

SHANTUI

Operation & Maintenance Manual

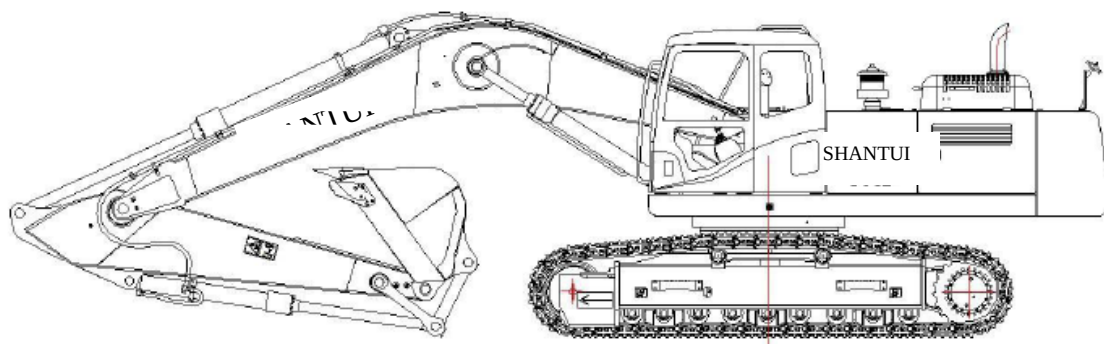
SE210

Hydraulic Excavator

⚠ WARNING

Unsafe use of this machine may cause serious injury of death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

SHANTUI CONSTRUCTION MACHINERY CO., LTD
THE PEOPLE'S REPUBLIC OF CHINA



Warning !

There should be no any operation or maintainace before reading and comprehending this manual.

Both of right maintainance and operation is very important to machine'ssafety, reliability and operability. The way of maintaince and operation in this book is the most efficient.Following this way would be helpful to insure equioment's' reliability, economy and efectiviness. To reduce the rate of casualties, equipment damage caused by improper operation and risk of unsafe factor, please pay attention to “notice” and “caution”.

Notice:

This book has been modified to fit all market. But the special equipments are not contained, for these maybe not for your machine.

We keep the right to perfect prodict's specification of technical parameters, standard, designs, operation and maintaince, and also keep right to improve these products. And please forgive us that we would not notice you about the previous products having no such equipments.

Safety requirement

Operate this machine under governmental rules. So the following operation safety omformation is just advice.

The following marks, apper with words means:



Warning!

Keep in mind, this is related to your own safety!

Ignoring this danger would cause accident, damage and even death.

The operator has the responsibility to make sure all the marks are on the machine and readability.

Be familiar to this machine's function and limitation.

Maintaince and operation

We JCM are responsible for the following situation:

- operate and maintaince the machine follow this book
- service and maintaince of every part is on time
- use the lubricating oil and fuel oil recommended by this book
- Protective seals are in good condition, or adjusted or reinstall by authorized dealer.
- all the change and maintaince should follow rules of JCM.
- use the original sapre parts and equipments, or from supplier confirmed by JCM.



Warning!

The operator should have enough skills and be familiar to this book before operation.

Untrained operator may caus terrible damage and even death.

Do not operate machine without this book.

Before operation, be familiar to marks, plates and this book.

Assembling of communication equipments

All the optional communication equipments should be assembled by trained people and follow rules of JCM.

Protection of EMI

This machine has been tested follow EU89/336 EC, so it is very important to test all the unauthorized equipments before or after working, for they may disturb electronic system.

Mobile telephone

A mobilephone should be assembled permanent in electronic system to get the best function. And there should be an antenna in cabin assembled follow manufacturer's advice. When the telephone is working, it should always send information to base station, even out of working, so it should not be put inside of electronic equipments.

Rule

Assemble under the following rules:

- antenna's place should be fit to around situation
- antenna must be coaxial type. Keep the cable in good condition and has good electricity contact.
- Between the antenna fixture and machine must be metal without surface dirt and oxide. Avoiding corrosion after assembling to keep in good contact.
- Keep distance between disturb cable and disturbed cable, disturb cable contains communication equipments' power and antenna cable. Disturbed cable is to connect machine's electronic equipments. For the metal has function to shield, these cables should be close to grounded metal.

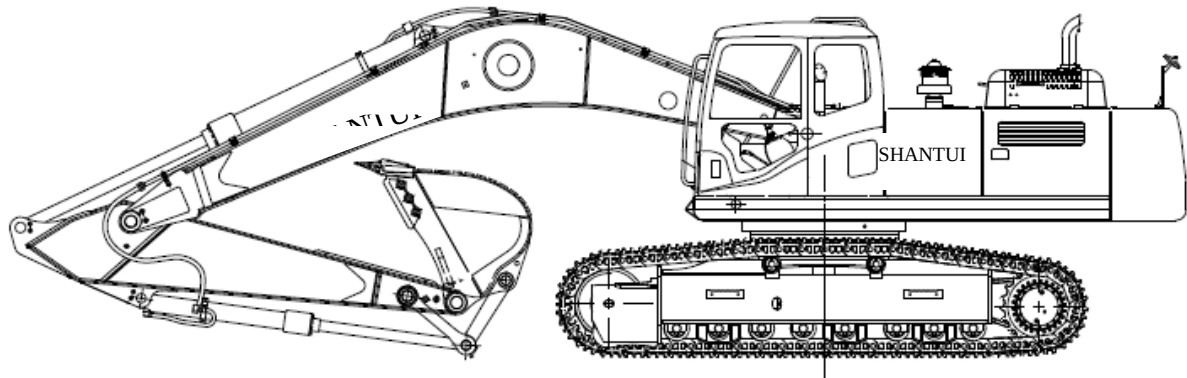
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Introduction



Summarize

Designed function

This machine is designed to work in normal situation. In special and dangerous condition, operator should follow special rules and equipped special equipments. Please contact dealer to get more information.

Engine

The engine is 6 cylinder, 4 stroke, direct injection, turbocharging, intercooling and water-cooling, with 5.9 L output volume, the model is Cummins B5.9-C

Electronic system

This system consists engine, charging, monitoring, engine-pump control and air condition system.

The speed is controlled by segmented increased continuous button and automatic idling system. Idling and increased speed system would reduce engine's revolving speed after operation in 7 seconds, and increases the speed to the designed.

Hydraulic pump

Hydraulic pump component consists two variable cam-type pump connected by two multiple keys and a quantitative gear pump, driven by engine.

Pump consists valve shroud and two groups of rotors and swash plates.

Two cam-type pumps' output volume is controlled by regulator , engine's is controlled by solenoid controlled proportional relief valve.

Main Control Valve

The control valve consists of 9 spool valve blocks, including 4 spool valves that are used for excavating gear, 4 spool valves for confluence and continuous driving, and 1 spool valve for optional equipment, 1 main relief valve, several outlet relieve valves, and several balance valves and one-way valves. All these valves are controlled by the servo-hydraulic system.

Travel Motor and Reduction Gear Unit

The travel motor is a cam-type axial piston including brake valve block and parking brake. The rear flange contains counterbalance valve, one-way valve, switch relief valve, and displacement conversion valve. The reduction gear unit consists of master gear, planetary gear, pinion, and casing.

Swing Motor and Reduction Gear Unit

The swing motor unit comprises a cylinder block and a piston assembly located in the block. Guided by the return plate and spring, the piston assembly can slide onto the swash plate smoothly. There is a relief valve for buffering and a cavitation inhibitor valve used to prevent cavitation erosion on the cylinder head unit. The reduction gear unit consists of sun gear, planetary gear, pinion, and casing. The power to the output shaft of the swing motor is transmitted to the pinion after motor speed is reduced and torque is increased through the sun gear and planetary gear.

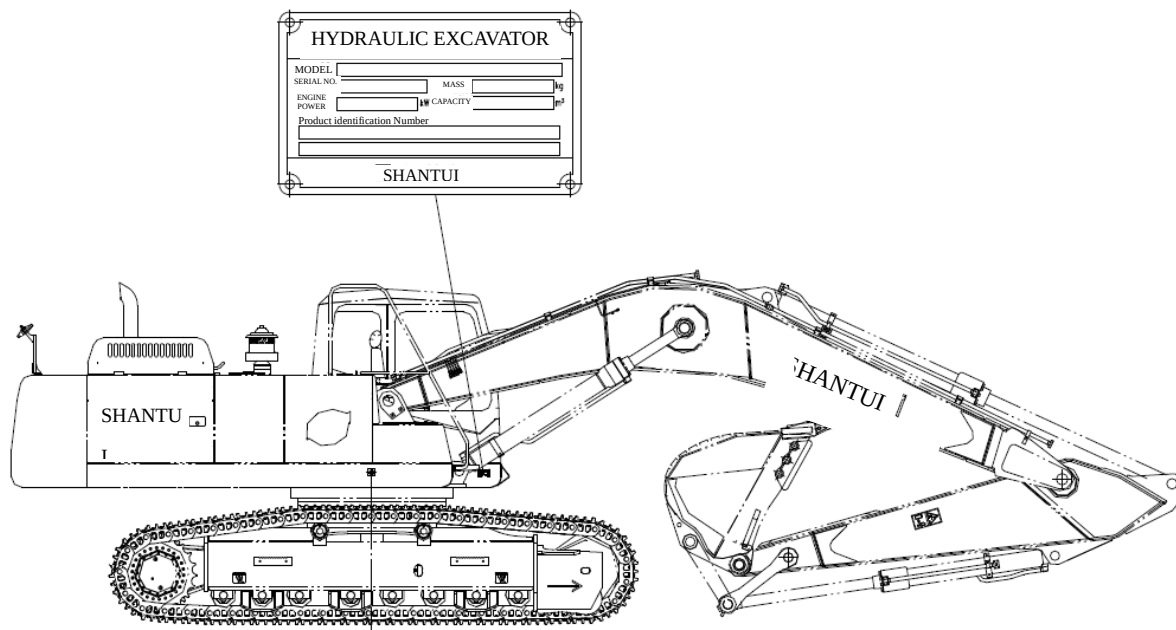
Plate and lamination

Plate

The following explanation and words should be on machine.

The product's model should be marked out when its spare parts are ordered.

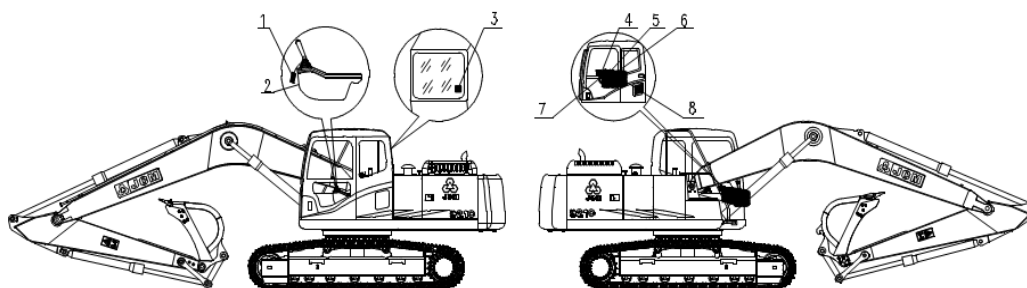
1. Plate(show model, number, weight, engine ourput mark) is on theleft side of upper frame which is close to body frame.



2. Engine's model and number and so on is on the plate where is on the engine's right side (from fan).

Information and caution mark

The following is the caution and words which should be found on machine.

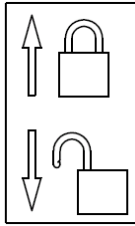


1. Do not start engine



2. Safety lockout

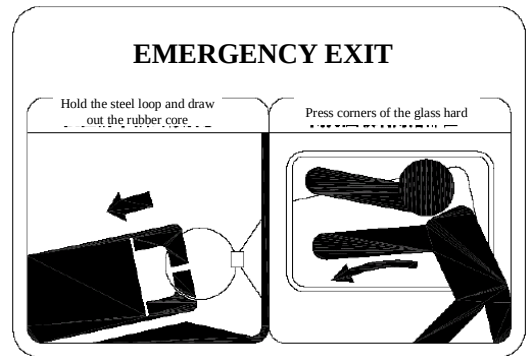
Refer to "safety lockout system"



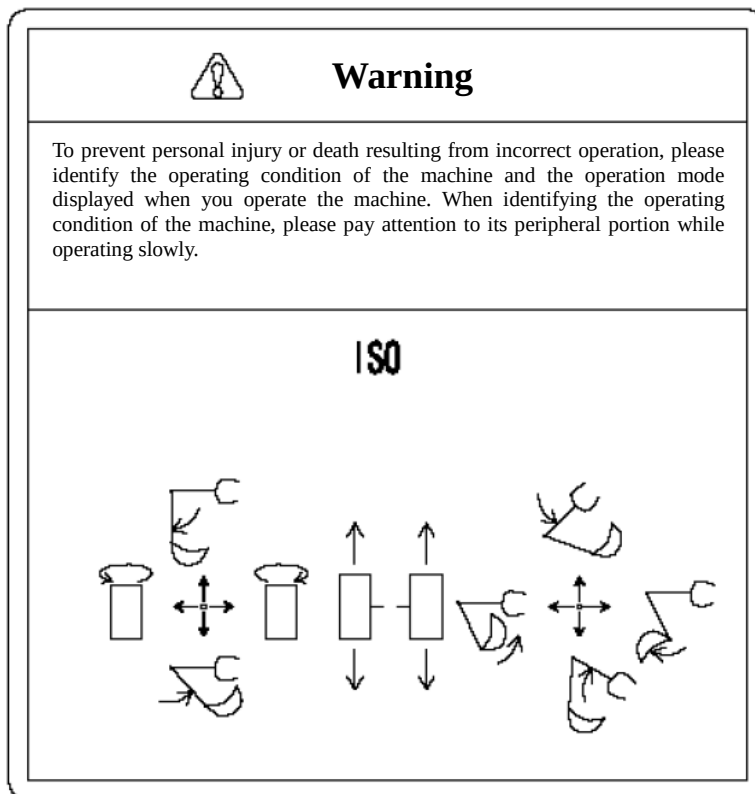
3.

Emergency exit

Please refer to “Escape in case of emergency”.



4. Operating options

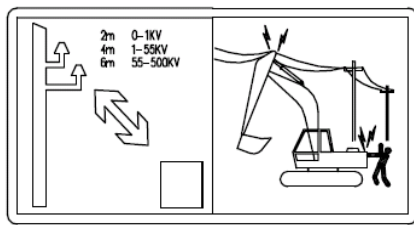


5. Accessories recommended table

Table of Recommended Accessories

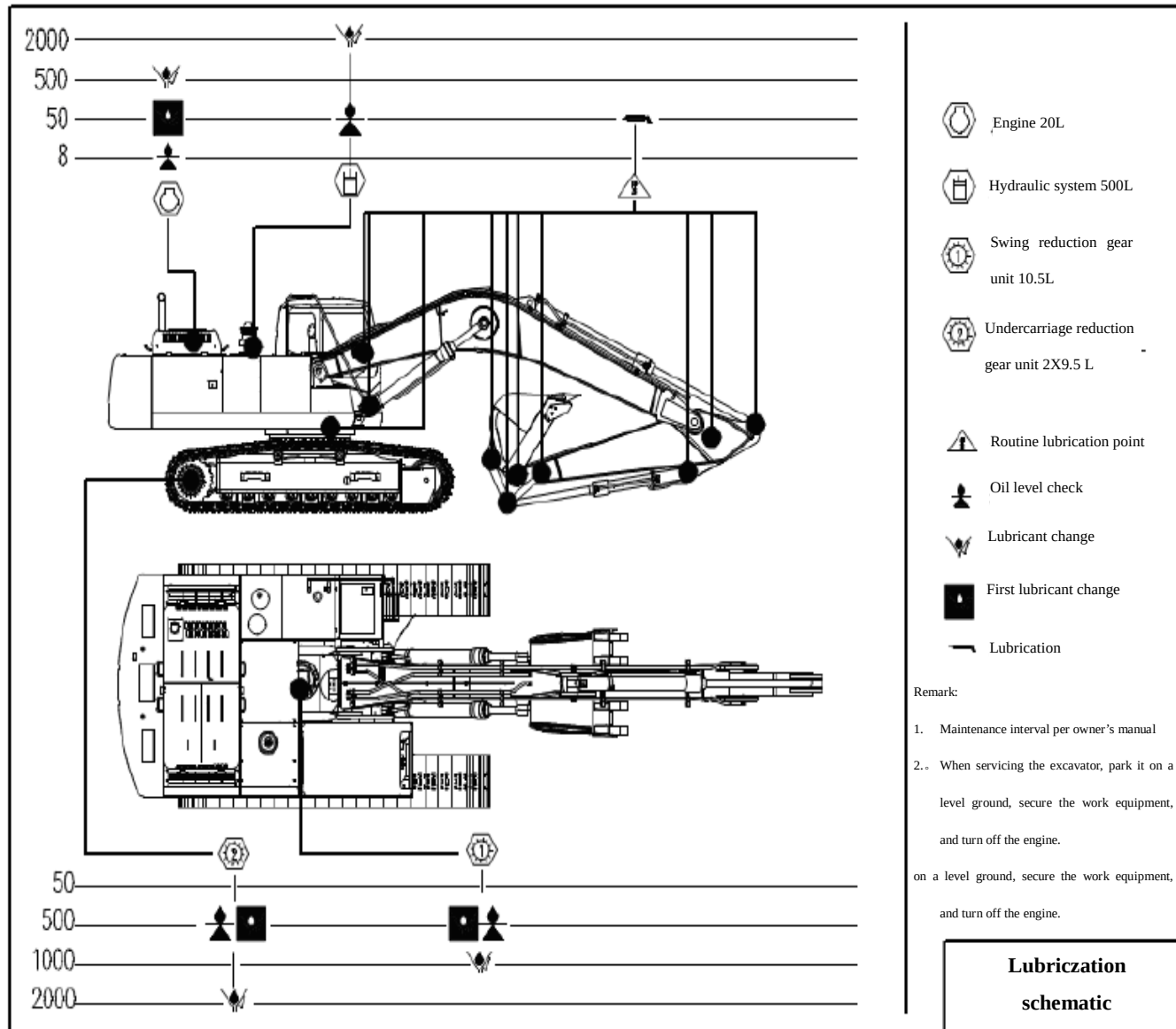
Table of Recommended Accessories for SE210 Excavator							
	Location						
	Engine	Fuel	Hydraulic oil	Antifreeze solution	Swing reduction gear unit	Undercarriage reduction gear unit	Air conditioner
Accessory requirement	API CH-4/ SJ SAE 15W-40	Sulfur content <0.5%	ISO VG46	-45℃	API GL-4 SAE 90	API GL-4 SAE 85W-90	R134a
Recommended variety	Premium Blue	-10# or -35#	Special hydraulic oil for SHANTUI	Special antifreeze for SHANTUI	Mobil GX	Mobil GX	-
Amount	20L	Capacity: 360L	420 L	Capacity:25 L	4.4 L	2X5.4 L	0.9Kg
Description: The various types of accessories selected in the table are generally required at delivery. For cold northern and hot southern areas, you can adjust the recommendations in accordance with the requirements of the Owner's Manual depending on climate conditions.							

6. High voltage



7. Maintaince

Service and maintenance

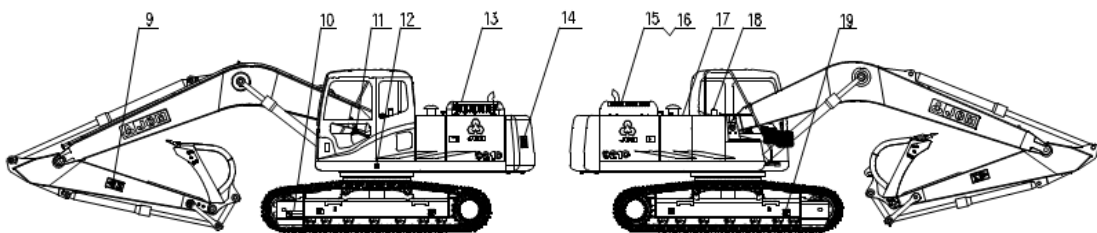


8. Note



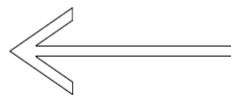
Caution

- Before operating the vehicle, you must read the Owner's Manual carefully.
- Before starting the vehicle, check it. When any unsafe factor exists, do not start the vehicle.
- The personnel must make clear the safe distance to high-tension lines.
- Before leaving the driver's seat, you must observe the following:
Lower the work equipment to the ground. Lock control lever with safety lock, and stop the engine.
When jacking up the vehicle body using boom or stick, do not allow anyone to enter under the body.
When parking on a slope, be sure to put stoppers under tracks.
When adjusting track tension, do not slacken the valve for more than 1 turn. When exceeded, the internal high-pressure grease may blow out.
- When stopping the engine, idle it with minimum throttle opening for 5 minutes before stopping it.
- If any hydraulic cylinder or a part of the circulating system is removed, be sure to follow the procedure below to bleed it when reinstalling it.
 1. Idle the engine at low speed.
 2. Extend and retract the cylinder piston for 4-5 times at first and stop it at 100m before its stroke end.
 3. Then move piston of each cylinder to respective stroke end for 3-4 times. For details of track adjustment, refer to the Owner's Manual.
- After a long-stay parking, you must follow the procedure below when starting the engine.
 1. Turn the starting switch of the engine to the "ON" position.
 2. Start the engine.
- Select engine oil according to ambient temperature. Please refer to the Owner's Manual.



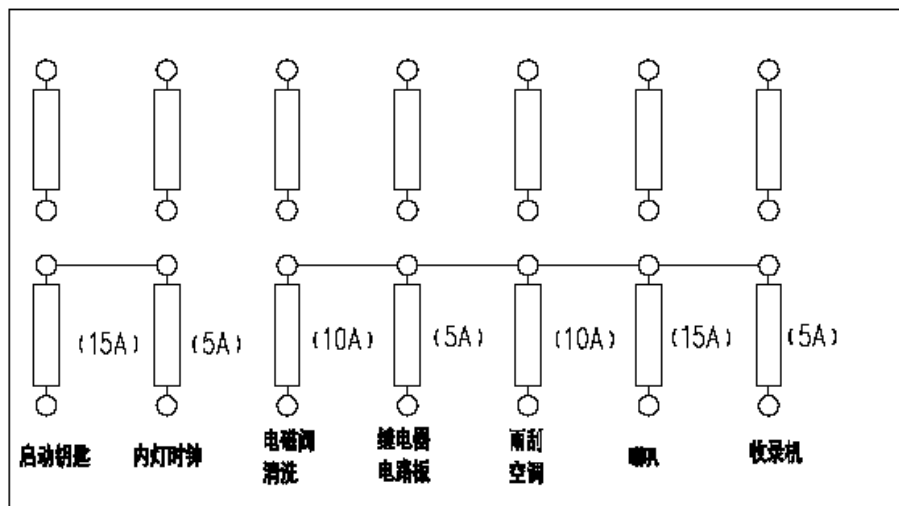
9. Keep distance

Working area, keep in distance !

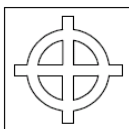


10. Travel direction

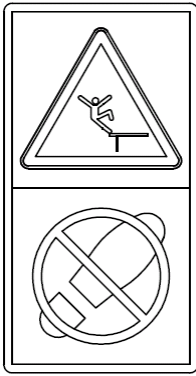
11. Fuse parameters



12. Swing location

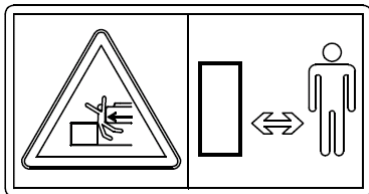


13.Warning! Banned trample, prevent slip



14. Keep distance

In swing radius, keep in distance !



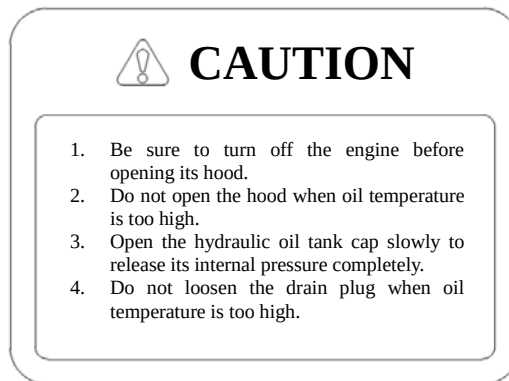
15. Warning! Cooling liquid is with high heat and pressure, be careful of scald.



16. Warning! Turning, keep in distance

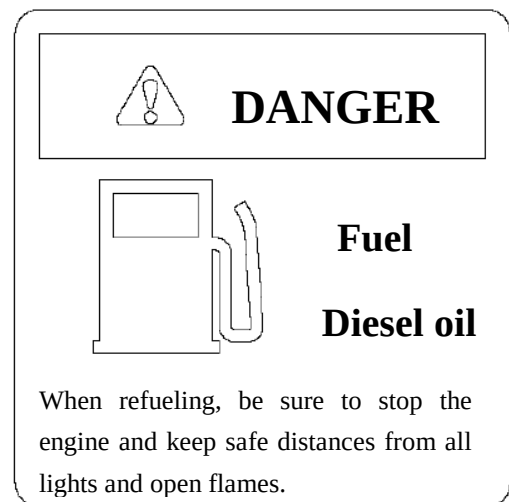


17. Caution! Hydraulic oil is with high heat and pressure, be careful of scald.

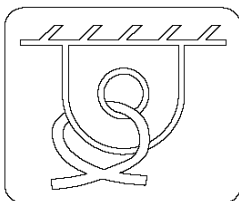


18.

