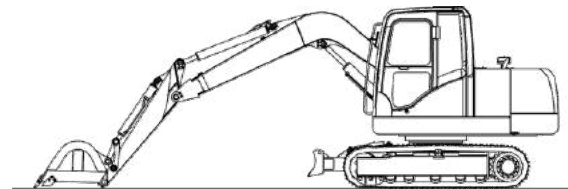
Before the machine is stored, the fuel tank shall be full, perform lubrication and replace engine oil.

Coat lubricating grease on the metal surface of piston rod.

Disconnect the negative terminal of battery and cover the battery or disassemble the battery on the machine and store it independently.

If the ambient temperature is predicted to drop below 0 (32°F), the anti-freeze fluid shall be added in the coolant.

Lock each control and foot pedal with lockout control and locking device of foot pedal.



Set the check valve used to install accessory on the machine for lock position. Install a plug screw on the elbow.

Set the selector valve used to install accessory on the machine for "No-accessory installation" position.

In order to prevent corrosion, the cooling system shall be added with authenticated anti-freeze fluid (AF-NFC) or long life anti-freeze fluid (mixing ratio is between 30% and 68%).

### During the storage period



#### WARNING

If the machine is stored indoors, if rust-proof operation must be performed, the door and window shall be opened to promote ventilation to prevent gas poisoning.

During the storage period, it is recommended that starting the engine to charge the battery at least for one time every seven days. Run idling for 5 minutes at first (cold regions can be longer), and then after running continuously for 40mins-50mins in the speed of 1500r/min-1700r/min, slow down and stop the engine.

The air-conditioner shall be operated for the machine equipped with air-conditioner.

Rotate track.

### After storage

When the monthly anti-rust operation isn't performed, if the machine is to be used, please contact an agent.

When the long-term stored machine is used, the following procedures shall be performed before use.

Remove the lubricating grease coated on the surface of cylinder piston rod.

Fill engine oil and lubricating grease to all positions.

When the machine has been stored for long time, the moisture in the air will enter the oil. Before the engine is started or after the engine is started, the oil of all positions shall be checked. If the oil contains water, the whole oil shall be replaced.

---

## Operate Machine



#### CAUTION

When the machine swings to trench, don't use the trench to stop swing.

If the boom impacts the bank or object, check whether the machine is damaged.

If the boom impacts the bank or object or stop the boom with object again and again, the structure damage will be caused.

The combination of one arm and one bucket of some boom will make bucket impact the cab or the front of machine or the front side of track. Accordingly, when new tooling is operated, check whether it's interfered.

During the digging work, if the machine track is lifted off the ground, the machine shall be lowered on the ground stably. The machine can't fall or supported by hydraulic device, else the machine will be damaged.

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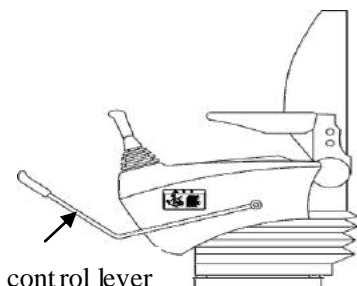
### Hydraulic lockout control

The hydraulic lockout control can close the hydraulic pilot oil flowing to the pilot control valve.

When the hydraulic lockout control is set for lock position, even though the control or foot pedal is touched, the machine won't move.

No matter when shutting down the engine, leaving the operator's seat or transporting the machine, the lockout control shall be pulled to the lock position.

Check frequently and ensure the hydraulic lockout control is at the lock position, to prevent accidental movement of machine.



Hydraulic safety lock control lever

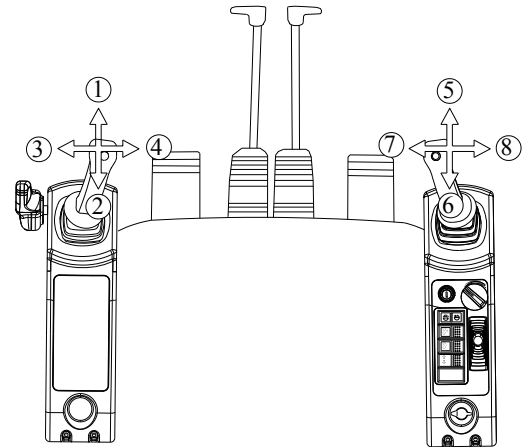
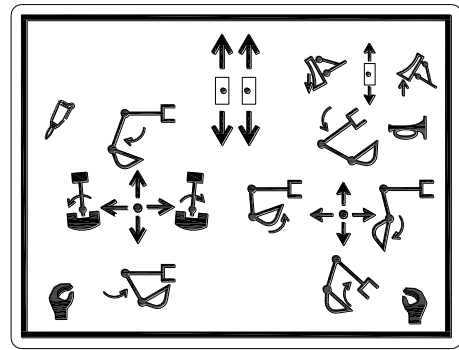
● **Joystick controls (standard mode)**

- The machine is marked with sign to display the standard control method of travel controls and joystick controls.
- When digging is performed, the track shall be prevented being contacted with boom cylinder.
- When the digging is performed, the travel motor shall be installed at the rear of machine so that the load of chain belt and carrier roller can be reduced minimally, and the stability and lifting capacity of machine can be enhanced maximally.
- When you release the joysticks from any position, it'll return to the neutral position automatically. The machine movement will be also stopped.

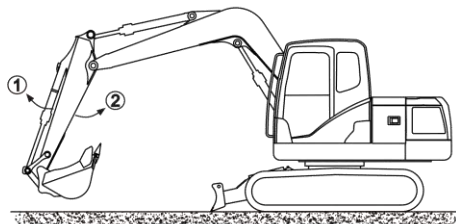


**CAUTION**

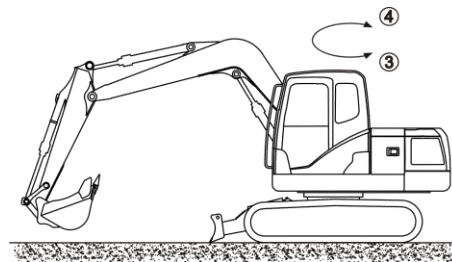
- Any part of body can't protrude the window frame.
- If the body protrudes window frame and touch the control rod accidentally, it'll be injured by the boom.



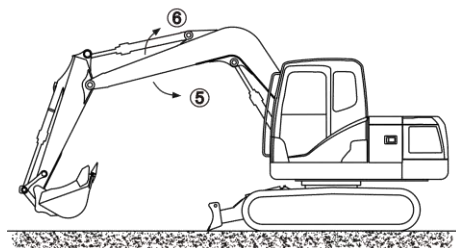
- If the window is lost or damaged, please replace it immediately.
- Before operation is started, please be familiar with the position and function of joystick controls (as the right Figure).



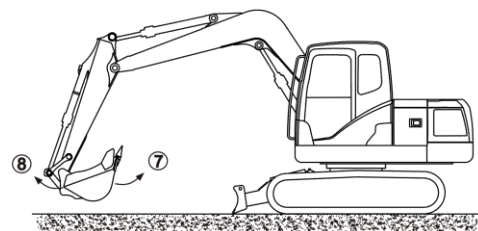
① . Arm extend      ② . Arm retract



③ . Swing left      ④ . Swing right



⑤ . Boom down      ⑥ . Boom raise



⑦ . Bucket close      ⑧ . Bucket open

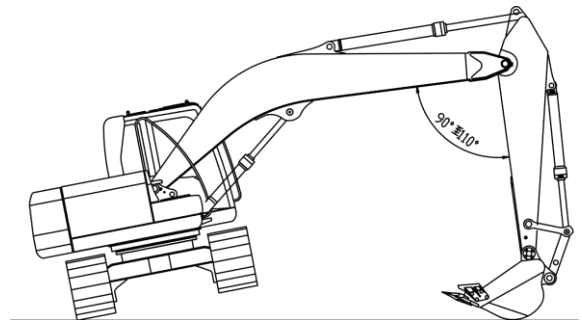
- **Use the boom and arm to lift one-side track**



**CAUTION**

Maintain the angle between boom and arm at 90°~100°, and lower the arc part of bucket on the ground.

- Rotate the superstructure by 90°, meanwhile, lower the bucket and lift the track off the ground.
- Place brick under the bottom of travel frame to support machine.



- **Operate machine on soft ground**

- Avoid traveling on the soft ground because the soft ground can't support machine reliably.
- If the machine works on the soft ground or the machine is blocked, the surrounding area of track frame shall be swept so as to rotate the superstructure by 90°, and lower bucket to lift the track off the ground. Please maintain the angle between boom and arm at 90°~110°, and lower the arc part of bucket on the ground.
- Rotate the lifted track back and front to remove the soil and dust on the track.
- Lower the engine speed, reduce travel speed and move the machine to the solid ground carefully.
- When the machine is blocked but the engine can be still operated, the machine can be towed. When the machine is towed, please connect steel cable correctly.

- **The operation precautions of driving on the slope**

☞ **Note** When working on slopes, the cab must be adjusted to facing the direction of uphill, while it is downhill, the cab must be adjusted to facing the downhill direction. When it start walking , be sure to check the hardness of the ground in front of the machine.

- When working on the slope, off-balance and roll-over of machine will be caused by rotating or operating working device, accordingly, this operation shall be forbidden.

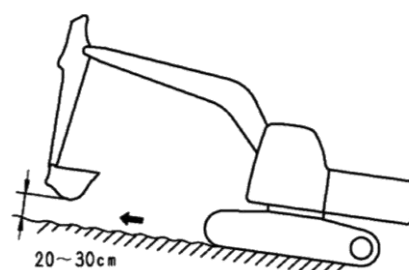
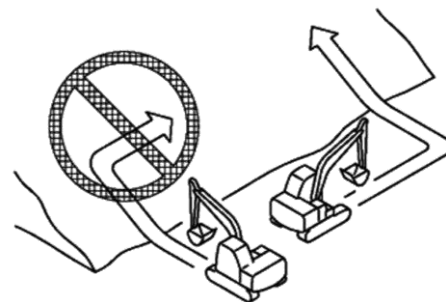
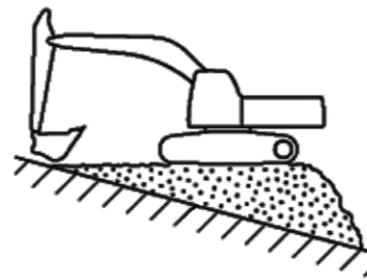
When the dozer is with load, it'll be very dangerous to swing in the downhill direction. If this operation has to be performed, a platform shall be piled with soil so that the machine can keep balance when working.

- **Avoid crossing the slope**

When traveling on the slope, the track shall be vertical to the slope. Don't make a turn on the slope or cross the slope, this operation can be only performed on a level place. This place is probably a little far away, but safety can be ensured.

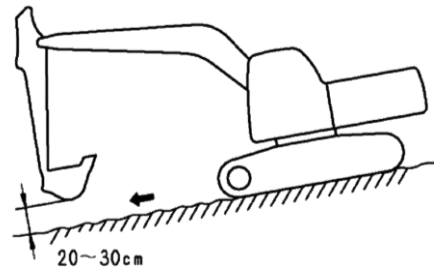
- **When the machine uphill**

- 1) When the slope is more than  $15^\circ$ , make sure that the work equipment is kept away from the ground 20cm to 30cm (as the right figure shown), so that in case of the emergency, you can quickly place the work equipment down to the ground to help stop the machine.
- 2) If the engine is turned off when the machine is walking on the slope, please immediately move the joystick to "neutral" position to restart the engine.



- **When the machine downhill**

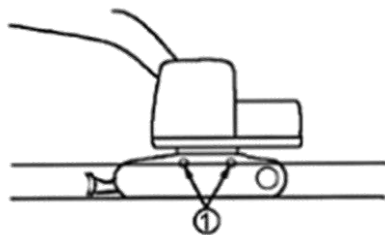
- 1) When traveling downhill, the machine shall be driven with low speed via joystick and throttle knob.
- 2) When traveling uphill over 15°, the working device shall be regulated to the status as the right Figure.
- 3) If the side of carrier roller is upward when the machine travels downhill, the track will be loosened to cause tooth-leap.



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- **Work in the water or muddy water**

- Don't drive the machine in the water where the water exceeds the center line ① of carrier roller. For the components which have been soaked in the water for long time, lubricating oil shall be filled until the used lubricating oil is extruded from the bearing (especially surrounding are of bucket pin).

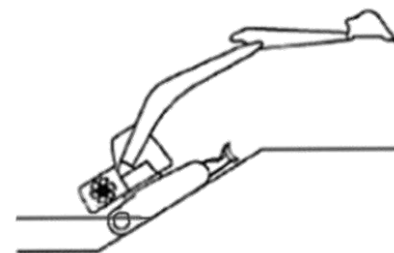


- If the swing bearing, swing gear and center joint is soaked, please move the plug at the bottom of lubricant reservoir of swing gear room, discharge the muddy water and water, sweep the gear room and lubricant reservoir, and then assemble the cover plate, and lubricate the swing inner gear and swing bearing.

 **CAUTION**

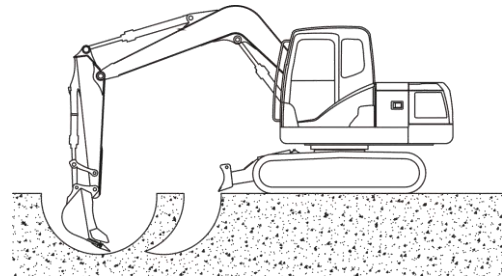
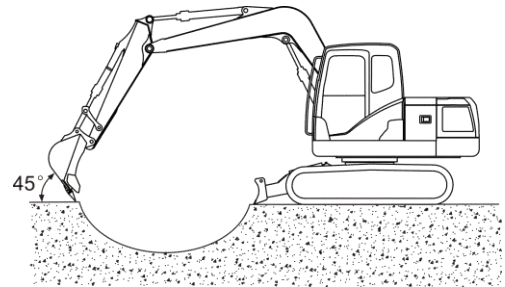
When the machine is driven from the water, if the machine angle exceeds 15°, the rear of superstructure swing platform will enter the water and the water will be flapped by the heat radiator fan. This will damage the fan. The machine shall be driven from the water with special care.

- When working in the water or muddy water, the machine position shall be checked frequently. If necessary, the machine position can be re-regulated, to prevent the swing bearing, swing gear and center joint being soaked.



**● Trenching operation**

- 1) Place the bucket tooth on the ground, and the angle of bucket bottom and ground is  $45^\circ$ .
- 2) Pull the bucket to the machine direction taking the arm as the major digging force.
- 3) When the bucket is blocked by soil, the soil can be removed by swinging arm or bucket back and front rapidly.
- 4) During the falling of boom, sudden stop shall be avoided because it'll cause shock load which will probably damage machine.
- 5) When the boom is operated, the hydraulic cylinder can't be lowered to the bottom to prevent damaging hydraulic cylinder.
- 6) When digging is performed with the same angle, the bucket tooth shall be prevented impacting track.
- 7) When the trench is dug, the boom and bucket cylinder hose shall be prevented impacting ground.
- 8) When the straight trench is dug, the track and trench shall be at parallel position. After the required depth is reached, if continual trenching is required, please move the machine.
- 9) In trenching operation, the earth in front of the machine can not dig too deep, because it might collapse and cause the subsidence of the machine.
- 10) In trenching operation, if the machine fails, adjust the crawler at right angles with the road or with the cliff, and keep the drive wheels in the back of the machine, in order to make the machine is easy to exit.



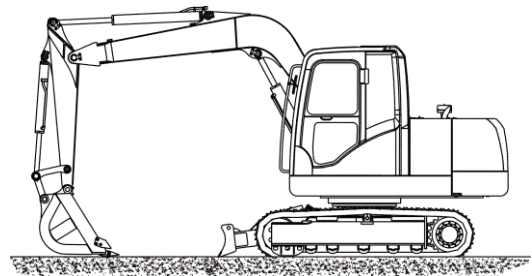


- **Leveling work**

### **IMPORTANT**

The soil can't be pushed or pulled with bucket when traveling.

- When the ground is leveled as the right Figure, retract the bucket and slightly place arm forward and vertically.
- When the boom is lifted slowly, operate the machine to retract arm. Once the arm movement exceeds vertical position, lower the boom slowly to maintain bucket moving along the surface.
- The ground leveling can be completed through operating boom, arm and bucket simultaneously.



