CDM6150 PREFACE LONKING

This operation manual sustematically 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 peridically to obtain latest data.

This is the second edition.

MANUAL OPERAÇÃO

LONKING (SHANGHAI) EXCAVATOR CO.,LTD.

July, 2010

SPECIAL STATEMENT OF EXCAVATOR FUEL SYSTEM OPERATION AND MAINTENANCE

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

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 of LONKING excavator. 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 of LONKING excavator 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.

Thank you again for choosing LONKING products.



Regards,

LONKING (SHANGHAI) EXCAVATOR CO.,LTD.

CDM6150
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.

CONTENTS

Chapter I Introduction.....1

Literature Information.....3

Manual Structure.....3

Certified Engine Maintenance.....4

Design Performance of Machine.....4

Chapter Ⅱ Safety.....5

Learn about Safety Information.....7

Comprehend Signal Terms.....7

Safety Mark and Label.....8

Abide by Safety Instruction.....17

Compressed Air and Compressed Water.....17

Preparation for Emergency.....18

Wear Protective Clothing.....18

Noise Prevention.....19

Check Machine.....19

General Advance Cautions for Cabin.....20

Safety Device.....20

Keep Machine Clean.....21

Use Handrail and Ladder.....21

Regulate the Operator's Seat.....22

Fasten Seat Belt.....22

Ensure Favorable Sight.....23

Move and Operate Machine Safely.....23

Operation is Only Performed on the Operator's Seat.....24

Engine Starting with Jump Start Cable.....24

The Passenger Shall Leave Machine.....25

Signal Shall be Specified When Multiple Machines Operate Simultaneously.....25

Confirm Travel Direction of the Driven Machine.....25

Drive Machine Safely.....26

Avoid Being Injured Due to Roll-over Accident of Machine.....27

Avoid Being Injured Due to Reverse and Swing Accident.....28

Avoid Roll-over.....29

Avoid Wire....30
Lifting Objects....30
Prevent the Ejected Scrap....31
Park the Machine Safely....31
Handle Liquid Safely - Avoid Fire....32
Safe Transportation....33
Implement Safety Maintenance....34
No Operation Tag....35
Support Machine Correctly....35
Keep Distance with Rotating Component....36
Prevent Part Being Ejected....36
Store Machine Accessories Safely....36
Tools Shall be Used Properly....37
Avoid Burn....37
Replace the Rubber Hose Regularly....38
Avoid High Pressure Liquid....38
Prevent Fire....39
Leave Machine When Fire Happens....40
Be Aware of the Discharged Fume....41
Advance Cautions for Welding and Polishing....41
Avoid Heating Near Pressured Liquid Pipe....42
Prevent the Pipe Containing Inflammable Fluid Being Heated....42
The Paint Shall be Removed before Welding or Heating....42
Prevent Battery Explosion....43
Maintain the Air-conditioning System Safely....43
Handle Chemicals Safely....44
Dispose Refuse Correctly....44
Prevention for Danger of Asbestos Dust....45
Before the Machine is Returned to the User....45
Memo：....46

Chapter III Product Information....47

Product Features....49
Main Uses and Scope of Application....50
Machine Profile....51

Specifications..... 52
Working Range..... 53
Performance Parameters..... 54

Chapter Ⅳ Product Operation..... 55

Before Engine Started..... 57
Check Around the Machine..... 57
Seat Adjustment and Check of Seat Belt..... 57
Engine Start..... 58
Engine Start with Temperature Above -18℃..... 58
Engine Start with Temperature Below -18℃..... 59
Engine Start with Jump Start Cable..... 59
After Engine Start..... 61
Excavator Operation..... 62
Direction..... 62
Operator Controls..... 62
Travel Controls and Joystick Controls..... 62
Right Stand Case Panel..... 63
Monitor..... 63
Air-conditioner Regulator..... 64
Radio..... 64
MCSS Electric Control System..... 65
Trial Run of New Machine..... 68
Driving Machine..... 69
Parking Machine..... 71
Long-term Storage..... 71
Operate Machine..... 72
Tow Machine within Short Distance..... 81
Air-conditioner Use..... 82
Air-conditioner Control Panel..... 82
Description of Button Functions..... 82
Cautions..... 83
Troubleshooting..... 83
Air-conditioner Operation Method..... 84
Radio Use..... 88

Radio Control Panel..... 88
Radio Tuning Method..... 88
Preset of Radio Station..... 90
Setting of Digital Clock..... 90
Cancel of Radio Preset Station..... 90

Chapter Ⅴ Product Maintenance..... 91

Maintenance Guide..... 93
Hour Meter Reading..... 93
LONKING Authenticated Worn Parts..... 93
LONKING Authenticated Lubrication Oil..... 93
Windshield Cleaning Liquid..... 93
Clean Engine Oil & Lubrication Oil..... 93
Check the Discharged Oil and Used Filter Element..... 93
Fuel Outer Element..... 93
Welding Instruction..... 93
Prevent Anything Falling into the Machine..... 94
Dusty Working Place..... 94
Avoid Using Different Lubrication Oil Simultaneously..... 94
Lock Inspection Cover..... 94
Hydraulic System-Air Discharge..... 94
Installation of Hydraulic Hose..... 94
Check After Inspection and Maintenance..... 95
Select the Fuel and Lubrication Oil Matching the Ambient Temperature..... 95
Technical Specification of Tightening Torque..... 96
Technical Specification of Oil..... 98
Technical Maintenance Outline..... 99
Maintenance on Demand..... 99
Maintenance of Initial 50 Working Hours..... 99
Daily Maintenance of Initial 100 Working Hours..... 99
Maintenance of Initial 250 Working Hours..... 99
Maintenance of Every 8 Working Hours or Daily Maintenance..... 100
Daily Maintenance Under Severe Condition..... 100
Maintenance of Every 250 Working Hours..... 100
Maintenance of Every 500 Working Hours..... 100

Maintenance of Every 1000 Working Hours....100
Maintenance of Every 2000 Working Hours....101
Maintenance of Every 3 Years....101
Technical Maintenance Operation....102
Boom and Arm Linkage Mechanism - Lubrication....102
Bucket Linkage Mechanism - Check/Regulation....104
Bucket Linkage Mechanism - Lubrication....105
Bucket Tooth - Check/Replacement....106
Track - Regulation....109
Final Drive Oil Level - Check....112
Swing Gear - Lubrication....113
Swing Driving Oil Level - Check....114
Cooling System Long Life Coolant - Replacement....115
Cab Air Filter Element - Cleaning/Replacement....117
Condenser - Cleaning....118
Cooling System Hose - Check....119
Engine Air Filter Outer Element - Cleaning/Replacement....120
Engine Oil Level - Check....122
Circuit Breaker - Reset....123
Hydraulic System Hydraulic Oil -Replacement....124
Check Around the Machine....127
Memo:....128

Chapter Ⅵ Accessories and Options....129

General Safety Cautions....131
Cautions for Selection....131
Read Operation Manual Thoroughly....131
Cautions for Assembly and Disassembly....131
Cautions for Use....132
Operate Bucket with Hook....133
Check Whether the Bucket with Hook is Damaged....133
Forbidden Operation....133
Hydraulic Circuit....134
Hydraulic Circuit Connection (1 additional pipe accessory)....134
Hydraulic Circuit Connection (2 additional pipe accessory) (option)....135

Gist of Accessory Assembly and Disassembly....136
Disassembly Gist....136
Installation Gist....137
Guide of Accessories and Options....138
Selection of Track Shoe....139
Method of Selecting Track Shoe....139
Selection of Bucket Tooth....140
Use of Horizontal Pin Type Bucket Tooth....140
Standard of Selecting Vertical Pin Type and Horizontal Pin Type....140
Use of Rubber Gasket Track Shoe and Road Gasket....141
Working Environment....141
Working Conditions....141
Storage and Maintenance....142
Rubber Damage Degree....142
Check Road Gasket....142
Height of Convex Tooth....142
For Long-term Machine Use....143
Hydraulic Breaker....143
Wrong Use Method....145
Position of Filling Lubricating Grease into Hydraulic Breaker....147
Memo:....148

Appendix I MCSS Electronic Control Manual CDM6150....149

Appendix II Low-temperature Operation Manual CDM6150....167

Proposal on Operation & Maintenance Manual Amendment

Chapter Ⅰ Introduction

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 LONKING 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 is composed of Introduction, Safety, Product Information, Operation, Maintenance, Accessories & Options, Appendix 1 and Appendix 2.

- The part of Safety includes the following:

  The basic safety prevention measures; position and contents of warning label on the machine.
- The part of Product Information includes the following:

  Some related data description of product.
- The part of Operation includes the following:

  Information of instrument, switches, operating mechanism of machine, operating mechanism of tooling, transportation and towing.
- The part of Maintenance includes the following:

  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 part of Accessories & Options includes the following:

  Some relevant information of accessories and options as well as related instruction.
- The part of Appendix Ⅰ includes the following:

  Related profile and operation instruction of MCSS electronic control system.
- The part of Appendix Ⅱ includes the following:

  Instruction for low-temperature operation of machine.

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 of LONKING 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 LONKING approval.

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, please contact LONKING agent.

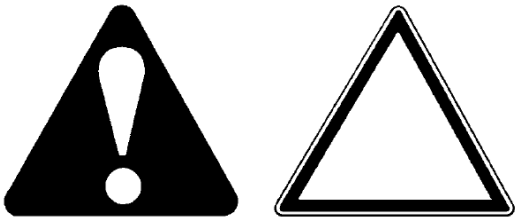
Chapter Ⅱ Safety

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 abided 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 (danger), WARNING (warning) or CAUTION (caution) will be used with the sign of noting safety together.
  - "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.
  - "CAUTION" indicates the condition of potential hazard. If this condition happens, minor or moderate injury will be caused.
  - "DANGER" or "WARNING" safety label is set near specific hazard position. Refer to "Caution" safety label for general safety measures.
  - After the safety alarm sign is used on the machine, some safety labels won't use the terms stipulated above.
- "CAUTION" also has the meaning of noting safety information in this Manual.
- 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.





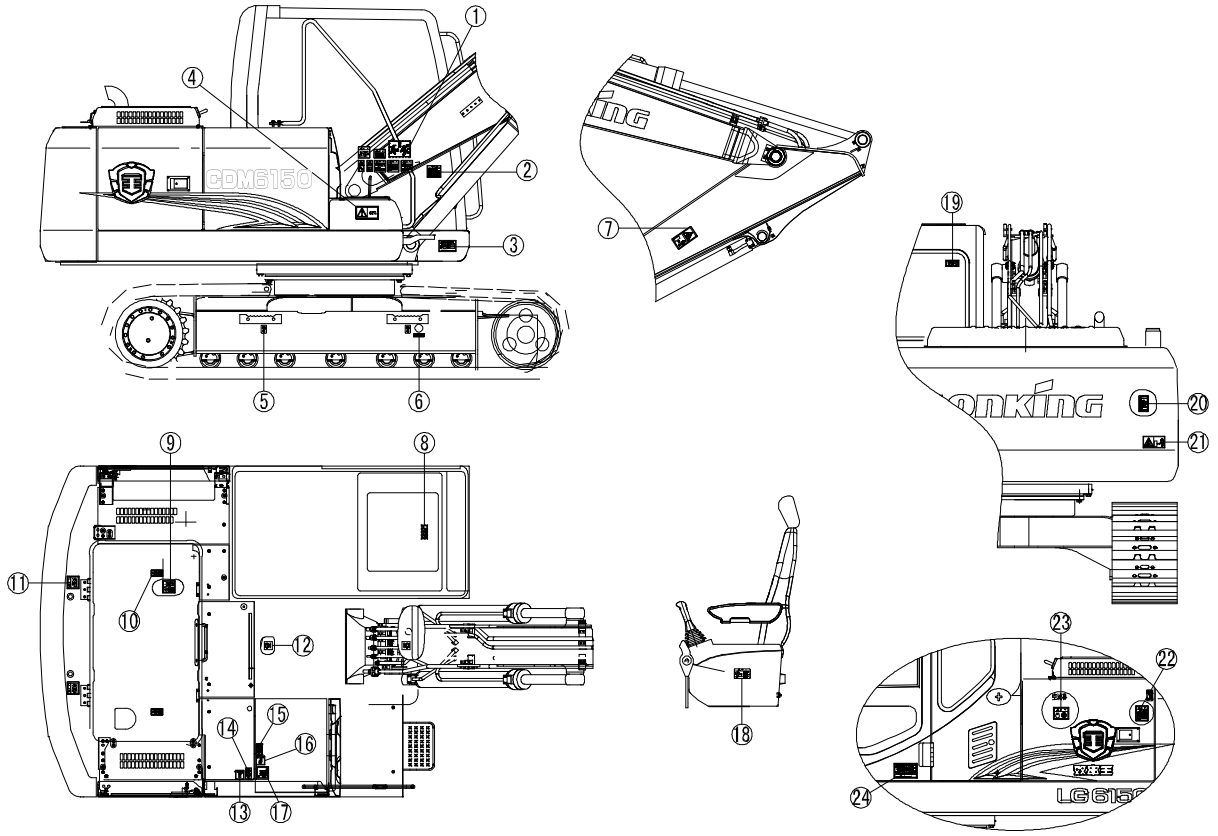






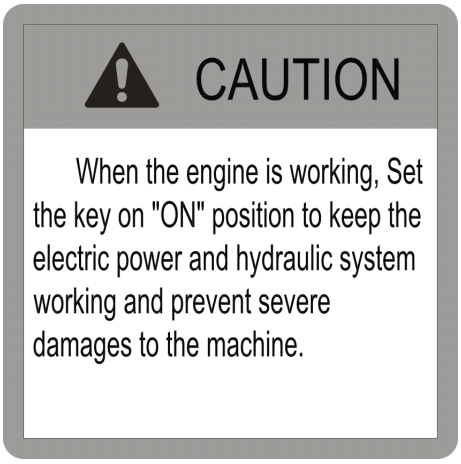
Safety Mark and Label

- There are several special safety marks on the machine. This chapter will indicates 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.
- China LONKING agent will provide new safety marks.

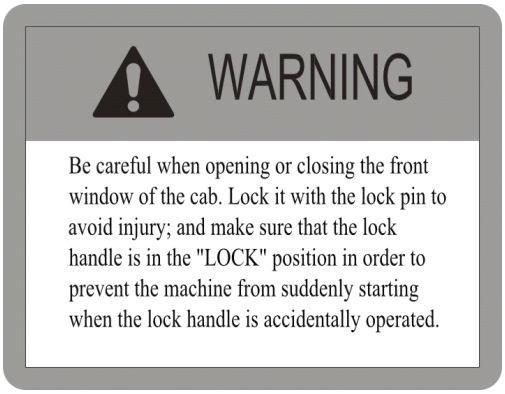


①

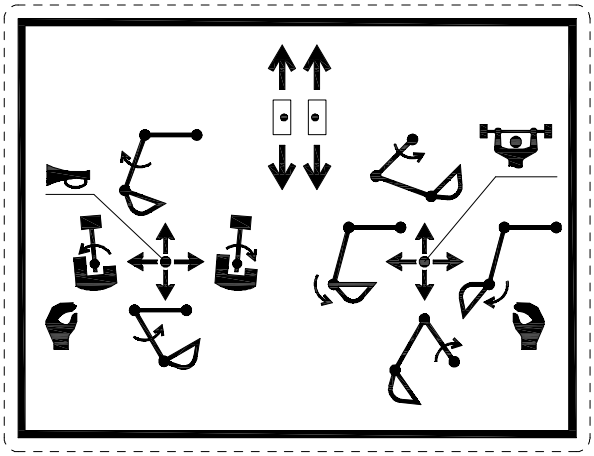
⊙ **Caution Label**



⊙ **Warning for Use of Front Window**



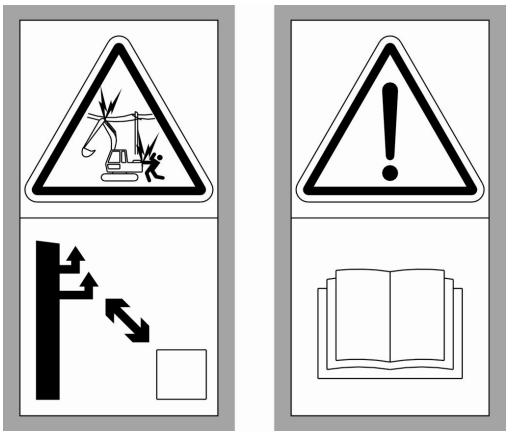
⊙ **Warning for Broken or Movable Window**



⊙ **Warning for Use of Seat Belt**



⊙ **Be aware of electric shock and reference book**



⊙ **Travel Speed Control Switch**

WARNING

Before going downgrade and moving up and down the tow-truck, should the traveling speed control switch should be placed on lower speed position, and turn off auto-idle-speed switch.

Otherwise speed of the machine may change suddenly and will damage the operation mechanism or even cause casualty.

⊙ **Automatic Engine Speed Control (AEC)**

WARNING

When the auto-idle-speed switch is on, operate the control lever or traveling pedal, engine rotating speed will increase automatically.

When machine is moving up and down the tow-truck or operating in narrow work site, the auto-idle-speed switch should be switched off to avoid causing casualty in case of starting suddenly.

② **Selection of Operating Mode**

Selection of Operation Mode

Please choose the desired operation mode with the button on the monitor panel according to the working conditions and your own demand:

H (Heavy-duty Mode): The mode with load coming prior for the common digging, loading, etc.

S (Saving Mode): The mode with low fuel consumption coming prior for common digging, loading, etc.

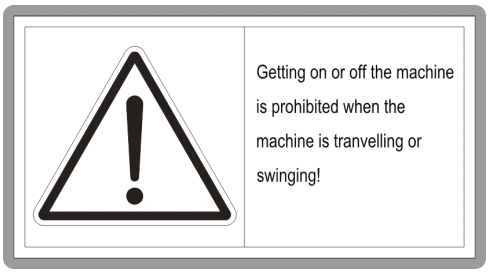
L (Light-duty Mode): The mode for common leveling and fine operation.

B (Breaking Mode): The mode in which such functions as Breaking are activated.

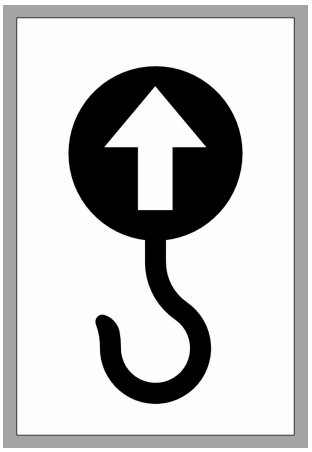
③ Machine Nameplate



④ When machine travels or rotates, staff can't get on and off the machine

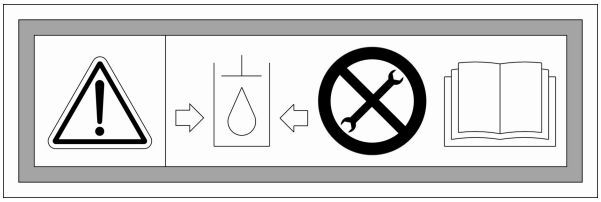


⑤ Lifting Device



⑥ Warning for High-pressure Cylinder

- Before the pressure is released, any part can't be disassembled to prevent personal injury.
- The relief valve can be only unscrewed by one circle.
- Please refer to the data of "Regulation of track regulator" in this Manual.



⑦ Caution of Working Equipment

When the machine works, please stay away from it to prevent being impacted by the working equipment.



⑧ Reference for Windshield Cleaning



⑨ Be Aware of Scald

Hot coolant will cause severe scald. Before the cover is opened, the engine shall be shut down, after the heat radiator is cooled, unscrew the cover slowly, to release pressure.

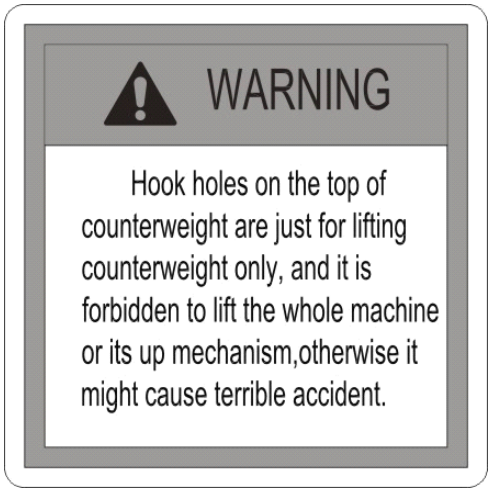


⑩ Warning for Falling

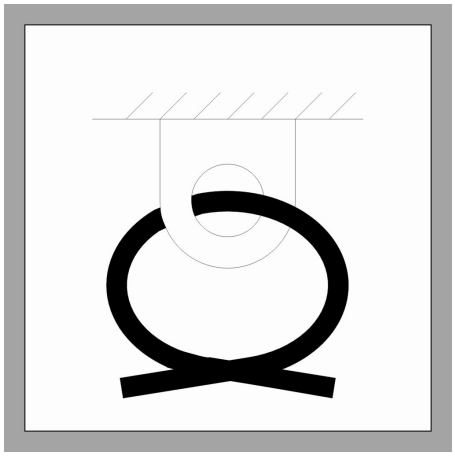
No standing here, danger of falling.



⑪ Operating Instruction for Counterweight Lifting Hole



⑫ Machine Towing Label



⑬ Hydraulic Oil Label



⑭ 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.



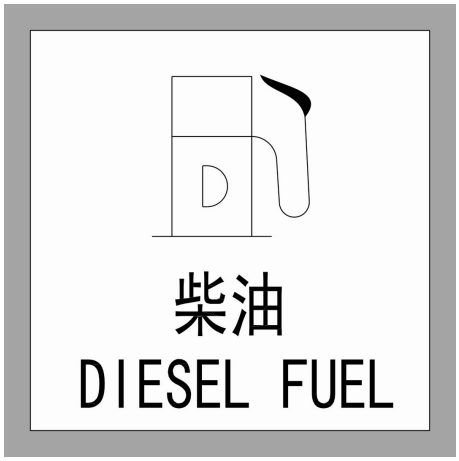
⑮ Prevent Fire

Prevent the fire due to fuel or engine oil.

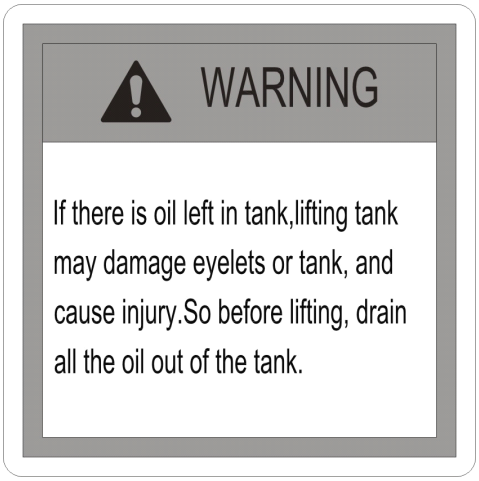
The fuel, engine oil, anti-freeze fluid and window cleaning liquid are very flammable and dangerous.



⑯ Diesel Fuel Label



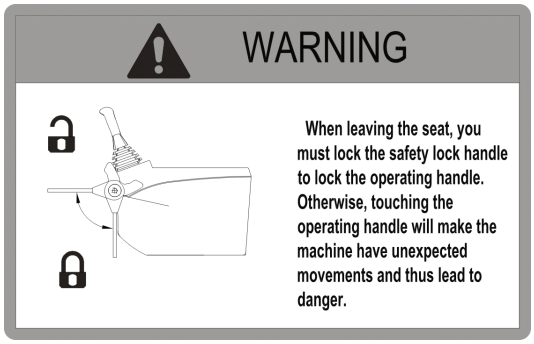
⑰ Probable Damage of Lifting Hole



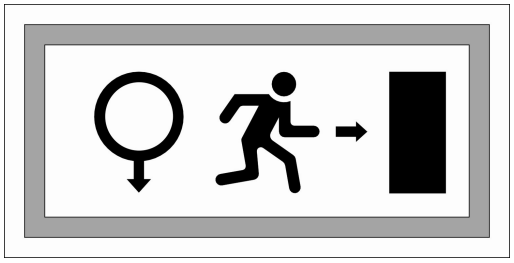
⑱ Warning for Leaving Seat

When leaving the machine, the driver must lock the lockout control.

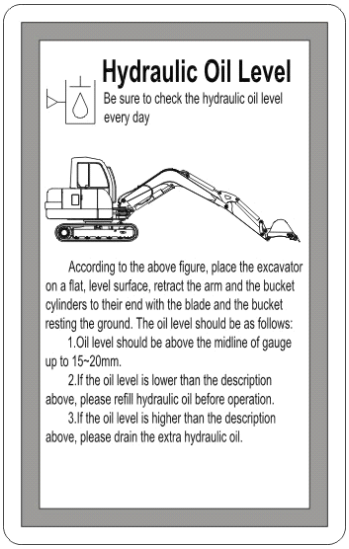
To prevent the machine being moved by staff without approval, please close the cab door and lock all the devices with key.



⑲ Method of Safe Escape

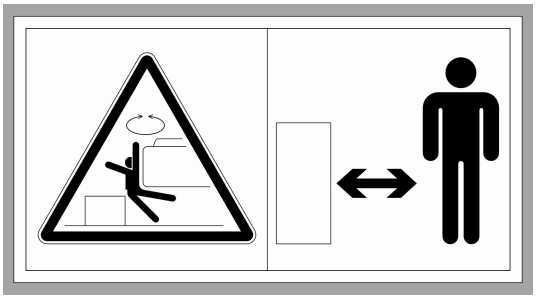


⑳ Check Hydraulic Oil Level

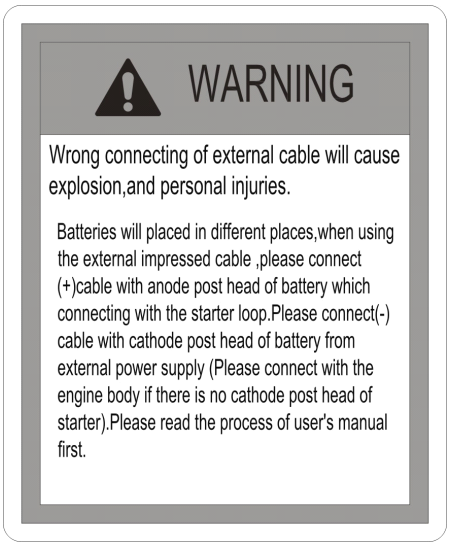


㉑ Swing Range is Forbidden to Enter

When the machine works, please stay away from the swing range of machine, to prevent being extruded by the machine superstructure.