Dangerous! Inflammable and explosive! Keep fire away!



19. Lifting and fixed position.



Repair and maintenance

Overview

In order to reduce the cost of using the machine as much as possible, you must do the machine with good maintenance and repair. Repair and maintenance intervals apply to normal environmental and working conditions of the machine, the operator can do the maintenance work described in the "Manual", further adjustments and

repairs should be done by authorized service center or manufacturer.

Delivery and Inspect

The machine has completed the test and adjusts accordingly before leaves the factory. According to the instructions in this manual, the dealer should also do further "delivery inspection." before the delivery of the user.

Warranty inspection

It is very important to inspect the machine regularly at an early stage. The contents include: checking the degree of tightening bolts, the set value and actual value to compare and make minor adjustments.

Therefore, the follow-up examination is divided into three phases: The first is in 500 hours later, the second is in 1000 hours later, and the third time is in 2000 hours later. Strong construction machinery co.,ltd has the right to make changes of the inspection time without prior notice.

Service

State testing and maintenance program

In addition to the measures described in manual and maintenance program, authorized service center also provides special state-based testing service content, as well as the general state of the machine.

You can get the information about the content of the authorization from the nearest Authorized Service Center.

General Information

U.S. federal "Clean Air Act."

The federal Clean Air Act Section 203 (a) (3) section shall prohibit removal of air pollution control device, or make the inspection and approval of non-road engines convert into the form without checking the structure.

Federal regulations at 40 CFR Part 89 1003 (a) (3) (i) section supplements the non-road engines of the Clean Air Act, as follows:

Prohibit the following acts and the reasons:

Before the sale or delivery of the machine prior to the end user, unauthorized removal or disposal of equipment used in line with the regulations, components, non-road engines or equipment;

After the sale or delivery to the end users, intentional removal or disposal of such devices or components.

Violation of this law shall be punishable by a fine of \$ 2,500;

Unauthorized modification to the fuel system to increase the certified calibration of engine power or torque is also an offense.

It is not allowed to change the passed certification of non-road engines, otherwise it will cause the current engine models that meets the federal standard does not match the overall machine system.

User support

Strong construction machinery co.,ltd is willing to provide to ensure better implementation of the emission control system warranty.

If you do not enjoy the warranty service that should get according to the emission control system warranty, please contact the nearest regional office for assistance.

The general-purpose of Non-road engines

Prerequisite for the maintenance of the machine according to the set "Manual" in the manner prescribed, and only use the specified fuel and lubricants.

Maintenance of non-road engines

Non-road engines are belonging to conventional design; any local sales agents can finish maintenance tasks that described in this manual require non-road engine emission control.

Particularly recommend that users comply with the "basic preventive maintenance" section of the non-highway engine maintenance instructions.

Such maintenance includes the maintenance of the engine emission control devices.

In order to carry out with written proof of status of regular maintenance, Strong construction machinery co.,ltd recommends that users retain all maintenance records and receipts. These records and receipts for all purchases should be handed over to users of non-road engines.

Services provided by local distributors

Local dealers are equipped with the manufacturer's original spare parts, special tools, the latest technical information and well-trained service technicians, which have the ability to provide you with quality, reliable service.

Please notify your local dealer of maintenance service requirements. According to your needs, they will make specialized maintenance program.

For regular maintenance work, you had better to get in touch with local dealers, mutually agreed time, to deploy the necessary equipment and maintenance technicians to repair your machine in order to ensure and improve the utilization of your machine.

Preventive maintenance and maintenance plan

In order to maintain the reliability of the engine, control exhaust emissions, noise, radiation, it is very important to maintenance, inspect and adjust the engine regularly.

Fuel System

Suggestions about the fuel:

The fuel must be clean, safe distillation, stable and non-corrosive. Optimal choice of fuel in the combustion efficiency and minimum wear and tear, the distillation range, Hexadecane number and sulfur content is the most important factor.

To cold characteristics and Hexadecane number, the engine working conditions and ambient temperature affect the fuel choice.

In cold climates, such as temperature below 0 °C, it is best to use lighter distillation or higher Hexadecane number. (Final boiling temperature of 349 °C and minimum Hexadecane number of 45).

In order to avoid the formation of too much precipitation, and reduce the exhaust emissions of sulfur dioxide to a minimum, you should choose the fuel with sulfur content as low as possible, we recommend the use of diesel engines should meet the American Society for Testing and Materials ASTM requirements: D975NoID (CB) or No.2D (TT) and not less than 42 Hexadecane number, sulfur content by weight not more than 0.5% of the fuel.

Check fuel leakage

If the engine is running at high idle, you should inspect all fuel fittings and hoses by eyes.

Check the fuel hose situations:

- Aging
- cracking
- blistering
- wear and tear

The fuel tank of the situation:

- discharge condensate
- Check the cracks and damage
- Check the installation
- Check for leaks

Check the turbocharger and intercooler:

- Visually inspect for loose suction and discharge lines and leaks.

Instruments and controls

Overview



Do not operate the machine, before you are familiar to the position, function and usage of the control instrumentation and control system, you must carefully read and be familiar with this part. You should view the displayed information at any time, and take appropriate measures to avoid damage to the machine.

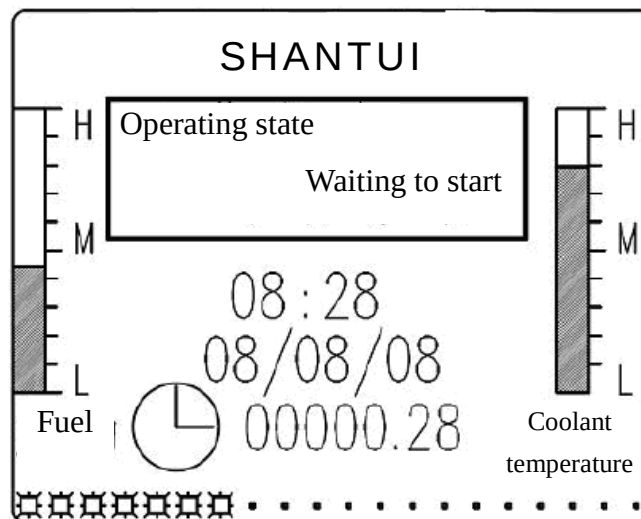
V3.0-13C Excavator monitor is equipped with a wide selection of type, 160 X128 dot matrix LCD display, vibration, good anti-interference ability, especially suitable for outdoor light environment; System is displayed in Chinese / English, with text and symbols displaying a variety of working conditions and a variety of fault alarm information. Various control functions are came true by centralized key control, monitoring of working conditions at any time, having the advantage of controlling display modern, reliable, simple operation and easy.

—.Description of the instrument panel

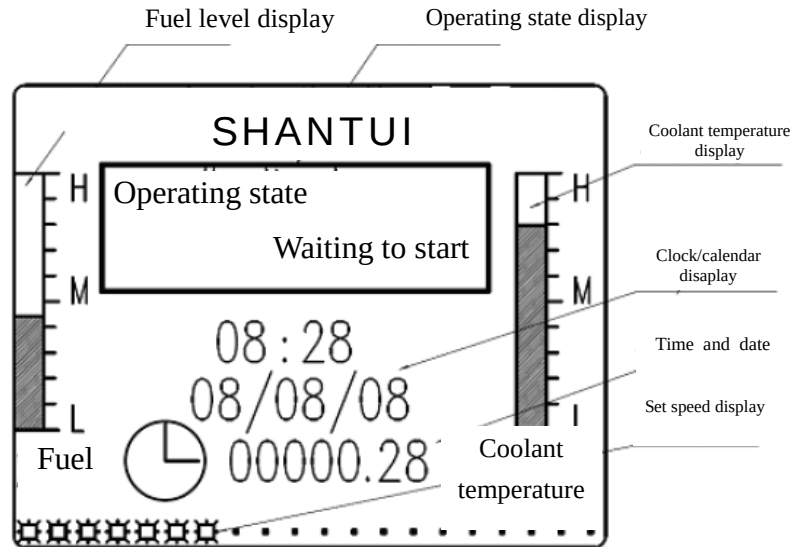
Start key switch

The start key switch has 3 (4) positions: HEATER (optional), OFF, ON, and START.

When the machine is operating normally, the monitor will display the following: (main frame)



They can be divided into 6 areas:



Expressed as follows:

1. Status display area

Displays the current engine operating state, such as the [start waiting], [waiting for operations], [normal operation], [delay] and so on standby.

Monitoring system monitors the situation of engine lubrication system, cooling system, intake system, power generation systems, and hydraulic system at the same time.

If the system gets problem, it will display the following fault alarm information in the status area:

Level 1 alarms

- 1.1. It displays [Coolant level] and flashes to indicate that the engine coolant level is below the normal value. At the same time, the buzzer sounds.
- 1.2. It displays [Coolant temperature too high] and flashes to indicate that the engine coolant temperature is above the normal value. At the same time, the buzzer sounds.
- 1.3. It displays [Oil lubrication] and flashes to indicate that the engine oil pressure is below the normal value. At the same time, the buzzer sounds.
- 1.4. It displays [System pressure] and flashes to indicate that the line pressure of the hydraulic system is above the normal set value. At the same time, the buzzer sounds.
- 1.5. It displays [Voltage too low] and flashes to indicate that the battery voltage is below 22V. At the same time, the buzzer sounds.
- 1.6. It displays [Voltage too high] and flashes to indicate that the battery voltage is above 32V. At the same time, the buzzer sounds.
- 1.7. It displays [Speed sensing] and flashes to indicate speed sensor signal abnormality. At the same time, the buzzer sounds.

Level 2 alarms:

- 1.8. It displays [Please refuel] and flashes to indicate that the remaining fuel in the fuel tank is

inadequate and that refueling is needed.

- 1.9. It displays [Air cleaner dirty] and flashes to indicate that the air cleaner is dirty and that you need to clean up or replace the intake filter screen.

2. Fuel display area

An analog bar is used to display percentage of fuel in the fuel tank. When fuel level is below 20%, it will display a “” in the Time & Date position and flashes; at the same time, the status display area will display a prompt [Please refuel].

3. Coolant temperature display area

An analog bar is used to display engine coolant temperature (°C). When the temperature is above 100°C, it will display a “” in the Time & Date position and flashes; at the same time, the status display area will display a prompt [Coolant temperature too high] and the buzzer will sound.

4. Calendar and clock display area

- 4.1. This area displays current date and time.
- 4.2. In case of malfunction alarm, an alarm prompt will be displayed in this position. (Alarm messages are highlighted.)

- 4.2.1. It displays  and flashes to indicate too low engine coolant level.

- 4.2.2. It displays  and flashes to indicate too high engine coolant temperature.

- 4.2.3. It displays  and flashes to indicate too low engine oil pressure.

- 4.2.4. It displays  and flashes to indicate too high line pressure in the hydraulic system.

- 4.2.5. It displays  and flashes to indicate inadequate remaining fuel.

- 4.2.6. It displays  and flashes to indicate abnormal battery voltage.

- 4.2.7. It displays  and flashes to indicate dirty air cleaner.

- 4.2.8. It displays  and flashes to indicate abnormal speed sensor signal.

5. Hour meter

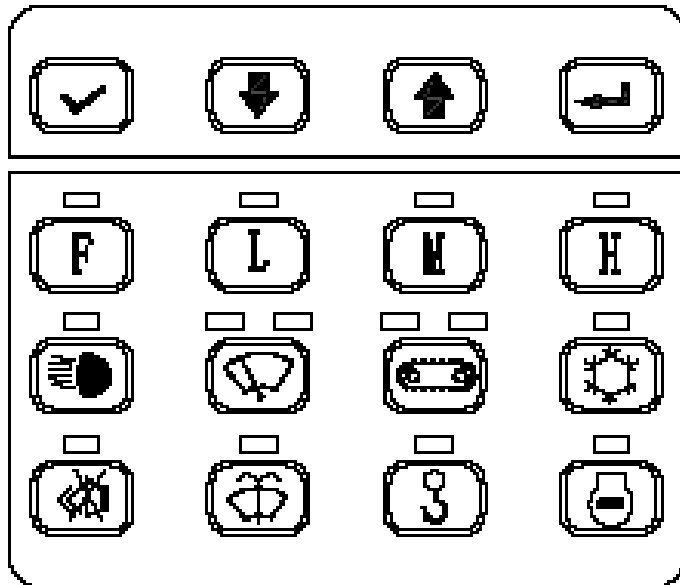
Then the engine start to timing meter start to working, the engine stop the timing meter will stop too. Every time restart engine, the timing meter working base on the total time. The picture will display the total time from the newest time.

6. Set speed display

Displaying the engine set speed of the current operating mode.

II. Description of key board

Monitor operating key board screen, as shown



Menu button

1.  is enter button, press this key to confirm that the contents of the prompt or enter the options menu;
2.  is Page Down key, the contents of the key is corresponding to the operation with the top of the screen.
In normal display mode, in addition to **【F】** mode, pressing this button can follow 50RPM / set times to reduce the engine speed.
3.  is Page Up key, the contents of the key is corresponding to the operation with the top of the screen.
In normal display mode, in addition to **【F】** mode, pressing this button can follow 50RPM / set times to increase the engine speed.

Working Mode key

5.  is **【F】** mode control keys; System is working in fine (slow) mode;
6.  is **【L】** mode control keys; The system is working in Light-load mode;
7.  is **【M】** mode control keys; The system is working in Standard operating mode;

8.  is **【H】** mode control keys; Strong power mode system.

Control key

9.  is working lights switch, press once to turn on the lights, and press again will turn off the light.

10.  is brush key, press this key ,the L light will on means the brush in the interval working situation , press again , the H lamp will light means brush in the continue working situation, press the third time , the brush will stop working.

11.  is the double walk speed key , press this key , the above L lamp will light means walking in the low speed, press again the H lamp light , means walking in high speed situation. Press again the walking situation will back to low speed.

12.  is air conditioner key , press this key the refer lamp will light , means the air conditioner have turn on , when press again the lamp will off and the air-conditioner will not working .

13.  is mute control buttons, press this key to keep the buzzer silent;

14.  is the brush water spray key, press this key, the lamp will light, the spray pump will out of water, same time the brush will working. Leave this key the lamp will off, and spray stopping and the brush stop too.

15.  (Optional) is Micro-mode control keys;

16.  is idle speed key, the lamp light time the situation are automatic to come back idle speed and so operation leader, the engine automatic to back default speed to working , operation leader in middle position stop more than 1 second, and start to delay, delay 7 seconds , the engine automatic back to idle speed. The lamp off and the working will be manual work, now engine are working on the default situation.

III. Operating instructions

Make sure the safety lock lever is in the locked (raised up) position.

1. After the start key is turned ON, the system will perform self check and initialization first. After finishing initialization, the system will enter the main working interface automatically. If no alarm signal appears on the display screen, the status display area should show [Waiting to start].
2. Turn the start key clockwise to the START position to start the engine. After the engine is started, release the key rapidly to allow the engine to run automatically in idle state. Then the status display area will show [Waiting to operate].
3. Select operating mode according to operational need. (At engine start, the default mode is [F].)

[H] mode: maximum power output. It is suitable for heavy-load operation.

[M] mode: 90% power output. It is suitable for operation in standard condition.

[L] mode: 70% power output. It is suitable for light-load operation.

[F] mode: 30% power output. It is suitable for occasions where fine movements are required.

Generally [M] mode is recommended because it can significantly improve working condition, reduce fuel consumption, noise, temperature rise and wear, and prolong life of the engine. In auto idle state, set down the safety lock lever and operate the left and right levers or the travel lever, then the engine will automatically run in the selected operating mode and the status display bar will show [Running normally].

4. To change engine speed in the operation process, you can press  or  key to decrease or increase the working speed of the engine. Each press can rev down (up) the engine by 50rpm. The speed adjustment is valid only in this on/off period. At restart after the system is turned off, the engine will return to the default set speed.
5. Once an alarm signal, such as [Oil lubrication], [Coolant level] or [Coolant temperature too high] message, appears in the status display area, stop immediate and check (refer to latter fault handling section for details). Otherwise, the system will rev down the engine to idle speed and record down time after 1 minute automatically. No record will be kept when the engine is out of operation.
6. After finishing work, do not turn off the engine immediately. Instead, let the engine rev down to idle speed automatically and run 3-5 minutes before shutdown, otherwise the service life of the engine will be affected.

CAUTION: All keys are touch keys (each press corresponds to an operation) except that the wiper spray key must be pressed and held to complete an operation.

IV. Fault handling and troubleshooting

In addition to displaying operating states, the monitor can also supervise operating states of the lubrication system, cooling system, intake system, and generator system of the engine. If any of above systems is out of order, the following prompts will appear in the Time & Date position on the screen respectively:

Level 1 alarms

1.  [Oil lubrication] prompt: low pressure in lubrication system. Troubleshooting should be carried out mainly in the following 3 aspects.
 - Check engine oil line for clogging.
 - Check engine oil pump for proper operation.
 - Check for lack of engine oil.
2.  [Coolant temperature too high] prompt: It indicates that coolant temperature is above 100°C. In case of coolant temperature alarm, check the cooling system immediately. Check the water tank for too high actual temperature and heavy coolant leak.
3.  [Coolant level too low] prompt: It indicates that the coolant level in the radiator or surge tank is below the safe value. Then a troubleshooting is required:
 - Check surge tank and water radiator for lack of coolant and seals of water radiator and

adapters for leakage.

- Check if coolant level in surge tank is below LOW mark.
- Check coolant level sensor which is mounted in two ways and falls into two types:
 - A. Mounted on water radiator: To check it in case of alarm, disconnect the sensor connector and short it. If the alarm disappears, poor contact of the connector, sensor bubbles or sensor damage may occur; if the alarm remains, perform troubleshooting forward in turn to check for poor contact of connector.
 - B. Mounted on surge tank: To check it incase of alarm, disconnect the liquid level sensor of the surge tank. If the alarm disappears, you need to replace the coolant level sensor; if the alarm remains, perform troubleshooting forward in turn to observe signal wires for short circuit.

4.  [System pressure] prompt: The pressure in the main pump of the hydraulic system is above the set value.

- Check the constant pressure valve on the main valve for normal operation.
- If none of above occurs, please contact the nearest agent for help.

CAUTION: Once such alarm signal is displayed, stop immediately and check. Otherwise, the system will rev down the engine to idle speed and record down time after 1 minute automatically.

Please see the figure below:

Failure time		
↓		
Low oil alarm	Min	
Low coolant alarm	Min	
High temperature alarm	Min	
Clear record	Options	Back

Level 2 alarms:

5.  [Voltage too low] prompt: It indicates that the battery voltage is below 22V. Then you should try to start the engine once and judge the fault according to the response:

- If the engine can start and the alarm will disappear after the former has run for 10 minutes, then minor power loss occurs. You can troubleshoot the problem by running the engine for an extended period of time. You can troubleshoot the problem by running the engine for an extended period of time.
- If the engine can start but the alarm remains after the former has run for 10 minutes, then you should check the generator for normal power generation and the battery for damage.
- If the engine can not start, then serious battery power loss occurs or the battery has been damaged and you should service or replace the battery.

6.  [Voltage too high] prompt: It indicates that the battery voltage is above 32V. When

the engine is running properly, its working voltage should be 26V-31V. At this point, you should measure the actual voltage of the battery.

- If the voltage is greater than 31.5V when the engine is running properly, then the generator regulator is out of order and you should service or replace the generator.



7. [Air cleaner dirty] prompt: It indicates that the air cleaner element is dirty. Then you should clean up or replace the element.



8. [Please refuel] prompt: It indicates that the actual fuel level in the fuel tank is less than 20%. Then you should check fuel level in the fuel tank and refuel in a timely manner.



9. [Speed sensing] prompt: It indicates that no speed signal comes from the speed sensor on the flywheel housing of the engine. Then you should check the engine speed sensor and corresponding lines.

Other operations

After entering the main interface, you can press [OK] key to open System Setup and Log frame:

System Setup and Log options		
01 Troubleshooting		
02 Speed and Power		
03 Time Setting		
04 Failure Logging		
05 System Help		
Clear Record	Options	Back

After entering the main interface, you can press [OK] key to open System Setup and Log frame:

General settings include Troubleshooting, Time Setting, and System Help. Speed and Power Settings, Working Hourmeter Setting, and Failure Logging are advanced settings which will not be described here. (Only service personnel or persons authorized by the company have access to advanced settings.)

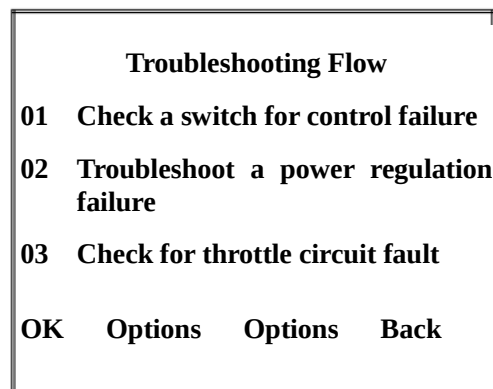
1. Troubleshooting

Press Page Up/Down key to move the black box in the figure up/down, and select "01". Then press [OK] key to open Troubleshooting frame.

Circuit Fault Display	
Temperature Sensor Circuit	
Fuel Sensor Circuit	
Speed Sensor Circuit	
Troubleshooting	Back

- a. The displayed statuses of the temperature sensing circuit are divided into [Normal], [Open Circuit/Low Temperature], and [Short Circuit].
- b. The displayed statuses of the fuel sensing circuit are divided into [Normal], [Open Circuit], and [Short Circuit].
- c. The displayed statuses of the speed sensing circuit are divided into [Normal] and [No Signal].

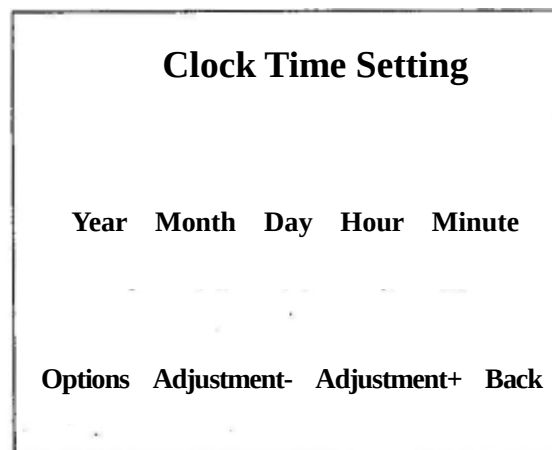
If selecting Troubleshooting, then you will enter the frame shown right:



Press Options key to select and [OK] key to enter the items of next level. You can troubleshoot a problem step by step by screen.

2. Clock display and adjustment

In System Setup and Log frame, press Page Up/Down key to select "03" and press [OK] key in succession to open [Clock Adjustment] frame. Date and Time on display screen of the monitor can be set respectively.



In above figure, you can cycle among Year, Month, Day, Hour and Minute by pressing corresponding keys of the options. When an option is selected, you can adjust the corresponding item using Adjustment keys.

- After Year is selected, you can adjust it within 00-99 by using [Adjustment+] / [Adjustment-].
- After Month is selected, you can adjust it within 01-12 by using [Adjustment+] / [Adjustment-].

- After Day is selected, you can adjust it within 01-31 by using [Adjustment+] / [Adjustment-].
- After Minute is selected, you can adjust it within 00-59 by using [Adjustment+] / [Adjustment-].
- Press [Esc] key to exit the frame.

3. Maintenance time records (optional)

In System Setup and Log frame, press Page Up/Down key to select “05” and then press [OK] to enter [Maintenance Records] frame where can display schedule of periodic maintenance and prompt customers to perform maintenance periodically.

The frame displays the specific time records of the 3 free maintenance services carried out by the manufacturer for the vehicle delivered:

500h, 1,000h, and 2,000h

1. The first engine maintenance should be carried out at 500 working hours as of the date of delivery. Now xxx hours left until the 500h maintenance.
2. The second engine maintenance should be carried out at 1,000 working hours as of the date of delivery. Now xxx hours left until the 1,000h maintenance.
3. The third engine maintenance should be carried out at 2,000 working hours as of the date of delivery. Now xxx hours is left until the 2,000h maintenance.

After each maintenance service is completed, the system will display a “Maintenance Finished” prompt

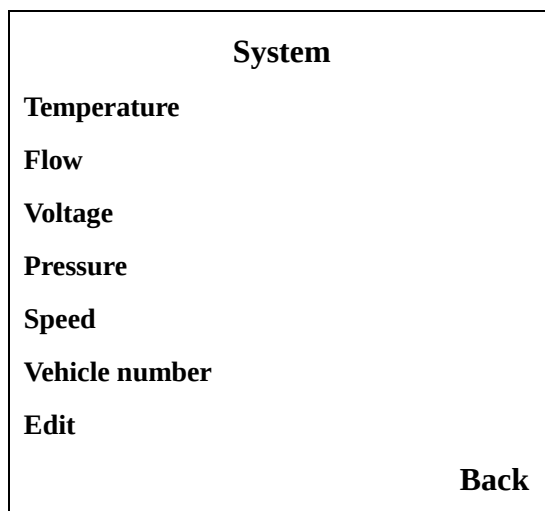
4. System Help

In System Setup and Log frame, press Options key to select “05” and then press [OK] to enter the interface shown below.