---

- **Drive machine out of mud**



### **CAUTION**

Handle operation with care to prevent being trapped in the mud. If the machine is trapped in the mud, drive the machine out according to the following procedure.

- The track of one side is trapped

When the boom or arm is used to lift machine, the bucket bottom must contact the ground. (Don't push with bucket tooth). The angle between boom and arm shall be 90°~110°. When the opposite bucket is used, it's also applicable.

When only the track of one side is trapped in the mud, lift the track with bucket, and then support wood plate or log and drive the machine out. If necessary, place wood plate under the bucket.

- The tracks of both sides are trapped

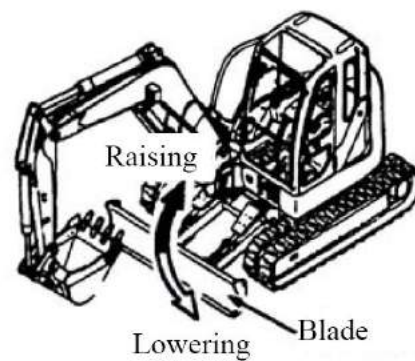
If the tracks of both sides are trapped in the mud, and the tracks skid and can't move. Place the log or wood under the tracks by adopting the above method. Dig the bucket into the front ground, operate the arm according to the same mode of digging, and regulate the travel control to the forward position to pull the machine out.

- **Operation of dozer blade**
- Operate the blade lever toward or backward.



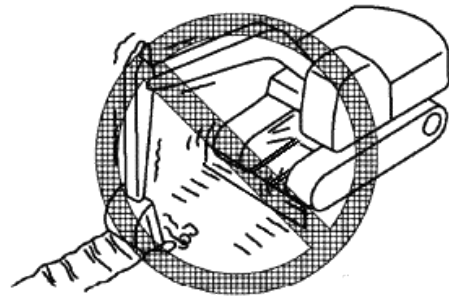
- Working height of the blade: 366mm/386mm (ground/ underground)

- The dozer blade is not available for fixing the machine, otherwise machine would be damaged.

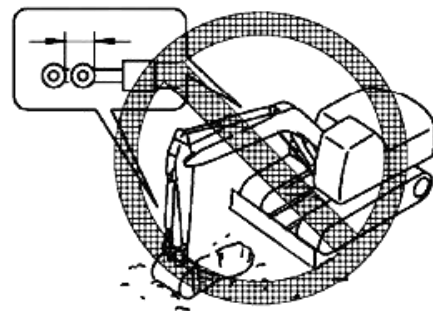


● **Forbidden operation**

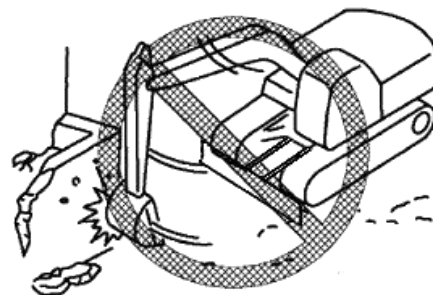
- Don't use swing force to compact ground or break object. This is not dangerous, but also greatly shortens service life of machine.



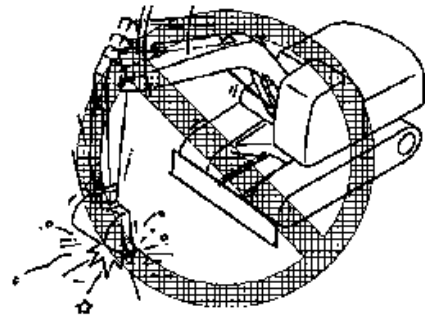
- Don't dig the bucket into the ground and perform digging via travel force. This will damage machine or working device.



- When the cylinder piston rod is telescoped to the stroke terminal and the impact is generated by external force, if the working device is used, it'll damage hydraulic cylinder and cause personal injury. Please avoid operation when the hydraulic cylinder is fully retracted or protruded.

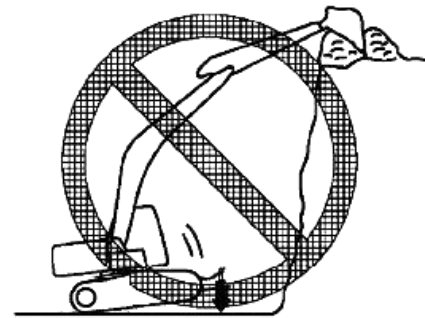


- The falling force of bucket can't be used as handpick, breaker or pile driver else it'll greatly shorten the service life of machine.



- The falling force of machine can't be used for digging.

- Don't attempt to use working device to directly dig hard rocky ground. Digging shall be performed after the rocky ground is broken by other method. This can not only reduce damage of machine, but also more economic.



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- **Select proper track shoe**

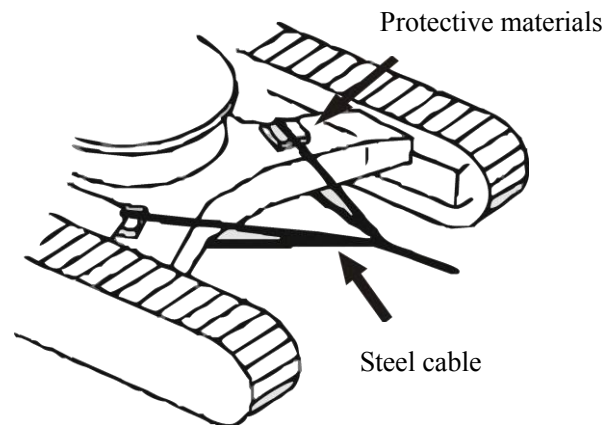
- The wide track shoe can't be used on the rough ground with rock, sand or grit.
- The wide track shoe is designed for traveling on soft ground.
- If the wide track shoe is used on rough ground, the track shoe will be bent or loose and other undercarriage component will be probably damaged.
- The tension of track shoe screw must be checked regularly.

- **Tow Machine within Short Distance**



**CAUTION**

- The steel cable, belt or rope will be probably broken to cause severe accident.
  - The damaged chain, worn cable, hoop cable, belt or rope can't be used to tow machine.
  - When the steel cable, belt or rope is handled, gloves must be worn.
- 
- When your machine is impacted but can also operate, connect the towing cable as the right Figure, and use the other machine to tow your machine to the solid ground.
  - Confirm the steel cable has been connected to the travel frame of two machines.
  - In order to prevent steel cable being damaged, some protective materials shall be placed between the travel frame and steel rope.
  - Connect the steel cable to the towing hole of frame via proper U-shaped hook.
  - The machine shall be towed slowly, the cable shall be kept horizontal and in parallel with the track.

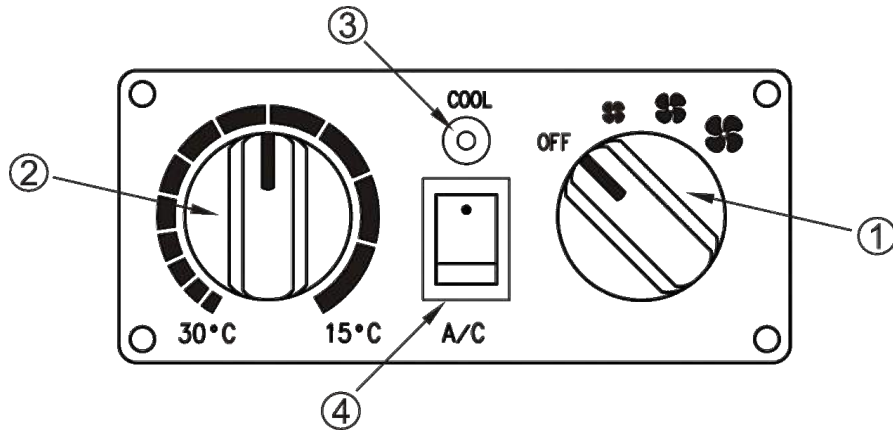


**IMPORTANT**

The track frame is provided with two towing holes which can be used to tow the article less than 7540kg. If the weight exceeds the specified range, the towing holes can't be used to tow article.

## Use of the Air-conditioner

### Air-conditioner Control Panel




### Description of Key Functions


| S.N. | Name                                      | Main functions  |
|------|---|---|
| 1    | Air regulation switch                     | It is used to adjust air output of the unit in cooling or heating mode (3-position control, LOW/MIDDLE/HIGH)  |
| 2    | Vehicle-inside temperature setting switch | <p>Driver may use the switch to set vehicle inside temperature in cooling mode</p> <ul style="list-style-type: none"> <li>Vehicle-inside temperature is set to 30 when the switch is turned to the leftmost position (Power switch of compressor clutch stops rotating before this)</li> <li>Vehicle-inside temperature is set to 15 when the switch is turned to its rightmost position</li> </ul> |
| 3    | Cooling Start LED                         | The LED is used to indicate the clutch actions in cooling mode  |
| 4    | Power switch                              | <p>Press the ON button, the air conditioner power on</p> <p>Press the OFF button, the air conditioner power off</p>   |

## Operating Procedures and Precautions for Air-Conditioner

- Starting the Vehicle Engine
- When Cooling Mode is Active
- Be sure to close the warm water valve to prevent the engine cooling water from flowing into the HVACUNIT.
- While cooling, turn rightwards the vehicle-inside temperature setting switch ② to the maximum extent.
- Vehicle-inside temperature setting:
  - Turned to the rightmost position = 15°C
  - Middle position = 22°C-24°C
  - Turned to the left most position = 30°C


 **Note** Temperature setting of the air conditioner must not be too low, and the recommended value is over 20°C. During temperature setting, a “crack” sound may be heard when the switch is turned leftwards to the OFF segment. That indicates that the compressor power switch is functioning, and the compressor clutch is closed. So, be sure not to close the clutch when turning leftwards.

- Air regulation switch
  - Adjust the air regulation switch ① to position 1 (LOW), the compressor is powered on and starts operation; meanwhile, the motor on HVAC UNIT will be started up, and cold air will be delivered into the vehicle. If the air regulation switch ① is turned rightwards to position 3 (HIGH) once the air conditioner is started, the vehicle-inside temperature will be reduced immediately.
- Setting the vehicle-inside temperature switch
  - When the vehicle-inside temperature regulation switch ② is set to its mid-position (A), the air conditioner may keep on operating; When the vehicle-inside temperature reaches 22~24°C, the compressor clutch will be automatically powered on/off to maintain the vehicle-inside temperature.

 **Note** The above-mentioned functions are available only in cooling mode; In heating mode, the switch must be turned to the leftmost position to maintain the OFF status.

- 
- When Heating Mode is Active
  - Be sure to open the warm water valve to allow the engine cooling water to flow into the HVACUNIT.
  - Adjusting the air regulation switch
    - Adjust the air regulation switch ① to position 1 (LOW) or any desired positions, the motor on HVAC UNIT will be started up, and hot air will be delivered into the vehicle.

- Setting the vehicle-inside temperature switch
  - Turn the temperature regulation switch ② leftmost to the segment that lies before the segment where the “crack” sound is heard, and keep the status.

 **Note** If the temperature regulation switch ② is turned rightwards, the compressor clutch will be actuated, the heating effect will be obviously reduced, and failures of compressor may be caused.

### Main Failure Causes of the Air-Conditioner and Measures

| Type of Failure                     | Causes   | Measures   |
|-------------------------------------|--|--|
| Evaporation motor is not started up | Poor power connection  | Check the power connection   |
|                                     | Power fuse is blown out  | Check and replace the fuse   |
|                                     | Disconnection or short circuit of wires  | Check for power-on and short circuit   |
| Inadequate air output               | Evaporation motor works poorly   | Conduct check and replacement  |
|                                     | Foreign substances adhere to the surfaces of the evaporation heat exchanger  | Conduct purging by compressed air or water   |
|                                     | The evaporation heat exchanger is frozen   | Check the temperature sensor that is designed to prevent the heat exchanger from being frozen                  |
|                                     | Air leak   | Check the section between evaporator and air for air leak  |
| Poor startup of compressor          | Fuse inside the control box is blown out   | Conduct check and replacement  |
|                                     | Pressure switch works poorly or pressure is abnormal   | Check the pressure<br>Check the connections or replace high-voltage switch harness                             |
|                                     | Temperature sensor for vehicle-inside temperature setting works poorly, or the temperature setting is abnormal       | Reduce the temperature setting value displayed in the control board<br>Check or replace the temperature sensor |
|                                     | Clutch is burnt or voltage is too low  | Check the clutch voltage<br>Replace it if burnt  |
| Low pressure is too high            | Expansion valve malfunctions   | Replace the expansion valve  |
|                                     | Valve body inside the compressor is abnormal: In a case that the high pressure and low pressure are almost identical | Check the body of compressor valve   |



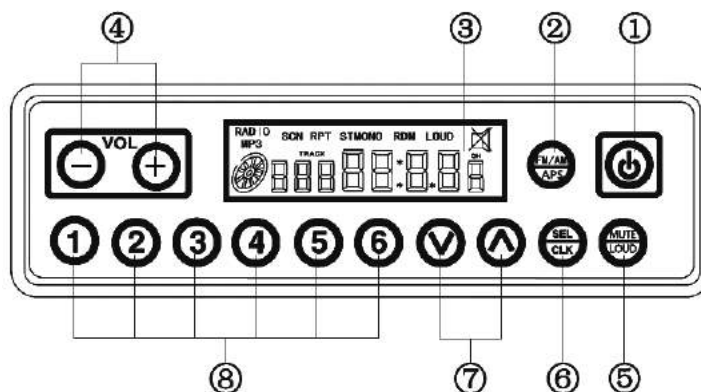
Product Operation

|                           |   |   |
|---------------------------|---|---|
| Low pressure is too low   | Desiccator or pipeline is jammed  | Temperature difference between the inlet and outlet of the desiccator: Replace the desiccator               |
|                           | Expansion valve is frozen or jammed   | Check the expansion valve for jamming<br>Verify whether or not the inside is frozen due to water content    |
|                           | Operation under low external temperature: Low-pressure pipe frosts  | Raise the temperature setting value displayed in the control board  |
| High pressure is too high | Poor condensation of the condenser  | Check the surfaces of evaporation heat exchanger for adhesion of foreign substances, and remove them if any |
|                           | Overfill of refrigerant: temperature of low-pressure pipe is too low or its pressure is too high          | Discharge the refrigerant; or conduct re-vacuumization, and then fill in a right amount of refrigerant      |
| High pressure is too low  | Insufficient air output   | Make sure with sight glass and replenish the refrigerant  |
|                           | Valve body inside the compressor is abnormal: In case high pressure and low pressure are almost identical | Check or replace the body of compressor valve   |
|                           | External temperature is too low   | The system is normal  |
| Abnormal noise occurs     | Evaporation fan is damaged or deformed  | Conduct check and replacement   |
|                           | Connecting nuts of compressor are loosened  | Fasten the nuts and screws  |
|                           | Poor parallelism or tension of the V-belt   | Conduct readjustment  |

## Use of the Radio

### Radio Control Panel

- ① Power control key
- ② Auto channel storage/band selection key
- ③ LCD
- ④ Volume control key
- ⑤ Mute/equal-loudness key
- ⑥ Sound effect setting/selector key
- ⑦ Manual channel selector key
- ⑧ Channel presetting key



### Radio Tuning

- Power ON/OFF
  - Push the key “①” to turn on the radio; or push and hold the key for over 2 seconds to turn off the radio.
- Automatic search/storage of channels
  - Push and hold the key “②” to start auto channel search from the low-limit frequency, and the channels searched are stored into the preset channels 1 to 6 successively;
  - Push the key “②” to switch over between FM and AM.
- Volume control
  - Push the keys “④ +” to raise the volume progressively;
  - Push the keys “④ -” to reduce the volume progressively.
- Mute and equal-loudness control
  - Push the key “⑤” to mute the radio, and push the key again to release the mute mode. Corresponding mute symbol is displayed in the LCD. Volume adjustment may also release the mute mode.
  - Push and hold the key “⑤” to turn on equal-loudness mode, and push the key once more to turn off the equal-loudness mode. Corresponding “LOUD” symbol is displayed in the LCD.
- Sound effect setting
  - Every time the key “⑥” is pushed, you may successively select VOL->BAS->TRE->BAL->VOL sequentially...; here, you may push the keys “④ +/- ④ -” to regulate the BAS, TRE and left/right balance etc.