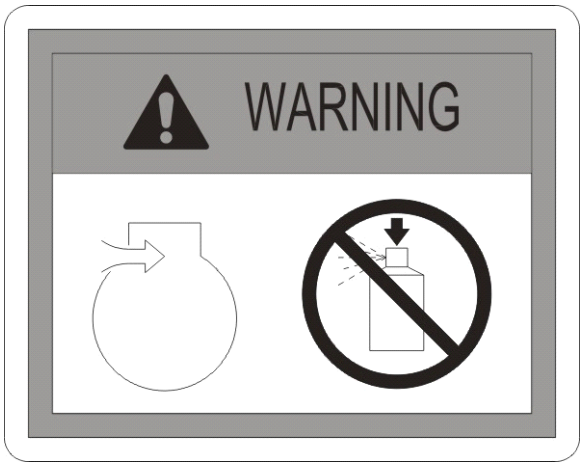
㉒ Incorrect Connecting of Jump Start Cable



㉓ Warning for Air Filter

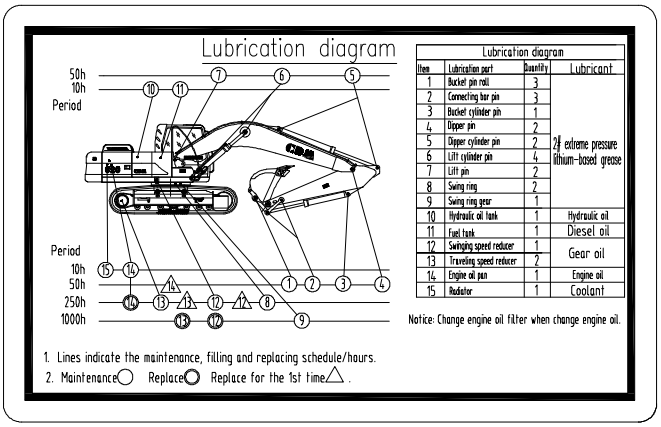
The component with this label isn't suitable for any machine equipped with ether auxiliary start.

This machine is equipped with air inlet pre-heating device, so ether can't be injected into the air supply duct. If ether is used, severe accident will be probably caused.



㉔ Lubrication Diagram

Please refer to "Technical Maintenance of Product" for details.

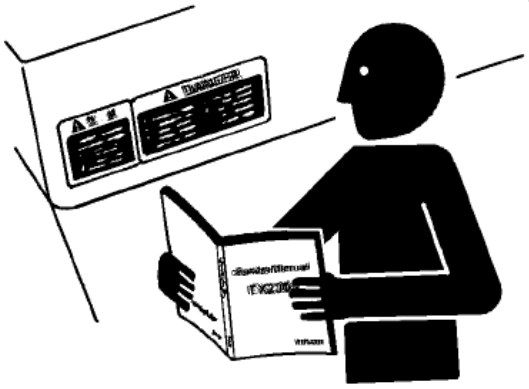


Lubrication diagram

Item	Lubrication part	Quantity	Lubricant
1	Bucket pin rod	3	2# extreme pressure lithium-based grease
2	Connecting bar pin	3	
3	Bucket cylinder pin	1	
4	Dipper pin	2	
5	Dipper cylinder pin	2	
6	Lift cylinder pin	4	
7	Lift pin	2	
8	Swing ring	2	
9	Swing ring gear	1	
10	Hydraulic oil tank	1	Hydraulic oil
11	Fuel tank	1	Diesel oil
12	Swinging speed reducer	1	Gear oil
13	Traveling speed reducer	2	
14	Engine oil pan	1	Engine oil
15	Radiator	1	Coolant

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.



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 check 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

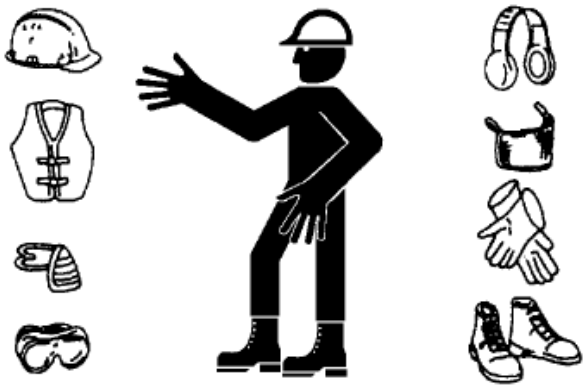
  Anti-radiation clothes

  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.



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".



General Advance Cautions for Cabin

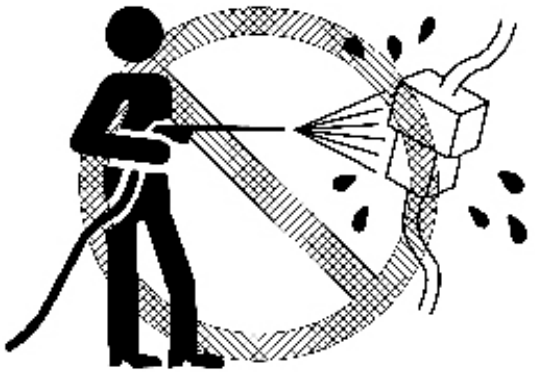
- Before entering the cab, the dirt or engine oil on the sole of working shoes shall be removed thoroughly. For any control device such as foot pedal, if the worker's shoes are pasted with dirt or engine oil, when he/she operate the foot pedal, the foot will slide off the foot pedal to cause personal accident.
- Don't put the part or tool around the operator's seat. They shall be stored at specified position.
- 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.

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.

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 of off the moving machine.
- When getting on and off the machine, note the platform, ladder and handrail are slippery.



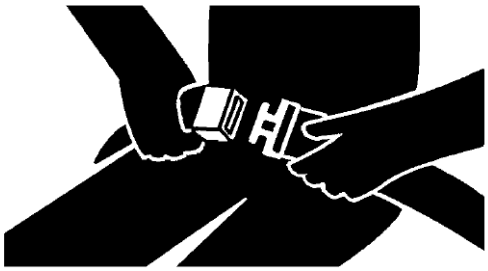
Regulate the Operator's Seat

- 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 abided 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 abided 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 abided 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.



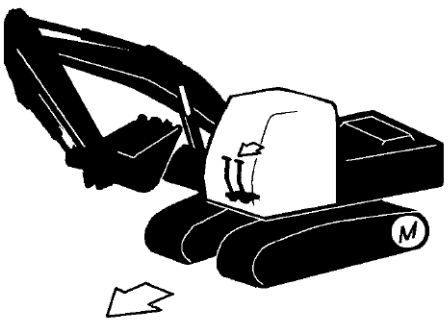
Signal Shall be Specified When Multiple Machines Operate Simultaneously

- 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.



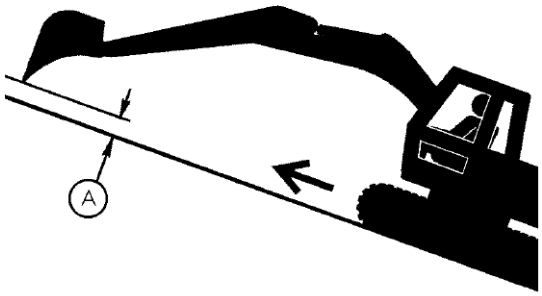
Confirm Travel Direction of the Driven Machine

- 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.

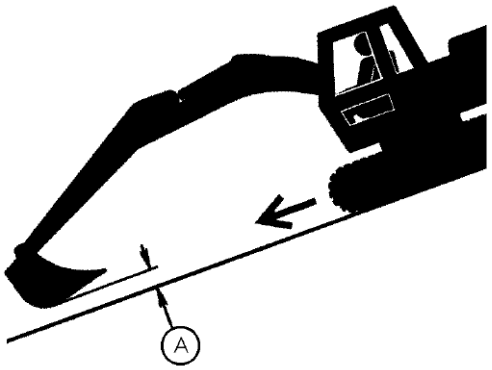


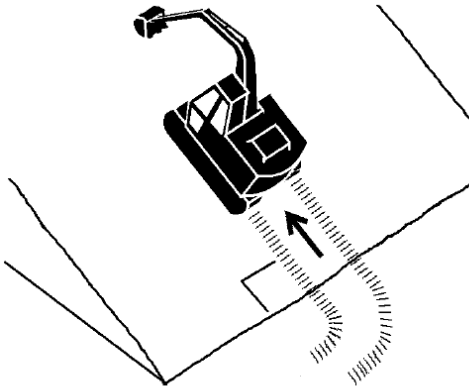
Drive Machine Safely

- 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.

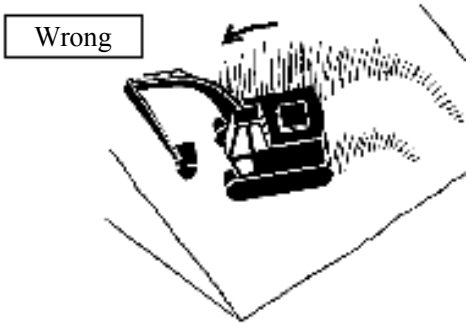


- The machine will skid or roll over on the slope, and severe injury or death will be probably caused.
  - When the machine travels on the slope forward or backward, the bucket shall face the travel direction and about 200～300mm (A) above ground.
  - If the machine skids or is unstable, lower the bucket 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.

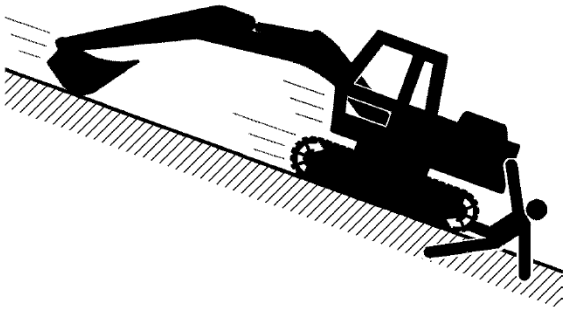


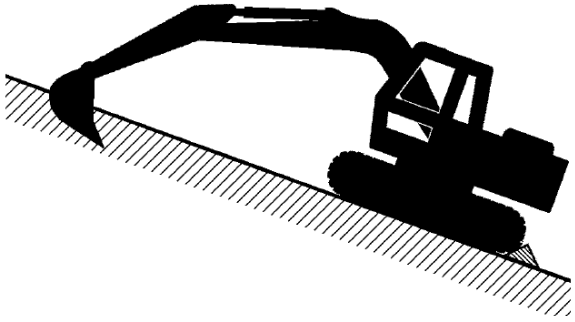
Avoid Being Injured Due to Roll-over Accident of Machine

- If the staff attempts to get on or block the moving machine, severe injury or death will be caused.

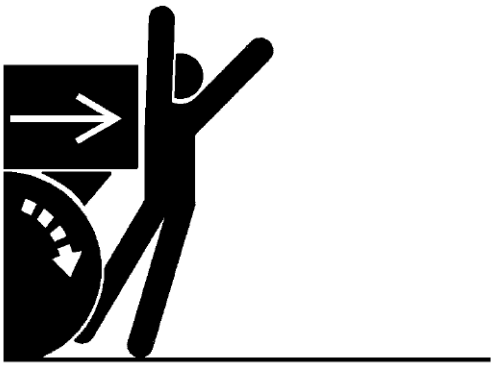
In order to avoid roll-over:

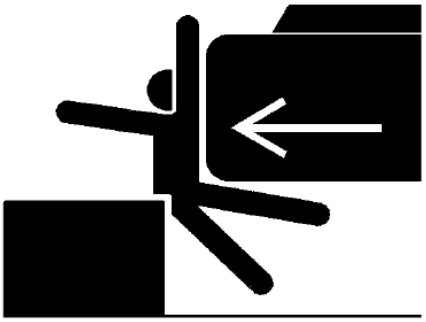
- Select one level ground suitable for machine parking.
- Don't park the machine on the slope.
- Lower the bucket and/or other working tool on the ground.
- Turn the auto-idle/acceleration selector and H/P mode switch to OFF position.
- Run the engine idle for 5 minutes with low-speed and no load to 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

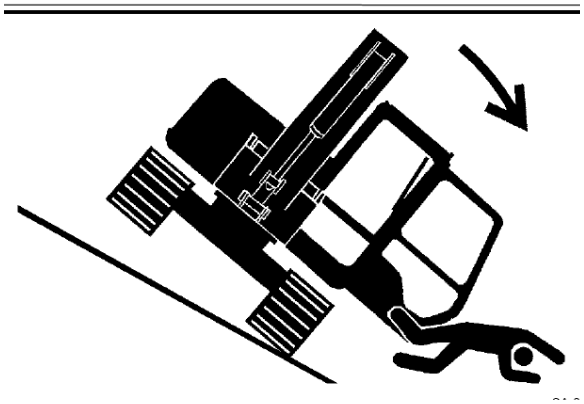




- When the machine reverses or the superstructure slew platform swings, if there is staff near the machine, he/she will be impacted or squeezed to cause severe injury or even death. To avoid accident due to machine reverse or swing:
  - You shall look around before reverse or machine swing. All the staves 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

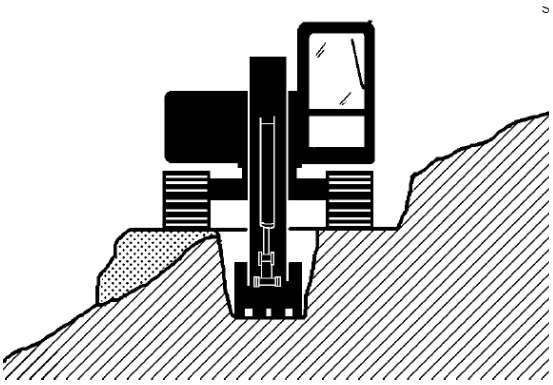
Don't attempt to jump off the inclined vehicle, it'll cause severe injury or life danger. The speed of vehicle roll-over is faster than your jumping speed. Fasten the seat belt.



- 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 travels unstably.

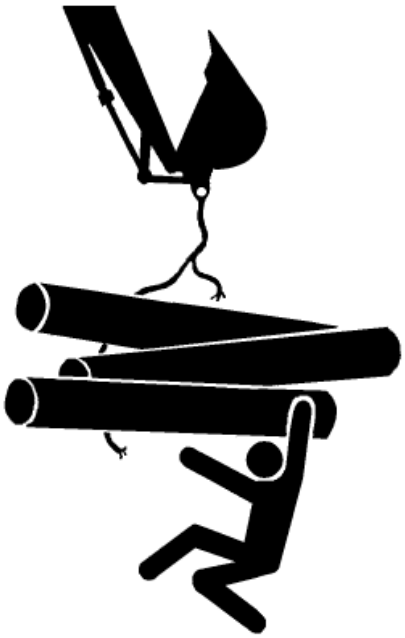
Avoid Wire

- 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.



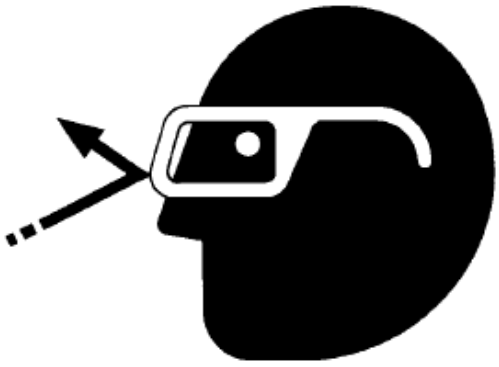
Lifting Objects

- If the lifted article is lowered, the staff nearby will be impacted or pressed by the lowered article, to cause severe injury or even death.
    - When lifting is performed by this machine, local rules must be abided by.
    - Don't use the damaged iron chain or scraped steel cable, lifting tool or cable.
    - Before lifting is performed, the position of superstructure slew platform shall be confirmed, and make the travel motor at the back.
    - The load shall be moved slowly with care. Sudden movement is forbidden.
    - All the staves shall leave load.
    - The load can't pass over the staff.
    - Anyone can't approach the load until it has been in position on the bearing block or lowered on the ground safely and reliably.
    - The chain or lifting tool can't be assembled on the bucket tooth. The bucket tooth will be probably disconnected to cause load falling.



Prevent the Ejected Scrap

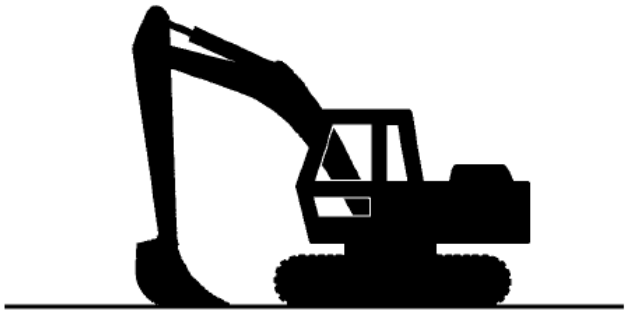
- If the scrap hits eyes or any part of body, severe injury will be probably caused.
  - Prevent the injury due to metal block or scrap; wear goggles or safety glasses.
  - Before any article is knocked, the staff nearby shall leave working area.



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.



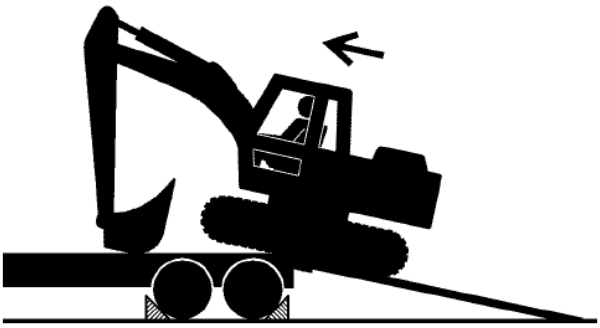
- All the fuel, most of lubricating grease and some coolant are inflammable.
  - Store the inflammable fluid at the place without fire risk.
  - Don't burn or punch the pressure container.
  - Don't store the oily wiping cloth, it'll probably catch fire or cause spontaneous fire.
  - The oil filler cap 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 abided 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) Connect the chain or steel cable on the machine frame reliably.



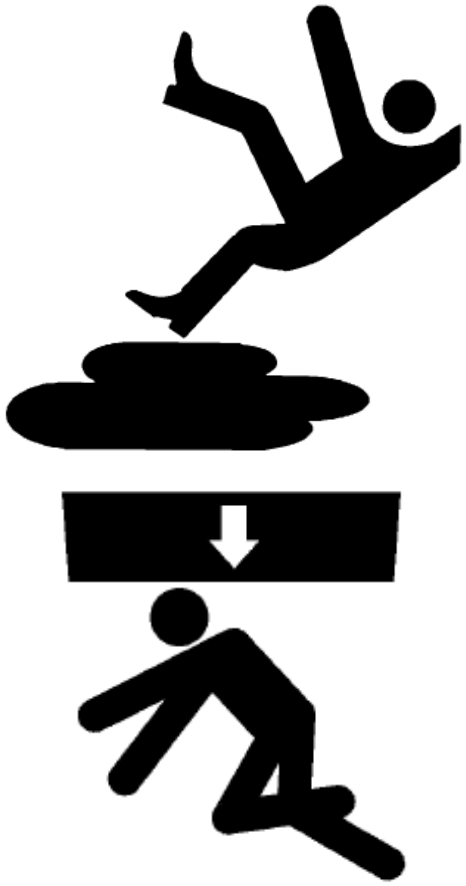
Implement Safety Maintenance

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° ～ 110°. 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 uninflammable 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.

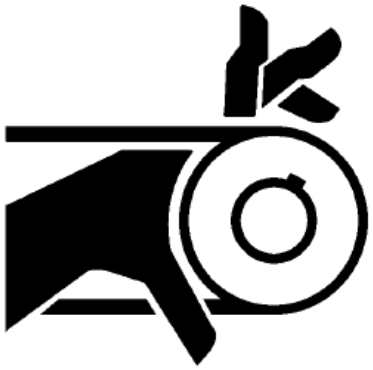


Support Machine Correctly

- 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.



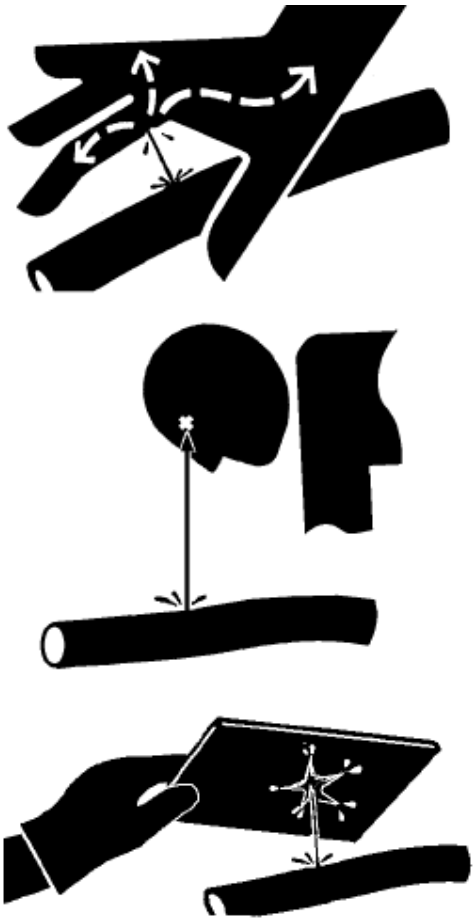
Replace the Rubber Hose Regularly

- 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.



Check the emergency braking switch of engine:

- If fire happens and the sealed air in the hydraulic oil tank can't be released, fire-extinguishing will be influenced and fire will become bigger.
    - Check the emergency braking switch function of engine every other 250h.

1) Start and run the engine under low idle speed.
2) Turn the emergency braking switch of engine to the "Emergency stop" position.
3) Ensure all the engines have been stopped and the sealed air of hydraulic oil tank is released (hiss sound can be heard).
    - If any abnormal condition is found, repair it before machine operation.

Check heat shield:

- The damage and loss of heat shield will probably cause fire.
    - For the damaged or lost heat shield, it shall be repair or replaced before machine operation.

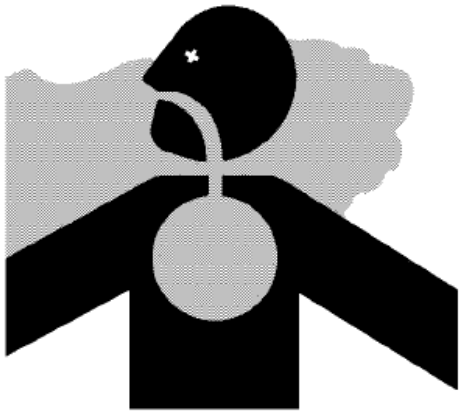
Leave Machine When Fire Happens

- 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, fire extinguisher can be used.
    - 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. Refer to the chapter of escape method at emergency.



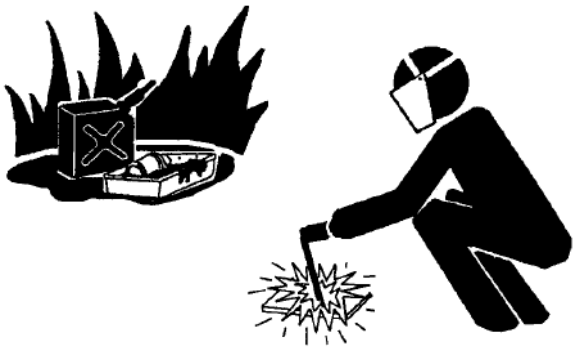
Be Aware of the Discharged Fume

- 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 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.



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.

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.



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℃ (60℉).
  - 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.



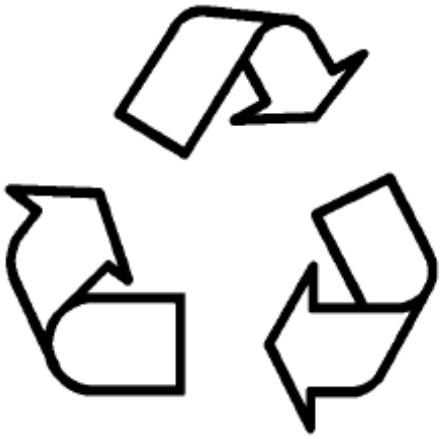
Handle Chemicals Safely

- 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 by LONKING 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 abided 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 abided 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.



Memo：

Chapter III
Product Information

Product Features

⊙ **Strong power system**

Adopt strong, high-torque and turbocharged direct-injected Cummins B3.9 - C engine, the engine can meet high-altitude work requirement and conforms to Euro II Emission Standard.

⊙ **Advanced hydraulic system**

- Adopt negative flow control system or dual-pump double-circuit constant power control system.
- Adopt boom holding system and swing cushion valve control.

⊙ **Excellent computer monitoring system**

- Adopt the independently designed and develop MCSS electronic control system, use computer to comprehensively control the engine and hydraulic pump, so that engine can match hydraulic pump perfectly to realize optimal energy-saving.
- Set three power control modes to meet different load requirements.
- Adopt the integrated electro-mechanical hydraulic technology to realize intelligent control, this technology can perform auto-diagnosis and auto-alarm display to the fault, and it can provide functions of automatic idle speed, automatic engine overheating protection, auto-prompt of maintenance information and history fault log.
- The multi-function monitor can fully monitor engine speed, coolant temperature, engine oil pressure and fuel level and so on.

⊙ **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 control box can be moved to the optimal position on the level-2 slide-way according to the condition of each 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.