System Help		
01 System Status		
02 Start and Stop		
03 Lubrication and Maintenance		
04 Engine Maintenance		
05 Hydraulics and Circuits		
06 Default Settings		
OK	Options	Back

This setting can help customers solve some problems, troubleshoot malfunctions, and inquire about current operating state of the machine.

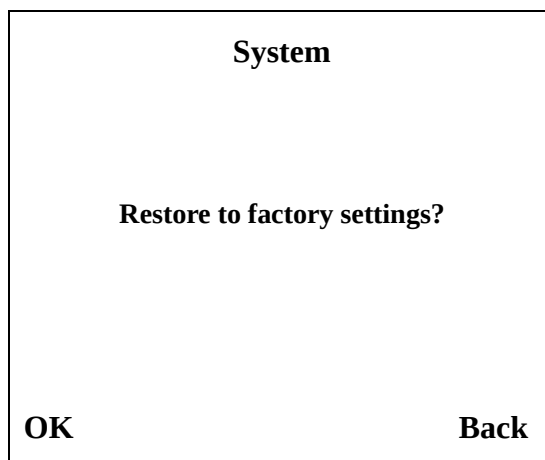
When the machine is out of order, you should view system status first. Press [OK] key, and the interface shown below will appear:



In the above figure, engine coolant temperature, main pump flow, charging voltage, engine oil pressure, engine speed and license plate number are displayed.
Press [Esc] key to exit.

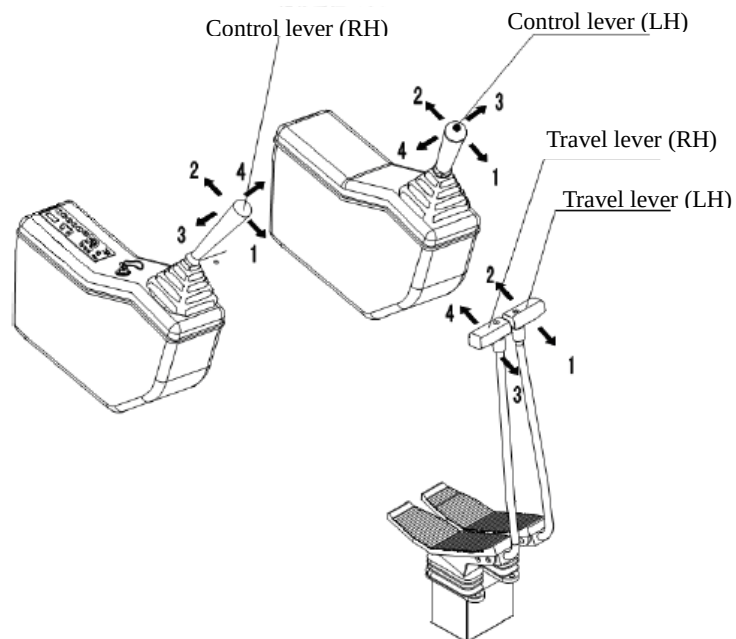
5. Restore Factory Settings

In System Help interface, press Options key to move the black box up/down to select "06" and press [OK] key to enter the following frame:



Pressing OK key can restore system status to the factory settings.

Controls



1. Control lever (LH): This lever is used for swing and dipper operation.

- 1 Dipper extension
- 2 Dipper retraction
- 3 Swing left
- 4 Swing right

2. Control lever (RH): This lever is used for boom and bucket operations.

- 1 Boom down
- 2 Boom up
- 3 Bucket rollover
- 4 Bucket rollback

3. Travel lever/pedal



Warning

When operating, do not put your foot on the travel pedal.

When operating the travel lever/pedal, make sure that driving operation is in the reverse order when the drive sprocket in the travel direction of the tracks is in front.

- 1 3 Forward
- 2 4 Backward
- 1 Turn right
- 3 Turn left

Operating 14 or 23 at the same time allows pivot turn.

Pedal (optional)

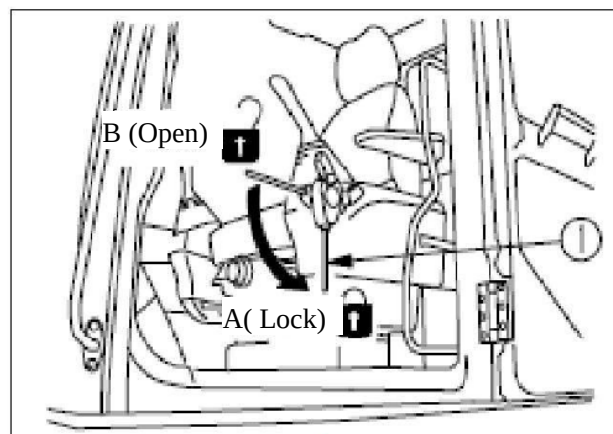
It is available when attachments such as breaking hammer and hydraulic shear are equipped.

Safety lock system



Warning

Remember to rise up the safety lock lever before starting operation. When the safety lock lever is not in position A (locked), the machine will move if any control lever is touched inadvertently and thus serious injury may result.



Safety lock system

- A- Lock position (When the safety lock lever① is set to this position, you can start the engine.)
- B- Unlock position (When the safety lock lever① is set to this position, you can not start the engine.)

This system is used to lock work equipment and swing and travel units.

CAUTION: When the safety lock lever is in position A (locked), all control levers are inoperative. You can start the engine only when the lever is in this position.

Operator seat



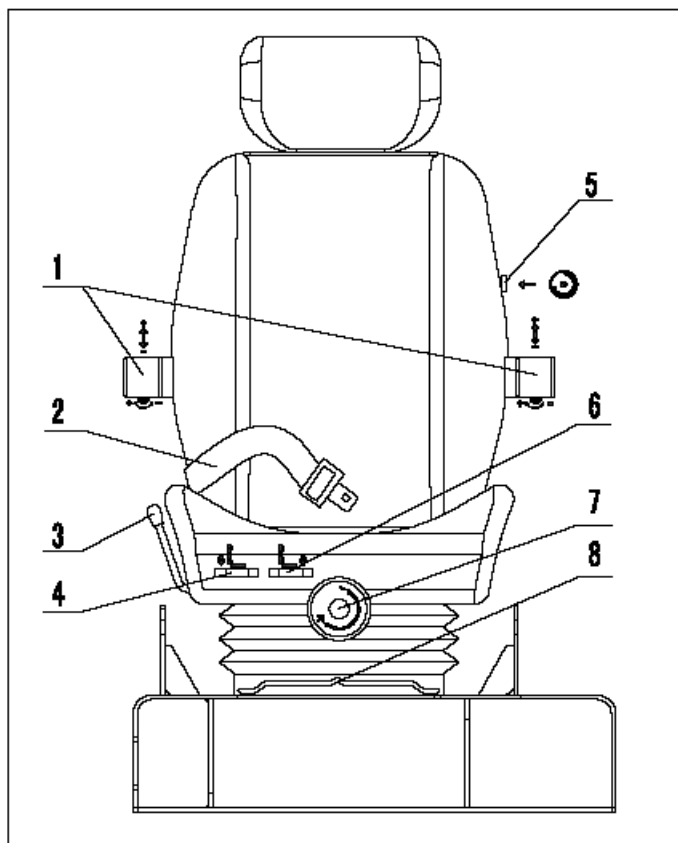
Warning!

Only for a people sit

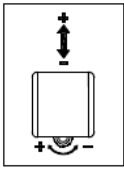
When the excavator working , we don't adjust seat.

Avoid move parts

Installation and maintenance work should by authorized, qualified personnel.



1. Armrest height adjust



Rotating below the roller, the armrest corresponding up and falling.

2. Safety belt

3. According to Back Angle adjustment

Backward push handle, the back seat adjustable to need Angle

4. Seat level to adjust



Upward uplift this handle, the back height seat can adjust up and down

4. Waist support adjust



Rotating this handle , the back seat operator position can be bumps or indenting.

5. Seat level adjust



Upward this handle, the front height seat can adjust up and down.

7. Weight adjust



+ sign rotating operator the heavier the weight, - sign rotating the more light.

In order to get the best comfort, we should use right way to adjust the operator seat , because it is important.

8. Seat position front and back adjustment

Upward draw this handle , the seat can move front and back.

Safety belt



Warning

--If safety belt wear、 damage or have an accident lead to the seat belt deformation, should be replaced immediately your seat belt.

If safety belt need clean, it must be:

- Use neuter soap fluid
- Before roll up the seat belts, let it fully dry in the case of Fully stretched
- Ensure safety belt with correct installation method
- Do not allow to seat belts and stent for any modification
- Safety belt is limited to use for a adult.
- No matter whether the seat belt use, must be replaced once every two years.

Cab and window

Open the front window

1. put work device on the ground
2. With both hands before holding two handle above at the same time use forefinger pull loosen front window above two window switch
3. Stay at the bottom of the front Windows and below the window arris contact before pushing the window window location to switch the window switch can be stuck.

Notice: There is no need to use a hand to turn front window switch.

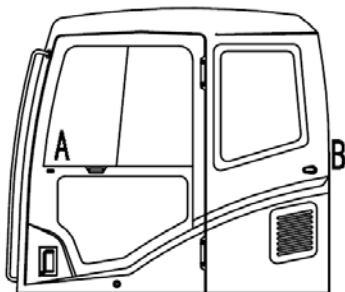
Open and close the transom window of cab

Loosen the front two clips of the transom window, and then push up light can open the window cab, close the transom window just hold his hand down a little hard to buckle the lock .

Cab door glass

Cab for two pieces of glass door of push-pull type with lock glass, can according to need to open or lock

Cabin door lock tight system



The system use for cab door to keep opening state

1. push the cab door to outboard
2. Ensure cab door card buckle (A) firmly card into (B)

Press close to the cab door below the pivotal point position black rubber handle can loosen the cab door

Fire extinguisher and emergency exits

Fire extinguisher (optional)

According to the following method, install fire extinguishers

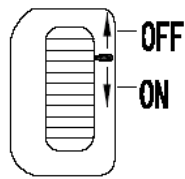
Withdrawing the left column of indoor driving position two bolts, and then install a fire extinguisher

emergency exits

Cab have two exits, respectively is door and rear window, if an emergency can't escape from cab door smoothly, can pull the edge of glass after hard steel ring, and then push hard pressure glass edge horn position, glass can be whole fall off, and then the escape from the rear window.

Cab lighting

Cab indoor rear near side pillar position have a cabin lights



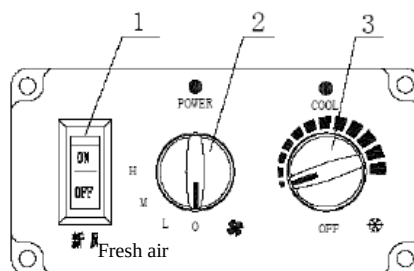
OFF-close ON-open

Cigarette lighter



Press the cigarette lighter, A few seconds of its core activities upspring to its original position, can use at this time, A cigarette lighter as emergency power socket to use, working voltage 24 V, allow maximum current 5 A.

A/C system



First open air-condition power, see buttons that twelfth item

1. Fresh air switch

- ON Air conditioning into fresh air
- OFF Air conditioning into fresh air close

2. Refrigeration switch

- O evaporator fan close
- L evaporator fan weak wind
- M evaporator fan middle wind
- H evaporator fan strong wind

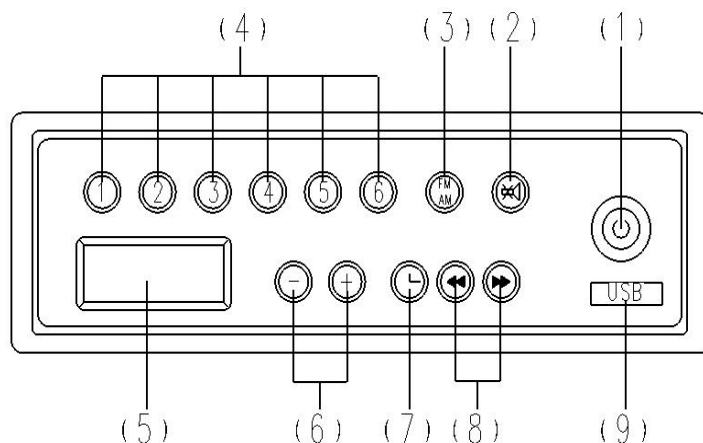
3. Temperature adjustment switch

Clockwise rotation target temperature decrease

Warning!

When only open the evaporator fan switch to, so that can open refrigeration switch, after use of air conditioning heating should open the engine hot water valve body side then open the evaporator fan, at this time, do not open the refrigeration switch!

Radio/MP3 player



1. Power / Model

- Power switch, short press to poen, and long press in working to power off.
- Model shift, short press in working to shift redio and MP3

2. Silence/Loudness

- short press, silence is on/off
- long press, loudness is on/off

3. APS automaticly save channel/band

- i. short press, shift in FM1/FM2/AM1/AM2
 - ii. long press, search channel from low frequency in present band, and save in radio in order
4. Preset radio
 - i. In aural reception, short press to select presetted radio, long press to save.
 - ii. When the MP3 is playing,
 - (1)pause/play
 - (2)SCN/play
 - (3)RPT/play
 - (4)RDM/play
 - (5)DISP/play
5. LED screen
6. VOL+/-
7. SEL sound effect/clock set
 - i. short press to show clock, short press in 5 seconds to enter into sound effect setting
 - ii. when the clock is showing, long press to set clock.
 - iii. without press in 5 seconds to show play information.
8. radio search/chapter select
 - i. search channel when the radio is on
 - ii. select chapter in MP3
9. USB connector

Operating instruction

Introduce

The chapter contains information about the operation and safety regulations, to ensure that the machines are correct, running safely and operation, must abide by these regulations.

But, abide by these regulations does not mean that the operator can not abide by the national, provincial and municipal transportation safety, traffic safety, industry safety and welfare and laws and regulations of the responsibilities and obligations

Grinding-in instruction

Overview

Important!

Always check the hydraulic oil pressure and temperature.

In the first 50 hours only, should be careful to operate the machine, it will improve the bearing surface hardness and all the smoothness, which greatly improve its life.

The following is relevant in the Grinding-in period of Grinding-in and interval for description.

Engine

Every 500 (or 250) hours should be replaced a lubricating oil and lubrication oil filter. In 500 (or 250) hours oil changing and lube oil filter premise is:

- Every time it oil filter must be replaced;
- Lubricating oil filter must comply with the specifications of the Cummins engine company and quality requirements
- Engine fuel shall not exceed the sulphur in 0.3% of the weight computation;
- Lubricating oil quality level must conform to the specifications of the lubricant recommended requirements; If you can't meet any one of the above conditions, or machine in acid and dust under the environment of the big special work, every 500 hours should be replaced lubricating oil and filter

Hydraulic system

Hydraulic oil filter back to filter, hydraulic oil oil absorption filter core and guide oil filter core must in the first 250 hours after the replacement.

Later, return oil filter core and oil absorption filter core every 500 hours change once, guide oil filter every 1000 hours change once.

Rotary motor reducer and walk motor reducer the lubricating oil should in the first 500 hours after replacement.

After, rotary motor reducer of oil every 1000 hours should be replaced, walk motor reducer of oil every 2000 hours should be replaced.

Safety and Responsibility

Operator responsibility

Operators have a responsibility to understand the operation of the potential danger of field, as well as to the mechanical operation and personnel to the specific requirement of the security. This is to avoid serious personnel, property damage and deadly accident happened necessary conditions.

Other personnel's responsibility

- Operate the machine, must avoid any damage and accidents. Operators have the obligation to have a responsibility to prevent such accidents.
- When the machine to work, such as did not inform the operator, no one can get into the machine work area. If someone must enter the machine to work area in some work, must be careful, don't reason go behind from the machine or appear in danger area.
- If someone in the machine to work area, the operator must be extra careful, and only in determine its position after they operate the machine.

Damage

When there is a endanger the safety of the operation damage and wear, the operator's responsibility to report.

Operator qualification



Warning

Only trained personnel can operate machine.



Warning

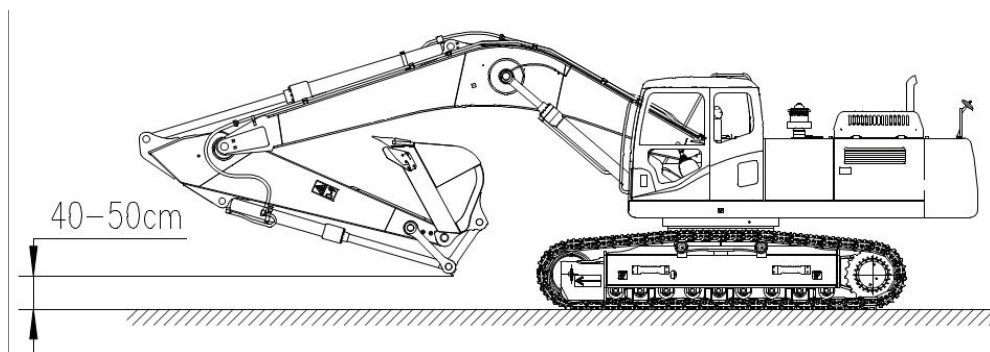
Don't stop in the working machine that will obstruct operator correct and safety operate machine.

Machinery common sense

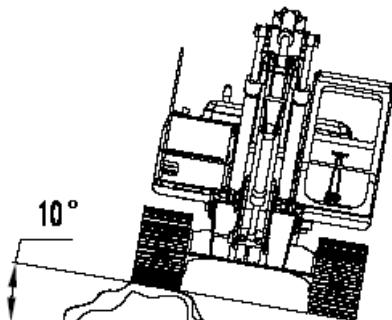
During the machine in the check, maintenance and repair work period , only understand machine operation and instrumentation control personnel to can be in cab indoor.

When walking the matters needing attention

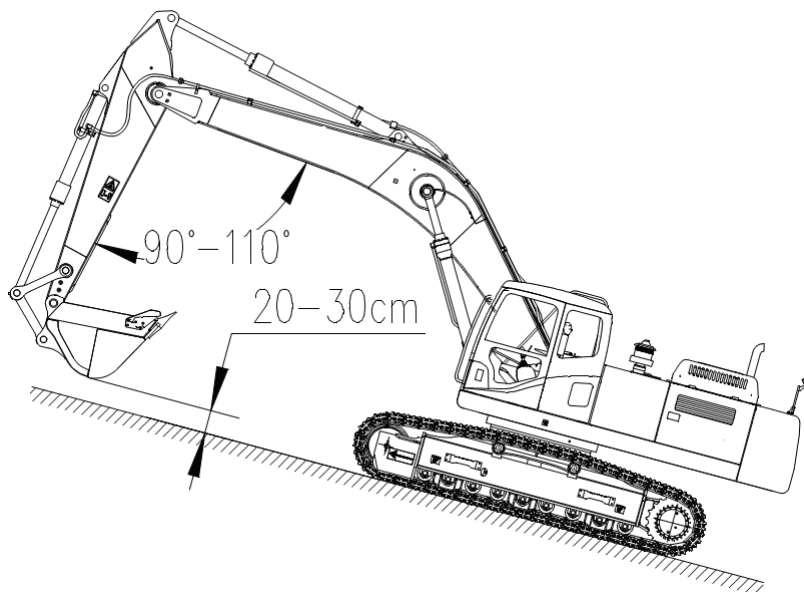
As in a flat floor walk, must will withdraw working device, and the raise, make it from ground 40 to 50 CM.



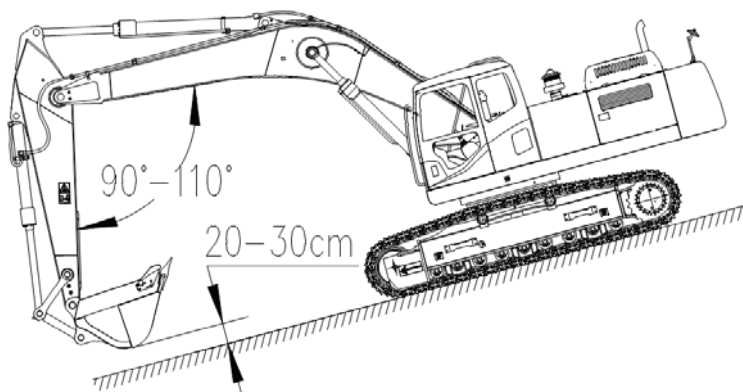
As in the rough ground to walk, when operating Angle don't is more than 10 degrees.



As in 15 degrees or more on the slopes of the walk up, should make the machine as shown in figure. If the crawler sliding, but will push the bucket into the soil, To help propel machines up traveling mechanism.



As in 15 degrees or more on the slopes of the walk down, should make the machine as shown in figure. And walk at low speed.



Don't close to the high tension line

If the machine close to the high tension line, personnel maybe shock. Although not sure touch directly, still will have danger. If work near the high tension line , prohibit all personnel close to machine. Before work close to the high tension line, first contact electric power company. In order to safety, the machine and the high tension line must be kept below minimum distance.

Allow the depth of water



Warning!

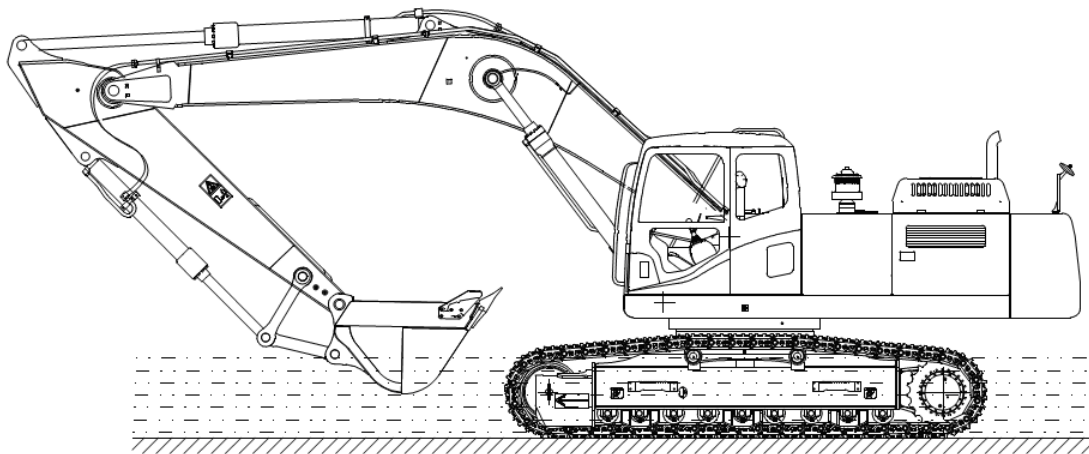
When from the water out, if the upper body back in the water, the engine fan may be damage. Meet the situation should be especially careful.

Allow the depth for the sprocket center line

Don't completely submerged chain

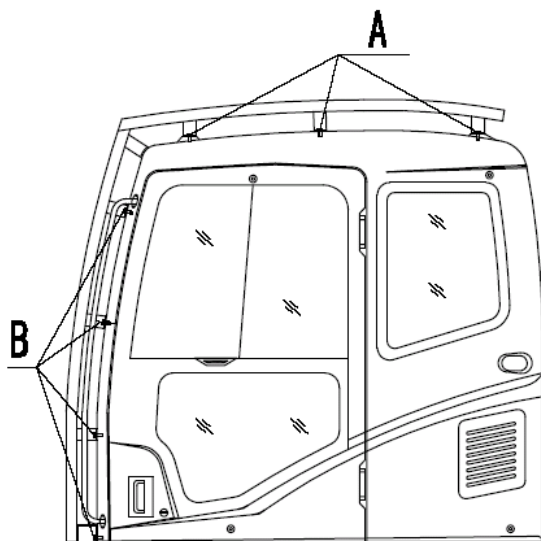
In the left waters, whether in maintenance cycle in time and again by filling water submerged parts of the grease

As in water stay time work more than eight hours, also check motor reducer of lubricating oil walk it has already been pollution, if necessary, to be replaced immediately.



Cab Prevent falling objects protection device

According to the working conditions, in the presence of a drop and splash and could harm the driver's work environment, must be installed the corresponding cockpit protection device, if machines installed protective equipment defect, please do not continue to use, contact nearby authorized agent services for help and replace it.



In broken work should be installed front protection device.

In mining operations must be used in things fall protection device.

In other assignments to fall or in the scattered materials may enter the roof of the cab

parts should be installed protection device;

To ensure the personnel that has nothing to do with drop between has a safe distance.

. A place for mounting bolts or removes the guard board

. B bolts used to install or dismantled before the board

Bolt: M12 provisions torque 120 + 12 N.M

Front protection device impact absorption power 5800 J

The top protection device impact absorption power 11600 J

The previous on top and protection structure accord with ISO 10262:1998 standard requirements, the protection device meets EMC0502.1 C6 standard requirements.



Warning!

When things fall protection device defect in the above-mentioned circumstances do use, don't use other accessory device without permission, without the company strong construction machinery co. ltd agreed to use other accessory device cause accident or damaged by the machine, the user must bear the responsibility.

Machine transportation

Loading and unloading



Warning!

The machine transportation, shall abide by relevant load weight, height, the length of the related laws and regulations.

