



ZE205E/ZE230E
HYDRAULIC EXCAVATOR
OPERATION MANUAL



First Edition of January 2013

To users

Dear users, thank you for choosing Zoomlion hydraulic excavator. Before using this machine, please read and fully understand this manual and strictly comply with the relevant provisions in it.

This manual gives detailed information on safety instruction, important technical parameters, and safe operation related to hydraulic excavator, aiming at instructing users for safe operation of hydraulic excavator and fully achieving the efficiency of the machine in the operating process. Please keep this operating manual for future reference.

Do not attempt the operation and maintenance of products before you have read and understood the operation manual. If there are any ambiguities or questions, please call your local service engineer, and we will provide you with timely and effective technical support. The company will not be liable for any adverse consequences arising from not following this manual.

The operation manual is an integral and important part of the product, so be sure to transfer this manual to the assignee along with the transfer of the machine. The operating manual is under the protection of intellectual property, so do not copy or use it for other purposes without permission.

Due to the continuous improvement and upgrades of product design as well as difference in the specifications and models of products, the details of some of the pictures and text in this manual may be different from your products. If in doubt, please call the local service engineer.

The Company reserves the right to amend the content of the "Operation Manual" due to technical improvements, the content of the manual is subject to change without notice. Herewith we beg your sincere understanding.

This operation manual is suitable for ZE205E/ZE230E hydraulic excavators.

Thank you for your trust and support to Zoomlion's products, and we sincerely wish you all the best.

Safety Instructions

The manual involves the following safety and warning icons:



Danger

High risk of danger: there is risk of death or heavy injuries



Warning

Middle risk of danger: there is risk of heavy injuries



Attention

Slight risk of danger: there is risk of light injuries or moderate injuries



Caution

Safety sign: there is risk of property loss



Prompt

This icon marks instructions for particular information.



Important

The icon is for showing the importance of particular information.



It shows that this operation does not conform to the safety specification and easily causes death and injuries, so it is forbidden.

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Chapter One: Safety criterion for excavator



Chapter One: Safety criterion for excavator

1.1 Safety signs

1.1.1 Location of safety signs

This machine uses the following warning signs and safety signs (as shown in Figure 1-1, Note: The figures inside the circle are the illustrations corresponding to the figures inside brackets in the "safety signs" text. For example: $\odot \rightarrow (1)$). It is necessary to remind that they should be kept in correct place and always be kept clean to ensure that the signage content can be clearly read. When cleaning the signs, do not use organic solvents or gasoline, otherwise it would peel off the sign. If some of the signs are damaged, lost or can not read normally, they should be replaced timely. See instructions or actual signs for details about the part number of the signs, and make the order from Zoomlion, or Zoomlion dealers.

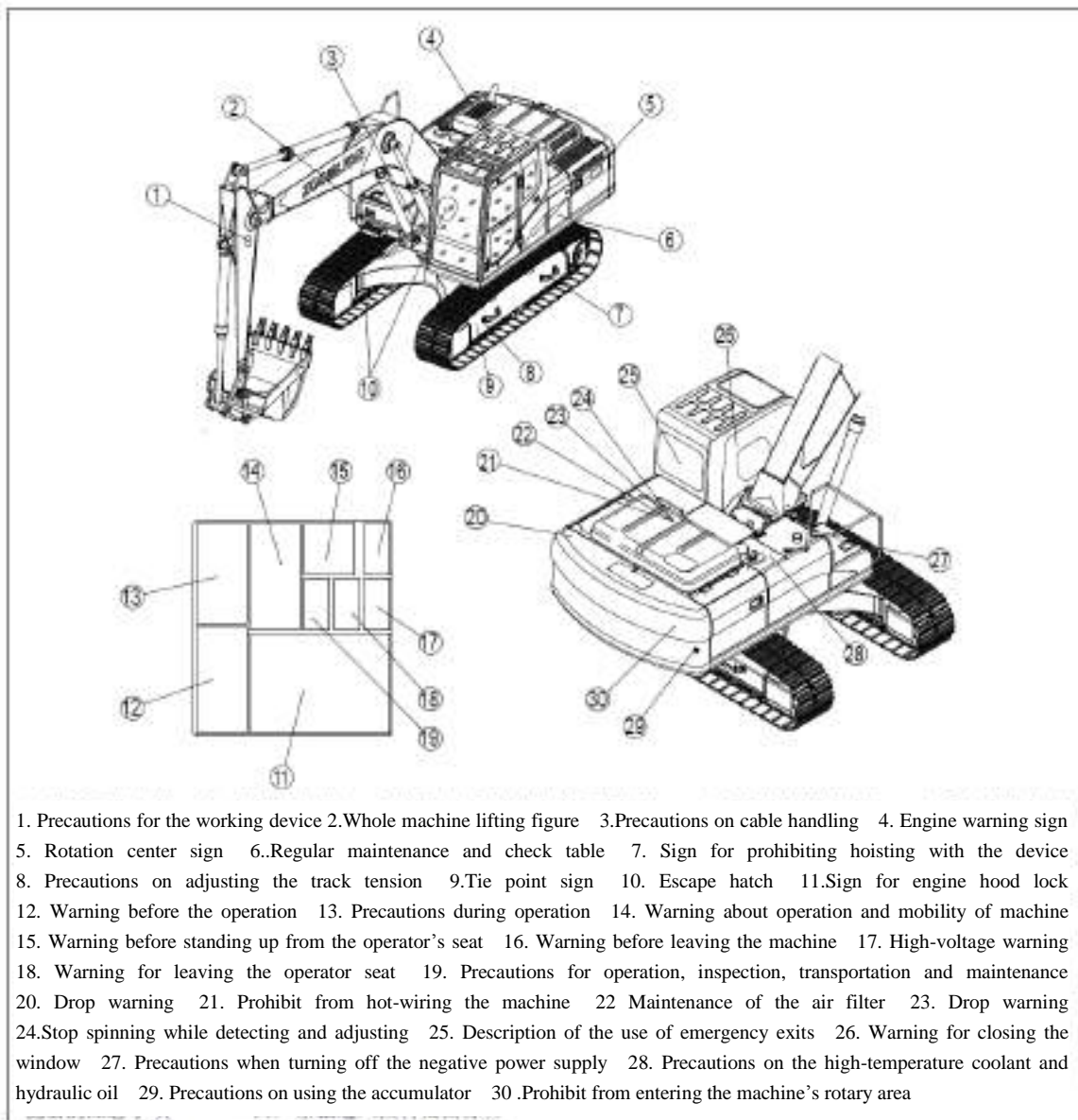


Fig 1-1 Location of safety signs

1.1.2 Safety signs

(1) Precautions about working device, as shown in Figure 1-2.



1. The sign shows the possibility of collision hazard by the working device.

2. Keep away from the machine's working device at a safe distance.



Figure 1-2 Precautions on working device

(2) Whole machine lifting figures, as shown in Figure 1-3.

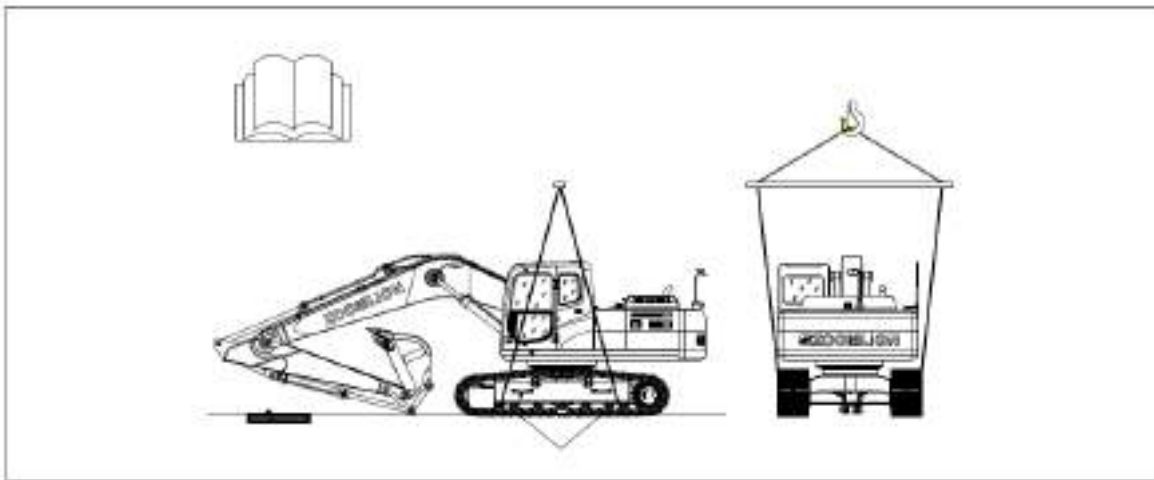


Figure 1-3 Whole machine lifting figure

(3) Precautions on cable handling, as shown in Figure 1-4



1. The sign says that there is a risk of electric shock when handling the cable

2. Please note that read the instructions carefully and handle the cable safely and correctly.

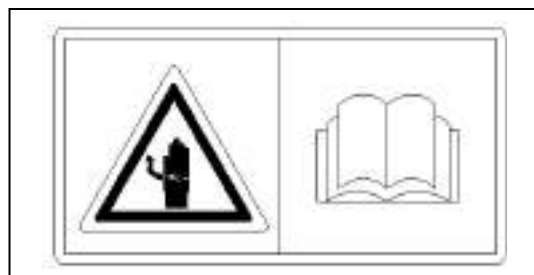


Figure 1-4 Precautions on cable handling

(4). Engine warning sign, as shown in figure 1-5.



This sign indicates to notice that there is a danger to be hurt by the high temperature or the fan blades when the engine was just started or shut down

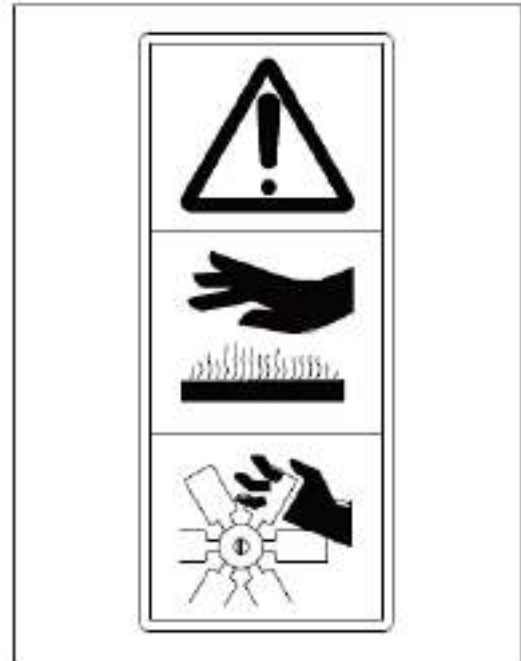


Figure 1-5 Engine warning sign

(5) Rotation center sign, as shown in Figure 1-6.



The sign indicate this is the rotation center of the machine.

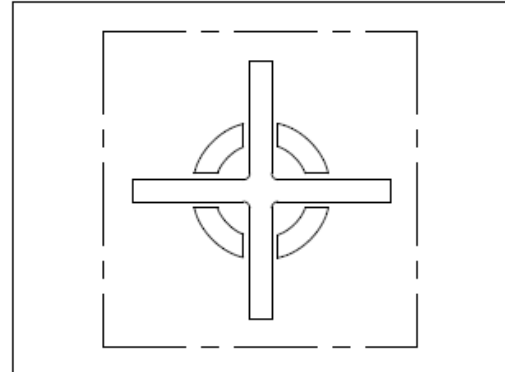


Figure 1-6 Rotation center sign

(6) Regular maintenance and check table, as shown in Figure 1-7.

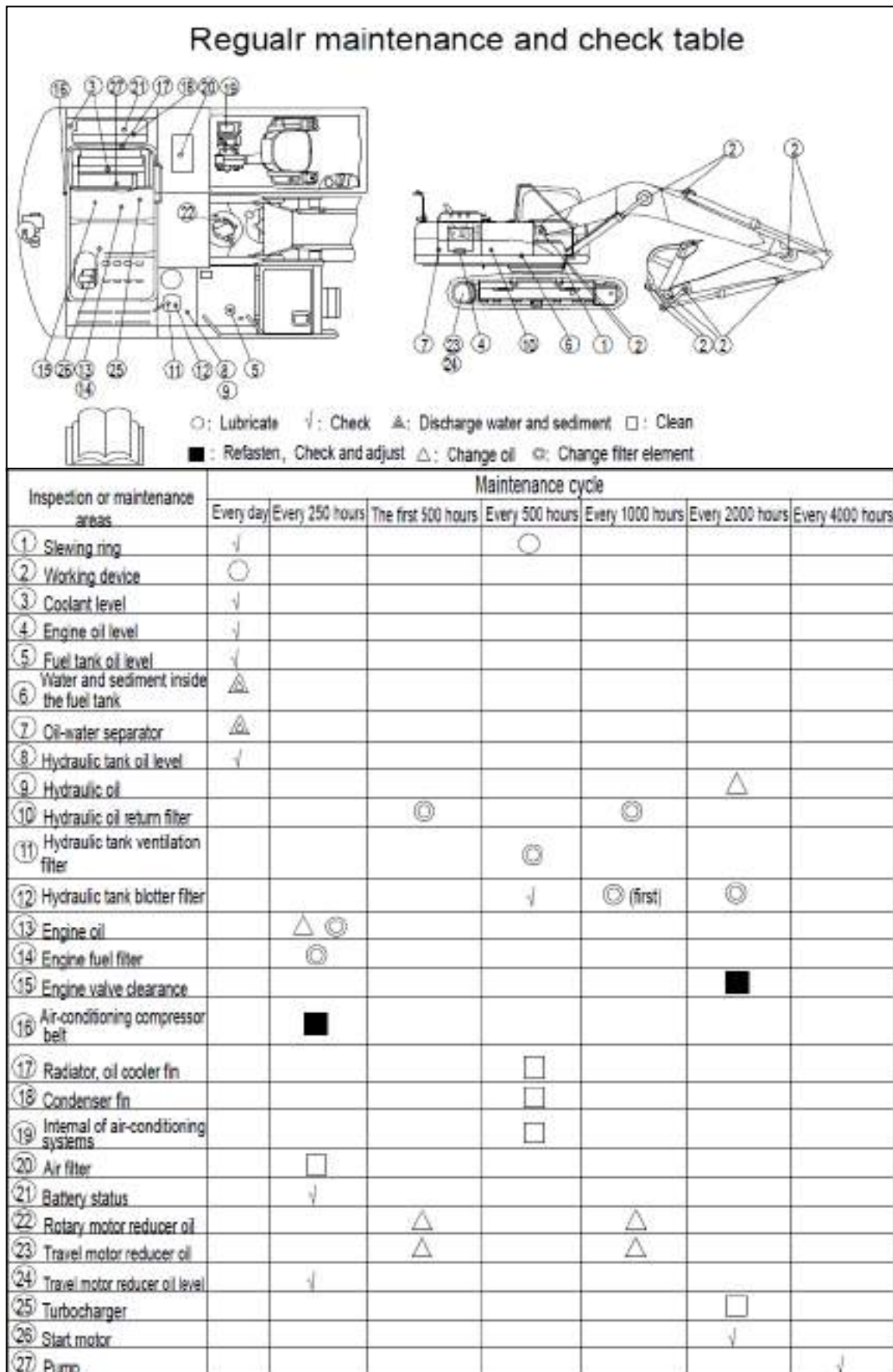


Figure 1-7 Regular maintenance and check table

(7) Sign for prohibiting hoisting with the device, as shown in Figure 1-8.



The sign indicates prohibition for hoisting with this device



Figure 1-8 Sign for prohibiting hoisting with the device

(8) Precautions on adjusting the track tension, as shown in Figure 1-9.



1. The sign says that there is risk of injury if plug flies out from the track tensioner.

2 For safe and proper adjustment of the tracks, please read the instructions.

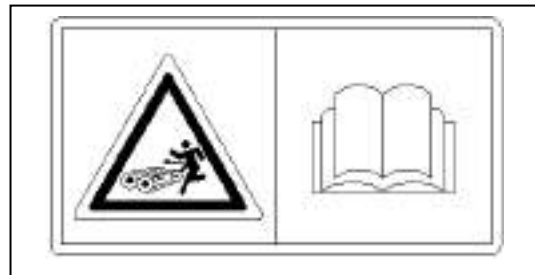


Figure 1-9 Precautions on adjusting the track tension

(9) Tie point sign, as shown in Figure 1-10.



The sign indicates bundle device can be installed here to fix the machine so that the machine is stable and to avoid the machine sway during the transportation

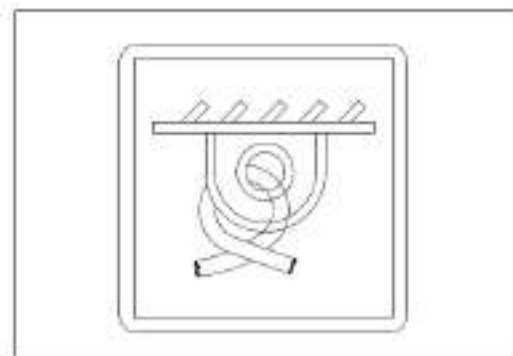


Figure 1-10 Tie point sign

(10) Escape hatch, as shown in Figure 1-11.



The sign indicates to escape along with the direction of the arrow to keep personal safety.

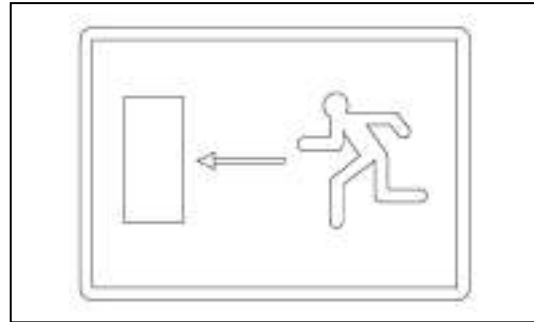


Figure 1-11 Escape hatch

(11) Engine hood lock sign, as shown in Figure 1-12.



1. This sign indicates to lift the handle to make sure the hood was locked firmly after covering the engine hood.

2. Please read the operation manual and maintenance manual carefully and comply with the provisions strictly.

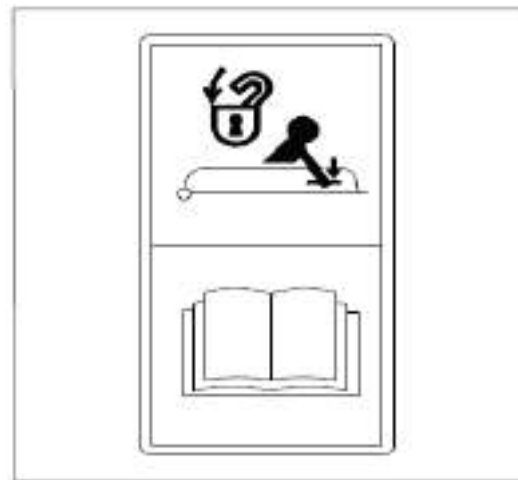


Figure 1-12 Engine hood lock sign

(12) Warning before operation, as shown in Figure 1-13.



1. The signal indicates that please keep in mind the followings before moving or operating machine in case of any heavy injuries or even death.

2. Please blow the horn to notify people nearby.

3. Please make sure that there are no people above, around the machine or in the rotation area of the machine.

4. Please rotate the upper body to ensure the clear vision for driving forward if necessary.

5. Please have surveillance at places of weak vision.

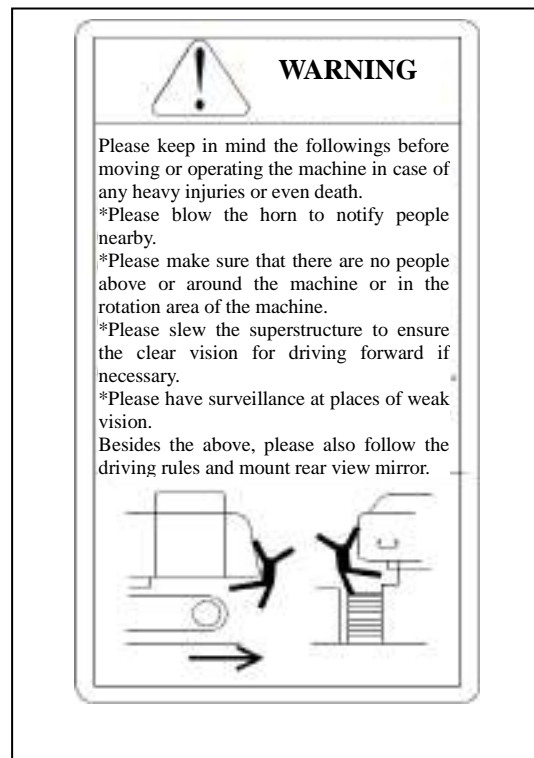


Figure 1-13 Warning before operation

(13) Precautions during operation, as shown in Figure 1-14.



1. The sign indicates that, in order to meet the needs of safety operation, please refer to the instruction about the standard operation and daily maintenance.
2. Please select the working mode that matching the work.
3. Starting and ending of the operation must be in accordance to the instructions, sufficient idle operation is necessary.
4. Raise one side of the body with the upper and lower arms supporting the ground. Do not work under the machine body.
5. When the vehicle is parked inclined, make sure the bucket end is located at the ground, and securely stop the track shoe.
6. Do not install or disassemble the machine with lifting jack theory.
7. Do not hit the machine while operating the boom, arm and bucket.

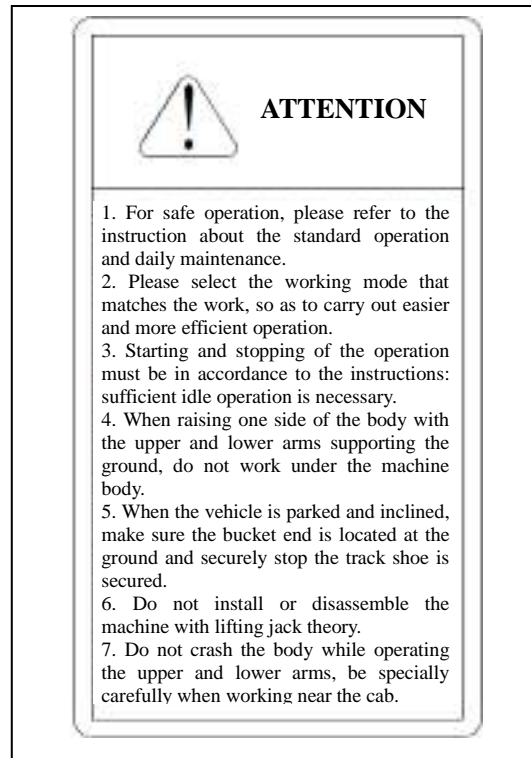


Figure 1-14 Precautions during operation

(14) Warning about operation and mobility of machine, as shown in Figure 1-15.



In order to prevent injuries or deaths caused by operation mistakes, before operating the machine, please confirm the condition of the machine and the displayed operation mode. Pay attention to the surrounding areas while confirming and do the operation slowly.

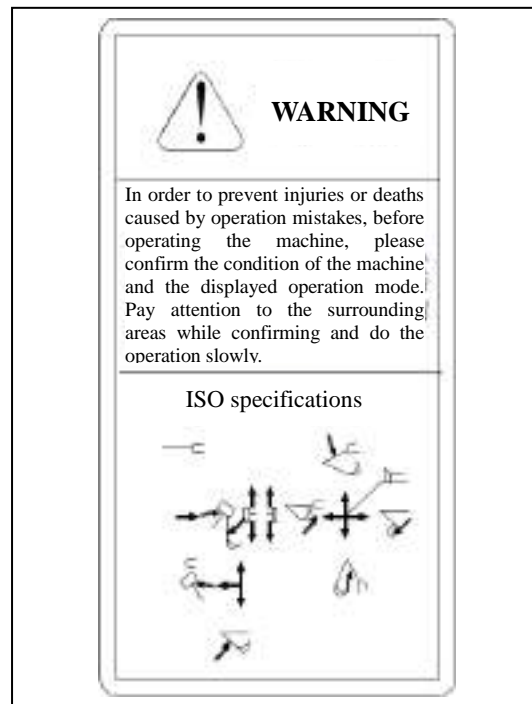


Figure 1-15 Warning about operation and mobility of machine

(15) Warning when you standing up from the operator’s seat, as shown in Figure 1-16.



When you want to stand up from the driver seat or to open or close the front window, or skylight or remove the window, make sure to turn the safety lock to the locked position. Any accidental touch of the operation lever may suddenly start the machinery, which may cause serious safety hazard.

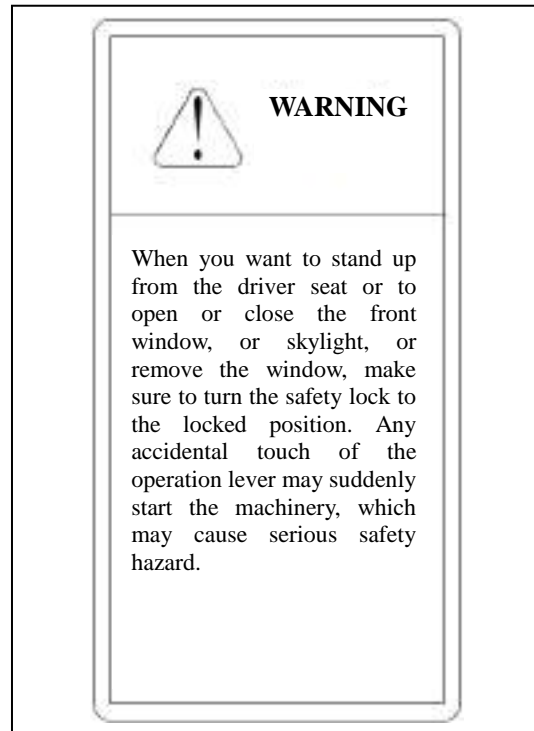


Figure 1-16 Warning when standing up from the operator’s seat

(16) Warning before leaving the machine, as shown in Figure 1-17.



Make sure that the locking lever is locked before leaving the machine

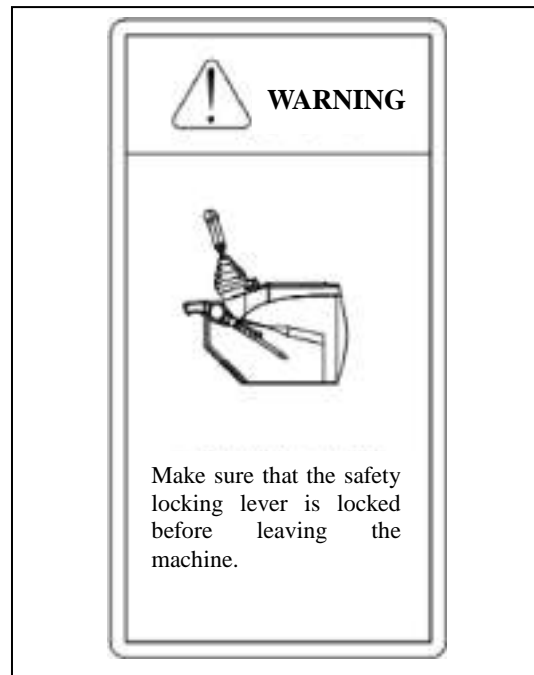


Figure 1-17 Warning before leaving the machine

(17) High-voltage warning, as shown in Figure 1-18.



1. The sign says that there is a risk of electric shock if the machine is too close to the power lines.

2. Keep away from the power line for certain distance.

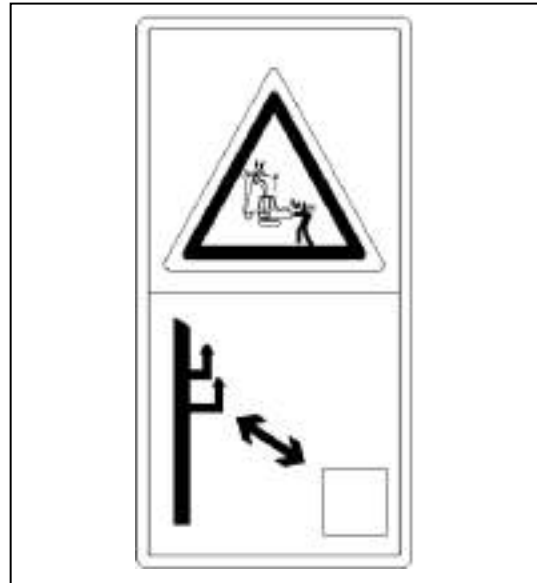


Figure 1-18 High-voltage warning

(18) Warning on leaving the operator seat, as shown in Figure 1-19.



1. The sign says that there is the risk of being clamped or run over by the machine if the machine suddenly moves.

2. Before leaving the machine, lower the working device to the ground, and move the locking lever to the locked position and then remove the engine key.

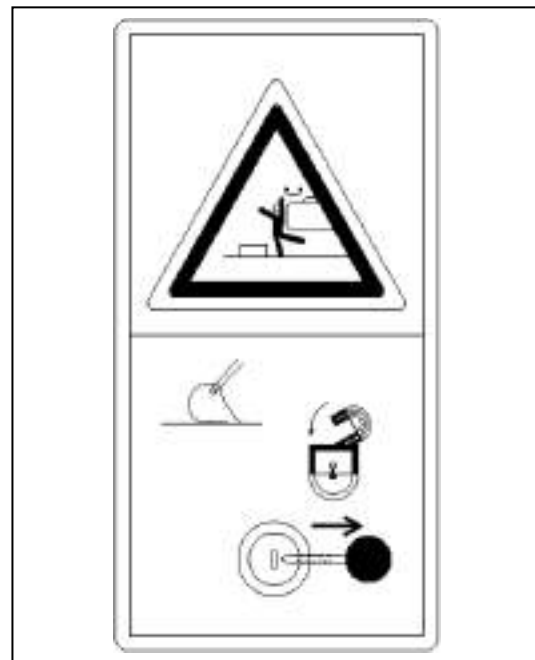


Figure 1-19 Warning on leaving the operator's seat

(19) Precautions for operation, inspection, transportation and maintenance, as shown in Figure 1-20.



1. **Warning**
2. **Read the manual carefully before operation, maintenance, dismantle, assembling and transport.**

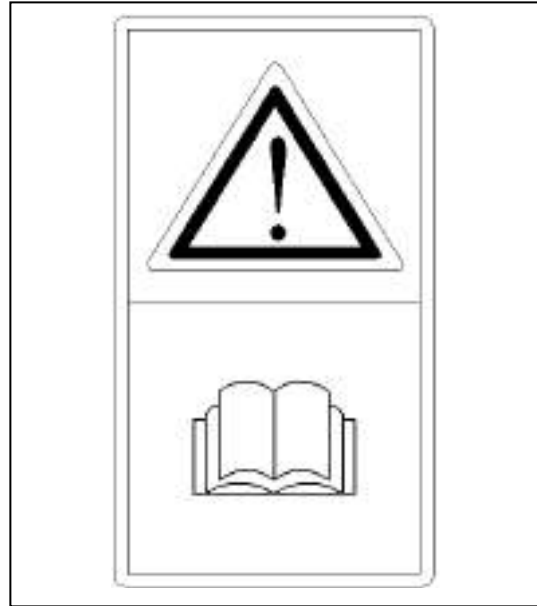


Figure 1-20 Precautions for operation, inspection, transportation and maintenance

(20) Drop warning, as shown in Figure 1-21.



1. **The sign indicates falling danger.**
2. **Keep away from it for a certain distance.**



Figure 1-21 Drop warning

(21).Prohibit from hot-wiring machines, as shown in figure 1-22.



1. **It is allowed to start the engine only when the operator was sitting on the seat.**
2. **Do not start hot-wire the machine, otherwise it will cause serious injuries or fire accidents.**



Figure 1-22 Prohibit from hot-wiring the machine

(22) Sign for Maintenance of the air filter, as shown in Figure 1-23.

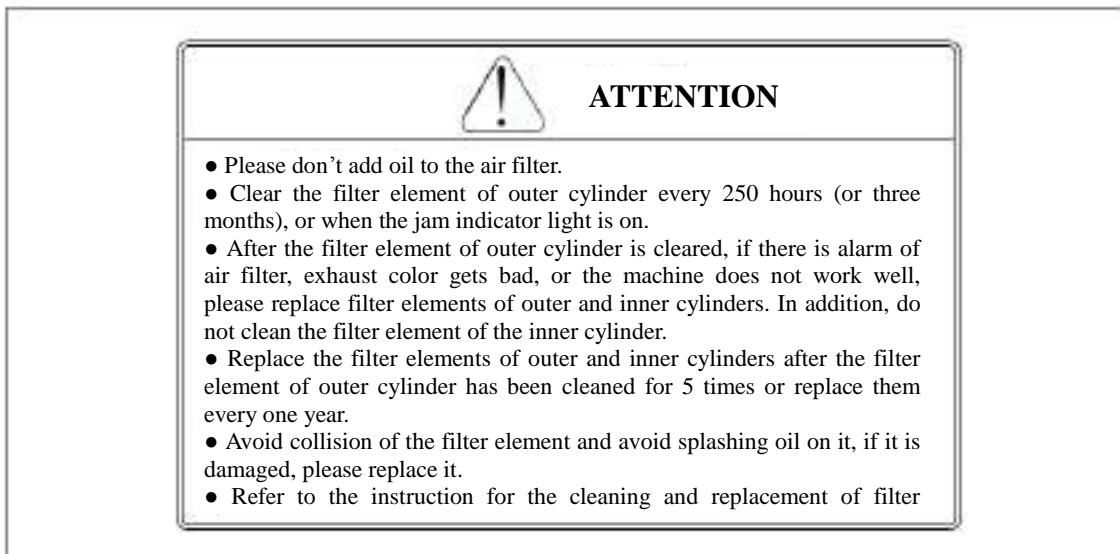


Figure 1-23 Maintenance of the air filter

(23) Drop warning, as shown in Figure 1-24.



1. The sign says that there is falling danger.
2. Don't stand close to this place.



Figure 1-24 Drop warning

(24) Stop spinning while detecting and adjusting, as shown in Figure 1-25.



1. The sign says that there is danger at the slewing parts, such as belts.
2. Contact the machine only when all parts of the machine have been stopped safely.

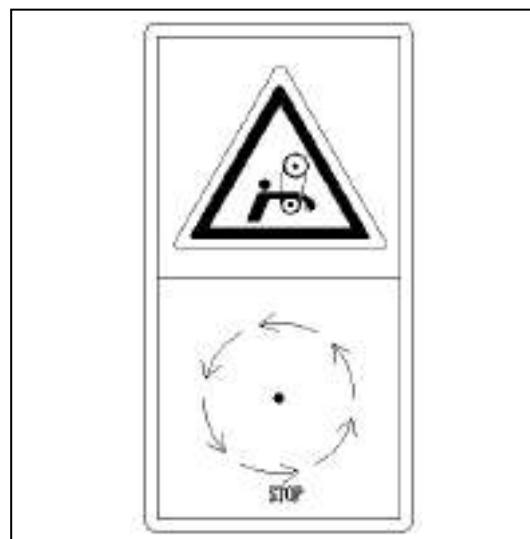


Figure 1-25 Sign for stopping spinning

(25) Description of the use of emergency exits, as shown in Figure 1-26.



The sign indicates to take out the breaker hammer to break glass on the back window and escape from the back window, mind being hurt by the broken glass.

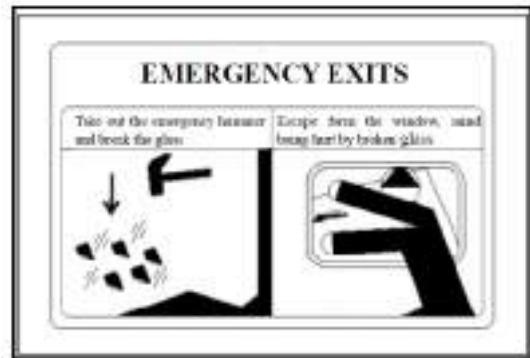


Figure 1-26 Description of the use of emergency exits

(26) Warning for closing the window, as shown in Figure 1-27.



1. The sign shows that the window may fall off.
2. Plug in the safety lock device after the window is lift up.



Figure 1-27 Warning for closing the window

(27) Precautions when cutting off the negative power supply switching, as shown in Figure 1-28.



Please cut off the negative switch when the machine is parked for long time.

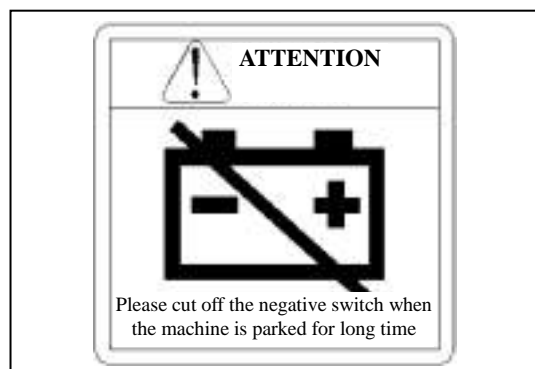


Figure 1-28 Precautions when turning off the negative power supply

(28) Precautions on the high-temperature coolant and hydraulic oil, as shown in Figure 1-29.



Warning

1. It shows the risk of injury by emitted hot oil or hot water when opening the cover of radiator or the hydraulic tank at high temperatures.
2. Let the radiator and hydraulic tank cool down before removing the cover.



Figure 1-29 Precautions on the high-temperature coolant and hydraulic oil

(29) Precautions on using the accumulator, as shown in Figure 1-30.



Attention

1. The sign says that there is a risk of explosion.
2. Drilling, cutting, impact or decomposition are prohibited in the accumulator, keep the accumulator away from open flame.