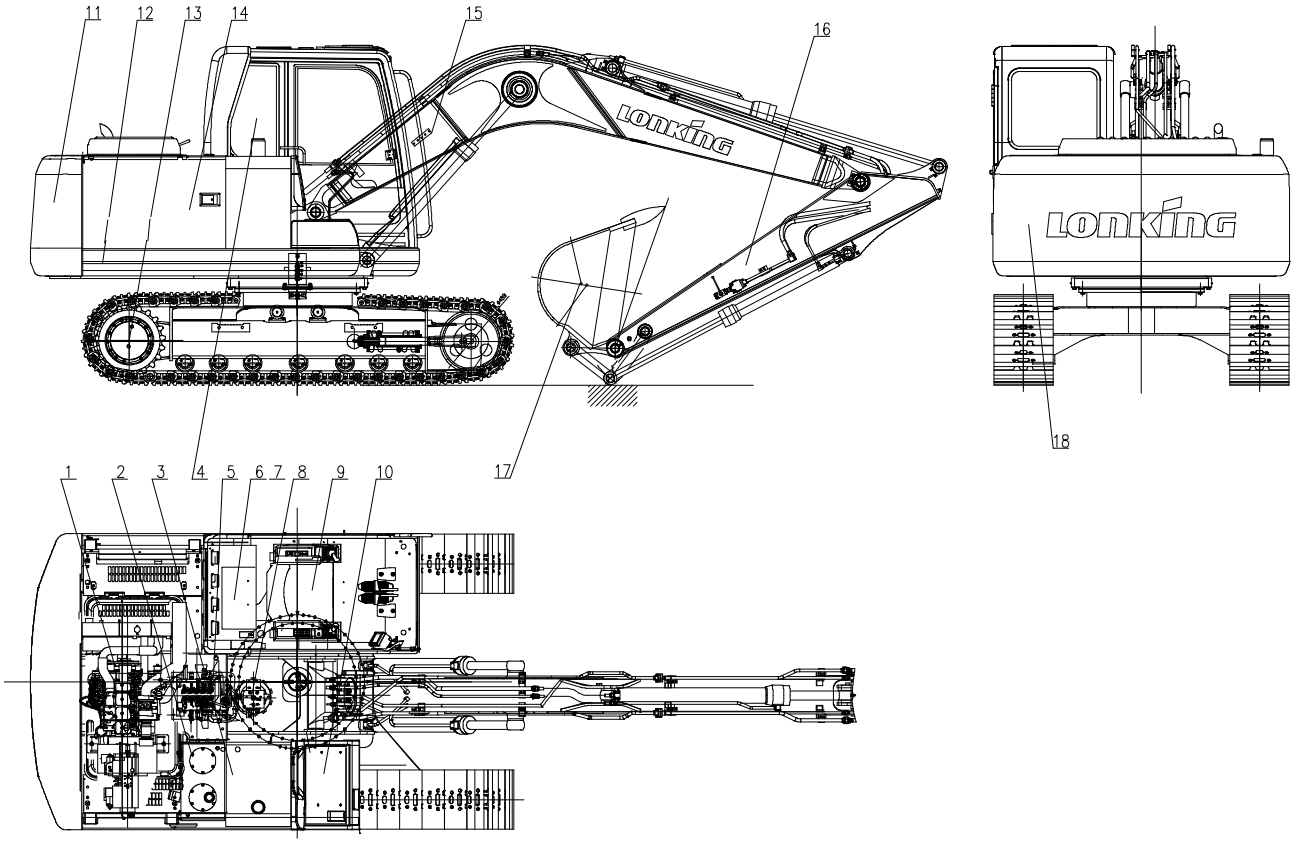
⊙ **Convenient maintenance system**

- 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.
- The electric elements are arranged in the cab and electric cabinet, convenient for maintenance.
- 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

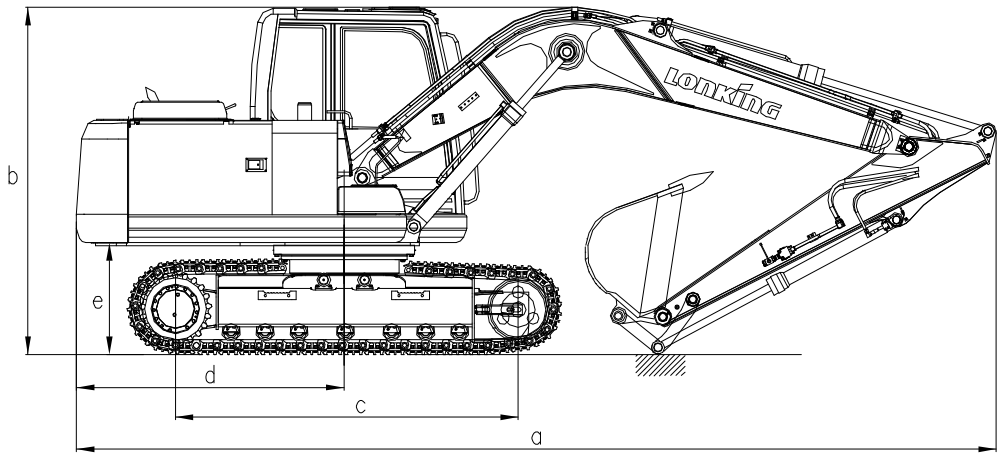
The hydraulic excavator belongs to an earthwork construction machine featured by strong function and wide application scope. The excavator can be used for excavation, loading and unloading; the standard working equipment is used for soil below III, after special attachment is configured, it can be used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

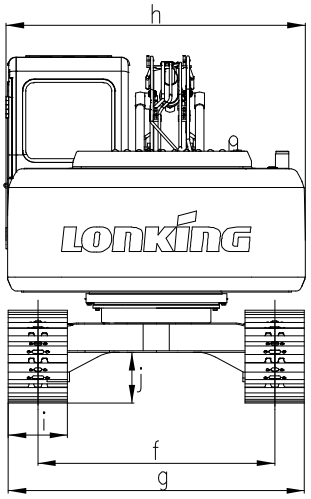
Machine Profile



No.	Name	No.	Name	No.	Name
1	Assembly of power device	7	Air-conditioning system	13	Assembly of undercarriage
2	Assembly of hydraulic oil tank	8	Rotation driving device	14	Assembly of covering part
3	Assembly of fuel tank	9	Seat installation assembly	15	Boom assembly
4	Cab assembly	10	Tool box	16	Arm assembly
5	Hydraulic system	11	Counterweight assembly	17	Bucket assembly
6	Electronic control system	12	Platform assembly	18	Label

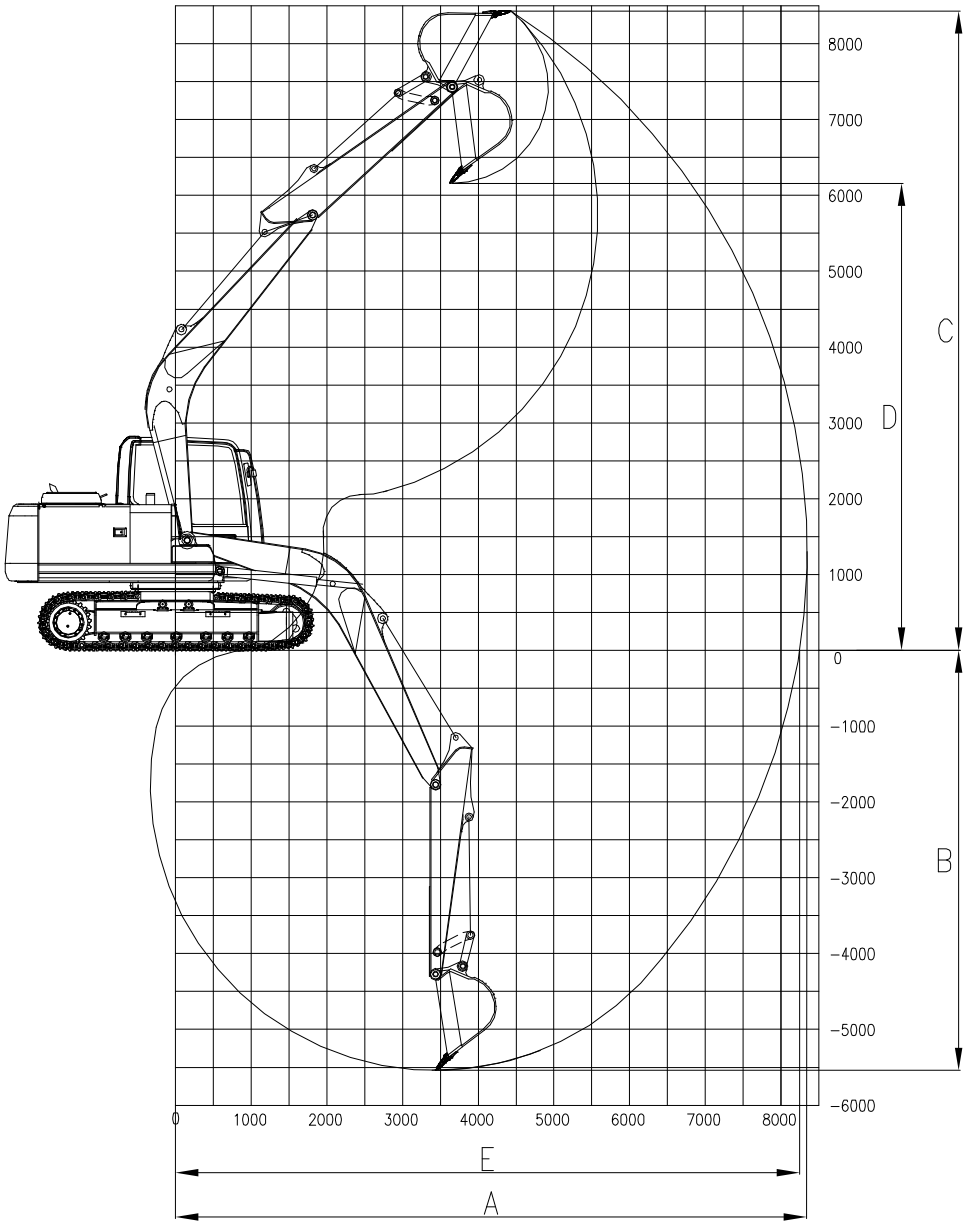
Specifications





a	Overall Length	7730 (mm)
b	Overall Height	2868 (mm)
c	Tumblers Distance	2880 (mm)
d	Radius, Swing Center to Rear End	2250 (mm)
e	Counterweight Ground Clearance	924 (mm)
f	Track Gauge	1990 (mm)
g	Overall Width	2490 (mm)
h	Width of Upper Structure	2500 (mm)
i	Track Shoe Width (Standard)	500 (mm)
j	Min. Ground Clearance	422 (mm)

Working Range



A	Max. Digging Radius	8336 (mm)
B	Max. Digging Depth	5542 (mm)
C	Max. Digging Height	8434 (mm)
D	Max. Dumping Height	6160 (mm)
E	Max. Digging Radius on the Ground	8214 (mm)

Performance Parameters

Machine	Approximate Weight	14000 (kg)
	Bucket Volume	0.56 (m^3)
	Bucket Volume Range	0.25-0.75 (m^3)
	Pressure to the Ground	45 (kPa)
	Travel Speed (Low/High)	3.34/5.5 (km/h)
	Rotation Speed	11.9 (rpm)
Engine	Model	B3.9-C
	Power	86/2200 (kW/rpm)
	Displacement	3.9 (L)
	Fuel Tank Capacity	265 (L)
Hydraulic system	Work Pressure	30.4/34.3 (MPa)
	Flow	120×2 (L/min)
	Hydraulic Tank Capacity	156 (L)
Working Equipment	Boom Length	4600 (mm)
	Arm Length	2500 (mm)
	Bucket Radius	1270 (mm)
Digging Force	Max. Bucket Digging Force	85 (kN)
	Max. Arm Digging Force	65 (kN)

Chapter Ⅳ
Product Operation

WARNING

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

Before Engine Started

Check Around the Machine

- In order to extend machine service life, before getting on the machine and starting the engine, the driver shall go around the machine to perform thorough check.
  - Observe surrounding area and underside of machine to check whether dirt is accumulated, bolt is loosened, oil is leaked, coolant is leaked, part is damaged or worn.
  - Check tooling and hydraulic component.
  - Please refer to the "Maintenance period chart" in this Manual to acquire all maintenance instructions.
  - Please check all the lubricating oil levels, coolant levels and fuel levels.

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.
- When the machine is transported from China LONKING Co., Ltd, the machine 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 "SAE J386 JUN85" and "SAE J386 JUN93" standard. If it's to replace part, please consult China LONKING agent.
- 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.

Engine Start

Engine Start with Temperature Above -18℃

CAUTION

The engine start switch must be set for "ON" position, and the engine runs normally to realize normal electric function and hydraulic function. This procedure must be abided by, else machine will be damaged severely.

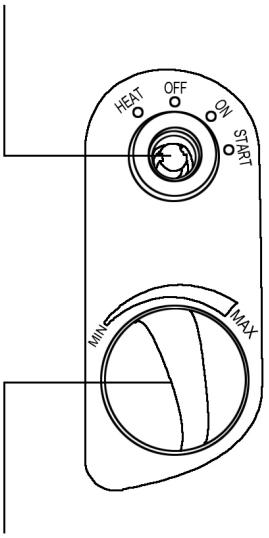
1) Set the battery break switch for "ON" position.
2) Ensure the reset button of circuit breaker is kept press-down position. Please refer to related contents of "Circuit breaker-reset" in this Manual.
3) Move the hydraulic starting joystick to "Lock" position.
   - This machine is equipped with engine neutral start system. This system requires that the engine can be only started when the hydraulic starting joystick is set for "Lock" position.
4) Move each joystick to "Hold" position.
5) Set the engine start switch ① for "ON" position.
6) Monitoring system start.

Note: For details of monitoring system, please refer to "Monitoring System Instruction".

7) If the engine start switch is kept at "ON" for over 2s, the check before monitoring system start will be started.
   - If the liquid level is below the specified height, this liquid level will be indicated by the information display. When the liquid level is too low, liquid shall be filled before the engine is started.
   - For more information of monitoring function before start, please refer to "Monitoring System Instruction".
8) Ensure "ON of air intake heater" isn't indicated on the information display.
   - If this information is indicated on the information display, it'll mean the engine coolant temperature is too low and the engine can't be started stably.

Note: If the engine coolant temperature is low, the air-intake heater will be started, and the information "ON of air intake heater" will be displayed on the screen. The engine shall be restarted after the information disappears.

① Engine ignition switch



② Engine speed knob

9) Turn the engine speed knob ② to the medium speed position.
10) Set the engine start switch ① for "ON" position.
11) After the engine is started, release the engine start switch key.

CAUTION

- The start motor can't run over 30s.
- If the engine can't be started, the starter shall be cooled about 2 minutes before it's restarted.
- Before restart, the engine start switch must be set for "OFF" position.

Engine Start with Temperature Below -18℃

- This machine is equipped with the engine conforming to standard technical specification, and the engine can be started where temperature is below -18℃. For colder area, two types of tool kits can be adopted for engine start.
- If the engine is started with temperature below -18℃, the auxiliary start device for frigid weather can be installed.
- Before the following function or part is added on or replaced to the standard machine, please consult China LONKING agent to acquire more detailed information.

  Increase two batteries

  Replace the start motor with higher capacity

  Replace the system wire with higher capacity

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.

When no auxiliary startup socket is provided, perform according to the following procedure.

1) Confirm the reason why the engine can't be started.

2) Lower the tooling on the ground. Move all joysticks to "Hold" position; move the hydraulic starting joystick to "Lock" position.

3) Turn the start switch of machine to be started to "OFF" position, and switch the power of utilization equipment off.

4) Turn the battery break switch of machine to be started to "ON" position.

5) Move the machine used as power supply near the machine to be started, so that the jump-start cable can be connected to the started machine. Two machines can't contact each other.

6) Stop the engine used as power generator. If auxiliary power supply is used, disconnect the charging system.

7) Ensure the battery covers of two machines are fastened and placed correctly; ensure the battery of machine to be started won't be frozen; ensure the battery electrolyte is sufficient.

8) The positive terminal of jump-start cable is red. Connect one anode of jump-start cable to the positive pole of discharging battery. Some machine is equipped with storage battery.

Note:

- The serial battery maybe placed respectively.
- Please use the pole connected with the electromagnetic coil of start motor.
- This battery or storage battery and start motor are at the same side of the machine.
- The cable anode clip can't contact any metal except the battery pole.

9) Connect the other positive terminal of jump-start cable to the positive pole of power.

10)Connect one negative terminal of jump-start cable to the negative pole of power.

- In the 24V battery system, connect the negative pole of power to the battery break switch of the same storage battery used in the above procedure.

11)Connect the other negative terminal of jump-start cable to the frame of machine to be started. The jump-start cable can't be connected to the battery pole. The jump-start cable can't contact the battery cable, fuel pipe, hydraulic pipe or any other moving part.

12)Start the engine of machine used as generator or connect the charging system of auxiliary power supply.

13)Wait for at least 2 minutes before starting the machine to be started, to charge the battery on the machine to be started.

14)Start the engine of machine to be started.

15)After the engine of machine to be started is started, disconnect jump-start procedure according to the opposite sequence.

16)Make fault analysis on the startup system or charging system of the started machine.

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:

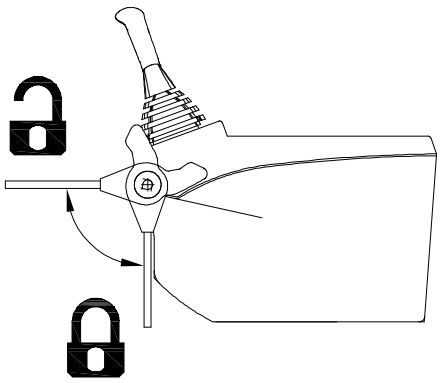
- If the temperature is above 0℃, the engine will be preheated about 15 minutes.
- If the temperature is below 0℃, the engine will be preheated about 30 minutes.
- If the temperature is below -18℃ or the hydraulic function is delayed, longer preheating time will be needed.

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.

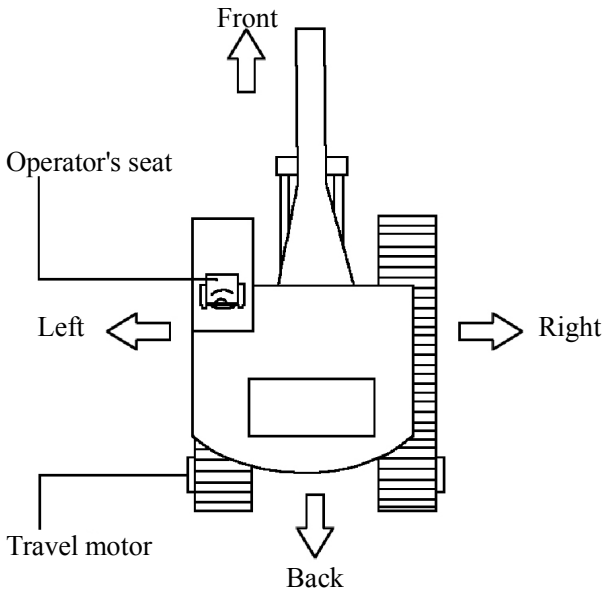
5) Note each instrument and indicator at any moment when working.



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.



Operator Controls

Travel Controls and Joystick Controls

① Cab door locking lever

② Hydraulic lockout control

③ Left joystick control/horn button

④ Left travel control

⑤ Left travel foot pedal

⑥ Right travel foot pedal

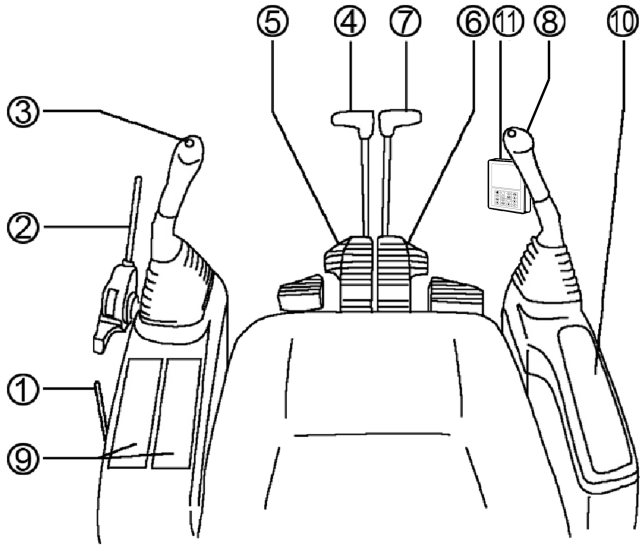
⑦ Right travel control

⑧ Right joystick control

⑨ Left stand case/air-conditioner panel

⑩ Right stand case/start switch/throttle dial

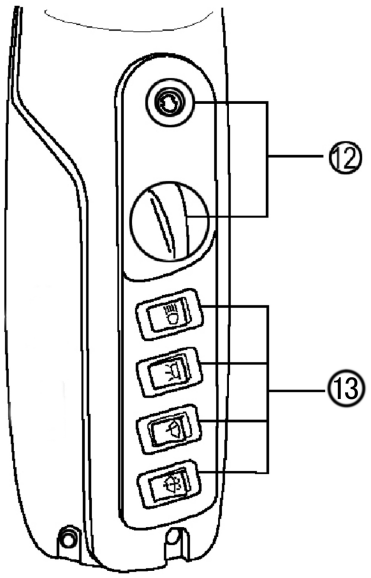
⑪ Electronic control system



Right Stand Case Panel

⑫ Start switch, throttle dial

⑬ Combination switch (from the top to the bottom: boom head lamp, platform head lamp, window wiper, window washer)

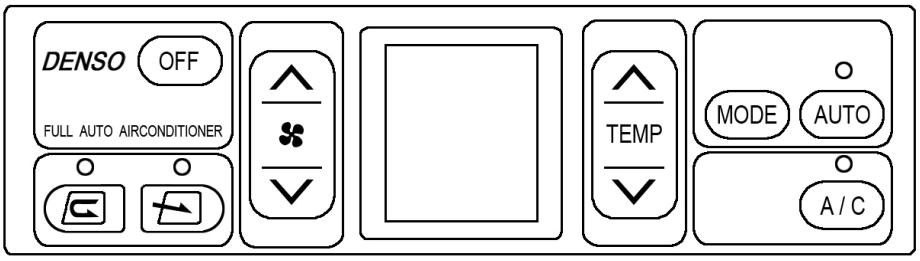


Monitor

- Used to display the intelligent control parameters and it's installed on the cab upright column in the right front of seat.
- Refer to Electronic Control System Operation Instruction for monitor operation.

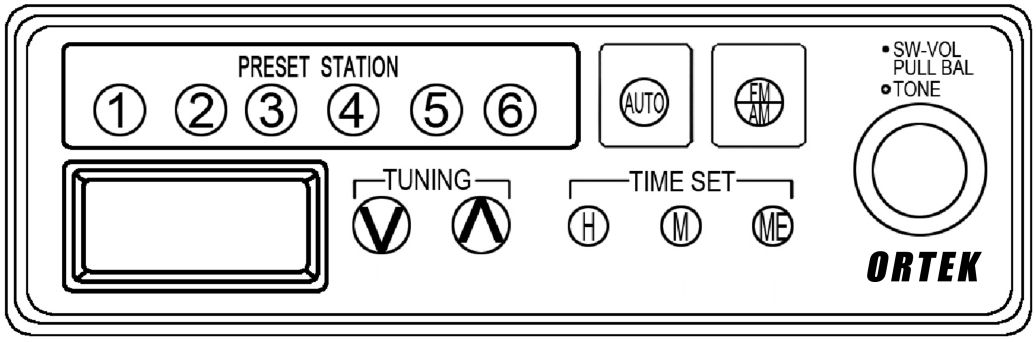
Air-conditioner Regulator

- The air-conditioner regulator is installed on the left stand case panel.
- Refer to related contents of the next section "Air-conditioner Use" for specific operation of air-conditioner regulator.



Radio

- The radio control panel is on the left stand case panel.
- Refer to related contents of the next section "Radio Use" for the specific operation of radio.



MCSS Electric Control System

- **System operation and display interface**

The left of upper part is fuel gauge, the right is water thermometer.

The lower part is as follows:

The position at the top left corner where 1 is displayed is the gear 1-10 of engine speed gear;

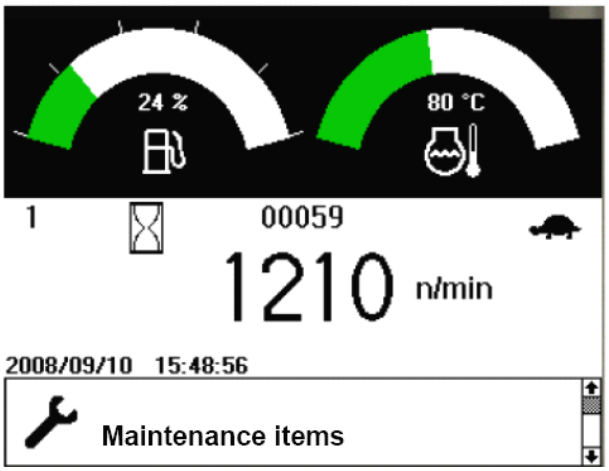
00059 is displayed in the middle of upper part, indicating total time of engine running;

The tortoise icon at the top right corner indicates low-speed running of current machine;

1210 is displayed in the right middle, indicating current engine speed;

The current time is displayed at the bottom left corner.

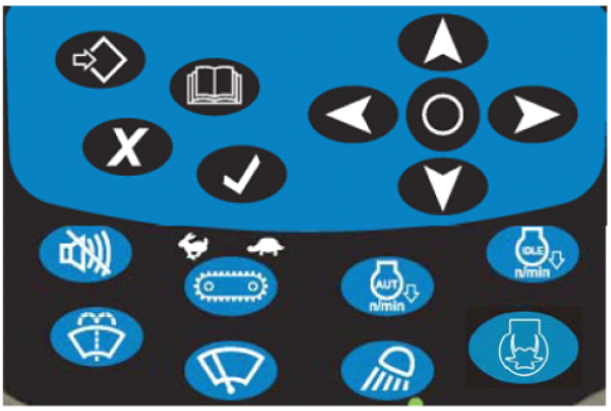
When the safety mechanism is locked, "Locked" icon below the travel status.



Display interface

- **Key instruction**

The upper part is menu operation key, and the lower part is the function operation key.





The key can be pressed to access the Settings interface directly, reset the Contrast, Backlight, Buzzer Volume, Key Clicks, Change Language, Set Clock, Factory Setup, Restore Factory Defaults, and view the vehicle information, display, software & hardware version number of controller in About menu.



Return key



Enter key



The key can be pressed to access main menu as the right Figure.



The options of Machine Status, Settings Maintenance Help, Maintenance Records and Alarm History can be selected via the Up and Down key, after it's selected, press  key to view detailed information.



Up key.



Down key.



Left key.



Right key.



Enter key.

- **Instruction of function key**


Alarm cancel key.


High-and-low speed switch key, if current condition is low-speed status, the screen will display tortoise icon, meanwhile, press this key and the right green lamp of tortoise will be on; when this key is pressed, the green lamp beside the rabbit icon at the left of this key will on, and the screen will display rabbit icon simultaneously, and high-speed status has been switched.


Windscreen wiper switch key.


Windscreen wiper switch/change-over key. Press the key once, the wiper will work under low-speed, and the green lamp at the left of key will be on simultaneously; press the key twice, the wiper will work under high-speed, and the green lamp at the right of key will be on; press the key three times, the wiper will work continually, and the green lamps at both sides of key will be on; press the key four times, the wiper will stop work, and the green lamps at both sides of key will be off simultaneously.


Auto idle speed/manual idle speed mode switch key, when lamp is on, it'll be auto idle speed mode.


Manual idle speed ***enabled/disabled*** key, when lamp is on, it'll be enabled mode, and it'll be effective under manual idle speed mode.


Working lamp switch change-over key. Press the key once, the working lamp of platform will be on, and the left green lamp will be on simultaneously; press the key twice, the working lamps of platform and boom will be on simultaneously and the green lamps at both sides will be on; press the key three times, the working lamps of platform and boom will be off simultaneously, and the green lamps at both sides will be off.


Working mode selector switch.

This switch is used to set the operation and operating force of working equipment. The operation will be easier through selecting the mode matching the operation type.

Please select the working mode via the keys on the display panel in accordance with the working condition and self-demand:

H mode: heavy-load mode

S mode: economic mode

L mode: light-load mode

B mode: break mode

The fine regulation of above mode can be performed via the throttle dial.

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

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

1) Start the engine

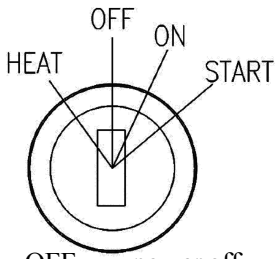
  - Turn the key switch to ON position.
  - Turn the key switch to start the engine. Release the key and the switch will return to ON position.

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.

2) Shut down the engine

If the engine isn't shut down correctly, the turbocharger will be probably damaged.

- 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 middle position.



OFF——power off
ON——power on
START——start
HEAT——preheat

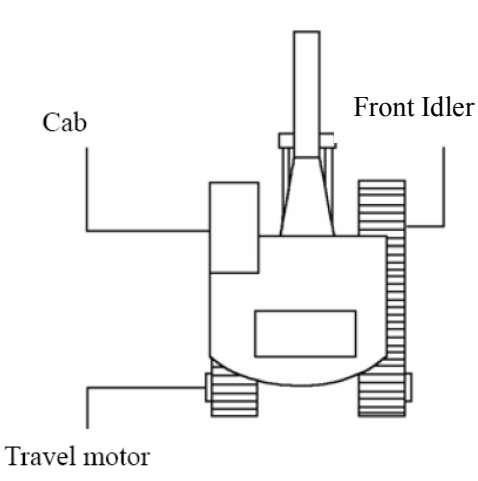
- Pull the hydraulic lockout control and set it for "Lock" position.