**Note** VOL- Volume

BAS- Bass

TRE- Treble

BAL- Balance

For example:

- **BAS- Bass:** Push the key “⑥” to select BAS, and push the key “④+” within 2 seconds to increase the bass; or push the key “④-” to reduce the bass.
- **TRE- Treble:** Adjusting procedures are identical with those for BAS- Bass.
- **BAL- Balance:** Push the key “⑥” to select BAL, and push the key “④-” within 2 seconds to reduce the right channel; If you push the key consecutively till “9-” is displayed in the screen, the radio gives out music through its left channel only. Push the key “⑥” to select BAL, and push the key “④+” within 2 seconds to reduce the left channel; If you push the key consecutively till “-9” is displayed in the screen, the radio gives out music through its right channel only. Push the keys “④+ / ④-” till “-0-” is displayed in the screen, the radio works with balanced right/left channels.
- **Band selection**  
Push the key “⑦” to search the channels forward / backward, and it is applicable to both automatic and manual channel search.

washing.

- **Automatic channel search**  
Push the keys “⑦∧/⑦∨” to start forward/backward channel search, and the radio stops channel search and starts play when a channel is searched.
- **Manual channel search**  
Push and hold the keys “⑦∧/⑦∨” to access the manual channel search mode. If one of the keys is held, the frequencies keep on quick skipping forward/backward; Frequency skipping stops once the key is released; Here, you may still push the key “⑦∧/⑦∨” to adjust the frequencies gradually. If no key is pushed within 2 seconds, the radio exits from the manual channel search mode, and returns to the automatic channel search mode.
- **Selecting the preset channels**
  - Push any numerical key among the keys “⑧”, you may select corresponding preset channel;
  - In course of play push and hold any numerical key among the keys “⑧”, you may store the current frequency into corresponding preset channel.

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### Automatic Protection Function

When current or temperature reaches a certain value, the unit may actuate its automatic protection function.



### CAUTION

- Set the radio to an appropriate volume so as to avoid accident during operation.
- The radio may be damaged if it is exposed to water. So it should be protected during vehicle

# **Chapter V**

## **Product Maintenance**

## Maintenance Guide

Don't perform any check and maintenance not stipulated in this Manual.

## Hour Meter Reading

Check hour meter reading every day to check whether maintenance shall be performed.

## Authenticated Worn Parts

The authenticated component stipulated in the Manual shall be used as the replacement part.

## Authenticated Lubrication Oil

Authenticated engine oil and lubricating grease shall be used. Select proper engine oil and lubricating grease according to ambient temperature.

## Windshield Cleaning Liquid

The vehicle windshield cleaning liquid shall be used to prevent dirt.

## Clean Engine Oil & Lubrication Oil

The clean engine oil & lubricating grease shall be used. Moreover, the oil or lubricating grease container shall be kept clean, prevent impurity being mixed in the oil and lubricating grease.

## Check the Discharged Oil and Used Filter Element

After oil or filter element is replaced, check whether the old oil and filter element contains metal scrap and impurity. If lots of metal scrap and impurities are found, inform the executive staff and take proper measures.

## Fuel Outer Element

If the machine is equipped with fuel outer element, when fuel is filled, don't disassemble the outer element.

## Welding Instruction

Turn off the engine start switch.

Don't use the voltage over 200V continually.

Connect the grounding cable within 1m (3.3ft) from the welding position. If the grounding cable approaches instrument and connector, the instrument will have fault.

Avoid sealing element or bearing between the welding position and grounding position.

Don't use surrounding area of working device pin shaft or hydraulic cylinder as grounding point.

Welding parts in the excavator without permission will cause safety hazard or damage to the machine. We will not assume responsibility for any troubles caused by the users for welding parts privately.

## Prevent Anything Falling into the Machine

- When the inspection window is opened or the filler port of oil tank is checked, don't drop the nut, bolt or tool into the machine.

If these articles drop into the machine, it'll cause damage and fault of machine and result in accident. If something drops into the machine, take it out immediately.

- Don't place any unnecessary things in the pocket, and only the things necessary for inspection can be placed.

## Dusty Working Place

When working in the dusty working place, follow the following procedures:

- Check whether the air filter is blocked with a dust indicator frequently, and clean the filter element more frequently.
- Clean the heat radiator core frequently to avoid blockage.
- Clean and replace the fuel filter element frequently.
- Clean the electrical component especially the starting motor and AC generator to avoid dust accumulation.
- When check is performed or oil is replaced, move the machine to the place without dust to prevent dust entering oil.

## Avoid Using Different Lubrication Oil Simultaneously

Don't use different oil together. If different oil is filled, drain the old one fully and then fill the new oil.

## Lock Inspection Cover

When maintenance is performed when the inspection cover is opened, the inspection cover can be locked in position reliably with lock lever. If check or maintenance is performed when the inspection cover is opened and isn't locked, the inspection cover will be closed due to the wind to cause personal injury.

## Hydraulic System-Air Discharge

When the hydraulic device is repaired or replaced, or the hydraulic pipeline is disassembled and assembled, the air in the oil circuit must be discharged.

## Installation of Hydraulic Hose

- When the component is disassembled where there is O-ring or sealing gasket, the installation assembly surface shall be cleaned and use a new component.



### CAUTION

Don't forget to assemble O-ring and sealing gasket.

- When the hose is assembled, don't distort the hose or bend it to a ring with minor diameter. Accordingly, it'll damage the hose and shorten the service life of hose greatly.

## **Check After Inspection and Maintenance**

If no check is performed after the inspection and maintenance, the accidental fault will occur to cause severe injury or damage. The procedures must be followed.

- Check after operation (when the engine is shut down)
- Whether position check and maintenance is forgotten?
- Whether all the check and maintenance items have been performed correctly?
- Whether any tool or component drops into the machine? It'll be very dangerous if any component drops into the machine and blocks the linkage mechanism.
- Whether water or oil is leaked? Whether all the bolts are tightened?
- Check when the engine is operated
- For the details of check when the engine is operated, refer to "When the engine is running, maintenance shall be performed by two staves" and pay attention to safety.
- Whether check and maintenance items are normal?
- When the engine speed is increased and load is applied to the oil pressure, whether oil is leaked?

## **Select the Fuel and Lubrication Oil Matching the Ambient Temperature**


Only the fuel and lubrication oil matching ambient temperature can be used.

## Technical Specification of Tightening Torque

- **Tightening Torque Values of Special Devices**

| Symbol | Fixed position    | Bolt size | Spanner size (mm) | Tightening torque |
|--------|-------------------|-----------|-------------------|-------------------|
|        |                   |           |                   | (N.m)             |
| ①      | Traveling motor   | M14       | 22                | 200               |
| ②      | Driving gear      | M16       | 24                | 300               |
| ③      | Thrust wheel      | M14       | 22                | 200               |
| ④      | Revolving support | M20       | 30                | 600               |
| ⑤      | Revolving motor   | M16       | 24                | 300               |

- **Tightening Torque Values of General Devices**

 **Note** Bolts and nuts not listed in the above table should be tightened as per the table below.

| Bolt size | Spanner size (mm) | Tightening torque (N·m)                 |     |                                       |     |
|-----------|-------------------|---|-----|---------------------------------------|-----|
|           |                   | Metric coarse-thread heat-treated bolts |     | Metric fine-thread heat-treated bolts |     |
|           |                   | Kgf.m                                   | N.m | Kgf. m                                | N.m |
| M8        | 13                | 2.3                                     | 23  | 2.5                                   | 25  |
| M10       | 17                | 4.8                                     | 47  | 5.1                                   | 50  |
| M12       | 19                | 8.5                                     | 83  | 9.3                                   | 91  |
| M14       | 22                | 13.7                                    | 134 | 13.8                                  | 135 |
| M16       | 24                | 21.0                                    | 206 | 22.5                                  | 220 |
| M20       | 30                | 42.0                                    | 412 | 46.0                                  | 450 |
| M24       | 36                | 73.0                                    | 715 | 83.0                                  | 813 |

| High-pressure hose nipple nut |                         |     |
|-------------------------------|-------------------------|-----|
| Hose size (inch)              | Tightening torque (Nm ) |     |
|                               | Kgf.m                   | N.m |
| 1/4"                          | 2.5                     | 25  |
| 3/8"                          | 5.0                     | 49  |
| 1/2"                          | 6.0                     | 59  |
| 3/4"                          | 12.0                    | 118 |
| 1"                            | 14.0                    | 137 |
| 1-1/4"                        | 17.0                    | 167 |



## Technical Specification of Oil

Please refer to technical maintenance outline for oil replacement and filling cycle.

The filling quantity of each position and the oil trademark are as follows:

| Oil filling position         | Capacity | Filling quantity | Trademark   |
|------------------------------|----------|------------------|---|
| Swing reduction gearbox      |          | 1.2L             | SAE#140 (GL-4) gear oil                               |
| Travel reduction gearbox     |          | 1×2L             | SAE#140 (GL-4) gear oil                               |
| Hydraulic oil tank           | 115L     | 69L              | N46 or N68 anti-wear hydraulic oil                    |
| Engine oil                   | 12L      | 8L               | CF grade supercharged diesel engine oil               |
| Each lubricating point       |          | 2kg              | 2# Molybdenum disulfide lithium-based grease          |
| Gear ring lubricating grease |          | 6kg              | 2# Molybdenum disulfide lithium-based grease          |
| Fuel tank                    | 95L      |                  | 0# or 10# diesel oil (summer)-10# diesel oil (winter) |
| Cooling system               | 15L      | 15L              | L35 coolant   |
| Cooling liquid reservoir     | 1L       | 0.5L             | L35 coolant   |
| Air-conditioner refrigerant  | 1000g    | 0.9±0.05kg       | R134a   |

### Important

If the cooling system uses improper coolant, engine, heat radiator and heat radiator of air-conditioner will be corroded, to cause damage of engine, heat radiator and air-conditioner components as well as leakage of coolant.

250h sampling cycle will be recommended for all positions. 250h sampling cycle can provide more data during the oil change cycle which greatly enhances the probability of detecting potential fault.

## Technical Maintenance Outline

- Before carrying out any operating or maintenance procedure, be sure to carefully read and understand all safety, warning and descriptive information included in the instruction manual of the machine.
- Before starting any single continuous maintenance cycle, it is necessary to first complete all maintenance work still left unfinished from the previous cycle. In completing any item of maintenance work, it is necessary to ensure that any other items that are supposed to be performed according to cycles shorter than its cycle are done simultaneously with that item of work.
- It is necessary to shorten times specified in the maintenance cycles table, if extremely harsh, dusty, wet, or other unfavorable working conditions exist, so that maintenance is carried out on the entire machine at a higher frequency.

### Routine maintenance items to be performed once every 10 hours

|  |                   |
|--|-------------------|
| Engine coolant level -----   | Check/Add         |
| Attached tank coolant level -----  | Check/Add         |
| Engine oil level -----   | Check/Add         |
| Hydraulic oil tank level -----   | Check/Add         |
| Oil water separator of fuel system -----   | Drainage          |
| Fuel tank level -----  | Check/Add         |
| Grease of all articulated points, pin shaft sleeves (When the machine works in the water, add more than twice every day) ----- | Add               |
| Each hydraulic components and hydraulic pipes -----  | Check             |
| All systems could not spill oil, water and air -----   | Check             |
| Engine fan -----   | Check             |
| Belt -----   | Check             |
| Travel device -----  | Check             |
| Bucket teeth -----   | Check/Replace     |
| The tension of the track shoes -----   | Check/Adjust      |
| The gap between two components connected by pin shaft -----  | Check/Adjust      |
| The performance of the diesel engine -----   | Check             |
| Indicator and instrument -----   | Experiment (test) |
| Seat belt -----  | Check             |

### Maintenance items to be performed once every 50 hours

|  |               |
|--|---------------|
| Air filter element -----                                     | Clean/Replace |
| Hydraulic oil tank level -----                               | Check/Add     |
| The swing bearing -----                                      | Lubricate     |
| Engine oil (For the first 50-hour item) -----                | Replace       |
| Engine oil filter (For the first 50-hour item) -----         | Replace       |
| Return oil filter element (For the first 50-hour item) ----- | Replace       |

### Maintenance items to be performed once every 100 hours

|                           |       |
|---------------------------|-------|
| Air-cooled radiator ----- | Clean |
|---------------------------|-------|

### Maintenance items to be performed once every 250 hours

|  |         |
|--|---------|
| Engine oil -----                                   | Replace |
| Engine oil filter -----                            | Replace |
| Fuel filter -----                                  | Replace |
| Water separator element (Optional equipment) ----- | Replace |

---

|                                       |                      |
|---------------------------------------|----------------------|
| Belt -----                            | Check/Adjust/Replace |
| All bolts which fix the battery ----- | Tighten              |
| Top of the battery -----              | Clean                |
| The weld seam of all structure -----  | Check                |

**Maintenance items to be performed once every 500 hours**

|   |               |
|---|---------------|
| The oil filter and respirator -----                         | Clean         |
| The engine air valve -----                                  | Check/Adjust  |
| The reducer oil of travel motor -----                       | Check/Add     |
| The reducer oil of swing motor -----                        | Check/Add     |
| The bolts and nuts for connecting the main components ----- | Check/Tighten |
| Inner element of the air filter-----                        | Replace       |
| Outer element of the air filter-----                        | Replace       |

**Maintenance items to be performed once every 1000 hours**

|   |               |
|---|---------------|
| The bottom of diesel tank -----   | Clean         |
| The pilot oil filter element -----  | Check/Replace |
| The oil intake filter element -----   | Check/Replace |
| The return oil filter element -----   | Check/Replace |
| The reducer oil of travel motor -----   | Replace       |
| The reducer oil of swing motor -----  | Replace       |
| The falling object protection structure (Optional equipment) -----              | Check         |
| The engine valve clearance (For the first 1000-hour item) -----                 | Adjust        |
| The fixed bolts connected cab -----   | Tighten       |
| Each earth wire, cable starting motor and line connecting the accumulator ----- | Check         |
| Engine coolant -----  | Replace       |

**Maintenance items to be performed once every 2000 hours**

|                                     |               |
|-------------------------------------|---------------|
| Hydraulic oil -----                 | Replace       |
| The pilot oil filter element -----  | Replace       |
| The oil intake filter element ----- | Replace       |
| The return oil filter element ----- | Replace       |
| Hydraulic oil tank -----            | Clean         |
| Injection pump -----                | Check/Adjust  |
| The engine valve clearance -----    | Adjust        |
| The engine shock absorber-----      | Check/Replace |

**Maintenance items to be performed once every 4000 hours**

|   |         |
|---|---------|
| Water pump -----                            | Check   |
| Engine -----                                | Check   |
| The hose of fuel system of the engine ----- | Replace |

**Maintenance items to be performed once every 6000 hours**

|   |               |
|---|---------------|
| The hydraulic hoses which bearing high oil press and sealing elements ----- | Check/Replace |
|---|---------------|

**Maintenance items to be performed once every 10000 hours**

|   |                      |
|---|----------------------|
| The working conditions of pump, valve and motor ----- | Check/Replace/Repair |
|---|----------------------|

**Maintenance items to be performed once every three years**

|                     |         |
|---------------------|---------|
| The seat belt ----- | Replace |
|---------------------|---------|

## Technical Maintenance Operation

### Boom and Arm Linkage-Lubrication

**Note** We recommends adopting 2# molybdenum disulfide lithium-based grease to lubricate boom, arm and bucket linkage.



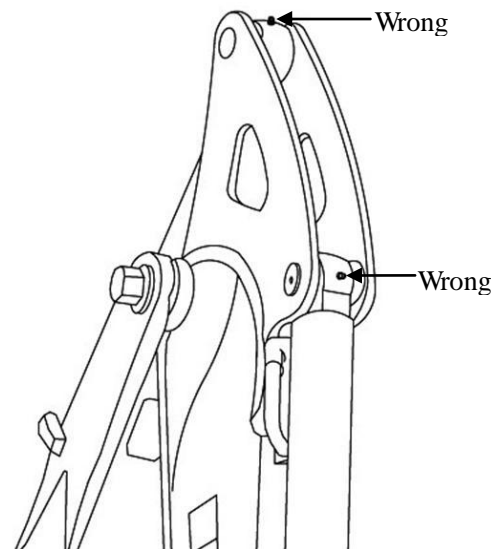
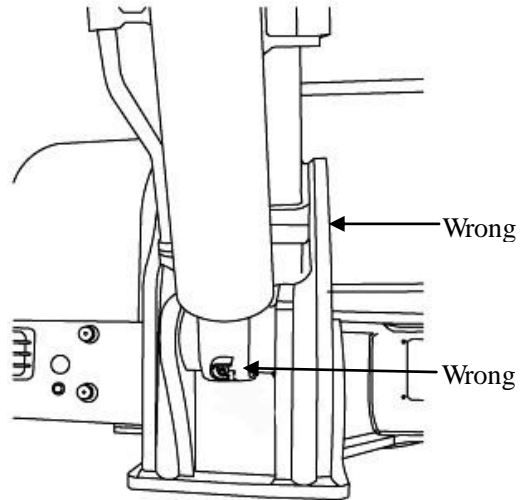
### CAUTION

- After operation in water, all grease nipples should be applied with grease
- Before filling grease, be sure to clean all grease nipples.