Figure 1-30 Precautions on using the accumulator

(30) Prohibit from entering the slewing range and away from the machine's slewing area, as shown in Figure 1-31.



Prompt

1. The sign says that there is risk of crashing hazard by machine superstructure.
2. Keep away from the slewing area of the machine at a safe distance.

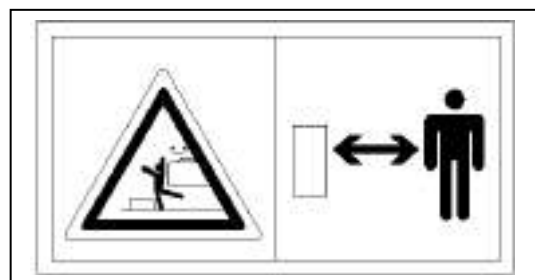


Figure 1-31 Sign for keeping away from the slewing area

1.2 Safety instruction

1.2.1 Basic safety requirements

a) According to the local laws and regulations at the place where the user of the machine is in, the driver should obtain required driver's license or training completion certificate, only after the training and guidance, can the personnel operate the machine.

b) While operating the machine operation comply with all safety rules, precautions, and instructions for use.

c) If the driver is under the influence of alcohol or drugs, his ability of safe operation or repair of the machine will be severely weakened, and he as well as the presence of others will be in danger.

d) When working together with other operators or site traffic control personnel, must make sure everyone understand the hand signals.

1.2.2 Safety at work site

Before you begin operation, a thorough check is necessary for the work area to find any abnormality (Figure 1-32 below):

a) Be careful when working near such combustibile materials as thatched roof, dry leaves or hay to prevent fire disasters.

b) Check the terrain and conditions of the working ground, and determine the safest method of operation. Do not operate at places where there are landslides or rock fall hazards.

c) If there are buried pipes, trachea, or high-voltage wires at the workplace under the ground of the work site, please contact the utility companies and map their location, so as not to damage any pipeline.

d) Adopt the necessary measures to prevent any unauthorized access to the work area.

e) Before traveling or operating in shallow water or soft ground, right before the operation, please check the type and circumstances of the bedrock as well as the water depth and flow rate.

1.2.3 Safety at work

If any abnormalities (noise, vibration, odor, incorrect instrument display, tobacco, oil leaks, or any unusual display of the alarm device or instrument) are found during operation, you should report to the personnel in charge and take the necessary measures. Do not operate the machine until the failure is removed.

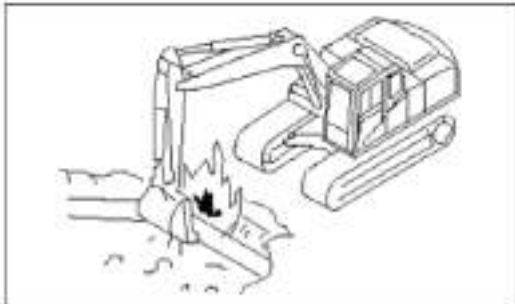


Figure 1-32 Pay attention to safety at work site

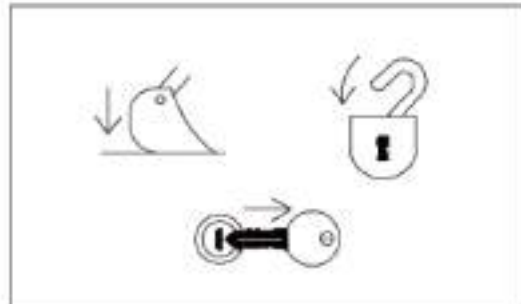


Figure 1-33 Lock signs

1.2.4 Safety operation after work

a) When the operator wants to stand up from the seat to open or close the window, remove or install the bottom window, or adjust the seat, completely lower the working device down to the ground and lock the locking lever before turning off the engine. If you accidentally touch the unlocked lever, the machine will suddenly move, which may cause serious injury or damage to the machine.

b) When leaving the machine, be sure to completely lower the working device down to the ground and lock the locking lever before turning off the engine. Lock all equipments, remove the key and put it on the specified location, as shown in Figure 1-33.

1.2.5 Keep the machine clean

a) If water enters the electrical system, it may result in failure or malfunction. Do not use water or steam to flush the electrical system (sensors and connectors, etc.).

b) If inspection and maintenance is done when there is mud or greasy dirt on the machine, there will be risk of slipping, or dirt may enter the eyes. Therefore, the machine should always be kept clean, as shown in Figure 1-34.

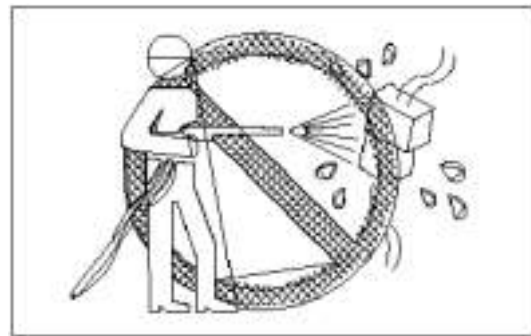


Figure 1-34 Keep the machine clean

1.2.6 Keep the cab clean

a) When entering the cab, be sure to remove the mud and oil on the soles. Pedal operation with mud or oil sticking under the soles may lead to serious accidents due to foot slipping.

b) Do not leave any parts or tools around the cab.

c) Do not stick the suction pad to the glass. Suction pad works as a magnifying glass, which may cause a fire disaster.

d) Do not use mobile phones in the cab while driving or operating the machine.

e) Do not put dangerous goods such as flammable and explosive materials into the cab.

1.2.7 Avoid scalding injury

1.2.7.1 Hot cooling liquid

When checking or discharging the coolant, operation should not be started until water cools down to the temperature that the radiator cap can be touched with hands in order to prevent burns caused by the spray of hot water or steam. Even if the coolant has cooled down, pay attention to release the cover slowly before removing the radiator cap, so as to discharge the internal pressure of the radiator.

1.2.7.2 Hot oil

When checking or discharging the oil, operation should not be started until the oil cools down to the temperature that the cap or screw plug can be touched with hands to prevent burns caused by the spray of oil or hot parts. Even if the oil has cooled, please pay attention to release the cover or plug slowly before

removing them, so as to drain the pressure inside.

1.2.8 Fire and explosion

1.2.8.1 The prevention of fire caused by fuel or oil

Fuel, oil, antifreeze and window washing liquid are all flammable and dangerous. To prevent fire, be sure to comply with the following provisions:

a) Do not smoke or use any open flame near fuel or oil (as shown in Figure 1-35).

b) Turn off the engine before refueling.

c) Do not leave the machine when adding fuel and oil.

d) Tighten the fuel and oil tank cap firmly.

e) Do not let fuel overflow to the overheating surface or parts of electrical system.

f) Refuel or store the oil in a well-ventilated place.

g) Oil or fuel should be stored in designated places, when people are not permitted in without permission.

h) Wipe spilled fuel or oil after fuel or oil is added.

i) When grinding or welding operations are carried out on the lower part of machine, all combustible materials should be moved to a safe place before work starts.

j) Oil used to wash the parts should be non-flammable oil. Diesel and petrol ignite easily, so do not use them.

k) Put oil-stained cloth or other combustible materials into a safe container to ensure a safe workplace.

l) Do not solder or cut the piping which contains flammable liquids.



Figure 1-35 Fireproof and anti-explosion signs

1.2.8.2 Prevention of fires caused by piles of combustible materials

Remove the dried leaves, wood chips, paper, dust and other combustibles that are piled up or stick to the engine, exhaust manifold, muffler, around the battery or interior of the hood.

1.2.8.3 Prevention of fires caused by the electric wire

Short-circuit of the electrical system can cause a fire, thus it is required to:

a) Keep the wire connectors clean and firmly fixed.

b) Check daily whether the wires are loose or damaged, tighten the loose connectors or wire clamps, repair or replace the damaged wires.

1.2.8.4 Prevention of fires caused by hydraulic pipelines

Check whether all clamps, shield and cushion of the hose and tube are firmly in place.

In case there is a loose part, it will vibrate and rub against other parts during the operation, causing damage to hose and spraying of high pressure oil, which may result in fire hazards or serious injury.

1.2.8.5 Prevention of explosion caused by the lighting

a) Use explosion-proof performance lighting while checking the fuel, oil, battery electrolyte, window washing fluid or coolant, otherwise, there will be risk of serious injury caused by an explosion .

b) When using the power of the machine is used for lighting, follow the provisions of this manual.

1.2.8.6 Accumulator

1.2.8.6.1 Precautions for operating accumulator

The accumulator is filled with high pressure nitrogen, so careless operation may cause explosion, resulting in serious injury or damage. Therefore, operators must observe the following precautions (see Figure 1-36):

- a) Can not disassemble the accumulator.
- b) Do not place accumulator near the fire source or expose it to the flame.
- c) Do not drill or weld the accumulator or use soldering set on it.
- d) Do not hit or roll the accumulator; prohibit the accumulator from being impacted in any way.



Figure 1-36 Prohibited operation of the accumulator

e) The accumulator must be deflated before disposing of.

1.2.8.6.2 Pressure relief steps for control pipelines of machine equipped with accumulator

- a) Lower the working device to the ground, and then turn off the breaker or other accessories.
- b) Turn off the engine.
- c) Turn the starter switch key to the ON position, so that the current flows in the circuit.
- d) Put the safety locking lever to the free position, and then fully operate the control lever to the front, rear, left and right position and the accessories control pedal to release the pressure in the control pipeline.
- e) Put the safety locking lever to the locked position to lock the control lever and accessories control pedal.

1.2.8.7 Batteries

1.2.8.7.1 Battery installation and removal

Battery installation and removal should be done according to the following:

- a) When installing or removing the battery, be sure to confirm the positive terminal (+) and the negative terminal (-) first.

b). Battery self-discharge is caused by the dirt around the terminals. Polish the terminal with sandpaper to remove the dirt, and coat it with a thin layer of lubricant before installation.

c). For installation, the first step is to install the positive (+) terminal. Please be particularly careful for there will be risk of sparking if tool touches the positive terminal and the rack, finally connect the grounding terminal. Check if the battery is loose after being installed in place. If movable, it should be reinstalled.

d) The battery should be removed as reverse sequence as installation, viz. to remove the battery, start with removing the ground side (negative (-) terminal) (see Figure 1-37).

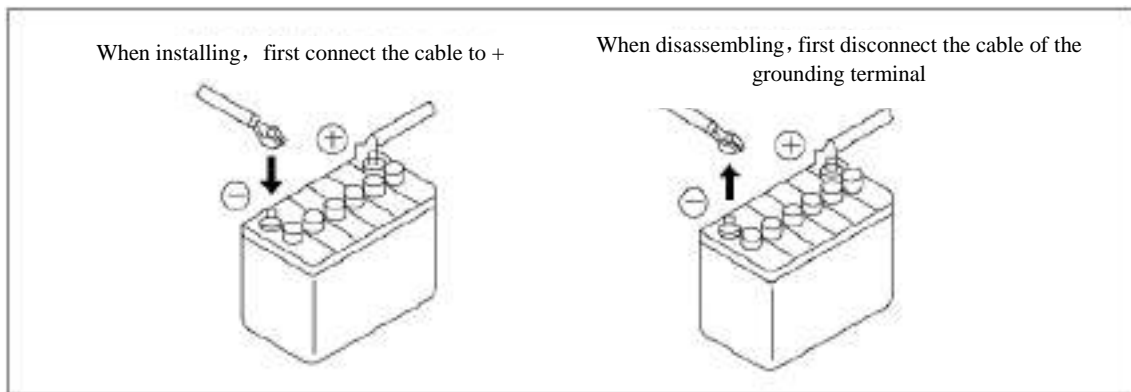


Figure 1-37 Precautions for removing and installing batteries

e) Clip the battery firmly with battery clips while replacing.

f). Tightening torque for installing the battery is 9.8 ~ 14.7 N • m.

1.2.8.7.2 Battery charge

When the battery is charging, wrong operation may cause the risk of battery explosion (Figure 1-38). Therefore, the charge of battery must follow the instructions in the “Common Faults and Solutions” and instruction manual along with the charger, besides, please observe the following precautions:



Figure 1-38 Risk of battery explosion

a) Adjust the voltage of the charger to a match the voltage of the rechargeable battery. If the voltage selected is not correct, the charger may overheat and cause an explosion.

b) Connect the positive (+) clamp of the charger to the positive (+) terminal of the battery. And then connect the negative (-) clamp of the charger to the negative (-) terminal of the battery. Make sure that the clamps are fixed.

c) Adjust the charge current to 1/10 of the rated battery capacity, for fast charge, the charge current should be lower than the rated battery capacity. If the charging current is too high, the electrolyte will leak or evaporate and the battery will catch fire or explode.

d) If the battery electrolyte is frozen, do not charge the battery or start the engine with different power supply. Otherwise, the operation will light the battery electrolyte and cause battery explosion.

e) If the battery electrolyte level is below the lowest line, do not use the battery or charge the battery, because this will cause an explosion. Check the battery electrolyte level regularly and add distilled water to keep the electrolyte level at the upper line.

1.2.8.7.3 Prevention of danger caused by the battery



Figure 1-39 Precautions for using the battery

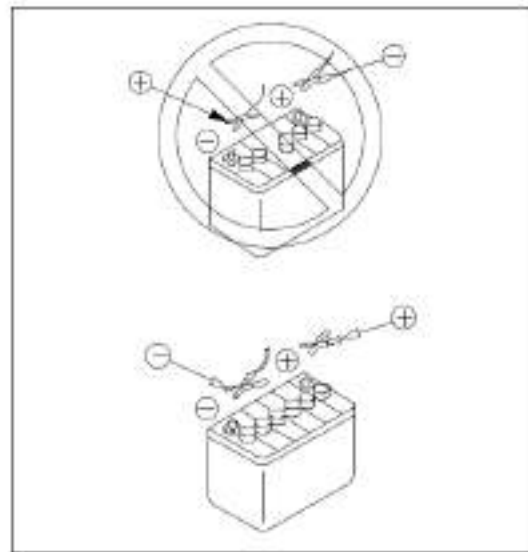


Figure 1-40 Precautions for removing the battery

As the battery electrolyte contains sulfuric acid and produces flammable and explosive hydrogen, any wrong operation may result in serious injury or fire disaster. So be sure to observe the following precautions (as shown in Figure 1-39):

- a) While handling the battery, wear safety goggles and rubber gloves.
- b) Smoking or open flame are not allowed near the battery.
- c) If sulfuric acid splashes to clothes or skin, immediately flush with plenty of water.
- d) If the sulfuric acid enters into the eyes, rinse immediately with plenty of water and seek medical care immediately.
- e) Before operating the battery, starter key must be switched to OFF position.

Because of the danger of sparks, please do according to the following steps (as shown in Figure 1-40):

- a) Do not let tools or other metal objects in contact between the battery terminals, do not drop any tools or other metal objects near the battery.
- b) When removing the battery, you should first disconnect the negative (-) terminal (grounding terminal); When the battery is installed, it is necessary to first connect the positive (+) terminal, and connect the grounding terminal lastly. Battery terminals should be firmly fixed.

- c) The charging of the battery produces flammable hydrogen gas, so you should remove the battery from the lower part of the machine before charging, and put it into a well-ventilated place and remove the battery cover.
- d) Firmly tighten the battery cover.
- e) The battery should be firmly mounted to the determined position.

1.2.9 Actions taken in the event of a fire disaster

Once a fire disaster takes place, obey the following requirements and immediately leave the machine:

- a) Turn the starter switch to OFF position to turn off the engine.
- b) Use handrails and ladder for self-help to leave the machine.

1.2.10 Prevention of falling objects, flying objects, and the invader

At such dangerous workplace where falling objects, flying objects and the invaders may hit or enter into the dangerous workplace of the cab, consider the operating conditions and install the necessary shield to protect the operator (as shown in Figure 1-41).

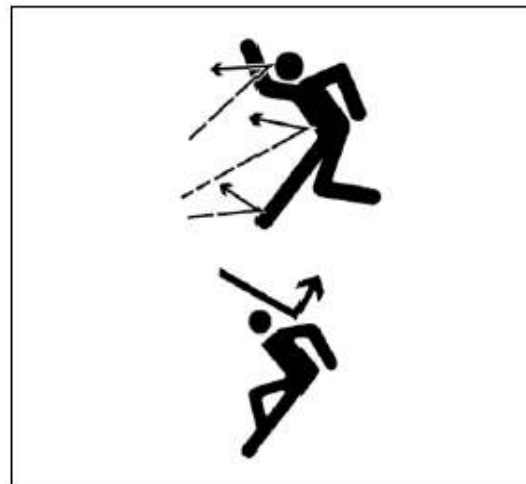


Figure 1-41Prevention of falling objects, flying objects, and the invaders

- a) When conducting demolition or crushing operations, mount front cover should be equipped, and paste cellophane on the front glass.
- b) While the machine is operating in the mine or quarry with rockfall danger, you should install FOPS (Falling Object Protections) and the front shield, and paste transparent cellophane at the front glass.
- c) When conducting the above operations, the front windows should be closed. In addition, ensure that other personnel are outside the litter danger zone, and keep an appropriate safe distance.

The above-mentioned is the typical operating conditions, and other guards may also be needed to install according to the actual operating conditions of the construction site. Please contact Zoomlion or Zoomlion dealer in advance.

1.2.11 Keep away from the high-voltage cable

Do not drive or operate the machine in the vicinity of cables, otherwise it is easily to encounter an electric shock, which may result in serious injuries or accidents (see Figure 1-42). Comply with the following regulations when the workplace may be close to cables:

- a) Before starting work in the vicinity of cables, you should notify the local power company about the operations to be carried out and request them to take necessary measures.
- b) The operator may also encounter electric shocks even if he does not come close to the high voltage cable and suffer from serious burns or even death, so a safe distance must be maintained between the machine and the cable (see Table 1-1). Check the measures taken for safe operation with the local power company before operating the machine.

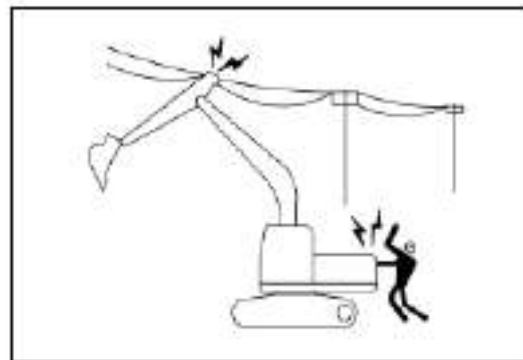


Figure 1-42 Keep away from high-voltage cable

- c) In order to be prepared for accidents that may occur, wear rubber boots and rubber gloves. Cap the seats with a layer of rubber pad and pay attention not to let your exposed parts of your body touch the lower part of the machine body.
- d) If the machine and the cable are too close, you should have a signalman send a warning.
- e) When operating in the vicinity of high-voltage cable, do not let anyone get close to the machine.
- f) If the machine and the cable are too close or if the machine touches the cable, in order to prevent electric shock, operator should not leave the cab, so as to prevent electric shock.

Table 1-1 The shortest safety distance from high and low voltage

Voltage category	Voltage V	Minimum safety distance m
Low-voltage	100, 200	2
	6,600	2
Extra high-voltage	22,000	3
	66,000	4
	154,000	5
	187,000	6
	275,000	7
	500,000	11

1.2.12 Ensure a good vision

To ensure safe operation or traveling, you have to check whether there are people or obstacles in surrounding area of the machine and check the conditions of the workplace. Besides, obey the following requirements:

- a) Open the work lights and headlights mounted on the machine while operating in dark places; set auxiliary lighting in the working area if necessary.
- b) In case of poor vision, such as in condition of fog, snow, rain or dust, the operation should be

stopped.

1.2.13 Ventilation of the closed region

If you have to start the engine, dispose of fuel or clean oil or paint in a closed area, open the doors and windows to ensure ventilation,so as to prevent gas poisoning.

1.2.14 Signals and gestures of signalman

- a) Set a flag on road shoulder or soft ground. In case the vision is not good, arrange a signalman if necessary. The operator should pay particular attention to the signs and obey the command of the signalman.
- b) Signals should be sent only by one signalman.
- c) Before operation, ensure that all workers understand all the signals and gestures.

1.2.15 Prevention of asbestos dust hazard

Inhalation of asbestos dust in the air may cause lung cancer. There is danger of inhaling asbestos when operators are engaged in the operation of demolition or handling industrial waste in the workplace, (see Figure 1-43), so be sure to observe the following rules:



Figure 1-43 Risk of inhaling asbestos

- a) For cleaning, spray some water for suppressing dust, and do not clean with the compressor air.
- b) If the air contains asbestos dust, operation of the machines must be done in windward side and all personnel should use qualified dust masks.
- c) During operation, do not allow other persons to get close.
- d) Comply with rules, regulations and environmental standards of the workplace.

The parts of this machine use no asbestos, but the counterfeit parts may contain asbestos, so be sure to use standard Zoomlion parts.

1.2.16 Safety rules for hydraulic oil

There is always pressure in the hydraulic system. When checking or replacing the pipes or hoses, be sure to check whether the pressure within the hydraulic circuit has been released. If the oil is still under pressure, it can cause serious injuries or damages, so be sure to obey the following regulations:



Figure 1-44 Danger of being injured by hydraulic oil

- a) Do not carry out check or replacement when there is pressure in the hydraulic system.
- b) If there is any leakage at the pipe or hose or the

surrounding area is wet, you have to check there is pipe or hose crack or hose expansion. You have to wear goggles and leather gloves when doing the checks (see Figure 1-44).

c) High pressure oil leaked from the holes will penetrate into the skin, and if it contacts with eyes, one may go blind. If skin or eyes are injured by the high-pressure oil flow, use a lot of clean water to rinse and seek medical care immediately.

1.2.17 Safe operation of the high pressure hose

If the high pressure hoses leak oil, fire disaster or operation failure will occur, which may result in serious injury or damage. If any bolts are found loose, operators should stop operation and tighten the bolts to the specified torque. If any damages are found in the hose, immediately stop operation and contact Zoomlion or Zoomlion dealer.

If you find the following questions, please replace the hose.

- a) The hydraulic fittings are damaged or leaks.
- b) Cladding is frayed or disconnected, or wire of strengthening layer is exposed.
- c) Expansion appears at some parts of cladding.
- d) The movable part is distorted or crushed.
- e) There are impurities in cladding.

1.3 Unauthorized modification

Modification without Zoomlion’s permit would be dangerous. Before modification, you should contact Zoomlion or Zoomlion dealers. The Zoomlion will not be liable for any injuries, accidents or product failures caused by unauthorized modifications.

1.4 Safety tool

1.4.1 Work clothes and labor protection appliances

- a) Do not wear loose clothes and jewelry, for they may snag on the levers or other protruding parts.
- b) Long hair falling out from helmet may be wrapped into the machine, so long hair should be tied to avoid danger.
- c) Always wear a helmet and safety shoes (Figure 1-45). In the operation or maintenance of the machine, the operators should wear safety goggles, face shields, gloves, ear plugs and belts if required.

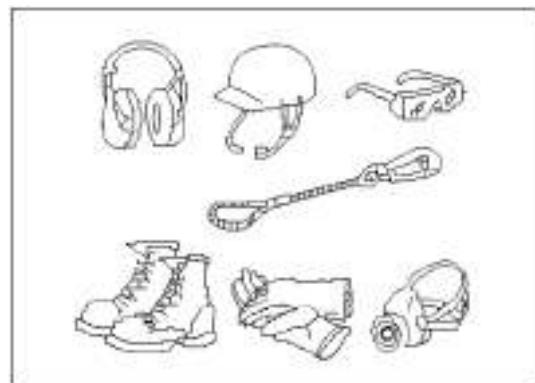


Figure 1-45 Work clothes and protective devices

- d) Check whether all protective devices are working properly before use.

1.4.2 Fire extinguisher

The following precautions must be observed in the event of injury or fire disaster (see Figure 1-46):

- a) Ensure that a fire extinguisher is ready for use and there are labels showing how to use the in case of emergency.
- b) Carry out regular inspection and maintenance to ensure that fire extinguishers can be used at any time.
- c) Make record of emergency contact numbers of the operator.



Figure 1-46 Fire extinguishers

1.4.3 Handrails and pedals

In order to prevent personal injury resulting from slipping or falling from the machine, please obey the following requirements:

- a) When getting on or off the machine, please use the handrails, stairs and track shoe support marked by the arrows in Figure 1-47.
- b) To ensure safety, you should face the machine and maintain the three points (two feet and a hand or two hands and one foot) on the handrails and the pedal (including crawler board), so as to support the body, as shown in Figure 1-48.
- c) When getting on and off the machine, do not grip the lever.
- d) Do not climb to the hood or lid without anti-skid pad on it.
- e) Check the handrails and pedals (including track shoe) before getting on and off the machine. If there is any oil, grease or mud on the handrails or pedal (including track shoe), they should be immediately wiped off to keep these parts clean. If damaged, these parts should be repaired and loose bolts should be tightened.
- f) Do not ascend or descend the machine with tools in hands.

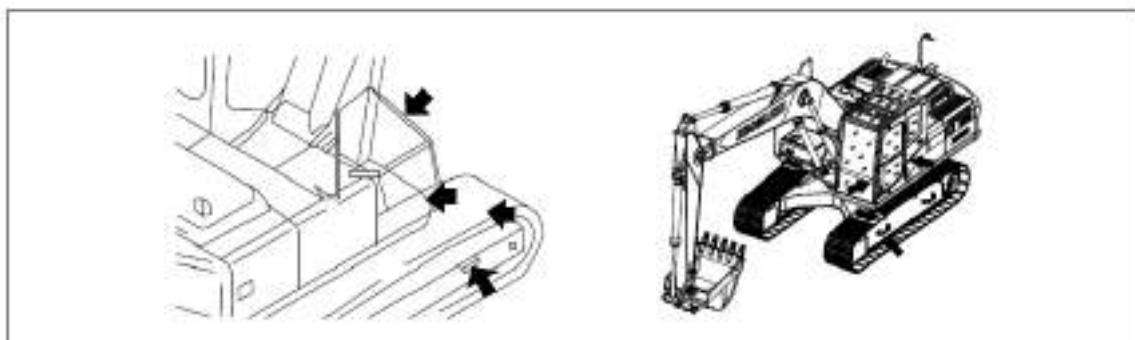


Figure 1-47 Support parts marked by arrows

1.4.4 Cab emergency exit

If for some reason, the cab door can not be opened, you can open the rear window and use it as an

emergency exits.

Escape by the following steps (as shown in Figure 1-49):

1. Break the glass of the rear window with the hammer (1) hanging in upper right of the back of the cab.
2. Climb out from the rear window.



The rear window should not be broken unless it is used as an emergency exit.. After smashing the glass, you should contact Zoomlion or Zoomlion dealer to replace the cracked glass as soon as possible.



Figure 1-48 Handrails and pedals

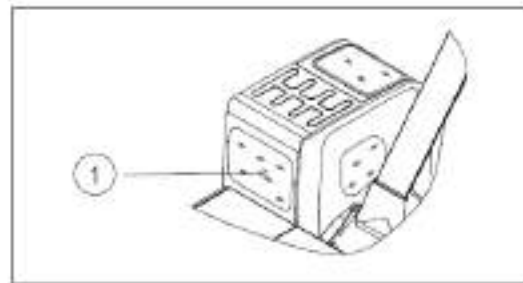


Figure 1-49 Emergency exits and escape tools



ZE205E/ZE230E HYDRAULIC EXCAVATOR
OPERATION MANUAL

Chapter Two: Product overview



Chapter Two: Product overview

2.1 Introduction

Zoomlion hydraulic excavators mainly serve the purpose of digging, leveling, trenching, loading and demolition operations, and the specific scope of operations is as follows:

2.1.1 Use of excavator

(1) Digging operation

Backhoe is suitable for digging at a position lower than the machine.

When the machine is in the state shown in Figure 2-1, that is, the maximum digging force of each cylinder is achieved when the bucket cylinder and bucket as well as bucket arm cylinder and bucket arm are of an angle of 90. Efficient use of digging at this angle optimizes work efficiency. Excavation scope is from 45 °angle away from the machine to 30 °angle towards the machine. Digging depth may be different, but try to operate within the above range rather than fully extend the cylinder.

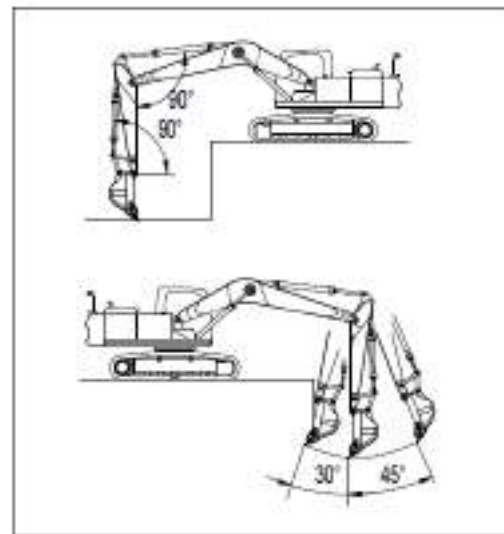


Figure 2-1 digging operation

(2) Trenching operation

Install a bucket that is suitable for the trench and then adjust the crawler to a position parallel to the trench to begin trenching operation, as shown in Figure 2-2.

When digging a wide trench, dig from both sides and then the central part.

(3) Loading operations

At places where the rotation angle is small, park the dump truck in the place that is easy to see by the operator can operate for more effective operation. Loading from the rear of the dump truck is more convenient than that from the both sides, and is of larger loading capacity. The loading operation is shown in Figure 2-3.

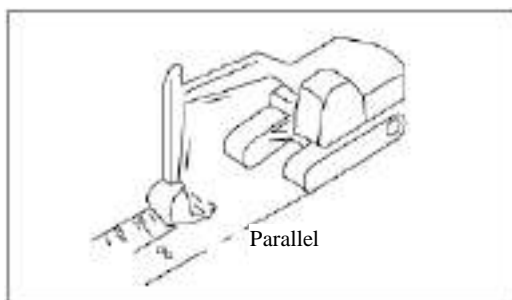


Figure 2-2 Trenching operation

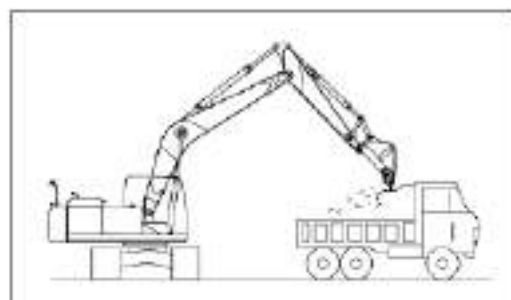


Figure 2-3 Loading operation

In addition to the above-mentioned uses, more can be achieved through the use of a variety of

accessories and optional parts.

2.1.2 The direction of the excavator

The front, back, left and right directions mentioned in this manual (see Figure 2-4) refer to the direction of traveling that the driver see when he faces forward and the drive sprocket is at the rear of the machine.

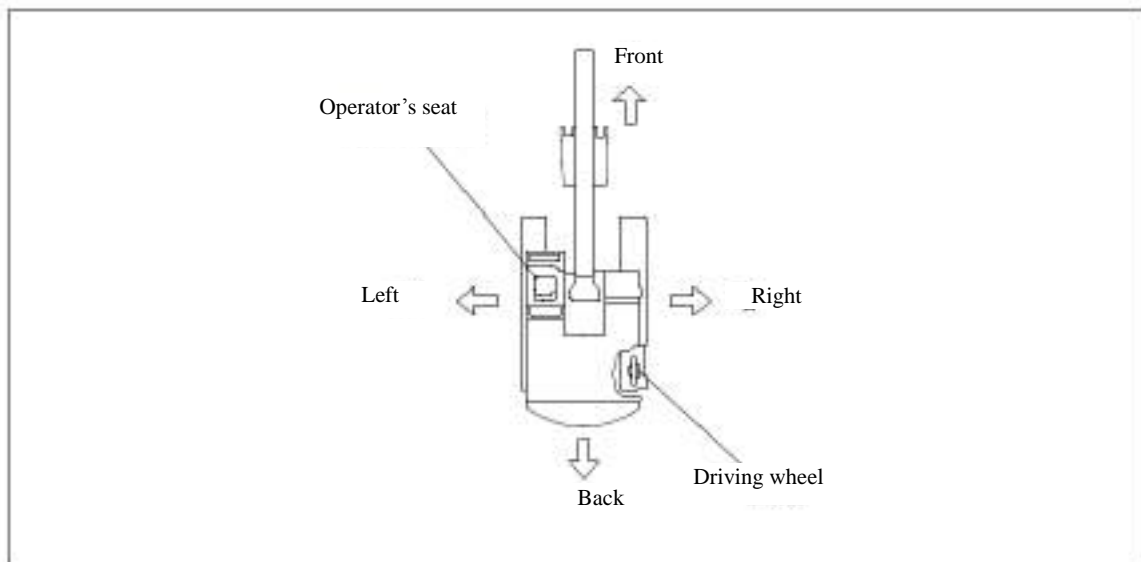


Figure 2-4 Direction of the excavator

2.2 External view of the excavator

The ZE205E and ZE230E hydraulic excavators introduced in this manual are basically of the same shape, as shown in Figure 2-5.

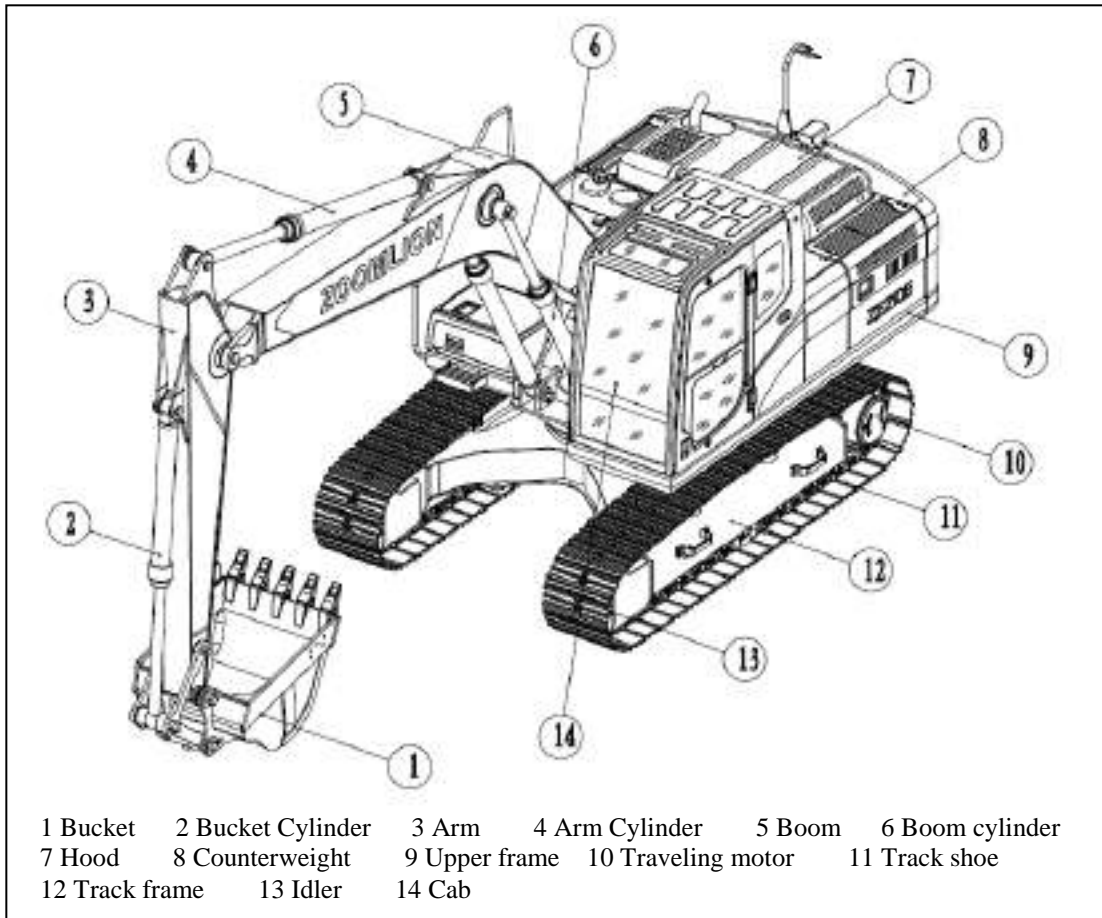


Figure 2-5 External view of the ZE205E and ZE230E hydraulic excavators

2.3 Main technical parameters of the excavator

The comparison of the main technical parameters of ZE205E and ZE230E are shown in Table 2-1, the external dimensions are shown in Figure 2-6, and the scope of work of the two models is shown in Figure 2-7 and 2-8.