Choose a solid and level ground, and to the curb and road with sufficient distance.

Remove the debris such as the oil may cause machine sliding.

Choose low speed operation

Loading machine

1. Trailer reliable brake;
2. In trailer tires below placed prevent slippery triangle pad;
3. Ensure that pulled a load platform inclined ladder steady, strength, and width size enough security;
4. Pulled a load of inclined ladder platform to 15 ° maximum horizontal Angle, should be as small as possible, and or so highly consistent;
5. Work with a low speed;
6. Cancel the automatic idle;
7. Direction, slowly moving to check on the platform;
-don't will bucket oil cylinder stem met on a trailer
-the machine at the trailer platform, try not to walk outside the operation for any handles.
8. Firmly fixed on a trailer in the machine.
See 19 hoisting or a fixed position, and another frame under the X board place round hole can also be used to fixed machine

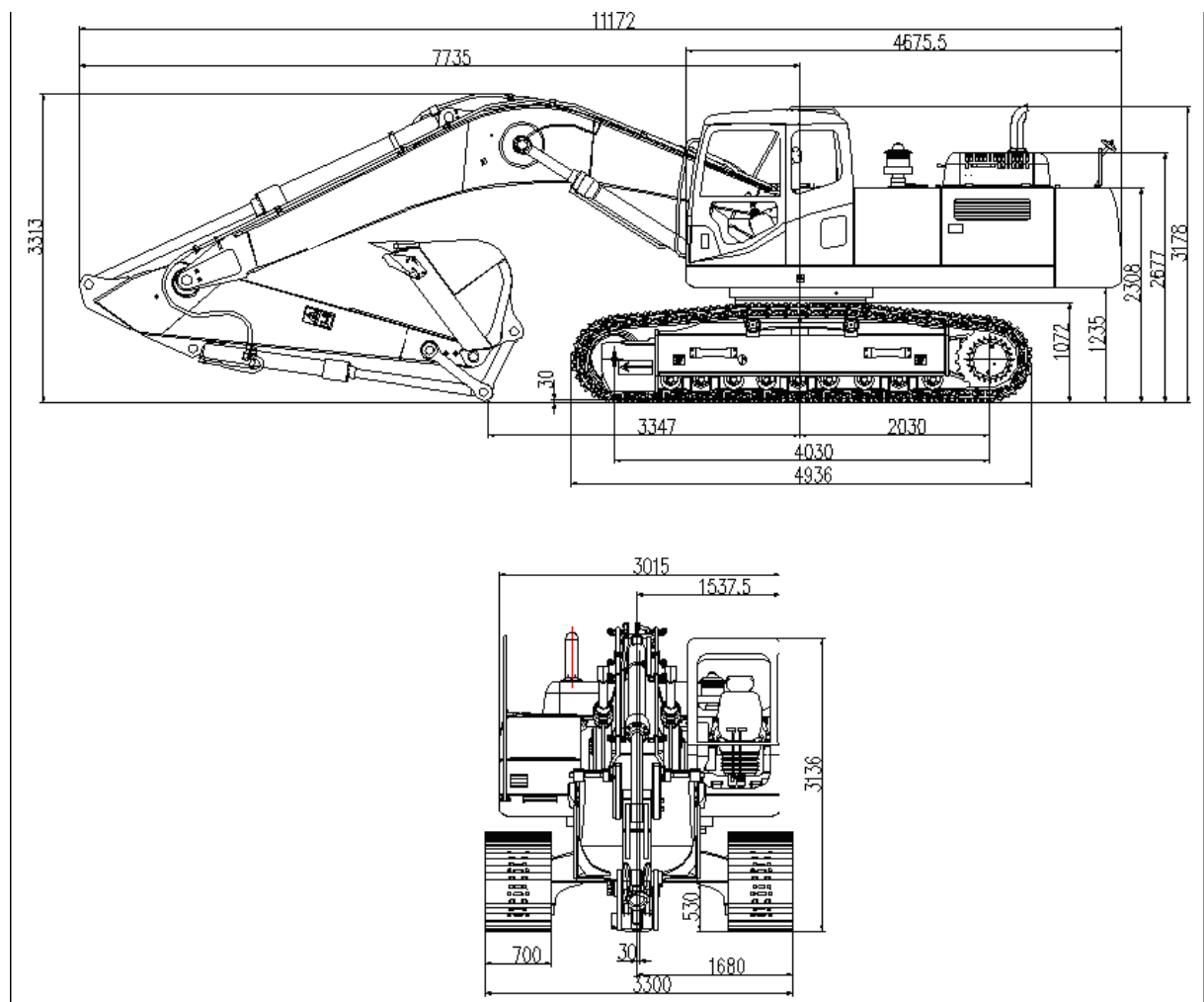
Fixed machine

1. Raise safety lock handle;
 2. Shut down engine, remove the start-up key;
 3. Close battery switch;
 4. Lock the accumulator switch;
 5. Using a triangle pad is fixed crawler ends;
- Use wire rope fixed in a fixed position, make the machine can't move.

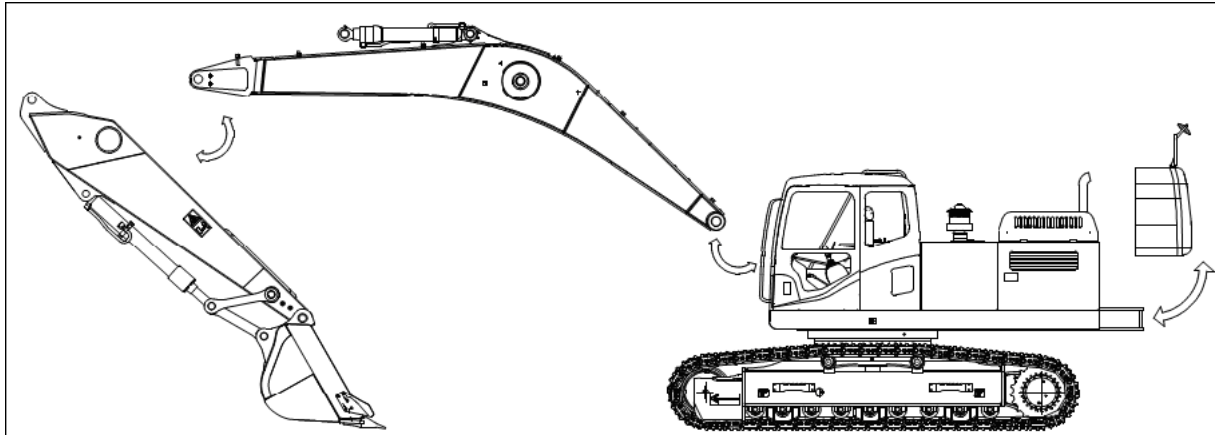
Dismantlement fot transportation

Note: transportation, to abide by local, provincial and national relevant load weight, width, height and length and so on the related regulations. In the choice of transport routes, want to consider all sorts of bridge and road traffic and limitations of time.

Overall dimensions:



Detachable parts for easier transport:



Dismounted and lifted in the process, must pay attention to oil cylinder, fixed mobile parts, and at the same time are fishing cable and parts contact edges location using coated to prevent damage to the edges that fishing cable cause dangerous.

Apart hydraulic pipeline

Warning!

The machine work just end, hydraulic oil temperature is very high, will serious burns without protection of the skin. And hydraulic system existing residual stress, so in the liquid pressure system for any repair work before, must be residual stress release. To avoid personal injury.

1. The machine will be put in flat and solid ground,
 2. Will the bucket oil cylinder completely stretched out;
 3. Will arm oil cylinder completely retract;
 4. Will boom oil cylinder goes back to work device to let bucket touchdown;
 5. Shut down engine;
 6. Make safety lock handle in open;
 7. Make the engine start-up key switch them to be in on state but don't start the engine;
 8. In each direction completely mobile several times handles to release the hydraulic system of residual pressure;
 9. Shut down engine start-up key switch and raise safety lock handle;
 10. Through hydraulic cover release the pressure;
 11. Apart to the corresponding apart piping.
- Note: processing hydraulic oil pay attention to protecting our environment.**
12. Remove parts such as: boom , arm , bucket, counterweight.

Hoisting machine

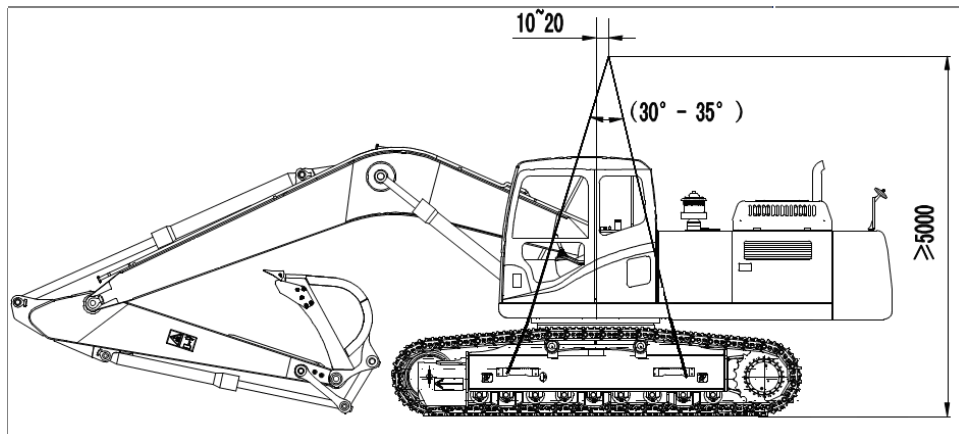


Warning!

If cab or machine has someone, don't lift machine.

Should use the approved has enough load ability fishing tackle.

Always pictured way according to the pictured way to lift machine, not the right way to lift the machine will be skewed, and may have dangerous, causing the machine to damage.



On flat, real ground hoisting machine;

1. Start engine, will drive wheels machine work device in the bucket cylinders and arm oil cylinder out completely, and fall to the ground. Pictured below
2. Up the safety lock handle;
3. Shut down engine, lock cab door, a side door and glass, engine mask.
4. According to the picture, relative to the weight of the machine with enough safe wire rope, separately from before and after the first and the second a heavy round wire rope between put on, reliable connect, for this position has guard board machine, should be put on the wire rope from crawler below;
5. Adjust the Angle of wire rope is not more than 30 ° (hoisting height more than 4.2 m) and then slowly slight lift machine, check the balance;
6. Slowly lift machine.

Counterweight installation

Standard counterweight is 5600 Kg



Warning!

Raise the safety lock, shut off the engine.

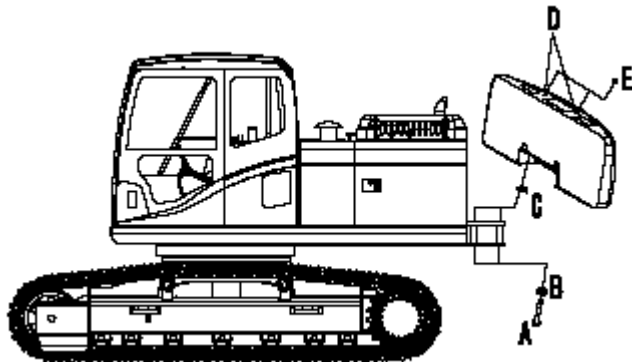
Installation counterweight, prohibited personnel in and around counterweight stay below.

Before install bolt the personnel must both enter from sides, do not enter from the rear.



Warning!

Counterweight drop will lead to casualties.



1. The machine placed in a solid no obstacle level the ground
 2. Fall work device;
 3. Up the safety lock handle, shut down engine;
 4. In part D installation thread rings (M30 × 3) and use enough fishing tackle strength lift counterweight slowly, move to install position, don't jump down, and keep 3 ~ 5 mm distance;
 5. The four groups are A and B gasket bolt connection screwing in about 15 mm;
 6. Fall and check whether counterweight smoothly, if should be adjust, a little bit lift counterweight in low insertion position adjustment gaskets C;
 7. After the check to tighten bolts (are × 3);
- Tighten bolts torque: 1900 + 50 n. M
Unloading sling, buckle rubber plug E

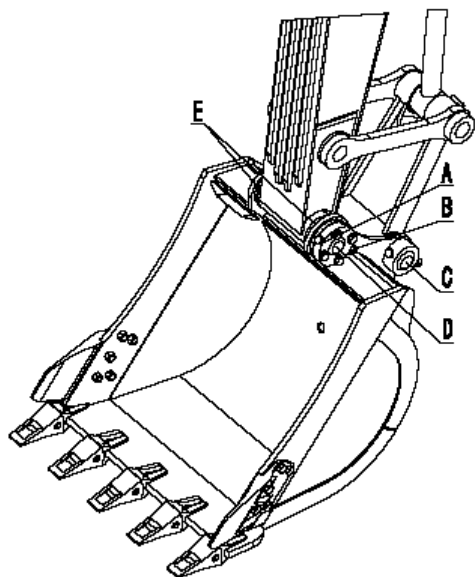
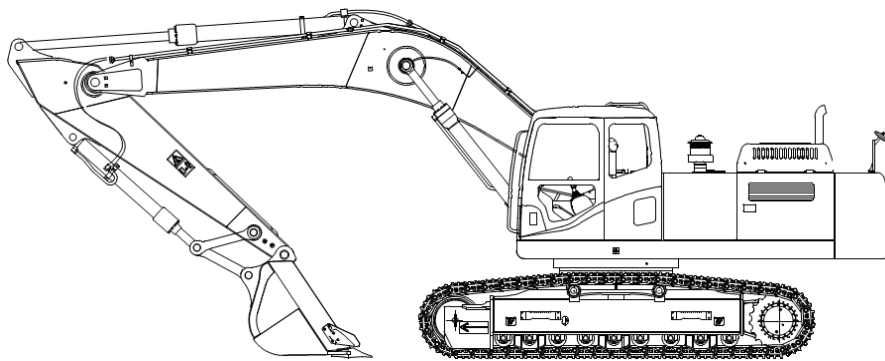
Changing bucket

Removing bucket



warning !

When you knock bucket pin, it maybe bring some metal fragments flying, so you have to wear goggles, helmet and gloves. The bucket which had been removed must be placed steadily.



1. Reduce working device, the bucket contact with the ground. as shown above;
2. Remove bolt A and bolt B (2 bolts);
3. Remove the bucket pin C and D.

Notes: Don't damage O-ring E. (2 O-rings)

Installing Bucket



Warning!

Don't insert your fingers into the pin hole to check whether the pin is in right position, or may be cause serious crush accident.

1. Align the arm with the bucket connection hole;
2. Apply grease in the hole properly;
3. Install O-ring in the external duct of bucket installation base inside bushing;
4. Install the bucket pin C and D separately;
5. Install bolt A and bolt B (2 bolts, fasten 2 nuts)

Important!

The distance from inside lock nuts to abutting surfaces should be 1-2mm; the pins must be applied by grease.

Selection of track shoes

Track sho	Application	Precaution for use
A 600mm	Stony ground	Keep slow when there are barriers (e.g. boulder and falling tree) and driving in rough ground.
B 700mm	Soft Ground	Only driving in flat ground can be driven in high speed.
C 800mm		For crossing barriers, it is necessary to reduce driving speed to about half of the low speed. This track shoes cann't be used when there are large-sized barriers (e.g. boulder and falling tree) and driving in rough ground.

Explosion-proof valve (Optional part)

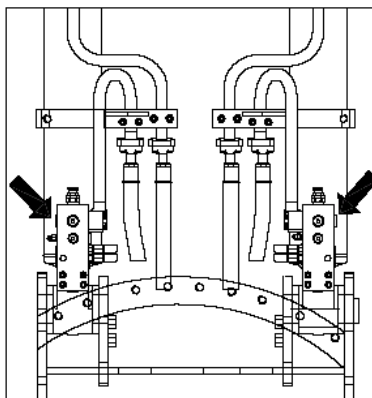
Summary



Warning!

Don't try to remove the boom explosion-proof valve, or under the action of spring tension, the internal components will pop up with great force and cause injury. If meet any problems, please contact with authorized service center of STRONG CONSTRUCTION MACHINERY CO., LTD.

In working state, the hydraulic oil is hot and poisonous. Under the action of high pressure, the hydraulic oil maybe be splashed in the skin and thus serious injury. If had been injured by the hydraulic oil, should be treated immediately. Boom explosion-proof valves are installed in the input interface of back of the boom cylinders.



Boom fall when boom explosion-proof valves are used.

Notes: Don't stand under the raised boom!

There are three situations

1. The engine is running.

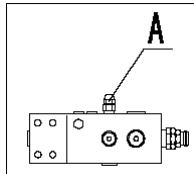
The boom is reduced in the normal way.

2. The engine has been stopped.

There is the accumulator in this excavator. The servo pressure still exists within a few minutes after shutdown, so the boom can be reduced in the normal way.

3. The engine has been stopped and without the servo pressure.

In this case, should be operated as follows:



- Remove the lock nut A; 拆开 A 处锁紧螺母;
- Remove the adjustment bolt using 6mm inside-hexagonal spanner

Notes: Before removing the adjustment bolt, must make position marks, so that confirm position for assembly.

- Reduce the boom slowly;
- Tighten the adjustment bolt to original position;
- Tighten the lock nut;
- Contact with authorized service center of STRONG CONSTRUCTION MACHINERY CO., LTD.**

Notes: In above operation, should collect leaking hydraulic oil in a suitable container.



Warning!

Under the action of hydraulic oil pressure, if remove the adjustment bolt completely, personal injury may occur and the boom will fall out of control causing serious accidents.

Before operation

General provisions



Warning!

Any violations for the provisions may result in serious disability incidents, even the death.

- Read the following text carefully for comprehension.
- Before operating the machine, please read and understand the Operation Manual.
- Before operating the machine or beginning repair work, please read and understand the marks and the nameplates in the machine.
- Before start up the machine, the security faults or defects must be excluded.

Notes: During inspection, the machine should be parked in the maintenance position, please refer to the "maintenance position".

- Start the engine indoors, should make sure the ventilation system capacity is adequate.
- When start the engine, must always sit in the seat.
- The cab doors must be closed.
- Don't operate the machine in the case of absence air.
- In operation, seat belts should be used.
- Don't operate the machine under the affection of alcohol, drugs or other drugs.
- To avoid pinching hands or fingers, please keep your hands away from these places which maybe pinch your hands. (covers, doors, windows, etc.).
- When enter and exit the machine, should face to it and use the stairs and handrails. Always adopt the three-points way which means two hands and one foot or one hand and two feet. Don't jump!
- Don't climb and trample these surfaces which don't adapt for climbing, only use these surfaces which were paved with non-slip materials.
- Wear clothes which are suitable for safe operation.
- Wear a hard hat, in order to strengthen head protection.
- There are two escape routes in the cab: the door and the back window. **Please refer to the "emergency exit".**
- When the machine is travelling, don't use communications equipments, such as mobile phone with improper installation. Communications equipment may interfere with the signal of the important electronic devices inside the machine. Mobile phones must be connected to the machine's electrical system and still must connect to the permanent external antenna according to the manufacturer's provisions.
- Don't overload, otherwise it will endanger safety.

Operation steps before starting

Important!

Must make sure no one near the machine before starting.

1. Park the machine in the maintenance position, please refer to the "maintenance position".
2. Execute routine maintenance, please refer to the "lubricating and maintenance chart".
3. Adjust the seat, so that you can operate the controller and the pedals comfortably and safely.
4. Check meters and controller.
5. Check whether headlights, windshield wiper / washer, mirrors and so on are available.
6. Check and make sure no leaks.
7. Check and make sure no lost or loose parts, these parts maybe cause damage or

even destroy another parts.

8. Check and make sure fuel quantity in the fuel tank.

9. Check and make sure the engine hood is closed and locked.

If the fuel was used up or the air come into the system as some reasons, the air must be discharged before starting the engine. Please refer to the “Air emission of Fuel system”

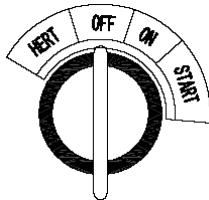
Before starting

1. Clean windows/ defrost.
 2. Sit in the operator seat when start the engine/ machine, please refer to “Starting engine”.
 3. Fasten seat belt before operation.
 4. Start operation after displaying “waiting for starting”.
 5. Check and make sure that all controllers and meters are available.
 6. Check and make sure no one near the machine before starting.
 7. honk the horn.
 8. Put down the safety lock handle, start the machine.
- Finally, to put down the safety lock lever up, started.

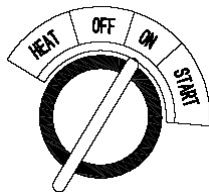
Start Switch

There are four positions in the start switch, the initial state is “OFF”.

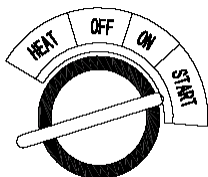
·**OFF**: Stop the engine immediately.



·**ON**: Start, self-check and initialize the electronic equipments.



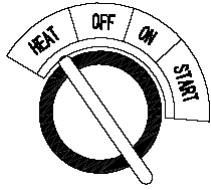
·**START**: Unite the starting motor gear and start the engine.



·**HEAT**: Preheat the engine(Optional).

Notes: Operation time cann't exceed 15 seconds and the interval between two

operations shouldn't less than 5 minutes.



Start the engine



WARNING!

After checking the mechanical staff and around obstacles, start the engine, while sounding speakers.

Do not touch any of the operating handle and trigger switch.

Important!

Do not keep the key at (start) position for more than 20 seconds. This will seriously damage your system. After 2 minutes, then try to start the engine.

If there is abnormal noise, excessive vibration or unusual circumstances immediately turn the key to stop (stop) position, turn off the engine and check.

At temperatures above 0 °C

1. Put the key to start position.
2. The engine starts, release the key.

Measures taken in cold weather

In the cold season or when the temperature is below 0 °C, note the following points:

- . Make sure the coolant freezing point adapt to climate conditions.
- . Use the recommended oil in winter, see the recommended lubricant.
- . After work, the fuel tank filled to prevent the formation of condensation water in the fuel tank.
- . After the engine is started, let it operate at low speed and light load operation, until the engine and hydraulic system oil is hot, more liquidity. This is also easier to adapt to the lubrication.

Important!

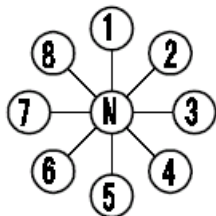
Very cold below -15 °C, the engine starts, and not immediately put into high-intensity work. Let the engine idle for 10-15 minutes.

Note: Use the auxiliary battery to launch, see the "auxiliary battery start."

Operation

Working device operation

Left joystick

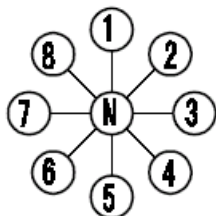


This handle controls rotation and arm.

N Neutral position

1. Stick out
2. Stick out and right rotation
3. Right rotation
4. Stick close and right rotation into the
5. Stick close
6. Stick close and left rotation
7. Left rotation
8. Stick out and left rotation

Right Joystick



This handle controls Boom and bucket

N Neutral position

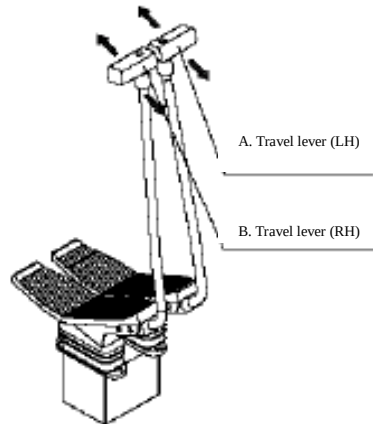
1. Boom fall
2. Boom fall and Bucket turned outward
3. Bucket turned outward
4. Boom Lift and Bucket turned outward
5. Boom Lift
6. Boom Lift and Bucket adduction
7. Bucket adduction
8. Boom fall and Bucket adduction

Walking direction control



WARNING!

Before controlling travel handle or pedal, you must check the direction of track. If the sprocket at the front of the machine, you must operate in the opposite direction of the operating handle (pedal). Do not change direction quickly, especially in the situation of stationary.



• Walking forward

1. Increase engine speed.
2. If the sprocket at the end of the machine, put the joystick A B forward slowly, or step the front of pedal slowly.
If the sprocket at the front of the machine, put the joystick A B backward slowly, or step the end of pedal slowly.

• Reverse Walking

1. Increase engine speed.
2. If the sprocket at the end of the machine, put the joystick A B backward slowly, or step the end of pedal slowly.
If the sprocket at the front of the machine, put the joystick A B forward slowly, or step the front of pedal slowly.

• Left turn

If the sprocket at the end of the machine:

Put the right joystick B to move forward, Track will turn to the forward direction, Mechanical forward left turn.

Put the left joystick A to move backward, Track will turn to the backward direction, Mechanical backward left turn.

If the sprocket at the front of the machine:

Operate the handle with the opposite direction.

• Right turn

If the sprocket at the end of the machine:

Put the left joystick A to move forward, Track will turn to the forward direction, Mechanical forward right turn.

Put the right joystick B to move backward, Track will turn to the backward direction, Mechanical backward right turn.

If the sprocket at the front of the machine:

Operate the handle with the opposite direction.

Notes: Even if the operating handle moves in the same direction, but also have turned to a different range of motion effects, If the sprocket at the end of the machine, Machine will move to the side of a small magnitude, If the sprocket at the front of the machine, Machine will move to the side of a small magnitude.