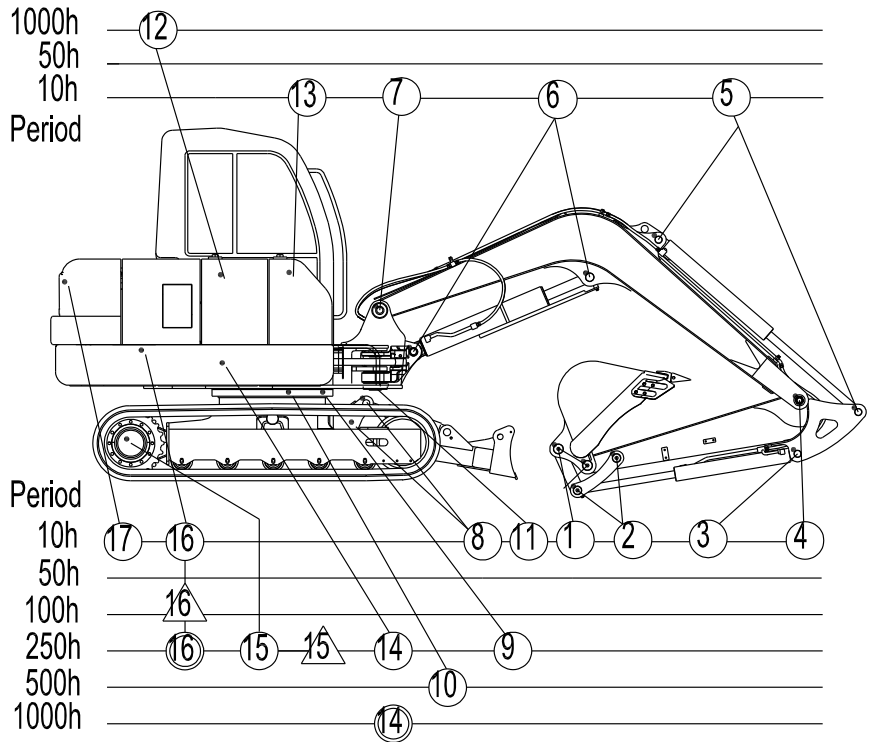
- 1) Fill lubricant via the grease nipple on the bottom of every boom cylinder.
- 2) The grease nipple is located on the left bottom of the boom. Fill grease via grease nipple ① to lubricate the lower bearing of the boom
- 3) Fill grease via grease nipple ② to lubricate the boom cylinder
- 4) Fill grease via grease nipple ③ to lubricate the bucket cylinder cover

**Note** In order to ensure the correct lubrication of the lower bearing of the boom and the end bearing of the arm cylinder, fill grease via the grease nipples ① and ②. When the boom rises and the instrument suspends, fill grease; then when the boom descends and the instrument falls to the ground with slight pressure applied, fill grease again.

- 5) Fill grease via grease nipple ③ located at rod end of the arm cylinder and grease nipple ④ located at the rod end of the bucket cylinder.



**Lubricant Diagram**



1. Upper and lower lines express total interval time during each maintenance, refilling and replacement.

2. Maintenance ○ Replacement △ First replacement of new machine □

| No. | Lubrication Position      | QTY | Lubricant                        | No. | Lubrication Position | QTY | Lubricant     |
|-----|---------------------------|-----|----------------------------------|-----|----------------------|-----|---------------|
| 1   | Bucket pin                | 2   | 2# EP<br>lithium-based<br>grease | 11  | Hydraulic oil tank   | 1   | Hydraulic oil |
| 2   | Tie rod pin               | 2   |                                  | 12  | Fuel tank            | 1   | Diesel oil    |
| 3   | Arm pin                   | 1   |                                  | 13  | Swing reductor       | 1   | Gear oil      |
| 4   | Bucket cylinder pin       | 1   |                                  | 14  | Travel reductor      | 2   |               |
| 5   | Arm cylinder pin          | 2   |                                  | 15  | Engine oil pan       | 1   | Engine oil    |
| 6   | Boom cylinder pin         | 2   |                                  | 16  | Radiator water tank  | 1   | Soft water    |
| 7   | Boom pin                  | 1   |                                  |     |                      |     |               |
| 8   | Dozer & its cylinder pin  | 4   |                                  |     |                      |     |               |
| 9   | Swing circle              | 2   |                                  |     |                      |     |               |
| 10  | Swing circle inner circle | 1   |                                  |     |                      |     |               |

### Bucket Linkage-Check/Adjustment

When conducting this adjustment, place the hydraulic start control lever in the “LOCK” position and stop the engine.

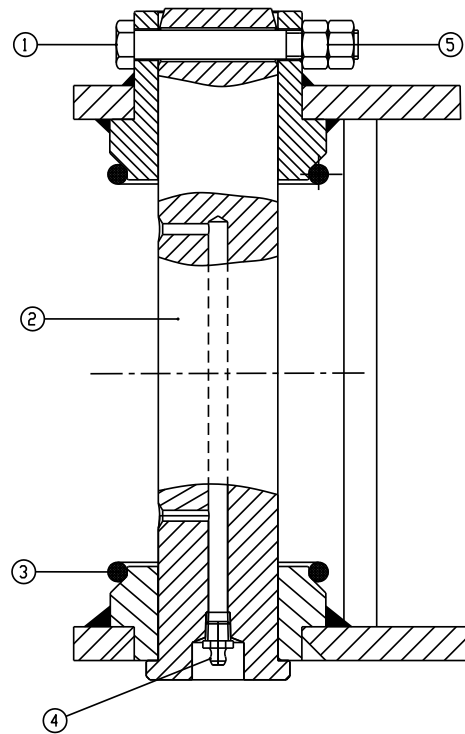


#### CAUTION

The improper adjustment of bucket clearance may cause scrape on the contact surface between the bucket and the arm, leading to large noise or damaged O-ring.

- ① Bolt
- ② Pin
- ③ Buckle (lateral pin)
- ④ Oil cup
- ⑤ Nut

- The bucket linkage clearance of this machine may be adjusted via the shims. If the clearance between the bucket and the arm is very large, be sure to adjust the clearance to be 0.5mm-1.0mm by reducing shims.
- Thickness of the shims includes 0.5mm and 1.0mm.



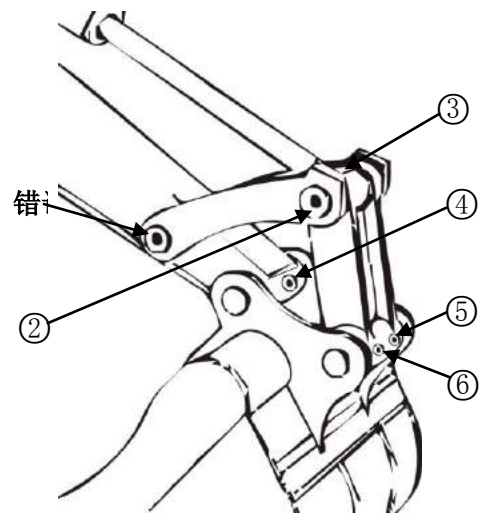
### Bucket Linkage - Lubrication

Before filling grease, be sure to clean all grease nipples.

**Note** When installing the bucket for the first time, fill up grease into the socket of the bucket linkage.

- 1) Fill grease via the grease nipples ①, ②, ③ and ④ to lubricate the linkage.
- 2) Fill grease via the grease nipples ⑤, ⑥ to lubricate the bucket.

**Note** After the bucket operates in water, be sure to apply grease to the above grease nipples.



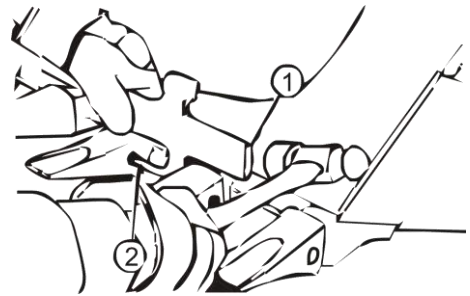
**Bucket Tooth - Check/Replacement****CAUTION**

- The bucket drop can cause personal injury or even death.
- Before replacing the bucket tooth sleeve or the side blade, be sure to block up the bucket.

Check the abrasion condition of the bucket tooth sleeve. If the sleeve has holes, be sure to replace it.

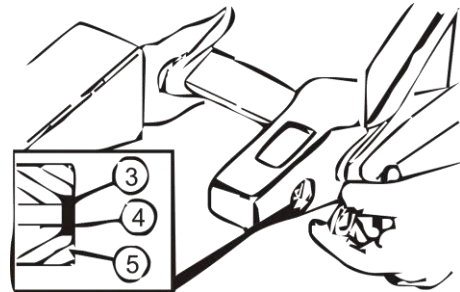
- 1) Remove the pin from the bucket tooth sleeve. This pin can be removed with one of the following methods:
  - Strike the pin out from the bucket tooth sleeve guard ring with a hammer and a punch.
  - When using the pin guide, follow the steps below:
    - a. Put the pin guide on the bucket tooth.
    - b. Align the puller ② with the pin.
    - c. Strike the pin guide from the back and remove the pin.
- 2) Clean the tooth holder and the pin.
- 3) Install the guard ring ③ into the guard ring fixing gasket ④. Install this combination into the groove on the gear ring ⑤ side.
- 4) Install a new bucket tooth sleeve into the tooth holder. The bucket tooth sleeve can be overturned by 180° to increase or decrease the force into earth.
- 5) Drive the pin into the bucket tooth sleeve. Install the pin as per one of the following methods:
  - Drive the pin in from the side opposite to the guard ring, through the bucket tooth sleeve, tooth holder and the guard ring.
  - Use pin guide. Follow the steps below:
    - a. Insert the pin into the bucket teeth.
    - b. Place the pin guide onto the bucket tooth and place the pin into the hole of the pin holder ⑦.
    - c. Strike the back of the tool ④ to push the pin.
    - d. Slide the pin holder ⑦ away from the pin and slightly turn the tool to align the pin positioner ⑥ with the pin.

- e. Strike the end of the tool until the pin is completely inserted.



①. Back of guide pin bushing

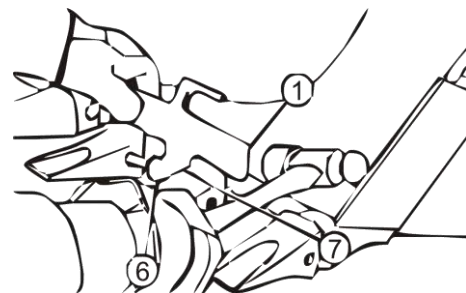
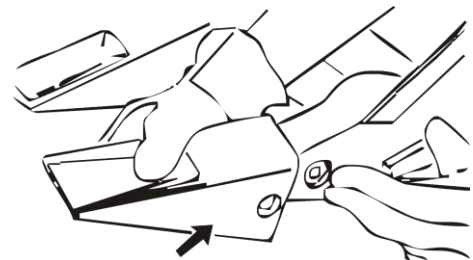
②. Puller



③ Guard ring

④ Fixing gasket of guard ring

⑤ Gear ring



⑥ Pin positioner

⑦ Pin holder

- 6) After the pin is driven in, make sure that the guard ring can tightly sit in the groove of the pin.

---

### Side Cutter - Replacement

- 1) Disassemble the fixing bolt and side shovel blade.
- 2) Clean the mounting surface.

Some side shovel blade can be turned over for use, to extend the service time.

- 3) Assemble the new side shovel blade.





## Track - Regulation



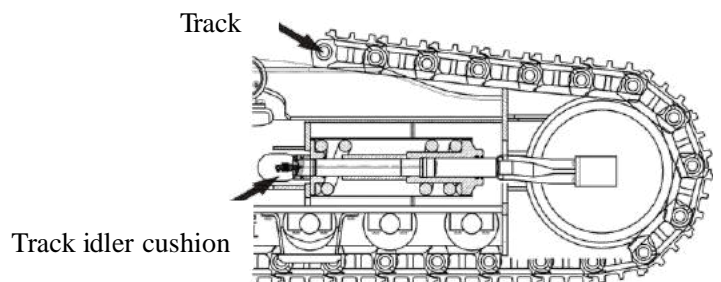
### WARNING

The lubricating grease ejected due to pressure effect will cause person casualty.

Under high pressure, the lubricating grease ejected from the relief valve can penetrate body to cause personal casualty.

Don't check whether the lubricating grease is leaked through observing the relief valve. Check whether track is loosened through observing the track or track idler cushion.

The relief valve can be only loosened by one circle.



### CAUTION

The service life of track and driving parts can be extended by keeping correct track regulation.

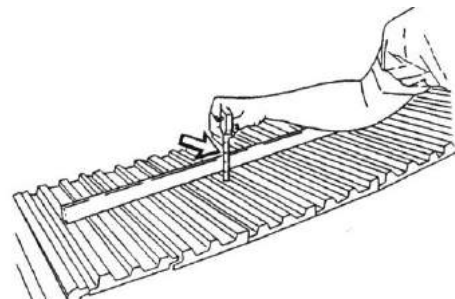
**Note** The track tension must be regulated according to current working condition.

If the soil is heavy, the track shall be loosened as possible.

### Measure track tension

Place a ruler on the track. The ruler shall be long enough so that it can be from the tension wheel to the carrier roller.

Measure the maximum sag of track. The sag is measured from the top of grouser shoe to the bottom of ruler. The sag of track which is regulated correctly is about 25mm~55mm.



### Tension Track

Before the lubricating grease is filled, please clean the grease fitting.

The track regulator is installed on the bogie wheel bracket.

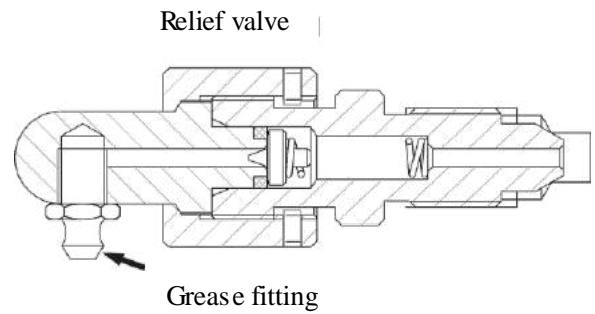
- 1) Fill the lubricating grease via a grease fitting until the track tension is correct.
- 2) Drive the machine to move forward and backward to balance pressure.
- 3) Check sag. Regulate the track as required.

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### Loosen Track

The track regulator is installed on the bogie wheel bracket.

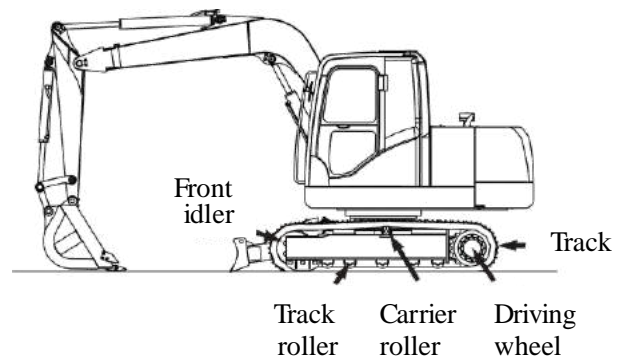
- 1) Loosen the relief valve carefully until the track slacks. The relief valve can be only loosened by one circle.
- 2) When the track reaches the required tension, please tighten the relief valve with 34N·m torque.
- 3) Drive the machine to move forward and backward to balance pressure.
- 4) Check sag. Regulate the sag as required.