Product overview

Table 2-1 ZE205E, ZE230E main technical parameter

Parts	Item	ZE205E	ZE230E
Bucket capacity	m ³	0.85	1.10
Motor	Model	B5.9-C	B5.9-C
	Type	6-cylinder, 4-stroke water-cooled direct injection, turbo intercooler	
	Rated power kW/rpm	112/1950	133/2000
	Maximum torque (N-m/rpm)	655/1500	708/1500
	Output volume (ml)	5883	5883
	Starting motor (v)	24	24
	Electric generator (Amp)	70	70
Hydraulic system	Main pump type	Swashplate-type double variable displacement piston pump	
	Maximum flow (L/min)	2×206	2×220
	Pilot pump	Gear pump	
	Traveling motor	Swashplate-type two-speed piston motors with automatic brake valve and parking brake	
	slewing motor	Swashplate piston motor with automatic brake	
System pressure	The Hydraulic circuit (MPa) of working device	32.1(35 when pressurized)	32.4(35.3 when pressurized)
	Traveling hydraulic circuit (MPa)	34.3	34.3
	slewing hydraulic circuit (MPa)	25.5	25.5
	Pilot hydraulic circuit (MPa)	3.9	3.9
Number of hydraulic cylinder Cylinder - Bore × stroke × piston rod diameter	Boom (mm)	2-120×1315×85	2-130×1315×90
	Bucket arm	1-135×1490×95	1-140×1635×100
	Bucket	1-115×1120×80	1-130×1020×90
slewing system	slewing motor	Swashplate piston motors	
	Reducing gear	Second Level Planetary Reducer	
	Slewing speed (rpm)	11.5	11.3
	slewing brake	Wet multi-plate disc brakes	
Traveling systems	Traveling motor	Swashplate piston motors	
	Reducing gear	Planetary reducer	
	Steering control	Two levers with foot pedals	
	Parking brake	Wet-type multi-plate disc brakes	
	Maximum traction force (kN)	192	195
	Grade ability	35°(70%)	35°(70%)
	traveling speed	5.5/3.3	5.2/3.4

Table 2-1 (Continued)

Parts	Item	ZE205E	ZE230E
Chassis	Track frame	Box structure	
	Track shoe (each side:)	46	49
	Track rollers (each side:)	7	8
	Carrier roller (each side:)	2	2
	Track retaining frame (each side:)	1	2
Volume of coolant and lubricating oil	Fuel tank (L)	350	350
	Coolant (L)	35	35
	Engine oil (L)	26	26
	Slewing device (L)	3.4	4
	traveling device (L)	2×5.5	2×5.5
	Hydraulic system (L)	300	300
	Hydraulic Tank: ml)	230	230
	Engine oil pan (L)	22	22
Working weight	Standard (Kg)	20300	22800
Dimensions(as shown in Figure 2-6)	A (total length: mm)	9481.5	9760
	B (total width: mm)	2800	2990
	C Overall height (to the top of boom: mm)	3010	3190
	D (Tail slewing radius: mm)	2740	2800
	E (tail length: mm)	2840	2840
	G Ground clearance of counterweight: mm)	1085	1070
	H (minimum ground clearance mm)	440	440
	I (ground contact length of track mm)	3370	3640
	J (track length mm)	4160	4430
	K (gauge mm)	2200	2390
	L (track width mm)	2800	2990
	M (track shoe width mm)	600	600
	N (grouser height mm)	26	26
P (total height to the cab at the top: mm)	2950	2960	
Q (turntable width mm)	2720	2720	

Table 2-1 (Continued)

Parts	Item	ZE205E	ZE230E
Work range (as shown in Figure2-7&2-8)	A (Max. digging reach: mm)	9855	10170
	B (Max. digging reach on ground: mm)	9675	9995
	C (Max. digging depth: mm)	6625	6860
	D (Max. vertical digging depth: mm)	5980	6120
	E (Max digging height mm)	9715	10220
	F (Max unloading height: mm)	6865	7240
	G (Min. slewing radius: mm)	3275	3140
Digging force	Max bucket digging force (kN)	140	155
	Max arm digging force (kN)	100	124

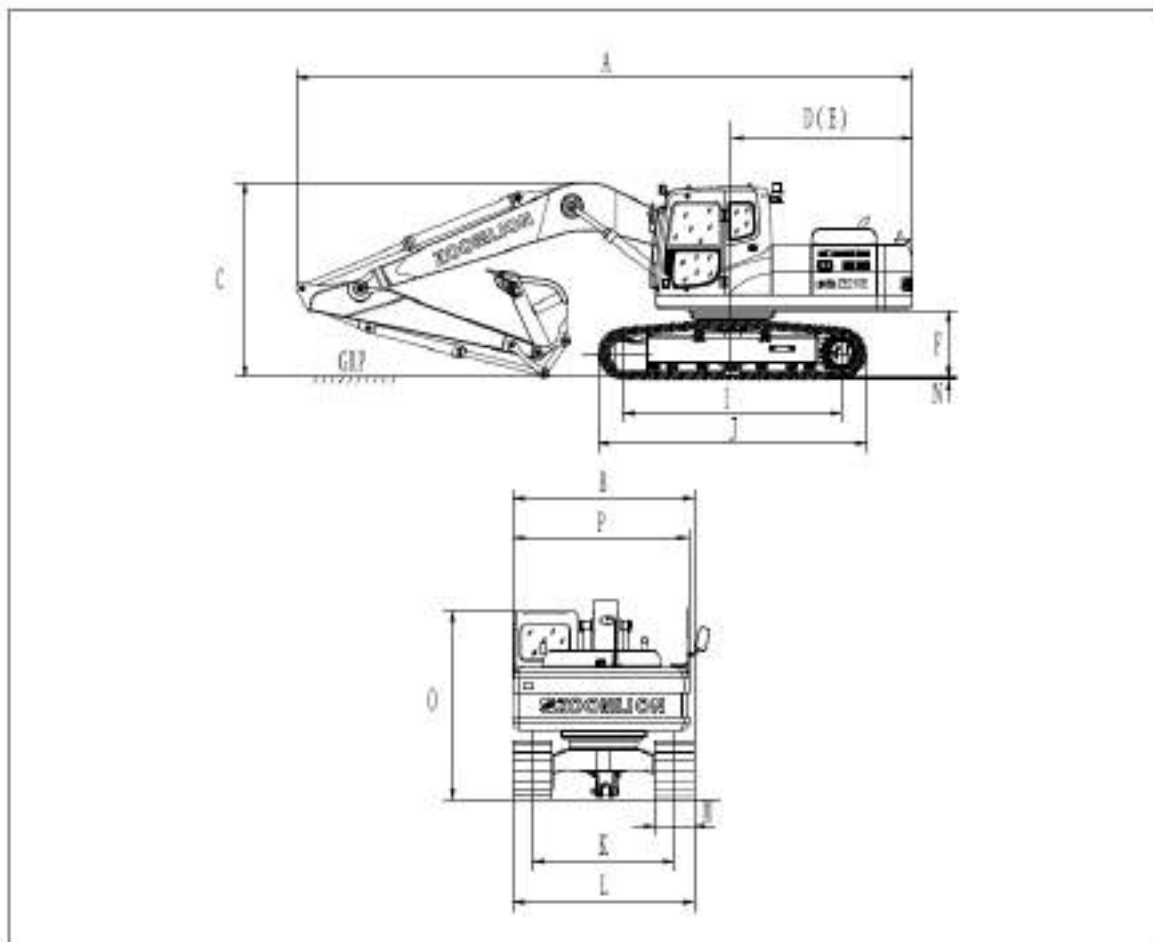


Figure 2-6 External dimensions of ZE205E/ZE230E

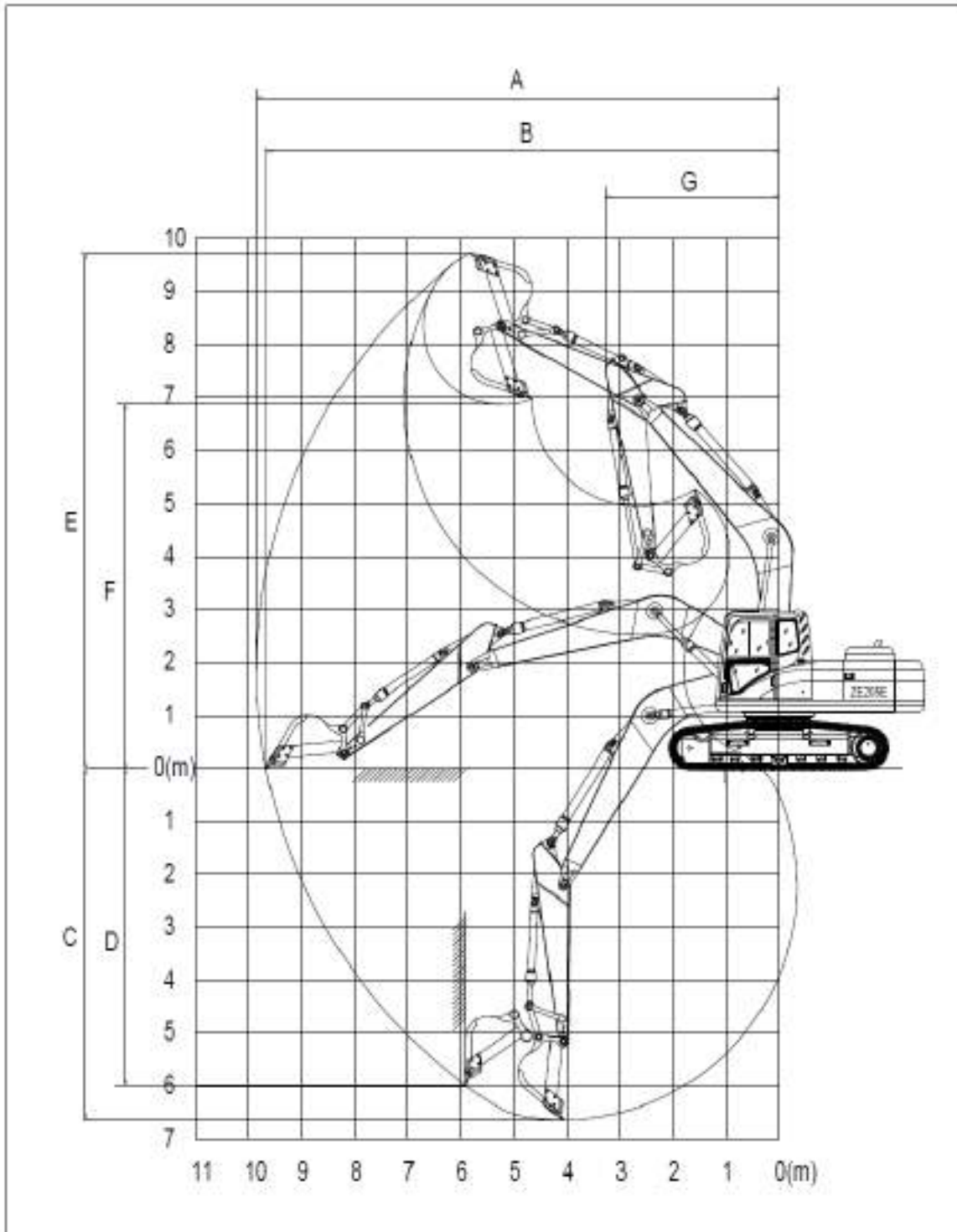


Figure 2-7 Schematic diagram of the working range of ZE205E

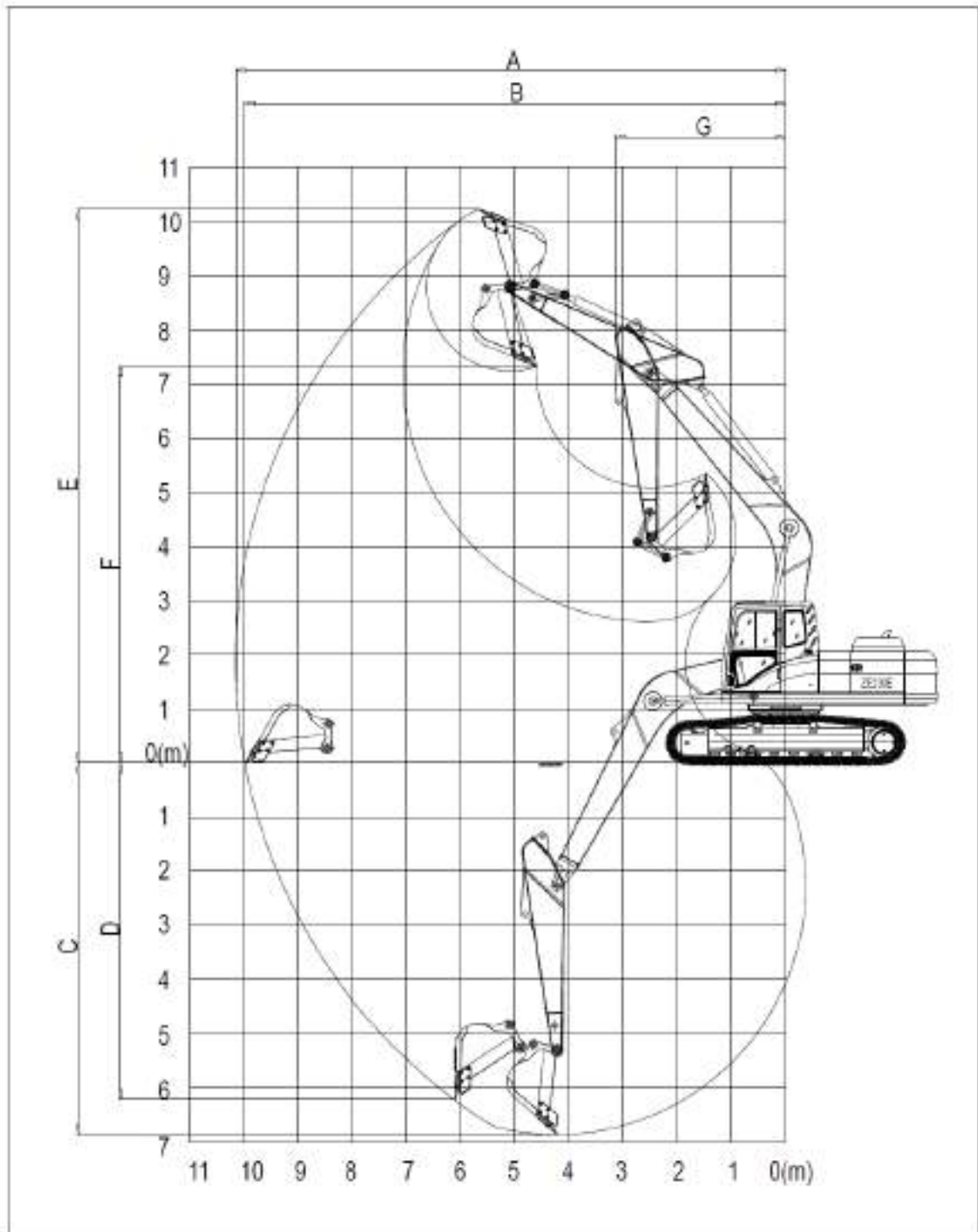
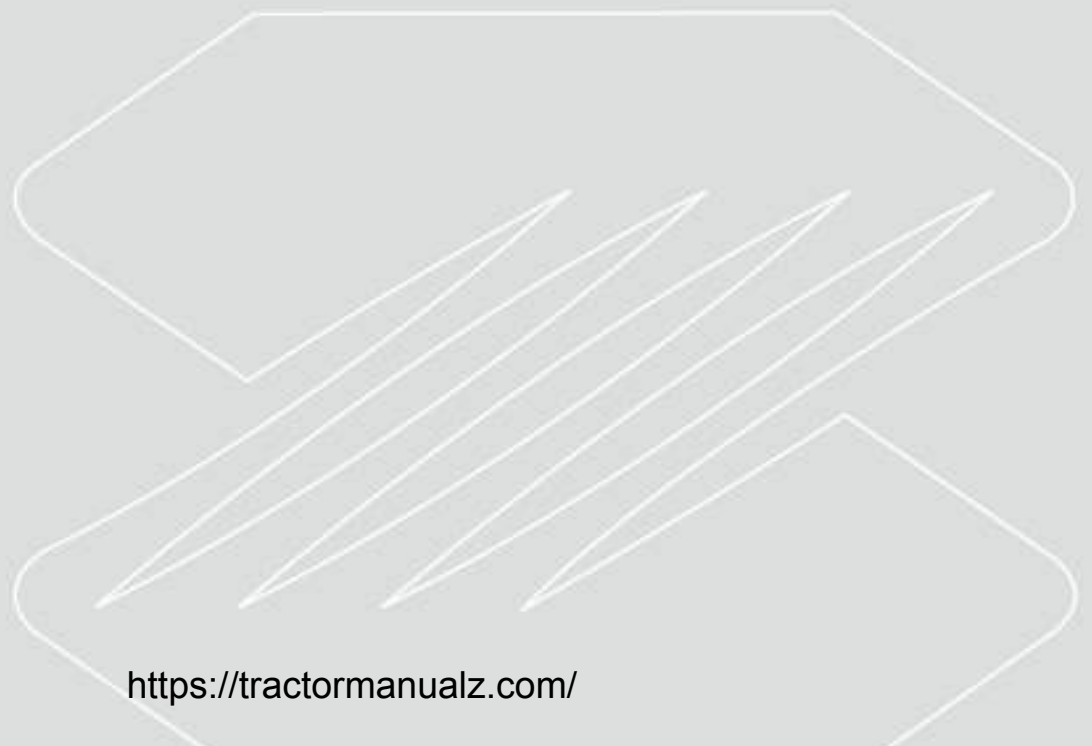


Figure 2-8 Schematic diagram of the working range of ZE230E



ZE205E/ZE230E HYDRAULIC EXCAVATOR
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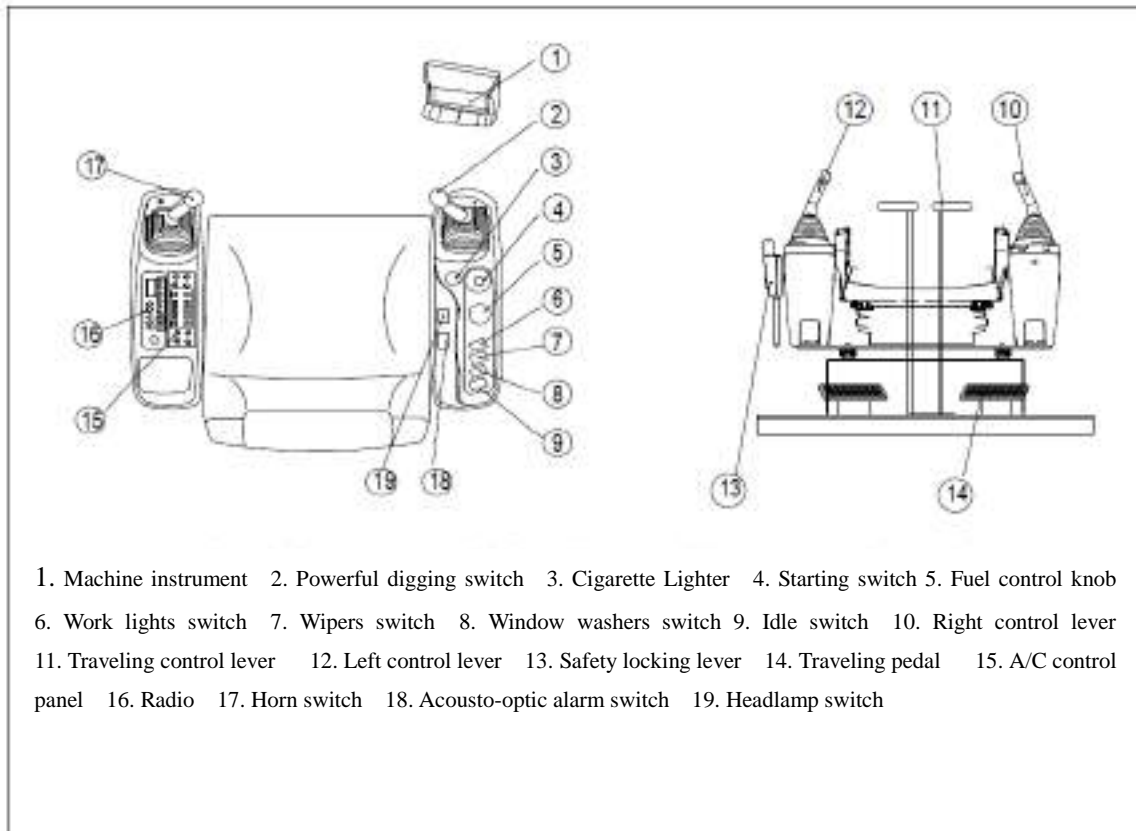
Chapter Three: Basic Operation Techniques of Excavator



Chapter Three: Basic Operation Technique of Excavator

3.1 General layout of the operating devices

Operating devices of Vanda ZE205E/ZE230E hydraulic excavators are shown in Figure 3-1.



- 1. Machine instrument
- 2. Powerful digging switch
- 3. Cigarette Lighter
- 4. Starting switch
- 5. Fuel control knob
- 6. Work lights switch
- 7. Wipers switch
- 8. Window washers switch
- 9. Idle switch
- 10. Right control lever
- 11. Traveling control lever
- 12. Left control lever
- 13. Safety locking lever
- 14. Traveling pedal
- 15. A/C control panel
- 16. Radio
- 17. Horn switch
- 18. Acousto-optic alarm switch
- 19. Headlamp switch

Figure 3-1 General view of the working devices

3.2 Excavator instrument operations

There are two kinds of instruments on the machine, which are classified as Instrument I (as shown in Figure 3-2) & Instrument II (as shown in Figure 3-34) based on difference of their working interfaces. However, each machine is equipped with only one kind. Therefore, please read the corresponding chapters as appropriate.

3.2.1 Basic operations of instrument I

3.2.1.1 Introduction of the instrument interfaces

The interface is shown in Figure 3-2.

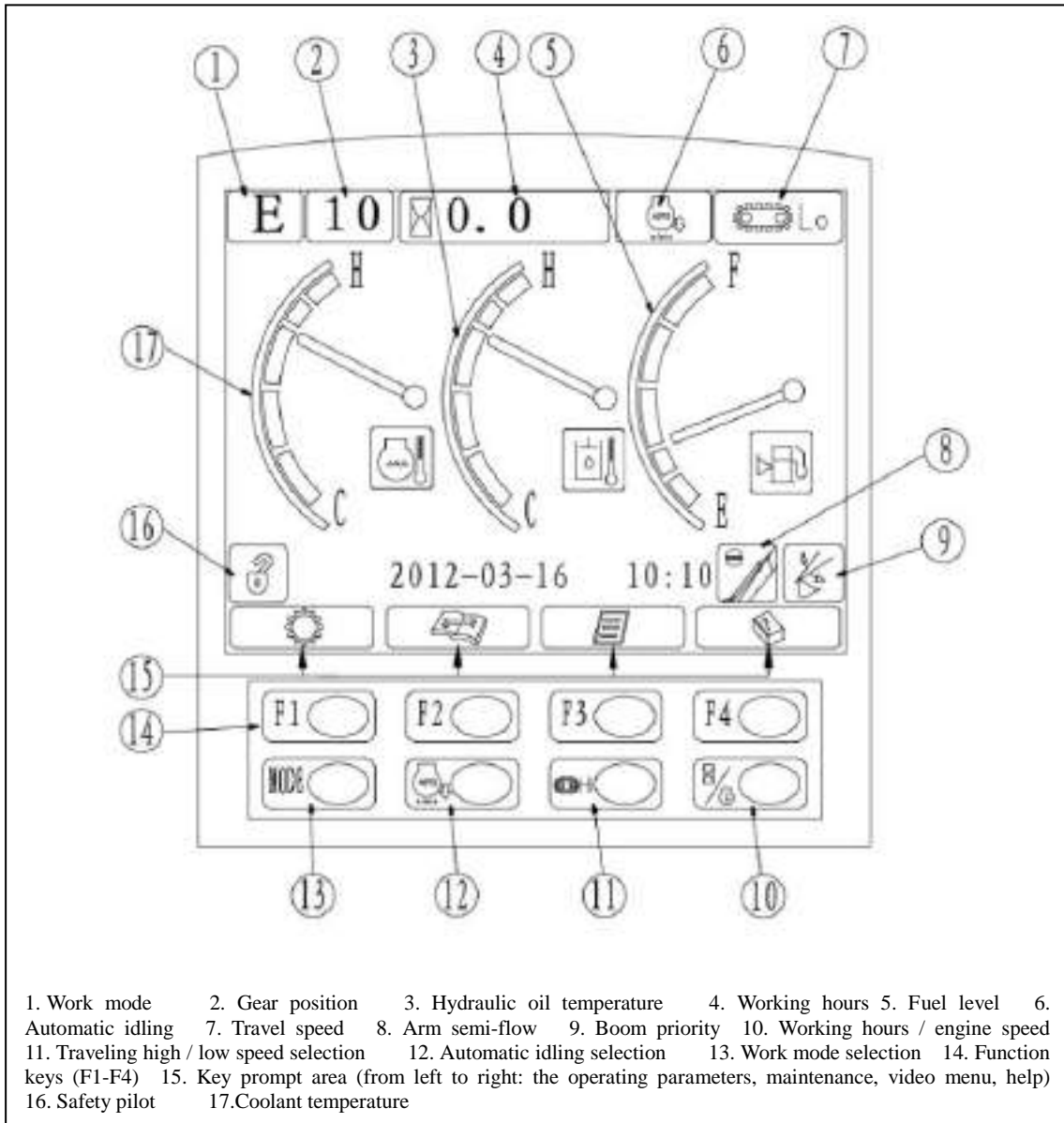


Figure 3-2 Standard working interface

3.2.1.2 Instrument operations and settings

3.2.1.2.1 Normal startup and shut-down of the instrument

a) Startup of the instrument: turn the key switch to the ON position and the display starts to initialize into the standard interface, as shown in Figure 3-3.

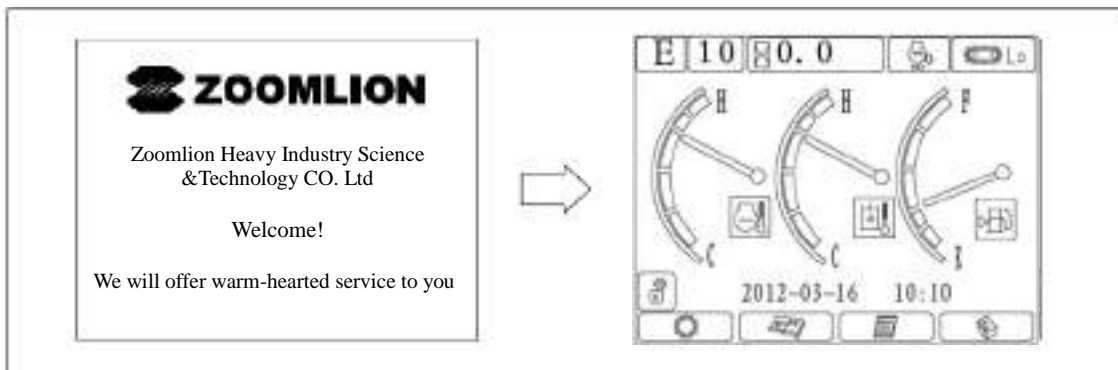


Figure 3-3 Menu for starting the instrument

b) Shutdown of the instrument: turn the key switch to the OFF position, the display is power-off and turns into black screen, as shown in Figure 3-4.

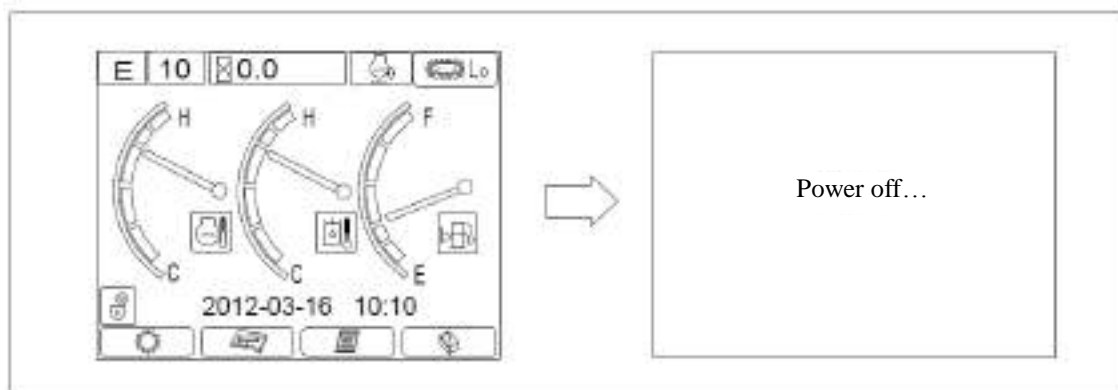



Figure 3-4 Menu for shutting down the instrument

3.2.1.2.2 Selection of operating modes

Customers can choose appropriate working mode according to the operating conditions of the machine. There are P, E, L and B modes: the power-on default mode is E mode; P stands for high-power fast digging mode, E for standard economic working mode, L for light and careful digging mode, B for attachment mode like breaker. Effective adjustment range of throttle knob in each mode is as follows: P mode: 1000~2150rpm, E mode: 1000 ~2000rpm, L mode: 1000~1800rpm, B mode: 1000~2000rpm. Press the  button to cycle through the operating mode and the instrument switching screen is shown in Figure 3-5.

Basic operation techniques of the excavator

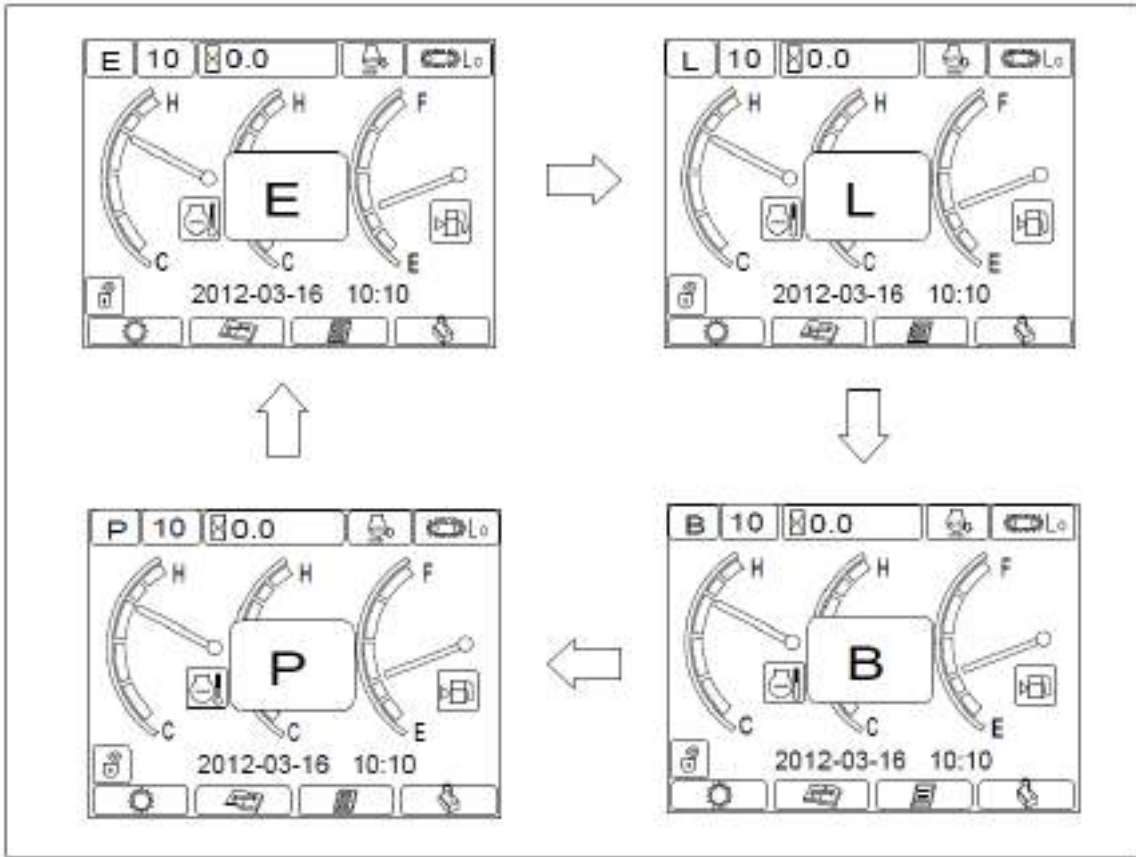



Figure 3-5 Menu for selecting working mode

3.2.1.2.3 Traveling speed selection

When you want to change traveling speed, press the  button on dashboard, Hi refers to high-speed, and L0 refers to low-speed. The power-on system default traveling speed is low speed. Every time when you switch the high and low traveling speed, the corresponding mode icon will be displayed on the dot matrix LCD, and the display will return to the standard interface two seconds later, as shown in Figure 3-6.

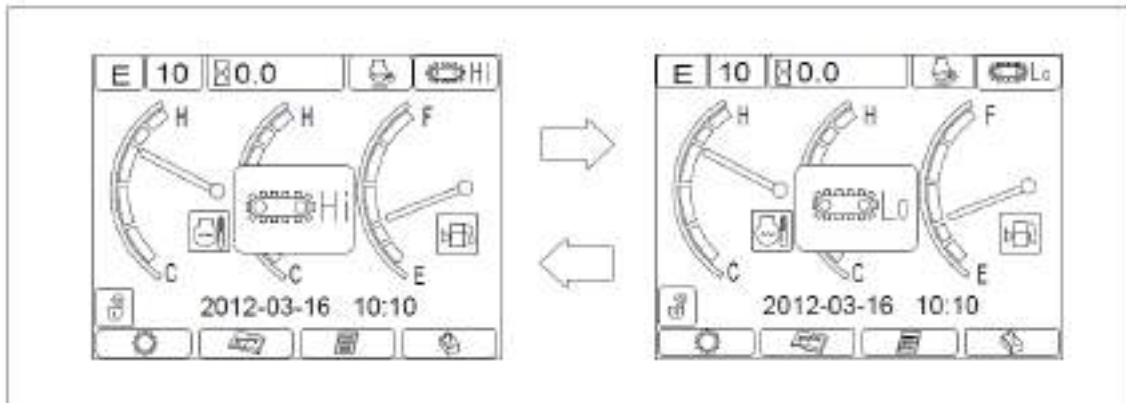


Figure 3-6 Traveling speed selection menu

3.2.1.2.4 Pilot safety switch

Before operation, pull the safety lever up, dot-matrix LCD panel shows the unlock state and safety solenoid valve is energized, as shown in Figure 3-7. Upon completion of operations, put the safety pilot lever down and dot-matrix LCD panel shows the locked state, as shown in Figure 3-8.

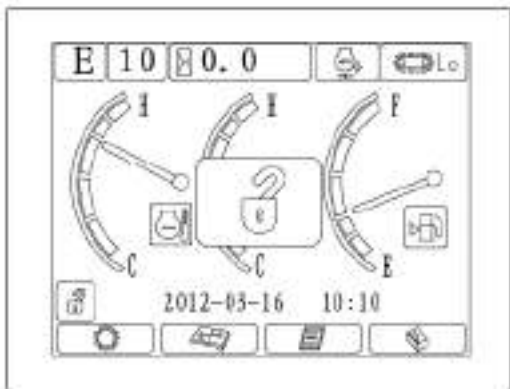


Figure 3-7 Status of safety locking lever during operation

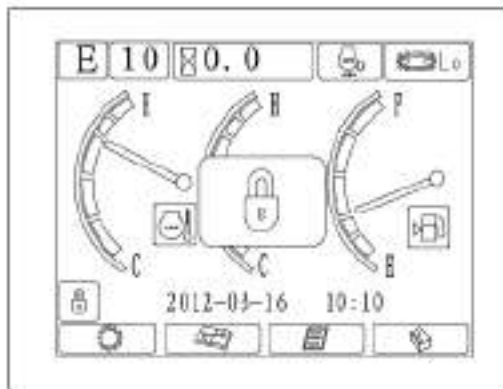



Figure 3-8 Status of safety locking lever after operation

3.2.1.2.5 Enable and disable automatic idling

Press the button  to enable or disable automatic idling. Automatic idling is enabled by power-on system default, and then the automatic idling icon will show up on the dot matrix LCD display. When the engine speed for corresponding throttle gear is above 1350 rpm, the system controls the engine throttle and makes the engine start at 1350rpm. When the system detects that the hydraulic system is working after the machine was started, the system throttle can return to the position corresponding to the preselected throttle gear (according to the engine speed of corresponding throttle knob position in current operating mode). You can activate automatic idling function in 5 seconds delay to control the throttle and operate the engine at 1350rpm when the engine speed is more than 1350rpm and the hydraulic system does not work. When automatic idling is activated to decrease the throttle speed to 1350rpm, you cannot adjust the engine speed by adjusting the throttle knob. Press automatic idling button, the automatic idling function is canceled and the icon of automatic idling canceled will display. Press the button again to return the system default state, as shown in Figure 3-9 and 3-10.

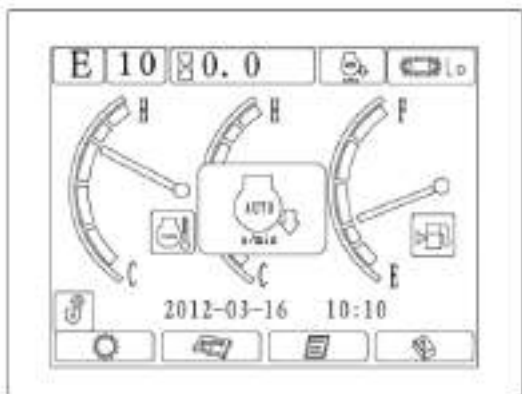


Figure 3-9 Menu for activating the automatic idling

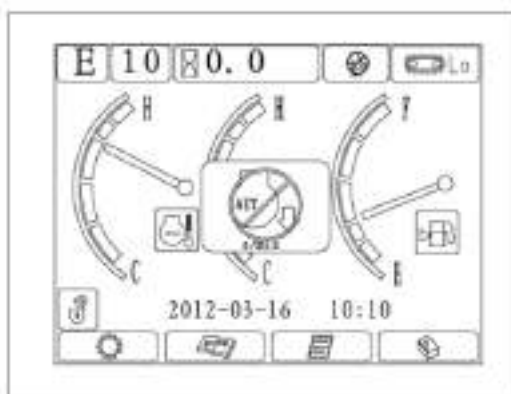


Figure 3-10 Menu for deactivating the automatic idling

Basic operation techniques of the excavator

3.2.1.2.6 Check operational parameters

Press F1 key on the standard working interface to check the system operating status, including real-time analog data, switch states and working hours collected by the controller. Menu for operating parameters is shown in Figure 3-11.