• Turning on the spot

Put the left joystick A to move forward while put the right joystick B to move backward, the machine will turn on the spot at clockwise.

Put the right joystick B to move forward while put the right joystick A to move backward, the machine will turn on the spot at counterclockwise.

Operation completed



WARNING!

Getting in or Out of the machine, you should face to the machinery all the time, and use the pedal and the handrails to avoid slipping. Climbing up and down the machine, you should always use the three-point, That is, two hands and one foot or one hand and two feet. Do not jump!

Shutdown

Important!

Park the machine on level ground.

- Put the left and right joystick into the neutral position.
- Put the engine speed control switch into the low idle position.
- Put the bucket to fall to the ground, and keep the bottom of the bucket in level.
- Lift the safety locking handle, Lock hydraulic system. See "Security Lock System."

Stop the engine

Important!

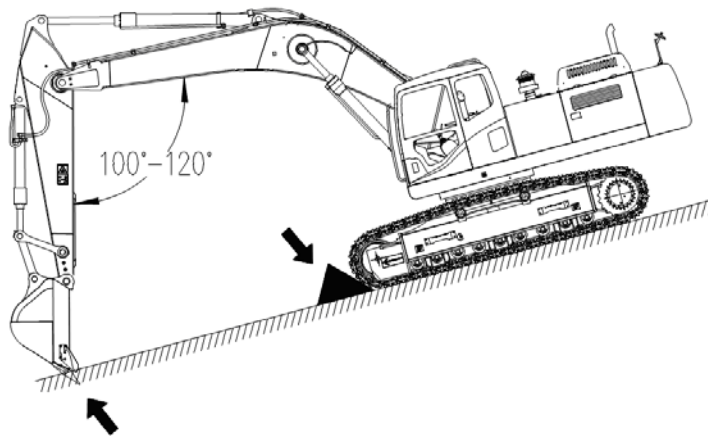
- Before stop the engine, keep the engines running at idle speed a few minutes to protect the turbocharger.
- Put the start switch to stop position.

Note: If you want to stay the machines for some time (no matter how long), disconnect the battery switch.

Parking machine

Overview

Important! Park the machine on level ground, if you must stop on the slope, plug wedge pads in under each track, and keep the bucket teeth into the ground.



- Pay attention to weather conditions and take appropriate measures,
- Do not let the machine to freeze on the ground, subsidence, or suffer any other adverse consequences.
- Put the handle and switch into turn off / neutral position.
- Lift the safety locking handle, Lock hydraulic system. See "Security Lock System."
- Close windows; lock the cab and all the doors and cover.
- Close the battery switch.

Long-term parking machines

In addition to comply with the parking requirements above, it also must be done as following:

- Check whether the machine is oil leakage or water leakage, and the working device and track is for failure.
- Clear the soil and debris attached to the track and rollers.
- Take the measure of anti-rust treatment to the exposed components, and thorough lubrication of machinery.
- Pour fuel and hydraulic oil, until a sign at the maximum capacity.

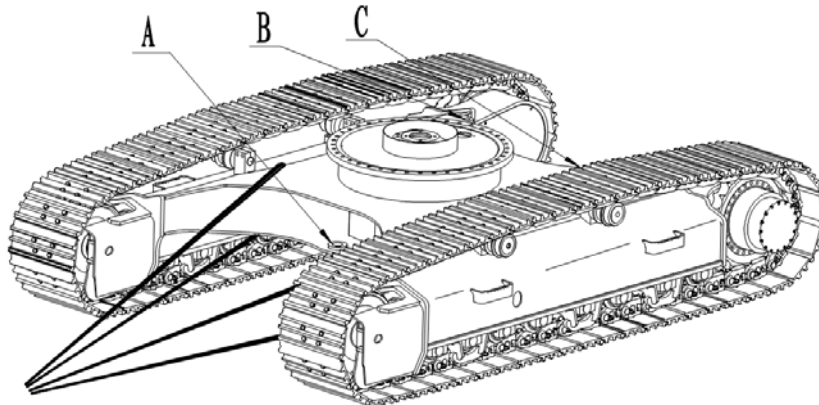
Hauling method



WARNING!

Use the strength of wire rope with sufficient traction.

Once slide into the muddy ground or pulling heavy objects, Use wire rope to pull the machinery, as shown.



Place the wood between the steel wire rope and machine in order to protect the machinery and steel wire rope from being damaged.

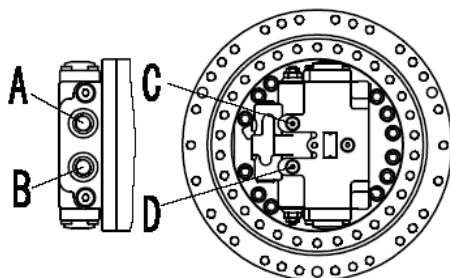
Notes: do not tract machine with loop holes A, B and C. These holes are used to fix the excavator machine when transported.

Method of releasing walking brake

When problems occur to running motor and reducer, before drawing the machine, walking brake should be released.

1.add 40 kg / square centimeter of hydraulic pressure to A or B in the mouth of the running motor.

2.after released the gas plug at C and D, connect them with hydraulic hose.



Work with the bucket

Excavator is a Multi-functional machine, you can install a variety of ancillary equipment to complete a variety of types of work. Here only introduce the simple operations.

Excavation

Work on the ground with smaller slope around the machine. When the degree of bucket cylinder and arm is 90 °, efficiency of the fuel tank is the maximum.

If operating the excavating work, the angle should be used to improve efficiency. The excavating scope of stick is about between 30 °forward and 45 °back. From the view of digging depth, the difference may be small. When using the cylinder, do not make it to the end of travel, so you can play the role of protecting the fuel tank.

Trenching work

Install a proper bucket to conduct the trenching work. Adjust the track well according the directing of the trenching work, so that it can work effectively. When digging a wide ditch, mining the both sides of the ditch firstly, and then dug the central region.

Loading work

when parking dump truck, the operator should have good visibility in order to work effectively. In addition, you can also load at rear of the dump truck instead of the sides, which makes the operator's work easier and improve efficiency.

The prohibitions in operation projects

- **You can not rake the soil with the put power on the ground, demolish the buildings or put the bucket teeth into ground turning. Such operation may damage the machinery and fixtures.**
- **Do not work using walking force. These actions may lead to mechanical overload and damage the track drive mechanism.**
- **Do not stretch the cylinder to its stroke end. This may make the fuel tank and stop buffer overload, and shorten its life. Maintain the distance at the end of travel 5CM.**
- **Do not work using the power of dropping bucket and the boom. You should use the hammer operation, rather than falling boom or bucket. This will make the work of mechanical overload or damage to the device. This is very dangerous.**
- **Do not conduct lifting operation directly. Basically, working as a crane is prohibited. However, if necessary, need to install the push-styled top hook and certified spreader properly.**

Contact your authorized Shandong Joyo company or authorized service center.

Exit from the muddy ground

When working on the soft muddy ground, to be very careful.

- When a track fall into the mud, shore the track using the bucket, place a wood under the track.
- When both tracks are into the mud, place the wood the under track. Push bucket teeth into the ground, recycling the stick as the excavating work, and push the walking handle forward, then make the machine to be out of the marsh.

Important! When supporting the machine from the ground using a boom or stick, use the bottom bucket (instead of the bucket teeth).

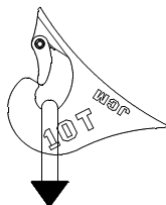
The angle between the arm and the stick is among the 90 ° - 100 °.

Operating in the water, or after the withdrawal from the muddy ground, add the grease to pin of the work unit. To check the oil of guide wheel, wheel and track drive boxes, if oil has been contaminated, replace the oil.

Hoisting equipment

Important! There maybe some roles for excavator to hoist in some country and region. Please check these rules and contact with dealer to get more information. Some like loose sand and water condition would make hoisting work (close to maximum) dangerous. Make sure the ground is solid and safe. There maybe dangerous under centrifugal force when the machine turning and swinging in hoisting.

 **Caution!**



To avoid accident and damage, do not hoist more than designed value. The value should be change according to condition if the machine is noe working in lever ground.

 **Caution!**



It is forbidden to load anti-separate device when hoisting, the device cannot bear lateral load. The load on anti-separate device should always be longitudinally.

In operation, make sure the load is not over designed value.

This hook is limited to 1000kg.

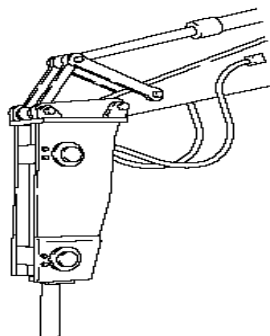
Over this value make take terrible damage, and operator must be responsible to the accident.

Caution: the hook which is not recommended by JCM may lead to damage. Please contact JCM or its dealer when have to assemble hook on other bucket or operate in other way.

Optional Components

Important! According to the mechanical attachment to be installed, select the appropriate attachment. Different types of machinery will be installed in different types of attachment. Please contact the authorized service center.

Hydraulic Breaker



- Broke stone

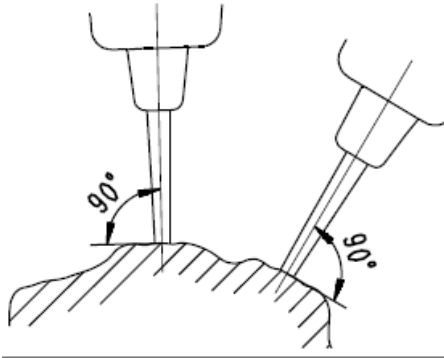
- Dismantling work

- Repair the road

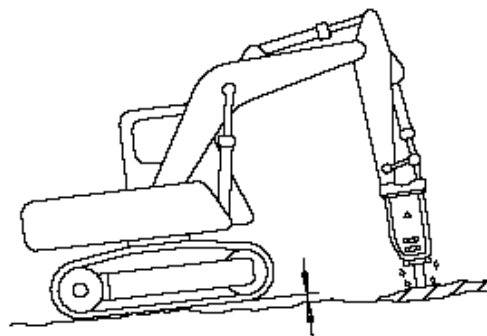
The hydraulic hammer is widely used in dismantling buildings, broking road surface, excavating the tunnel, crushing slag, and broking or cutting stone.

Breaker operation should note the following

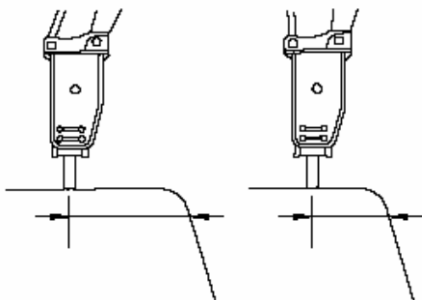
- Press the hammer on the surface vertically, as shown



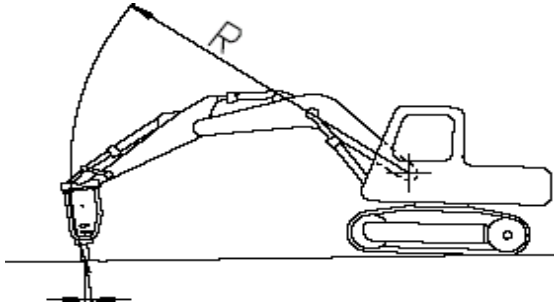
- When beating, press hammer on the surface, and increase the machine up to 5 cm, do not lift the body too high.



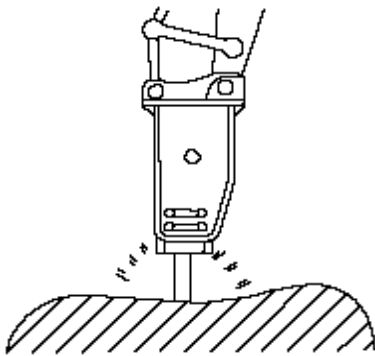
- If the surface is not broken within one minute after repeated attacks, you should move the breaker, and broke from the other location.



- There is always a little bias between the direction of Hammer blows struck and reasonable direction . Therefore, we must continue to correct the direction of the bucket cylinder, maintain always aligned.

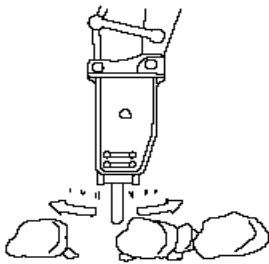


- Appropriate pressure hammer, so as to avoid attack in vain

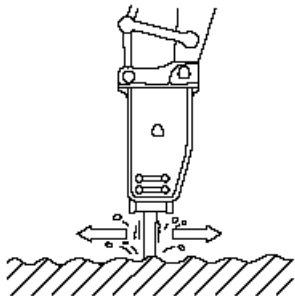


Notice of operating hydraulic breaking hammer

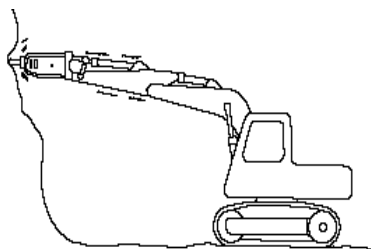
- Operating cylinder, do not reach the end of its travel, keep a distance of 5 cm.
- Do not swing hydraulic breaking hammer aiming at the rock and concrete breaker.



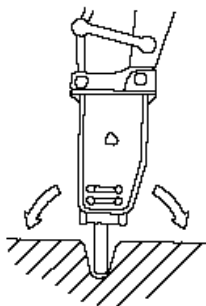
- Do not move the hammer when impacting.



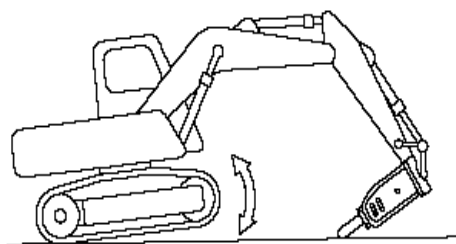
- Do not hit by level or up



- When holing in the ground, do not twist the hammer.



- When lifting machinery, do not make the bucket cylinder elongate to the maximum position.



Maintenance of safety

Introduction



WARNING!

Operators who do not comply with this “manual” in the safety instructions provided, not pay attention to warning, note, key tips and other related instruction must be alert and ensure the safety of its working methods, or a serious accidents happen most likely , and

even endanger lives.

Notice: This section covers general safety requirements, when in the mechanical inspection and maintenance, it should be adhered. The "Manual" also describes safety regulations and warnings and other related content when inspecting and maintaining machinery in different sections.

This chapter is intended to guide the proper maintenance of machinery. So read carefully before servicing. And always place this “Manual” on the machine for reference.

We spend a lot of time on design, production to manufacture a effective and safe mechanical as possible. However, if not read these safety requirements or do not comply with these requirements before using the machine, then our care and thought can not to be reflected.

For example:

- Do not re-install protection board
- Step on the machine on a very slippery parts, instead of using the pedal and handrail
- Hold the hose firmly rather than the handrail.
- Use the incorrect tools to operate.
- Carry out the operation without permission
- Do not use the necessary protecting.

To ensure safe and effective, we must always use original spare parts.

Machinery itself rarely cause accidents, incorrect use will lead to accidents. If the operator has a sense of safety, machinery is in good condition, we will be able to achieve safe, efficient production, and create greater efficiency.

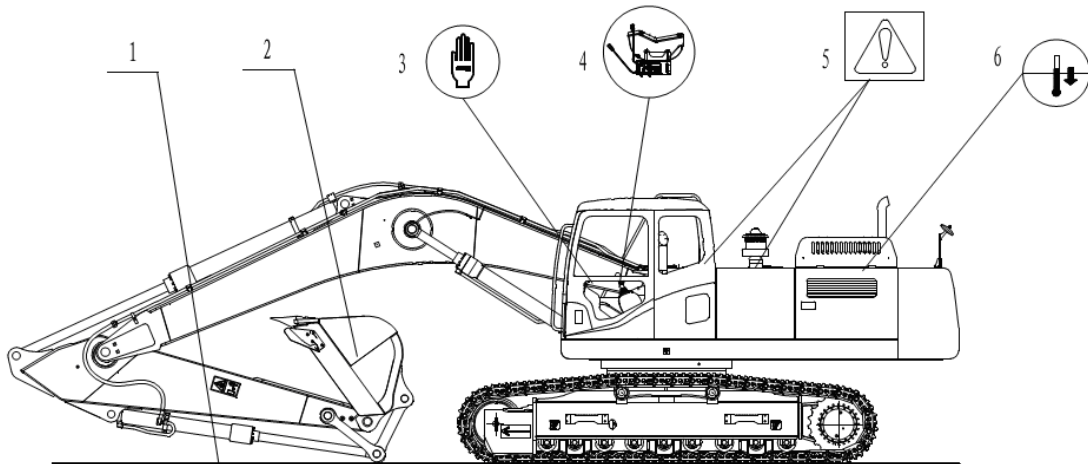
Maintenance position



WARNING!

Be careful not to be scald by the hot liquids and parts, if you must to repair and maintain before the cooling of the machine.

Whenever to repair, stop the machine on a flat ground and do the preparation as follows:

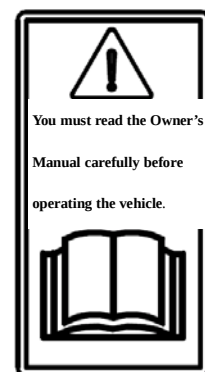


1. Stop the machine on a flat, solid ground.
 2. Land the working equipment on the ground. Refer to the illustration.
 3. Turn off the engine, take out the key.
 4. Lift the safety locking handle; make sure to lock the system. Refer to “Safety Locking System”
 5. Release the pressure of the hydraulic pipeline and the container in case of the danger.
 9. Cool the machine.
- ※ Be careful not to be scald by the hot liquids and parts, if you must to repair and maintain before the cooling of the machine.

Statement

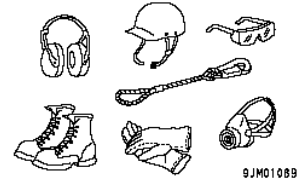
⚠ WARNING! Don't comply with these regulations may lead to accidents, even serious casualties

- Before repairing, please read and understand all the signs, patterns and the book of << operator>>. Every statement contains important information about the machinery repair and maintenance
- Do not do any repair work unless you have mastered the correct machinery knowledge or have been trained professionally.
- It is very dangerous without the correct repair instructions. Make sure you have mastered enough knowledge, the correct information and the appropriate tools and equipment.
- Pour out the oil or fuel to avoid the overflow. Take a pump or a hose to discharge the liquid safely, when the liquid couldn't be discharged directly.
- Take the appropriate way to assemble in the pollution area. Abide by the relevant



security regulations when repair the machine.

- Check and make sure of all the antiskid protections are firmly fixed.
- Pay attention to the logos and the films that are pasted on the machine. Be careful to the high pressure washing. Once the logos and the films are damaged or lost, please to be replaced.
- Make sure there is no oil, water or ice and so on on the pedal surface, repair area, handrail and the non-slip surface. Avoid the wet and slippery of the surface.
- Don't step on the surface of the parts which are forbidden to be stepped on.
- When you are operating the machine, please do not wear loose clothes like turban or jewelry, or they will be clamped to bring the injury.
- Make sure to wear the hard helmet, protective glasses, gloves, protective shoes and other safety necessities.
- Make sure to turn off the engine when you are repairing, unless there are other explanations on the label or this book. Hang the sign of "forbid to turn on" in the left handle as a warning.



WARNING!

Be careful not to be scald by the hot liquids and parts, if you must to repair and maintain before the cooling of the machine.

- Do remember the oil could be very hot when you replace the engine lubricating oil or the hydraulic oil, it might be got burned.
 - When lifting or supporting the parts, make sure the rated load of the lifting device at least is the same weight with the hanging parts.
 - All the lifting devices, such as the sling, ratchet locking must comply with the relevant regulations of the lifting device. Our company will take no responsibility if you don't take the lifting devices, tools and methods that stipulated in this book.
 - When you are looking for the leak, make sure to use the paper or the wood rather than directly by hands.
 - Make sure to release the pressure in the hydraulic system before the repair and maintain work.
- Make sure to turn off the engine before open the engine cover, radiator shell, and make sure again that there is not any tools left in the machine to affect the damage before restart the machine.
- Make sure all the windows, doors and covers have been closed tightly before to start the engine. Then start the machine.
 - Must be careful to open all the pressure containers, release all the residual pressure. There is still residual pressure after turning off the engine, if you opened it before releasing the residual pressure, the liquid will be out of the jet with the affection of the high pressure. Similarly, make sure to release all the pressure of the system, and then start to inspect the leakage of the connection and the tightness of the joint.

▲Hydraulic system: without any affection by the external force.

- Scrapped accumulator must be drilled before discarding; otherwise, it may cause an explosion.
- Do not adjust the pressure of the safety valve higher than the pressure recommended by the manufacturer.
- Do according to the instructions of the manufacturer when you install the communications radio, mobile telephone and other equipments. To make sure the normal function of the electronic system and electronic components.
- Keep away from the machine when start the engine.
- Make sure to close tightly the engine hood and all protective plates.
- Measures about the welding Please refer to “welding”.

Prevention measures



WARNING!

Make sure to equip with the special equipments when the machine works in the danger environment, such as easy explosion environment.

NOTE: Must be careful when washing the machine by the high pressure spray gun. Because the electrical components and wiring are also easy to be damaged, even at very low pressure and temperature.

- Be vigilant to the danger of fire. Know how to use the extinguishers and where it is kept, in case we could find it ASAP.
- Have strong sense of safety even the danger of the fire is not serious. Take the measures as follows when necessary:
- Keep the machine away the fire danger zone.



- Lower the accessory device to the parking position; please refer to “Park machine”.
- Switch from start to the stop position.
- Get off the operating cab.
- Turn off the storage battery.
- Put off the fire; call the fire fighters if necessary.

If the machine equipped with the portable fire extinguisher, it should be ABC type, which means it can put out the fire caused by the solid organic material and liquid organic matter, and it is not conductive. Effectiveness of grade 1 stage means fire extinguisher action time must not be less than 8 seconds, 2 for at least 11 seconds, and 3 for at least 15 seconds.

— Forbid to smoke when fill fuel or the fuel system is turned on. Make sure there is no flame around the machine.

— Diesel oil is easy to be fired; it can't be used for cleaning. Choose the guaranteed cleaning agent.

— Be careful, some solvents can cause skin rashes and lead to a fire hazard. Don't contact with the solvent directly or breathe in its steam.

— Please put the auxiliary starting agent in a low temperature and good ventilation place. Make sure not to use it with the electric preheating device together.

— Keep the spot clean when do the repair work. The cleanliness is the key point for the normal operation of every system. Oil or water can make the ground and step sliding, it is also dangerous to the electrical system and electric tools. Clothes or cloth soaked with oil is the serious hidden danger of fire.

— Check the machine and equipments everyday, and make sure there is no dirty or oil on the every board. That can reduce the risk of fire.

— When work in some special environments (such as sawmill, landfill and so on), pay more attention to the cleanliness of the machine. The machine should be equipped with some appropriate equipment (such as a muffler cover, radiator partition, high-power electric fan or a filter.) to induce the accumulation of the flammable material.

— Any fire fighting equipment on the machine should be available. Some additional equipment can also used for fire prevention; however these devices can not replace the operator's fire prevention job.

— Check the cable to confirm it isn't damaged because of the friction. This method is especially suitable for the unlinked fuse wire.

For instance:

- Between the storage batteries
 - Between the storage battery and the starter
 - Between the alternator and the starter
 - The wire connected to the preheating element
- Make sure to check when the wire disconnected to the fuse wire. In order to confirm the connection and clamping way is not affected by friction. The disconnected wire mustn't be linked to any tubing.
- When install any additional equipment. Make sure that all the wires (circuit) are

connected with a fuse and the selected clamped route so as to avoid the abrasion.

—Check the fuel hose and the hydraulic system pipeline to confirm they aren't damaged because of the friction.

—Welding and grinding work can only be done in a clean place. Forbidden to be carried out in the components filled with compressed air or combustible liquid, such as fuel tank, hydraulic pipe or somewhere similar else. Be careful when you are welding and polishing near the combustible place. The operator should ensure the fire extinguisher available.

—Storage battery, things made of plastic and other materials that could pollute the environment, should be discarded after an environmental treatment.

Dangerous about the polymer

Paint work



WARNING!

The paint will decompose and form lots of complexes when the paint heated. These substances may be irritating, will threaten to health if you are frequent or long time exposure in it.

NOTE: Make sure to wear the gas mask when doing the paint work.

—When welding and cutting, clear the surface paint first, then clear the scope around at least 10CM (4inch) radius area. The heated paint will release the harmful gases.

—Do not weld on the paint surface. It not only endanger to the health, but also lead to poor welding quality, strength reduction, may even cause weld cracking.

—Take the sandblasting way to remove the paint on the work area, or take the paint stripper.

NOTE:

When use the paint stripper, be sure to take the portable pump, wear the guaranteed gas masks and protective gloves.

—Be sure to take the portable pump when you use the high speed grinding machine to heat the paint.

Rubber and plastics

NOTE:

The heated polymeric materials will form the compounds harmful to health and the environment.

—Do not weld and cut near the polymeric materials (rubber and plastic parts), if you don't take the thermal protection for the polymeric materials.

—Do not make it burn when remove the polymeric materials.

—Be careful when deal with the machine that has been burned or exposed to in a

intense heat.