---

### Check Travel Mechanism

- 1) Check whether the carrier roller, bogie wheel and tension wheel is leaked.
- 2) Check whether the surface of track, carrier roller, bogie wheel, tension wheel, track shoe and driving chain wheel is worn and whether the fixing bolt is loosened.
- 3) Drive the machine slowly on the open ground to hear whether there is abnormal noise.
- 4) If the abnormal abrasion, noise or leakage is found.

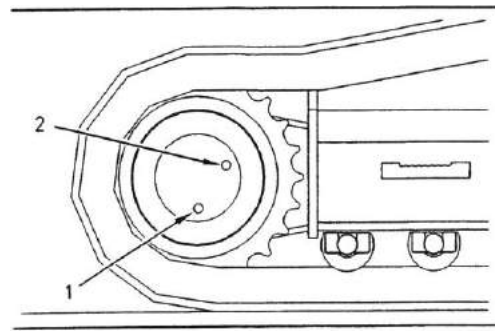


**Final Drive Oil Level - Check**

- 1) Position one final drive so that oil drain plug (1) is at the bottom.
- 2) Disassemble the oil level plug (2).
- 3) Check the oil level. The oil shall be near the bottom of oil-level plug filler.
- 4) When necessary, the oil shall be filled via the oil-level plug filler.

**Note** If excessive oil is filled to the final drive, the sealing of travel motor will be poor, and the hydraulic oil or water will enter the final drive. Accordingly, the final drive will be probably polluted.

- 5) Clean the oil level plug (2). Check the o-ring. If the o-ring is worn or damaged, it shall be replaced.
- 6) Assemble the oil level plug (2).
- 7) Repeat the above procedures to the other side of final drive.



(1) Oil drain plug

(2) Oil level plug

### Swing Gear - Lubrication

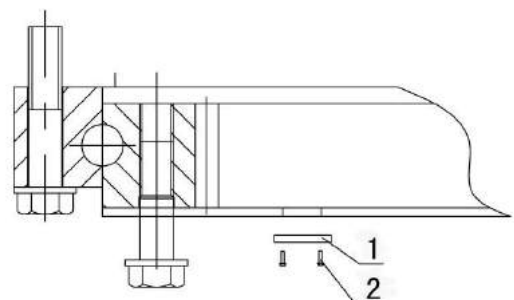
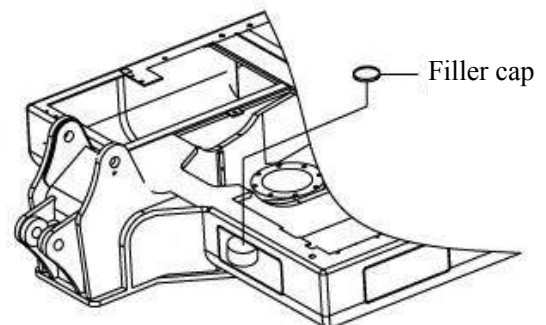
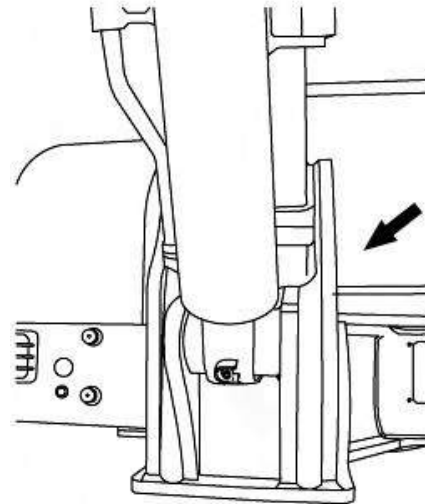


#### CAUTION

- Improper lubrication may cause the damage to the machine parts.
- In order to avoid damage, be sure to apply a proper amount of grease to the revolving drive.
- Too much grease in the revolving gear chamber will increase the mixing loss, thus speeding up the grease deterioration.
- The grease deterioration will damage the revolving drive pinion and annulus.
- Insufficient grease will cause bad gear lubrication.

Open the grease filler cap close to the main valve. Check the grease.

- 1) Open and check the filler cap. Replace the filler cap if it is obviously damaged.
- 2) Check the grease level. The grease shall be distributed equally on the groove bottom. For the capacity of the oil groove, refer to the information in “Filling Capacity” in this Manual. Add or reduce grease as needed. Too much grease can lead to deterioration due to excessive stir; too little grease may lead to the bad lubrication of the swing gear.
- 3) Check the grease for contamination and color change.
- 4) If the grease is polluted or changes color due to water, be sure to replace it. Loose bolt ② and remove the oil-drain cover plate ① to release the water and the contaminated grease. If the bolt ② is obviously damaged, replace it.
- 5) Lift the boom and turn the upper structure by 1/4 turn. Lower the bucket onto the ground.
- 6) Repeat the above step for every 1/4 turn, totally 4 positions. Fill grease as needed.
- 7) Install the filler cap.



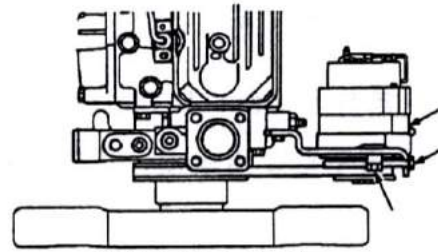
## Tenseness, Crack, Wearing and Tearing of Engine

### Fan Belt - Check

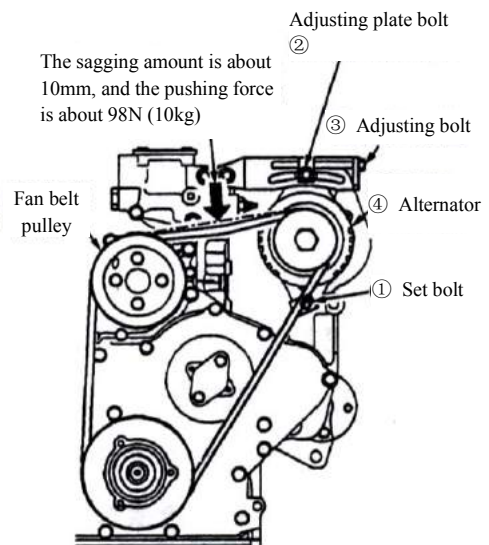
#### IMPORTANT

Too loose fan belt may lead to engine overheat, poor charge, and earlier wearing and tearing of the belt. Too tight fan belt may lead to damage of water pump, dynamo bearings and the belt.

- 1) Check it once every 10 hours.
- 2) Shut off the engine. Push the belt between the fan wheel and dynamo pulley to check its tension. The belt sagging should be 10mm when the pressure is 98 N [10kg (221b)]. Adjust the belt if necessary.
- 3) Check the engine belt for abrasion or rupture, and damages at the joint. If any, replace it with a new belt.



Top view of engine



#### ● Adjust the Belt Tension




#### CAUTION

Adjust the belt if the belt is crooked or after replacement.


- 1) Unscrew the adjustment bolts of adjusting plate and the set bolts of the dynamo.
- 2) Incline the dynamo to adjust the belt tension.
- 3) After adjustment, tighten the adjusting bolt and set bolts.
- 4) Allow the engine to idle for 5 minutes, and readjust the belt tension.

### Oil-Water Separator - Check


- 1) Open the engine hood, and check the oil-water separator. If water exists inside the container, the red float may fluctuate.
- 2) When floating to the warning limit, and before water is drained, set the control lever to the position of "CLOSED" to stop oil delivery.

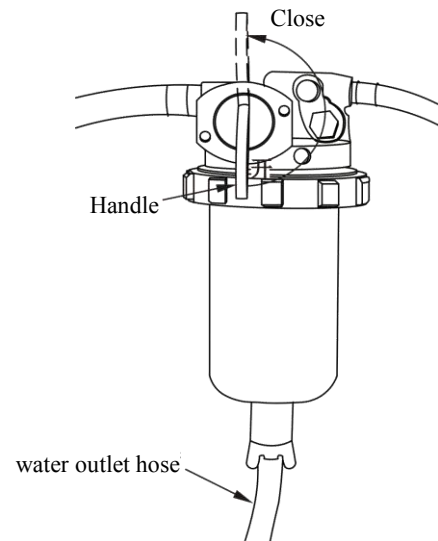
 **Note** The fuel lever should point upward.

- 3) Remove the top nut and precipitator, and discharge water and foreign substances out of the precipitator.
- 4) When discharge is over, remount the precipitator. Set the fuel lever to its position "OPEN".

 **Note** Pull down the fuel lever such that it points downward.

- 5) Loosen the oil plug to discharge gases.

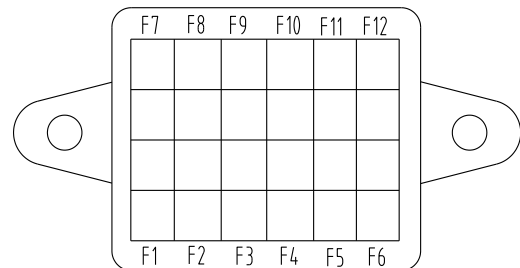
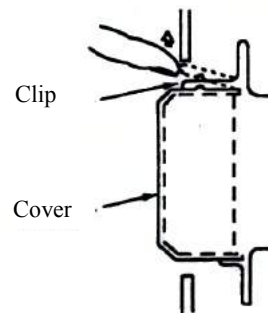
 **Note** Gases should be discharged when water drainage is over.



**Fuse Link - Replacement**

**IMPORTANT**

- The fuse box is located inside the close board at the lower right side of driver’s seat.
- Before changing the fuse link, be sure to set the starter switch to its stop (OFF) position.
- Do not replace the fuse link with metal wire or silver foil, etc. Circuit overheating or blow-out may cause a fire.
- When lights fail to light up or devices of the electric system fail to work, the fuse link may be blown out. Check the fuse link, and replace it with fuse link of identical specification if it is blown out.
- If the fuse link is blown out again after replacement, contact the sales service provider of the Company for checks.
- Replacement Method
  - Set the starter switch to its stop (OFF) position.
  - Remove the clip of fuse link cover, and remove the box.
  - Replace it with fuse link of identical specifications.



| NO. | Fuse rating | Circuit name                         |
|-----|-------------|--------------------------------------|
| F1  | 10A         | Power of key switch                  |
| F2  | 10A         | Inspection light, indoor light       |
| F3  | 20A         | Horn                                 |
| F4  | 5A          | Breaker solenoid valve               |
| F5  | 30A         | Power of fuel pull                   |
| F6  | 10A         | Power of display                     |
| F7  | 20A         | Radio, Cigarette lighter             |
| F8  | 10A         | Oil delivery pump                    |
| F9  | 20A         | Boom light, platform light           |
| F10 | 20A         | Window wiper, motor of window washer |
| F11 | 30A         | Oil filling pump                     |
| F12 | 30A         | Power of air conditioner             |

### Storage Battery - Check






#### WARNING

- The storage battery may give out inflammable hydrogen that may catch fire or cause explosion. It is forbidden to place the storage battery aside a source of fire; do not allow a storage battery to give out sparks.
- It is forbidden to put metal articles and combustible materials on/around the storage battery. Short circuit may result in catching fire or explosion.
- Liquid (dilute sulphuric acid) inside the storage battery may lead to loss of sight and burns. In case the liquid is splashed onto eyes, skin, or clothing, rinse them with plenty of water immediately, and take medical treatment.
- To remove the storage battery, confirm conditions of the storage battery grip and its fixing point, and then lift the storage battery



#### Indication given by indicator

Indicating the charging state, and level state

- Good  (Blue)
- Charging required  (Red)
- Insufficient storage battery liquid  (White)

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### Terminal Post of Storage Battery - Cleaning

#### IMPORTANT

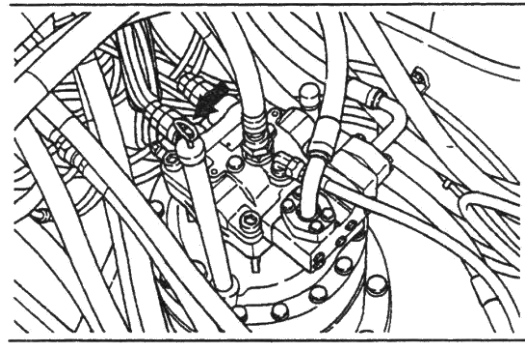
- Prior to operation, be sure to shut off the engine.
  - During operation, do not allow tools etc. to touch positive/negative poles of the storage battery in order to avoid short circuit.
  - To remove the storage battery terminal from the terminals posts, remove the negative terminal first.
  - The negative terminal should be remounted at last.
  - Do secure the terminal side in order to avoid getting loose.
- 1) In case the terminals get dirty or are corroded, clean them (white powder adhered to the corroded terminals may be removed when they are wiped with warm water).
  - 2) If the terminals are seriously corroded, remove the terminals, and polish them with wire brush and sand paper etc.
  - 3) When cleaning and fastening are finished, coat the terminals with a thin layer of grease.



**Swing Driving Oil Level - Check**

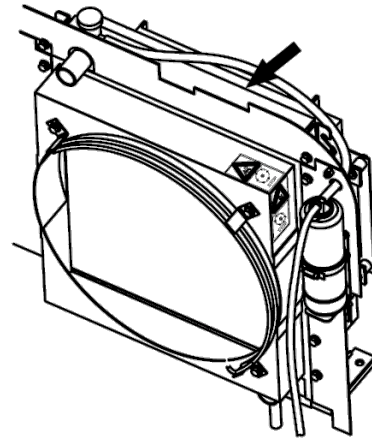
The oil gauge of swing driving oil is on the swing driving box at the back of boom.

- 1) Pull out the oil gauge
- 2) Check the oil gauge. Keep the oil level between two marks of oil gauge. When necessary, fill oil via the oil gauge tube.
- 3) Insert the oil gauge.



### Cooling System Long Life Coolant - Replacement

- 1) Loosen the lock of engine hood and lift the engine hood.
- 2) Loosen the pressure cover on the heat radiator slowly to release the pressure of cooling system.
- 3) Disassemble pressure cover.
- 4) Disassemble the inspection cover below heat radiator.
- 5) Open the discharge valve to discharge coolant into one proper container. The discharge valve is at the bottom of heat radiator.
- 5) Check the pressure cover gasket of cooling system. If the gasket is damaged, replace the pressure cover.



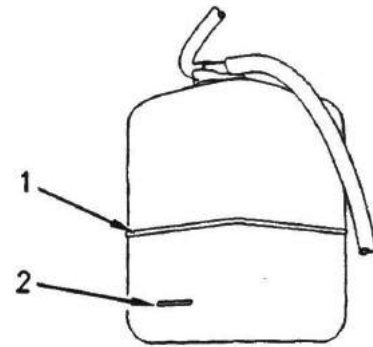
### Flush cooling system.

- 1) Close the discharge valve.
- 2) Fill water into the cooling system.
- 3) Assemble the pressure cover.
- 4) Start and run the engine so that it can reach working temperature.
- 5) Stop the engine to cool it.
- 6) Loosen the pressure cover slowly to release the pressure of cooling system.
- 7) Open the discharge valve below heat radiator to discharge the coolant into one proper container.
- 8) Flush the heat radiator with water until the drained water is clean.

### Refuel coolant

- 1) Close the discharge valve and assemble the inspection cover below the heat radiator.
- 2) Fill long life coolant.
- 3) Start the engine. Run the engine without the pressure cover of cooling system until the temperature saver is opened and the cooling system liquid level is stable.
- 4) Keep the cooling system liquid level within 13mm above the bottom of filling pipe.

- 6) Assemble the pressure cover of cooling system.
- 7) Stop the engine.
- 8) Check the coolant reservoir. Keep the coolant level between "Full" and "Low" .
- 9) If it's to fill coolant, disassemble the reservoir cap to fill proper coolant.
- 10) Assemble the reservoir cap.
- 11) Cover the engine hood and insert bolt, and close the left access door.



### CAUTION

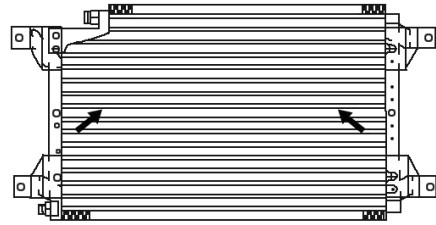
If the long life coolant is mixed with other product, the coolant efficacy will be reduced, and the cooling system component will be damaged too.