Machine power off: disconnect the manual power main switch

Driving Machine

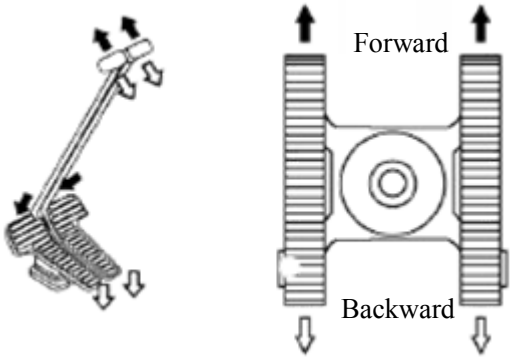
When the machine travels for long distance, please rotate the cab so that the travel motor is at the back.

When the machine travels on the slope downwards, please control the foot pedal slowly.



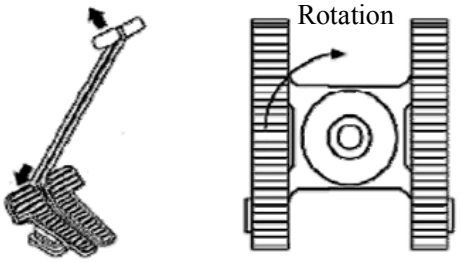
- **Travel**

- 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.

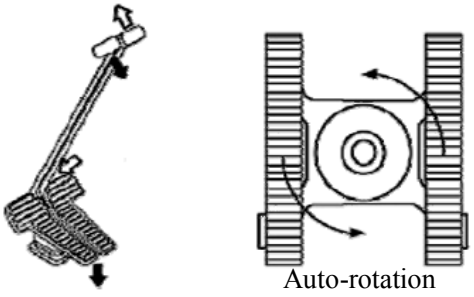


- **Rotation**

  - 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.

- **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 1200rpm 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.

Long-term Storage

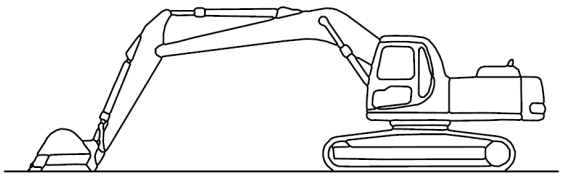
- **Before storage**

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 LONKING 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, the machine shall be operated once every month so that the part surface can be coated with new oil film. Meanwhile, the battery shall be also charged.
- 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 LONKING agent.

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

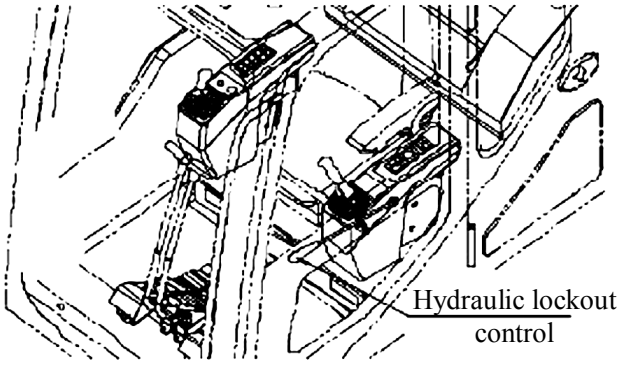
- Remove the lubricating grease coated on the surface of cylinder piston rod.
- Fill engine oil and lubricating grease to all positions.
- When the machine has been stored for long time, the moisture in the air will enter the oil. Before the engine is started or after the engine is started, the oil of all positions shall be checked. If the oil contains water, the whole oil shall be replaced.

Operate Machine

CAUTION

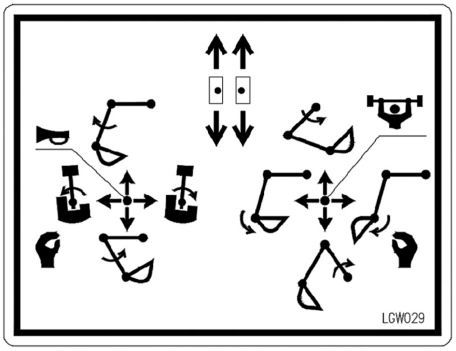
- When the machine swings to trench, don't use the trench to stop swing.
- If the boom impacts the bank or object, check whether the machine is damaged.
- If the boom impacts the bank or object or stop the boom with object again and again, the structure damage will be caused.
- The combination of one 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.

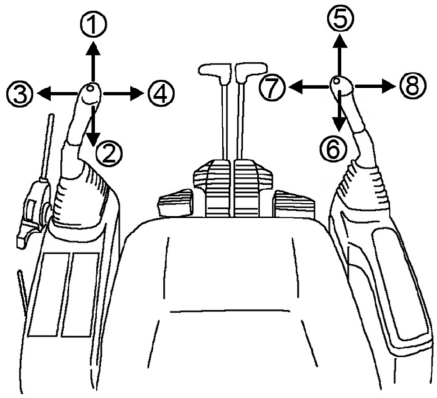
- **Hydraulic lockout control**
- The hydraulic lockout control can close the hydraulic pilot oil flowing to the pilot control valve.
- When the hydraulic lockout control is set for lock position, even though the control or foot pedal is touched, the machine won't move.
- No matter when shutting down 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.

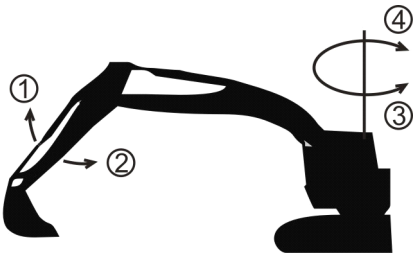


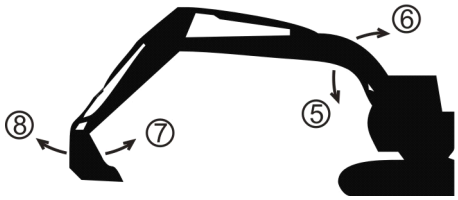
- **Joystick controls(standard mode)**

- 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

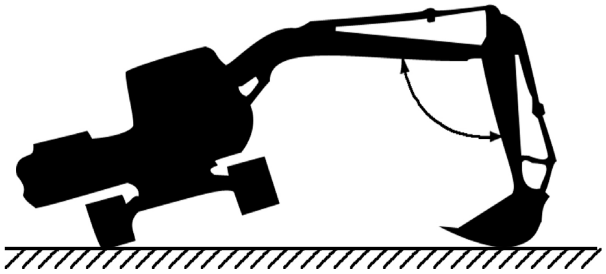
- Any part of body can't protrude the window frame.
- If the body protrudes window frame and touch the control rod accidentally, it'll be injured by the boom.
- If the window is lost or damaged, please replace it immediately.
- Before operation is started, please be familiar with the position and function of joystick controls (as the right Figure).

(1) Arm out
(2) Arm in
(3) Swing left
(4) Swing right
(5) Boom lower
(6) Boom raise
(7) Bucket in
(8) Bucket out

- **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 stilled operated, the machine can be towed. When the machine is towed, please connect steel cable correctly.

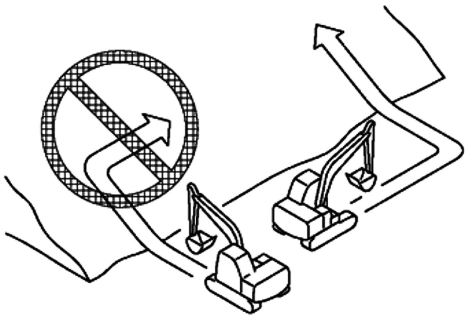
- **Avoid roll-over**

• 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 avoided.

• 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.

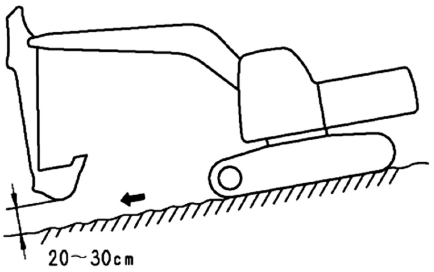
• Avoid crossing the slope

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 traveling downhill, the machine shall be driven with low speed via joystick and throttle knob.

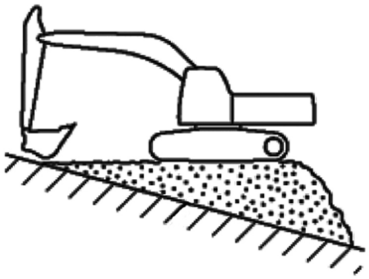
When traveling downhill over 15°, the working device shall be regulated to the status as the right Figure and the engine speed shall be lowered.

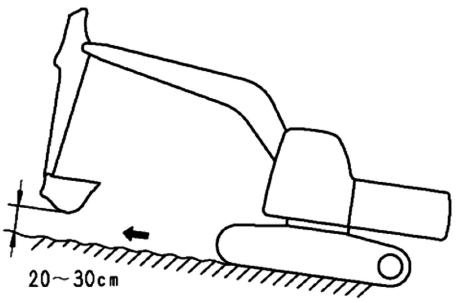


Note:

- When traveling downhill, the side of carrier roller shall be downward.
- If the side of carrier roller is upward when the machine travels downhill, the track will be loosened to cause tooth-leap.

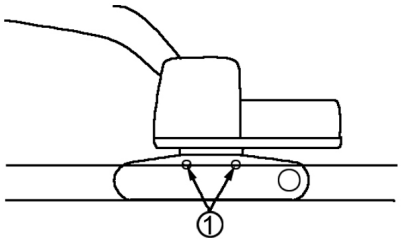
• When traveling uphill over 15°, the working device shall be regulated to the status as the right Figure.

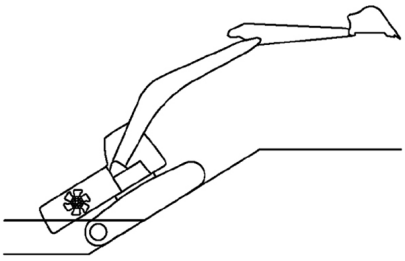




- **Work in the water or muddy water**

- 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).
- 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.
- 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.



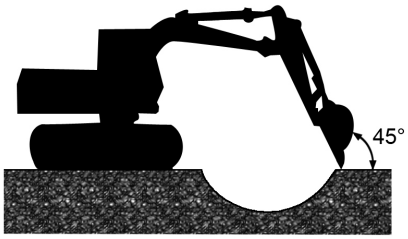


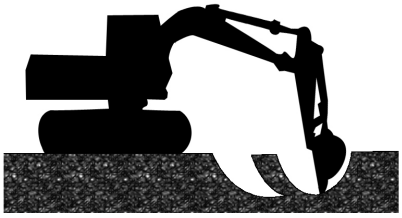
CAUTION

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.

- **Trenching operation**

1) Place the bucket tooth on the ground, and the angle of bucket bottom and ground is 45°.
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.

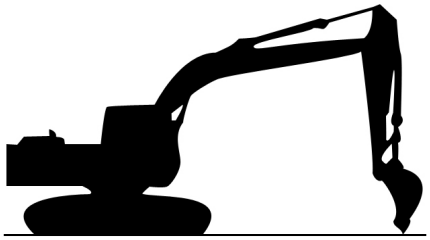




- **Leveling work**

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.

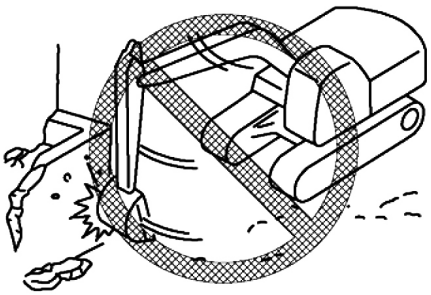
  When only the track of one side is trapped in the mud, lift the track with bucket, and then support wood plate or log and drive the machine out. If necessary, place wood plate under the bucket.

- The tracks of both sides are trapped

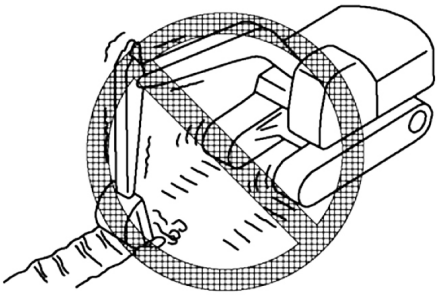
  If the tracks of both sides are trapped in the mud, and the tracks skid and can't move. Place the log or wood under the tracks by adopting the above method. Dig the bucket into the front ground, operate the arm according to the same mode of digging, and regulate the travel control to the forward position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

- **Forbidden operation**

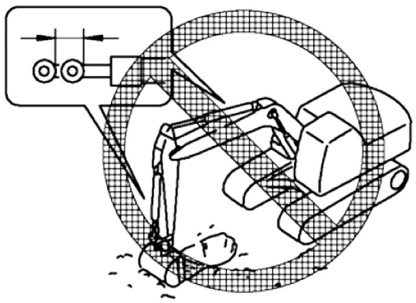
  - Don't use swing force to compact ground or break object. This is not dangerous, but also greatly shortens service life of machine.



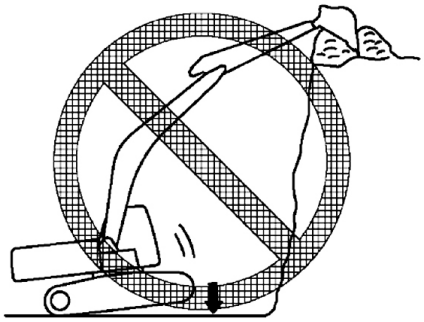
  - Don't dig the bucket into the ground and perform digging via travel force. This will damage machine or working device.



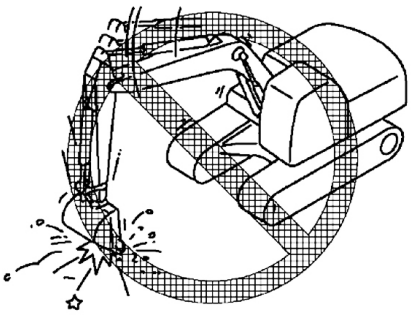
  - When the cylinder piston rod is telescoped to the stroke terminal and the impact is generated by external force, if the working device is used, it'll damage hydraulic cylinder and cause personal injury. Please avoid operation when the hydraulic cylinder is fully retracted or protruded.



- 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.

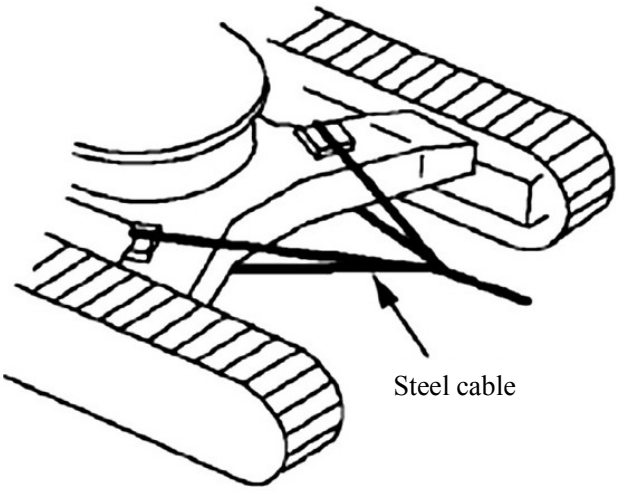
- **Select proper track shoe**
  - The wide track shoe can't be used on the rough ground with rock, sand or grit.
  - The wide track shoe is designed for traveling on soft ground.
  - If the wide track shoe is used on rough ground, the track shoe will be bent or loose and other undercarriage component 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.

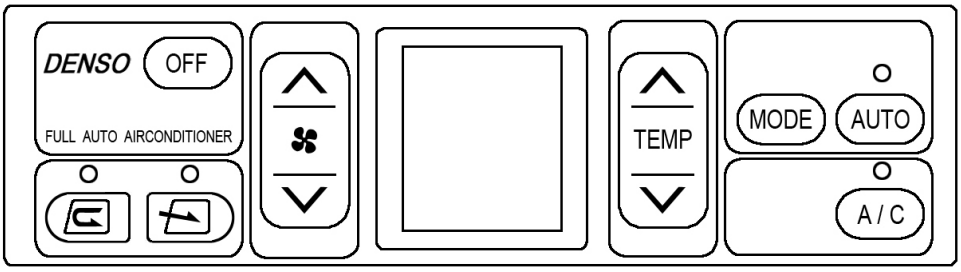


Important

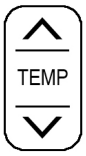
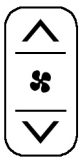
The track frame is provided with two towing holes which can be used to tow the article less than 7540kg. If the weight exceeds the specified range, the towing holes can't be used to tow article.

Air-conditioner Use

Air-conditioner Control Panel



Description of Button Functions

Symbol	Name	Description
	ON/OFF button	This button can be used to switch ON/OFF mode of control panel. When the button is ON, the background light of control panel will be switched on and operation can be started.
	Air-conditioner switch	The command of manual control of air-conditioning system will be sent to the controller via control panel to ensure the compressor will run continually. **Note:** When the air-conditioning system is used, it'll not necessary to press this button. In case of automatic temperature control, the temperature drop can be realized via simple temperature setting.
	Temperature selection	When the temperature selection button is pressed, the displayed value of default temperature will be decreased (∨ key) or increased (∧ key) When the temperature selection button is used to decrease or increase temperature, the displayed value will be decreased or increased by one analog by pressing the button once.
	Air volume selection	Display analog of air volume.
	Air inlet selection switch (Circulated air)	When this button is pressed, the corresponding symbol on the control panel will be on and the air damper receiving circulated air will be opened.
	Air inlet selection switch (Fresh air)	When this button is pressed, the corresponding symbol on the control panel will be on and the air damper of fresh air will be opened.

Cautions

1) The air-conditioning system can be only used after the engine is started. After the engine is shut down, the power switch will be off.
2) If the air-conditioner isn't used in spring, autumn or winter, it must be operated for about 5 minutes every other week to prevent the moving parts of system being rusted.
3) If the heating system is connected with water tank, when the ambient temperature is below 0℃ and the air-conditioner won't be used for long time, the water tank must drain water or filled with anti-freeze fluid to prevent the heater copper tube being frozen crack.

Troubleshooting

1) Press the OFF switch, the display of temperature setting and air volume on LCD will be off and operation will be stopped.
2) When the temperature setting buttons "<" and ">" are pressed unreleased for 3s simultaneously, the troubleshooting mode of LCD will be displayed.
3) Monitor display and fault mode:

Display	Fault mode
E--	No fault
E11	Disconnection internal air sensor
E12	Short-circuit of internal air sensor
E18	Short-circuit of sunlight sensor
E15	Disconnection of water temperature sensor
E16	Short-circuit of water temperature sensor
E43	Damper of ventilation opening is abnormal
E44	The air mix damper is abnormal

4) When over one fault is found, press the temperature setting buttons "<" and ">", the faults will be displayed in turn.
5) After troubleshooting is completed, press the internal and external circulating buttons simultaneously, the fault code will disappear.
6) Press OFF button to recover normal display.

Air-conditioner Operation Method

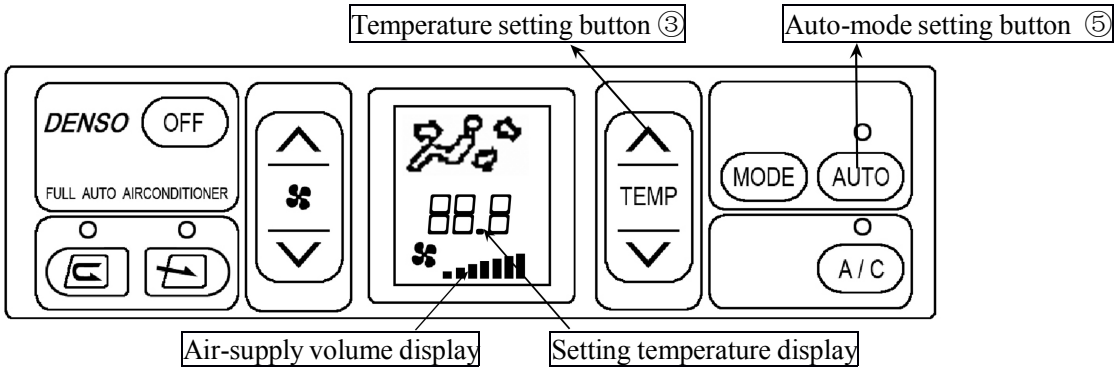
- **Auto-run**

1) If the auto-mode setting button ⑤ is set for ON, the temperature display, air-supply volume, auto-button and the lamp at the upper part of air-conditioner button of LCD will be on.

2) Regulate temperature switch to set comfort temperature. The air-conditioner will switch air-supply volume, air outlet, internal and external air automatically corresponding to the setting temperature. The air-conditioner will run automatically to reach the setting temperature.

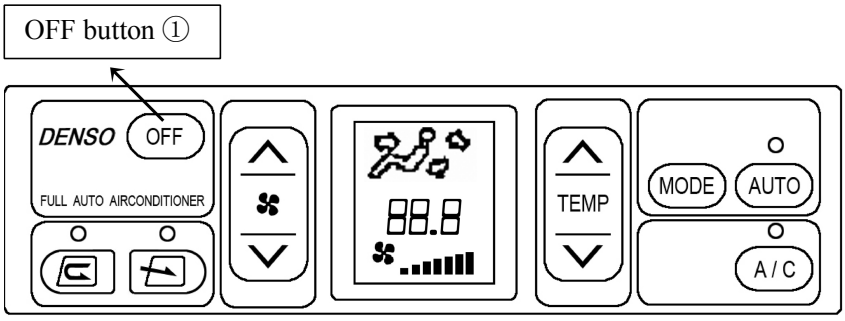
Note

If the lower air outlet of auto-run is under or status, when the engine water temperature is lower, the cooling air will be prevented being discharged and the air-supply volume will be limited automatically.



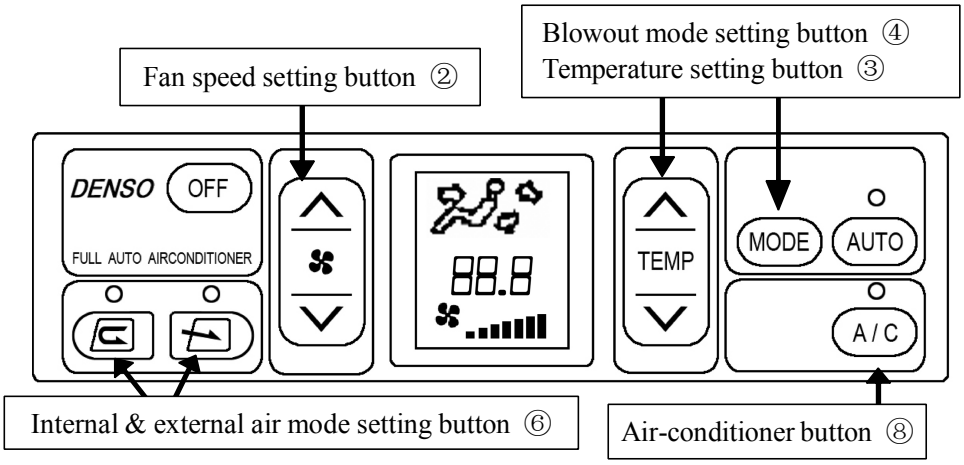
- **Stop of auto-run**

Press the OFF button ①, the setting temperature, air-supply volume, auto-button and the lamp at the upper part of air-conditioner button of LCD will be off, and operation will be stopped.



- **Operation of manual control**

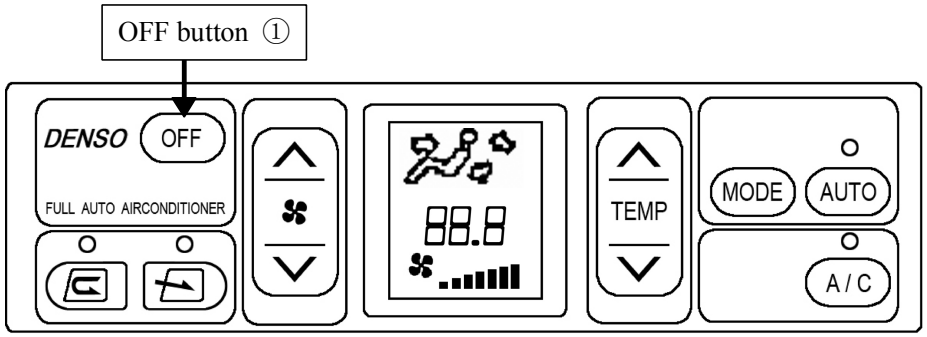
1. Press the fan regulating button ② to regulate the air-supply volume. In addition, the setting temperature and air-supply volume is confirmed via display of LCD.
2. The on/off of lamp at the upper part of switch can be used to judge whether the air-conditioner button ⑧ is on.
3. Set proper temperature via regulation of temperature setting button ③.
4. Regulate the blowout mode change-over button ④ to set the required blowout air opening.
5. Select internal & external air change-over button ⑥ to select the required internal & external air mode.



- **Stop of manual operation**

Press OFF button ①

The setting temperature display, air-supply volume display and lamp at the upper part of air-conditioner button of LCD will be off, and the operation will be stopped.



- **Operation of BYLEVEL mode**

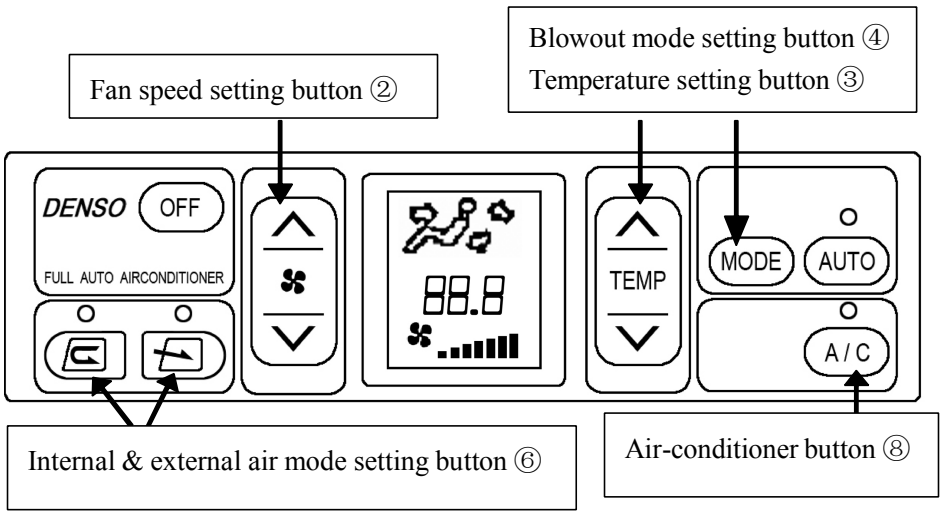
1) Press the fan button ② to regulate air-supply volume. Confirm the setting temperature and air-supply volume via LCD screen.

2) Press the blowout mode setting button ④ to select blowout mode, and it'll be displayed on LCD screen.

3) Set the air-conditioner button ⑧ for ON, and confirm via whether the lamp at upper part of button is on.

4) Regulate the fan speed setting button ②, temperature setting button ③ and internal & external air mode change-over button ⑥ to proper position.

The air blown out from the head direction is cool, and the air from the foot direction is warm, belonging to BYLEVEL operation.



- **Defrost operation**

1) Press the fan button ② to regulate air-supply volume. Confirm the setting temperature and air-supply volume via LCD screen.