— Always wear gloves, goggles and guaranteed respirator.



Fluorine rubber



WARNING!

Some seals can withstand high operating temperature (for example: the engine, the main valve, hydraulic motors and pumps), are made of fluorine rubber, fluorine rubber can form hydrogen fluoride and hydrofluoric acid when heated to a high temperature. This acid is of highly corrosive. It can result in severe burns because it can't be washed from the skin. So it needs to take a long time to recover. Commonly, the damaged organs must be excised through the surgical operation.

After contacting the acid, it will take a long time (few hours) to show up the symptoms, so you won't get the immediate warning. The acid may remain in the mechanical parts for a long time (a few years) after the fire.

If there are some symptoms such as swelling, redness or tingling sensation. Go see the doctor immediately if you contacted with the heated fluorine rubber. If the machine or part of it had suffered fire or been in the high temperature, the machine should be handled by specially trained personnel. Make sure to wear the thick rubber

gloves and goggles when you are dealing with it.

Around the area of the part once be in a high temperature, (the part may be made of fluorine rubber.) Make sure to take the lime water (a calcium hydroxide solutions or suspensions) to clean and remove the pollution. Then wash the gloves before throw it away.

Forbid to burn the parts which will be thrown way, has been paint or made of plastic or rubber. These parts should be treated by the guaranteed recycling factory.

Check list

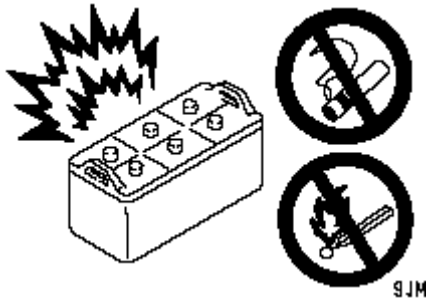
When deal with the machine that has been burned or exposed to in a intense heat. Take the following measures under any circumstances:

- In case, take the same measure as fluorine rubber products when deal with the seals (O ring seals and other seals).
- Do not touch the burned parts, or may contact the melted polymer materials. First of all, clean with the lime water (the part may be made of fluorine rubber.) Make sure to wear the thick protective rubber gloves and goggles when you are dealing with it.
- If you think have contacted with the burned fluorine rubber, please coat with the hydrofluoric acid burn ointment immediately and go see the doctor. It will take a few hours to show up the symptoms.
- Discard the protective gloves, cloth which might have contacted with the burned fluorine rubber.

Storage battery

Regulations about the storage battery

Key point! Storage battery contains something that will hazardou to the health and brings the pollution to the environment. Therefore, the scrapped storage battery must be treated by the relevant provisions of the local / national.



- Do not smoke around the storage battery, because it can emit the explosive gas.
- The electrolyte is corrosive, make sure to keep a distance to it when don't take any protective measures about the skin. It should take 10-15 minutes to wash the skin if you contacted it.
- Disconnect the ground conductor (ground wire) When you take off the storage battery. Make sure to connect to the ground wire to reduce the danger of sparks (that will cause the fire) when install the storage battery.
- Do not tilt the storage battery excessively in any direction, or the storage battery will leak.
- When charging the storage battery, please refer to the relevant regulations.
- When take the spare storage battery to start the engine, please refer to the relevant regulations.
- Don't connect the uncharged storage battery with a fully charged storage battery. The electric current impact will cause the storage battery explosion.
- Make sure to keep the metal objects (such as tools, ring and bracelet) away from the storage battery, or it may lead to injury or fire. Reinstall the pole and the storage battery frequently.
- When turn on the power by another machine's storage battery, don't contact the two machines with each other, or it will damage the electrical systems of the both machine.
- When the engine with the auxiliary storage battery on the machine starts, first idle it for several minutes, and then start the machine that will charge the storage battery.
- Storage battery contains something that will hazardous to the health and brings the pollution to the environment. Therefore, the scrapped storage battery must be treated by the relevant provisions of the local / national.

Start with the auxiliary storage battery



Don't connect the uncharged storage battery with a fully charged storage battery. The electric current impact will cause the storage battery explosion and injury the people.

When take the auxiliary storage battery to start, Check the battery and other power source make sure they are of the same voltage.

Do as follows:

1. Turn off the storage battery.
2. Remove the protective cap of the storage battery.
3. Connect the Two 12 volt storage batteries in series.
4. Connect the storage battery (+) pole and the auxiliary storage battery (+) pole with a jumper wire.
5. Connect another jumper wire to the storage battery (-) pole.
6. Turn off the storage battery, Connect the storage battery.
7. Start the engine with the key in the operating cab.
8. After starting the engine, first remove the jumper wire, then remove another pole of the auxiliary storage battery.
9. Reinstall the storage battery pole protective cap.

Charging the storage battery



When charging the storage battery, take off the cover (except maintenance free storage battery) till the end of charging. When charging the storage battery, it will form an explosive mixture of hydrogen and oxygen. Short circuit, flames or sparks near the storage battery can cause the terrible explosion.

- Cut off the charging electricity before you open the charging clip.
- When charging in the limited space, make sure the good ventilation.
- The electrolyte contains corrosive sulfuric acid. If you contact it, make sure to wash it with soap and a lot of water. If your eyes or other sensitive skin contact it, be sure to wash it with a lot of water, and go see the doctor at once.

Air conditioner

Refrigerant

Statement

R134a refrigerant is for air conditioning device. Please place the mark disk beside the liquid storing drier when you take this device.

R134a has no potential depletion properties that will affect to the atmospheric ozone layer. But it will make the greenhouse effect worse. Don't put it out into the air directly. The health risks against R134a refrigerant is in the medium.

Personal ability and identification (license)

Repair personnel or the place must pass through the identification when deal with the refrigerant.

There must be at least one qualified supervisor in the place that has get permission. Comply with the national laws; pass through the national agency for identification.

Repair equipment

The device such as pressure vessel, filling station, vacuum pump and hose, just only be poured into the refrigerant to repair. This type of refrigerant must not contact with another refrigerant. In the case of the R12, even if the volume is very small it also has a great decomposition. This in turn will destroy the parts of the refrigeration device.

Personal protective equipment

Risk about the contact

—Make sure to wear snugly type goggles, protective gloves, so as to protect the exposed skin (risk the danger of frostbite).



—Do not wear contact lenses.

Health risk

The refrigerant in a liquid status will cause frostbite.

When the gas at low concentration, it will has some impact on the health, especially on the nervous system.

Gas of high concentration may have a narcotic effect.

Because of the risk of explosion, don't expose the parts or the containers that contain the refrigerant in the environment of above 40°C (+104°F) temperature.

Emergency measures in the accident

—Take the measures as follows if you contacted the refrigerant.

·Gas could form into the refrigerant. When heated, if the gas at low concentration, it will has some impact on the health, especially on the nervous system. If it's at high concentration, it may have a narcotic effect. In these two circumstances, people should be moved out of the danger zone, to the outdoor fresh air. Go to the hospital

immediately if the situation is serious.

·If your eyes contacted with the refrigerant, wash your eyes with lukewarm water. If there are other symptoms, go see the doctor.

—Be careful when you work with the refrigerant.

—Air conditioning system includes a pressurized refrigerant. Don't discharge the refrigerant into the environment. Make sure to collect the refrigerant into a special pressure container if you must turn on the air-conditioning system.

—Air conditioning system is a supercharging device, refrigerant may leak. Do not disconnect the connection tube, or open the compressor infusion stopper. If there is possibility to leak, contact the authorized repair center first, they will take the corresponding measures.

—Take the special equipment when Empty (removing) or refilling (charging) the refrigerant.

—The refrigerant vapor is heavier than the air, so it will sink in the ground.

—Don't smoke, weld or make use of flame when you are at refrigerant place. Or the refrigerant gas will be lighted and form the toxic gases. It is very dangerous if you tasted the gas. The gas in high concentration has a pungent taste when heated.



WARNING!

The gas is still harmful to the lung even at the low concentration. But it has no obvious symptoms in this moment. It will show up the symptoms when the gas exposed several hours (even up to 24 hours).

Handrails and pedals to be on/off the machine

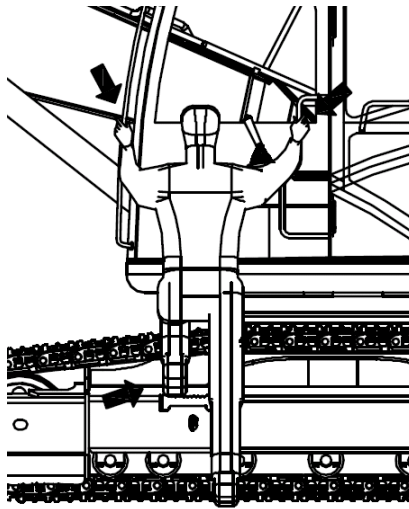
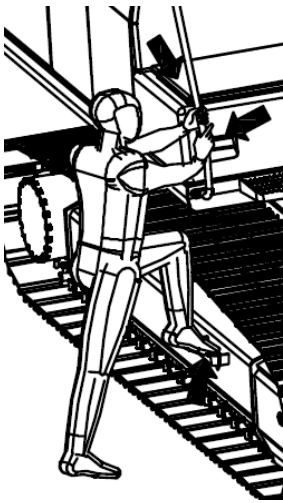


WARNING!

Comply with this notice strictly to ensure the safety.

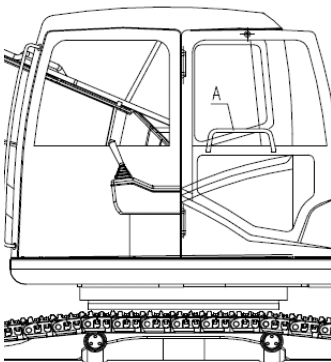
Forbid to jump up or down on the machine, especially when the machine is moving. Forbid to be on/off the machine by holding the control handle.

Support your body by handrails and pedals (as follows).



Remove the mud and the oil on the handrails, pedals and the shoes. Make sure to keep clean of the window, rearview mirror and the lamp.

When leave the cab, don't take the handle (A). This handle is used to close the cab door. It is too weak to support you be in and out.

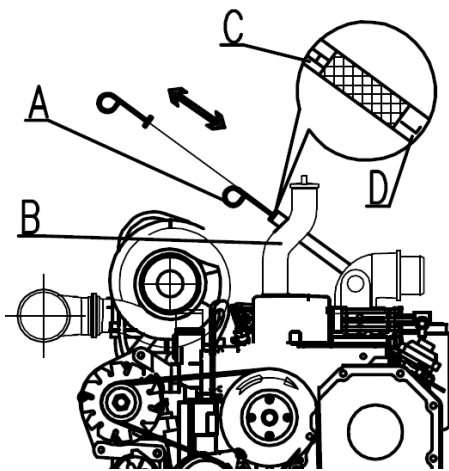


Repair and maintenance

Engine

Check the oil level

1. Open the engine hood.
2. Pull out the oil level gauge (A) and clean it.
3. Insert it again, and then pull out.
4. It means normal if the oil level is between C and D. If it lowers than D, please add through B.



- A the oil level gauge
- B the filling hole
- C H High oil level mark
- D L Low oil level mark

Change engine oil



WARNING!

The hot oil will get you burned if you don't take any protective measures about your skin.

Change the oil in every 500 hours if you take the grade CH-4.

Apply to 500 hours interval conditions as follows:

- Lubricating oil filter should comply with engine specifications, original parts, too.
- The sulfur of the engine fuel can not exceed 0.3% by weight.
- The lubricating oil should be in line with the “recommended lubricant”.
- Be sure of the right engine oil viscosity relative to the ambient air temperature,

refer to the "recommended lubricant".

If you can't meet any one of the conditions above, or the machine works in acidic or dust environment. Make sure to change oil and filter in every 250 hours.

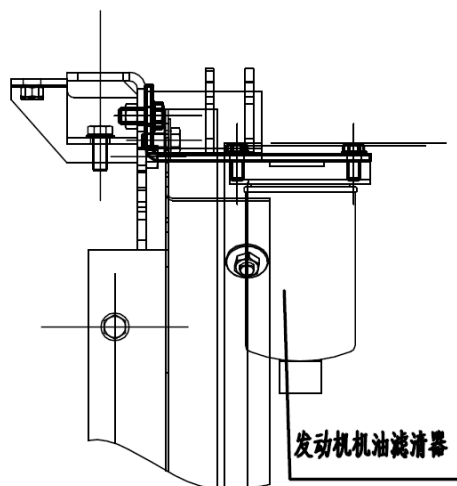
Change oil

- a) Lay the machine on the maintenance place.
- b) Put a container (more than 30 liters) under the valve of the engine oil bottom shell.
- c) Turn on the oil valve.
- d) Put out the oil.
- e) Turn off the oil valve.
- f) Add through the oil filler (B)
- g) When changing the oil, lubricating oil volume is about 20 liters, including filter. As for the oil level, refer to the "recommended lubricant".

Make sure to protect environment, when deal with the waste oil and waste liquid.

Change engine oil filter

Make sure to change engine oil filter when change the oil. Refer to "67 check the engine oil level". The filter of the lubricating oil must be replaced after cleaning.



Disassemble

Take the appropriate tools

Installation

1. Add the lubricating oil into the filter.
Each filter oil capacity is about 0.5 liters.
2. Coat the lubricants on the sealing pad.
3. Make sure to let the sealing gasket and the sealing surface contact when you screw on the filter.
4. Then take the filter wrench to tighten the filter to 1 / 2 loop.

After installation

5.

Check the seal when you start the engine. If the seal is not good, remove the filter and check the sealing surface.

NOTE:

Typically, it is not helpful to the sealing status if the filters were screwed too tight.

Key point!

The engine must run for at least 1 minutes at low idle when replace the oil filter. It is very important to add the lubricating oil before the installation. This can ensure the engine get the lubrication immediately when it starts.



WARNING!

Be environmental when deal with the waste oil and waste liquid!

Fuel system

Fuel tank

Keep the fuel tank clean is the key point to the operation of the diesel engine.

The fuel tank can be of 360 liters of fuel.

Keep the cleanness when you open the fuel tank cover. Avoid the overflow when add the fuel. The overflow fuel will adsorb dust. Prevent the condensation water into the fuel tank to make the fuel tank maintained full state without working in the cold season.

As for the quality of the fuel, please refer to 99 recommended lubricants.

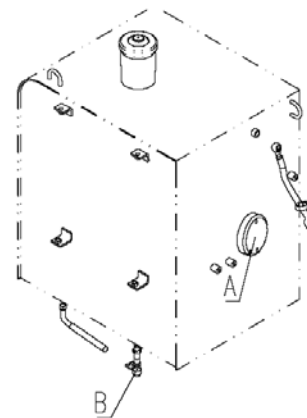
NOTE:

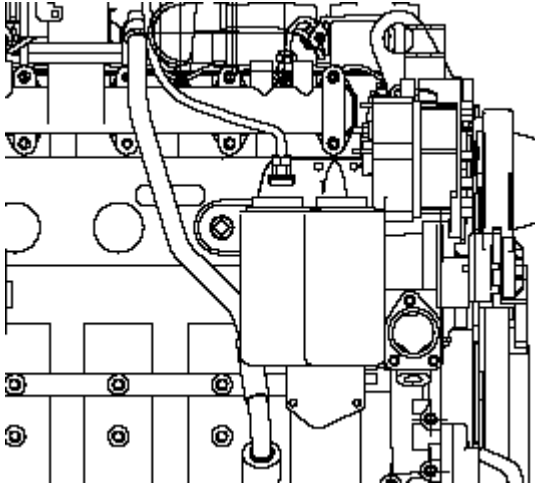
Make sure not to pollute the fuel tank fuel level gauge (A) by solvent, or it will be damaged

Discharge the sediment in every 100 hours.

Be environmental when deal with the waste oil and waste liquid!

Replace the fuel filter





Discharge the fuel filter in every 100 hours.
The filter of the lubricating oil must be replaced after cleaning.

Disassemble

Take the appropriate tools to remove fuel filter (C).

Installation

1. Coat the sealing pad with diesel.
2. Make sure to let the sealing gasket and the sealing surface contact when you screw on the filter.
3. Then tighten the filter to 1 / 2 loop.
4. Discharge air.

Oil-water separator drainage

The oil-water separator is located on the wall of the main pump's hydraulic oil tank.
Put a container beneath the hose of the oil-water separator. Be convenient to drain the water.

Fuel system air emission

 **WARNING!**

Make sure to keep away from the high-pressure fuel with your body doesn't take any protective measures when you work with the fuel injection equipment.

If the oil in the tank has run out or the air entered the system, make sure to remove the air from the system.

Key point!

In any case, don't start the engine if the fuel oil system sealing is not good. Otherwise, the fuel injection pump may be seriously damaged.

Statement

1. Clean the bleeder valves plug.

Note: Don't spill the fuel onto the electrical components.

Fuel filter

2. Open the gas plug and make sure there isn't any air bubble in the fuel of the hand oil pump.
3. Tighten the nozzle when the fuel flows out.

Cylinder body

4. Open the bleeder plug of cylinder relief valve.
5. Make sure there isn't any air bubble in the fuel of the hand oil pump.
6. Tighten the nozzle when the fuel flows out.

Air discharge

7. Run the engine for about 10 minutes at a higher idle speed.
8. Make sure there is no leakage after the running of the machine.

Intermediate cooler

The engine is equipped with air to air intermediate cooler. The temperature of the air be inhaled in intermediate cooler is lower than ambient temperature above 30°C. So the density of inhaled air is bigger, to make sure the combustion fully. This helps to improve the output power of the engine, and the cold air can reduce the stress between the valve and piston.

Turbocharger

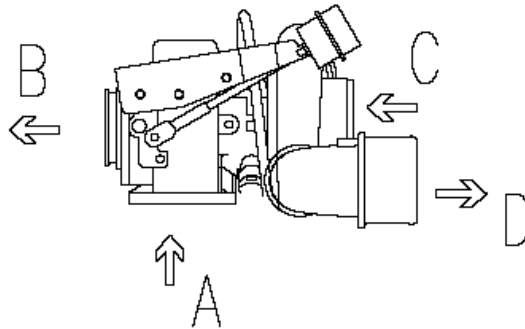
Important!

Run the engine for at least 30 seconds at a higher idle speed and run it for at least several minutes before the stop. This can protect the turbocharger lubrication.

The turbocharger take through the engine lubrication system for lubricating and cooling, the most important condition is to replace the engine oil and the filter within the regular time. The maintenance of the air filter and the sealing of the exhaust system and lubrication oil pipeline are also very important to the turbocharger. Make sure to adjust or replace when you hear any loud noise or vibration of the turbocharger.

Only the authorized repair center can do the maintenance or repair to the turbocharger.

A Exhaust in
B Exhaust out
C Air in
D Air out



Air filter

Statement

Air filter can prevent dust and other impurities from entering the engine. The air first enters the outer primary filter, and then enters the auxiliary filter.

The cleanliness of the inhaled air is the key point to the engine. Therefore check the air filter and do the maintenance regularly. Make sure to take the air filter. Make sure to keep clean when at work.

Key point!

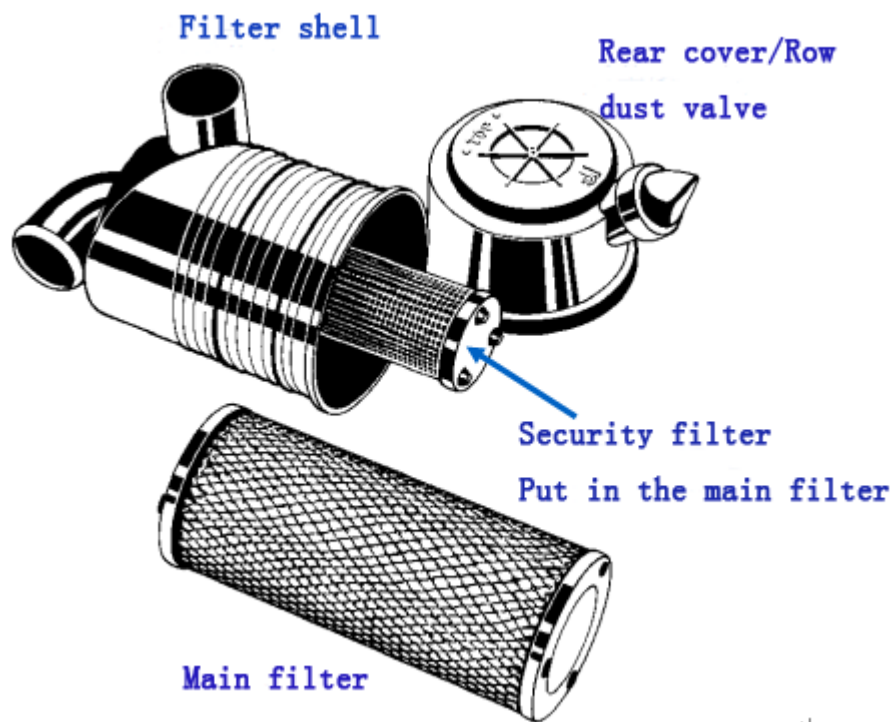
In any case, do not run the engine without installation of the filter or filters have been damaged.

Air filter

Air filter is radial sealing, double-layer filter type.

The structure diagram of the air filters as follows:

Including air filter shell, rear cover, and dust discharging valve, main core and safety filter.



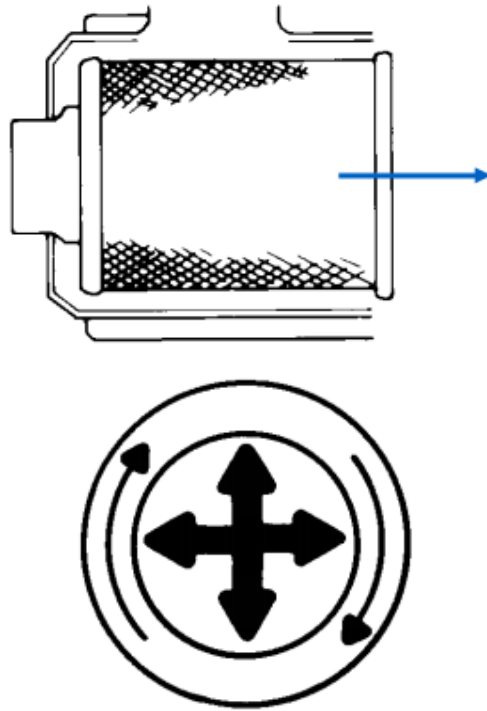
Clear the air filter

1. When the machine has worked 250 hours or dirty air filter alarm instrument displays, the air filter should be cleaned.
2. Can not clean the filter with beating absolutely.
3. Must not simply determine the filter's life with naked eye, pressure alarm is the most reliable way.
4. Unless a last resort, air filter must not be open for a long time.
5. Can not use bad or damaged filter, if any defects or damage, replace it immediately.
6. Never replace the generation of use when the coding is wrong.

Notice: In dusty and humid conditions, you should clean up everyday.

Do it with the following steps:

1. Break apart the 4 cover clips with the thumb, remove the cover, and then removed the main filter, straight pull, gently turn the filter before and after carefully pull it out.

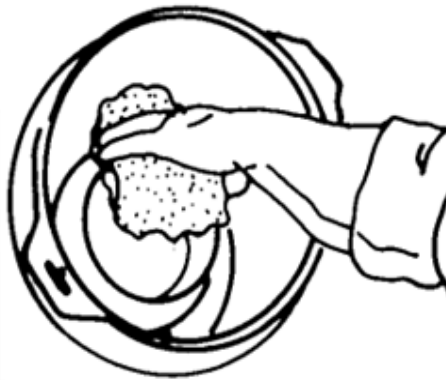


1. Air filter with safety cartridge, please replace the main filter in the third time, while the replacement of safety filter, removed security also need to gently turn the filter cartridge and slowly pull out the filter. Safe filter effect:

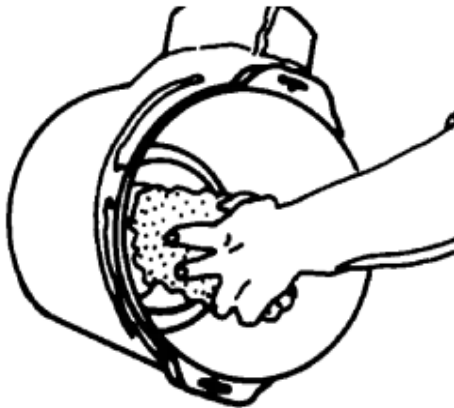
Of maintenance work, to prevent dirt entering the engine, when the main filter appear small、 uneasy detected damage to protect the engine.

Notice ! Only with the security filter, must not run the engine.

2.Clean the shell inside with a clean cloth.



Clean the inside of the center pipe



Clean the outside of the center pipe

2. Check valve dust



Visual inspection of
the row dust valve

If any valve is damaged or lost, replace it immediately!

If dust is not removed promptly and effectively, the filter life will shorten.

3. Check the filter

A、 Check whether the old filter is degumming, check if there is dust in clean side stripes;

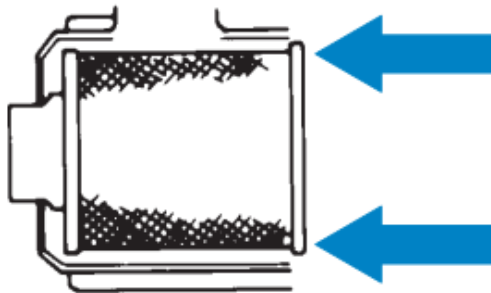
B、 Check the new filter, do not install the damaged filter.