### Condenser - Cleaning



#### CAUTION

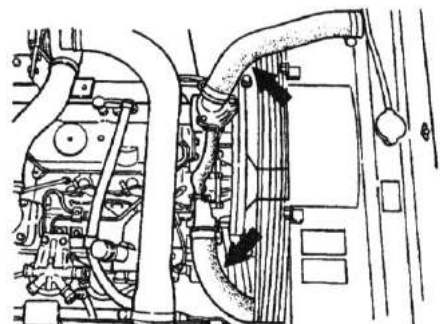
- If dirt is more, please clean the condenser with brush.
  - In order to prevent the condenser radiation fin being damaged or bent, hard brush is forbidden.
  - If the condenser radiation fin has defect, please repair it timely.
- 1) Open left back door of machine.
  - 2) Check whether condenser contains scrap. Clean the condenser when necessary.
  - 3) Please remove the dust and dirt in the condenser with clean water.
  - 4) Close the left back door.



---

### Cooling System Hose - Check

- 1) Unlock the engine hood lock, and open the engine hood.
- 2) Check all the hoses to see whether crack or leakage is found; whether the position approaching pipe clamp is softened and pipe clamp is loosened.
- 3) Replace cracked or softened hose, and tighten the loosened pipe clamp.



**Engine Air Filter Outer Element****-Cleaning/Replacement****CAUTION**

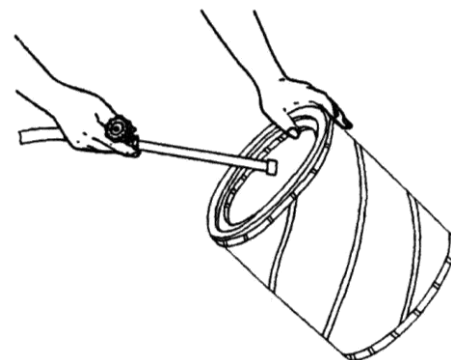
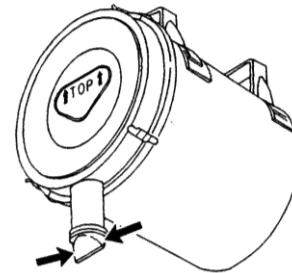
Air filter can prevent dust and other impurity from entering engine, so wearing degree of engine depends on cleanliness of sucked air to a great extent. Therefore, cleanliness of air filter should be inspected regularly. If a warning or image is displayed on the information display, or black smoke is exhausted, the outer filter shall be checked.

Clean/Replace outer element as follows:

- 1) Open left front door of machine.
- 2) Gently extrude the outlet pipe to remove dust.
- 3) Loosen four fasteners of air filter, and disassemble the air filter cover.
- 4) Disassemble the filter outer element from the air filter shell.
- 5) Clean the air filter cover and inside of air filter shell.
- 6) Check the sealing ring of air filter cover. If the sealing ring is damaged or worn, please replace it timely.
  - The filter element can't be cleaned via impact or knock.
  - The filter element with damage of pleat grid, gasket or sealing ring can't be used, else the engine will be damaged.
  - Before the filter element is inserted into the filter shell, please ensure the cleaned filter element has been dried.
- 7) Clean and check the outer element.
  - The outer element can be cleaned with compressed air, compressed water or detergent. When the element is cleaned with compressed water, the maximum pressure can't exceed 0.25MPa.
- 8) Spray the air or water along the inner side or

outer side of the pleat grid of outer element.

- The outer element can be cleaned with warm water and foamless household detergent.
- Rinse the inner side and outer side of pleat grid, and then dry the outer element with air.



- 9) Check the outer element after cleaning, don't use the outer element with damage of pleat grid, gasket or sealing ring.
- 10) Please pack the cleaned outer element and store it at clean and dry place.
- 11) Assemble the clean outer element.
- 12) Assemble the air filter cover and lock it with fasteners. Please assemble the air filter cover correctly.
- 13) If any one of following conditions occurs, the filter element shall be replaced:
  - The air filter blockage indicator on the monitoring panel is still on.
  - After the outer element is assembled, the discharged air is also black.
  - The outer element can be cleaned for 6 times, if it has been used for one year, replace it.
- 14) Close the left vehicle door.
  - The inner element must be replaced. Don't attempt to use the cleaned inner element.
  - When the outer element is replaced, the inner element shall be replaced simultaneously.
  - After the cleaned outer element is assembled, if the air filter blockage warning also appears on the information display, and the discharged air is still black, the inner element shall be replaced.

## Engine Oil Level - Check



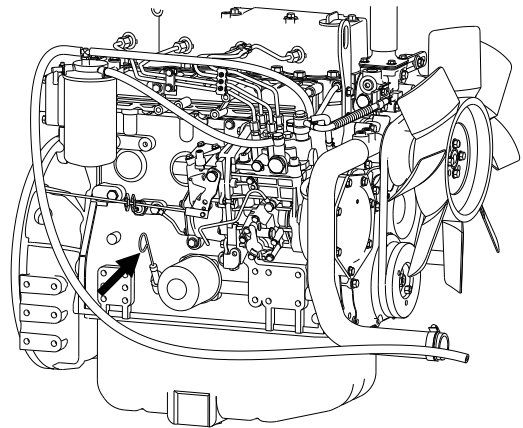
### CAUTION

The crank case can't be filled with excessive lubricating oil, else the engine will be damaged.

**Note** If the machine is tilted or the engine hasn't been stopped enough, the engine oil won't return to the crank case fully, so the oil level can't be checked correctly via any one method. The machine shall be parked on the level ground and the engine shall be stopped at least 30s and then check the engine oil level.

When the engine stops, check the engine oil level. Don't check the engine oil level when the engine runs.

- 1) Open the engine hood.
- 2) Take out the oil gauge, remove the oil on the oil gauge and insert it again.
- 3) Take out and check the oil gauge, and keep the oil level between the "H" and "L" of oil gauge.



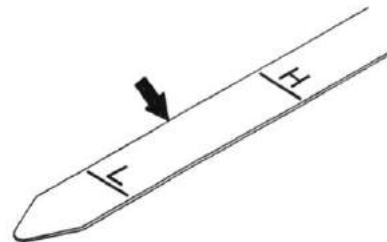
### CAUTION

If the engine runs when the oil level is above the "H" of oil gauge, the crank shaft will operate in the engine oil. This not only causes too high engine oil temperature to reduce the engine oil lubricating property, but also causes bearing damage and reduction of engine power.

- 4) When necessary, disassemble the lubricating oil filler plug and fill lubricating oil. Please refer to related contents of "Filling Capacity" in this Manual.

**Note** If the lubricating oil is deteriorated or severely polluted, it shall be replaced despite of maintenance period.


- 5) Clean the lubricating oil filler plug and assemble it.
- 6) Cover the engine hood.



### Hydraulic Oil of the Hydraulic System- Replacement

● **To discharge the oil from the oil tank**

- 1) Place the machine on a flat plane so that the bleed valve and track keep certain angle. Lower the bucket to the ground and keep the arm vertical to the ground.
- 2) Completely clean the circumference to prevent dust from entering the filter screen cover and breather.
- 3) Release the breather cover to release the pressure in the hydraulic oil tank. After the pressure is released, remove the breather.

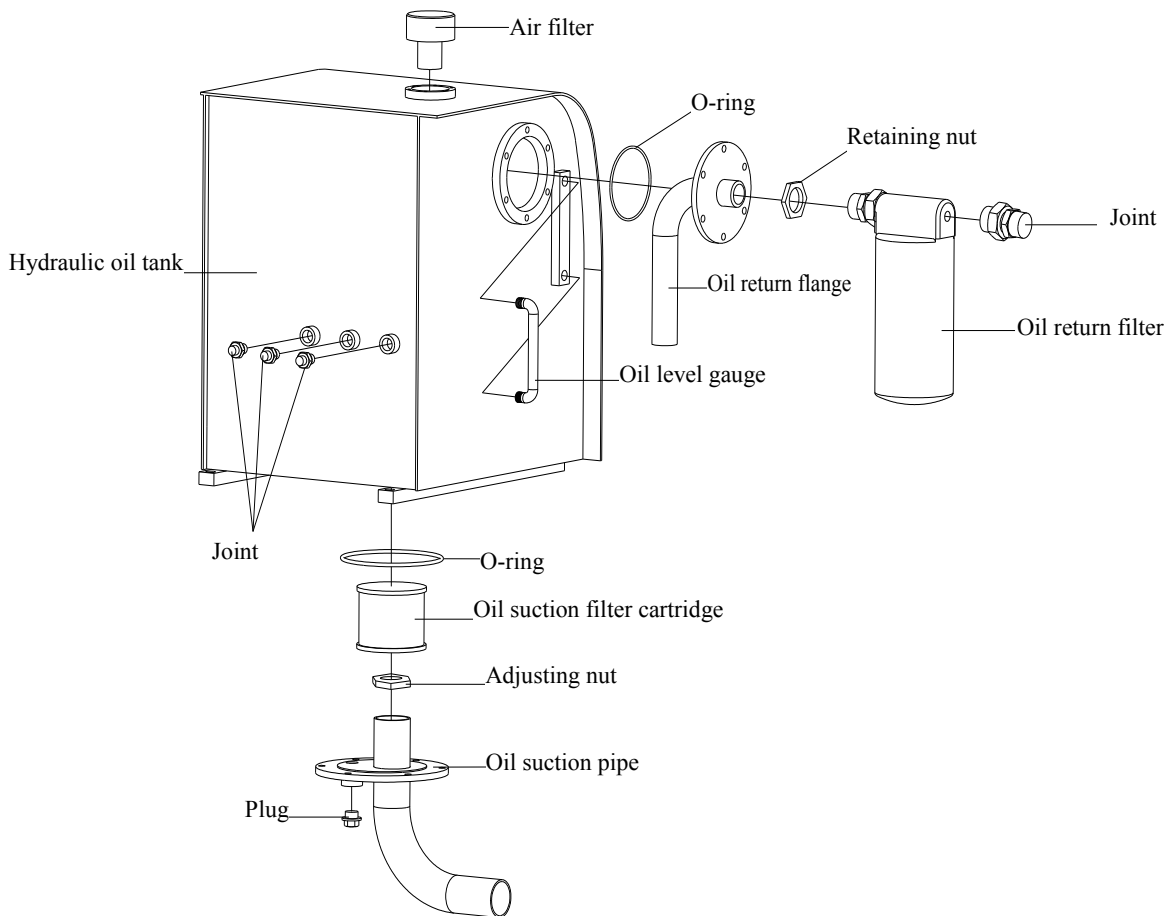
 **Note** The hydraulic oil bleed valve is located under the hydraulic oil tank.

- 4) Open the bleed valve.
- 5) Drain the oil into a proper container.



### CAUTION

Do not place the bleed valve above the track to prevent the hydraulic oil from leaking onto the track.





- **Check and replacement of oil return filter of hydraulic oil tank**

**Note** The seal must be checked, if it is worn or damaged, it shall be replaced.

- 1) Disassemble the bolt and oil return filter cover plate, and check the seal on the cover plate.

**Note** Dispose the used filter and oil in accordance with local rules.

- 2) Disassemble the spring, retainer and oil return filter.

- The oil return filter belongs to disposable, after blockage is severe (alarm switch will give alarm) or damage occurs, it must be replaced. The filter can't be reused after being cleaning.

- 3) Check or replace the oil return filter. The damaged filter shall be replaced.

- 4) Check the oil return filter and the seal on the filter support.

- 5) Assemble oil return filter, ring and spring.

Assemble the oil return filter, retainer and spring.

**Note** When the filter is assembled, ensure the seal and spring is placed correctly.

- **Check, cleaning and replacement of respirator pressure cover**

- 1) Disassemble the pressure cover of respirator.

- 2) Check the pressure cover. Clean the pressure cover. If the pressure cover is damaged, it shall be replaced.

- **Check and cleaning of oil suction filter of hydraulic oil tank**

**Note** Prevent the spring falling into the oil tank.

- 1) Disassemble the bolt and oil suction filter cover plate, and check the seal on the cover plate.

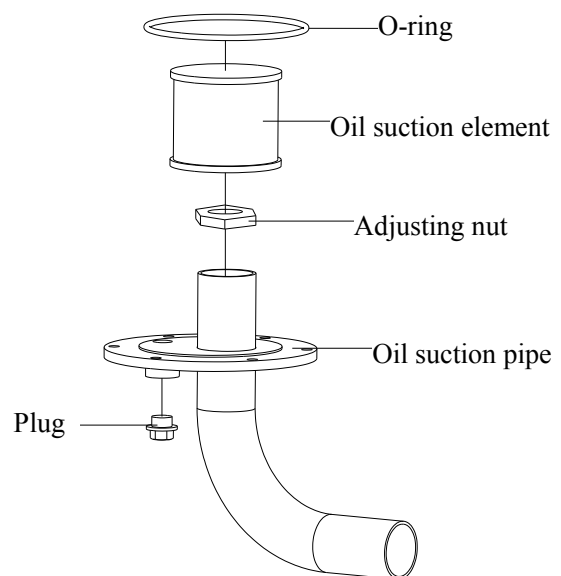
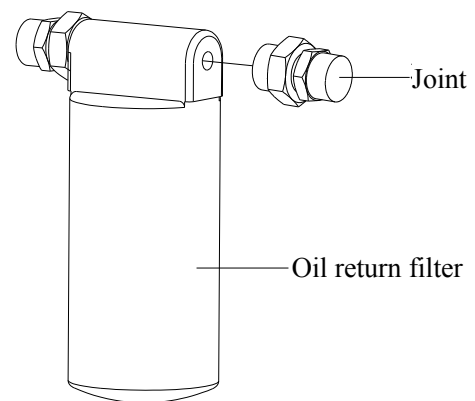
- 2) Disassemble the spring, retainer and oil

suction filter.

- 3) Check and clean the oil suction filter, and

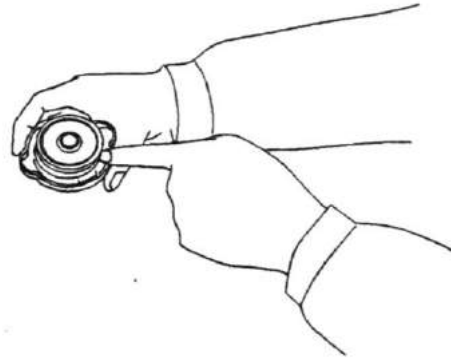
check the seal on the filter.

- 4) Assemble the above components in turn



- **Oil filling of hydraulic oil tank**

- 1) Fill the hydraulic oil from the hydraulic reservoir filler and filter the oil via the oil return filter. Please refer to related data of "Filling Capacity" in this Manual.
- The respirator pressure cover shall be disassembled when oil is filled.
- The oil can't be directly filled from the respirator without being filtered.
- 2) Assemble the oil return filter and respirator cover.



### Safety Components - Regular Replacement

To guarantee safe operation, periodic inspections shall be conducted, and the following parts shall be replaced. These parts are subjected to wearing and tearing, heat, or fatigue; therefore, they should be replaced before the preset time limit expires even if they look intact.

Regularly replace all related parts such as washers and O-rings, and adopt genuine products only.

| Safety Components |              | Components requiring periodic replacement         | Replacement interval   |
|-------------------|--------------|---|------------------------|
| Engine            |              | Fuel hose (from fuel tank to filter)              | 1 years or 2,000 hours |
|                   |              | Fuel hose (from fuel tank to fuel injection pump) |                        |
|                   |              | Heating hose (from heating device to engine)      |                        |
| Hydraulic system  | Machine body | Pump oil suction hose                             | 2 years or 4,000 hours |
|                   |              | Pump oil drain hose                               |                        |
|                   |              | Revolving hose                                    |                        |
|                   | Instrument   | Boom cylinder hose                                |                        |
|                   |              | Arm cylinder hose                                 |                        |
|                   |              | Bucket cylinder hose                              |                        |
|                   |              | Pilot hose  |                        |

### Use of Hoses within Time Limit - Check (European ISO 8331 and EN982 CEN Standard)

It is stipulated in European regulations that the service life of the hydraulic hose must not exceed 6 years.

The hoses must not be stored in the management places of customer for over 2 years before they are discarded or installed onto the machine.

Their service life must not exceed 6 years; of which, the hoses for main parts should be replaced once every 2 years (see the list of parts requiring periodic replacement). The hoses exceeding the service time must be replaced regardless of the external wearing and tearing.