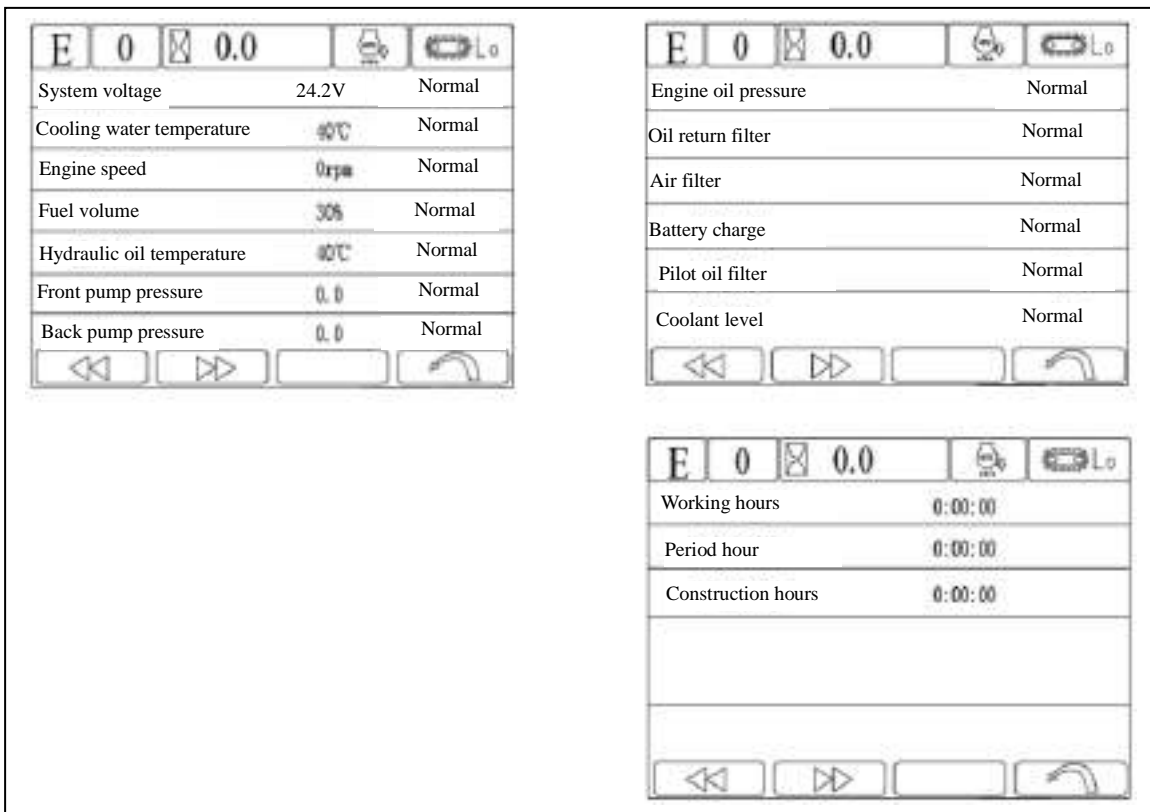


Figure 3-11 Operating parameter menu

3.2.1.2.7 Time / alarm prompts

When the system sends out no alarm, current time is displayed in this area; when the system sends out alarm signal, the center of the screen shows a red alarm icon and text prompts. The menu for trouble-free condition is shown in Figure 3-12; the menu for failure condition is shown in Figure 3-13.

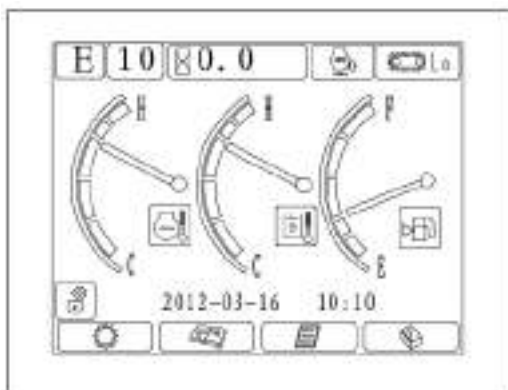


Figure 3-12 Time/alarm menu for trouble-free

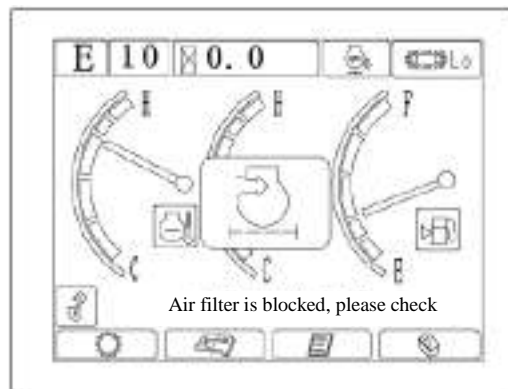


Figure 3-13 Time /alarm for failure

Each parameter alarm icon is shown in Figure 3-14.

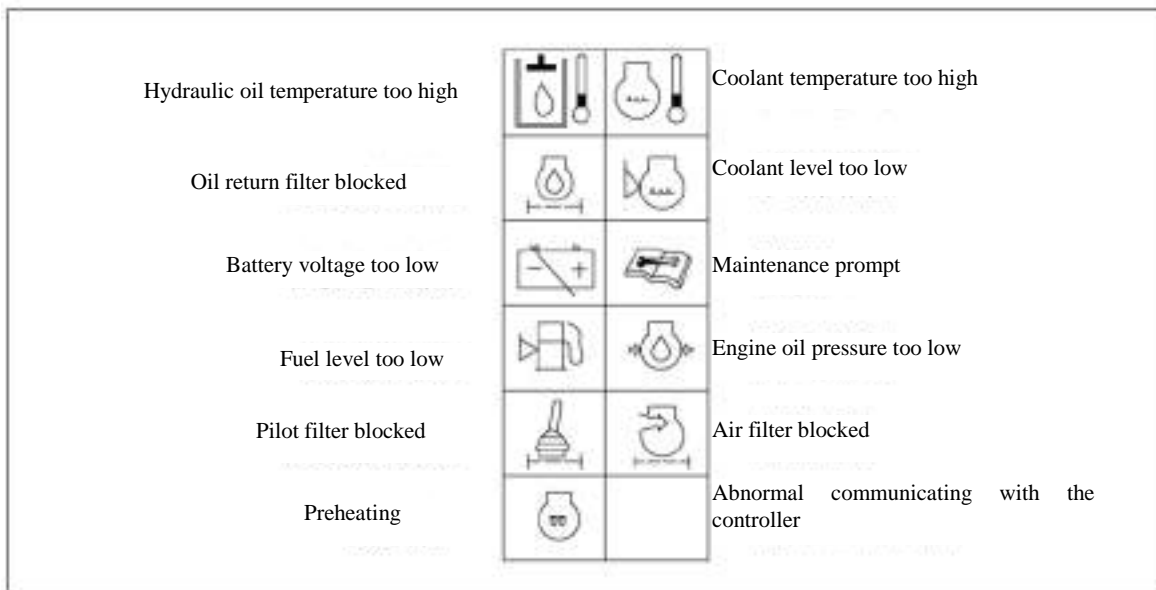


Figure 3-14 Parameter alarm icon menu

3.2.1.2.8 System warming-up settings

System warming-up function can be activated or deactivated via menu operations. Press F3 on the standard working interface to enter the main menu, select user settings by pressing the UP and DOWN icons F1 and F2, and press F3 to enter the user settings interface. Select system configurations via the UP and DOWN icons F1 and F2, press F3 to enter the system configurations interface, select system warming-up settings to enter the setting interface to activate or deactivate system warming-up and finally press F3 for confirmation. When this function is activated, the system begins automatic warming-up at low speed when the coolant temperature is below 10 °C while the engine is started and this automatic warming-up ends when the coolant temperature rises to above 30 °C. You need to select power-on system default state for this function. System warming-up setting menu is shown in Figure 3-15.

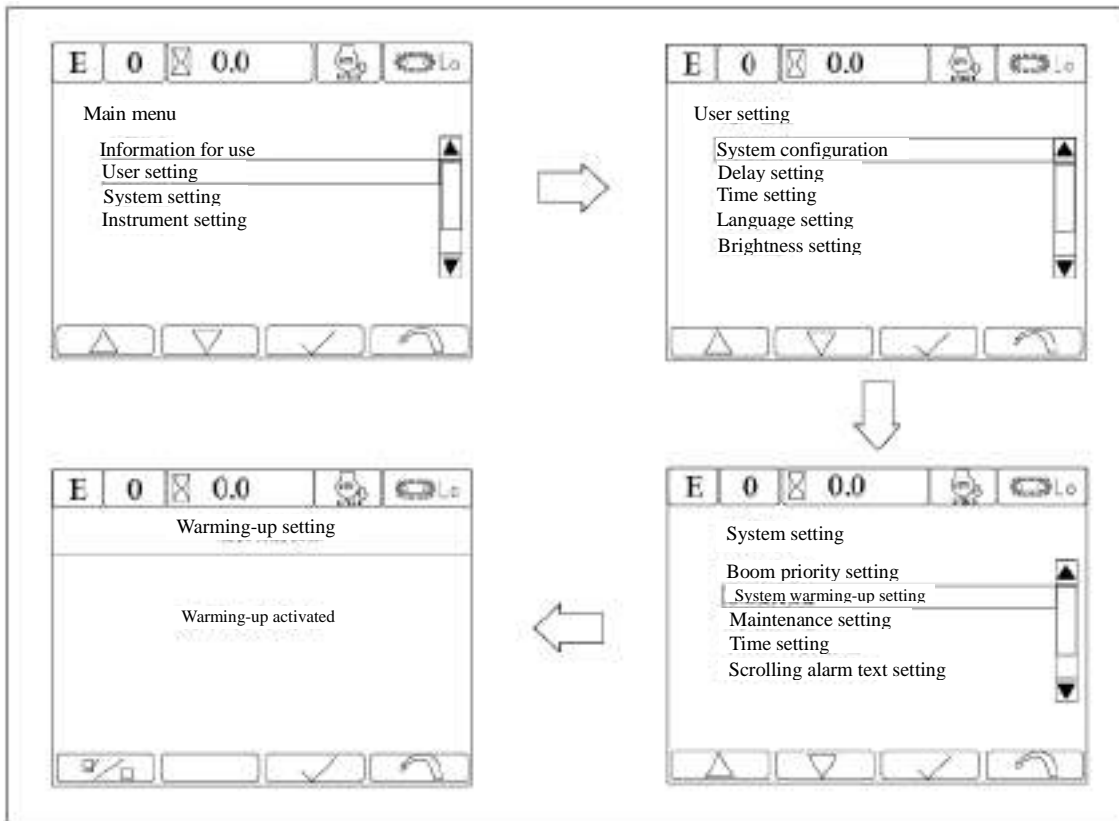


Figure 3-15. System warming-up setting menu

3.2.1.2.9 Boom priority function setting

Boom priority function can be activated or deactivated via menu operations. Press F3 on the standard working interface to enter the main menu, select user settings by pressing the UP and DOWN icons F1 and F2, and press F3 to enter the user settings interface. Select system configurations via the UP and DOWN icons F1 and F2, press F3 to enter the system configurations interface, select boom priority settings to enter the setting interface to activate or deactivate boom priority function and finally press F3 for confirmation. This function is activated by power-on system default state. Boom priority function setting menu is shown in Figure 3-16.

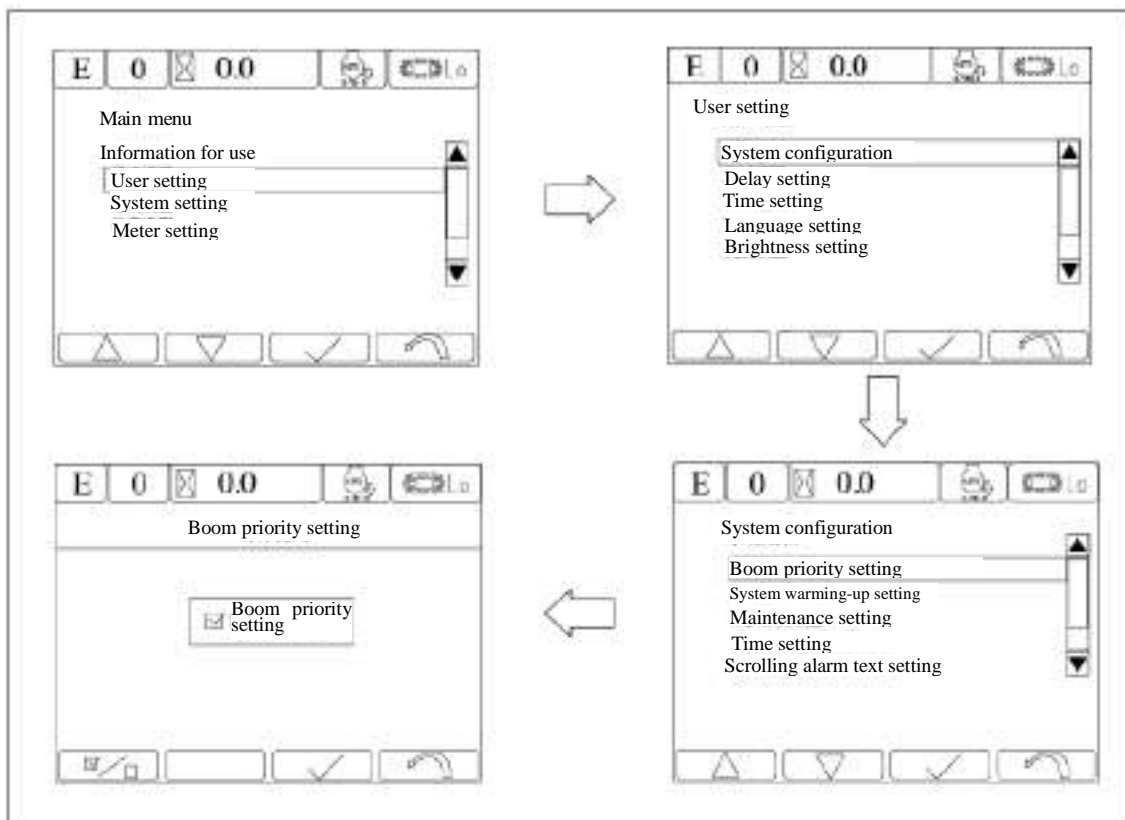


Figure 3-16 Boom priority function setting menu

3.2.1.2.10 Arm semi-flow function setting

Arm semi-flow function: When the system is operating under L mode, the screen displays arm semi-flow icon and the system automatically activates this function; when the system does not work under L mode, the system automatically deactivates arm semi-flow function, as shown in Figure 3-17.

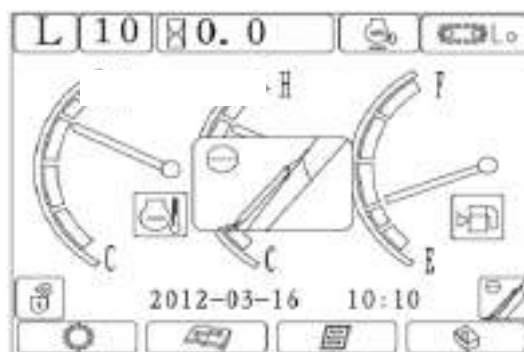


Figure 3-17 Arm semi-flow function setting menu

3.2.1.2.11 Period hour timing setting

Press F2 to enter period hour timing setting interface, which is for timing hours of a certain period. To check period hour timing, you can choose working hour timing or period hour timing at the main interface. As to how to use, activate or reset the period hour timing, please refer to Figure 3-18 for period hour timing setting menu.

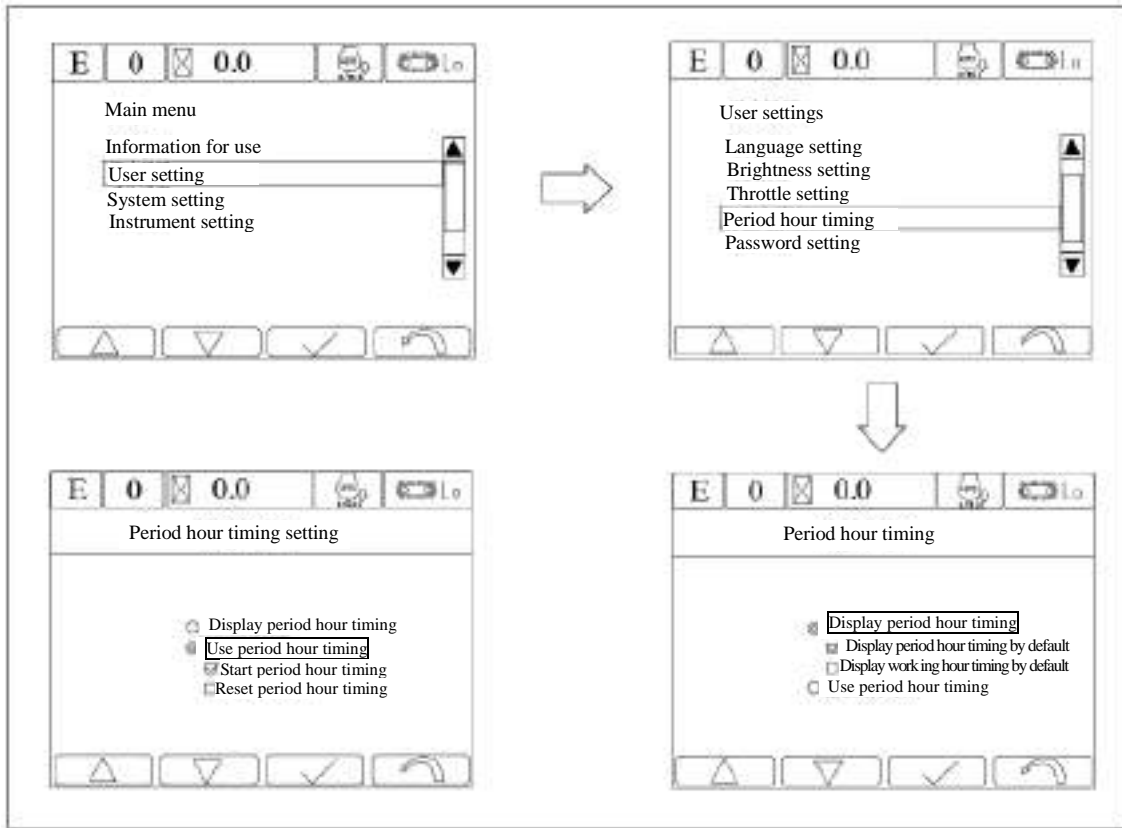


Figure 3-18 Period hour-timing settings menu

3.2.1.2.12 Check and set maintenance information

The system provides 500-hour, 1000-hour, 2000-hour and 5000-hour regular maintenance information, which is sent out 30 hours in advance. You can also check this maintenance information by pressing F3. For instance, when the working hours reach 470 hours, the screen displays maintenance information as shown in Figure 3-19; when the maintenance is completed, you can enter the maintenance setting interface to set that the maintenance is completed, as shown in Figure 3-20:

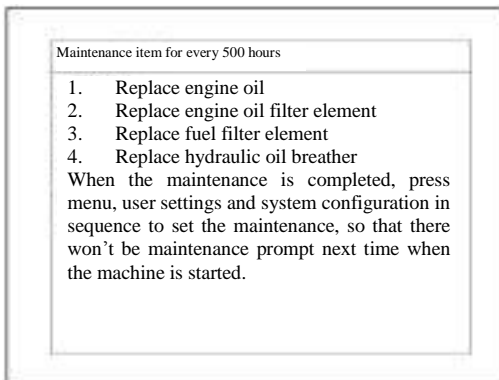


Figure 3-19 Maintenance prompt every 500 h

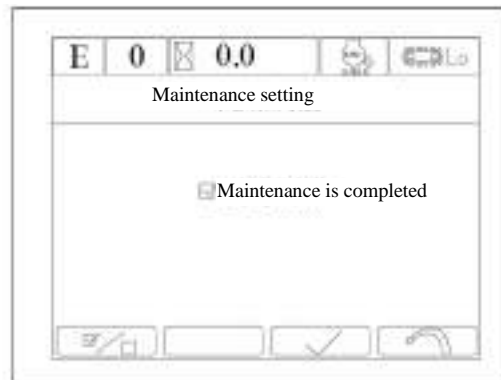


Figure 3-20 Maintenance setting menu

3.2.1.2.13 Help / silencing

When the system sounds an alarm, press F4 key for silencing. Otherwise, press F4 for help information

3.2.1.2.14 Pressure boost switch

Only when the system power mode is under P and E mode and the engine speed is above 1650rpm, can the system perform pressure boost function. Press the button switch on the right lever, the system digging force is increased to the maximum and this function will be deactivated after 8 seconds. Moreover, this function can only be repeated after a 3-second interval. If current power mode is B mode, the system automatically switches the switch into breaker or other accessories switch. The pressure boost switch icon and the interface are shown in Figure 3-21.

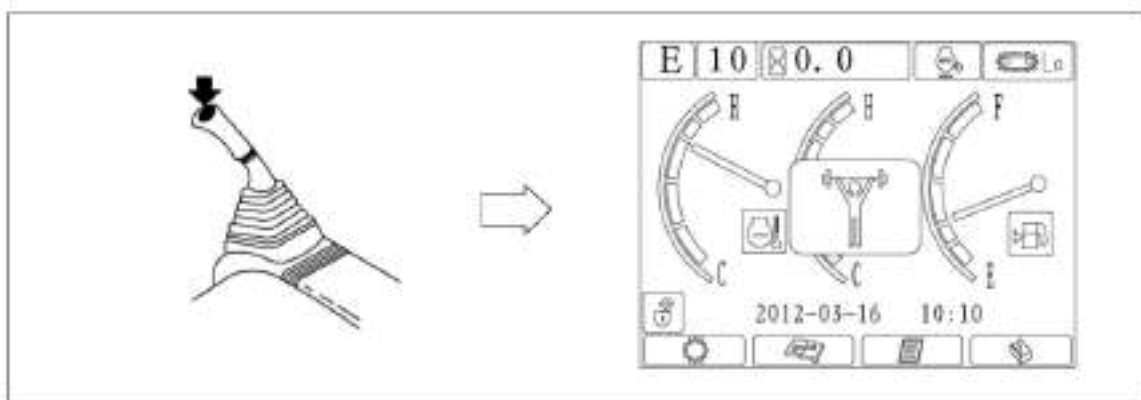


Figure 3-21 Pressure boost switch icon and the interface

3.2.1.2.15 Throttle settings

When the speed of each engine gear deviates a lot from the set speed, customers can reset the throttle by entering user setting interface and selecting throttle setting.

- a) Press F3 to enter throttle setting interface shown in Fig 3-22.

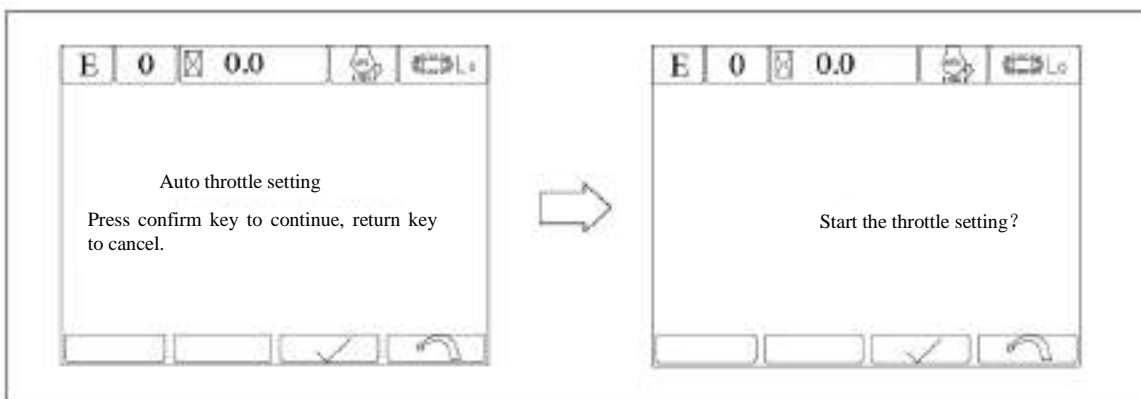


Figure 3-22 Confirm whether to enter throttle setting interface

- b) Turn the throttle knob to max. engine speed and press F3 to confirm the adjustment. The interface is

shown in Fig 3-23.

c) Turn the throttle knob to min. engine speed and press F3 to confirm the adjustment. The interface is shown in Figure 3-24.

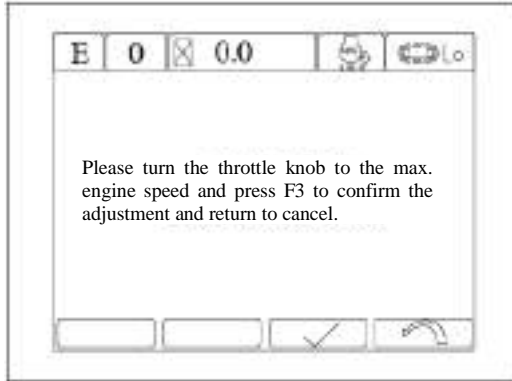


Figure 3-23 Turn throttle knob to max. engine speed

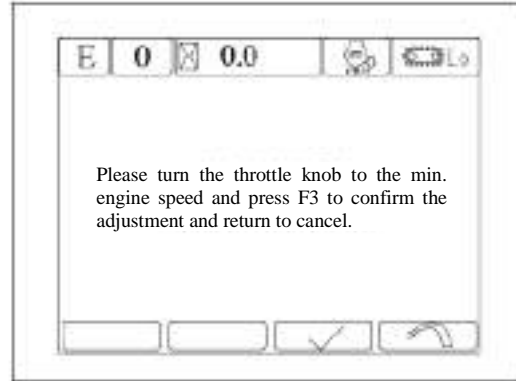


Figure 3-24 Turn throttle knob to min. engine speed

d) Please start the engine: skip this if the engine has been started; the interface is shown in Figure 3-25.

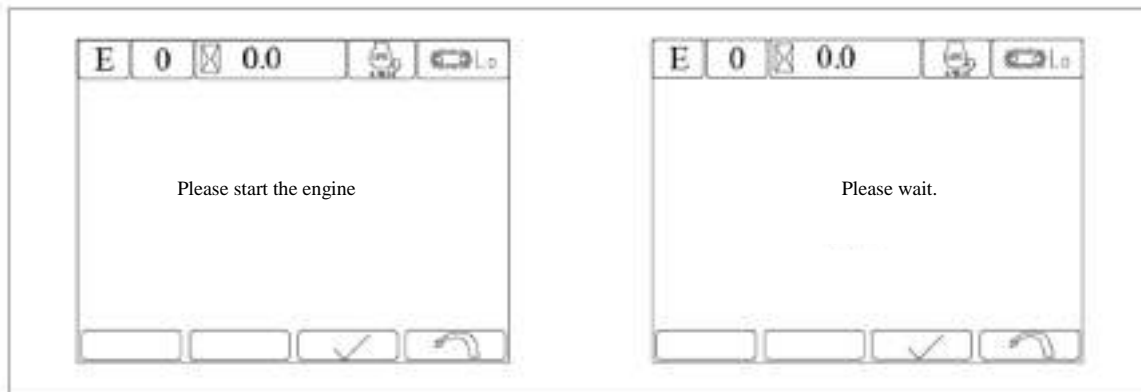


Figure 3-25 Engine startup interface

e) Setting interface is shown in Fig 3-26.

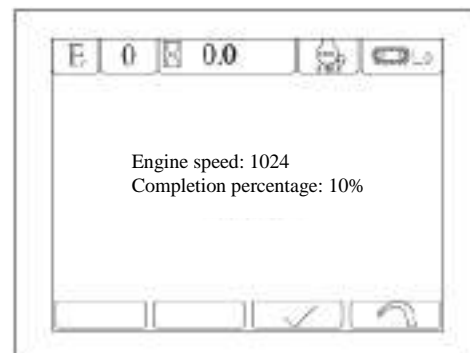


Figure 3-26 Throttle setting interface

f) Setting result is shown in Figure 3-27.

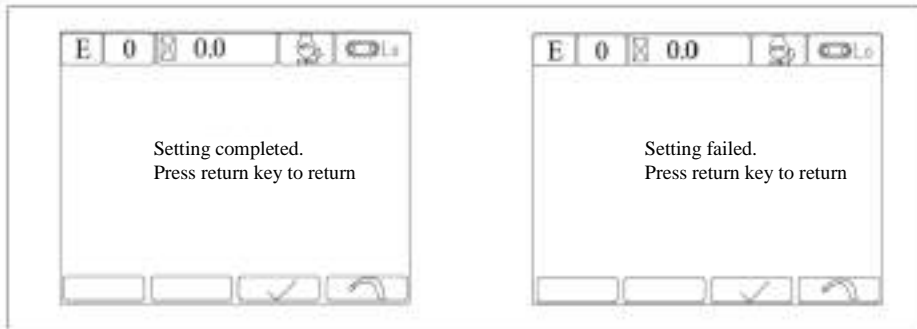


Figure 3-27 Throttle setting result interface

3.2.1.2.16 Time setting

a) Press F3 at the standard display interface to enter into main menu, select user settings with UP and DOWN icons F1 and F2 and press F3 for confirmation; the interface is shown in Figure 3-28.

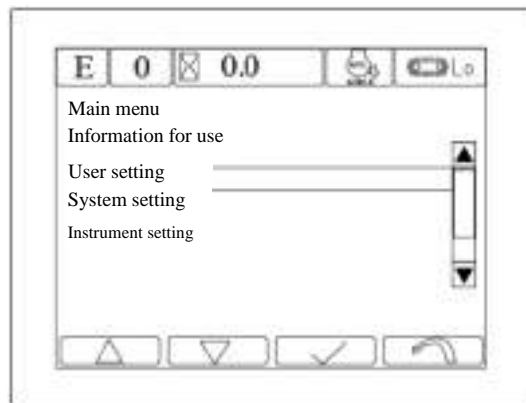


Figure 3-28 Main menu Interface

b) Press UP and DOWN icons F1 and F2 at the user setting interface to select time adjustment and press F3 for confirmation; the interface is shown in Figure 3-29.

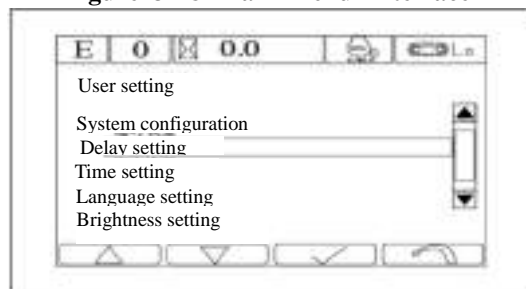


Figure 3-29 User setting interface

c) After entering into the time settings interface, enter the exact time through F1-F4 functional keys, the interface is shown in Figure 3-30

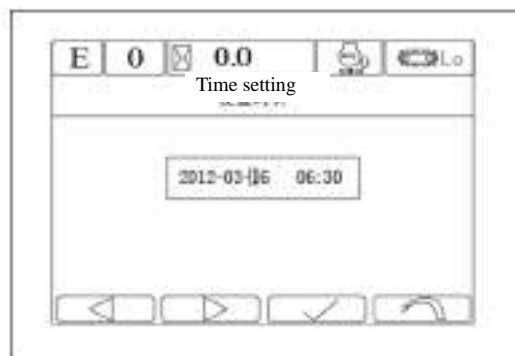


Figure 3-30 Time setting interface

3.2.1.2.17 Language Selection

a) Press F3 at the standard display interface to enter into main menu, select user settings with UP and DOWN icons F1 and F2 and press F3 for confirmation; the interface is shown in Figure 3-31.

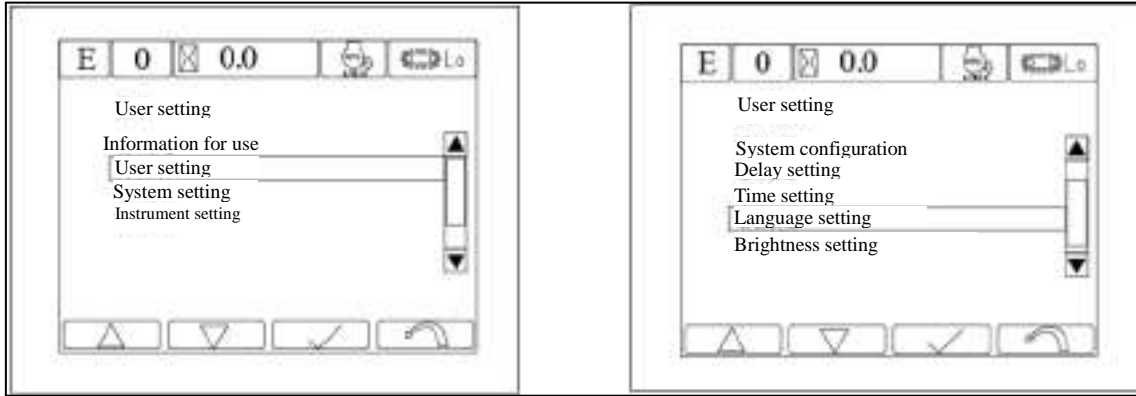


Figure 3-31 Main menu interfaces

Figure 3-32 User Setting interface

b) Press UP and DOWN icons F1 and F2 at the user setting interface to select language setting and press F3 for confirmation; the interface is shown in Figure 3-32.

c) After entering into language setting interface, press UP and DOWN icons F1 and F2 to select the desired language and press F3 for confirmation; the interface is shown in Figure 3-33.



Figure 3-33 Language selection interface

3.2.1.2.18 Pointer gauge

a) Coolant temperature pointer gauge: It indicates the current engine coolant temperature. The display range is -40 ~ 120 °C. The yellow segment is below 40 °C, the green segment is between 40 ~ 102 °C, and the red segment is the alarm segment. When the engine coolant temperature T is no less than 105 °C, the controller automatically controls engine throttle to downshift into a lower gear to protect the engine; if the engine coolant temperature T is no more than 95 °C, the overheating protection function is automatically canceled.

b) Hydraulic oil temperature gauge: It indicates the current hydraulic oil temperature. The display range is from -40 ~ 110 °C. The yellow segment is below 40 °C, the green segment is between 40 ~ 90 °C, and the red segment is the alarm segment.

c) Fuel level gauge: the display range is from 0 to 100% and the red segment is 0-10%.

3.2.2 Basic operations of instrument II

3.2.2.1 Introduction of the instrument interfaces

The interface is shown in Figure 3-34

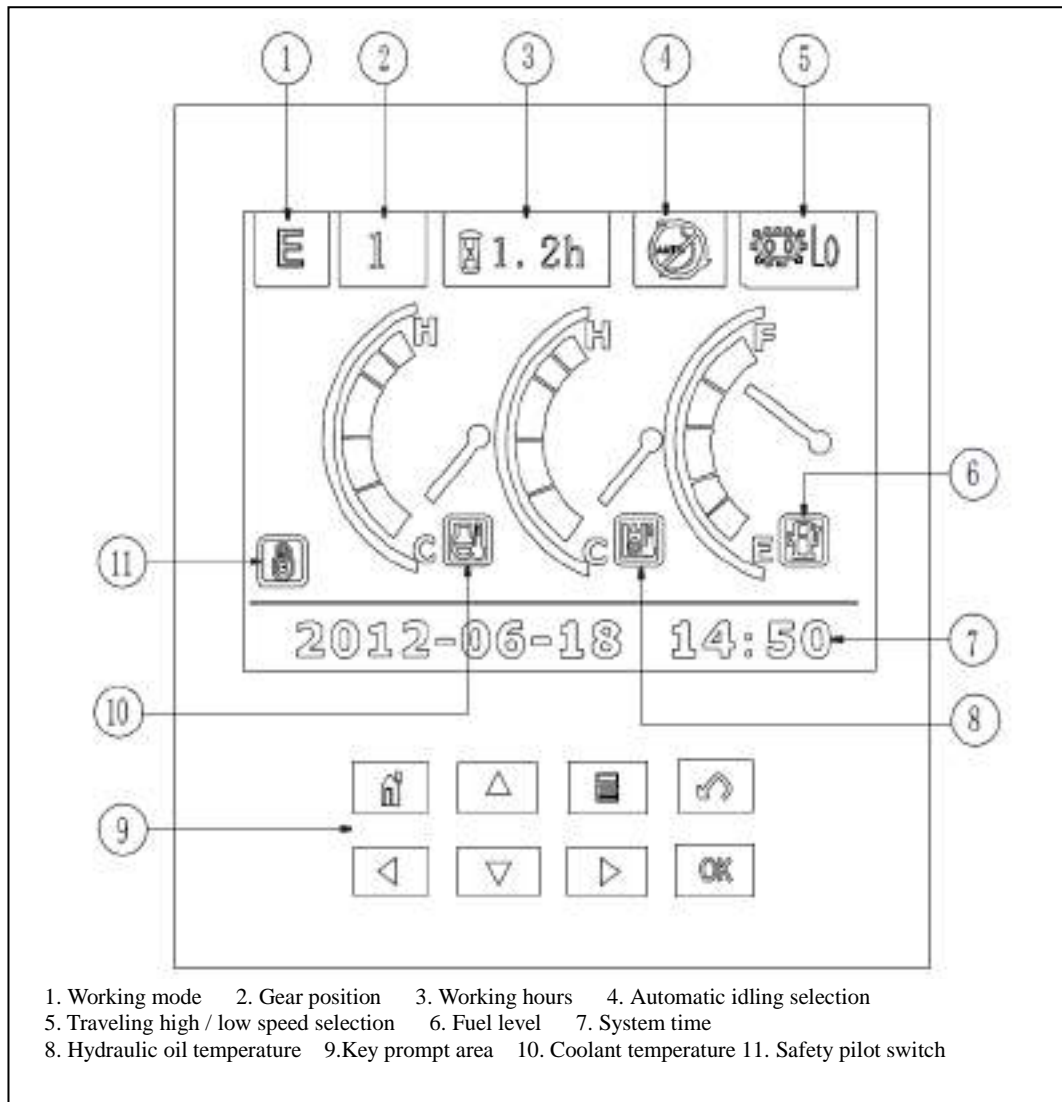


Figure 3-34 Standard working interfaces

Key prompt area: on the main interface worked as short-cut keys (the first row from left to right: the operating parameters, High and low traveling speed selection, main menu, help/buzzer state, the second row from left to right: Automatic idling selection , work mode, working hours/slewing speed, the period hours); on the other interfaces worked as function keys (the first row from the left to right: main interfaces, up, main menu, back; the second row from left to right: left, down, right, confirm)

3.2.2.2 Instrument operations and settings

3.2.2.2.1 Normal startup and shut-down of the instrument

a) Startup of the instrument: turn the key switch to the ON position and the display shows the standard interface, as shown in Figure 3-35.