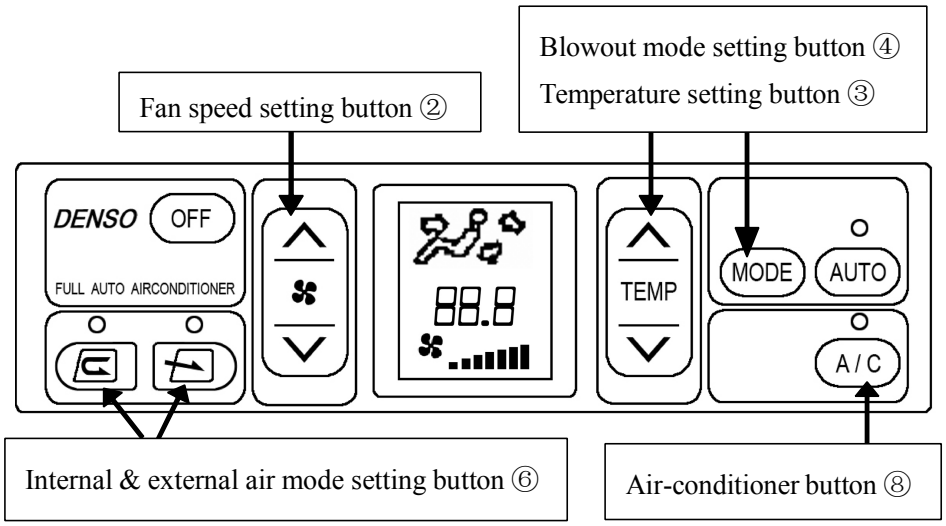
2) Regulate the blowout mode change-over button ④ to dispaly as , and then switch it to .

3) Select the internal & external air change-over button ⑥ to select the external air inlet status.

4) Regulate the temperature control button ③ to set temperature for 32℃ (maximum heating quantity).

   In order to blow the air to the glass, regulate the louver position of each blowout port.

Note If the glass is accumulated with water or dehumidification is needed during the rainy season, press the air-conditioner button ⑧ to remove water.



Radio Use

Radio Control Panel

① Power switch & volume & balance control button

② Tone control button

③ Frequency modulation & amplitude modulation change-over switch button

④ Manual tuning button

- Frequency increasing button ∧
- Frequency decreasing button ∨

⑤ Auto-tuning button

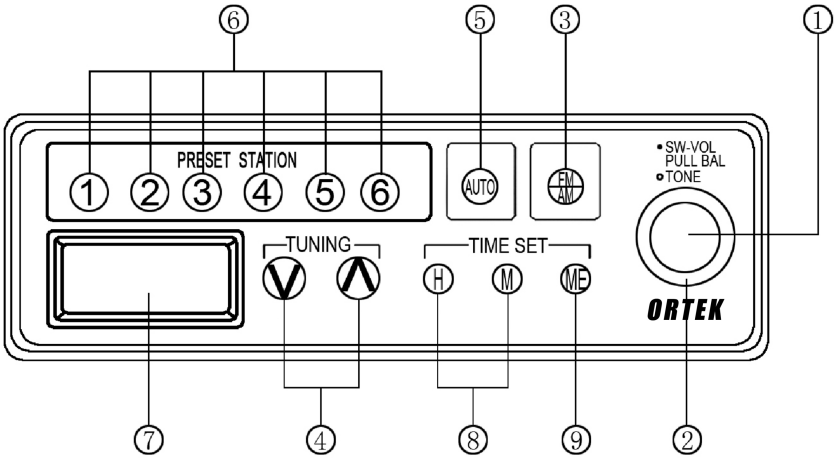
⑥ Station preset button

⑦ Digital display screen

⑧ Time setting button

- Hour button (H)
- Minute button (M)

⑨ Memory button (ME)



Radio Tuning Method

1) Turn the power knob ① clockwise to switch on the radio, and display the turning frequency on the digital display screen ⑦.

- Turn the power switch volume balance control knob ① clockwise and counterclockwise, to decrease or increase volume.
- Turn the tone control knob ② clockwise and counterclockwise to regulate the required tone.
- Slightly pull the power knob ① outward to regulate balance of right and left output sound channel by turning clockwise and counterclockwise.

2) Manual tuning method

- Press the frequency modulation/amplitude modulation change-over button ③ to select the required wave band.
- Press the tuning button ④ to select the required station frequency manually:

FM (frequency modulation): the frequency will be changed by 100kHz by pressing the tuning button once.

AM (amplitude modulation): the frequency will be changed by 9kHz by pressing the tuning button once.

- Frequency increasing button "∧".
- Frequency decreasing button "∨".

3) Auto-tuning function

- Press the auto-tuning button ⑤ over half second, and then release the button, the frequency will be changed to the next higher station frequency. When higher station frequency is to be regulated, the above procedure can be repeated. If the auto-tuning button ⑤ is pressed again before the next higher station frequency is changed, the auto-tuning function will be cancelled.
- When the display screen displays time, press the tuning button ④ or auto-tuning button ⑤, the display screen will be changed from time display to frequency display. Under no-operation status, time display will be converted automatically after 3s.

Preset of radio station

1) Press the power button ① to open radio, and the frequency will be displayed on the digital display screen.

2) Press the manual tuning button ④ or auto-tuning button ⑤ to select the required station frequency. Press the memory button ⑨ and the "ME" will flash on the display screen, and then press the station preset button ⑥ to be stored (the lower right corner of display screen will display the number of this preset button), the selected station will be memorized in the preset button.

3) When the station preset button ⑥ is pressed, the radio sound will disappear, after preset is finished, the radio sound will be played again and the display screen will display the preset station frequency and preset number.

    - Once one station is preset, the radio can be tuned to the preset station frequency by pressing the station preset button.

Cancel of radio preset station

1) The previous preset station will be replaced by the preset station later.

2) When the battery is disconnected or the radio is disassembled from the machine, all the preset stations will be deleted from radio memory.

CAUTION

- In order to avoid work accident, please set the volume for proper position.
- After radio is wet, it'll be damaged, when you wash vehicle, please protect the radio.
- When this machine is under high-power output state for long time, the enclosure temperature will be probably increased to about 70℃, take care!

Setting of digital clock

1) When the display screen displays time, the memory button ⑨ (ME) can be pressed as required, and then press (H-hour) or (M-minute) to regulate the required time.

2) Function of time setting button ⑧

    - Memory button (ME): when the time is set, this button must be pressed unreleased, and then press H or M button as required.
    - Button (H): 1 hour will be increased by press the button (H) once. For 12h system, AM indicates forenoon, PM indicates afternoon.
    - Button (M): 1 minute will be increased by pressing the button (M) once.
    - If the button (H) or (M) is pressed, the hour or minute will be changed continually until the button is released.

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.

LONKING Authenticated Worn Parts

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

LONKING Authenticated Lubrication Oil

LONKING 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.

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

- Standard tightening torque value of universal metric fastener:

(Unit: Nm)

Metric nut and bolt			
Thread size	**Standard tightening torque value**	**Thread size**	**Standard tightening torque value**
M6	12±3	M14	160±30
M8	28±7	M16	240±40
M10	55±10	M20	460±60
M12	100±20	M30	1600±200

- Tightening torque value of bolt on the main component: (unit: Nm)

Bolt size	**Recommended tightening torque value**
M16 travel motor fixing bolt	252±40
M16 drive wheel fixing bolt	252±40
M18 track roller fixing bolt	415±35
M22 swing bearing fixing bolt	800±70
M20 swing mechanism fixing bolt (optional)	570±60
M20 swing mechanism fixing bolt	570±60
M24 carrier roller fixing bolt	710±60
M30 counterweight fixing bolt	1600±200

- Tightening torque value of air-conditioning system pipe joint and bolt:

(Unit: Nm)

Tightening torque of rotating nut of refrigerant tube **IMPORTANT:** when nut is assembled, the O-ring must be lubricated, tighten it with two wrenches, and one of them is torque wrench.	
Position	**Tightening torque value**
φ8 pipe	12-15
D5/8 Pipe	30-35
D1/2 pipe	20-25
Tightening torque of bolt on the flange joint of refrigerant pipe	
Compressor position	8.0-12
Reservoir position	4.0-7.0
Compressor fixing bolt	
M8 bolt (screw nail), 8.8 rating	24.5-29.4

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:

CDM6150			
Oil filling position	**Capacity**	**Filling quantity**	**Trademark**
Swing reduction gearbox		1.8L	SAE#140 (GL-4) gear oil
Travel reduction gearbox		2.5×2L	SAE#140 (GL-4) gear oil
Hydraulic oil tank	156L	119L	N46 or N68 anti-wear hydraulic oil
Engine oil	14L	12L	CH grade supercharged diesel engine oil
Each lubricating point		5kg	2# extreme pressure lithium base grease
Gear ring lubricating grease		6.5kg	2# extreme pressure lithium base grease
Fuel tank	265L	241L	0# or 10# diesel oil (summer)-10# diesel oil (winter)
Cooling system	20L	20L	China LONKING long life coolant
Cooling liquid reservoir	3L	1.5L	China LONKING long life coolant
Air-conditioner refrigerant	1kg	0.85kg	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.
- Under some heavy-load condition and some hot condition, 250h sampling cycle will be recommended for all positions. Because 500h sampling cycle can't provide pre-prompt of fault, and 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 the continual cycle maintenance is started, all the maintenance required by the previous cycle must be performed.

Note: Refer to Engine Specification for the engine maintenance.

Maintenance on Demand

Battery ----------Reclaim

Battery, battery cable or battery opening switch----------Replacement

Bucket linkage mechanism----------Check/regulation

Bucket tooth sleeve----------Check/replacement

Cab air filter element----------Cleaning/replacement

Circuit breaker----------Reset

Engine air filter outer element---Cleaning/replacement

Engine air filter inner element----------Replacement

Fuse ----------Replacement

Diesel oil tank oil filler cap and filter screen ----------Cleaning

Engine oil filter ----------Check

Heat radiator core ----------Cleaning

Air-conditioner reservoir - dryer ----------Replacement

Air-conditioner refrigerant ----------Filling

Track ----------Regulation

Window----------Cleaning

Window water sprayer liquid storage tank -----Filling

Windscreen wiper ----------Check/replacement

Maintenance of Initial 50 Working Hours

Engine oil and filter ----------Replacement

Daily Maintenance of Initial 100 Working Hours

Bucket linkage mechanism----------Lubrication

Boom and arm linkage mechanism ---------Lubrication

Maintenance of Initial 250 Working Hours

Travel driving lubrication oil ----------Replacement

Hydraulic oil filter (hood oil return) ------Replacement

Hydraulic oil filter (pilot oil circuit) ------Replacement

Hydraulic oil filter (main oil circuit) -----Replacement

Swing drive lubrication oil ----------Replacement

Maintenance of Every 8 Working Hours or Daily Maintenance

Engine coolant ----------Check liquid level

Engine oil ----------Check oil level

Oil water separator of fuel system----------Drainage

Hydraulic oil tank ----------Check oil level

Indicator and instrument ----------Experiment (test)

Safety belt of seat----------Check

Track regulation ----------Check

Travel device ----------Check

Around machine----------Check

Belt ----------Check

Fan----------Check

Heat radiator core ----------Cleaning

Daily Maintenance under Severe Condition

Bucket linkage mechanism----------lubrication

Maintenance of Every 250 Working Hours

Air inlet system----------Check

Air filter resistance ----------Check

Supercharged air cooler ----------Check

Air-conditioner----------Test

Air-conditioner condenser ----------Cleaning

Air-conditioner duct----------Check

Engine pipe ----------Check

Slew bearing ----------Lubrication

Slew driving lubrication oil ----------Check oil level

Hydraulic oil tank breathing filter----------Cleaning

Belt ----------Inspection/regulation/replacement

Engine oil and filter ----------Replacement

Fuel filter ----------Replacement

Maintenance of Every 500 Working Hours

Engine crankcase ventilation breather --------Cleaning

Fuel system oil water separator filter tank----------
----------Replacement

Fuel tank oil filler cap and filter screen -------Cleaning

Engine air filter outer element----------Replacement

Engine air filter inner element----------Replacement

Fuel filter ----------Replacement

Air inlet system----------Check

Coolant ----------Check

Maintenance of Every 1000 Working Hours

Battery ----------Cleaning

Battery fixing clamp ----------Tightening

Engine valve clearance ----------Regulation

Travel driving lubrication oil ----------Check oil level

Hydraulic oil filter (hood oil return) ------Replacement

Hydraulic oil filter (pilot oil circuit) ------Replacement

Hydraulic oil filter (main oil circuit) -----Replacement

Swing drive lubrication oil ----------Replacement

Fuel filter ----------Replacement

Air inlet system----------Check

Valve clearance ------Regulation (only for initial time)

Belt tension ----------Check

Coolant ----------Check

Maintenance of Every 2000 Working Hours

Travel driving lubrication oil ----------Replacement

Air-conditioner reservoir - dryer ----------Replacement

Swing gear ring----------Lubrication

Cab air filter element----------Replacement

Fuel filter ----------Replacement

Air inlet system----------Check

Valve clearance ----------Regulation

Belt tension ----------Check

Shock absorber ----------Check

Coolant ----------Replacement

Hydraulic oil ----------Replacement

Maintenance of Every 3 Years

Safety belt of seat----------Replacement

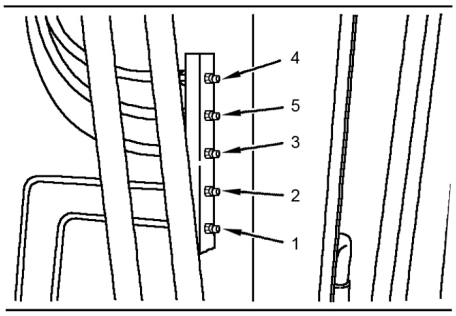
Technical Maintenance Operation

Boom and Arm Linkage Mechanism - Lubrication

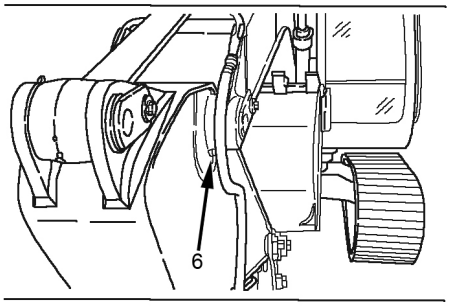
Note: China LONKING recommends 2# molybdenum disulfide lithium base grease to lubricate boom, arm and bucket linkage mechanism.

CAUTION

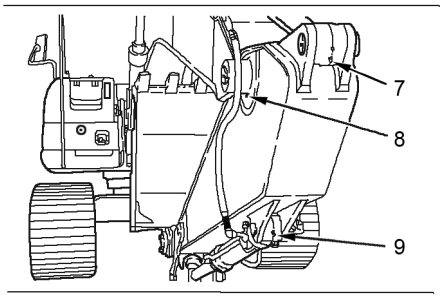
- After boom operates in the water all the grease fittings shall be filled with lubricating grease.
- Before the lubricating grease is filled, all the grease fittings shall be cleaned.



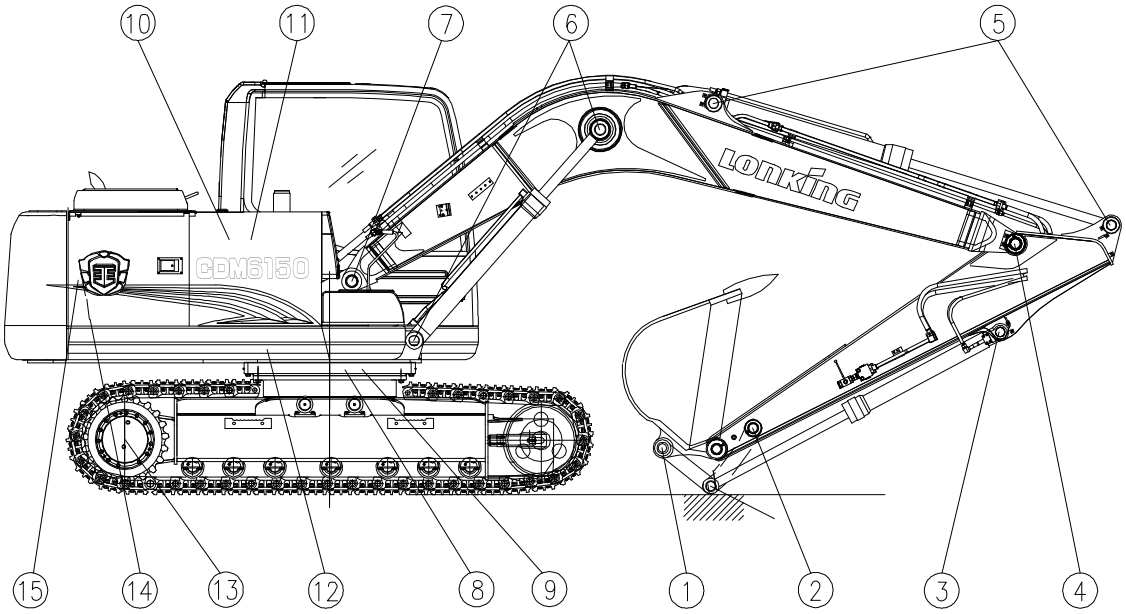
1) The lubricating grease is filled via the grease fitting at the bottom of each boom cylinder.
2) The grease fitting is at the bottom of boom, and it can be maintained from the top platform of storage box. In order to lubricate the lower bearing of boom, the lubricating grease shall be filled via the grease fittings (1) and (2).
3) If the lubricating grease is filled via the grease fittings (3) and (4), the boom cylinder rod can be lubricated.
4) If the lubricating grease is filled via the grease fitting (5), the arm cylinder cap can be lubricated.



Note: In order to correctly lubricate the lower bearing of boom and the rod end bearing of boom cylinder, the lubricating grease shall be filled via the grease fittings (1), (2), (3) and (4).When the boom is lifted and suspended, fill the lubricating grease; when the boom is lowered and the tooling is placed on the ground via the downward pressure, fill the lubricating grease.



5) Fill lubricating grease via the grease fitting (6). The grease fitting (6) is on the joint of boom and arm.
6) Fill the lubricating grease via the arm cylinder end grease fitting (7), the grease fitting (8) on the joint of boom and arm and the grease fitting (9) at the bucket cylinder cap end.



No.	Lubrication position	QTY
1	Bucket pin shaft	3
2	Linkage pin shaft	3
3	Bucket cylinder pin shaft	1
4	Arm pin shaft	2
5	Arm cylinder pin shaft	2
6	Boom cylinder pin shaft	4
7	Boom pin shaft	2
8	Slew bearing	2
9	Slew bearing inner gear ring	1
10	Hydraulic oil tank	1
11	Fuel tank	1
12	Slew speed reducer	1
13	Travel speed reducer	2
14	Engine oil pan	1
15	Radiator tank	1

Bucket Linkage Mechanism - Check/Regulation

When this regulation is performed, the hydraulic starting joystick shall be set for "Lock" position and shut down the engine.

CAUTION

If the bucket clearance adjustment is incorrect, the contact surface of bucket and arm will be scraped to cause big noise or damage of O-ring.

① Dust-proof ring 60×75×6

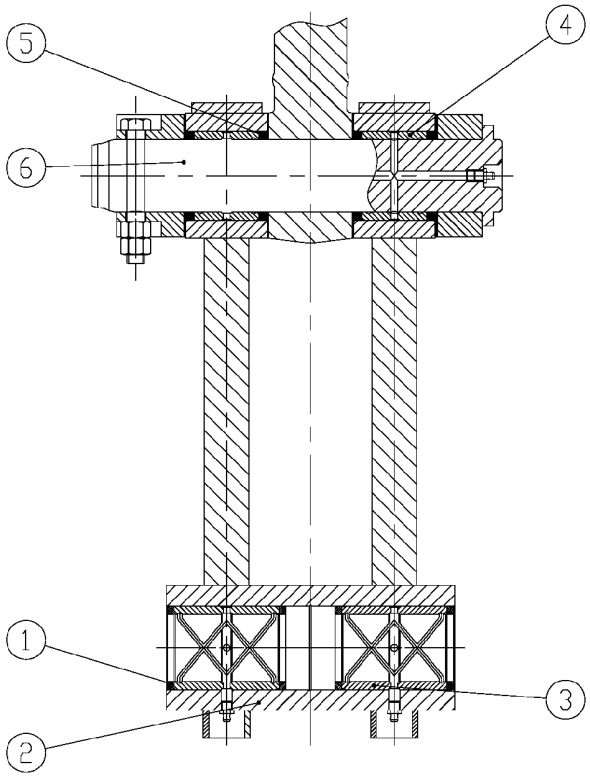
② Right linkage

③ Steel bushing 2 (Ø60×Ø75×94)

④ Steel bushing 3 (Ø65×Ø80×58)

⑤ Dust-proof ring 65×80×6

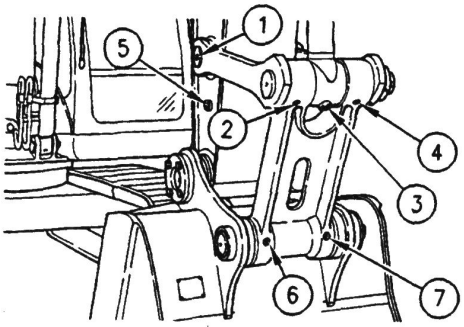
⑥ Pin shaft 4



- When the bucket is connected, it'll be collected, and the arm is extended outwards, lower the boom to make the bucket tooth several inches above the ground, and this position is convenient for dimension measurement.
- The bucket linkage mechanism clearance of this machine can be regulated via a gasket. If the clearance of bucket and arm is excessive, it shall be regulated to 0.5-1.0mm through adding gasket.
- The gasket thickness is 0.5mm and 1.0mm.
- Push the bucket to the other side and check the above clearance again.
- When regulation is required, disassemble the back screw cap and bolt, remove or add gasket as required, the gasket(s) with same number shall be used at both sides, finally assemble bolt and nut.

Bucket Linkage Mechanism - Lubrication

Before the lubricating grease is filled, all the grease fittings shall be cleaned.



Note: When the bucket is installed initially, the groove of bucket linkage mechanism shall be filled with lubricating grease.

1) Fill the lubricating grease via the grease fittings ①, ②, ③ and ④ to lubricate the linkage mechanism.

2) Fill the lubricating grease via the grease fittings ⑤, ⑥ and ⑦ to lubricate bucket.

Note: After the bucket operates in the water, the above grease fittings shall be filled with lubricating grease.

Bucket Tooth - Check/Replacement

CAUTION

- The bucket falling will probably cause personal casualty.
- Before the bucket tooth sleeve or side shovel blade is replaced, the bucket shall be jacked.

Check the worn condition of bucket tooth sleeve. If the bucket tooth sleeve is broken, it shall be replaced.

1) Disassemble the pin from the bucket tooth sleeve. This pin can be disassembled via one of the following methods:

- Knock the pin out from the guard ring of bucket tooth sleeve with a hammer and a punch.
- Use the guide pin bushing and perform according to the following procedure:

  a. Place the guide pin bushing on the bucket tooth.

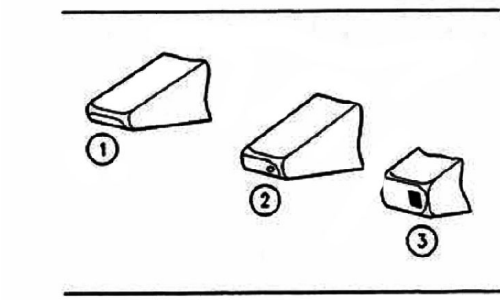
  b. Align the puller ⑤ with the pin.

  c. Knock the guide pin bushing from the tool back and disassemble the pin.

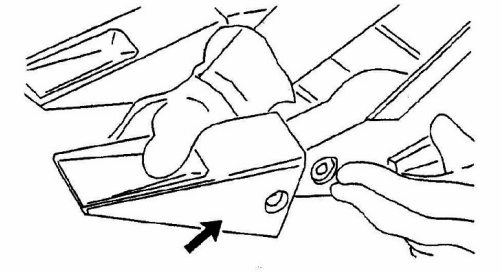
2) Clean the tooth holder and pin.

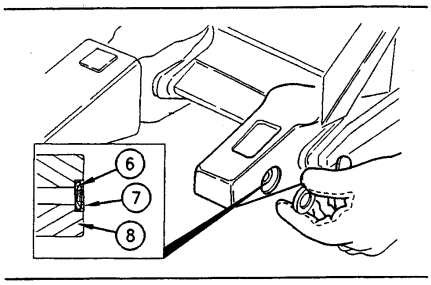
3) Assemble the guard ring ⑥ in the fixing gasket ⑦ of guard ring. Assemble this combination into the groove at the side of tooth holder ⑧.

4) Assemble a new bucket tooth sleeve on the tooth holder. The bucket tooth sleeve can be rotated by 180° for use, to enhance or reduce soil piercing capacity.



① Used normally
② Bucket tooth shall be replaced
③ Excessively worn





⑥ Guard ring
⑦ Fixing gasket of guard ring
⑧ Gear ring

5) Knock the pin into the bucket tooth sleeve. The pin can be assembled via one of the following methods:

- Knock into the pin from the opposite side of guard ring, crossing the bucket tooth sleeve, tooth holder and guard ring.
- Use the guide pin bushing. Follow the following procedure:

  a. Insert the pin into the bucket tooth.

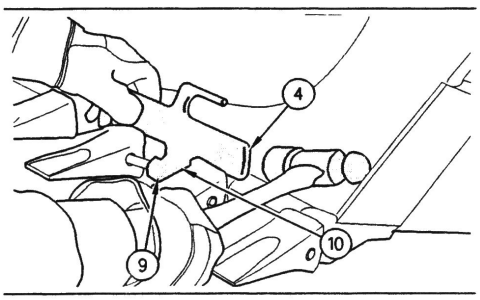
  b. Place the guide pin bushing on the bucket tooth and insert the pin into the hole of holder ⑩.

  c. Knock the back of tool ④ with hammer to push the pin.

  d. Move the pin holder ⑩ off the pin and slightly turn the tool to align the pin positioner ⑨ with the pin.

  e. Knock the tool end until the pin is fully inserted.

6) After the pin is assembled, the guard ring must be inserted into the pin groove perfectly.



④ Back of guide pin bushing
⑨ Pin positioner
⑩ Pin holder

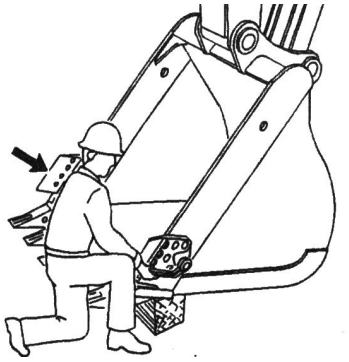
Side Cutter - Replacement

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.

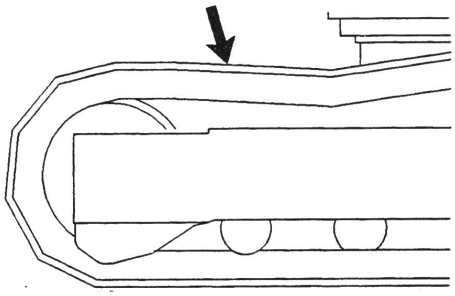
3) Assemble the new side shovel blade.