The hoses should be stored in places with a maximum relative humidity of 65%, air temperature of from 0°C (32°F) to 35 °C (95°F) (optimum air temperature is 15°C (59°F)), and kept away from ozone-generating copper, manganese or hard tubes.

### Check Around the Machine



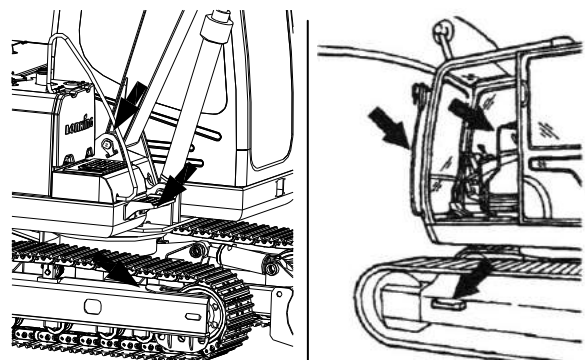
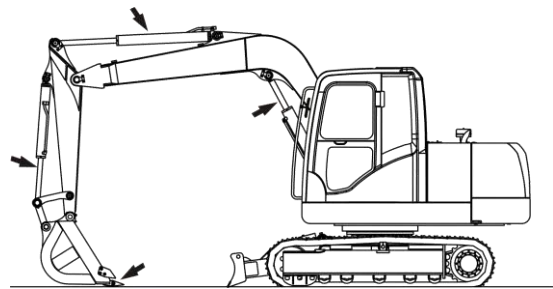
### CAUTION

- The accumulated lubricating grease and lubrication oil on the engine will cause fire.
- When lots of lubrication oil (or other liquid) are on the engine or splash nearby, it shall be removed with steam or high pressure water.
- Before maintenance is started, clean all the grease fittings, covers and plugs.

 **Note** Note whether leakage occurs. If leakage is found, find out the leakage source and eliminate leakage. If leakage is found or doubted, the liquid level shall be checked frequently.

- 1) Check whether the tooling linkage mechanism, tooling cylinder and tooling is damaged or worn excessively. Perform necessary repair.
- 2) Check whether the lamp glass and bulb of illuminating lamp is damaged. Replace the damaged bulb and lamp glass.
- 3) Check whether the dirt is accumulated in the engine compartment, and remove the dirt from the engine compartment.
- 4) Check whether cooling system leaks, whether there is damaged hose and accumulative dirt. Eliminate leakage and remove dirt on the heat radiator.
- 5) Check all the belts of engine accessory. Replace the worn, scraped or cracked belt.
- 6) Check whether hydraulic system leaks. Check the oil tank, cylinder rod seal, hose, tube, plug, joint and grease fitting. Eliminate the leakage in the hydraulic system.
- 7) Check whether the final transmission leaks, and perform necessary repair.
- 8) Check whether swing drive leaks.

- 9) Ensure all the covers and guard plates are installed reliably. Check whether the cover and guard plate is damaged.
- 10) Check the ladder, walkway and handrail. Clean the ladder, walkway and handrail. Perform necessary repair.
- 11) Check whether there is accumulative dirt in the cab. Check whether there is accumulative dirt in each chamber of platform. Keep these places clean.
- 12) Regulate the rear view mirror to acquire optimal visual field.



## Wearing Parts

Replacement of wearing parts should be in the time of regular maintenance or before the wear limit is reached. Such as filters, air filter elements.

In order to the economic use of the machine, it should be the correct replacement of wearing parts.

When ordering the parts, please check the part number in the parts book.

**List of Wearing Parts**

| No. | Item           | Part Name            | QTY               | Replacement Cycle  | Note                  |  |
|-----|----------------|----------------------|-------------------|--------------------|-----------------------|--|
| 1   | Engine         | Engine oil filter    | Element           | 1                  | per 250 hours         |  |
| 2   |                | Fuel oil filter      | Element           | 1                  | per 250 hours         |  |
| 3   |                | Air filter           | Element           | 1                  | as using condition    |  |
| 4   |                | Fan, air-conditioner | Belt              | 2                  | as using condition    |  |
| 5   |                | Radiator             | Anti-freeze fluid | --                 | per 1000 hours        |  |
| 6   |                | Oil pan, fuel tank   | Oil               | --                 | check and refill      |  |
| 7   | Hydraulic tank | Element              | 1                 | per 1000 hours     |                       |  |
| 8   |                | Hydraulic oil        | --                | per 5000 hours     | Half time for breaker |  |
| 9   | Bucket         | Too th (stand ard)   | 5                 | as wear condition  |                       |  |
| 10  |                | Pin                  | 5                 |                    |                       |  |
| 11  |                | Side cut ter, L      | 1                 |                    |                       |  |
| 12  |                | Side cut ter, R      | 1                 |                    |                       |  |
| 13  |                | Bolt                 | 3                 |                    |                       |  |
| 14  |                | Nut                  | 3                 |                    |                       |  |
| 15  | Dozer blade    | Blade (weldment)     | 1                 | as wear condition  |                       |  |
| 16  | Electric       | Fuse                 | -                 | as using condition |                       |  |
| 17  |                | Bulb                 | -                 | as using condition |                       |  |
| 18  | Work equipment | Pin roll             | -                 | as wear condition  |                       |  |
| 19  |                | Bushing              | -                 | as wear condition  |                       |  |

## Main Parts

Main parts should be inspect and maintain at periodic maintenance.

Authenticated components shall be used as replacement main components, otherwise it will cause the machine using the abnormal damage or wear.

When ordering the main components, please check the part number in the parts book.

**List of Main Parts**

| No. | Item       | Part Name           | QTY | Note              |
|-----|------------|---------------------|-----|-------------------|
| 1   | Main parts | Boom                | 1   | Welding Structure |
| 2   |            | Arm                 | 1   | Welding Structure |
| 3   |            | Platform            | 1   | Welding Structure |
| 4   |            | Undercarriage frame | 1   | Welding Structure |
| 5   |            | Swing circle        | 1   | Welding Structure |

# **Chapter VI**

## **Option Parts**

## General Safety Cautions

- When the accessories and options are installed on the machine, pay attention to safety. When the accessories and options are selected, assembled, disassembled and used, the following cautions must be abode by.
- If you option to install the hydraulic breaker, be sure to install the protective net to avoid the splash of debris hit the cab during the process of crushing, which causing damage to the person and the machine.

## Cautions for Selection

- The accessories and options can be only installed after negotiating with dealer in advance.  
In accordance with the type of accessories and options, the protective devices such as front shield or top shield will be probably installed on the main machine. Accordingly, the accessories or options and cab will be mutually interfered.
- Don't install the accessories and options not authenticated. If personal casualty accident, machine fault and article damage are caused by installing the accessories and options not authenticated.

## Read Operation Manual Thoroughly

- Before the accessories or options are assembled and disassembled, the Operation Manual of the installed accessories or options and machine shall be read thoroughly.
- When the Operation Manual is damaged or lost, it shall be reordered dealer or the manufacturer of ccessories and options.

## Cautions for Assembly and Disassembly

When the accessories and options are assembled and disassembled, the following cautions shall be abode by to ensure safe work.

- The assembly and disassembly shall be performed at the solid and even place.
- When the work is completed by over 2 staves, commander shall be confirmed and operate according to the commander's instruction.
- When the heavy component (over 25kg) is assembled and disassembled, crane shall be used. (The one without crane license is forbidden to operate crane)
- No standing under lifted article.
- Work under lifted article is forbidden, bearing platform must be used to prevent article falling.
- When heavy component is disassembled, the balance after component is disassembled shall be considered. If necessary, the support to prevent roll-over shall be prepared before disassembly.
- The accessories and options before installation as well as the accessories and options after disassembly shall be placed stably to prevent roll-over.



## Cautions for Use

When longer working device or heavier working device is installed, the following cautions shall be noted, and trial operation shall be performed at the safe place before actual work simultaneously, and fully master the machine operation, gravity center and scope of work.

- Swing operation shall be avoided when machine is tilted. Otherwise, machine will be tilted.
- Operation shall be started after sufficient distance is kept from surrounding barrier. If longer working device is installed, the scope of work shall be increased.
- When heavier working device is installed, pay special attention to the following items.
- Swing slide distance (the distance from starting swing and stopping operation to full stop of swing operation) will be increased. Because visual measurement will cause error, to cause collision, when swing operation is performed, sufficient swing space shall be left.
- The natural falling (the working device off ground will gradually fall due to self-weight) quantity of working device will be increased. The working device can't be stopped off ground.
- Sudden swing, falling or stop of working device are forbidden. Otherwise, it'll cause roll-over of machine.
- The boom cylinder can't be telescoped suddenly. Otherwise, it'll cause roll-over of machine due to impact force.

## The Installation of the Protective Device

According to the work environment, falling objects may enter into the operator's cab, so it is necessary to install protective devices onto the cab.

When doing the crushing work, be fitted with a protective plate (Model YZ36-FHW) (shown as the right figure 1).

On mining applications, it is should be use FOPS (falling object protective structure) (Model YZLG40-QF, and YZLG40-DF) (shown as the right figure 2).

The above recommendations are based on the standard work conditions. It should be based on the conditions of the job site, installing the necessary protective devices.

To guarantee that the unrelated persons with machinery or falling objects are keeping a safe distance.

The installation Description of protective device:


Using an inner hexagon spanner to remove 4 rubber plugs in the front of cab, and use standard part of serial number (A) (shown as the right figure) to install the front protective net onto the cab; use the lifting ring on the top of the cab to install and fix the top protective net.

Figure 1

- (A) : Bolt GB/T 5783 M12×25 4 pieces class 10.9  
Washer GB/T 97.1 Washer 12 4 pieces class 10.9
- (B) : YZ36-FHW Protective net 1 piece

Figure 2

- (A) : Bolt GB/T 5783 M12×25 4 pieces class 10.9  
Washer GB/T 97.1 Washer 12 4 pieces class 10.9
- (B) : YZ-ZWJSS-008 Lifting ring 4 pieces
- (C) : YZLG40-QF Front Protective net 1 piece
- (D) : YZLG40-DF Top Protective net 1 piece

 **Note** Use 4 lifting rings on the top of the cab to fix the top protective net.

## CAUTION

When the main structure of cab is damaged, the cab will lose the function of the ROPS and FOPS, please immediately replace the cab, so as to avoid the losses of personnel and property.

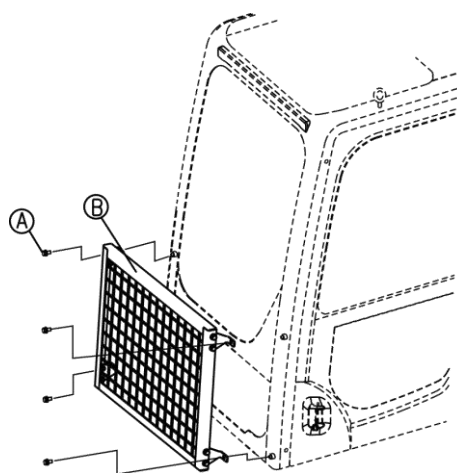


Figure 1

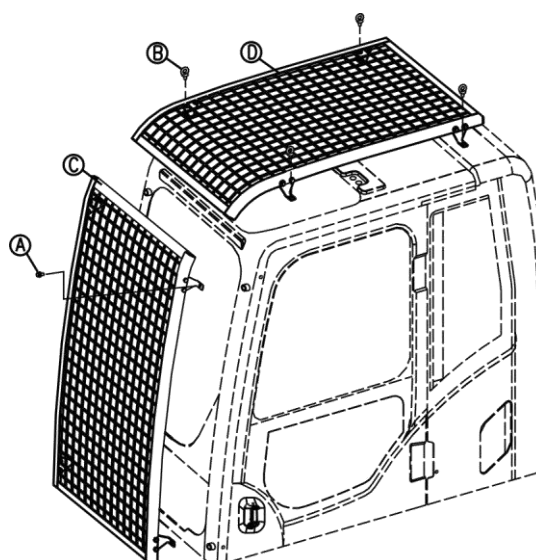


Figure 2

## Hydraulic Breaker



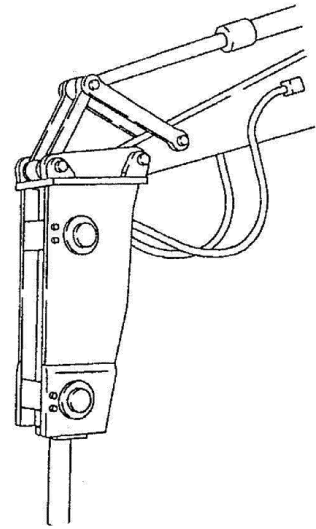
### CAUTION

If you option to install the hydraulic breaker, be sure to install the protective net to avoid the splash of debris hit the cab during the process of crushing, which causing damage to the person and the machine. The model of protective net depends on the actual working conditions.

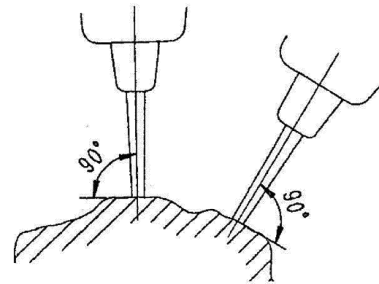
- **Primarily suitable for the following works**

- Break stone
- Dismantlement
- Road engineering

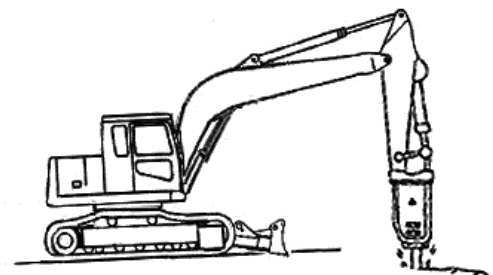
Suitable for dismantling building, breaking road, tunnel construction, breaking steel slag, breaking stone and quarry work and so on.



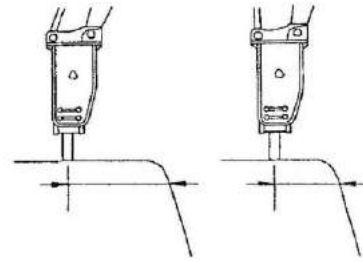
Place the chisel on the breaking surface with right angle to perform break work.



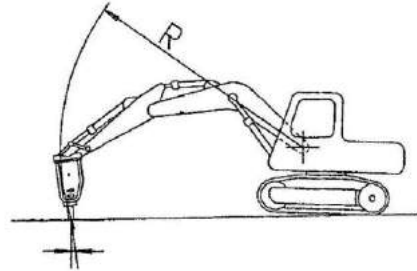
Before impact is started, place the chisel on the break surface and make machine off ground about 5cm. Don't make machine off ground too high.



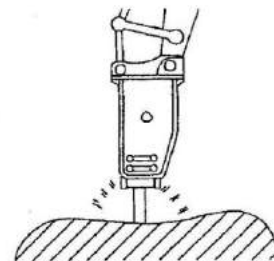
When continual impact is performed on the same impact surface, if the chisel can't break or break through surface within 1 minute, the impact surface shall be changed, and continue breaking at the position near the edge of break object



Because the break-through direction of chisel will be gradually deviate from the direction of breaker body, the bucket cylinder shall be regulated according to the direction all the time.



In order to prevent chisel performing impact without resistance, the chisel shall be against the impact surface correctly.

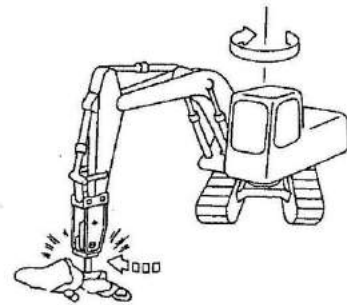
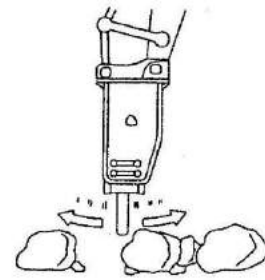


## Wrong Use Method

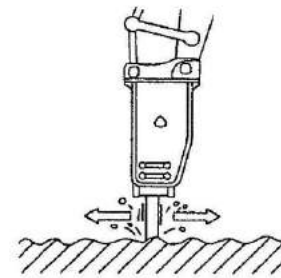
In order to extend service life of machine, and perform operation safely, the following methods are forbidden.

- The cylinder can't be operated to the stroke end, and about 5cm allowance shall be kept.