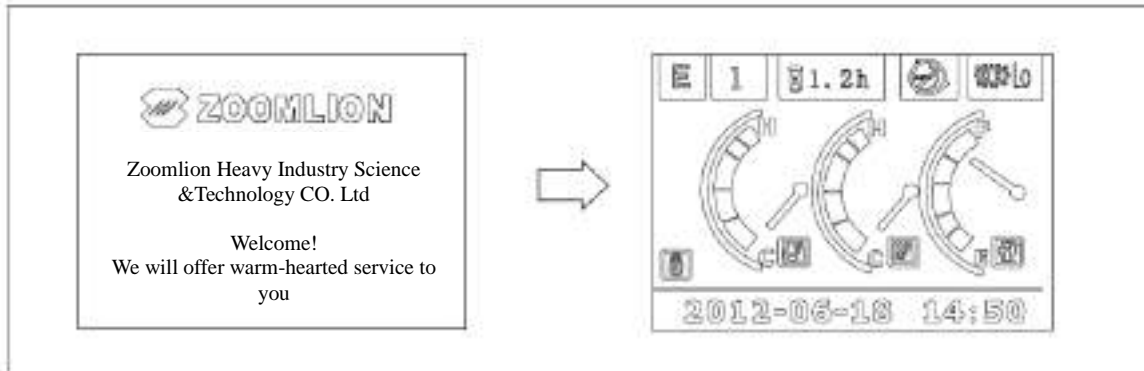


Figure 3-35 Menu for starting the instrument

b) Shutdown of the instrument: turn the key switch to OFF position, the display is power-off and turns into black screen, as shown in Figure 3-36.

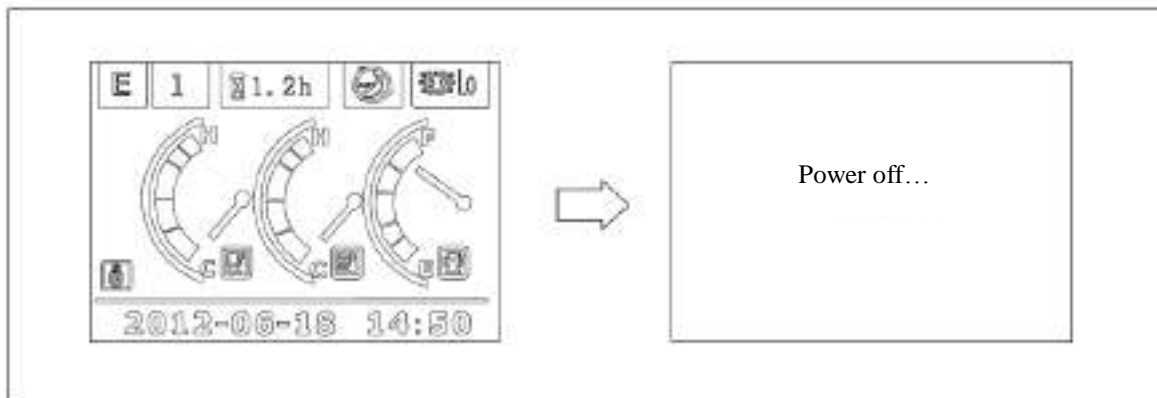



Figure 3-36 Menu for shutting down the instrument

3.2.2.2.2 Selection of operating modes

Customers can choose appropriate working mode according to the operating conditions of the machine. There are P, E, L and B modes; the power-on default mode is E mode; P stands for high-power fast digging mode, E for standard economic working mode, L for light and careful digging mode, B for attachment mode like breaker. Effective adjustment range of throttle knob in each mode is as follows: P mode: 1000-2150rpm, E mode: 1000-2000rpm, L mode: 1000-1800rpm, B mode: 1000-2000rpm. Press the button  to change operating mode and the instrument switching screen is shown in Figure 3-5.

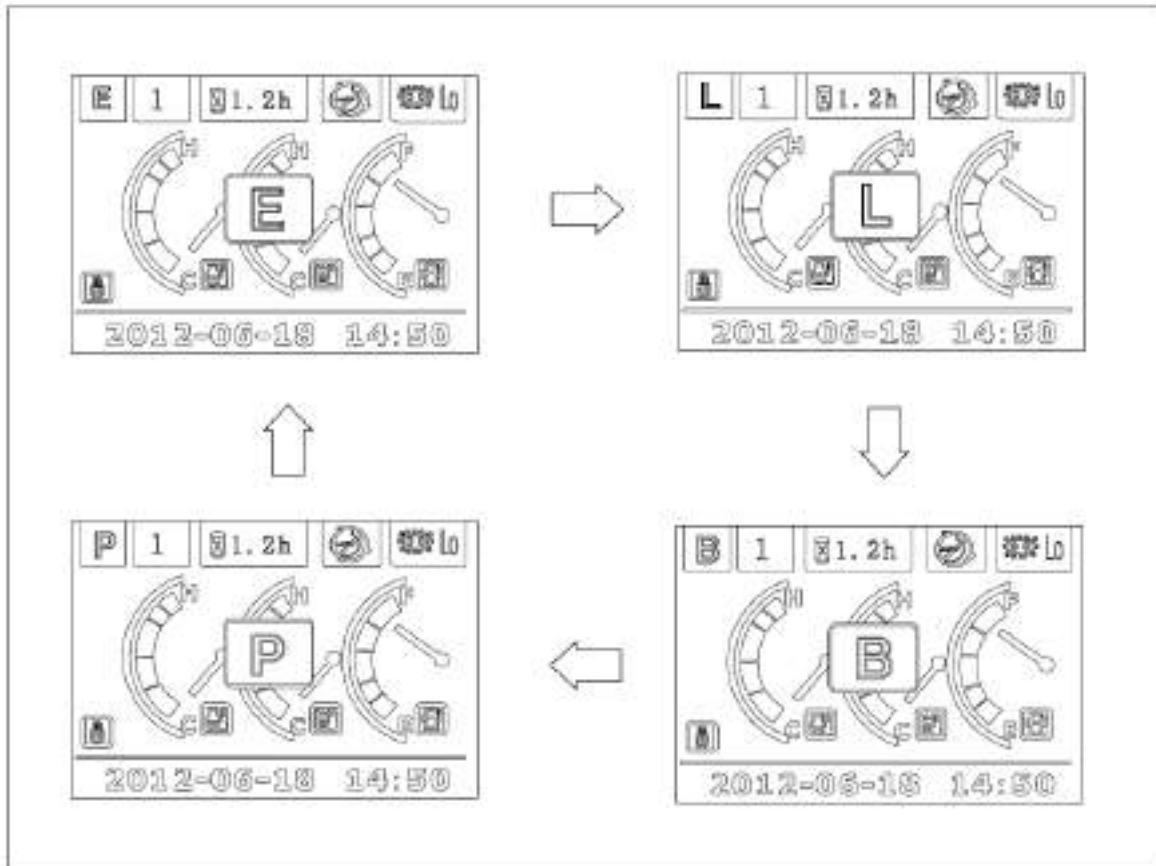



Figure 3-37 Menu for selecting working mode

3.2.2.2.3 Traveling speed selection

When you want to switch traveling speed, press the button  on dashboard: Hi stands for high-speed and L0 for low-speed. The power-on system default traveling speed is low speed. Every time when you switch the high and low traveling speed, the corresponding mode icon will be displayed on the dot matrix LCD, and the display will return to the standard interface two seconds later, as shown in Figure 3-38.

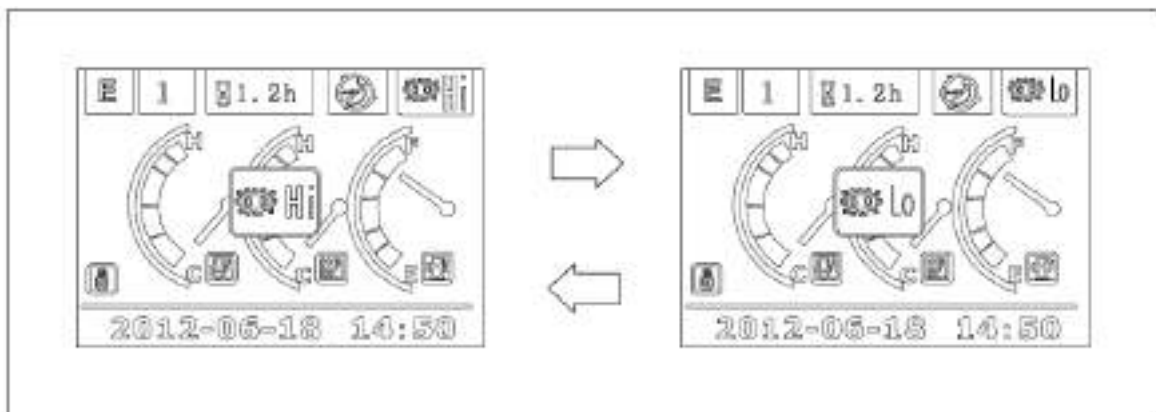


Figure 3-38 Traveling speed selection menu

3.2.2.2.4 Pilot safety switch

Before operation, pull the safety lever up, dot-matrix LCD panel shows the unlock state and safety solenoid valve is energized, as shown in Figure 3-39. Upon completion of operations, put the safety pilot lever down and dot-matrix LCD panel shows the locked state, as shown in Figure 3-40.

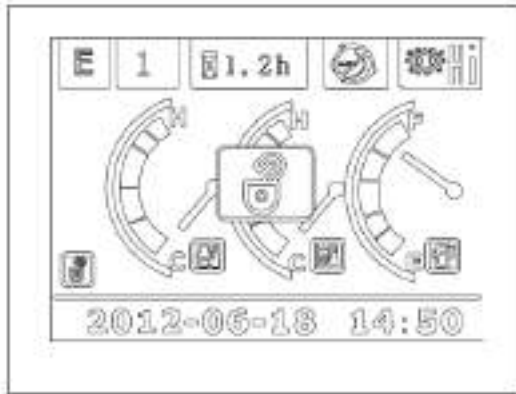


Figure 3-39 Status of safety locking lever during operation

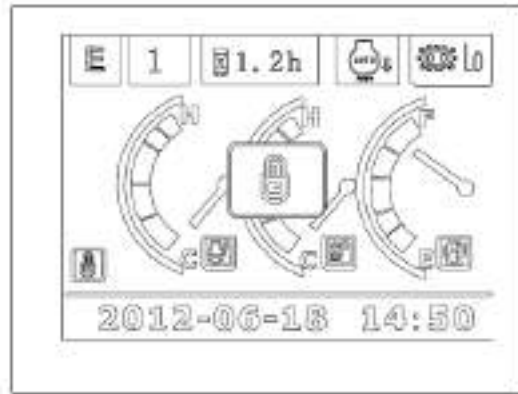



Figure 3-40 Status of safety locking lever after operation

3.2.2.2.5 Enable and disable automatic idling

Press the button  to enable or disable automatic idling function. Automatic idling is enabled by power-on system default, and then the automatic idling icon will show up on the dot matrix LCD display. When the engine speed for corresponding throttle gear is above 1350 rpm, the system controls the engine throttle and makes the engine start at 1350rpm. When the system detects that the hydraulic system is working after the machine was started, the system throttle can return to the position corresponding to the preselected throttle gear (according to the engine speed of corresponding throttle knob position in current operating mode). You can activate automatic idling function in 3 seconds delay to control the throttle and operate the engine at 1350rpm when the engine speed is more than 1350rpm and the hydraulic system does not work. When automatic idling is activated to decrease the throttle speed to 1350rpm, you cannot adjust the engine speed by adjusting the throttle knob. Press automatic idling button, the automatic idling function is canceled and the icon of automatic idling canceled will display. Press the button again to return the system default state, as shown in Figure 3-41 and 3-42.

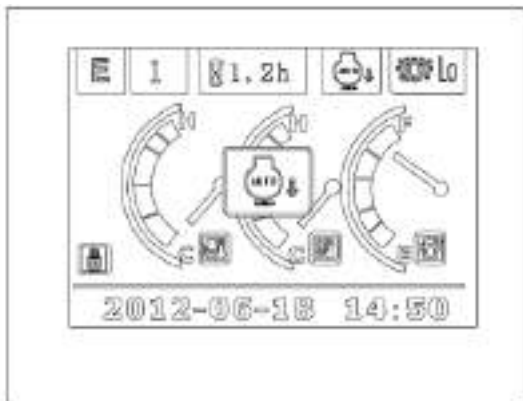


Figure 3-41 Menu for turning on the automatic idle switch

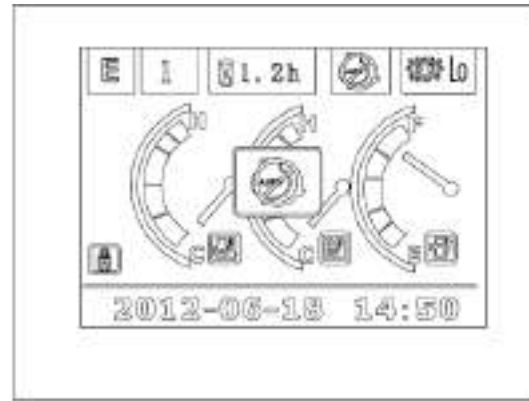



Figure 3-42 Menu for turning off the automatic idle switch

3.2.2.2.6 Check the operational parameters

Press the button  on the standard working interface to check the system operating status, including real-time analog data, switch states and working hours collected by the controller. Menu for operating parameters is shown in Figure 3-11.

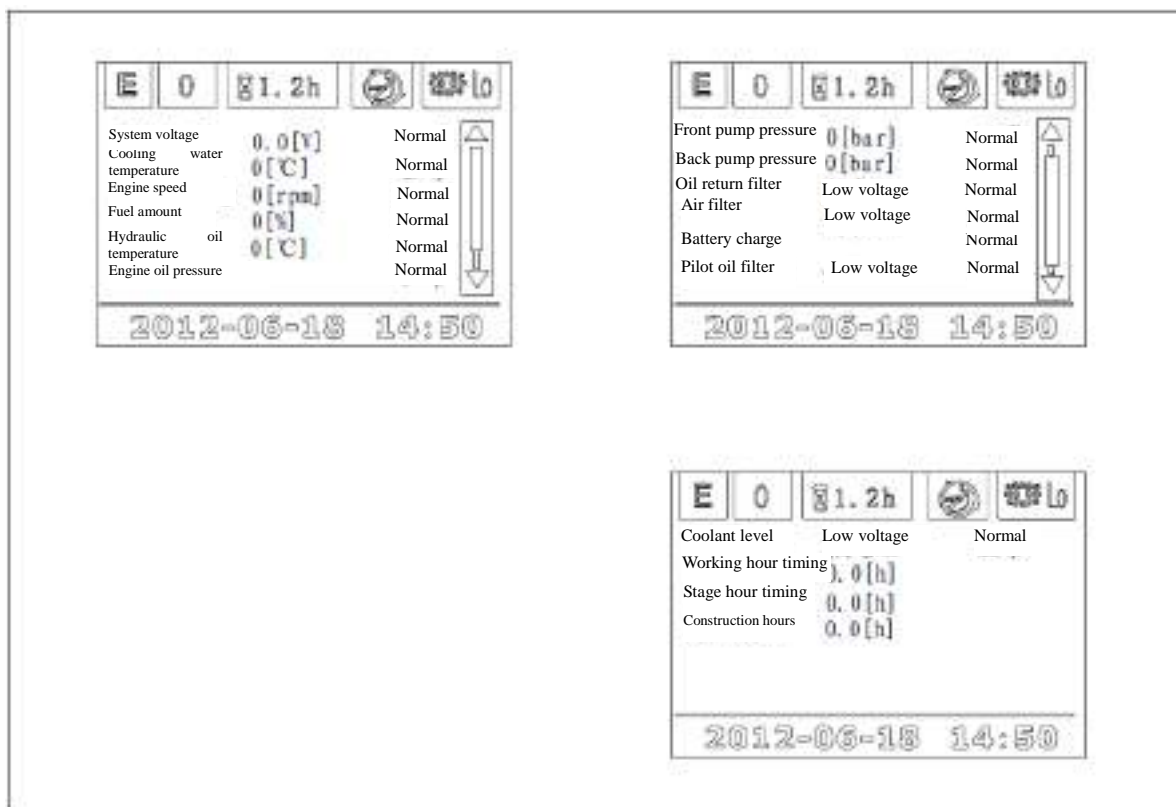



Figure 3-43 Operating parameter menus

3.2.2.2.7 Time / alarm prompts

When the system sends out no alarm, current time is displayed in this area; when the system sends out alarm signal, the center of the screen shows a red alarm icon and text prompts, as well as buzzer icon shown at the upper-left of the prompt frame (press  to startup or shutdown the buzzer). The menu for trouble-free condition is shown in Figure 3-44; the menu for failure condition is shown in Figure 3-45.

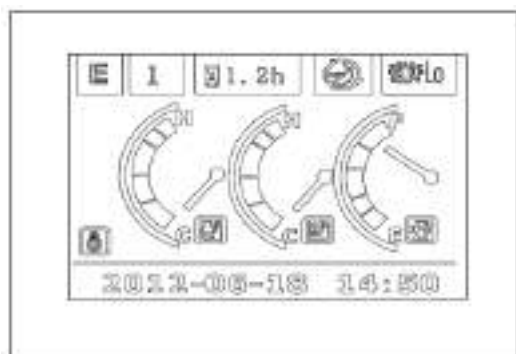


Figure 3-44 Time/alarm menu for trouble-free

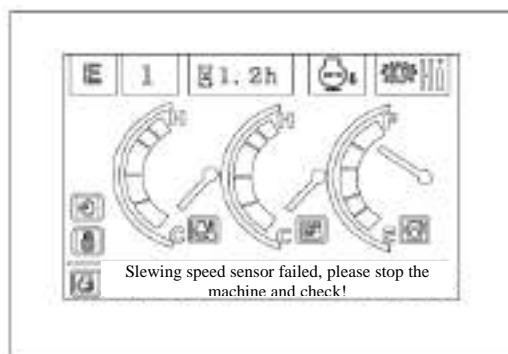


Figure 3-45 Time / alarm menu for failure

Each parameter alarm icon is shown in Figure 3-46.

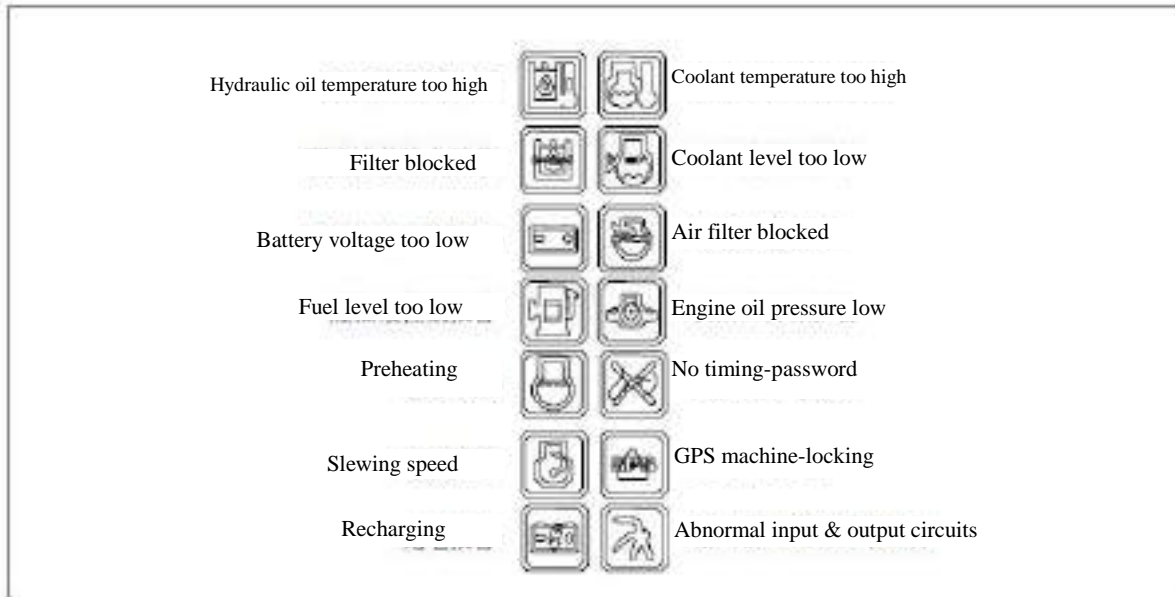



Figure 3-46 Each parameter alarm icon

3.2.2.2.8 System warming-up settings

System warming-up function can be activated or deactivated via menu operations. Press  on the standard interface to enter the main menu, select User settings by pressing the UP and DOWN buttons and

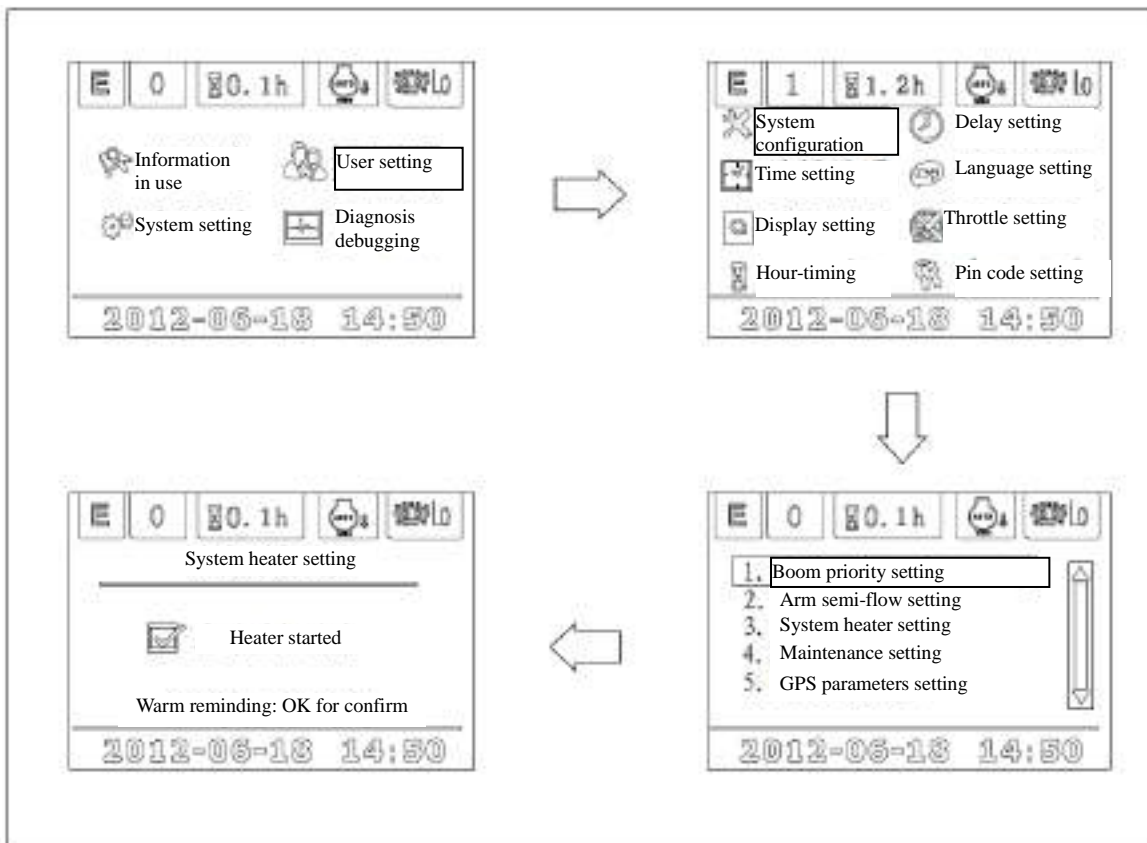



Figure 3-47 System warming-up setting

press OK button to enter the user settings interface, select the system configuration via the UP and DOWN keys, then press OK button to confirm and enter the system configuration interface, select system warming-up setting to enter the setting interface to activate or deactivate system warming-up, and finally press OK for confirmation. When this function is activated the system begins automatic warming-up at low speed when the coolant temperature is below 10 °C while the engine is started and this automatic warming-up ends when the coolant temperature rises to above 30 °C. You need to select power-on system default state for this function. System warming-up setting menu is shown in Figure 3-47.

3.2.2.2.9 Boom priority function settings

Boom priority function can be activated or deactivated via menu operations. Press  on the standard interface to enter the main menu, select User settings by pressing the UP and DOWN buttons and press OK button to enter the user settings interface, select the system configuration via the UP and DOWN keys, then press OK button for confirmation and enter the system configuration interface, select boom priority setting to enter the setting interface to activate or deactivate boom priority, and finally press OK for confirmation. This function is activated by power-on system default state. Boom priority function setting menu is shown in Figure 3-48.

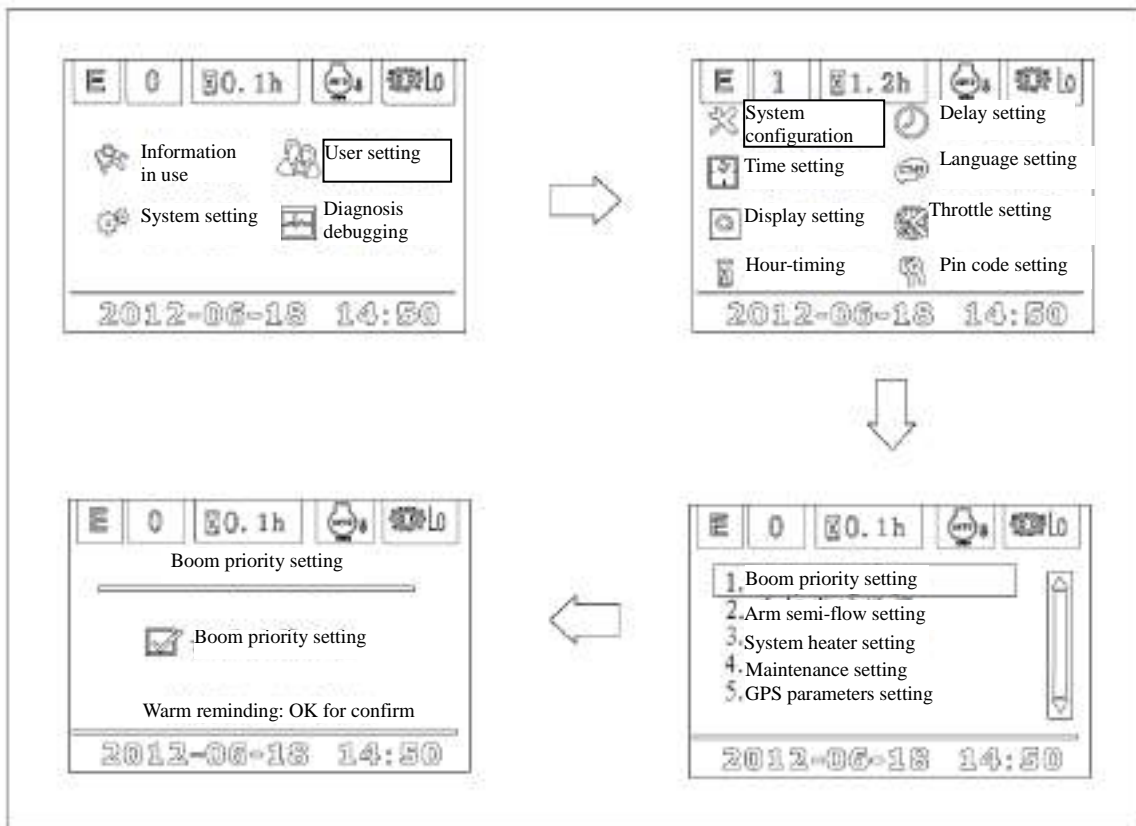


Figure3-48 Boom priority function setting menu

3.2.2.2.10 Arm semi-flow function settings

Arm semi-flow function: When the system is operating under L mode, the screen displays the arm semi-flow icon and the system will automatically activate this function; when the system does not work under L mode the system will automatically deactivate the arm semi-flow function, as shown in Figure 3-49

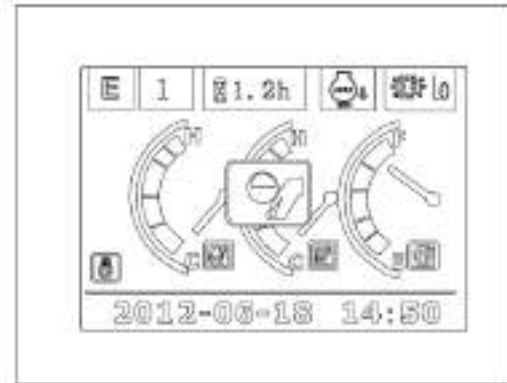



Figure 3-49 Arm semi-flow function setting menu

3.2.2.2.11 Period hour timing setting

Period hour timing function can be activated or deactivated via operating the menu key. Press the 

button on the standard interface, select the User setting via the UP and DOWN keys, and press OK to enter the user setting interface, then select the hour timing set by the UP and DOWN keys, then press OK to confirm and enter into the hour timing interface to activate or deactivate the function and then press OK to confirm. Setting menu is shown in Figure 3-50.

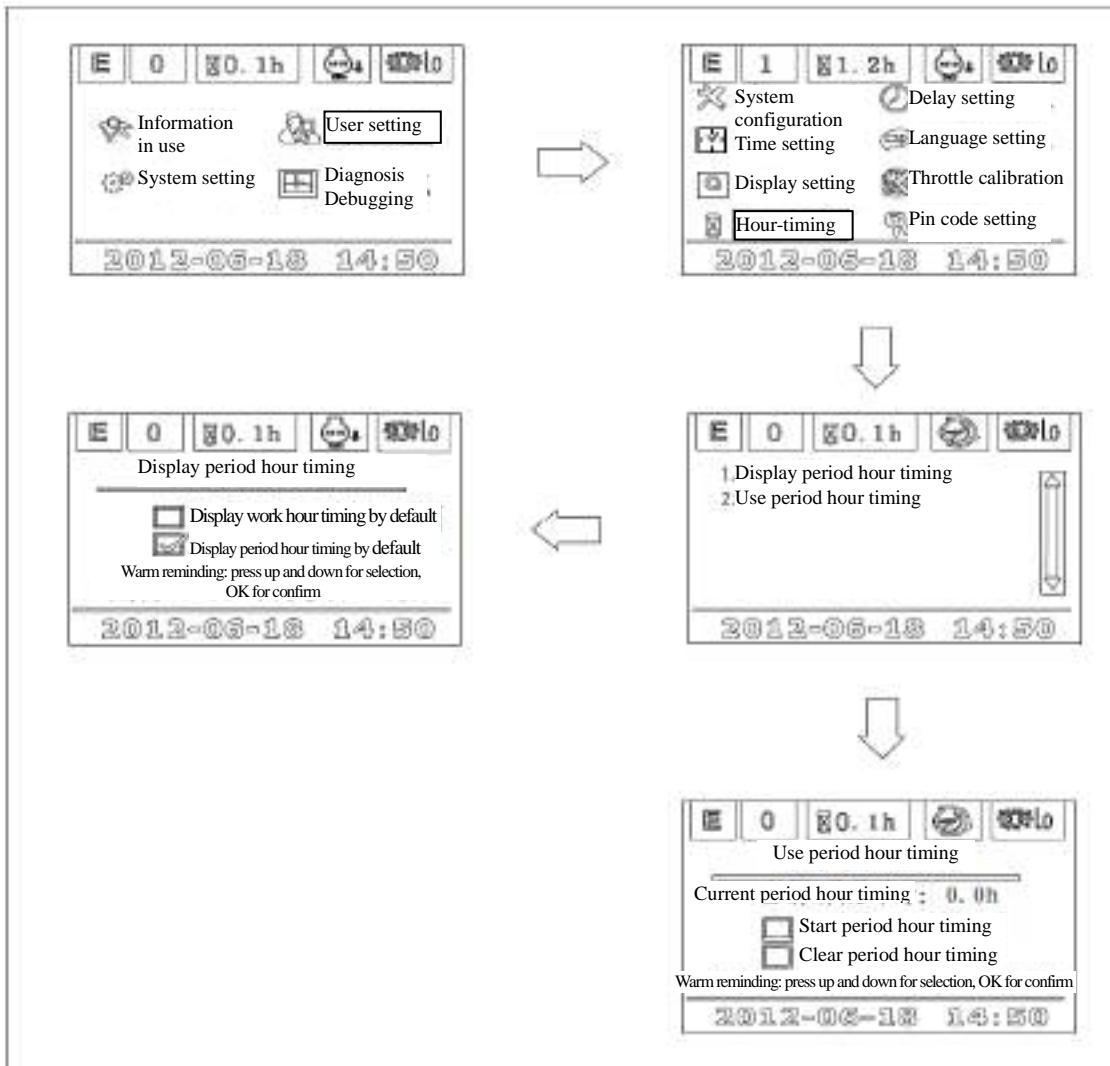


Figure3-50 Period hour timing setting menus

3.2.2.2.12 Check and set maintenance information

The system provides 500-hour, 1000-hour, 2000-hour and 5000-hour regular maintenance information, which is sent out 30 hours in advance. You can also check the maintenance information by pressing the button, as shown in Figure3-51. For instance, when working hours reach 470 hours, the screen displays the self test prompt at power on, as shown in Figure 3-52: when maintenance is completed, you can enter the maintenance setting interface to set that the maintenance is completed, as shown in Figure 3-53

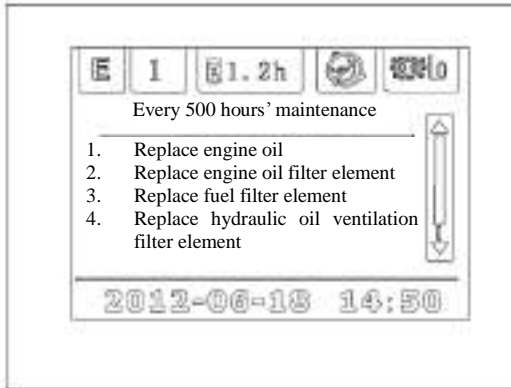


Figure 3-51 Check the maintenance information

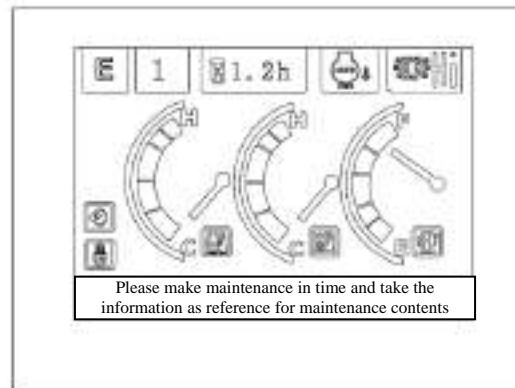


Figure 3-52 Maintenance information prompt

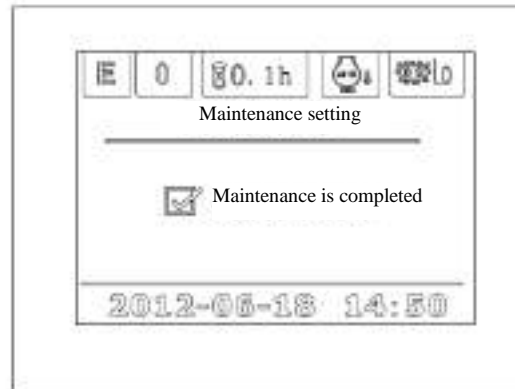


Figure 3-53 Maintenance setup menus

3.2.2.2.13 Pressure Boost switch

Only when the system power mode is under P and E mode and the engine speed is above 1650rpm, can the system perform pressure boost function. Press the button switch on the right lever, the system digging force is increased to the maximum and this function will be deactivated after 8 seconds. Moreover, this function can only be repeated after a 3-second interval. If current power mode is B mode, the system automatically switches the switch into breaker or other accessories switch. The pressure boost switch icon and the interface are shown in Figure 3-54.