Track - Regulation

WARNING

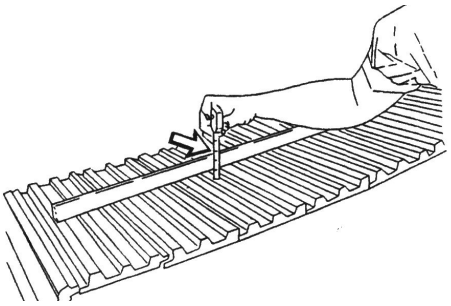
- The lubricating grease ejected due to pressure effect will cause person casualty.
- Under high pressure, the lubricating grease ejected from the relief valve can penetrate body to cause personal casualty.
- Don't check whether the lubricating grease is leaked through observing the relief valve. Check whether track is loosened through observing the track or track regulation cylinder.
- The relief valve can be only loosened by one circle.
- If the track isn't loosened, close the relief valve and consult China LONKING agent.



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

1) 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.
2) 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 25～55mm.

- **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.

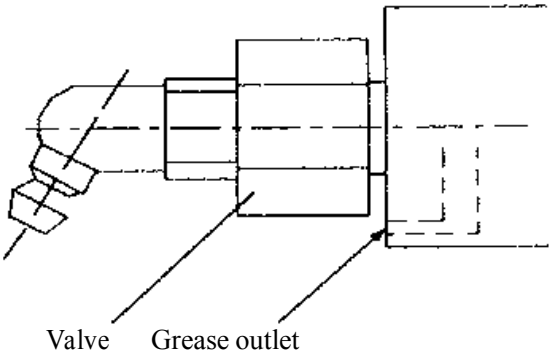
3) Check sag. Regulate the track as required.

- **Loosen Track**

The track regulator is installed on the bogie wheel bracket.

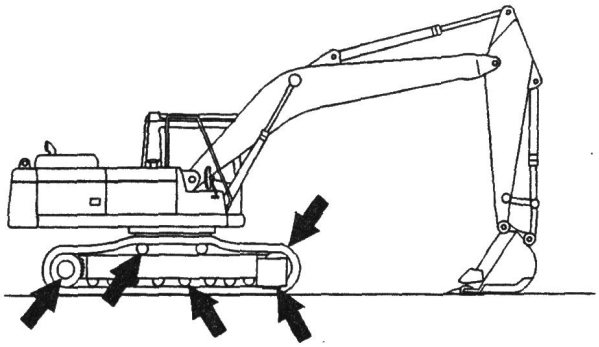
1) Loosen the relief valve carefully until the track slacks. The relief valve can be only loosened by one circle.
2) When the track reaches the required tension, please tighten the relief valve with 34Nm torque.
3) Drive the machine to move forward and backward to balance pressure.
4) Check sag. Regulate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

If the regulation is always wrong, please consult China LONKING agent.



- **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, please consult China LONKING agent.



Final Drive Oil Level - Check

1) Position one final drive so that oil drain plug (1) is at the bottom.

Note: Please refer to related data about liquid overfill limit in "Safety" of this Manual.

2) Disassemble the oil level plug (2).

3) Check the oil level. The oil shall be near the bottom of oil-level plug filler.

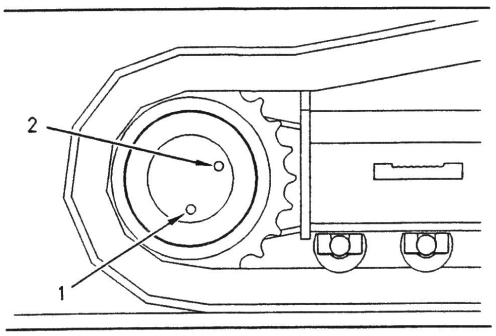
4) When necessary, the oil shall be filled via the oil-level plug filler.

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

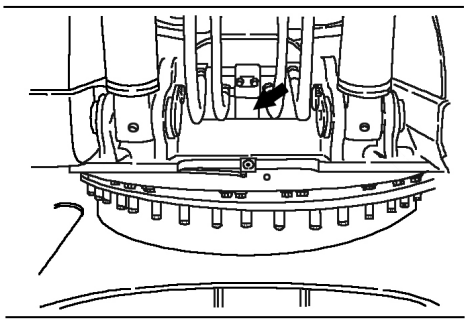
Swing Gear - Lubrication

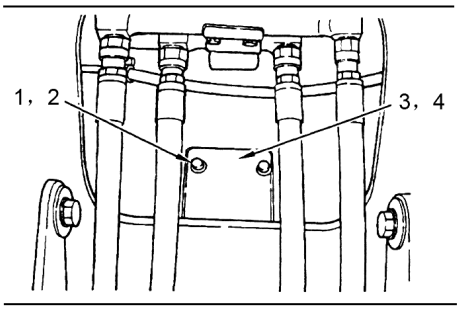
CAUTION

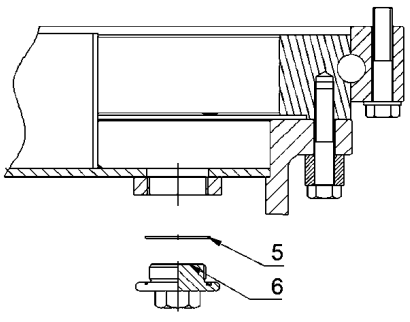
- The incorrect lubrication will probably cause damage of machine components.
- In order to prevent damage, please ensure proper lubricating grease is filled into the swing driving device.
- If the lubricating grease in the swing gear chamber is excessive, the stirring loss will be increased, thereby accelerating deterioration of lubricating grease.
- The deterioration of lubricating grease will damage the swing driving pinion gear and inner gear ring.
- The insufficient lubricating grease will reduce the gear lubrication performance.

Disassemble the inspection cover near the boom seat. Check the lubricating grease.

1) Disassemble the bolt (1), gasket (2), cover (3) and washer (4).
2) Check the washer (4). If the washer is damaged, replace it.
3) Check the lubricating grease oil level. The lubricating grease shall be distributed at the groove bottom evenly. For oil grove capacity, please refer to related contents of "Filling capacity" in this Manual. Increase or reduce lubricating grease as required. If the lubricating grease is excessive, it'll be deteriorated due to excessive stirring; if the lubricating grease is insufficient, the lubrication of swing gear performance will become poor.
4) Check whether the lubricating grease is polluted and color is changed.
5) If the lubricating grease is polluted or color is changed, it shall be replaced. Loosen and disassemble the plug screw (6) to discharge water and polluted lubricating grease. If the o-ring (5) is damaged, replace it.
6) Lift the boom and turn the superstructure about 1/4 circle. Lower the bucket on the ground.
7) Repeat the above procedure for every 1/4 circle turning, totally 4 positions. Fill the lubricating grease as required.
8) Assemble the washer (4), cover (3), gasket (2) and bolt (1).

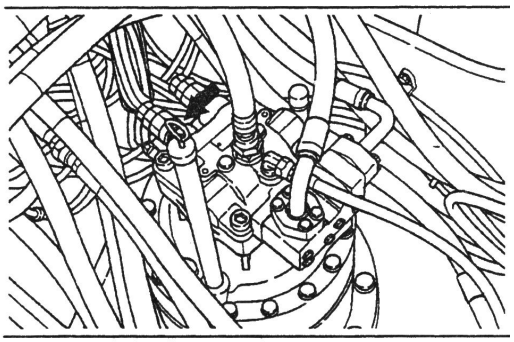






Swing Driving Oil Level - Check

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

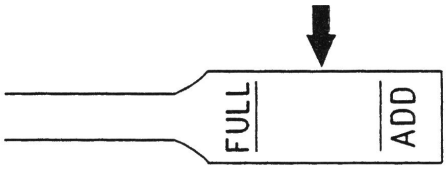


1) Pull out the oil gauge

Note: Please refer to related data about liquid overfill limit in "Safety" of this Manual.

2) Check the oil gauge. Keep the oil level between two marks of oil gauge. When necessary, fill oil via the oil gauge tube.

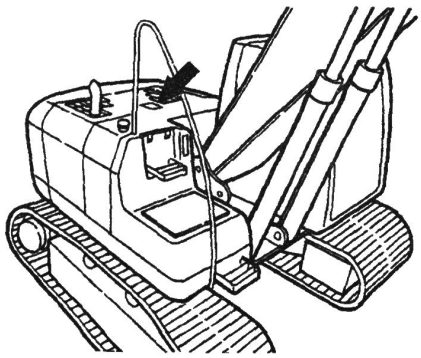
3) Insert the oil gauge.

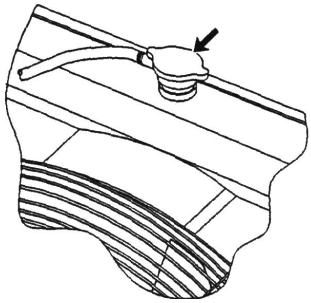


Cooling System Long Life Coolant - Replacement

Note: This machine has been filled with China LONKING's long life coolant by default.

1) Open the inspection door.
2) Loosen the lock of engine hood and lift the engine hood.
3) Loosen the pressure cover on the heat radiator slowly to release the pressure of cooling system.
4) Disassemble pressure cover.
5) Disassemble the inspection cover below heat radiator.
6) Open the discharge valve to discharge coolant into one proper container. The discharge valve is at the bottom of heat radiator.
7) Flush cooling system. Flush the cooling system correctly according to the following procedure:
   a. Close the discharge valve.
   b. Fill water into the cooling system.
   c. Assemble the pressure cover.
   d. Start and run the engine so that it can reach working temperature.
   e. Stop the engine to cool it.
   f. Loosen the pressure cover slowly to release the pressure of cooling system.
   g. Open the discharge valve below heat radiator to discharge the coolant into one proper container.
   h. Flush the heat radiator with water until the drained water is clean.
8) Close the discharge valve and assemble the inspection cover below the heat radiator.
9) Fill long life coolant.
10) 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.
11) Keep the cooling system liquid level within 13mm above the bottom of filling pipe.
12) Check the pressure cover gasket of cooling system. If the gasket is damaged, replace the pressure cover.





13) Assemble the pressure cover of cooling system.

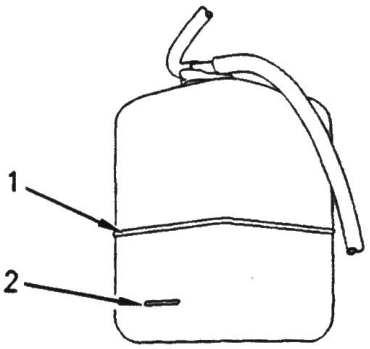
14) Stop the engine.

15) Check the coolant reservoir. Keep the coolant level between "FULL" (1) and "ADD" (2).

16) If it's to fill coolant, disassemble the reservoir cap to fill proper coolant.

17) Assemble the reservoir cap.

18) Cover the engine hood and insert bolt, and close the left access door.



CAUTION

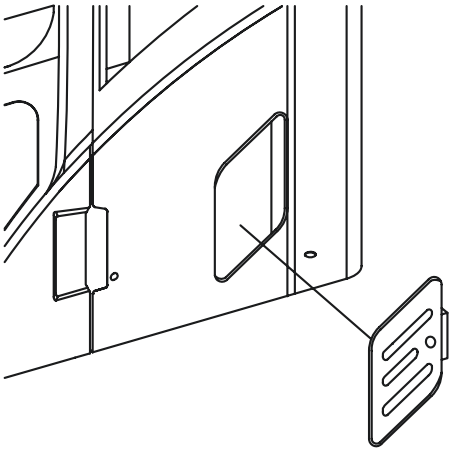
- If the long life coolant is mixed with other product, the coolant efficacy will be reduced, and the cooling system component will be damaged too.
- If the market sale product is used instead of authenticated LONKING product, please ensure it can conform to the pre-mixing or condensing coolant standard stipulated by LONKING.

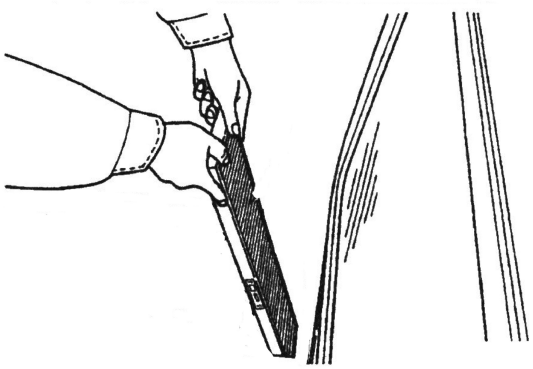
Cab Air Filter Element - Cleaning/Replacement

The cab air filter is at the side of cab.

1) Unscrew two bolts, open the filter cover and air filter element.
2) Disassemble the air filter element from the filter cover.
3) Clean the air filter element with the compressed air whose maximum pressure is 0.2MPa.
4) After the air filter element is cleaned, check it. If the filter element is damaged or severely polluted, please use a new filter element.
5) Assemble the air filter element and filter cover.

Note: Ensure the arrow at the top of air filter element is forward.

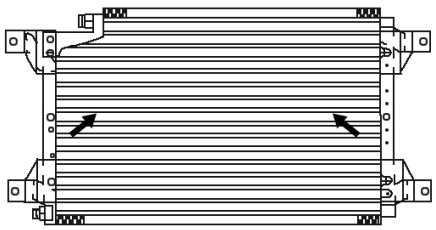




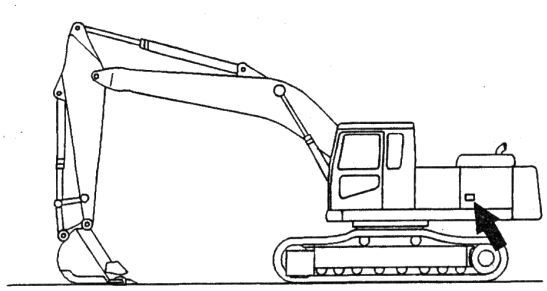
Condenser - Cleaning

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.

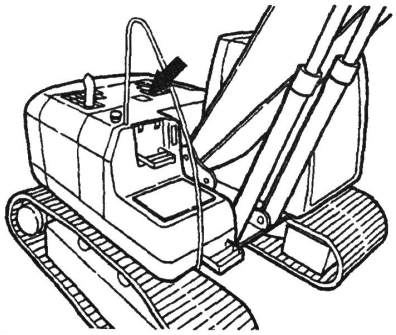


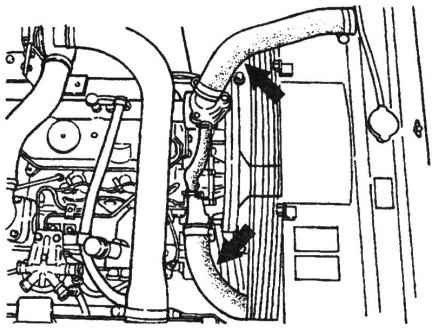
Cooling System Hose - Check

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.



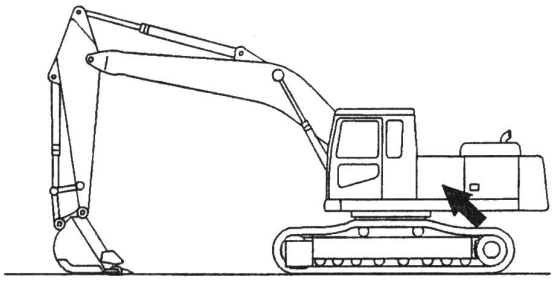


Engine Air Filter Outer Element - Cleaning/Replacement



CAUTION

If warning or image is displayed on the information display, or black smoke is exhausted, the outer filter shall be checked.

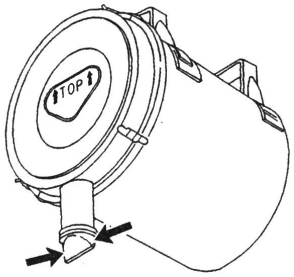


1) Open left back door of machine.

2) Open left front door of machine.

3) Gently extrude the outlet pipe to remove dust.

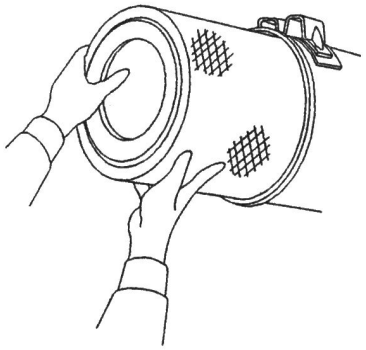
4) Loosen four fasteners of air filter, and disassemble the air filter cover.



5) Disassemble the filter outer element from the air filter shell.

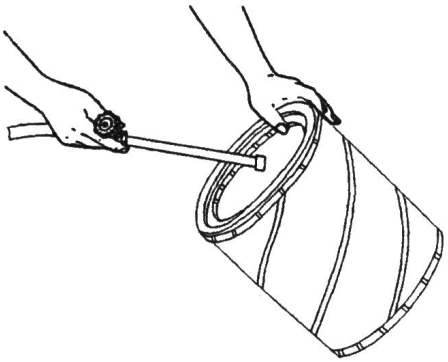
6) Clean the air filter cover and inside of air filter shell.

7) 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.

8) 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.
- Before the outer element is cleaned with compressed air, please refer to related contents of "General Hazard Items" in this Manual.

9) 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 grip, and then dry the outer element with air.

10) Check the outer element after cleaning, don't use the outer element with damage of pleat grid, gasket or sealing ring.

11) Please pack the cleaned outer element and store it at clean and dry place.

12) Assemble the clean outer element.

13) Assemble the air filter cover and lock it with fasteners. Please assemble the air filter cover correctly.

14) 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.

Note: The outer element can be cleaned for 6 times, if it has been used for one year, replace it.

15) 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, of 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

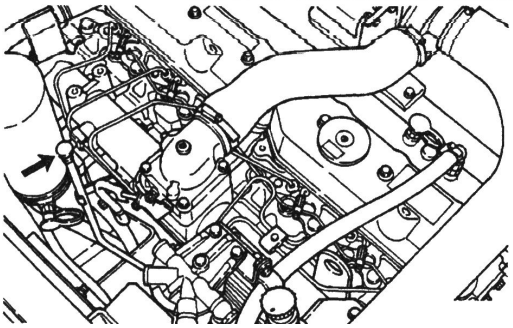
If the engine runs when the oil level is above the "H" of oil gauge, the crank shaft will operate in the engine oil. This not only causes too high engine oil temperature to reduce the engine oil lubricating property, but also causes bearing damage and reduction of engine power.

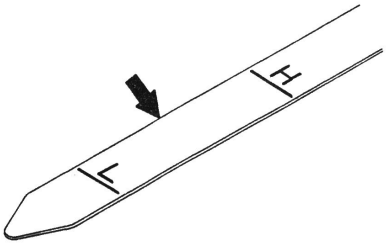
Note Please refer to related data about liquid overfill limit in "General Hazard Items" of this Manual.

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.



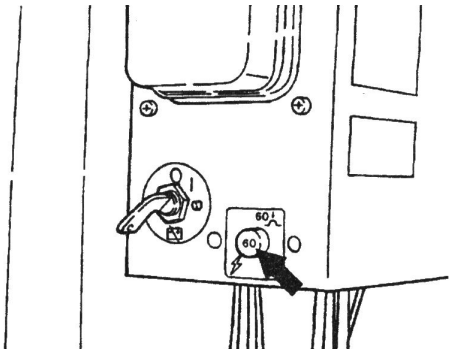


Circuit Breaker - Reset

CAUTION

The circuit breaker in the AC generator circuit is used to protect AC generator. If the battery polarity is wrong, the circuit breaker can prevent damage of AC generator rectifier.

- The circuit breaker capacity is 60A.
- Circuit breaker reset - press the button to reset circuit breaker. If the electric system works normally, the button will be kept at press-down position. If the button can't be kept at press-down state, the corresponding circuit will be checked. When necessary, repair the circuit.



Hydraulic System Hydraulic oil -Replacement

- **Oil drain of oil tank:**

1) Park the machine on the level ground and make the discharge valve and track stagger with certain angle. Lower the bucket on the ground and make arm vertical to the ground.

2) Disassemble the bolt (1), gasket (2) and cover plate (3) from the top of hydraulic oil tank.

3) Clean surrounding area thoroughly, to prevent the dust entering the filter screen cover and respirator.

4) Loosen the respirator cover to release the pressure in the hydraulic oil tank. After the pressure is released, disassemble the respirator.

Note: The hydraulic oil discharge valve is below the hydraulic oil tank.

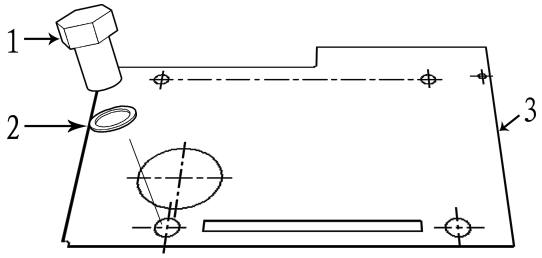
5) Disassemble the inspection cover of hydraulic oil tank below the superstructure, and open the discharge valve.

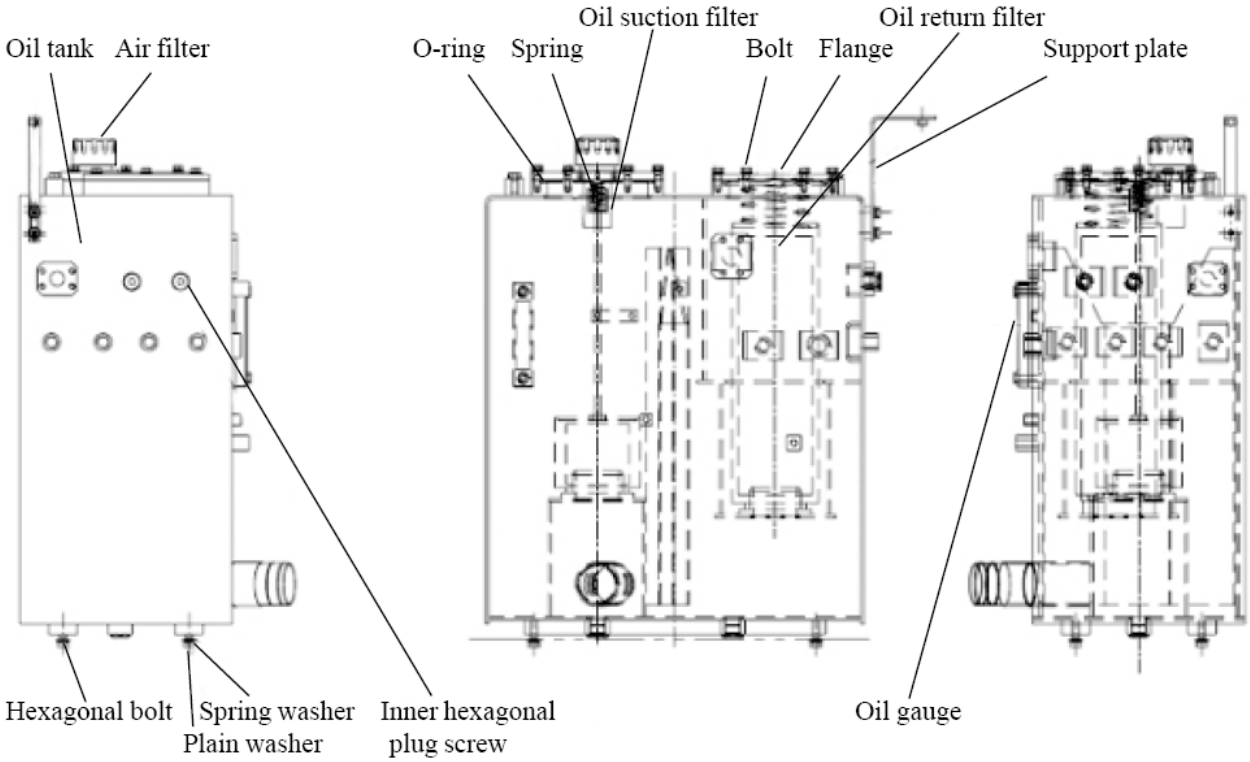
Note: Please refer to related data about liquid overfill limit in "General Hazard Items" of this Manual.

6) Discharge the oil into a proper container.

CAUTION

Don't place the discharge valve above the track to prevent the hydraulic oil being leaked on 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.

Note:

- Please refer to related data about liquid overfill limit in "Safety" of this Manual.
- 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 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**

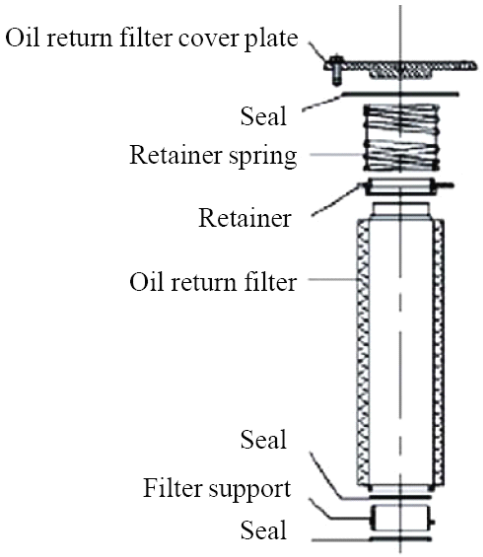
Note: Prevent the spring falling into the oil tank.

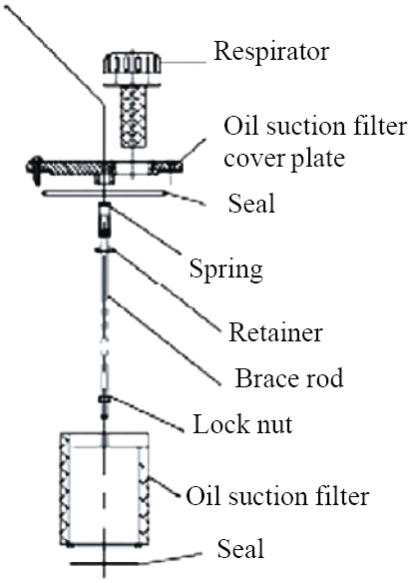
1) Disassemble the bolt and oil suction filter cover plate, and check the seal on the cover plate.

2) Disassemble the spring, retainer and oil suction filter.

3) Check and clean the oil suction filter, and check the seal on the filter.

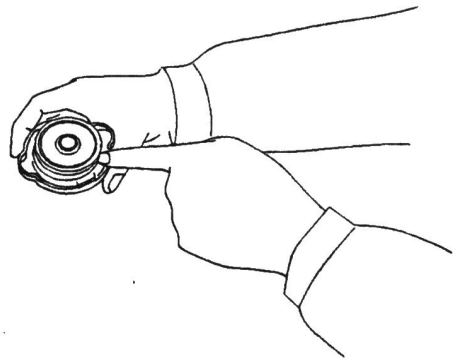
4) Assemble the above components in turn





- **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.



Note:

- 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.