;



4. Install the filter

Carefully insert a new type of radial seal filter:



- A. If it is safe filter maintenance, the safe filter must be in place before install the main element;
- B. After the filter in place, immediately cover fixed, pay attention to the valve to keep dust down, lock the cover folder.

Notice !

Must not use the power of the filter top cover in place! This will damage the housing or end cap fasteners.

Cooling System

Summarize

If the engine temperature is too high, even if the coolant level is normal, the radiator should be cleaned.

Important !

Be careful not to damage the fins on the radiator core.

If the engine temperature is still too high, shall take remedial measures with authorized special service center.

Clean radiator, hydraulic oil cooler and condenser fins.



WARNING!

Compressed air, steam or water may harm the body, protective goggles are required to wear. Do not use steam clean-air intercooler.

All should be cleaned every 500 hours

1. To remove all the fins, dust and leaves on the sludge attached to the heatsink with compressed air.
2. Before cleaning the oil cooler grid, charge air coolers and air conditioning condenser fins.
3. Check whether the rubber hoses are damaged and cracking. If damaged, the hose must be replaced, check whether hose clamp is loose.

Important !

When using the air compressor, be sure to maintain a certain distance with the fin to prevent damage. If the fin is damaged, may cause leakage or cause overheating. In the dusty environmental conditions, regardless of how the maintenance interval, daily checks are necessary.

Coolant

With the role of antifreeze and coolant rust

Antifreeze

Check antifreeze properties every 500 hours.

When shipped from the factory, if the machine has been filling the cooling system coolant - water and a mixture of concentrated antifreeze, it can reduce the freezing point of coolant and improve its boiling point.

Antirust

Concentrated antifreeze includes effective anti-corrosion additives to protect the engine and radiator. Sustainability of these additives is limited.

Therefore, the cooling fluid should be replaced every 2000 hours, 3000 hours or a year once.

Notice:

Do not mix concentrated antifreeze with other manufacturers or additives of any antifreeze. Mixture may have a negative impact.

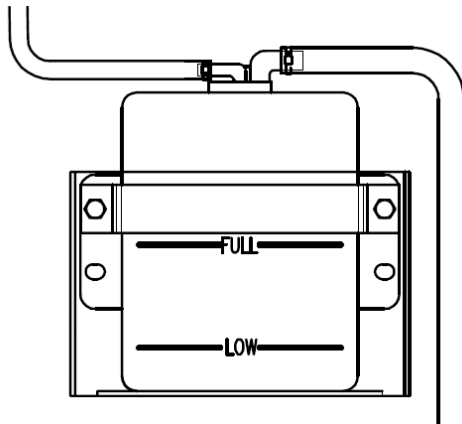
Antifreeze content can not be less than 40%.

Cooling system capacity is about 25 liters.

40% of antifreeze will lower the freezing point to -25 °C.

50% of antifreeze will lower the freezing point to -37 °C.

Check the coolant level



WARNING !

After just turn off the engine, coolant temperature is still high. Before the coolant is cold, do not open the radiator cap directly and immediately. Open the radiator cap slowly to release internal pressure.

Check the coolant level daily as follows,

1. Open the left door.
2. Check the reserve tank coolant level.
 - If the level is between the "FULL" and "LOW", it is said the level is normal.
 - If the liquid level is below the "LOW", attach the coolant to the coolant tank perfusion to the level between the "FULL" and "LOW" level.
3. Open the engine cover
4. Open the main water tank cover, check the coolant volume

Replace the coolant

The coolant should be replaced every 2000 hours.

Discharge the coolant

1. Remove the bottom end of the radiator cover, and place a container below the valve.
2. Loosen the radiator cap.
3. Open the valve.

Notice: Even if the coolant are discharged, the cooling system is not safe in antifreeze, and there may be a considerable amount of coolant stay in them.



WARNING!

When handling waste, protect the environment.

Rinse

1. After discharged, close drain valve.
2. Add clean water through outlet perfusion.
3. Start the engine and run for about 10 minutes at low idle speed.
Stop the engine. And drain the water.

Fill the coolant

When replacement, cooling system capacity is approximately 25 l

1. After washing, close the drain valve and open the radiator cap.
2. Add the recommended coolant through the coolant outlet.
3. Let the engine run at low idle speed for 5 minutes.
4. Stop the engine, refill coolant until it is full, the reserve tank coolant level reaches the proper position.
5. Installed the tank cover

Important !

Do not fill the cold coolant when the machine is in the work or just to the end of the work that the temperature is still very high. This may lead to cracks in the cylinder block and cylinder head.

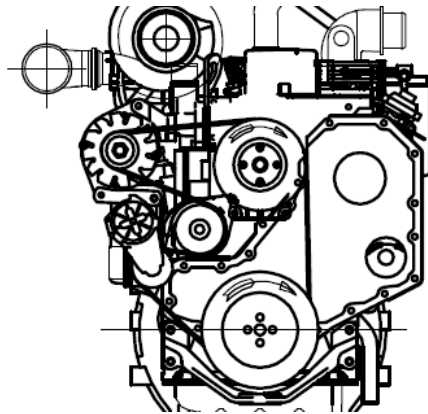
Not promptly replace the coolant may cause cooling system blockage, and there are dangers like stick-cylinder engine.

The tension power of the pump fan belt



WARNING!

When check the belt tension force, the engine must be stopped, because the moving parts can cause injury



Check the belt every 250 hours.

At the right edge of the belt tension, the belt should be possible to pressure down about 15 mm. If more than 15 mm, a new belt should be replaced

Electric system

Battery switch

Battery disconnect switch is located on the right side of the toolbox of mechanical

Important !

The machine is equipped with an alternator.

Therefore, when the engine is running, the battery disconnect switch must always be in the open position.

If the engine is running, the battery switch is turned off, the alternator may be damaged.

After day's work, you should turn off battery disconnect switch.

Battery electrolyte level

The machine is equipped with maintenance-free batteries for the battery



WARNING !

Battery gas (hydrogen) is flammable.

Do not expose it in the condition such as fire, cigarettes and other fire or spark sources.

If the battery electrolyte spill spilled on clothing or skin, rinse with

water immediately.

If the battery electrolyte gets into the eyes, flush immediately with a mount of water, examined by a doctor as soon as possible.

Check the electrolyte level (except maintenance-free batteries)

1. Open the mechanical right side of the battery box cover.
2. Loosen the cap.

The battery electrolyte level should be above board about 10 mm.

If the level is too low

1. To be filling distilled water.
2. After the filling, operate machine, so that water and electrolyte battery mix, this is especially important in cold climates.
3. Check the cables and pole terminals are clean, well-fastened, and whether coated with Vaseline or similar material

Provisions of the battery

Refer to the 62 "battery".

Battery charging

Refer to 64 battery charging.

Alternator

Check the belt tension force



WARNING!

When check the belt tension force, the engine must be stopped,

because the moving parts can cause injury

At the right edge of the belt tension, the belt should be possible to pressure down about 15 mm. If more than 15 mm, a new belt should be replaced.

Note: Incorrect wiring will affect the alternator's work and damage the machine, it should always observe the following instructions

- when the engine is running, the battery and alternator cables can not be disconnected. Otherwise, the alternator and electronic components may be faulty.
- Before any work is to be done to the alternator, disconnect the battery cables

and insulation

Connect the battery

- Battery terminals must not be confused with each other. (+) or (-) sign are clearly to be marked on each terminal. If the cable is connected correctly, resulting in the cable error, alternator rectifier will be damaged immediately.
- When you disconnect the battery, first switch off the circuit with the battery.

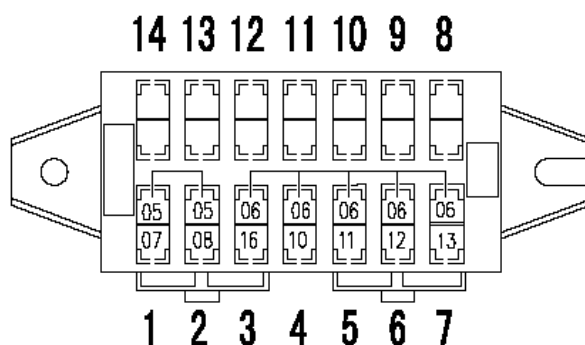
Electric welding

- before weld the machine or any mechanical device Installed in the machine, battery switch must be turned off.
- In any welding machine, you must disconnect the battery cable and plug the cable plug from the electronic control device.
- when it is open and re-connected, the wire should be no current (off the battery switch).
- Grounding conductors of welding equipment should be close to the welding point as soon as possible.
- before welding, remove weld around at least a radius of 10 cm (4 inches) all paint .because the heat will release harmful gases to paint.
- All paint will break down and format a large number of compounds in the heating and if prolonged exposure to them, may cause pain, allergy which is Hazardous to health.
- In addition to health hazards, the welding quality and intensity can be damaged and even lead to weld fracture in future. So do not the weld on the paint surface directly.

Storage Box

Summarize

Machine equipped with a fuse box Installed in the bottom of the right control box in the cab. Fuse box also contains a spare fuse.



WARNING!

Do not install a fuse more than the label of state (a circuit board to damage or fire hazard).

If the same location of the fuse blows repeatedly, you must find out the cause of the failure.

Fuses protect electrical equipment from burn out.

If the fuse is eroded or loosened, check and clear the relevant circuit problems immediately. Replace the fuse if it is broken.

Notice: Only the same fuse as original ones can be used.

Switch off the general switch when replacing the fuse.

The equipment and circuit of the fuse

NO.	Specification	Circuit	NO.	Specification	Circuit
1	15A	Power electric lock	8	5A	Spare
2	5A	Radio, light lock	9	5A	Spare
3	10A	Electromagnetic valve	10	10A	Spare
4	5A	Relay	11	10A	Spare
5	10A	air conditioner, Wind device	12	10A	Spare
6	15A	Speaker, Safety Lock, Light	13	15A	Spare
7	5A	Radio	14	15A	Spare

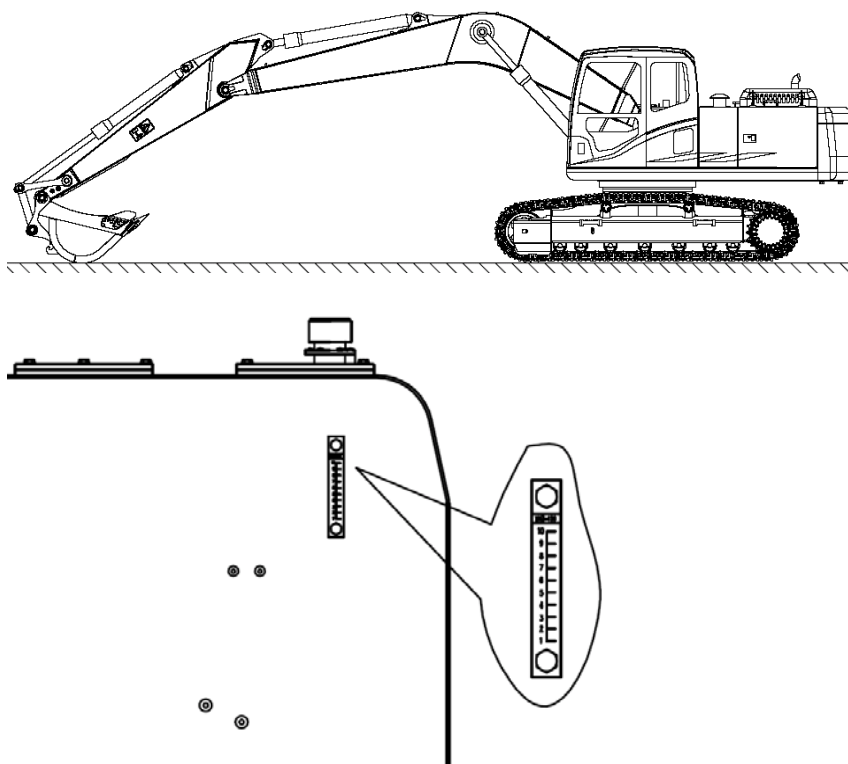
Hydraulic system

Important !

Keep clean when filling hydraulic oil and operating hydraulic components.

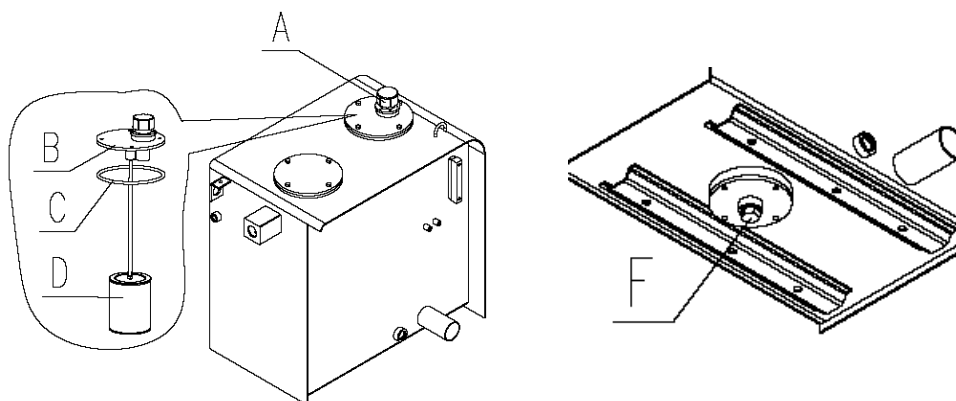
Check the hydraulic oil level.

Check hydraulic oil level every day.



1. Extend the bucket cylinder fully and fully retract stick cylinder, and decline the work unit to the ground, as shown in photo 80;
2. Stop the engine;
3. Put down safety lock lever and moves left and right joystick in all directions several times to remove residual hydraulic pressure;
4. Lift safety locking handle , refer to the 25 safety lock system;
5. Turn on right side of the door at upper structure, and check the hydraulic oil level by visual form, as shown above;
6. If the oil level is in the center of the hydraulic design it is normal. If the oil level is low, you must fill hydraulic oil.

Replacement of hydraulic oil



Hydraulic oil should be replaced every 2000 hours



WARNING !

Be careful when replacing hydraulic oil, high-temperature will burn unprotected skin.

1. Turn the upper structure, so that the drain plug which is at the bottom of the hydraulic oil tank is located between the left and right track;

1. Retract the bucket cylinder fully, recover the arm cylinder fully, and decline the work unit to the ground. Such as 80 shown in photo;
2. Stop the engine;
3. Put down safety lock lever and moves left and right joystick in all directions several times to remove residual hydraulic pressure;
4. Lift safety locking handle , refer to the 25 safety lock system;
5. Release internal pressure of the tank by breathing valve (A) , (there are protective cover installed on the upper, need to be removed first);
6. Unscrew the cover (B);
7. Remove O-ring (C) and coarse filter (D);
8. Place a container below drain plug(F);
9. Spin open oil drain plug (F);
10. Discharge hydraulic oil;
11. Tighten the oil drain plug (F);
12. cleaning coarse filter (D) Thoroughly, and re-installation;
13. Perfusion fluid, re-install the cover;
14. Check the oil level on the gauge;
15. when replacing the, total capacity of hydraulic system is about 420 liters ,hydraulic oil tank capacity is about 250 liters.

On the oil level, refer to the 99 recommended lubricant.

Biodegradable hydraulic oil

If you need to replace mineral oils to biodegradable hydraulic oil, please contact the authorized service center.

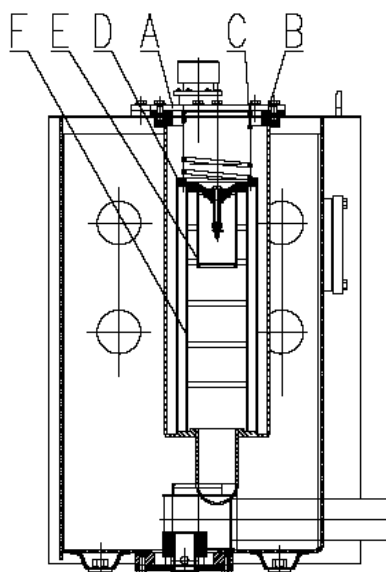
Replacement of hydraulic oil return filter

After 250 hours the oil filter should be replaced at the first time, replaced every 1000 hours later.

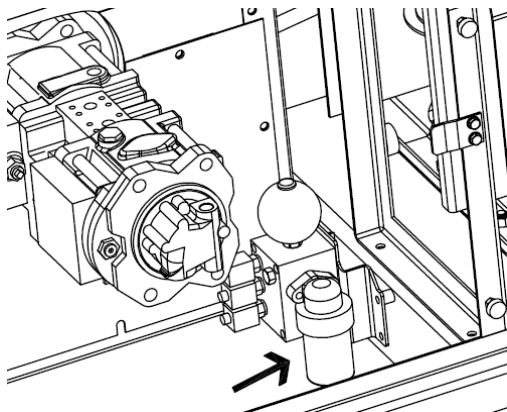


WARNING !

Before removing the cover (A), the pressure inside the tank must be released.



1. Unscrew the lid (A) (there is a protective cover installed on the upper, need to be removed first);
2. Remove O-ring (B), spring (C) and bypass valve (D), then pull out the filter bypass valve (E) and the oil filter (F).
3. Clean the removed parts and filter bypass valve (E).
4. Install the new oil return filter (F) and all parts.
5. Start the engine and keep running at low speed for 10 minutes in order to remove air.
6. Stop the engine

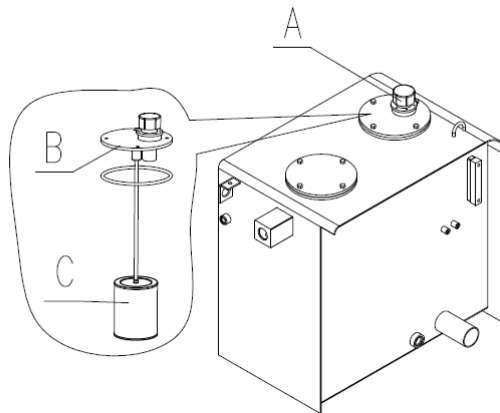


Replacement of Pilot filter cartridge

Replace auxiliary filter element after 250 hours at the first time, replace every 1000 hours later.

1. Place a container below the filter.
2. Remove the filter body.
3. Replace pilot filter cartridge

Cleaning oil filter



Clean coarse filter every 2000 hours, if necessary, then it is replaced.

1. Loosen the breathing valve (A) to release the pressure inside the tank out.
2. Unscrew the cover (B), pull out the oil filter (C).
3. Cleaning or replace oil filter according to the number of hours of work.

Replace the air ventilation device components on hydraulic tank

If necessary, replace breathing valve (A) every 2000 hours. When working in dusty environments for some time, breathing valve will be blocked.

1. Remove the breathing valve.
2. Clean or replace the breathing valve thoroughly.

Rotary drive

Summarize

Important!

Before check the oil level, it is necessary to clean the oil level gauge around. If there are impurities in the oil, it will damage the rotary drive box.

Maintain oil level normal, check the oil level at operating temperature, it is very important. Therefore, to keep in mind:

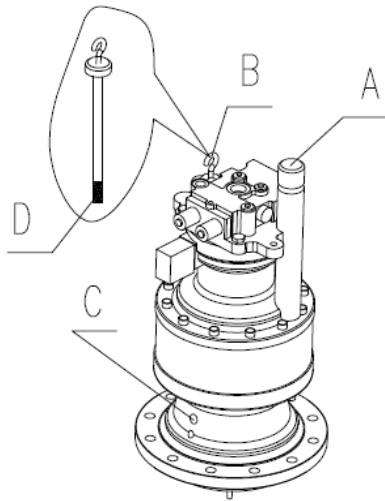
- If the oil is too little, rotary drive impaired because of insufficient lubrication.
- If the oil is too much, it will result in a rotary drive box overheating.



WARNING! Machine just stop working, the oil is hot, be cool oil.

Check the rotary drive box oil level

Check the oil level every 250 hours



1. Pull out the oil-foot (B), dry it with a clean cloth.
2. Then insert the oil level scale (B).
3. Then pull out the oil feet (B), and check the oil level. If the oil level in the center of D, then the oil level is normal.

If the oil level is below the normal oil level, fill the oil through the ventilation port (A) to the correct oil level. Lubricant specifications: See the 99 recommended lubricant. "

If the oil level is above the correct oil level, loose oil drain plug (C), discharge the oil to adjust the oil level to the correct oil level. Then tighten the oil drain plug (C).

Replacement of rotary drive box oil

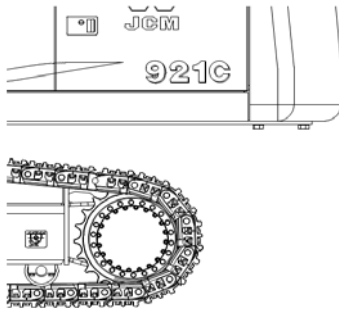
Replace after 500 hours at the first time, replace every 1000 hours later.

1. Prepare a container (10 liters) to emission the filled oil.
2. Put the container below the drain plug, then emission the oil.
3. Open oil drain plug (C), discharge oil.
4. Close the oil drain plug (C).
5. Pull out the oil level-foot (B), fill the oil to the correct oil level through the ventilation port (A).
6. Then check the oil level, if required, plus note.

Lubricant specifications: See the 99 recommended lubricant.

Track drive

Summarize



Before check the oil level, we should clean up the oil level gauge around. If there are impurities in the oil, it will damage the track drive boxes.

Maintain oil level normal, and check the oil level at the operating temperature, it is very important.

Therefore, to keep in mind:

- If too little, drive box does not track drive, will be undermined.
- If the oil is too much, it will from the foam, which will result in track drive boxes overheating.

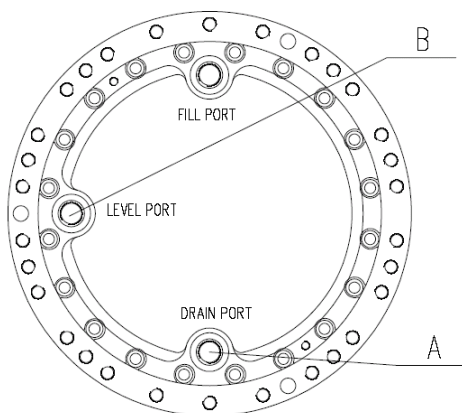
⚠ WARNING!

Mechanical vehicles just stop working, the oil is hot, be cool oil, the remaining drive tank pressure may lead to oil or plug injection. So release the plug slowly.

Check the track drive box oil level

Check the oil level every 250 hours

1. Transfer the oil level plug (B) above, so that the drain plug (A) is perpendicular to the ground, as the photo shown.



2. Remove the oil level check plug (B). If the oil spill almost from the hole, indicating the oil level is normal.

If the fuel is short, add the fuel through the injected port (B) to the proper oil level. Lubrication specification, refer to the 99 recommended lubricant.

Replace track drive tank oil

Replace after 500 hours at the first time, replace every 2000 hours later.

1. Prepare a container (5 liters), then emissions filled oil.
2. Transfer the oil level plug (B) above, so that the drain plug (A) is perpendicular to the ground, as shown above.
3. Put the container (A) below the drain plug.
4. Remove the drain plug (A), oil level check plug (B), and then put the oil.
5. Check the O-ring stuffed, if damaged, must be promptly replaced.
6. Install the drain plug (A)
7. Add oil to the proper oil level from the injection port (C).
Lubrication specification, refer to the 99 recommended lubricant.
8. Install the oil level check plug (B)

Accumulator operation



WARNING!

High pressure nitrogen gas filled accumulator pressure.

To prevent serious casualties, to be careful and follow these instructions:

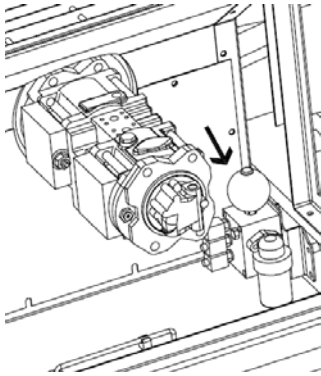
Can not tap on the accumulator, drilling or welding.

Away from open flame or other high temperature heat source.

Before disposal, please authorize authorized service center for pressure relief of the accumulator.

If the engine stopped, operate control handle, the accumulator can make the device work with their weight down.

After working device down, lift safety lock handle, refer to the 25 safety lock system



Accumulator operation (emergency)

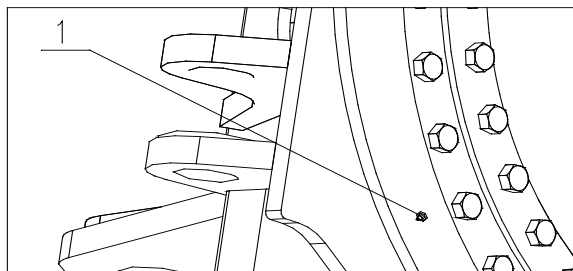
1. Key to the stop position, stop the engine;
2. Turn the key to running position;
3. Use accumulator operation to make attachment down with their weigh.

Release the pressure of accumulator

1. Make the attachment completely down to the ground;
2. After engine stopped, turn the starter key to connecting position;
3. Put security lock handle down.
4. For the release of the pressure control loop, moving the control handle and pedal to the Forward / backward, left / right to each location.
5. Turn the starter key to the stop positing.
6. Lift the safety lock handle, refer to the 25 safety lock syste
7. Release the hose union slowly, avoid the injection direction of the hydraulic oil.