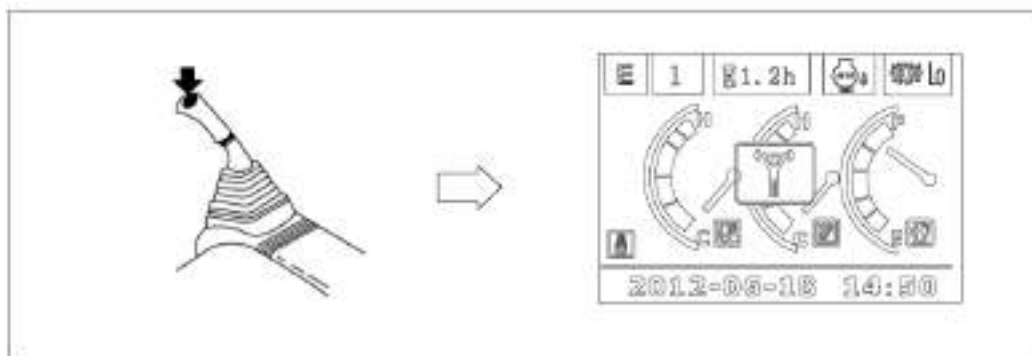



Figure 3-54 Pressure boost switch icon and the interface

3.2.2.2.14 Help / silencing

When the system sounds an alarm, press  for silencing, otherwise, for help information. The help information covers order operation prompt, instructions for using timing, control and maintenance of throttle and contacts.

3.2.2.2.15 Throttle setting

When the speed of each gear deviates a lot from the set speed, customers can reset the throttle by entering user setting interface and selecting the throttle adjustment setting.

- a) Press OK to confirm whether entering the throttle setting, the interface is shown in Figure 3-55.
- b) Throttle adjustment is setting, as shown in Figure 3-56

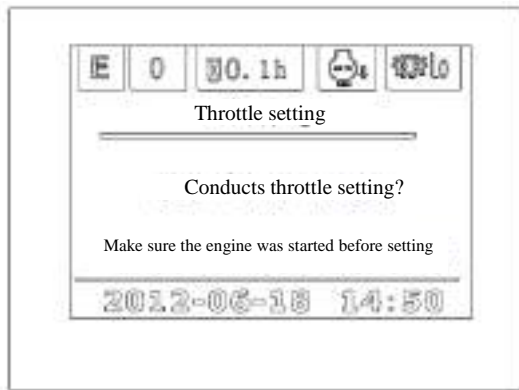


Figure3-55 Confirm whether to enter the setting interface

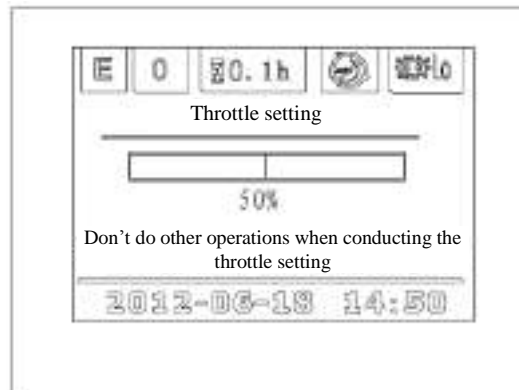


Figure3-56 Setting percentage

- c) Throttle setting completed, as shown in Figure 3-57.

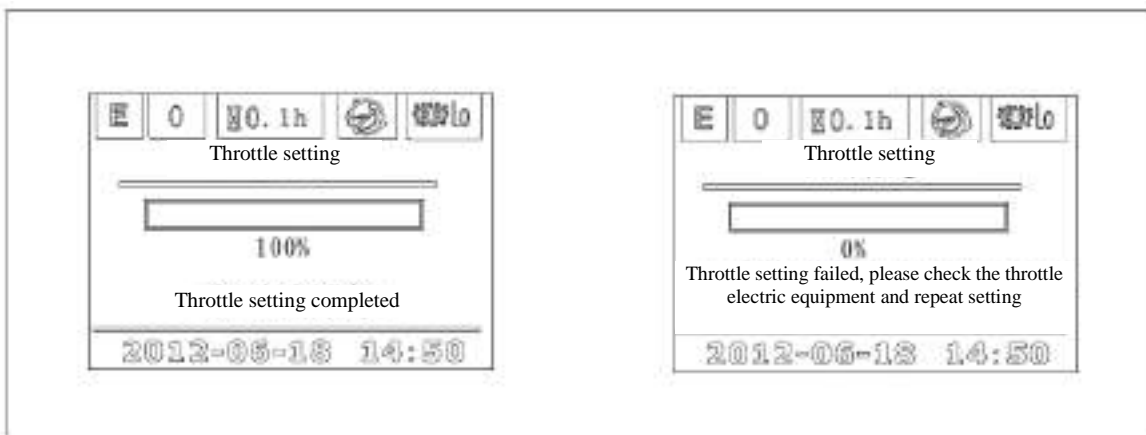



Figure3-57 Throttle setting interface

3.2.2.2.16 Time setting

- a) Press  at the standard interface to enter main menu, select user settings with

UP and DOWN icons and then confirm, the interface is shown in Figure 3-58

b) Select time setting via UP and DOWN icons under the user setting interface and then press OK to confirm, the interface is shown in Figure 3-59

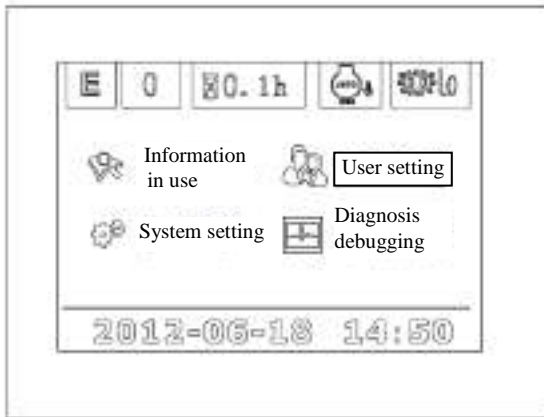


Figure3-58Main menu interface

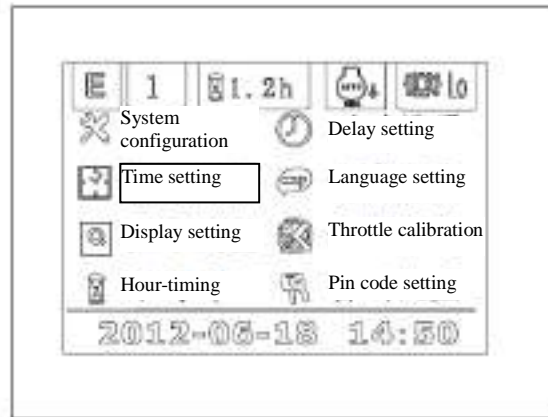


Figure3-59 User setting interface

c) After entering the timing setting interface, enter the exact time through the UP and DOWN icons, the interface is shown in Figure 3-60

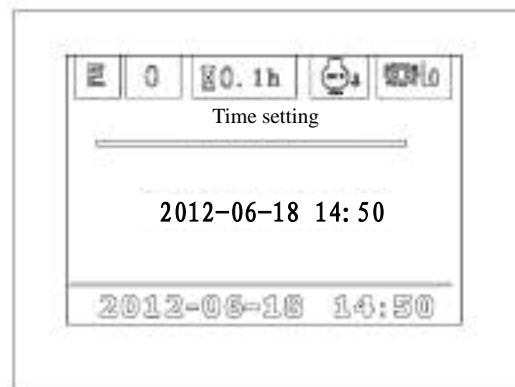


Figure 3-60 Time setting interface

3.2.2.2.17 Keyboard light

Keyboard light can be activated or deactivated both automatically according to the month and the system time and selectively via the buttons on the order. when the keyboard light function is started, all the keys display green

a) Time table for the keyboard light automatic turn-on or turn-off according to the month and system time, As shown in Table 3-1.

Table 3-1 keyboard light automatic turn-on and turn-off time

Month	keyboard light automatic turn-on time	keyboard light automatic turn-off time
April-October	18:00	7:00
Nov.-Dec. Jan.-March	17:00	8:00

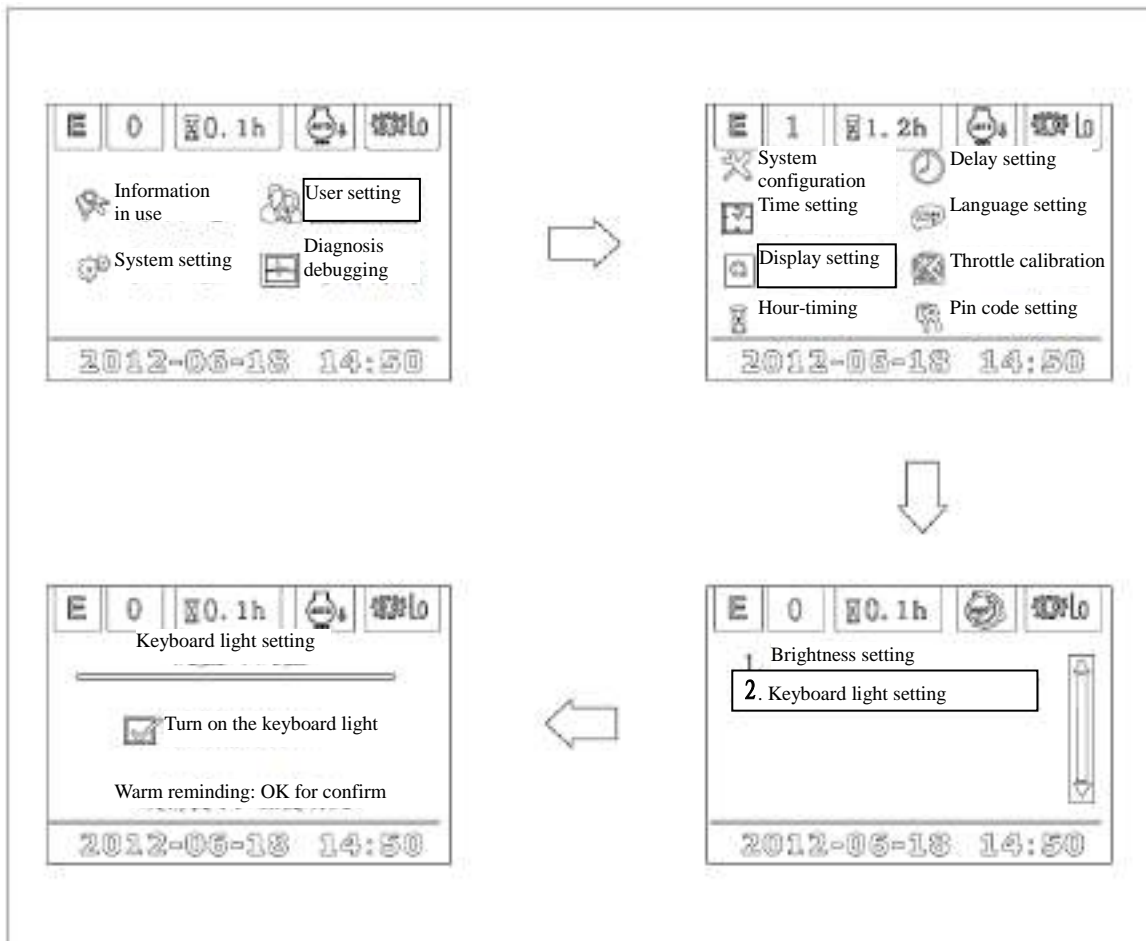



Figure 3-61 Keyboard light setting

b) Select keyboard light turn-on or turn-off via the menu keys. Press  on the standard display interface to enter the main interface, select the user menu by direction keys and press OK to confirm, then you can choose display setting under the user setting interface and press OK to enter display setting interface to start keyboard light function, as shown in Figure 3-61

3.2.2.2.18 Pointer gauge

a) Coolant temperature gauge: It indicates the current engine coolant temperature. The display range is -40 ~ 120 °C. The yellow segment is below 40 °C, the green segment is between 40 ~ 102 °C, and the red segment is the alarm segment. When the engine coolant temperature T is no less than 105 °C, the controller automatically controls engine throttle to downshift into a lower gear to protect the engine; if the engine coolant temperature T is no more than 95 °C, the overheating protection function is automatically canceled.

b) Hydraulic oil temperature gauge: It indicates the current hydraulic oil temperature. The display range is from -40 ~ 110 °C. The yellow segment is below 40 °C, the green segment is between 40 ~ 90 °C, the red segment is the alarm segment.

c) Fuel level gauge: display range is from 0 to 100% , and the red segment is 0 to 10%.

3 Basic operating instructions

3.3.1 The basic checking items



1. You cannot completely rely on the monitor to determine the machine’s status. While doing daily checks before startup, you should get off from the machine and conduct direct checks for all items instead of simply relying on the monitor.

Before starting the engine, you must check two basic items: coolant low-level alarm and maintenance prompts. If there are any abnormalities, corresponding instruments will go on and the buzzer will sound.

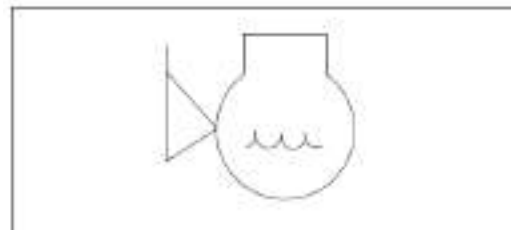


Figure 3-62 Coolant low-level alarm

a) Coolant low-level alarm

This indicator warns the operator that the coolant level in this radiator has dropped. If coolant level in this radiator is too low, the light turns red. Then you should check the coolant levels in this radiator and auxiliary tank and add water, as shown in Figure 3-62.

b) Maintenance prompts indicator

Maintenance prompt indicator is a warning light to remind the operator that the set time since the last maintenance is up, as shown in Figure 3-63.



Figure 3-63 Maintenance prompt indicator

This warning stops and returns to normal operation status after 5 seconds. If the maintenance is completed, you can press the "OK" button on the screen, indicating that the maintenance is completed.

If you need to change the setting of maintenance period, please contact Zoomlion or Zoomlion dealer.

c) Charge indicator

Battery voltage alarm warns the operating personnel that there is charging abnormalities while the engine is running. If the battery did not properly charged when the engine is running, the corresponding alarm icon will go on, along with text prompts, as shown in Figure 3-64

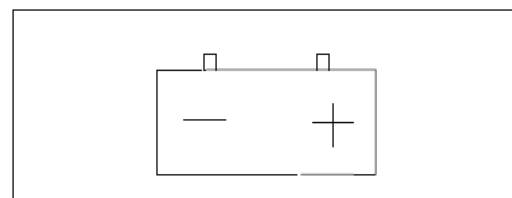


Figure 3-64 Charge indicators

d) Fuel level too low alarm

When this alarm light is on, the operator is warned that the fuel level is too low, the fuel left can only support the machines to work for 1 to 2 hours and he should add fuel as soon as possible, as shown in

Figure3-65.

e) Air filter blocked

When this alarm light is on, the operator is warned that the air filter is blocked, as shown in Figure 3-38.

Turn off the engine, and check and clean the air filter.

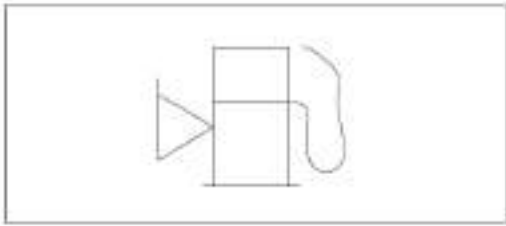


Figure 3-65 Fuel level too low alarm

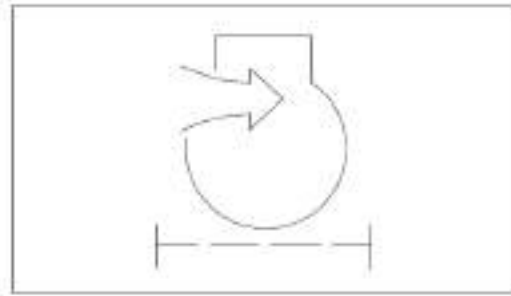


Figure 3-66 Air filter blocked alarm

3.3.2 Emergency stop items



1. If the indicator turns red, immediately turn off the engine or keep it running at low idle speed, then check corresponding parts and take necessary actions.

When the engine is running, you should pay particular attention to these items. In case of any abnormalities, the indicators corresponding to abnormal parts will turn red, and the buzzer will sound, so immediate action should be taken.

a) Coolant temperature alarm

The coolant temperature alarm warns that the coolant temperature is too high.

If the engine coolant temperature becomes abnormally high, the warning light turns red, overheating prevention system automatically starts and the engine speed drops, as shown in Figure 3-67

If necessary, stop the operation and keep the engine running at low idle speed until the warning light is black out.

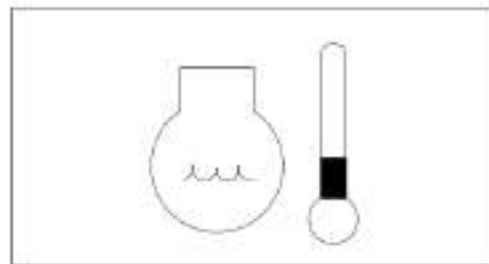


Figure 3-67 Coolant temperature alarm

b) Hydraulic oil temperature alarm

The hydraulic oil temperature alarm warns the operator of increased hydraulic oil temperatures. If the warning light turns red during operation, run the engine at low idle or shut down the engine until the oil temperature drops and the warning light goes out, as shown in Figure 3-68.

c) Engine oil pressure alarm

If the engine lubricating oil pressure falls below normal level, this alarm light turns red. Then turn off the engine and check the lubrication system, as well as the oil level in the sump, as shown in Figure 3-69

Note: This indicator will be on when the starter switch is turned to ON position and it goes off as long as the engine is started. It is normal that the buzzer sounds temporarily when the engine is being started.

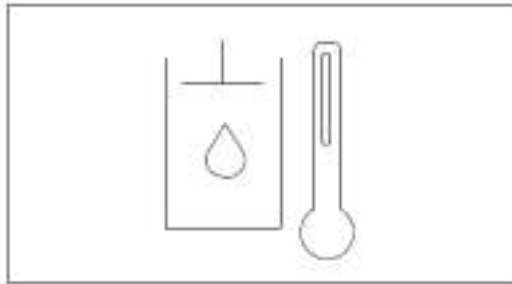


Figure 3-68 Hydraulic oil temperature alarm

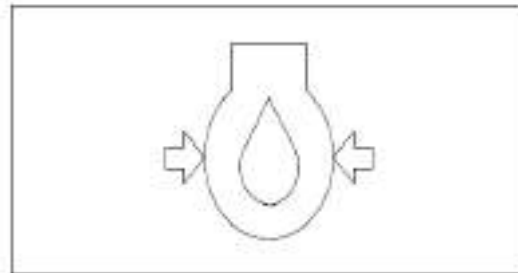


Figure 3-69 Engine oil pressure alarm

3.3.3 Basic operations of switches

Locations of switches are shown in Figure 3-70

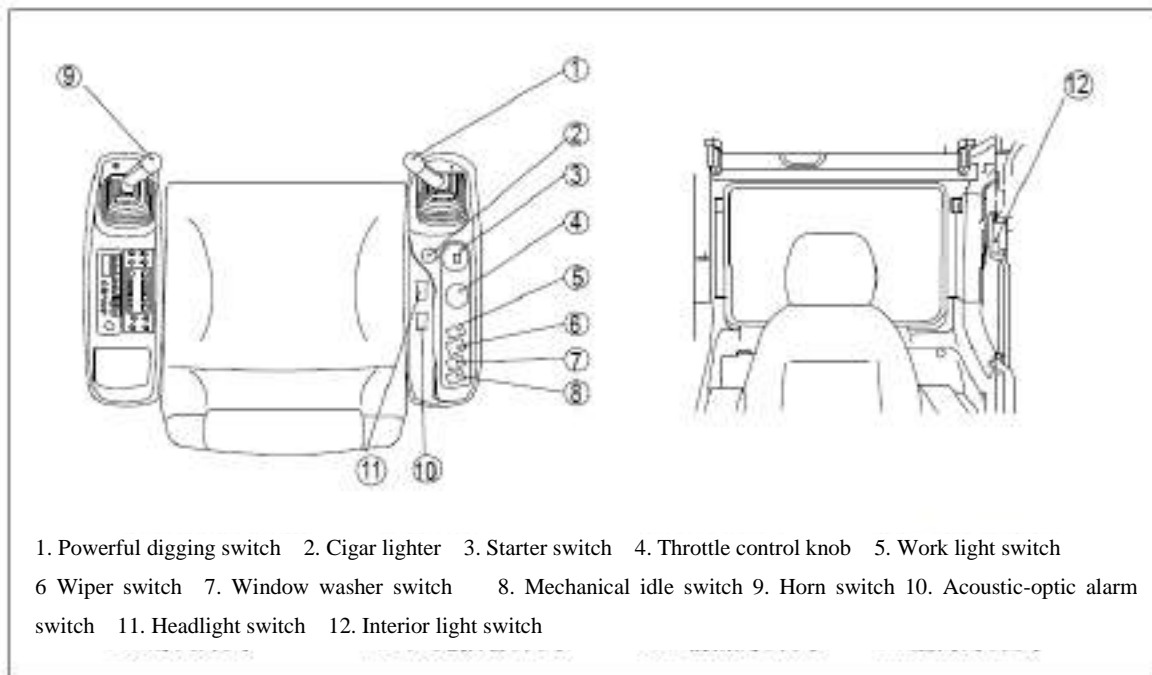


Figure 3-70 Switch location diagram

3.3.3.1 Powerful digging switch

The powerful digging switch (1) on the top of the right lever shown in Figure 3-71 is increasing digging force. Press the switch and the powerful digging icon at the upper area of the display will show the weightlifter lifting the barbell. Under P or E mode and when the speed is greater than 1650 rpm, the machine

can function at maximum power for 8 seconds. After that, the hydraulic pressure and engine speed return to normal.



1. The interval between two powerful digging operations should be at least three seconds and only a maximum of three powerful digging operations are allowed within one minute.

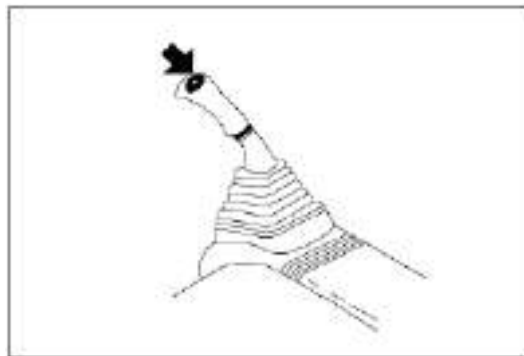


Figure 3-71 Powerful digging switches

3.3.3.2 Cigarette lighter

Light cigarettes with the switch (2) shown in Figure 3-72. When being pushed in, the cigarette lighter will return to its original position a few seconds later; pull it out and it is ready for use. If the cigarette lighter is removed, it turns into a power outlet (The maximum bearing power is 85W). The power of the cigarette lighter is 85W (24V x 3.5A).



Figure 3-72 Cigarette lighter

3.3.3.3 Starter switch

The starter switch (3) is used to start or shut down the engine as shown in Figure 3-73.

OFF position: You can insert or remove the key.

ON position: the electrical system connects to power. When the engine is running, make sure the starter switch key remains at the ON position.

START position: This is the engine start position. When starting the engine, the key is at this position. After the start of the engine, release the key immediately, and it will automatically return to the ON position.

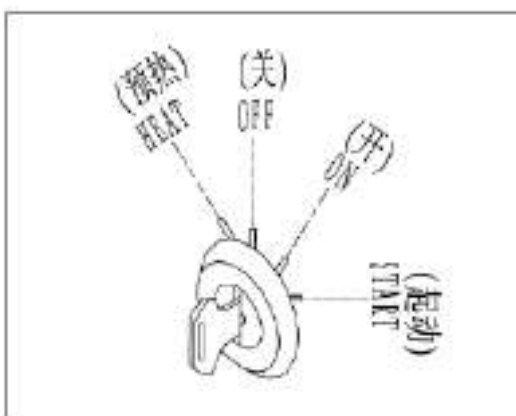


Figure 3-73 Starter switch



1. The pilot safety locking lever must be locked when starting the engine, turn the starter switch to the START position. and if the engine fails to start after 10 seconds, please wait for another 2 minutes to restart the engine. If the starting of the engine continues for more than 15 seconds, the starter may burn out.

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3.3.3.4 Throttle control knob

The control knob (4) is used to control the engine speed and power output, as shown in Figure 3-74.

- a) Low idle position: turn this knob left (counterclockwise)
- b) High idle position: turn this knob right (clockwise)

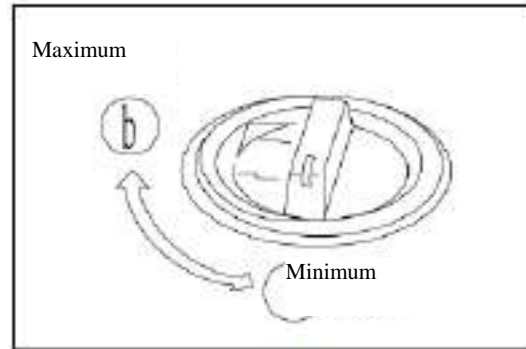


Figure 3-74 Throttle control knob

3.3.3.5 Work lights switch

The switch (5) shown in Figure 3-70 (5) is used to control the headlights and boom lights. The switch works at three positions:

- a) All lights are off
- b) Boom is on
- c) Both lights are on

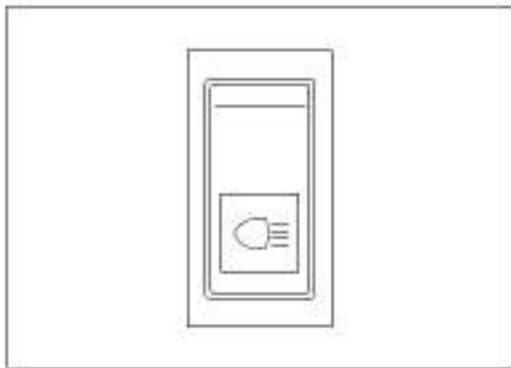


Figure 3-75 Work light switch

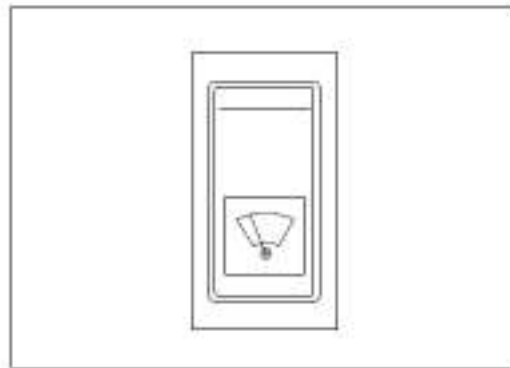


Figure 3-76 Wiper switch

3.3.3.6 Wiper switch

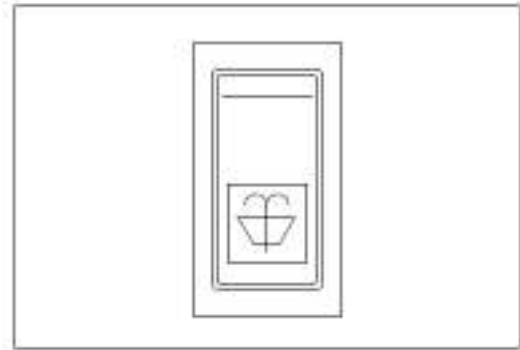
The wiper switch (6) shown in Figure 3-48 is used to control the activation and speed of the wiper.

The switch works at three positions:

- a) The wiper is off
- b) The wiper works slowly.
- c) The wiper works quickly

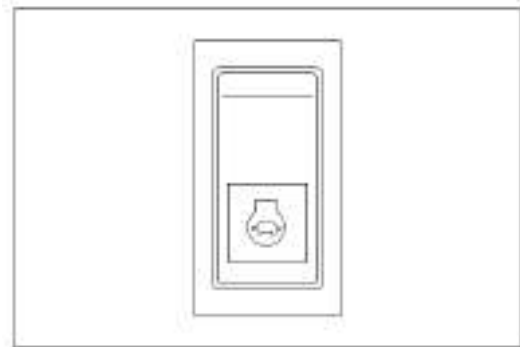
3.3.3.7 Window washer switch

You need to spray water on the glass during cleaning. The window washer switch (7) shown in Figure 3-77 is used to control the activation and speed of the washer. The switch only works at ON and OFF positions.

**Figure 3-77 Window washer switch**

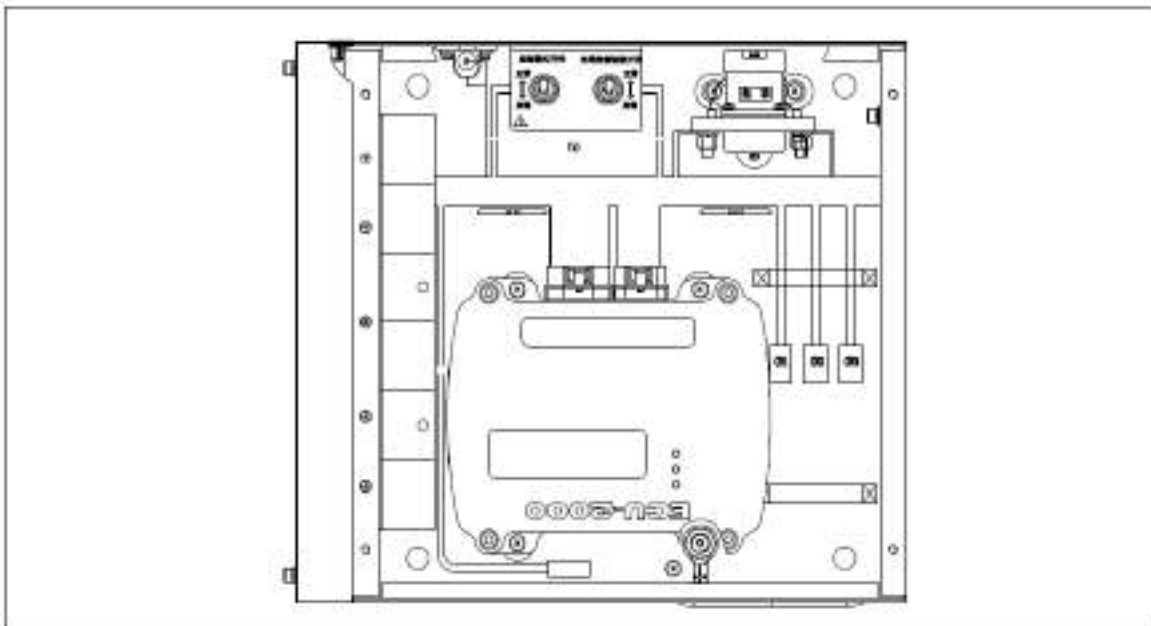
3.3.3.8 Idle switch

When the left and right control levers as well as the traveling lever are in the neutral positions, press the switch (8) shown in Figure 3-78, and the control system reduces the engine speed to the minimum and the instrument displays the idle icon and text prompts. The idle function will be automatically canceled when the left or right control lever or the traveling lever moves.

**Figure 3-78 Idle switch**

3.3.3.9 Emergency mode switch

When the controller can not work properly, pull the emergency mode switch (as shown in Fig 3-79) to the emergency position to control the main pump proportional solenoid to output a constant current.

**Figure 3-79 Emergency mode switches**

3.3.3.10 Acoustic-optic alarm switch

Switch (10) shown in Figure3-70 is used to control the on-off of the sound and light alarm, as shown in Figure 3-80.



Figure 3-80 Acoustic-optic alarm switches

3.3.3.11 Headlamp switch

Switch (11) shown in Figure 3-70 is used to turn on the two headlamps, and the icon is corresponding to the work light, shown in Figure 3-75.

3.3.3.12 Interior light switch

The switch (12) shown in Figure3-70 is used to open the interior lights. ON position: light on; OFF position: Light off. Please see Figure 3-81.

3.3.3.13 Horn switch

When you press switch button (9)at the top of left lever, the horn sounds, as shown in Figure 3-82..

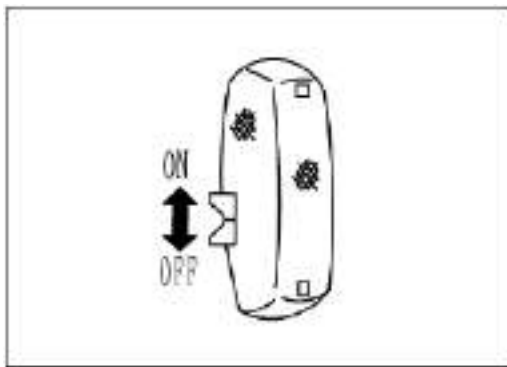


Figure 3-81 Interior light switch

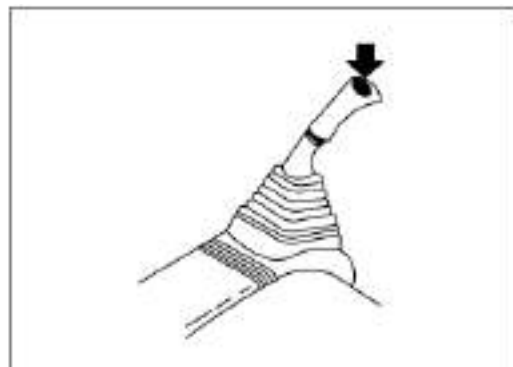
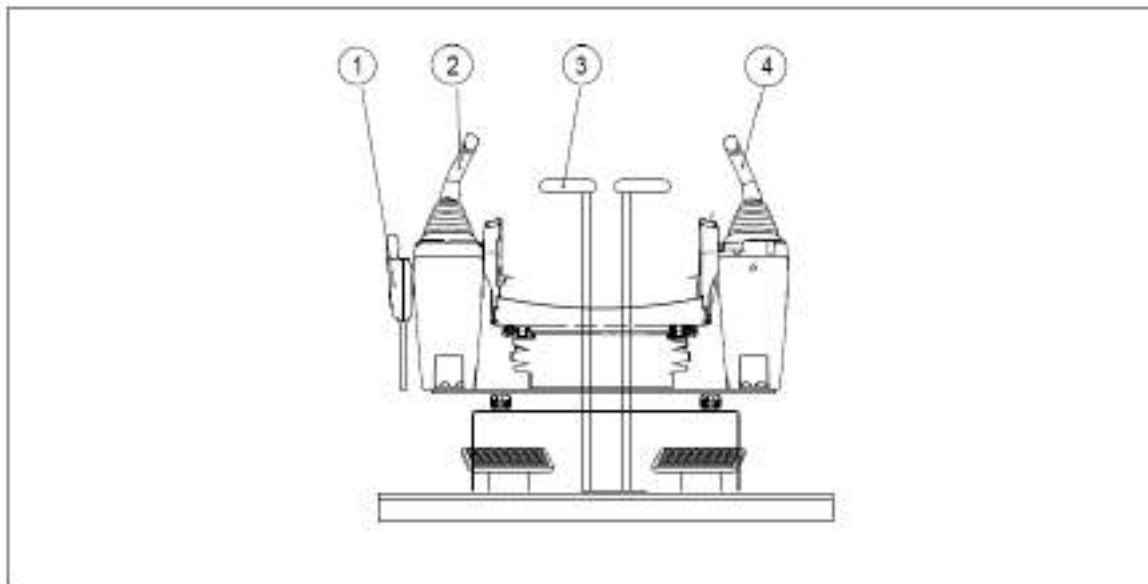


Figure 3-82 Horn switch

3.3.4 Instructions of the control devices

Layout of each control devices is shown in Figure 3-83.



- | | |
|-------------------------|--------------------|
| 1. Safety locking lever | 3. Traveling lever |
| 2. Left lever | 4. Right lever |

Figure 3 - 83 levers

3.3.4.1 Safety locking lever



1. When leaving the cab, the safety locking lever must be firmly placed in the locked position, as shown in Figure 3-84. If not, serious personal injury may be caused when the lever is moved by mistake.

2. If the safety locking lever is not securely placed in the locked position, the lever may be moved, resulting in a serious accident or injury.

Pay attention not to touch the lever for working device when pulling the safety locking lever up.

Pay attention not to touch the lever for working device when pushing the safety locking lever down.

The lever ① is a device for locking working device, slewing, traveling and accessories (if any). Pull the lever up to lock the device.

The locking lever is of hydraulic lock type, so even if it is in the locked position, the levers for working devices and the traveling lever can still be moved, but the working device, traveling motor and slewing motor will not work.

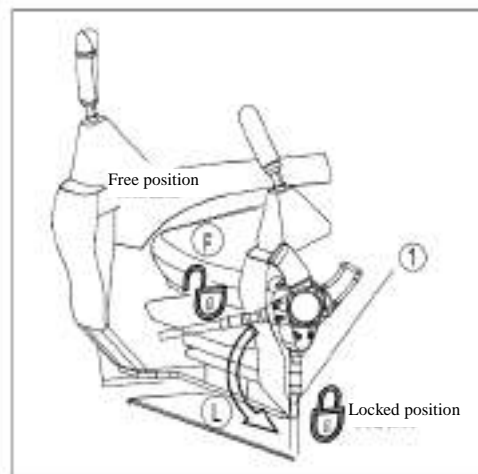


Figure 3-84 lever at the locked position

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3.3.4.2 The use of lever

3.3.4.2.1 Lever for working device

Changes of the automatic idle function of engine are as follows:

a) When the traveling lever and the levers for working device are in the neutral positions, the engine speed will be reduced to idle even if the fuel control knob is at a speed above the medium-speed. Operating of either one of the levers will raise the engine speed to the speed set by the fuel control knob.

b) If all levers are in the neutral positions, the engine speed will be reduced down to the set speed of the automatic idle speed (about 1350rpm) after about 5 seconds.