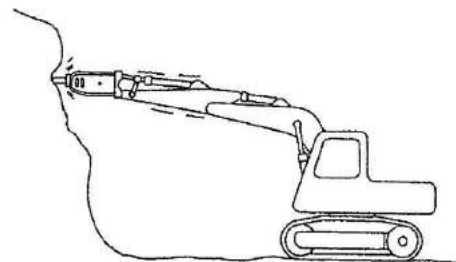
Move stone with the bracket position.



Utilize turning force to work

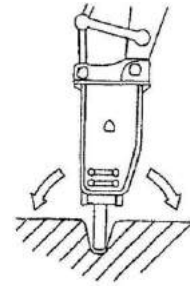


Move chisel when impact is performed.

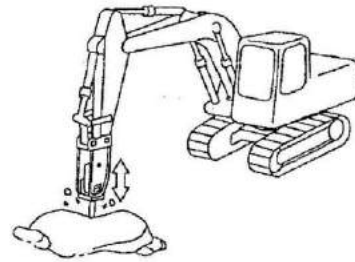


Perform impact in the horizontal direction or upwards

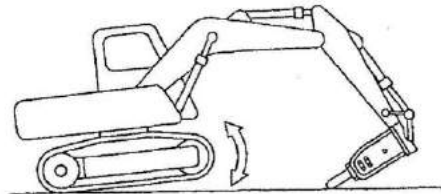
Swing chisel when it impacts into rock



Knocking operation



Fully protrude bucket cylinder to support machine off ground.



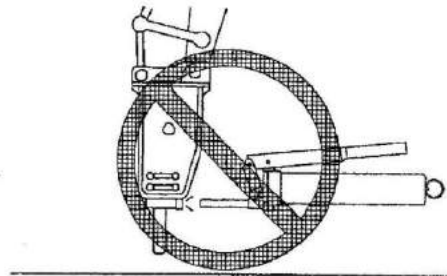
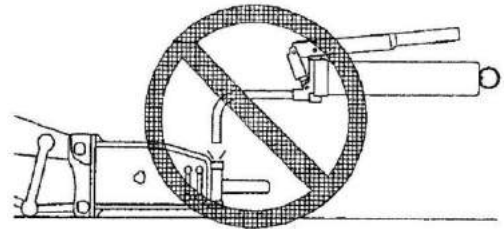
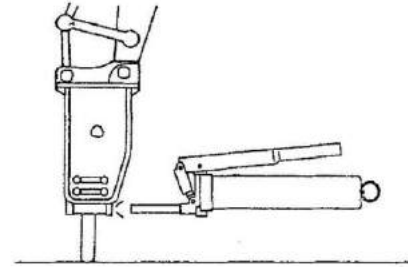
## Position of Filling Lubricating Grease into Hydraulic Breaker

Lubricating grease shall be filled with correct method.



### CAUTION

If the lubricating grease is filled at wrong position, more lubricating grease will be filled into the breaker, and soil and sand will enter the hydraulic circuit when breaker operates to damage hydraulic device. Lubricating grease shall be filled at correct position.



### Hydraulic breaker maintenance cycle

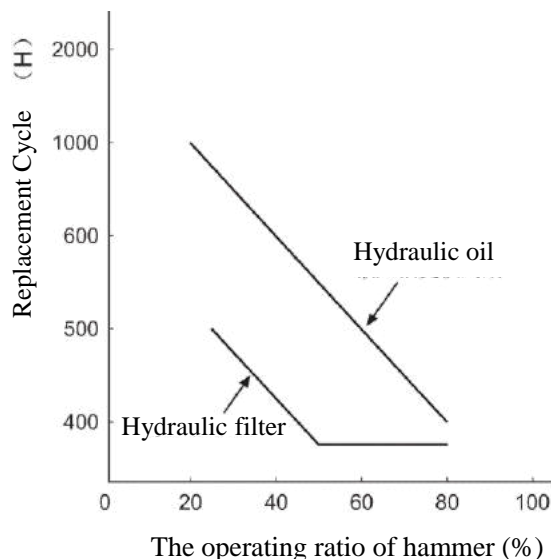
Hydraulic oil of the machine equipped with breaker is easier to spoil than standard machine.

Replace the hydraulic oil filter

For new machines, replace the filter element in the first 100 to 150 hours.

Replace the hydraulic oil

Please replace hydraulic oil as the picture on the right shown.



Replace additional filter for breaker

Used breaker for 250 hours as a guide. The operating ratio of breaker: more than 50%

### Selection of hydraulic breaker

| Breaker           | Machine Weight |            |         |            |                          |                          |                          |
|-------------------|----------------|------------|---------|------------|--------------------------|--------------------------|--------------------------|
|                   | 6 Tons         | 7.5-9 Tons | 15 Tons | 22-24 Tons | 28 Tons                  | 36 Tons                  | 48 Tons                  |
| Rod diameter (mm) | Φ75            | Φ85        | Φ100    | Φ140       | Φ140<br>Maximum<br>≤Φ150 | Φ155<br>Maximum≤<br>Φ165 | Φ165<br>Maximum<br>≤Φ175 |



### CAUTION

Breaker selection should be according to machine weight, bucket capacity, breaker weight, tool rod diameter and impact energy. We provides machine weight and rod diameter relational table for breaker selecting. Please be sure to select breaker according to this table.



Option Parts

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**Memo:**

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# **Appendix**

## **Operating Manual for Electronic Monitoring Meter**

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## Product Profile


WDJLONG65-10 monitoring meter is mainly used for real-time operation monitoring of engine, and it is characterized by aesthetic appearance, easy operation, convenience, and reliability.

 **Note** If the product pictures given in the Operating Manual are different from the material object, the material object should take the priority, and the pictures in the Manual are given for reference only. The Company reserves its right to upgrade the edition of the Manual, and the upgraded edition should substitute the previous edition.

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## Normal Working Environment Parameters and Other Indices of the Meter

- ① Power supply: 10VDC~36VDC
- ② Operating temperature: -20°C~+65°C
- ③ Storage temperature: -40°C~+85°C
- ④ Relative humidity: 30%RH~90%RH
- ⑤ Atmospheric pressure: 86kPa~106kPa
- ⑥ Vibration intensity: 5g at 10Hz~1000Hz
- ⑦ Impact strength: 10g at 0.03Hz-0.08Hz
- ⑧ Protection grade: IP65 (waterproof, dustproof)

 **Note** If one or more items mentioned above exceed the limits for continuous service for a certain period of time, the meter might work abnormally or might be damaged. Be sure to guarantee the normal operating environment strictly as per the above requirements so as to ensure normal operation of the product.

## Functional Diagram of the Panel

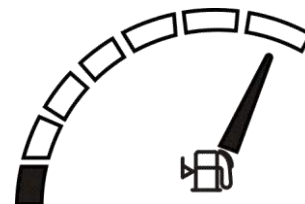
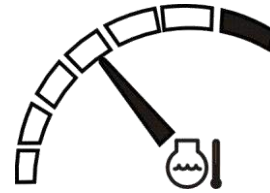


- |                                      |                           |
|--------------------------------------|---------------------------|
| 1. Low battery alarm display         | 10. Rotary speed display  |
| 2. Preheat alarm display             | 11. GSM signal display    |
| 3. Water temperature alarm display   | 12. Mute/Exit key         |
| 4. Date/time/service hour display    | 13. Up guide key          |
| 5. Fuel level alarm display          | 14. Menu/Enter key        |
| 6. Water temperature display         | 15. Down guide key        |
| 7. Oil level display                 | 16. Mute indicating light |
| 8. Air filter alarm display          | 17. Left guide key        |
| 9. Engine oil pressure alarm display | 18. Right guide key       |

## Description of Alarm Functions of the Meter

- **Water temperature gauge**
  - It displays the temperature of engine coolant.
  - Its measuring range is 40°C-120°C.
  - When water temperature of engine is lower than 40°C, the meter displays <40°C; When the displayed water temperature reaches 105°C, buzzer gives an alarm, the water temperature indicating symbol flickers, and characters prompt is displayed.
- **Charge alarm display**
  - It displays the working condition of dynamo.
  - When the dynamo operates normally, the symbol is not displayed.
  - When the dynamo fails to generate electricity normally, charge indicating symbol and characters prompt are displayed in the liquid crystal display, and the hummer beeps as an alarm.
- **Air-filter alarm display**
  - It displays the working condition of air filter element.
  - When the air filter element operates normally, the symbol is not displayed.
  - When the air filter element is jammed, symbol indicating the air filter element is displayed in the liquid crystal display, the hummer beeps as an alarm, and characters prompt is displayed simultaneously.
- **Oil level gauge**
  - It displays the fuel volume existing inside the fuel tank.
  - Its measuring range is 0%~100%.
  - When the displayed oil level is lower than 30%, a characters prompt is displayed; When the displayed oil level is lower than 10%, the oil

level indicating symbol flickers, the buzzer beeps, and an characters prompt is displayed.



- **Preheat alarm display**

- It displays the preheat state when engine is started.
- When the operator turn the ignition switch to the position “Preheat” and maintain it in the position, preheat indicating symbol and characters prompt are displayed in the liquid crystal display; 15 seconds later, the preheat is over, and the indicating symbol goes off, indicating that the preheat is finished. Here, the operator should release the ignition switch such that it may automatically return to its position OFF.



- **Oil-pressure alarm display**

- It displays the working condition of engine oil pressure.
- When the meter is powered on, engine oil pressure indicating symbol appears, and this does not mean a fault of oil pressure. When the engine is started up, engine oil pressure indicating symbol disappears; Conduct checks if the engine oil pressure indicating symbol is displayed and flickers, the buzzer beeps, and characters prompt is displayed.



- **Low-voltage alarm display**

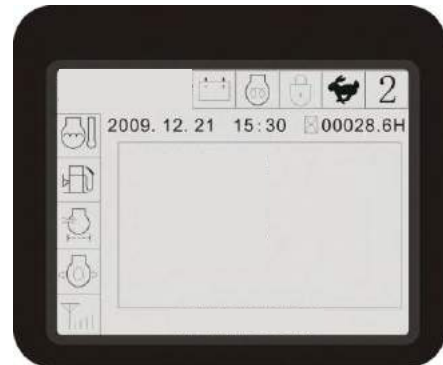
- When voltage is lower than 9.5V, low-voltage characters prompt is displayed.

## Meter Operating Method

1. Monitor meter main interface.



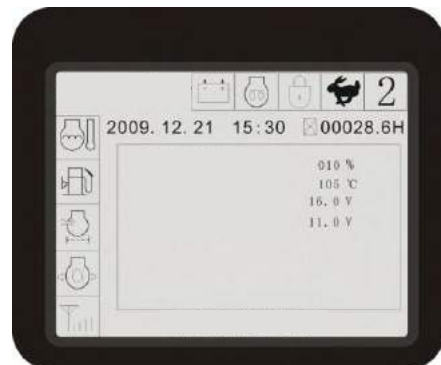
2. Push the menu key to access the following interface:



3. Access "Working parameter":



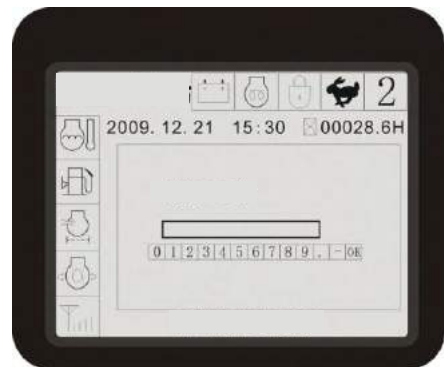
4. Access "Warn parameter":





- Access "User settings":

Push the left/right guide key to select the digits for password entering; the password is 66668888. Select OK and push ENTER key to access the user settings menu interface.



- After accessing "User settings", you may set the following as required:

You may set the parameters by pushing upper/lower/left/right guide key.

Note: Set the throttle knob without starting the engine.



Push the left/right guide key to select the digits for password entering; the password is 66668888. Select OK and push ENTER key to access the user settings menu interface.

- To access "System settings", please contact the manufacturer of the main machine

The system settings menu is specially designed for machine commissioning personnel, and the user cannot access the menu for any operation.



Access "English", and the user may switch over between Chinese and English:



- Access "Help":

Model: ××××××  
Manufacture No.: ×××  
Meter Model: ××××××  
Software Edition: ×××××  
Meter No.: ××××××

## Meter Troubleshooting

### ● Water Temperature Display Abnormal

① Remove the signal line of engine water temperature from water temperature sensor (suspending), if the first displaying stage of its corresponding water temperature meter flashes, the meter is normal. Ground the signal line (ground or negative power), the corresponding water temperature meter displays the tenth stage (full). Notice: water temperature meter has the function of delay, please waiting more than 20s during operation.

② If it matches with the above-mentioned conditions after checking, it means the signal line of system and meter works normally. The water temperature sensor could be considered to be damaged according to the faults, then replace it. If the results don't match with the above-mentioned condition, there would be the following several conditions:

a、Ground the signal line (ground or negative power), the corresponding water temperature meter always flashes at the first stage: please check its signal line (with multimeter) maybe result from disconnection or poor contact of signal lines. It will be meter's faults under the condition of well contact of signal lines, please replace meter.

b、Remove the signal line of water temperature of engine from water temperature sensor (suspending), the corresponding water temperature meter always displays the tenth stage: please check its signal line (with multimeter) maybe result from disconnection or poor contact of signal lines. It will be meter's faults under the condition of no short-circuit and ground of signal lines, please replace meter.

c、Remove or ground (ground or negative power) the signal line of water temperature of engine from water temperature sensor (suspending), if the corresponding water temperature meter displays any position between the second stage

and the ninth stage: maybe result from poor contact of signal line or meter faults, please replace the meter under the condition of well contact of signal line.

### ● Fuel Oil Level Display Abnormal

① Remove the signal line of fuel oil level from oil level sensor (suspending), if the first displaying stage of its corresponding oil level meter flashes, the meter is normal. Ground the signal line (ground or negative power), the corresponding oil level meter displays the tenth stage (full). Notice: oil level meter displays anywhere has the function of delay, please waiting more than 20s during operation.

② If it matches with the above-mentioned conditions after checking, it means the signal line of system and meter works normally. The oil level sensor could be considered to be damaged according to the faults, then replace it. If it doesn't match with the above-mentioned condition, check it using the above methods how to check water temperature.

### ● Signal of Air Filter Always Flash and Warn

Remove the signal line from air filter sensor and suspend it according to the faults, air filter netting has plugged and need cleaning or replacing, if air filter alarm lamp goes out. If it still alarms after removing air filter netting from air filter sensor and suspending it, please check connecting line between air filter signal line and meter whether has short-circuit, replace meter if the line is normal.

### ● Engine Oil Pressure Working Abnormal

If the indicator of engine oil pressure always flash and warn when engine is working, remove the signal line on the sensor (suspending), it indicates that the meter is normal if the indicator of engine oil pressure go out. Engine oil pressure sensor is considered to be damaged under the condition of engine without any fault, and then

replace the sensor; If the indicator of engine oil pressure isn't off, please check the connecting line between engine oil pressure signal line and meter, and also connection bolts on the sensor and ground lines whether short-circuit or GND, then replace the meter if the harness is normal.

- **Charging Abnormal**

If charging alarm lamp always flashes and warns when the engine is working, measure line whether output or not with multimeter (usually 24V system is about 13V, 12V system is about 7V). If midpoint signal output of generator is normal, then the generator works normally, further, check midpoint relay works normally or not. If abnormally, check wire ground of midpoint relay whether contact well or relay output terminal contact and ground line whether short circuit, replace the relay under the condition of all above-mentioned is normal. If relay works normally, please check the harness between midpoint relay output terminal and meter whether contact well, replace the meter if the harness contact well.

- **Break mode function failure**

Break mode function failure please check whether the hydraulic safety lock control lever is lowering. And whether the break solenoid valve is undamaged. Be sure that the control cable of meter is 12v output (when break mode selection key is pressed, the symbol is display. Please replace the meter if there is no 12v output) . Please also check whether the break mode switch is in good condition. And whether its wire harness and connector are broken.

**Memo:**

# Proposal on Operation & Maintenance Manual Amendment

Name of company:

Model:

Name:

Page:

Date:

(In the middle of lower part of each page. If two places or more need modification, please write in the opinion column.)

Fax:

Your opinion/proposal:

If necessary, picture or diagram can be attached.

If paper is insufficient, please use more.

Reply:

(The copied can be used)