Fulling and changing the lubricant

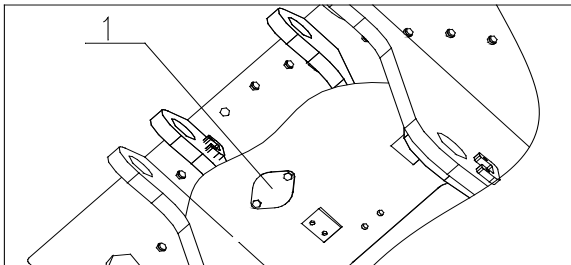
Lubricate the swing circle



Fulling the lubricant every 250 hours

1. Park the Excavator on level ground.
2. Put the bucket on the ground
3. Turn the key start to to “off”
4. Lift the safety lock lever, refer to the 25 security locking system
5. Inject the lubricant by the outer oil cup of the swing circle(1)
6. Start the engine, elevated to the bucket a few inches off the ground, then rotate the upper structure to the next filling mouth.
7. Put the bucket on the ground
8. Starting from step 3, repeat the steps
9. Injection of grease to the swing circle until the grease overflow from the joint strip joint of the swing circle.
10. Be careful, don't add too much
11. After injection of grease, clean the overflow grease.

Check the grease of the swing slot



1. Park the Excavator on level ground.
2. Put the bucket on the ground
3. Turn the key start to to “off”
Lift the safety lock lever, refer to the 25 security locking system
4. Remove cover and bolts (1).
5. Check the oil level and condition of the grease.
6. If necessary, add the grease.
7. Check the pad, replace it if damaged
8. Install the cover.
9. Replace the grease, if the grease is polluted or discoloration caused by the water. The grease perfusion is about 24 L.

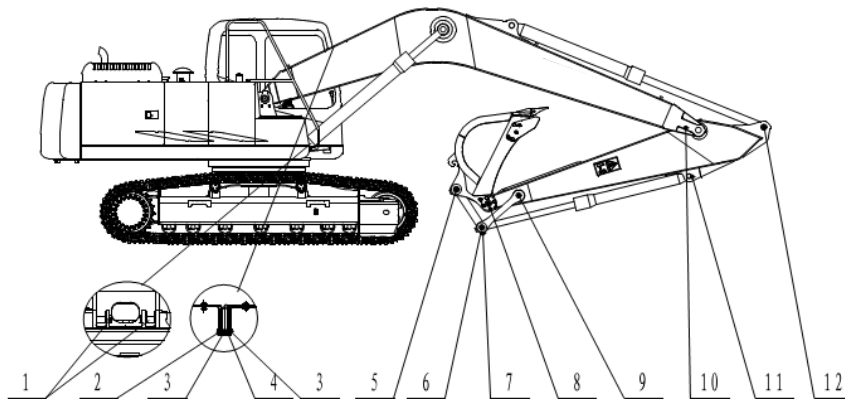
Lubricant the working device

1st using within 50 hours, Maintenance the new machine every 10 working hours or everyday .

1st using within 100 hours, Maintenance the link system of the working device every 50 working hours or every week.

Notice:

If the machine is used under hard conditions (after using the hydraulic hammer), embedded in mud, water or abrasive may enter the bearing, maintenance the link system of the working device every 10 working hours or everyday.



When manual filling the grease, put the working devices on the ground as shown above chart, and turn off the engine.

Manually or use electric grease gun, full the grease through the grease filling hole.

After fulling the grease, please clean the overflow of grease.

After working in the water, full the new grease to the components (for example pin of buckets) which are immersed in the water, no matter how the grease filling cycle.

Lubricant specification: refer 98 recommended lubricant.

1. Boom cylinder install pin (2 points)
2. The back of boom install pin (2 points)
3. The end of boom cylinder piston rod pin (2 points)
4. Arm cylinder install pin (1point)
5. The connecting pin of connecting rod and bucket (1point)
6. connecting rod and connecting rod pin (2points)
7. The end of bucket cylinder piston rod pin (1point)
8. The connecting pin of arm and bucket (1point)
9. The connecting pin of arm and connecting rod (1point)
10. The connecting pin of the front of arm and arm (1point)
11. Buck cylinder pin (1point)
12. The conctecting pin of arm and piston rod (1point)

Remmended lubricant and auxiliary materials

Table of Recommended Accessories for SE210 Excavator							
	Location						
	Engine	Fuel	Hydraulic oil	Antifreeze solution	Swing reduction gear unit	Undercarriage reduction gear unit	Air conditioner
Accessory requirement	API CH-4/ SJ SAE 15W-40	Sulfur content <0.5%	ISO VG46	-45℃	API GL-4 SAE 90	API GL-4 SAE 85W-90	R134a
Recommended variety	Premium Blue	-10# or -35#	Special hydraulic oil for SHANTUI.	Special antifreeze for SHANTUI..	Mobil GX	Mobil GX	-
Amount	20L	Capacity: 360L	360 L	Capacity:25 L	4.4L	2×5.4 L	0.9Kg

Description:

The various types of accessories selected in the table are generally required at delivery. For cold northern and hot southern areas, you can adjust the recommendations in accordance with the requirements of the Owner's Manual depending on climate conditions.

Air Conditioning

Important !

Air-conditioning system contains pressurized R134a refrigerant.

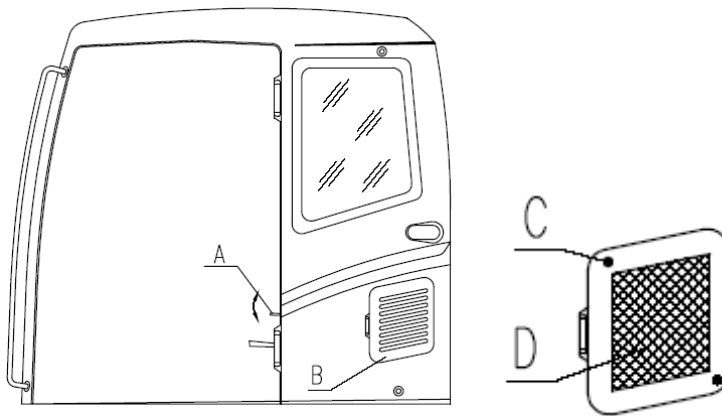
According to the provisions of law, don't release the R134a refrigerant.

Repair and filling refrigeration systems only by trained personnel, should be authorized to contact the authorized service center.

Clean or replace the Air-conditioning filters every 1,000 hours or 6 months.

The power of air flow will be reduced, and the capacity of cooling and heating will be reduced if the air filter is clogged. So it needs to be cleaned regularly

Install and removal the filter:

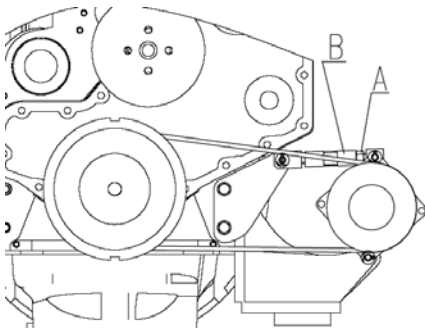


1. Press the handle (A), open the door(B).
2. Remove the nut (C), remove the filter (D)
3. Clean the filter with compressed air.
4. If the filter is damaged, or severely pollution, the filter should be replaced with new.
5. Install the filter and assembly in the reverse order.

Adjust the strap tensivity of air conditioning

Import !

If the belt tension is incorrect, the compressor performance will drop, and the belt and the compressor may be damaged.



With 10 kilograms force press two between the central parts of the pulley, if belt are crushed 7 to 10 mm, show the belt tension force to normal.

1. Locknut screw locknut (A);
2. Adjust tension institutions (B) can adjust the belt tension force;
3. Twist the lock nut.

Crawler tension force

Check and adjust the crawler tension

Every 50 hours check crawler belt tension force

To check the crawler tension force, must be carry crawler belt from the ground.

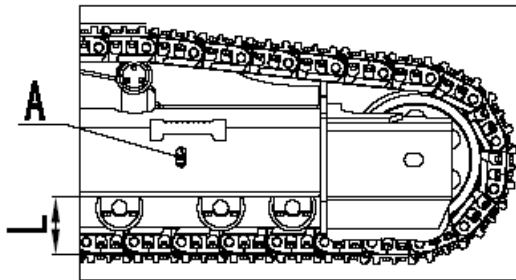
Measurement, be very careful, in order to avoid falling or movement.

Take connection pin and bush usually wear , and work with the characteristics of the soil conditions to change. To check the crawler tension force, and will keep the

stipulated in the numerical, when in the wet sand or clay sand and clay work the ground will stick in the chassis of the movement between the parts, can interfere with the correct meshing between parts, which causes the interference and form big load, the abrasive materials can be greatly increased the material wheel, pins/bushings, guide roller, supporting roller and crawler fittings to wear away, and increase the load and caterpillar tension force. Normally, packing effect is unable to control, can often clean/remove filling material.

So to thoroughly clean the chassis, at least clean every day one or more, according to work the soil conditions and decide.

Check



1. Use boom and arm uplift the crawler belt. Then, slowly operate handles.
 2. "L", namely between crawler frame a bottom and crawler board surface on the gap.
 3. According to the characteristics of the soil, adjust the tension force of crawler belt.
- **According to the standard of soil properties determine the crawler tension force.**

Operating condition	L: Clearance (mm)
General soil	320—340
Rocky ground	300—320
Medium soil such as gravel, sand, snow, etc	340—360

Adjust



Warning

Because of the high pressure of the oil cylinder grease effect, yellow nozzle may be pop-up, loosen yellow nozzle, loosen don't more than a week.

At this time, don't loose yellow nozzle outside other parts. When operating keep far away from the lateral and yellow nozzle installation position.

If you can not use the manual adjustment of the method of crawler belt tension force, please and contact the special arrangement of authorized service center.

Improve the crawler belt tension force

1. The use of high pressure filling grease gun and through the position of A yellow nozzle to filling grease.
2. Before check and adjustment of the crawler belt tension force, first the mechanical

walk backward and forward several times.

3. Check again for a tight force, if a tight force is not correct, should adjust again.

Reduce the crawler belt tension force



Warning

Because of the oil cylinder high in the role of the grease, yellow nozzle may be pop-up, loosen yellow nozzle, loosen don't more than a week.

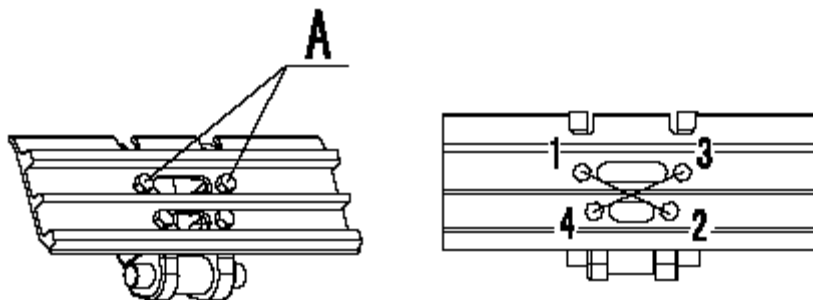
At this time, don't loose yellow nozzle outside other parts, away from the installation position. If you can not use the manual adjustment of the method of crawler belt tension force, please and contact the special arrangement of authorized service center.

1. Gradually loosen yellow nozzle, so that emissions grease, loosen yellow nozzle is not more than a week, when operating personnel must stand side, banned head near access port, to ensure safety, because of the high pressure in the cylinder, grease and refueling nozzle might suddenly pop-up.
2. Close yellow nozzle, but do not twist too tight, otherwise the joint be damaged. For inspection by the adjustment of tension, mechanical walk backward and forward a few times.
3. Check again for a tight force. If a tight force is not correct, should adjust again.

Crawler board bolt on tight

Every day to check the crawler board screw

If the crawler board loose bolts, crawler board often was damaged, so should always check bolt looseness of degree, and will tighten bolts to provisions tightening torque of 794 ± 39 N.



Tightening again

After use $794 + 39$ N · m tightening torque tight, it should check the bolts, nuts and crawler board whether sufficient contact.

Tight sequence

According to the above are shown in order to tighten bolts.

The bucket of clearance adjustment



In the adjustment of the gap, due to incorrect operation and cause work device is very dangerous, must put work device in steady state, shut down engine and raise safety lock handle.

Clearance adjustment

1. According to the following work device placed



2. Remove o-ring and measuring gap value (A), advance to move to one side to measure the bucket is relative easy, use A feeler gauge more accurate;
3. Loosen the four bolts (2) and board (3), because use the open design, and two of them will not be removed;
4. According to the gap value (A) remove the adjustment pad (4), such as $A = 1.5 \text{ mm}$, removal 1 mm and 0.5 mm adjustment pad (adjust pad (4) 1 and 0.5 two specifications) when A less than A clearance adjustment pad thickness need not do to adjust;
5. Tighten four bolts (2).

Replacement bucket tooth

Before the teeth wear and destroy, the bucket tooth should be replace.



Warning

Replace bucket tooth, always will put the bucket on the ground, that it is in the most convenient to work state, and shut down engine.

Will a pad on below the bucket, and then put down the bucket, to keep the level. Shut down engine, and up the safety lock handle, refer to 25 safety lock system ".



Warning

Replace in operation, often can have a fly pieces, so to wear goggles, gloves and other protective equipment.

Replacement dipper teeth

1. Will a metal bar on the pin head, use hammer to knock out metal pin. Dismantle the bucket teeth.
2. Note, want to use a root diameter is slightly less than the pin metal bar.
3. Clean install surface. The new bucket teeth into a tooth, by hand push the pin , then use a hammer will knock into the lock pin to bucket teeth in the bucket.

Lubrication

Summarize

Lubrication is an important part of preventive maintenance. It increases the life of the bearings and pins if lubricate the machine correctly. Lubrication chart can make the lubrication easy and reduce the risk of forgetting the lubrication points.

There are two main purpose of lubrication:

- Supply grease for the bearings, and reduce friction between pins and bearing bushings.
- Replace the old and dirty grease.

IMPORTANT!

Before adding the grease, please wipe the injection mouth and grease gun to avoid filling of grease into the sand and dirt particles.

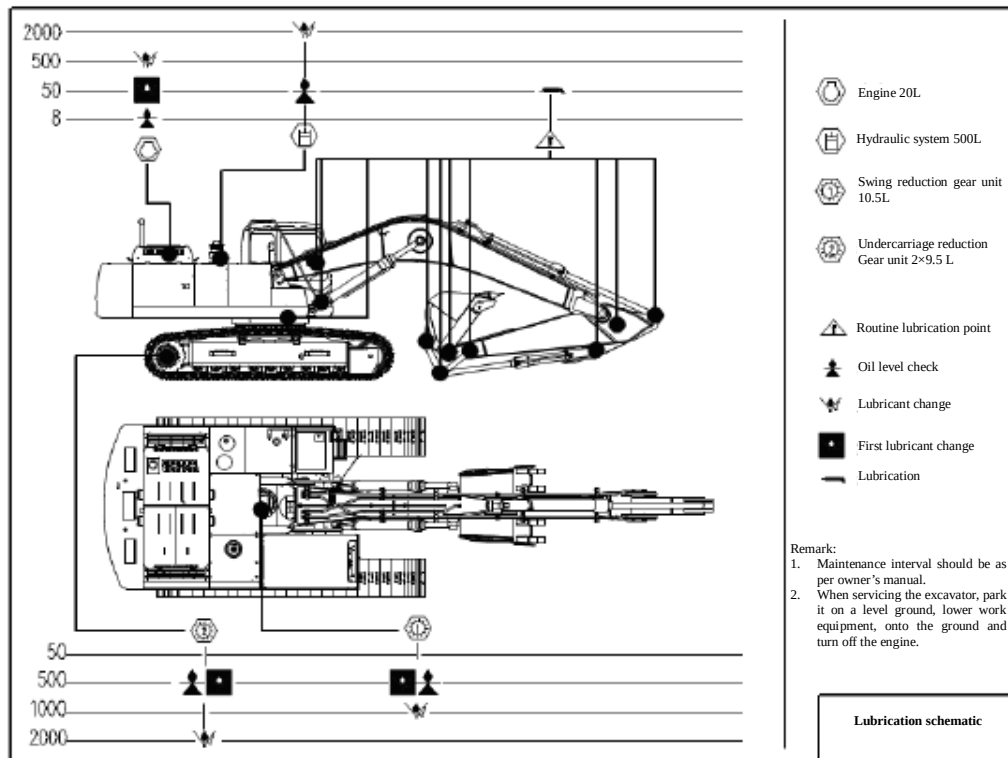
Symbols for lubrication and maintenance chart

The standard symbols for lubrication and maintenance charts, please refer to the tables.

1.  Engine Oil
2.  Hydraulic System
3.  Swing Gear
4.  Travel Gear
5.  General Lubrication Points
6.  Check The Oil Level
7.  Change lubrication
8.  Change Lubrication For The First Time
9.  Lubrication

Lubricant And Maintenance Chart

10h (daily) and 50h, 250h, 500h, 1,000h, 2,000h maintenance



CAUTION: Customer shall assume the liability for any excavator malfunction resulting from use of inferior oils.

Checking, Replacing and Lubricating

Measures	Page
Everyday= Every 10 hours Checking: Check the engine oil level Check the cooler level Drain the water in the separator and tank Battery electrolyte level Hydraulic oil level The fixing bolts of the tracks Alternator belt tension	

Measures	Page
Everyday=Every 50 hours After completing routine maintenance work: Checking: Tension of the tracks Lubricating: Lubrication to the working device	

Measures	Page
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Adjusting: Check and adjust the track tensi	
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Measures	Page
Every 100 hours After completing every day or 50 hours maintenance work: Cleaning: (If necessary) Sediment in the fuel tank	

Measures	Page
Every 250 hours After completing every day or 50, 100, 200 hours maintenance work: Checking: Fan strap tension Swing motor oil lever Travel motor oil lever Lubricating: Lubricating the swing circle	

Every 500 hours After completing every day or 50, 100, 200, 250 hours maintenance work: Checking: Coolant Lubricating the gear of the swing circle Replacing: Engine lubricant and filter Replace the hydraulic suck filter core (1st after using the 250 hours) Cleaning: Radiator, hydraulic oil condenser and condenser fins	
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Measures	Page
Every 1,000 hours After completing every day or 50, 100, 200, 250, 500 hours maintenance work: Replacing: Oil filter Fuel-Water Separator Hydraulic components of pilot filter (1st after using the 250 hours) Oil of the Swing motor (1st after using the 500 hours) Cleaning: Suck filter (Hydraulic tank)	

Measures	Page
Every 2,000 hours After completing every day or 50, 100, 200, 250, 500, 1,000 hours maintenance work: Replacing: The main element of air filter The protection element of air filter Hydraulic oil The oil of travel motor (1st after using the 500 hours) Coolant Cleaning: The vent valve on the hydraulic tank (If necessary)	

*: Filling in the factory

** : High viscosity index or better resistance to water hydraulic oil

***: With EP additives

****: Biodegradable hydraulic oil is made of synthetic resin

ASTM:美国测试与材料学会

SAE:汽车工程师学会

ISO:国际标准化组织

API:美国石油学会

Total: Total volume, including the retained part of the piping and other components

Filling volume: During machinery examination and maintenance, filling the storage tank that it required

Notice:

Please use the SAE 10W-30 and SAE 15W-40 engine oil, start the engine if the ambient temperature is below 0 °C. Please do this even if the temperature reached 10 °C during the day.

Please replace once every 500 hours, if use fuel with a sulfur content of less than 0.5% and not less than the requirement of GB252-94

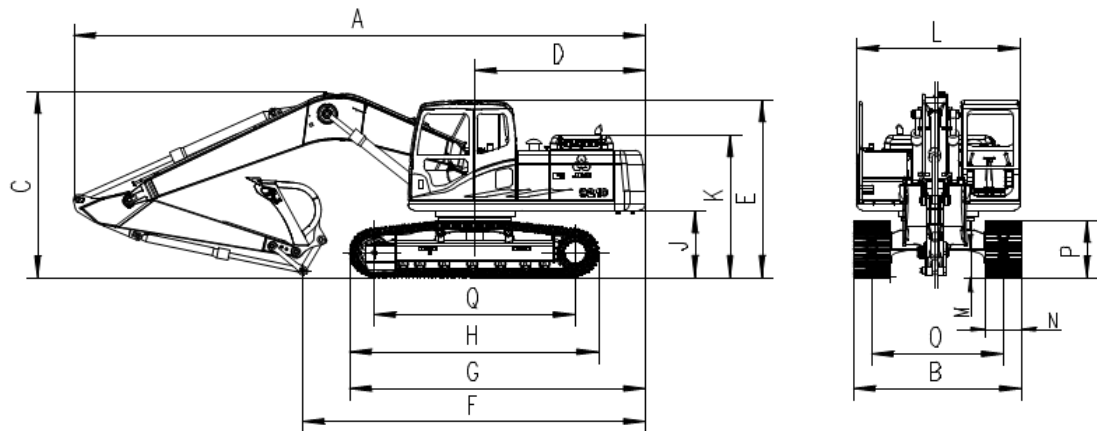
Noise level

Noise level of the cab.

The noise level meet the ISO 6395和98/37/EC, when close the cab door.

The noise level around the machine (see the values shown in the cab at the front windows) according to ISO 6395: 2000/14/EC.

Dimensions

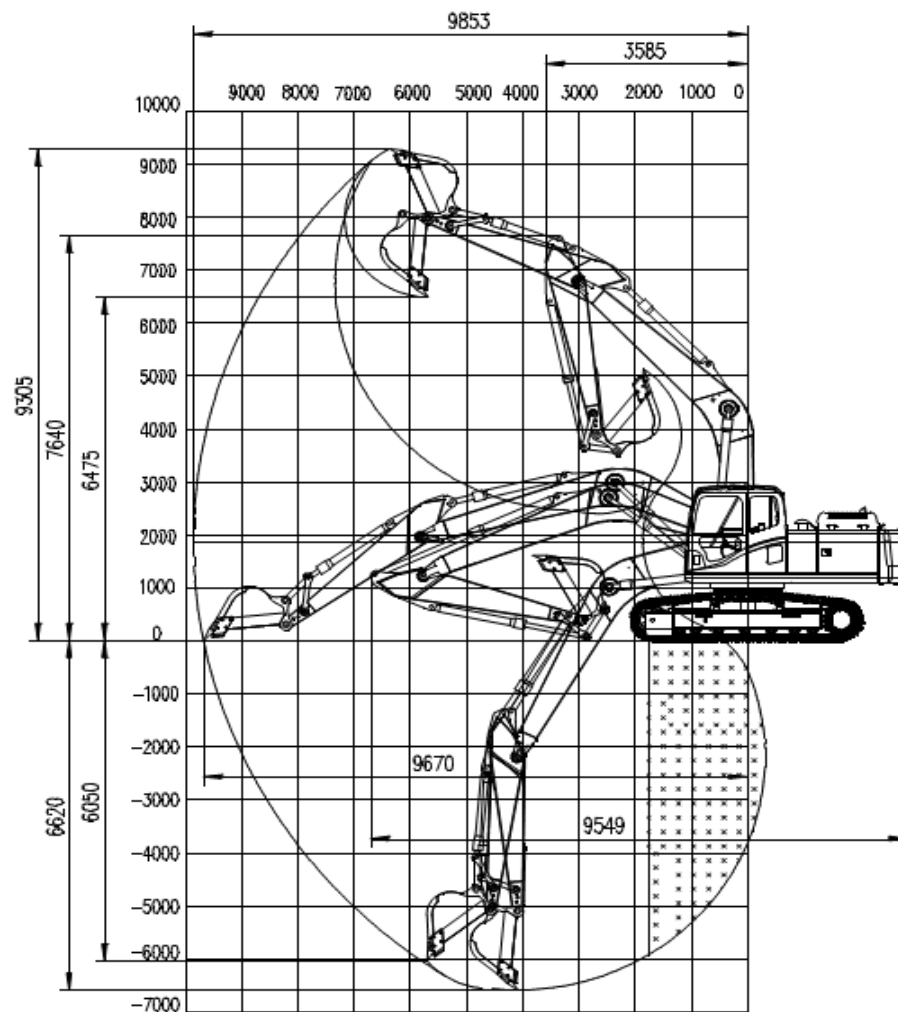


	mm
A	9549
B	2800
C	3073
D	2853
E	2932.5
F	5726
G	4943
H	4160.5
J	1075
K	2348
L	2736
M	468
N	600
O	2200
P	946
Q	3360

Standard equipments and Digging force

Stick lengths	m	2.919
Max. digging depth	m	6.62
Max. digging radius	m	9.853
Max. reaching height	m	9.305
Max. dump height	m	6.475
Digging force of arm cylinder	kN	92.5
Digging force of bucket cylinder	kN	115

Working Ranges



Operating Weight and Ground Pressure

Operating weight includes basic machine (With 5.7m boom, 2.919 arm, and 0.36-1.0m³ bucket)

Track width (mm)	600
Weight (kg)	20500
Ground pressure (KPa)	45

Standard equipments with Boom 5.7m, Arm2.919m and 0.36-1.0m³ bucket.

Warning: Only after getting the permission of our company that the optional or special parts can be install on the machine.