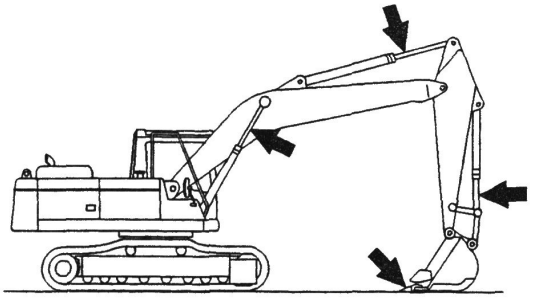
Check Around the Machine

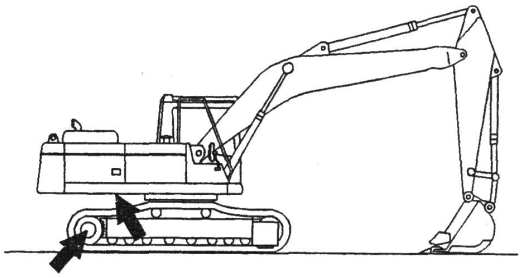
CAUTION

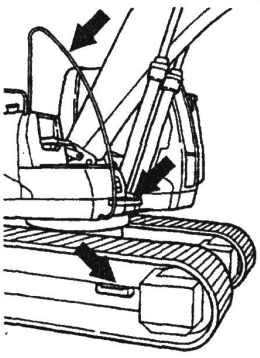
- The accumulated lubricating grease and lubrication oil on the engine will cause fire.
- When lots of lubrication oil (or other liquid) are on the engine or splash nearby, it shall be removed with steam or high pressure water.
- Before maintenance is started, clean all the grease fittings, covers and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

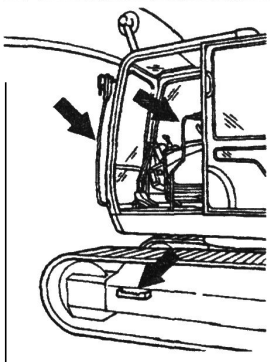
Note: Note whether leakage occurs. If leakage is found, find out the leakage source and eliminate leakage. If leakage is found or doubted, the liquid level shall be checked frequently.

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 rearview mirror to acquire optimal visual field.









Memo:

Chapter Ⅵ
Accessories and Options

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 abided by.

Cautions for Selection

- The accessories and options can be only installed after negotiating with LONKING 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 by LONKING Company. If personal casualty accident, machine fault and article damage are caused by installing the accessories and options not authenticated by LONKING Company, LONKING won't undertake any responsibility.

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 from LONKING dealer or the manufacturer of accessories and options.

Cautions for Assembly and Disassembly

When the accessories and options are assembled and disassembled, the following cautions shall be abided 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.
- For detailed assembly and disassembly, please contact LONKING dealer.

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.

Operate Bucket with Hook

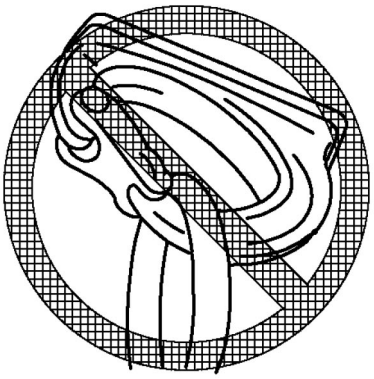
Check Whether the Bucket with Hook is Damaged

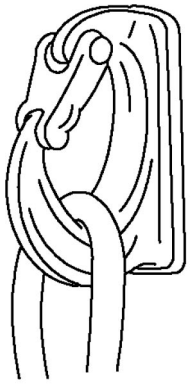
Check whether the hook, stop block or mounting device of hook is damaged. For any abnormal condition, please contact LONKING dealer.

Forbidden Operation

Cautions for operation

- When lifting operation is performed, reduce engine speed and adopt the lifting operation mode.
- Note the position of working device, else the steel rope or load will slide out of the hook.
- Correct hook angle shall be kept well to prevent this condition.
- Don't turn when load is lifted.
- If the bucket with hook is turned and used for operation, when unloading operation is performed, the arm will be collided, handle it with care.



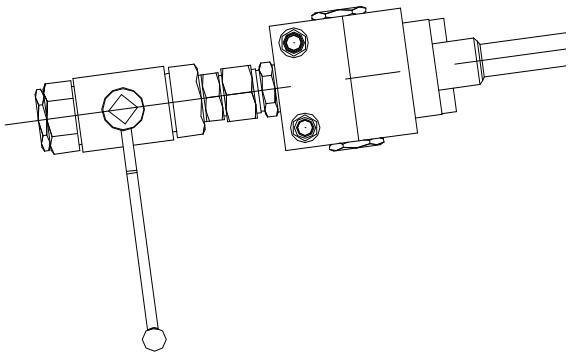


Hydraulic Circuit

Hydraulic Circuit Connection (1 additional pipe accessory)

When the accessory is connected, the hydraulic circuit shall be connected according to the following requirements.

1. After the check valve is confirmed at lock position, remove the blind plug. The disassembled component shall not be lost or damaged.
2. The accessory pipe provided with the accessory manufacturer shall be connected. The size of check valve is as the right Figure, and the size shall be determined after consulting the accessory manufacturer.
3. After pipe is connected, the air in the hydraulic circuit shall be discharged.



(1) After the engine is started, it shall run with low idle speed for 10 minutes and then continue the next operation.

(2) Operate the button (about 10 times) repeatedly under low idle speed to discharge air until the air is fully discharged from the accessory hydraulic circuit.

CAUTION

When the accessory is provided with air discharging requirements stipulated by the manufacturer, the air shall be discharged according to the stipulated mode.

(3) After the air is discharged, the engine shall be shut down firstly and start engine again after over 5 minutes, accordingly, the bubble in the oil of cylinder will be released.

(4) Check whether oil is leaked, and clean the outside oil.

Hydraulic Circuit Connection (2 additional pipe accessory) (option)

When the accessory is connected, the hydraulic circuit shall be connected according to the following requirements.

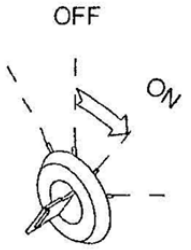
1. Release the residual pressure in the accessory hydraulic circuit according to the following requirements.

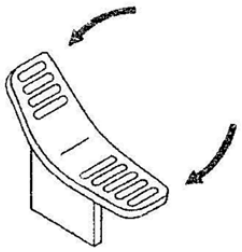
(1) Place working device on the ground.

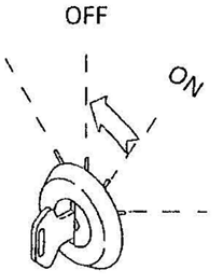
(2) After the engine is shut down, set the ignition switch for ON position.

(3) Switch the machine power on, lift the safety rod (open safety lock) and push the right joystick control forward to the maximum stroke, repeat about 10 times.

(4) Reset the ignition switch for OFF position, and set the safety lock lever and lock pin for locking position.



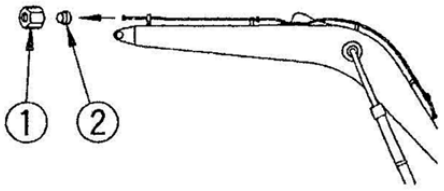




2. Remove the nut ① and plug screw ② in the front of pipe. The disassembled component shall not be lost and damaged.

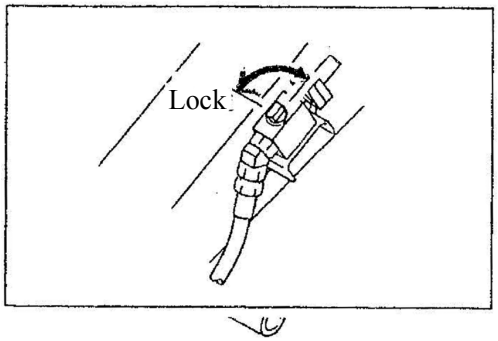
3. The accessory pipe provided by the accessory manufacturer shall be connected.

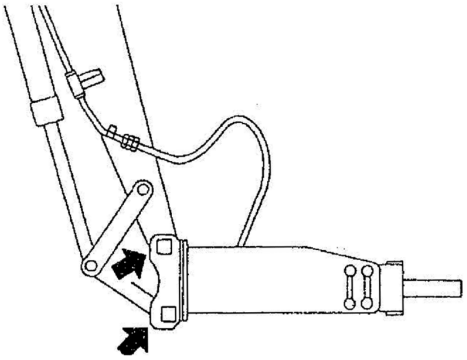
   The pipe size is as the right Figure. The accessory size shall be determined after negotiating with the accessory manufacturer.



4. After the accessory pipe is connected, discharge the air in the hydraulic circuit.

Gist of Accessory Assembly and Disassembly



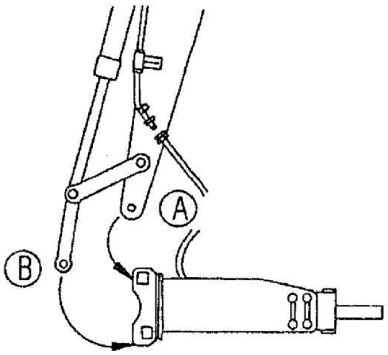


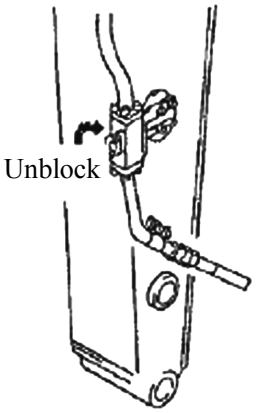
Disassembly Gist

1. Place the accessory on the ground and shut down the engine.
2. Operate the joystick of each working device front and back, left and right with full range and step the accessory foot pedal for 2-3 times, to eliminate the internal pressure in the hydraulic circuit.
3. After the oil temperature drops, turn the check valve rotator connected to the arm inlet and outlet to lock side.
4. Disassemble the hose at the accessory side, install the blind plug on two outlets.
5. Disassemble the pin (two) and accessory, and then assemble the bucket.
6. After the bucket is installed, check the hydraulic oil level.

Installation Gist

1. Refer to bucket replacement and installation for the disassembly and gist.
2. Place the accessory on the even ground and assemble the pin (A) and pin (B) on the arm in turn.
3. Shut down the engine after accessory is installed, operate the joystick of each working device back and front, right and left with full range and step the accessory foot pedal for 2-3 times, to eliminate the internal pressure in the hydraulic circuit.
4. After the oil temperature drops, disassemble the blind plug from outlet and inlet respectively, prevent the dust and mud being on the hose joint. If O-ring is damaged, replace it with a new one.
5. Turn the check valve rotator connected to the arm inlet and outlet pipe to the disassembly side.
6. After accessory is installed, the oil quantity in the hydraulic oil tank shall be confirmed.





Guide of Accessories and Options

WARNING

- Please reach the accessory operation manual and related accessories and options in this Manual.
- When the accessories and options are installed, it'll relate to safety, so contact the LONKING dealer in advance.
- If the accessories and options are installed without contacting LONKING dealer, it'll cause safety problem and have adverse impact on machine operation and service life of machine.
- If personal casualty accident, machine fault and article damage are caused due to using the accessories and options without contacting LONKING dealer, LONKING won't undertake any responsibility.

Selection of Track Shoe

Select proper track shoe according to working condition.

Method of Selecting Track Shoe

Confirm type from the uses in the Table below, and then select track shoe from it.

- "B" and "C" in the type indicate wide track shoe, due to its use limit, the applied track shoe can be only used after confirming the use cautions, fully surveying and researching working conditions.
- When the width of track shoe is selected, select the narrow one as possible without influencing the condition of machine floatability ground pressure. If the adopted track shoe is wider than the required, because the track shoe load is increased, it'll cause many problems such as bend of track shoe, break of link, brake of pin shaft and loosening of track shoe bolt.

Type	Use	Cautions for use
A	Rocky ground, riverbed and common ground	• On the rough ground with big barrier such as round stone and fallen tree, travel with low speed.
B	Common ground, soft ground	• Unavailable to the rough ground with big barrier such as round stone and fallen tree. • Only travel with medium and high speed on the even ground, in case of crossing barrier, reduce speed and travel with half speed of low speed.
C	Extremely soft ground (wet ground)	• Only used when machine is trapped and the A or B track shoe can't be used. • Unavailable to the rough ground with big barrier such as round stone and fallen tree. • Only travel with medium and high speed on the even ground, in case of crossing barrier, reduce speed and travel with half speed of low speed.
D	Pavement road surface	• In order to protect rubber gasket track, the item of "Road gasket use" must be abided by.

	CDM6150	
	Specification	Type
Standard	500mm triple grouser track shoe	A
Option	500mm rubber gasket track shoe (rubber gasket type)	D
Option	600mm triple grouser track shoe	B
Option	700mm triple grouser track shoe	C

Selection of Bucket Tooth

Different operation conditions will lose or damage bucket tooth, proper vertical pin type bucket tooth or horizontal pin type bucket tooth shall be selected, the standard vertical pin type bucket tooth and horizontal pin type bucket tooth can be widely used, and the following bucket tooth is recommended according to the operation condition.

Use of Horizontal Pin Type Bucket Tooth

- Method of selecting bucket tooth

Used for digging and loading of common soil such as sandy soil, gravel stone and clay.

Used for digging with light load: digging and loading of soil such as dry, loose sandy soil and mud.

Used for loading of dry and loose sandy soil.

- Use of horizontal pin type bucket tooth

Used for digging with heavy load, heavy digging such as break digging and flaking of combined soil of hard clay and rock.

The heavy load bucket belongs to horizontal pin type bucket which shall be used as the heavy load digging.

- Long life bucket tooth

- The operation condition site where loading of hard rock will shorten service life.
- Operation condition site without digging-in such as the broken rock via detonation and flaking.
- The heavy operation condition site where the rock is knocked or flaked by the front end of bucket tooth.

- Self-sharp tooth: (horizontal pin type, vertical pin type)

- The operation condition site where it's necessary to perform digging-in work for sandy soil and clay digging and loading.

Standard of Selecting Vertical Pin Type and Horizontal Pin Type

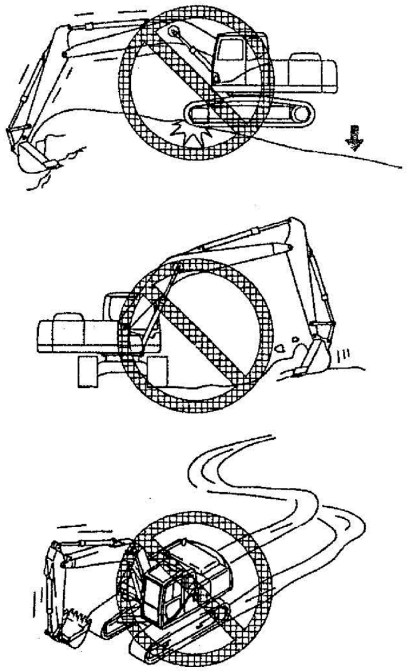
<table>
<tr><td colspan="3" rowspan="2"></td><td colspan="4">Applied working site</td></tr>
<tr><td>Rock</td><td>Round stone</td><td>Clay, subgrade soil</td><td>Sandy soil</td></tr>
<tr><td rowspan="4">Job content</td><td rowspan="4">Heavy
↑
↓
light</td><td>Break digging</td><td colspan="2">Horizontal pin type bucket tooth</td><td colspan="2">Vertical pin type bucket tooth</td></tr>
<tr><td>Flaking</td><td colspan="2">Horizontal pin type bucket tooth</td><td colspan="2">Vertical pin type bucket tooth</td></tr>
<tr><td>Common digging</td><td colspan="4">Vertical pin type bucket tooth</td></tr>
<tr><td>Loading</td><td colspan="4">Vertical pin type bucket tooth</td></tr>
</table>

Use of Rubber Gasket Track Shoe and Road gasket

When the rubber gasket track shoe and road gasket is used, the following cautions must be abided by.

Working Environment

- The rubber gasket track shoe and road gasket are primarily used for working on the pavement road surface. Once used on the non-pavement road surface, the rubber will be broken and damaged and service life will be shortened greatly. Avoid the following conditions as possible.
- Work on the broken concrete or sandstone.
- Work on the sharp projection such as steel bar and glass. (Avoid crossing the steel plate sharp inserted into the ground as possible).
- Avoid traveling and working on the concrete road shoulder, rock and stony riverbed.
- When working on the road surface with water, ice, snow, sand and gravel stone, pay attention to preventing skidding. Pay special attention to unloading machine from truck.
- Because the rubber gasket track shoe and road gasket are featured by rubber characteristic, it shall be used under -25℃~65℃.

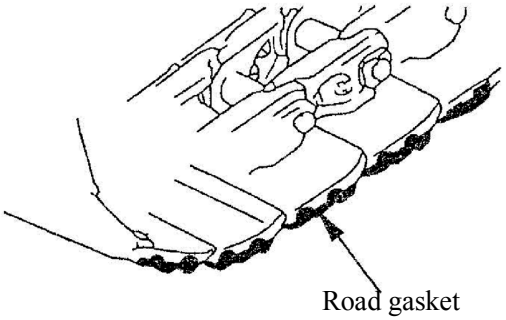


Working Conditions

- As the Figure, the work by taking the undercarriage of vehicle body as support, the side digging work, the work on the slope and the work with frequent turning will generate big load on the rubber gasket track shoe so as to damage the rubber gasket track shoe.
- If special working device is installed, the service life of rubber gasket track shoe won't be ensured.

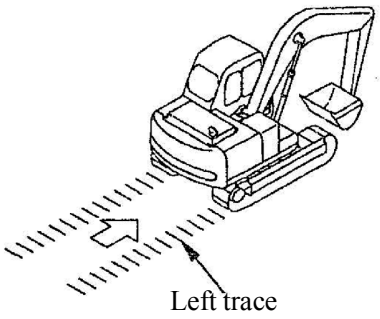
Storage and Maintenance

- Prevent the oil or lubricating grease being pasted on the rubber, if it is, remove and clean it.
- The rubber gasket track shoe and road gasket shall be assembled continually according to the link quantity, if not, rubber will be deformed severely to cause damage.
- If the rubber gasket track shoe and road gasket will be stored for long time, they shall be stored indoors free from sun light and rain.



Rubber Damage Degree

- When the machine travels on the concrete pavement, rubber will adhere to the road surface and leave black trace.
- Even though the rubber appearance isn't fine due to being flaked or cut, it won't damage the whole track shoe immediately and damage the road surface, it can be used continually.

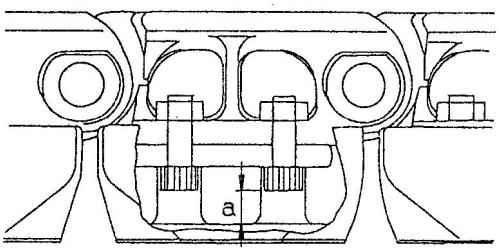


Check Road Gasket

- If the following conditions occur, the road gasket must be repaired or replaces, and repair and replacement must be performed by LONKING agent.

Height of Convex Tooth

- The height "a" of convex tooth will be reduced due to abrasion, so as to reduce towing force. When "a" height is less than 5mm, a new one shall be used.



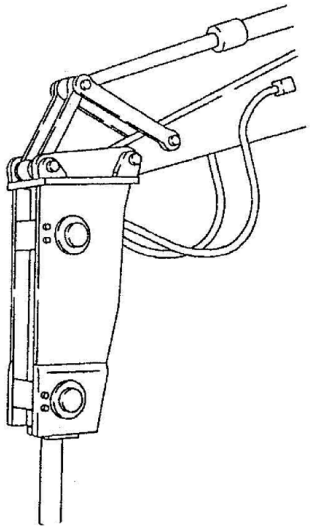
For Long-term Machine Use

When the accessory is installed on the hydraulic excavator and work is performed, the following items must be noted.

CAUTION

When the accessory is installed, the type matching hydraulic excavator optimally shall be selected.

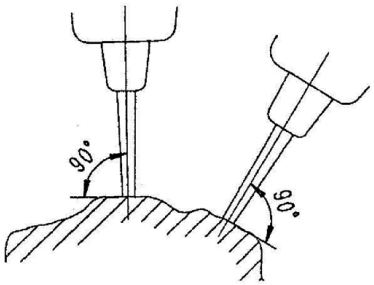
- The accessory and machine will be different due to various vehicle body, contact LONKING dealer for selection of accessory and machine type.



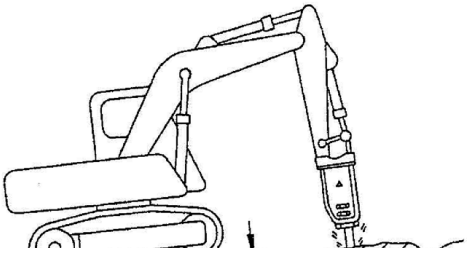
Hydraulic Breaker

- 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.

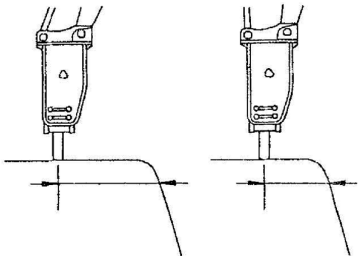


Place the chisel on the breaking surface with right angle to perform break work.

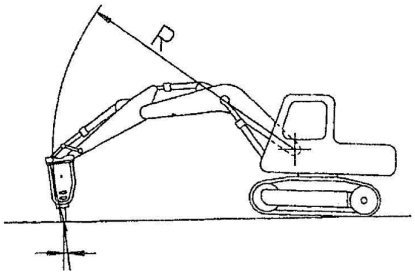


Before impact is started, place the chisel on the break surface and make machine off ground about 5cm. Don't make machine off ground too high.

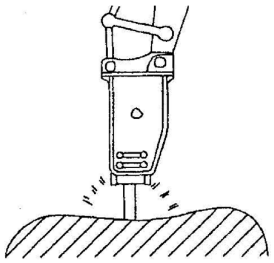
When continual impact is perform on the same impact surface, if the chisel can't break or break through surface within 1 minute, the impact surface shall be changed, and continue breaking at the position near the edge of break object.



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.

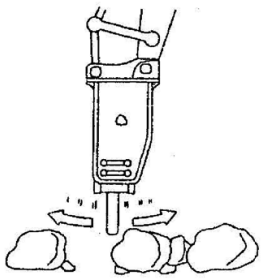


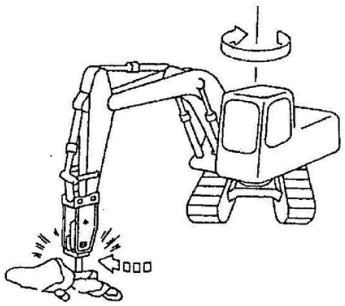
Wrong Use Method

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

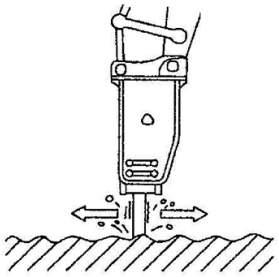
- The cylinder can't be operated to the stroke end, and about 5cm allowance shall be kept.

Move stone with the bracket position.

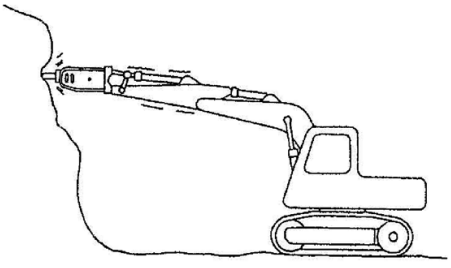




Utilize turning force to work

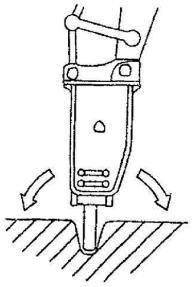


Move chisel when impact is performed.

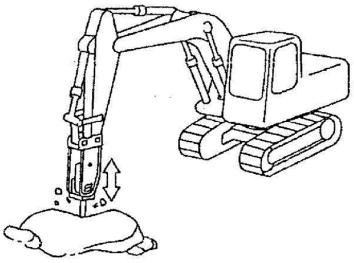


Perform impact in the horizontal direction or upwards

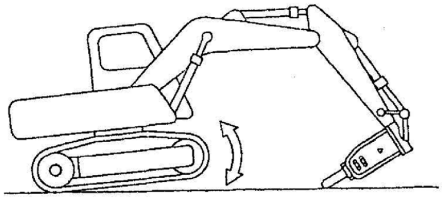
Swing chisel when it impacts into rock



Knocking operation

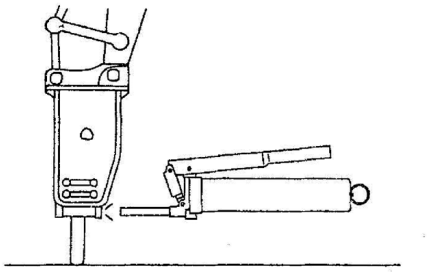


Fully protrude bucket cylinder to support machine off ground.



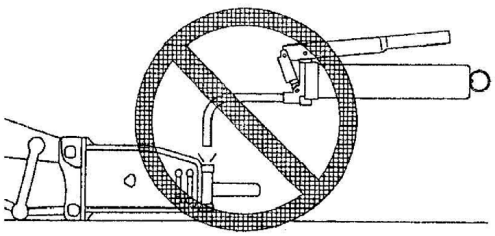
Position of Filling Lubricating Grease into Hydraulic Breaker

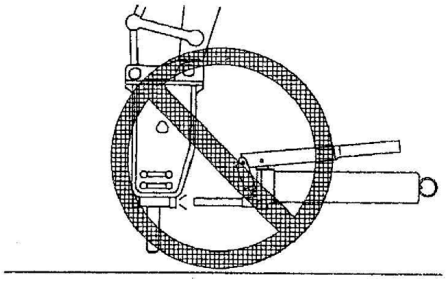
Lubricating grease shall be filled with correct method.



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.





Memo:

Appendix Ⅰ

MCSS Electronic Control Manual

CDM6150

CONTENTS

Appendix I MCSS Electronic Control Manual CDM6150.....149

Installation of Throttle Flexible Shaft, Engine Gear and Engine Ignition.....153

AC2 Throttle Flexible Shaft Installation..... 153

Engine Gear and Speed.....153

Engine Ignition..... 153

Installation of Elements.....154

Installation of Hydraulic Pressure Sensor..... 154

Hydraulic Demand Switch..... 154

Installation of Speed Sensor..... 154

Hydraulic Filtering Alarm Switch..... 154

Air Filter Alarm.....154

Oil Level Sensor..... 154

Temperature Sensor..... 154

System Operation and Display Interface.....155

Display Interface.....155

Key Function..... 156

Instruction of Function Key.....157

Instruction of Change Language..... 158

System Parameter Inquiry.....159

Maintenance Help.....160

Input of Maintenance Records.....160

Alarm Display and Alarm History.....161

Speed Knob Calibration..... 162

System Function, Parameter, Alarm and Protection.....162

Water-Thermometer.....162

Water Overheating Protection.....163

Low Engine Oil Pressure Protection.....163

Hydraulic oil temperature.....163

Hydraulic Oil Level..... 164

Fuel Level..... 164

Auto/manual Idle Speed Function..... 164

Battery Voltage..... 164

Hydraulic Main Oil-return Filter Element Blockage Alarm..... 164

Input of Whole Machine Number.....164

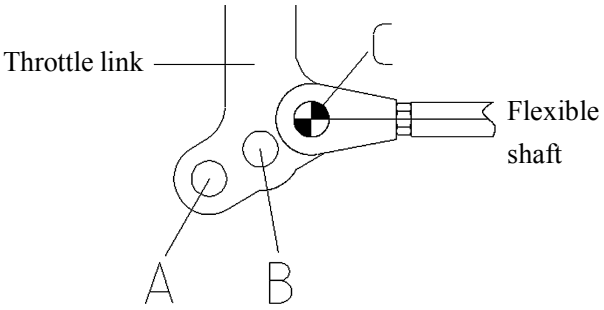
Alarm Log Clear..... 164

System Error Diagnosis..... 165
CAN Communication Error..... 165
Throttle Gear Fault..... 165
Memo:..... 166

Installation of Throttle Flexible Shaft, Engine Gear and Engine Ignition

AC2 Throttle Flexible Shaft Installation

- After the electronic control system is installed on the machine and machine power is switched on, AC2 throttle flexible shaft can be connected on the throttle swinging link of engine.
- Before machine power is switched on, the exposed length of AC2 throttle flexible shaft is shorter and it can't be connected with the throttle swinging link of engine.
- After machine power is switched on, AC2 throttle flexible shaft will be controlled by the main controller and it'll protrude to the initial position. Connect the AC2 throttle flexible shaft to the C hole of engine throttle swinging link as Figure below, the flexible shaft will slightly slack and mark white line at the C hole of throttle swinging link.
- Engine speed will be corrected automatically without manual regulation, see the instruction below.