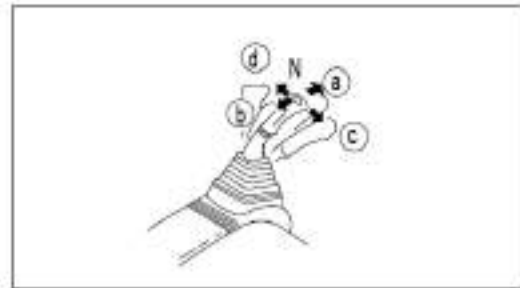


Figure 3-85 lever at the left side of the device

c) The left lever ② shown in Figure 3-83 and Figure 3-85 is used to control the bucket arm and the slewing of superstructure.

- a) Arm unloading
- b) Arm digging
- c) Slew to right
- d) Slew to left

N (neutral position): the superstructure and the arm remain fixed in place.

d) The right lever ④ shown in Figure 3-54 and 3-57 is used to operate the boom and bucket.

Operation of boom / bucket:

- a) Raise the boom
- b) Lower the boom
- c) Bucket unloading
- d) Bucket digging



Figure 3-86 right levers

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

3.3.4.2.2 Traveling lever



1. Unless the machine is traveling, do not step your feet on the pedal, if your feet stays on the pedal and depresses it by mistake, the machine will move suddenly and may cause a serious accident.

2. When the track frame faces backward, the machine moves in reversing direction in way of traveling forward and forward direction in way of reverse traveling.

3. Check if the track frame faces forward or backward before using the traveling lever. (If the sprocket is in the rear, the crawler frame faces forward.)

4. When pedal is used for controlling operation and traveling, particular attention should be paid.

The lever ③ shown in Figure 3-83 is used to change the machine's traveling direction (when the front of the superstructure is in the same direction with the idler), as shown in Figure 3-87. The following is the description for pedal operation.

(a) Traveling forward: move the lever forward (tilt the pedal forward).

(b) Reverse: move the lever backward (tilt the pedal backward).

(c) N (neutral): the machine stops.

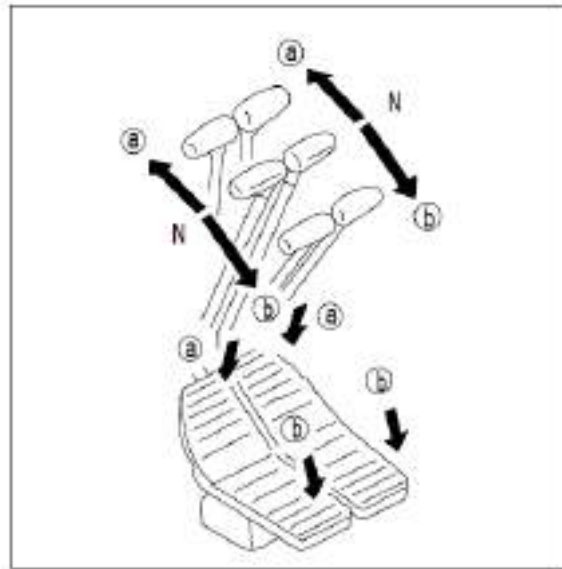


Figure 3-87 traveling lever and pedals

3.4 Cab accessories operating instructions

3.4.1 Ashtray

The ashtray is in the right front side of the cab. Be sure to put out the cigarette before putting it into the astray and then close the lid.

3.4.2 Air conditioner

3.4.2.1 Precautions for using the air conditioner



1. The air conditioner should be started when the engine is running at low speed. Do not start the air conditioner when the engine is running at high speed, for this will cause damage to the air conditioner.

2. If water enters into the control panel of the A/C, accidental failures may occur. Therefore, be careful not to allow water to enter into these parts. Besides, do not expose these parts to open flame.

a) When using the A/C, the cab should be kept ventilated:

Smoking when the A/C is on is bad for eyes, so you should open the window for ventilation and activate the cooling system of A/C for a while to exclude the smoke.

When the A/C has run for a long time, ventilate the cab and activate the cooling system of A/C once per hour.

b). Fog on windows:

In rainy or humid days, if fog appears at the inner side of the window, open the air conditioner to help keep the window clear. Excessive use of air conditioner in very humid air may cause fogging at the outside of the window. At this time, you should turn off the air conditioner to regulate the temperature of the cab.



1. Be careful not to set the cab temperature too low. When the cooler is on, set the temperature to one that is 5-6 °C lower than the outdoor temperature. This temperature is considered to be the most suitable for human body. So pay attention to properly regulate the temperature.

3.4.2.2 Button description

The air conditioner should be turned off when the engine gets started; the air-conditioning control panel equipped in the machine is shown in Figure 3-88.

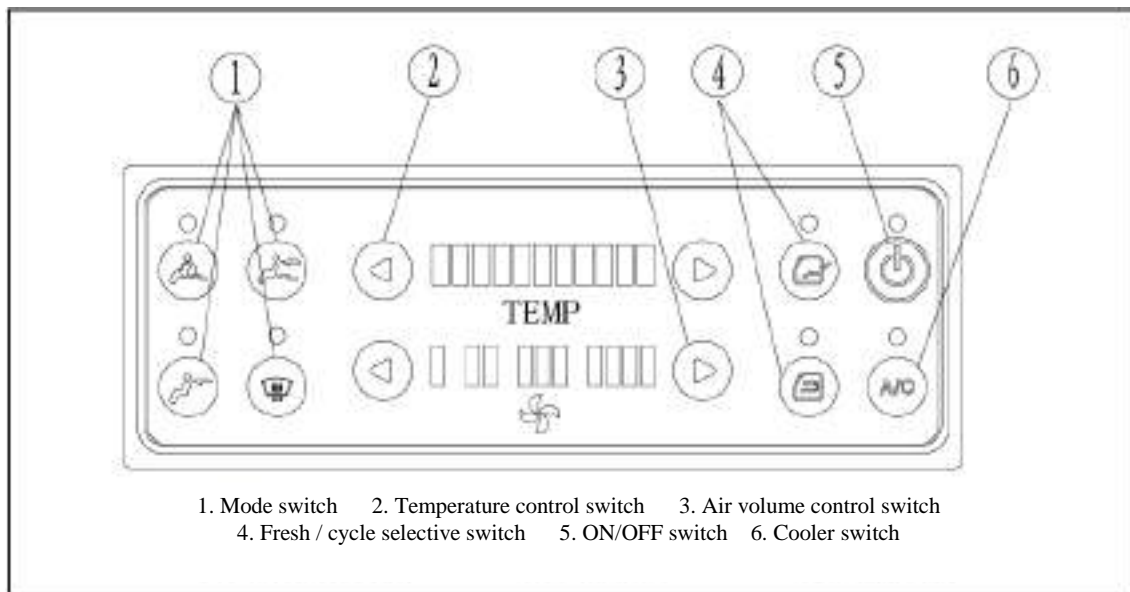


Figure 3-88 A/C control panel

1. Mode switches:

Switch (1) is a group of air regulator or ventilation selection switch as shown in Figure 3-89. There are four modes:



: Bottom ventilation, ie, wind comes out from vent C.



: Bottom and rear ventilation: wind comes out from vents A and C at the same time.



: Rear ventilation: wind comes out from vent A.



: Defrosting: bottom and front air vents are opened

- (A): Rear vents (4)
- (B): Front vent (1)
- (C): Bottom vent (1)
- (D1): Front window vent (1)
- (D2): Front window vent (1)

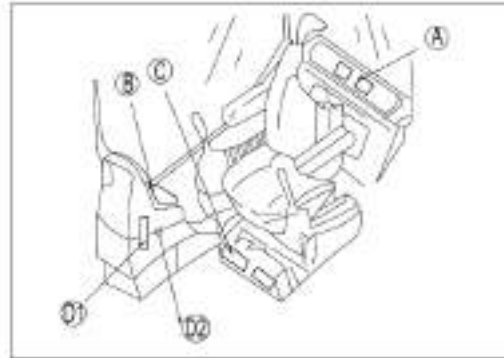


Figure 3-89 Vent of the air conditioner


Description:


The front window vent (D2) can be turned on or off by hand.

2. Temperature control switch:

The switch (2) is used to control the temperature of the cab. There are 12 grades of temperature available for adjustment, with red for heating and blue for cooling.


Tip: While heating, A/C is in closed state and corresponding indicators are off, while cooling, A/C must be on and corresponding indicators are on.


Press the  switch to increase the set temperature.

Press the  switch to decrease the set temperature.

3. Air volume control switch:

The air volume control switch (3) is used to adjust air flow among four grades, namely low, middle 1, middle 2 and high.

Press the  switch to increase the set air volume.

Press the  switch to reduce the set air volume.

4. Fresh / cycle selective switch:

The switch (4) is used to switch between interior air recirculation and outdoor air inlet.



: Fresh air inlet: This switch is used for outdoor air inlet or defrosting.



: Outdoor air is cut off and only interior air circulation is activated. Use this switch for rapid cooling of the cab or when the outdoor air is not clean.

5. ON/OFF switch:

The switch (5) controls the on or off state of the A/C.

6. A/C cooling switch:

Turn on the switch (6) for cooling and the compressor is started. Turn off this switch for heating and the compressor stops working. Generally, the temperature adjustment switch is used for cooling among grades

2-5 and for heating among grades 6-11.

3.4.2.3 A/C operating instructions

3.4.2.3.1 Panel operation

- a) Press the air volume control switch ③ to adjust the air flow to the required grade.
- b) Turn on the A/C switch ⑥ for cooling and turn off the A/C switch ⑥ for heating; check whether the indicator light on the A/C switch is on.
- c) Press the temperature control switch ② to adjust the cab temperature to a moderate one.
- d) Press the Mode switch 1 to select the required ventilation mode. For the mode chosen, the indicator light on corresponding switch will be on.
- e) Press the fresh / cycle selective switch ④ to select the cab interior air circulation or outdoor fresh air inlet.
- f) Press the ON / OFF switch ⑤, and the display for temperature setting and air volume setting as well as the indicator light on the A/C switch all go out and the operation stops.

3.4.2.3.2 Operation of the defroster

- a) Press the air volume control switch ③ to adjust the air volume.
- b) Press the defrosting mode switch among mode switches ①.
- c) Press the fresh / cycle selective switch ④ to select fresh air inlet mode.
- d) Press the temperature control switch ② to adjust the set temperature to the hottest one.
- e) selective switch ④ to select fresh air inlet mode.

3.4.3 Motor radio

3.4.3.1 Function control and instructions:

The radio control panel of the machine is shown in Figure 3-90:

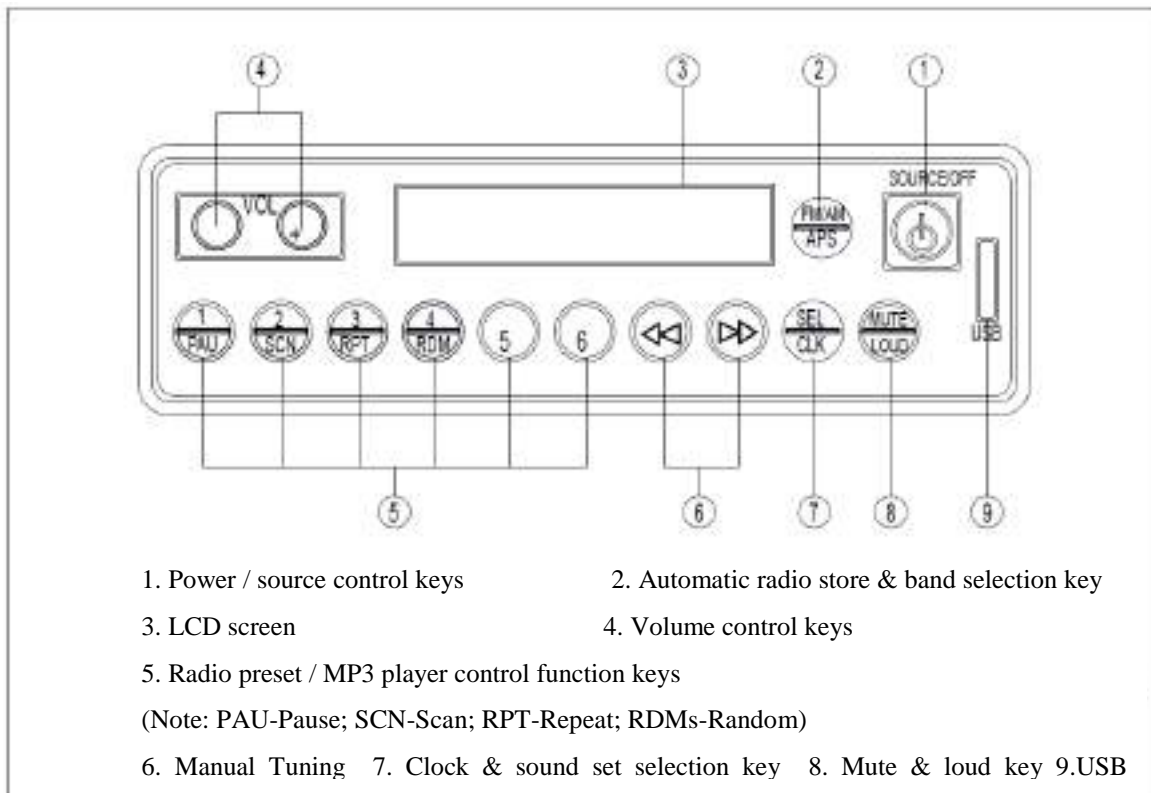


Figure 3-90 Radio control panel

3.4.3.2 Precautions for use

- a). To avoid accidents, please select the appropriate volume.
- b). The radio get damaged easily if being splashed wet, so please pay attention not to let water spray into the radio when you have the machine washed.
- c). The default button settings will have been eliminated when replacing the battery, these settings should be reset.

3.4.3.3 Radio Operating Instructions:

- a). Power on / off

Press the key "①" to turn on the radio, long press to cut off the radio power.

- b). Automatic radio search and store

long press the key "2" for automatic channel search from the low-limit frequency, and the radios searched will be sequentially stored in preset stations 1-6;

Short press the key "2" is to switch between FM and AM.

- c). Volume Control

Press the key "④ + " to increase the volume gradually; press the key "④ -", to reduce the volume gradually

Basic operation techniques of the excavator

d). Select a preset station

Press any number key in "⑤" to select corresponding preset radio;

During playing, long press any number key in "⑤" to save the current frequency into corresponding preset station.

e). Band selection key

Press the key "⑥" for forward / backward search, which can be either automatic search or manual search..

Automatic station search: Press the key "⑥ → / ⑥ ←" for forward / backward search; the radio stops searching to play when a station is searched.

Manual search: Press the key "⑥ → / ⑥ ←" to enter manual search. Hold the key pressed and the frequency moves forward / backward quickly; release the button and the frequency stops beating, but you can still short press the key "⑥ → / ⑥ ←" to gradually adjust the frequency. If the button is not pressed within 2 seconds, the radio will exit from manual search mode and return to automatic search mode.

f). Sound settings

Short press the key "⑦" to check the clock and you can press this key again within two seconds to enter into sound setting mode. If no button is pressed within 2 seconds under clock display mode and sound setting mode, the radio will exit from clock display mode and return to radio frequency display mode.

Under clock display mode, press and hold the key "⑦", to enter clock adjustment.

For sound settings, each time you press the key, you can select VOL-> BAS-> TRE-> BAL-> VOL in return and then you can press the key "④+ /④-" to adjust the volume accordingly: bass, treble, balance, etc.

Note: VOL-volume BAS-bass TRE-treble BAL-balance

g). Mute and sound control

Short press the key "⑧", the radio will be mute; press it again to release the mute state. Mute symbol is displayed on the LCD screen. Adjusting the volume under mute mode will also release mute state.

Long press the key "⑧", the loudness mode will be activated; press it again to release the loudness state. A "LOUD" symbol is displayed on the LCD screen.

3.4.3.4 MP3 operating instructions

a). Short press the key <SOURCE> to select MP3 player.

b). Firstly the radio will read U disk player

For no U disk, it shows "NO DISC".

If there is U disk with no MP3 files, then it displays "NO SONG".

c). After U disk is read, it first shows the total number of tracks, and then starts playing.

d). Play at breakpoint

If the radio was shut down or switched to radio station while the MP3 was playing, next time the MP3 will start playing from where it was last played if the U disk last played does not change.

If there is only U disk and it was unplugged while playing, the radio will start playing from where it was last played when the device is inserted again if the MP3 songs on it remain unchanged.

e). While playing, LCD screen displays the track number and the play time of the current track.

f). Pause

Press the button <1/PAUSE> during playing to pause, and the track number and play time will flash on the LCD screen; press it again to continue playing.

g). Song selections

Press the key “Ⓜ → / Ⓜ ←” for forward / backward song selections.

h). Quick song selections

Press and hold the key “Ⓜ → / Ⓜ ←” to quickly increase or decrease the track number. When the key is released, you can still press it to adjust the track number one by one. If the button isn't pressed within one second, the radio skips to the track last selected to play.

i). Repeat, random and play

Press one of <3/REPT>, <4/RAND> and <2/SCN> keys to select corresponding play mode. Press that button again and the songs will be played in sequence.

j). Supported MP3 song types

MPEG 1/2/2.5 Layer 3 Audio

Sampling frequency: 8k, 11.025k, 12k, 16k, 22.05k, 24k, 32k, 44.1k and 48k

Bit rate: 32Kbps-320Kbps, VBR supported

As for the number of MP3 files on the U-disk, the system only supports up to 511 MP3 files for each device and the excessive files will not be played by the system.

3.4.4 Antenna

Before transporting the machine or placing it inside a building, the antenna should be withdrawn in order to prevent any interference.

3.4.5 Windows and locks

3.4.5.1 Skylight



Warning

1. When you leave the cab, the safety locking lever should be firmly placed in the locked position, as shown in Figure 3-84.

2. If the lever hasn't been locked, it may be touched by mistake and result in serious accidents.

a). When opening the window:

Firmly lock the safety locking lever.

Pull the front handle lock knob (1), check whether the skylight is movable and then release the handle (1) to let the skylight open up under the force of the two gas springs at both sides (2), as shown in Figure 3-91.

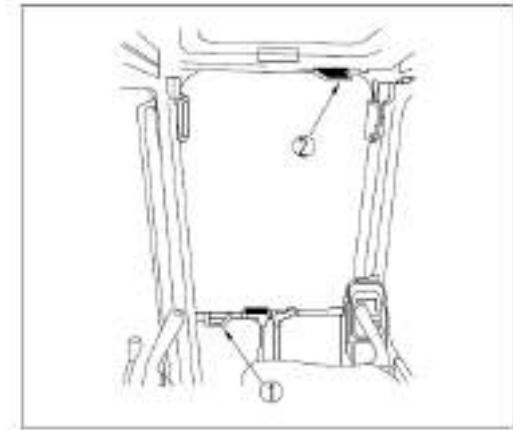


Figure 3-91 Skylight handle and gas springs

b). When closing the window:

Hold the handle (1) to close the skylight and lock it with the handle lock knob (1). If it is not locked up, open it once again and close.

3.4.5.2 Front window



Warning

1. When opening or closing the skylight, front window, rear window or door, the safety locking lever should be placed in the locked position.

2. If the lever wasn't locked and it was accidentally touched, serious accidents will occur.

3. Before opening or closing the front window of the cab, the machine should be parked on level ground, the working device should be completely lowered to the ground and the engine should be shut down.

4. While opening the front window, hold the handle firmly with both hands, pull it up and do not let it go until the automatic lock gets locked.

5. While closing the front window, the window will move fast under its own weight, so when you are closing the front window, you should hold the handle firmly with both hands

3.4.5.2.1 Opening steps

The front window (upper part) can be placed (pulled up) at the top of the cab, as shown in Figure 3-92. The opening steps are as follows:

a). Lower the working device to level ground and stop the machine.

b). Firmly lock the safety locking lever.

c). Check whether the wipers blades are retracted in the right box.

d). Hold the handles (A) of the front window and pull the handle lock knob (B) to open the lock of the top of the front window, as shown in Figure 3-93. The top of the front window will then be pulled out.

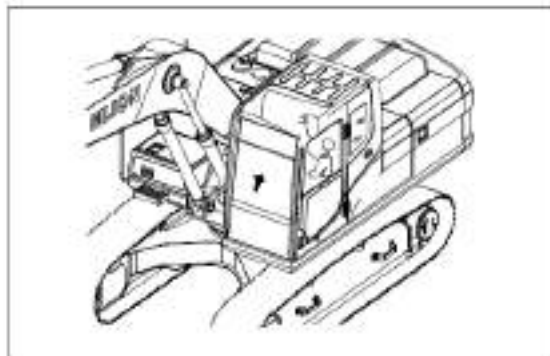


Figure 3-92 Schematic for opening direction of front window

e). Hold the bottom handle (C) inside the cab with the left hand and hold the top handle (D) with the right hand to pull the front window up and remove it.

f). Check whether the handle lock (B) is firmly located in the locked position.

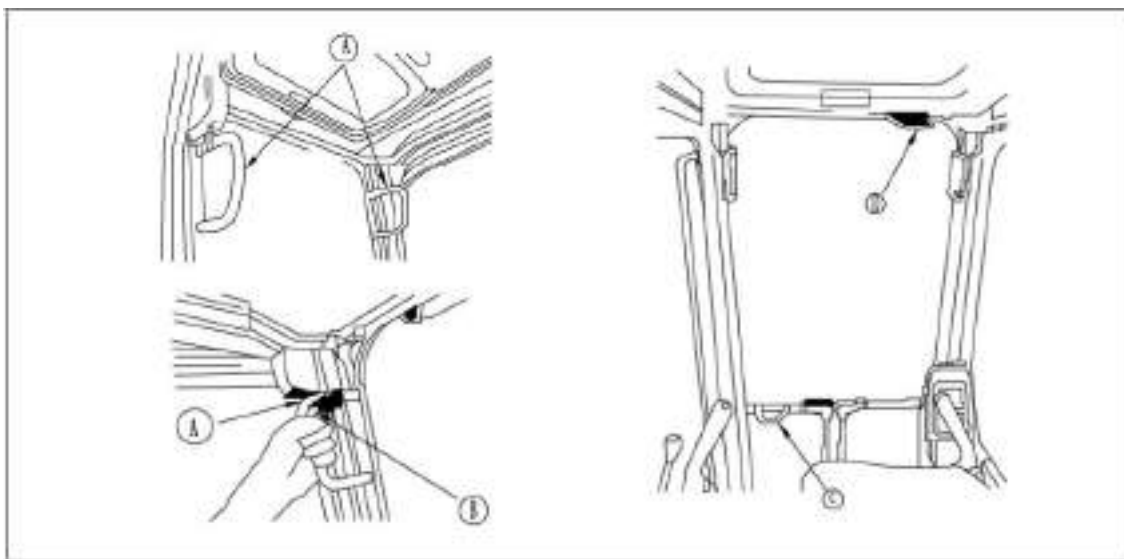


Figure 3-93 Steps for opening the front window (I)

If the arrow on lock shell (F) is directly facing the arrow on the lock handle (B), the handle is well locked, as shown in Figure 3-94. If the arrow on lock shell (F) is not facing the arrow on the lock handle (B), the handle hasn't been locked; repeat step 5 to lock it.

3.4.5.2.2 Closing steps



1. When closing the front window, slowly put the front window down and be careful not to nip

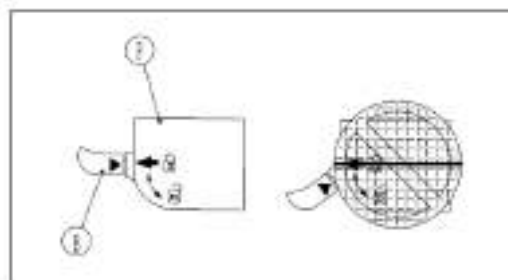


Figure 3-94 Steps for opening the front window(II)

your hand.

Closing steps are as follows:

- a). Place the working device on a flat ground and turn off the engine.
- b). Firmly lock the safety locking lever.
- c). Hold the left and right handles (A) and pull the handle (B) down to release the lock as shown in Figure 3-95.
- d). Hold the handle (C) at the bottom of the front window with the left hand and the handle (D) at the top with the right hand, push the window forward, and then slowly put it down.
- e). When the bottom of the window gets close to the top of the lower window, you should push the bottom of the window forward, so that the front window couples the left and right locking pins (G) and gets locked.

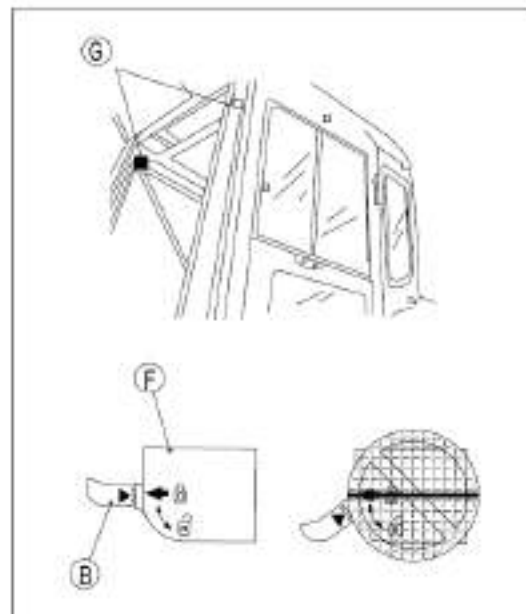
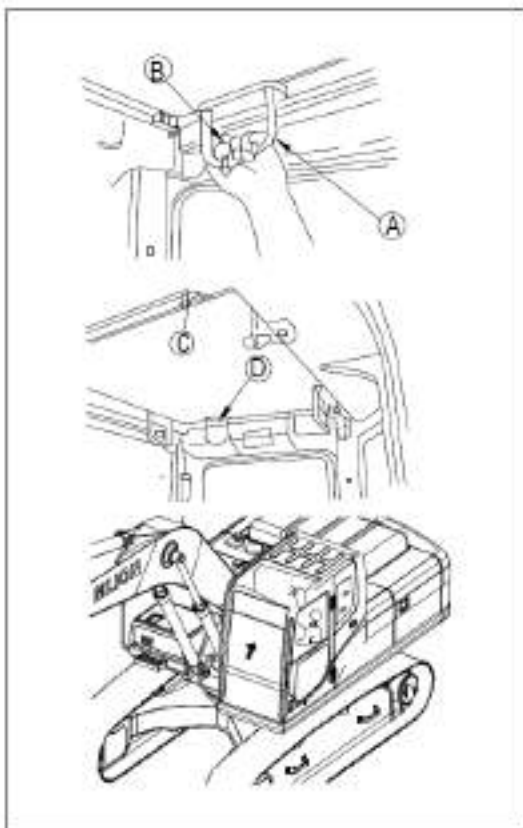


Figure 3-95 Steps for closing the front window (I) Figure 3-96 Steps for closing the front window (II)

- f). Check whether the lock handle (B) is firmly located in the locked position.

If the arrow on lock shell (F) is directly facing the arrow on the lock handle (B), the handle is well locked, as shown in Figure 3-96. If the arrow on lock shell (F) is not facing the arrow on the lock handle (B), the handle hasn't been locked; repeat step 5 to lock it.

3.4.5.3 Lock

3.4.5.3.1 Door lock

When the door is opened, use the door lock as shown in Figure 3-97 to fix the door in place (1).

a). Push the door to the direction of the lock pin (1) to fix the door in place.

b). When opening the lock, press the button (2) at the left side of the driver's seat to open the lock pin.

c). Fix the door firmly to the lock pin.

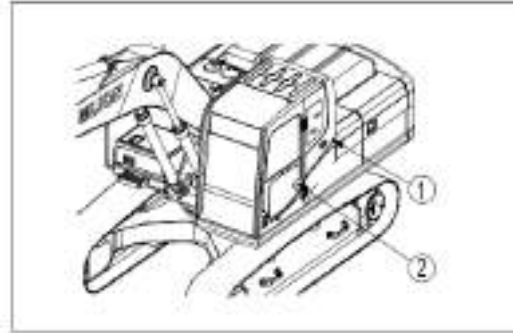


Figure 3-97 Door lock

3.4.5.3.2 Caps and covers with locks

Locks are fixed at the injection ports of the fuel tank and hydraulic oil tank, driver's cab, engine cover, battery cover as well as left and right doors of the machine. These caps, doors and covers can be opened by keys. The keys should be fully inserted to the end before being turned, otherwise it may break

The steps for opening and locking the caps with locks:

a) For opening:

- 1). Insert the key into the key slot.
- 2). Turn the key counterclockwise, align the key slot with the mark on the cap and then open it.

b) For locking

- 1). Screw the cap on and then insert the key into the key slot
- 2). Turn the key clockwise as shown in Figure 3-98 and then remove the key.

3.4.5.3.3 Methods for opening and locking covers with locks

a) Open the cover (locked cover):

- 1). Insert the key into the key slot.
- 2) Turn the key and pull the cover handles to open the cover.

b) Lock the cover:

- 1). Screw the cover, and put the key into the key slot.
- 2). Turn the key clockwise and then remove the key.

3.5 Power supply and fuse

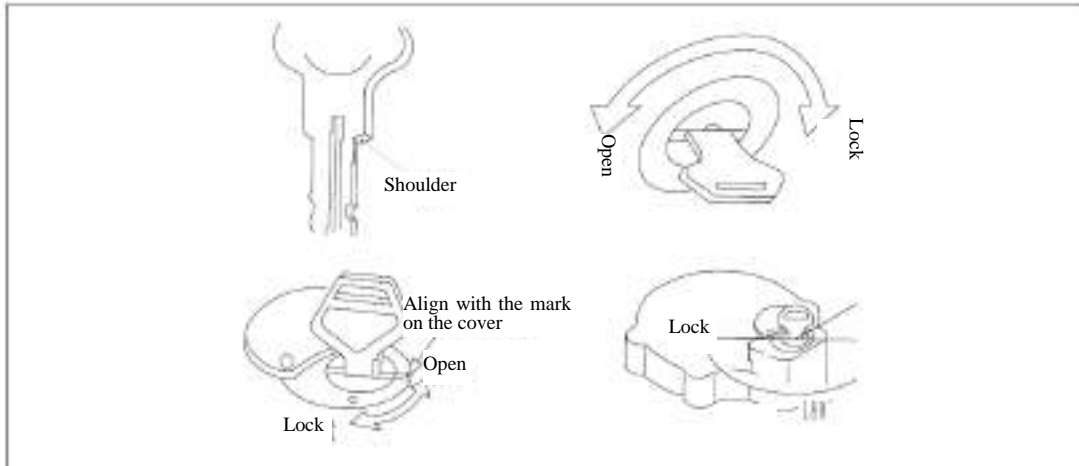


Figure 3-98 Open or lock the caps and covers with locks

- 1. The supply voltage is 24V. It cannot be used as the power for 12V electrical appliances, for damage to these electrical appliances will be caused.**
- 2. The cigarette lighter can be removed to supply the power with the max. loading power of 85W. The maximum power of the cigarette lighter is 85W (24V×3.5A)**

3.5.1 Fuse safety notice



- 1. Before replacing fuses, be sure to turn the starter switch to OFF position.**
- 2. Fuses are located in the interior trim parts at the rear of the cab.**
- 3. Fuses prevent electrical equipment and wires from getting burnt.**
- 4. If any fuse corrodes or you can see white powder on it or any fuse is loose in the fuse holder, you should replace it.**
- 5. Replace any fuse with one with the same capacity.**

3.5.2 Fuse capacity, circuit names and the relay names

Fuse capacity, circuit names and the relay names are shown in Figure 3-99.

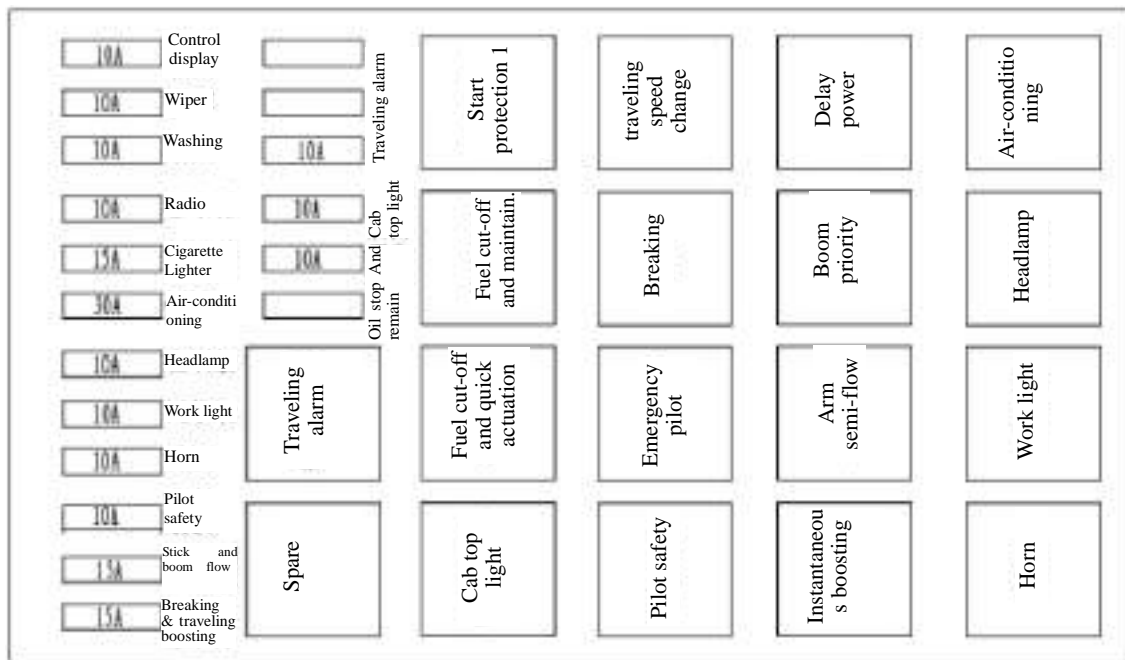


Figure 3-99 Fuse capacity, circuit names and the relay names

3.5.3 Fuse

Fuse is the part with large current in the circuit and it protects the electrical components and wires from getting burnt.

If the machine is not energized when turning the starter switch to the ON position, the fuse may have melted. Under such condition, check the fuse and replace it if necessary.

3.6 Controller

The controller of this machine is installed in the control box located at the left side of the machine.



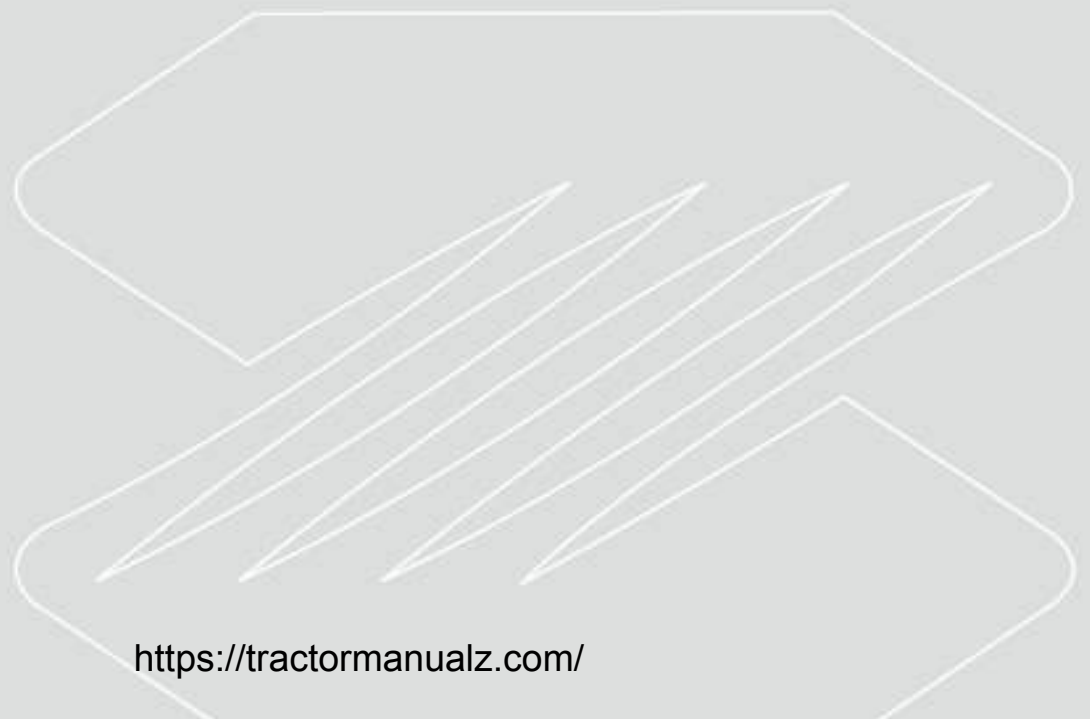
1. Do not spray water or mud on the controller, otherwise, failure will be caused.
2. If the controller is abnormal, please do not disassemble it by yourself and contact Zoomlion or Zoomlion dealers for repairing.



ZE205E/ZE230E HYDRAULIC EXCAVATOR
OPERATION MANUAL

Chapter Four: Safe operation and operating techniques

of excavator



Chapter Four: Safe operation and operating techniques of excavator

4.1 Adjustment before operation

4.1.1 Adjustment of driver's seat

Adjust the seat as shown in Figure 4-1 so that the operator can operate the levers and switches freely and easily while sitting against the seat. The methods for seat adjustment are as follows::

- a) a) Adjust the seat forward or backward

Move the seat with the lever 4 to the desired position and then release the lever. Adjustable range: 110mm (10mm per class)

- b) b) Adjust the backrest

Pull the handle ① up to set the backrest at the best position for easy operation and then release the handle.