Engine Gear and Speed

- Engine has 10 gears, from gear 1 to gear 10; regulate the speed knob and the screen will display corresponding gear at the left middle position. If the position of speed knob exceeds the range of gear 1 - 10, the screen will display "Speed knob exceeds range". The rpm corresponding to each gear is as right Table:
- Gear 6 - 10 belong to working gear, gear 1 - 5 belong to non-working gear under specific condition such as tooling position adjustment.

Gear	No-load speed rpm	Minimum speed with load rpm
1	1000	
2	1140	
3	1260	
4	1380	
5	1500	
6	1620	1506
7	1740	1618
8	1860	1730
9	1980	1841
10	2120	1971

Engine Ignition

- When the engine is ignited, the hydraulic safety joystick shall be set for "Lock" position.

Installation of Elements

Installation of Hydraulic Pressure Sensor

- Direction of double-pump: The pump near the engine is left pump (or front pump), the pump away from the engine is right pump (or rear pump), 5 sensors are installed on the pump;

The pressure sensor of left pump is 400bar - installed at a1 of the left pump hydraulic oil tank

The pressure sensor of right pump is 400bar - installed at a2 of the right pump hydraulic oil tank

The servo pressure sensor is 60bar-installed at a4 beside servo-valve

The left negative flow feedback pressure sensor is 60bar - installed at Pi1 on the left pump regulator

The right negative flow feedback pressure sensor is 60bar - installed at Pi2 on the right pump regulator.

Hydraulic Demand Switch

- Two pressure switches are respectively installed at Py and Px on the main valve, Px is at the top of main valve, and Py is at the rear of main valve - near engine. Py tube traveling, Px tube swing and tooling.
- Hydraulic demand switch belongs to normally open switch, in case of hydraulic operation, it'll be opened and closed.

Installation of Speed Sensor

- Install the speed sensor and turn it fully and then release about 3/4 circle, slightly less than 3/4 circle, the lock nut can be used, and locking moment is 36 ± 5Nm.

Hydraulic Filtering Alarm Switch

- The alarm switch is connected with normally open contact, and the switch will be on and off when alarm is given.
- Pilot filtering alarm switch: model is VD5C.0, installed on the pilot valve block, and the pilot valve block is self-provided.
- Pump and motor oil-return filtering alarm switch: model is VMF 2 F.0, installed on the external oil-return filter beside pump.
- Main oil-return filtering alarm switch: model is VR2C.0, installed on the hydraulic oil tank.

Air Filter Alarm

- Normally open switch, it'll be closed when alarm is given, provided by air filter.

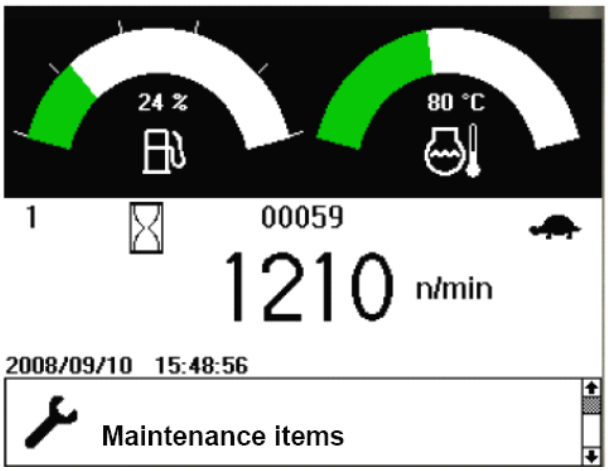
Oil Level Sensor

- The arresting pin on the shell shall be pulled out when the oil level sensor is installed.

Temperature Sensor

- Locking moment is 24 ± 4Nm.

System Operation and Display Interface



Display Interface

Shown as the right figure.

The left of upper part is fuel gauge, the right is water thermometer.

The lower part is as follows:

The position at the top left corner where 1 is displayed is the gear 1 - 10 of engine speed gear;

00059 is displayed in the middle of upper part, indicating total time of engine running;

The tortoise icon at the top right corner indicates low-speed running of current machine;

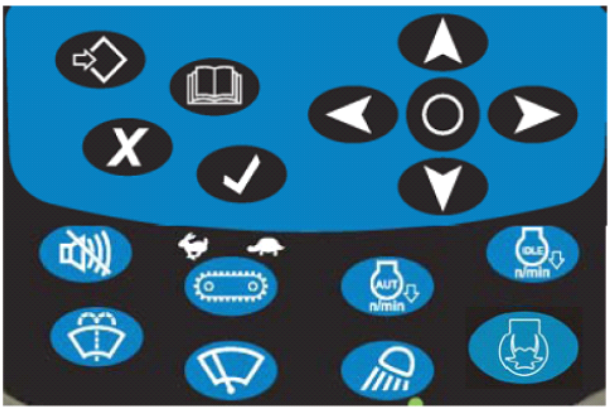
1210 is displayed in the right middle, indicating current engine speed;

The current time is displayed at the bottom left corner.

When the safety mechanism is locked, "Locked" icon below the travel status.

Key Function

As the right figure, the upper part is menu operation key, and the lower part is the function operation key.



Instruction of menu operation key:



The key can be pressed to access the Settings interface directly, reset the Contrast, Backlight, Buzzer Volume, Key Clicks, Change Language, Set Clock, Factory Setup, Restore Factory Defaults, and view the vehicle information, display, software & hardware version number of controller in About menu.



Return key.



Enter key.



The key can be pressed to access main menu as the right Figure.



The options of Machine Status, Settings, Maintenance Help, Maintenance Records and Alarm History can be selected via the Up and Down key, after it's selected, press  key to view detailed information.



Up key.



Down key.



Left key.



Right key.



Enter key.

Instruction of Function Key



Alarm cancel key.



High-and-low speed switch key, if current condition is low-speed status, the screen will display tortoise icon, meanwhile, press this key and the right green lamp of tortoise will be on; when this key is pressed, the green lamp beside the rabbit icon at the left of this key will on, and the screen will display rabbit icon simultaneously, and high-speed status has been switched.



Windscreen wiper switch key.



Windscreen wiper switch/change-over key. Press the key once, the wiper will work under low-speed, and the green lamp at the left of key will be on simultaneously; press the key twice, the wiper will work under high-speed, and the green lamp at the right of key will be on; press the key three times, the wiper will work continually, and the green lamps at both sides of key will be on; press the key four times, the wiper will stop work, and the green lamps at both sides of key will be off simultaneously.



Auto idle speed/manual idle speed mode switch key, when lamp is on, it'll be auto idle speed mode.



Manual idle speed ***enabled/disabled*** key, when lamp is on, it'll be enabled mode, and it'll be effective under manual idle speed mode.



Working lamp switch change-over key. Press the key once, the working lamp of platform will be on, and the left green lamp will be on simultaneously; press the key twice, the working lamps of platform and boom will be on simultaneously and the green lamps at both sides will be on; press the key three times, the working lamps of platform and boom will be off simultaneously, and the green lamps at both sides will be off.



Working mode selector switch.

This switch is used to set the operation and operating force of working equipment. The operation will be easier through selecting the mode matching the operation type.

Please select the working mode via the keys on the display panel in accordance with the working condition and self-demand:

H mode: heavy-load mode

S mode: economic mode

L mode: light-load mode

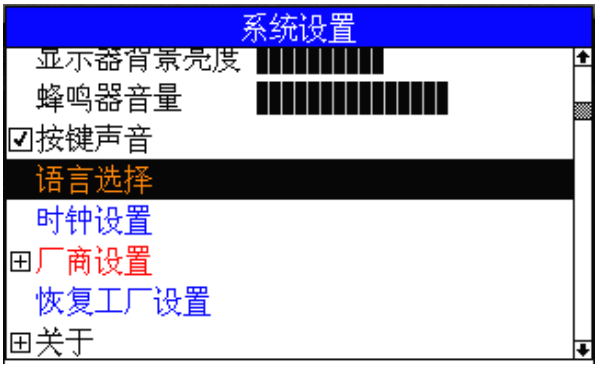
B mode: break mode

The fine regulation of above mode can be performed via the throttle knob .

Instruction of Change Language

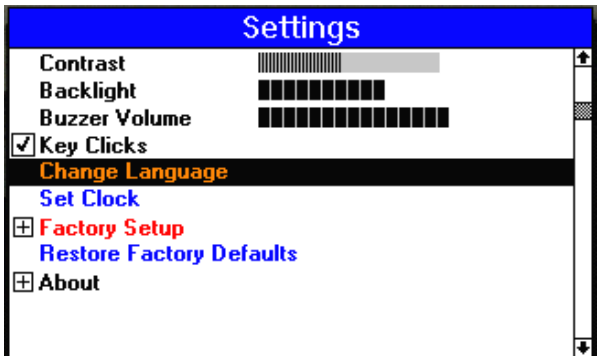
Press  key to to access the Settings interface directly (as the right figure). The option of Change Language(语言设置) can be selected via the Up and Down key.

Press  key to enter.



Settings interface in Chinese

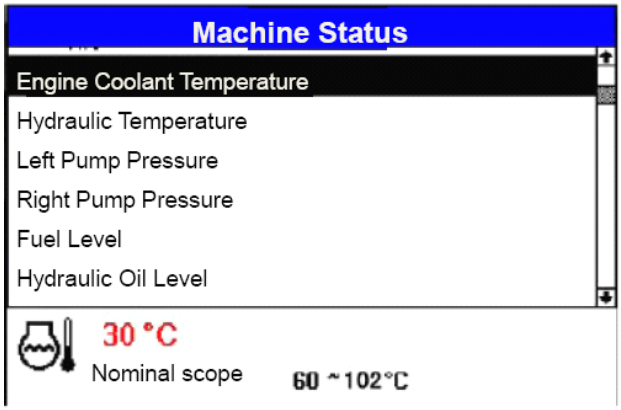
The English Settings interface is as the right figure. Press the  key to Change the language to Chinese.



Settings interface in English

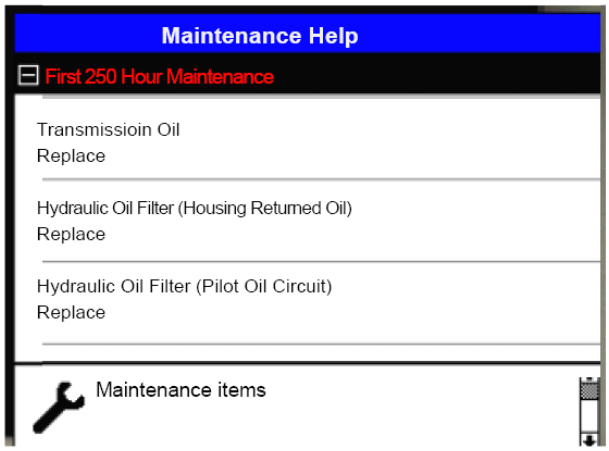
System Parameter Inquiry

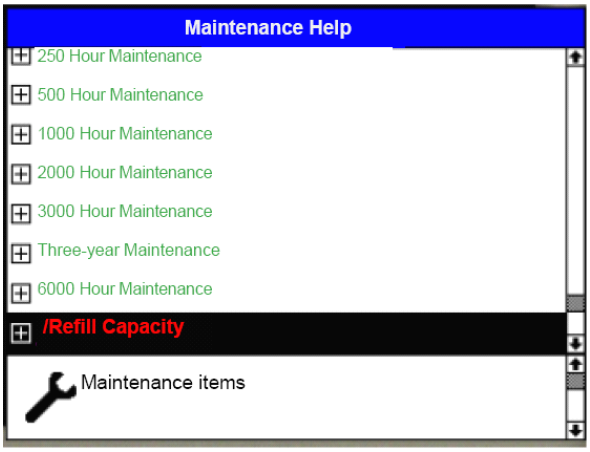
- After the Machine Status is selected in the main menu, parameter inquiry can be started as the right Figure.



Maintenance Help

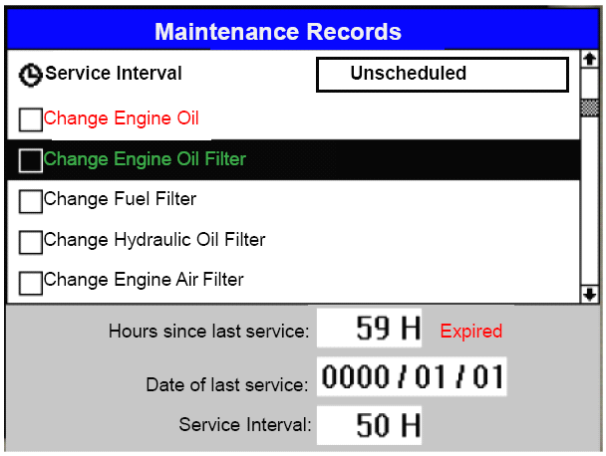
Select Maintenance Help in the main menu, the details are as Figure below.

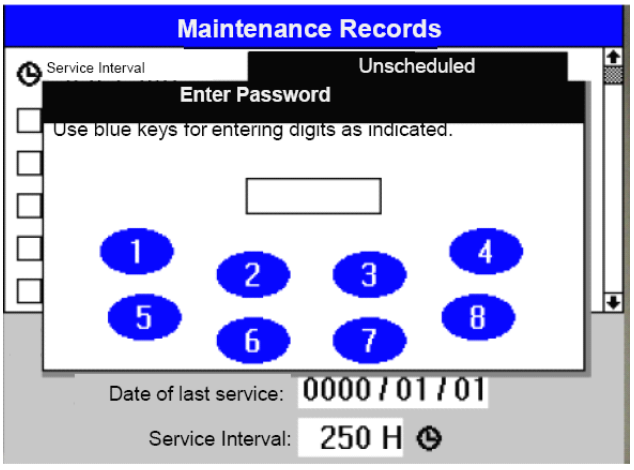




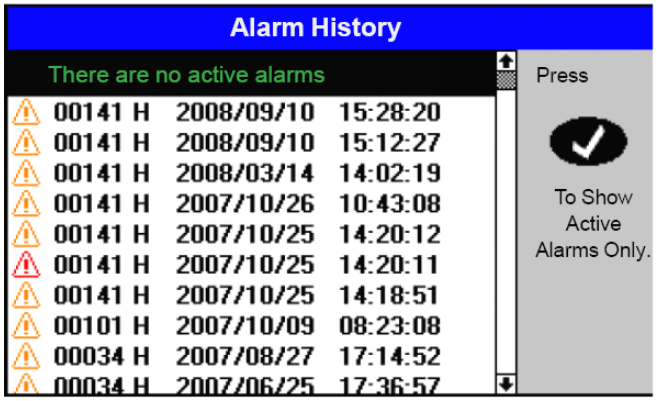
Input of Maintenance Records

Select Maintenance Records in the main menu, the details are as Figure below.





Alarm Display and Alarm History



- As the right Figure, select Alarm History in the main menu to access the details, press Enter key to switch real-time alarm record and history alarm record.
- Divided into three-level alarm:

Third-level mode, the subtitle and alarm icon are red; stop machine and repair it. The buzzer will be used to give these alarms.

The second-level mode, the subtitle and alarm icon are yellow, indicating that the working mode of machine shall be modified, or the machine needs necessary maintenance.

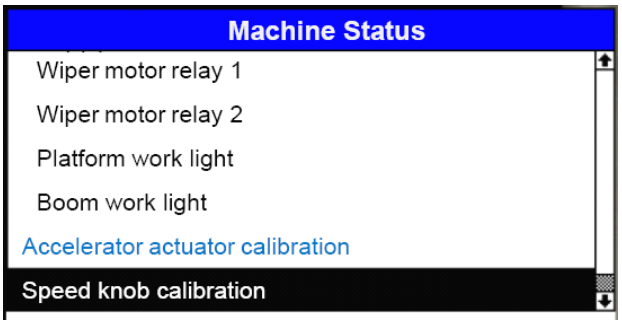
The first-level mode, the subtitle and alarm icon are orange, only telling operator to perform necessary maintenance.

- The code of each item is composed of machine working hour, alarm date and alarm time from the left to the right in turn.
- Alarm will be displayed according to time sequence, the latest alarm will be displayed at the top.50,000 items can be saved, if 50,000 is exceeded (depending on saved contents), the oldest one will be deleted.
- Alarm display of alarm zone in the main default window: if multiple alarms exist, the most urgent alarm will be displayed. After the fault is eliminated, the alarm information will disappear automatically.

Speed Knob Calibration

(This function can be only used by the debugging, maintenance and service staff)

- After Machine status of main menu is selected, select Speed knob calibration to start operation.
- When the screen displays speed knob calibration is needed, use this function.
- When the speed knob calibration is performed, screen will display calibration prompt tag, the system will calibrate each gear speed of engine automatically without manual operation, after calibration is finished, the calibration prompt tag will disappear.



System Function, Parameter, Alarm and Protection

Water-Thermometer

- Below -20℃ is blue zone, -20 ~ 102℃ is green zone, 102℃ ~ 105℃ is yellow zone, >105℃ is red zone.

Water Overheating Protection

- When water temperature exceeds 102℃, overheating protection function will be used, the engine won't be stopped immediately and system will reduce engine speed. Specific process is as the right Figure:

The protection mode is as follows:

Keep the original engine speed, and reduce hydraulic power with three steps.

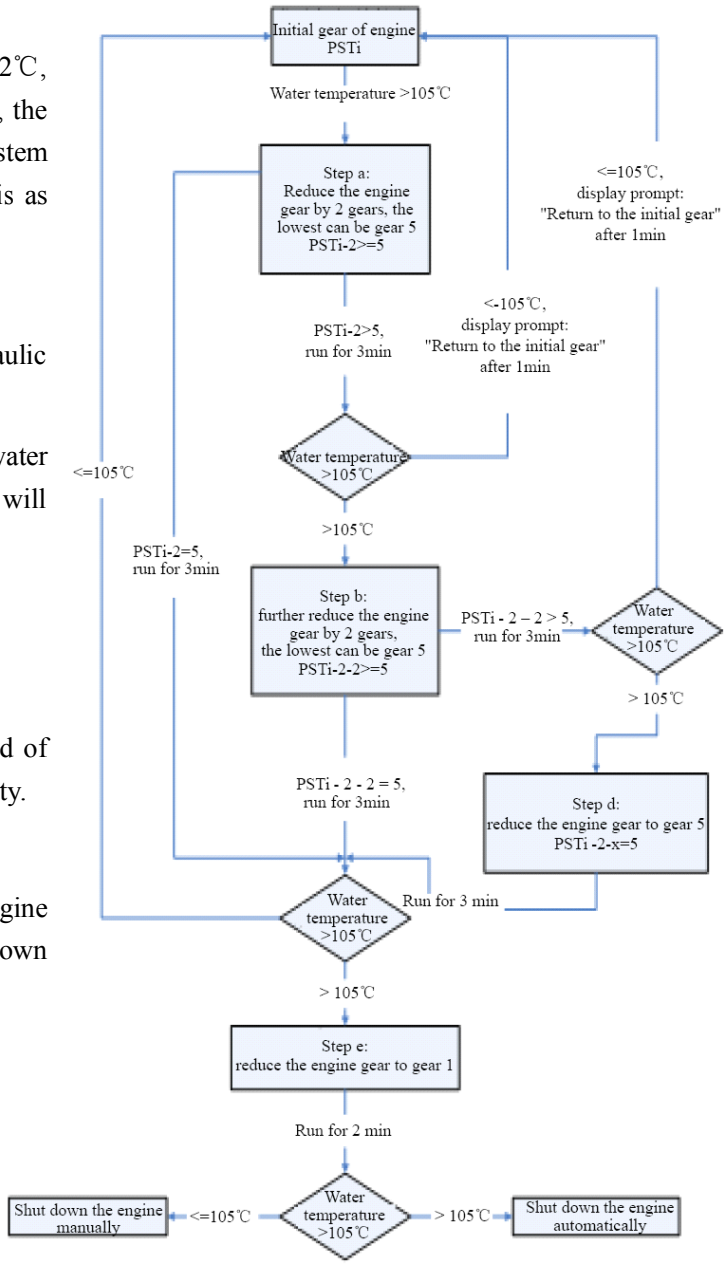
Each step of initial two steps will keep 3min, if water temperature drops below 100 ~ 102℃, machine will be recovered normal.



CAUTION

When protection is started, the working speed of machine will be reduced, pay attention to safety.

Third step: if water temperature is over 105℃, engine will run with low idle speed. User shall shut down engine to protect machine and find cause.



Low Engine Oil Pressure Protection

(Below 69kPa, speed>600rpm)

- When the engine oil pressure is below standard value, the engine oil pressure switch will be closed, alarm will be given with icon, 3s later, engine speed will be reduced to low idle speed, user shall shut down engine at proper time to protect machine.

Hydraulic oil temperature

- Normal temperature is -20 ~ +85℃
- The higher temperature is +85 ~ +90℃
- Over-high temperature is > +90℃

Hydraulic Oil Level

- When the hydraulic oil level is too low, system will give alarm.

Fuel Level

- When the fuel level is too low, system will give alarm.

Auto/manual Idle Speed Function

- Auto idle speed: if there is no power demand within 3s, the engine speed will be reduced to 100rpm. If there is no power demand within 5s, engine speed will be reduced to 1300rpm.
- Manual idle speed: speed will be reduced to 1300rpm.

Battery Voltage

Normal is 18-32V

Hydraulic Main Oil-return Filter Element Blockage Alarm

- The hydraulic main oil-return filter element blockage alarm message is "Hydraulic main oil-return filter element blockage".
- Hydraulic main oil-return filter element blockage alarm is displayed by 5s time delay.
- When the hydraulic oil temperature isn't below 20℃, the hydraulic main oil-return filter element blockage alarm message will be "Hydraulic main oil-return filter element blockage".
- When the hydraulic oil temperature is below 20℃, the hydraulic main oil-return filter element blockage alarm message will be "The oil-return pressure is higher, the hydraulic oil temperature will be probably low".
- When the hydraulic oil temperature is below 20℃, alarm will be given due to high oil consumption and big oil-return resistance, when the oil temperature reaches over 20℃, alarm will be cancelled, this condition will be normal.

Input of Whole Machine Number

- Input number in the Machine information menu → Machine information menu → Serial number via service aid or remote communication module.
- The remote input of remote communication module will be effective when GPS is used.

Alarm Log Clear

Clear alarm log via service aid or remote input of remote communication model.

The remote input of remote communication module will be effective when GPS is used.

System Error Diagnosis

CAN Communication Error

When the line between display and main controller is disconnected, or the main controller isn't powered on after machine is powered on, this alarm message will be displayed.

Meanwhile, the parameters on the display except system time are N/A.

Throttle Gear Fault

- Fault: No gear 1 or gear 10, or part of gears among gear 1 - 10 are displayed.
- Cause: the line connected with throttle knob is broken or contacted poorly; or the throttle knob is loosened, it'll swing and be off the initial position.

Memo:

Appendix Ⅱ

Low-temperature Operation Manual

CDM6150

CONTENTS

Appendix II Low-temperature Operation Manual CDM6150.....167

Important Safety Items.....170

Instruction of Low-temperature Startup and Operation of Machine.....171

Technical Specification of Machine Oil under Low Temperature.....172

Important Safety Items

Most of the accidents during machine operation, maintenance and repair are caused by violating the fundamental safety rules or preventive measures. If the potential hazards can be recognized, the accident will be probably avoided. For various potential hazards, the staves must be warned. The staves must be trained to master necessary skill and use tools correctly.

The incorrect machine operation, maintenance and repair will be dangerous and will even cause personal casualty.

These works can be only started after reading and comprehending the machine operation, maintenance and repair data.

LONKING is impossible to predict every hazard, so the warnings in this Manual can't be all-inclusive. If the adopted tool, operation procedure, working method or operation technology isn't recommended by the company, you must ensure safety of yourself and others. Moreover, you shall ensure the operation method, maintenance or repair procedure won't damage machine or cause un-safety.

The data, technical specification and diagram of this Manual are based on the current available data. All the listed technical specification, measured values, adjusted values, diagrams and other items will be probably modified, and the modification will influence machine maintenance. Before various works are started, the complete data must be acquired. China LONKING agent has the latest information. In order to acquire the catalogue of latest Manual, please contact China LONKING agent.

This Manual is the supplement of "Electronic Control System Manual" and "Operation & Maintenance Manual", and it's for the machine with low-temperature configuration.

Instruction of Low-temperature Startup and Operation of Machine

The design value of startup temperature of machine with low-temperature configuration isn't lower than -40℃.

When the ambient temperature is lower than -40℃ and the machine doesn’t' work, it shall be parked indoors as possible, and the anti-freezing measures shall be taken for the machine oil and display.

When the ambient temperature is lower than -20℃, the engine can't be started directly, the monitor will display "Engine oil temperature is too low, engine can't be started, heating is needed" and "Hydraulic oil temperature is too low, engine can't be started", after the oil and hydraulic oil is heated to -20℃, engine can be started.

When oil heater is installed on the engine oil pan, the hydraulic oil heater is installed on the bottom of hydraulic oil tank, and both of the heaters are connected with 240V AC supply.

When the ambient temperature is lower than 0℃, the machine will adopt automatic inlet pre-heating when engine is ignited, before pre-heating is completed, the engine won't be ignited, and it will be ignited after pre-heating is completed.

After machine is started, when the hydraulic oil temperature is lower than 0℃, work can't be started. In order to protect hydraulic system and realize normal operation of hydraulic system, operate the machine with idle speed until the hydraulic oil temperature reaches 0℃, and then start work, when the machine operates with idle speed, the hydraulic lockout shall be set for **Lock Position** to ensure safety.

For more cautions and instruction, please refer to "Electronic Control System Manual" and "Operation & Maintenance Manual".

Technical Specification of Machine Oil under Low Temperature

Oil filling position	Trademark
Swing reduction gearbox	China LONKING low-temperature gear oil
Travel reduction gearbox	China LONKING low-temperature gear oil
Hydraulic oil tank	China LONKING low-temperature hydraulic oil
Engine oil	China LONKING low-temperature diesel engine oil
Each lubricating point	China LONKING low-temperature lubricating grease
Gear ring lubricating grease	China LONKING low-temperature lubricating grease
Fuel tank	Low-temperature diesel oil (meet ambient temperature requirement)
Cooling system	China LONKING low-temperature long life coolant
Cooling liquid receiver	China LONKING low-temperature long life coolant
Air-conditioner refrigerant	R134a

Important

Only the original coolant can be used. The diluted coolant can't realize the required temperature.

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.

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)