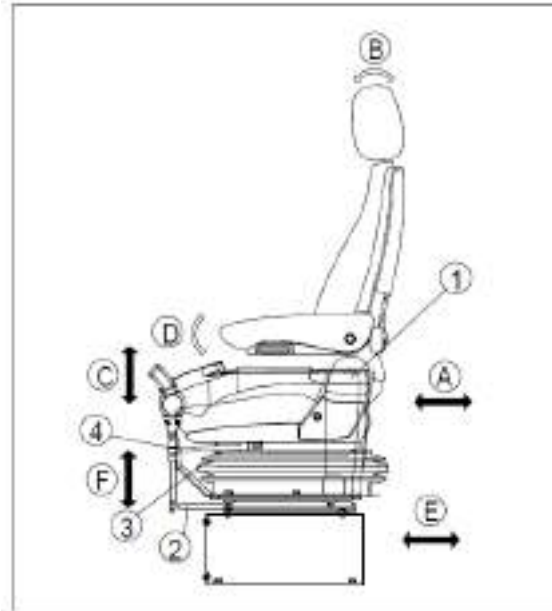


Figure 4-1 Driver's seat



Warning

1. While adjusting the inclination of the backrest, be careful not to interfere with the rear A/C cover plate and not to allow the armrest to touch the lever.

- c) Adjust the seat height

Lift the seat up to hear a "click" sound and the sit will be raised up by 30mm; continue to move it up to hear the second "click" sound and the sit will be lift up by another 30mm; further lift it up and the seat will be lowered to the lowest position. Maximum height adjustment: 60mm (each time 30mm).

- d) Adjust the armrest angle

The armrest can be lifted up for 100 °and be adjusted continuously for 40 °(10 °above the level and 30 °below the level).

- e) Adjust the seat and lever forward and backward as a whole

Pull the handle ② up to adjust the seat to the desired location and release the handle. In this case, the driver's seat, left and right levers as well as safety locking lever will move together. Adjustable range for forward and backward adjustment: 160mm

- f) Adjust the seat suspension

Turn the knob ③ to make the suspension become flexible or fixed and make the weight displayed (kg)

at the transparent part of the knob conforms to the weight of the operator. Adjustable range: 50-130kg.

g) Adjust the headrest height

Lift or press the headrest to adjust it to the most appropriate height.

4.1.2 Adjustment of rearview mirror

The method for rearview mirror adjustment (shown in Figure 4-2) is as follows:

a) Loosen the nut ① and bolt ② that fasten the mirror and adjust the position of the mirror to provide the best view for the blind area at the rear of the machine.

b) Adjust the rearview mirror installation, so that the driver can see people at the rear left and right of the machine (or object with a height of 1m (39.3in) and a diameter of 300mm (11.8in)).

c) Mount the rear-view mirror according to the mounting position and size shown as follows. The values provided below are the reference values for the field of view.

Mounting position X: 100mm (3.9 in)

Field of view Y (right): 1500mm (59.1in)

d) Field of view Z (left): 1830mm (72in)

Mirror A: reflect the region (A) marked by the slash.

Mirror B: reflect the region (B) marked by the slash.

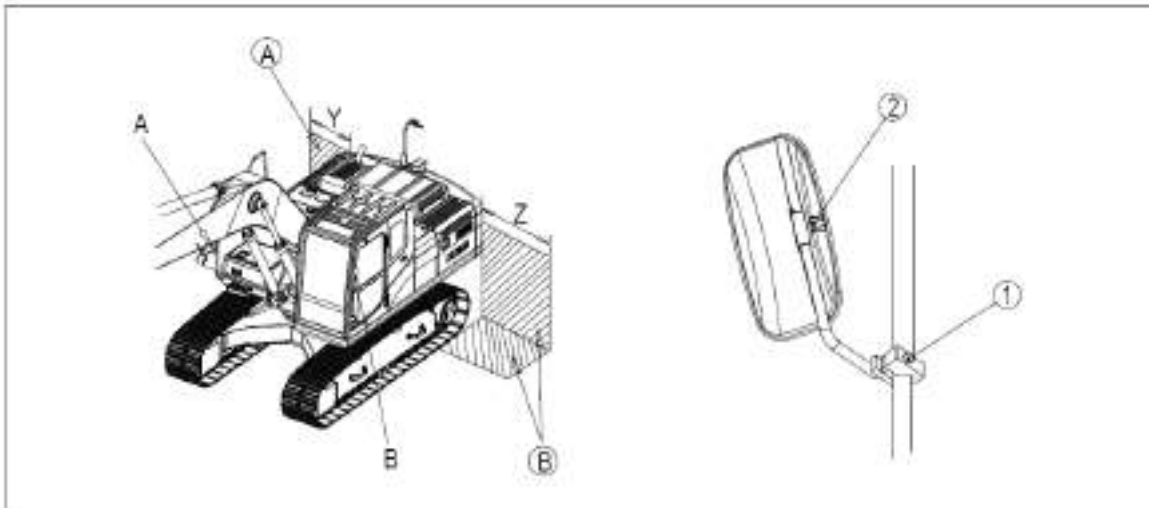


Figure 4-2 Rearview mirror and field of view

4.1.3 Seat belt (optional)



1. Before using the seat belts, check whether the mounting bracket and installation of the seat belts are in good condition. If any seat belt is worn or damaged, it should to be replaced.

2. Even if a safety belt appears to be in good condition, it has to be replaced once every three years. The manufacture date of a seat belt is shown on the back of it.

3. Do no distort the seat belt when fastening it.

The seat belt can wind up automatically, so length adjustment is unnecessary. The adjustment of the seat belt is shown in Figure 4-3 and the adjustment method is as follows:



Figure 4-3 Seat belt

a) Fasten the seat belt

Hold the seat belt clip ② and pull the seat belt out from the winding device ①. Check whether the seat belt is twisted and then insert the tongue ③ into the buckle ④ firmly. Then gently pull the seat belt to make sure that it is properly locked.

b) Unfasten the seat belt

Press the button ⑤ on the buckle ④ and take the tongue ③ out from the buckle ④. The seat belt will wind up automatically and hold the seat belt clip ② so that the seat belt returns into the winding device slowly.



The seat belt of the machine is an optional part and you can order it from Zoomlion, or Zoomlion dealer according to your demands.

4.2 Engine operation

4.2.1 Check before starting the engine

4.2.1.1 Basic checks



1. Before starting the engine, you should check the machine and the surrounding area to see if any bolt or nut is loose, if there is any oil, fuel or coolant leakage and if the working device and hydraulic system are in good condition. Besides, check whether any wire exposed to high temperature is loose and whether there is any clearance or dust accumulation.

2. Remove any combustibile in the surrounding area of the battery, engine, muffler and other high-temperature engine components. Fuel or oil leak may make the machine catching a fire. Please check carefully; for any repair, please contact Zoomlion dealer.

Daily checks before starting the engine:

- a). Check whether there is any damage, wear or clearance in the working devices, cylinders, connecting

rods and hoses. Check whether there are any cracks, excessive wear or clearance in the working devices, cylinders, connecting rods and hoses. If any abnormality is found, please have it repaired.

b). Remove dust and dirt around the engine, battery and radiator. Check whether there is any dust and dirt accumulated around the engine or radiator. Also check whether there are any combustibles (leaves, twigs and grass, etc.) accumulated around the battery or high-temperature components such as engine muffler or turbocharger. All dirt and combustibles should be removed.

c). Check whether there is any water or oil leakage around the engine. Check whether the engine has oil leakages and whether the cooling system has water leakages. If abnormality is found, repair soon.

d). Check to make sure there is no oil leakage at the hydraulic units, hydraulic oil tank, hoses and joints. The check should be done to all of them without missing any one. Leakage is found should be repaired.

e). Check the lower part of the machine (track, sprockets, idlers and guard) to see if there is any damage, wear, loose bolts or oil leakage at the rollers.

f). Check whether any handrail is damaged or any bolt is loose. Repair the damaged parts and tighten the loose bolts.

g). Check whether any meter or monitor is damaged or any bolt is loose. Confirm that the instruments and monitors in the cab are in good condition. If any abnormality is found, the parts should be replaced and the dirt on the surface should be cleaned.

h). Clean the rearview mirrors and check for damage. Confirm that the rearview mirrors are not damaged. Otherwise, they should be replaced with new ones. Clean the mirror face and adjust the angle so that the driver can see the rear view from the driver's seat.

i). Check to see if the seat belts and buckle (if any) are in good condition,. If damaged, they should be replaced with new parts.

j). Check whether the hook bucket (if equipped) is damaged. Check whether the hook, limiter and hook seat are damaged. If any damage is found, please contact Zoomlion or Zoomlion dealers for repair.

4.2.1.2 Check the coolant



1. Do not open the radiator cap unless necessary. Do not check the coolant in the reserve tank until the engine cools down.

2. When the engine is turned off, the coolant is hot and the internal pressure of the radiator is high. Under such condition, there will be danger of burns if you remove the radiator cap to drain the coolant. Therefore, you should wait until the cap cools down and then turn it cap slowly to release pressure.

Checking steps:

a). Open the left rear door of the machine to check the reserve water tank ① shown in Figure 4-4.

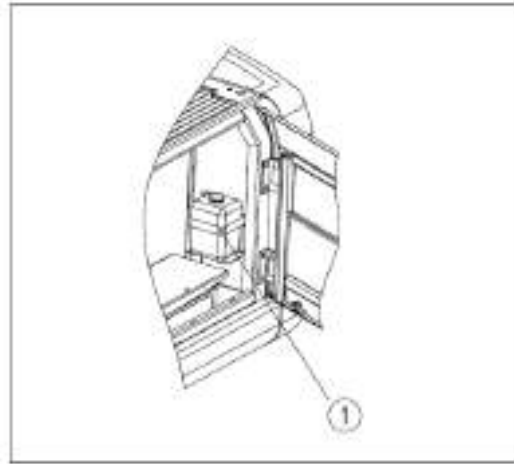


Figure 4-4 Reserve water tank

b). Check whether the coolant level in the reserve water tank is between the LOW and FULL mark, as shown in Figure 4-5. If the coolant level is too low, add coolant to the FULL mark through the filling port.

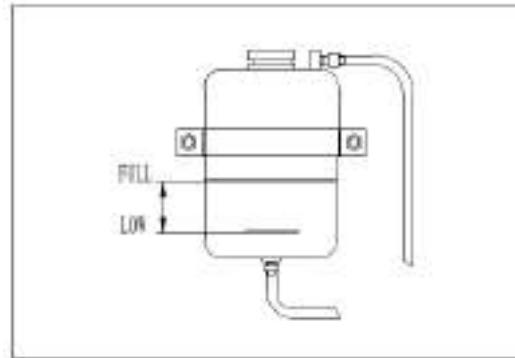


Figure 4-5 Coolant level

- c). Screw the cap on firmly when the coolant is added full.
- d). If the reserve water tank is empty, it maybe leak.
- e). Repair immediately after the check. If there is no abnormality, check the coolant level in the radiator; if the level is too low, add coolant to the radiator and then add coolant to the reserve tank ①.

4.2.1.3 Check the engine oil



1. When the engine is shut down, the parts and oil are still hot, which may cause serious burns. Therefore, you should wait until the oil cools down before operation.

Checking steps:

- a). Open the engine cover on the machine.
- b). Pull the dipstick (F) out and wipe off the oil with a cloth.
- c). Insert the dipstick (F) fully into the oil filling port, and then pull the dipstick out.
- d). The oil level should be between the H and L mark on the dipstick (F). If the oil level is below the L

mark, you should add oil through the filling port (G), as shown in Figure 4-6. If the oil level is higher than the H mark, open the drain valve at the bottom of the engine sump (P) to drain the excessive oil, and then check the oil level again. If the oil level is appropriate, screw the filling port cover on and close the hood.



1. You should turn off the engine and wait at least 15 minutes before checking the oil level.
2. If the machine is slanted, keep it level before starting the check.

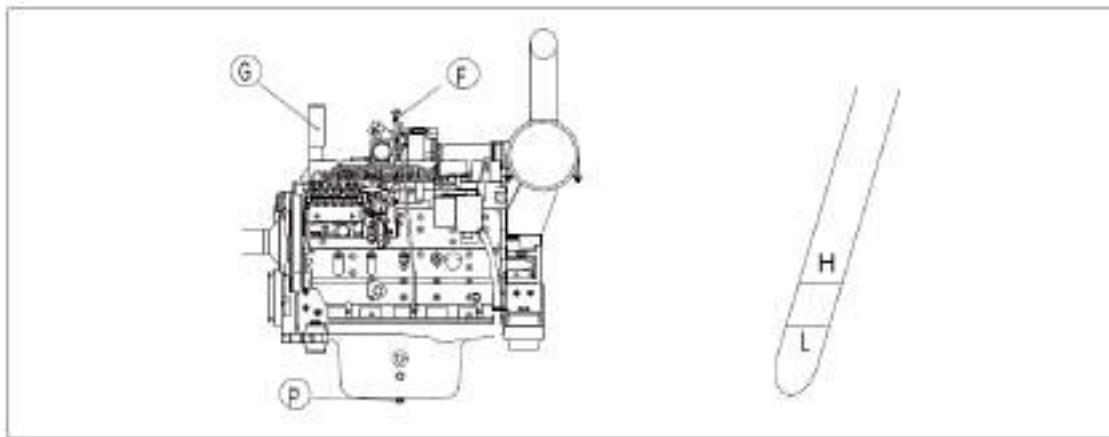


Figure 4-6 Engine oil filling port and the dipstick

4.2.1.4 Check the fuel level and refuel



1. When you are refueling, do not let the fuel overflow or it may cause a fire. If the fuel overflows, wipe the overflowed oil off thoroughly. Since the fuel is flammable and dangerous goods, fireworks are strictly prohibited to have fireworks near the fuel.

2. Starting the refueling pump is prohibited when the engine is running properly.

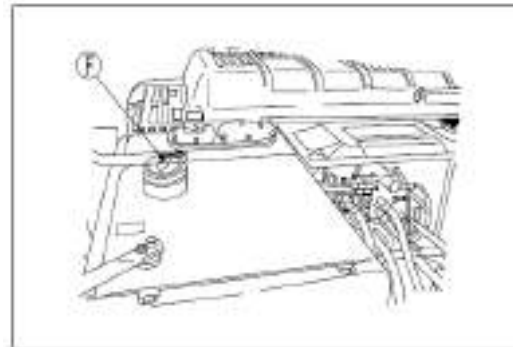


Figure 4-7 Oiling port of the fuel tank

Checking steps for machine with no refueling pump equipped:

a). Open the cap of the fuel injection port on the fuel tank (F) (as shown in Figure 4-7).

b). As shown in Figure 4-8, open the cap of the fuel injection port, the level gauge (G) rises with the oil level increasing. Check whether the fuel tank is full by checking the level gauge (G). If the tank is not full,

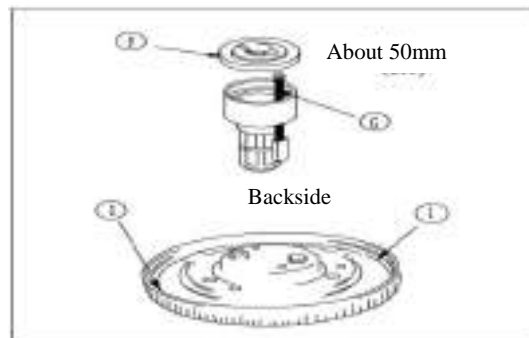


Figure 4-8 Refuel

continue to add fuel through the filling port until the level gauge (G) rises to the highest position. (Fuel tank capacity: 350L). When the tank is filled, the top of the level gauge (G) is about 50mm (2in) from the fuel tank.

c). After refueling, press the level gauge (G) with the cap of the fuel injection port (F). Pay attention not to let the level gauge (G) get stuck at the lug of the injection port (F), and then tighten the oiling port cap (F) firmly.



1. If the vent on the cap is blocked, the pressure inside the tank will drop and the fuel will not flow. Thus the vent should regularly be cleaned.

Checking steps for machine equipped with refueling pump:

a). Open the cover of the fuel injection port(F),level gauge (G) rises with the oil level increasing. Check whether the fuel tank is full by looking the tank and check the level gauge (G). If the tank is not full, insert the suction pipe of the fuel filling pump into the tank (Figure 4-9), and turn on the machine power by the start switch.

b). Press the green "Run" button on the refueling control box (Figure 4-10), and the refueling pump will enter into automatic refueling control state. The refueling pump will cut off automatically when the fuel tank is filled and then the entire refueling process ends.

c). If unforeseen circumstances take place during refueling process, you can press the red "Stop" button on the refueling control box and the refueling pump stops immediately; press the "Run" button again to continue to add fuel.

d). When the pump stops running automatically due to unforeseen circumstances (e.g. the controller may mistake the tank for a full one due to fuel bubbles produced while fueling), press the "Run" button if the fuel tank is not yet fully fueled. However, the pump only turns once at this press (to prevent fuel spillage), so repeat pressing the "Run" switch until the tank is full.

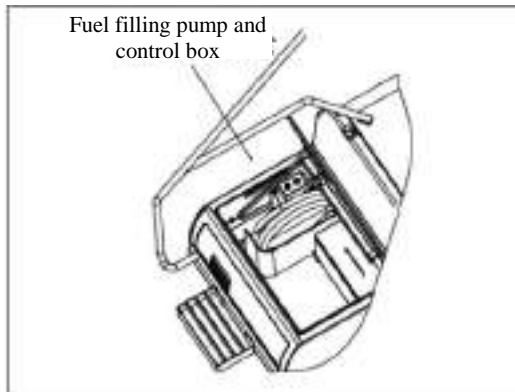


Figure 4-9 Refueling pump

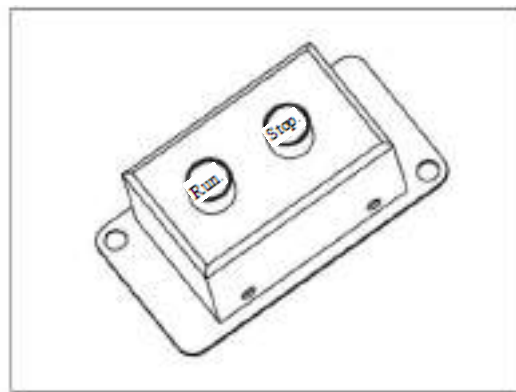


Figure 4-10 Fuel control box

Discharge of water and sediment in the fuel tank:

a). The water and sediments in a fuel tank is directly discharged through the drain valve set in the bottom, so you should put a container under the drain valve ① to receive the discharged fuel.

b). Open the drain valve ① at the bottom of the fuel tank and discharge the sediments and water accumulated at the tank bottom with the fuel.

c). Close the drain valve ① when the discharged fuel is clean, as shown in Figure 4-11.

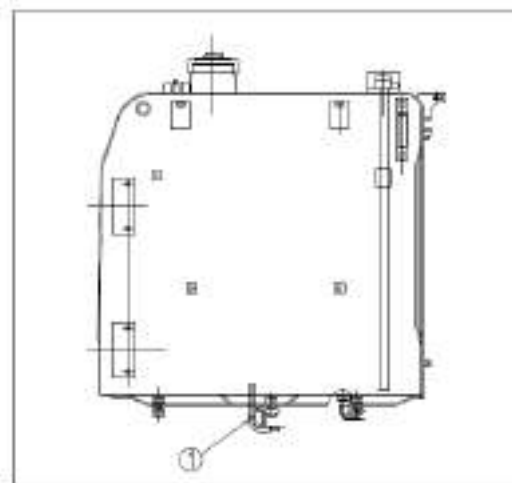


Figure 4-11 Fuel tank drain valve

4.2.1.5 Check the oil-water separator

a). Open the right rear door of the machine.

b). Find the oil-water separator as shown in Figure 4-12 and put a container under the oil-water separator for oil discharge.

c). Open the drain valve ① at the bottom of the oil-water separator and discharge the water and sediments into the container.

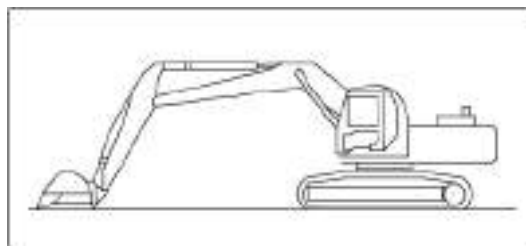


Figure 4-13 Check the gesture of the hydraulic oil device



1. It is recommended to discharge the sediments in the oil-water separator after the machine has worked for a whole day.

4.2.1.6 Check the hydraulic oil



1. The oil may erupt when the cap of the oiling port is removed, so you should turn the cap slowly to release the internal pressure before removing it.

a). If the working device is not in the state shown in Figure 4-13, you should start the engine and keep it run at low speed. Retract the arm and bucket cylinders, and lower the boom and adjust the bucket teeth to have them contact with the ground, and then turn off the engine.

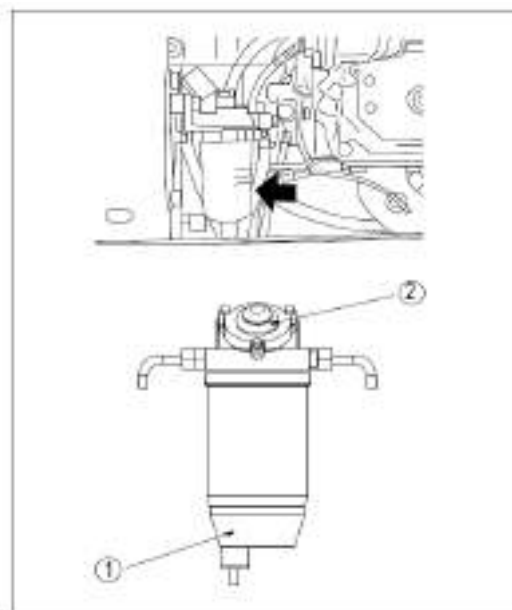


Figure 4-12 Oil-water separator

b). Turn the starter switch to the ON position within 15 seconds after the engine is shut down and fully

operate the levers (for working device and traveling) in all directions to release the internal pressure.

c). Open the right rear door of the machine and check the oil level gauge (G) from the inspection hole of the hydraulic oil tank. The oil level should be between the H line and L line, as shown in Figure 4-14.

d). If the oil level is below the L line, you should add oil through the oil filling port (F) at the top of the hydraulic tank.



1. Do not add oil to a level above the H line, otherwise the hydraulic circuit may be damaged or oil ejection may be caused. If this happens, turn off the engine and discharge the excessive oil through the drain plug (P) when the hydraulic oil cools down.

Notes:

The oil level may change according to oil temperature as follows:

- 1). Before operation: the oil level is between H and L (oil temperature is 10 °C to 30 °C)
- 2). Normal operation: the oil level is close to H (oil temperature is 50 °C to 80 °C)

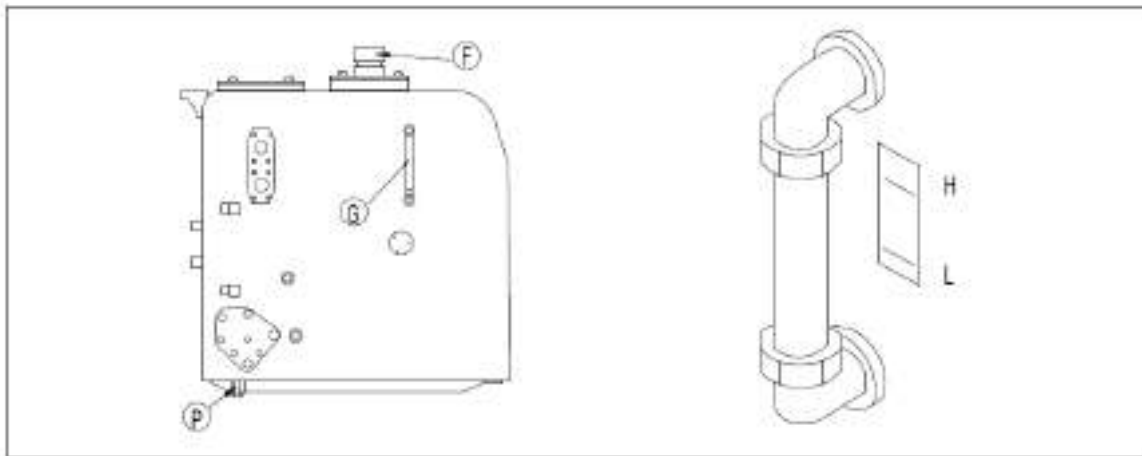


Figure 4-14 Oil level in the hydraulic oil tank

4.2.1.7 Check the electric circuits



1. If the fuse gets burnt frequently or there are signs of a short circuit, you should immediately identify the causes and carry out repair work or contact Zoomlion dealers.

2. The upper surface of the battery should be kept clean, ; check the vent on the battery cover and you should flush the battery cover and clean the vent if the vent is clogged by dirt or dust.

Checking items:

- a) Check if any the fuse is damaged or the capacity does not match, check whether there are signs of

break or short circuit and check whether any terminal is loose and tighten the loose parts.

b) Pay special attention while checking the wire lines of the "battery, starter motor and alternator.

c) When conducting the patrol check or check before starting, be sure to check whether there are combustibles accumulated around the batteries and clear the combustibles. For investigation and correction of certain causes, please contact Zoomlion or Zoomlion dealer.

4.2.1.8 Check the horn

a) Turn the starter switch to the ON position.

b) Confirm that the horn rings immediately when being pressed. If the horn does not ring, please have it repaired by Zoomlion or Zoomlion dealer.

4.2.2 Operational qualifications before starting the engine



1. Before starting the engine, check to make sure that the safety locking lever is in the locked position shown in Figure 4-15. If the lever is not locked and accidentally touched when starting the engine, the working device will suddenly move and a serious accident may occur.

2. When the operator wants to stand up from the seat, be sure to put the safety locking lever ① in the locked position, no matter whether the engine is running or not. Check the position of all levers and put them in neutral positions.

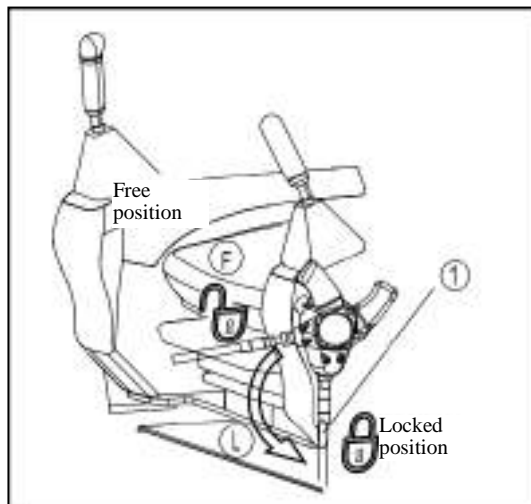


Figure 4-15 safety locking lever

Steps for operational qualifications before starting the engine:

a) Do not touch buttons and switches when starting the engine.

b) Insert the key into the starter switch as shown in Figure 4-16, turn the key to the ON position and then perform the following checks.

c) Turn the starter switch from OFF to ON to switch on the electrical system. The display will complete startup automatically in about 10 seconds.

d) If the starter switch is kept in the ON position, but the engine has not been started, it is normal that the "engine oil pressure too low" alarm and "battery voltage

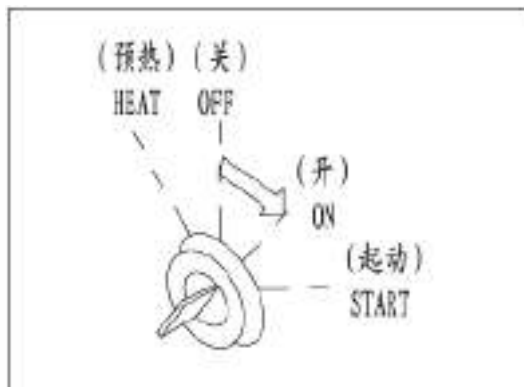


Figure 4-16 Starter key switches

too low” alarm may be sent out. After the engine gets started, these alarm stops.

e) During startup, initial states of various operating parameters are as follows:

Traveling speed: low speed

Automatic idling

Work mode: E mode

Warming-up: uncertain depending on the coolant temperature and system settings

Safety locking lever: locked.

f) Press the light switch as shown in Figure 4-17 to check whether the headlamps are illuminated. If the headlamps don’t light up, the bulbs may have burnt out or may be open-circuited, so please contact Zoomlion or Zoomlion dealer for repair.

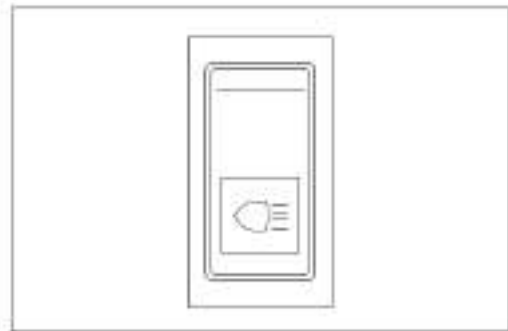


Figure 4-17 Indicator switch

4.2.3 Start the engine

4.2.3.1 Normal start



1. Check whether there are people or obstacles in the surrounding area, and then honk the horn and start the engine.

2. As gas exhausted from the engine is harmful, paying particular attention to ensure good ventilation when starting the engine in an enclosed space.



1. Before starting the engine, check whether the fuel control knob is in the position of the low idle speed (MIN).

2. Do not continuously operate the starter motor for more than 15 seconds.

3. If the engine does not start, wait at least two minutes and then restart.

4. If the fuel control knob is at the FULL position, the engine will suddenly accelerate, which may cause damage to the engine components. Therefore, the control knob should be adjusted to the medium-speed or low speed position.

5. After a vehicle gets started, it should run at idle speed for five minutes before it can work properly.

Normal engine start should follow these steps:

a) Check whether the safety locking lever is in the locked position as shown in Figure 4-15; if not, the engine will not start.

b) Turn the fuel control knob to the low idle speed (MIN) position shown in Figure 4-18. Turn the starter switch key to the START position shown in Figure 4-19 and the engine will start.

c) When the engine is started, release the starter switch key and the key will automatically return to the ON position as shown in Figure 4-19.

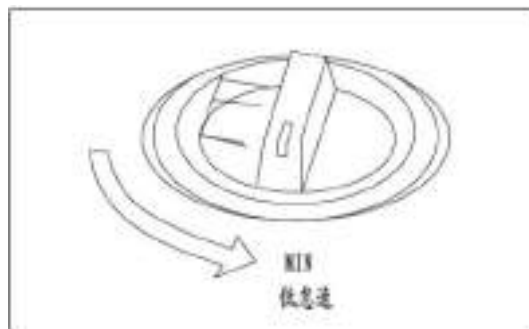


Figure 4-18 Fuel control knob at idle speed

d) If the “engine oil pressure too low” warning light is still on as shown in Figure 4-20 after the engine is started, do not operate the levers for working devices and the traveling pedal.



1. If the engine oil pressure indicator light is still on after 4-5 seconds (as shown in Figure 4-20), immediately shut down the engine, check the engine oil level, check for any oil leakage and take necessary measures.

4.2.3.2 Start the engine in cold weather



1. Check whether there are people or obstructions in the surrounding area, and then honk the horn and start the engine.

2. Do not use fluids that aid starting, because they may cause an explosion.

Please pay attention to the following when starting the engine in the cold weather:

a). Check whether the fuel control knob is at the position of the low idle speed (MIN) before starting the engine.

b). Do not continuously operate the starter motor for more than 15 seconds.

c). If the engine does not start, wait at least 2 minutes,

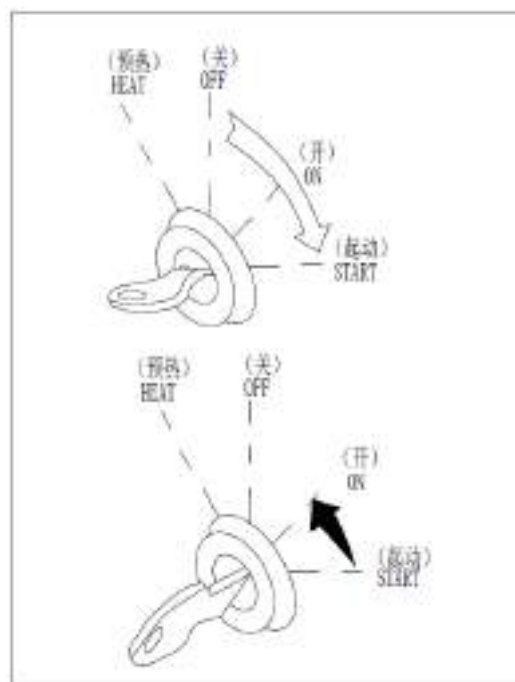


Figure 4-19 engine start switch

and repeat the operation from step 2.

When starting the engine in cold weathers, do according to the following steps.

a) Check whether the safety locking lever is in the locked position as shown in Figure 4-15. If not, the engine will not start.

b) Turn the fuel control knob to the low idle speed (MIN) position.

c) Turn the starter switch key to the START position to start the engine.

d) When the engine is started, release the starter switch key and the key will automatically return to the ON position.

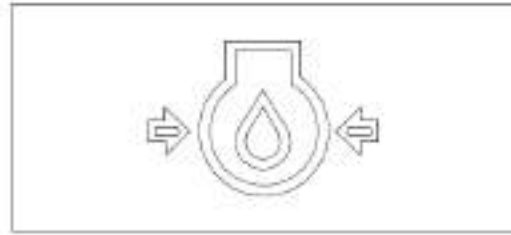


Figure 4-20 Engine oil pressure indicators

e) If the “engine oil pressure too low” warning light is still on as shown in Figure 4-20 after the engine is started, do not operate the levers for the working device and the traveling pedal.

4.2.3.3 Operation after the engine was started

After starting the engine, do not immediately begin the operation. First, do the following operations and checks:

a) Turn the fuel control knob to the center of the low and high speed as shown in Figure 4-21, and run the engine for about 5 minutes under the no-load condition.

b) Adjust the safety locking lever to the free position as shown in Figure 4-15, and raise the bucket from the ground.

c) Slowly operate the bucket lever and lever of the stick as shown in Figure 4-22, move the bucket cylinder and bucket cylinder rod to stroke end.

d) Operate the bucket and stick with full stroke for five minutes, converse between the bucket operation and stick operation each 30 seconds.

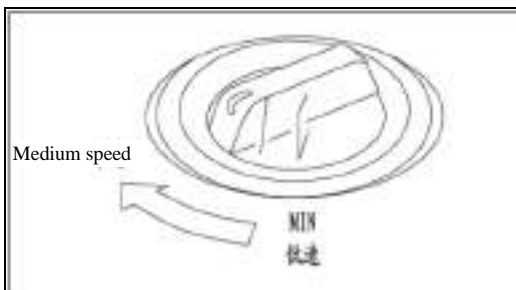


Figure 4-21 Fuel control knob medium speed

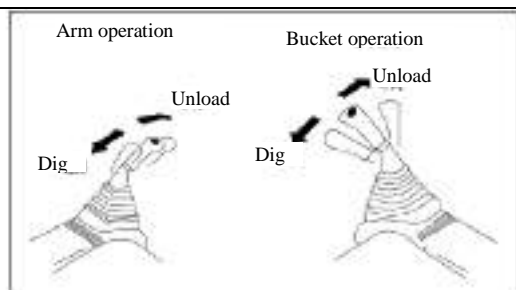


Figure 4-22 Arm, bucket lever



1. When withdrawing the working device, pay attention not to interfere with the body or on the

ground.

e) When preheating is performed, check if all instruments and indicators on the machine instrument controller are in the following states:

- Coolant level too low alarm: no
- Battery voltage alarm: no
- Fuel level to low alarm: no
- Coolant temperature alarm: no
- Oil pressure alarm: no
- Air filter blocked: no
- Hydraulic oil temperature alarm: not alarm
- Coolant thermometer: the pointer is within the blue region
- Hydraulic oil thermometer: the pointer is within the blue region
- Fuel level gauge: the pointer is within the blue area

f) Check if there is any abnormal exhaust color, noise, or vibration, any abnormality found should be repaired.

g) If the air filterblocked alarm flashes, you should immediately clean or replace the filter. See the Maintenance Manual for more details.

h) Select the work mode you prefer by using the POWER MODE button on the instrument of the machine.

Operating mode instrument display:

P mode: for heavy-load operation, the whole machine runs in maximum working potential.

E mode: used for general operations.

L mode: for light-load operation mode, applied to the ground, slope operations, stick movement is gentler.

B mode: used for operations of accessories such as breaking hammer.

4.2.4 Engine warming-up and new machine running-in operation

For emergency stop under any circumstances or failures, turn the starter switch key to the OFF position.

While operating the working device when the machine is not fully preheated, the reaction of the working devices to the movement of the lever will be slow and the device can not move in accordance with the requirements of the operator. So be sure to perform adequate warming-up operation, especially in cold areas.

4.2.4.1 Engine warming-up operation



1. When the hydraulic oil is at low temperature, do not operate the lever or move it suddenly.
2. Be sure to perform warming-up operation, which helps prolong the life of the machine.
3. Before the warming-up operation is completed, do not accelerate the engine suddenly.
4. Do not run the engine at low speed or high speed continuously for more than 20 minutes, otherwise it will cause oil leakage at the oil supply line of turbocharger. If you have to run the engine at idle speed, you should apply load from time to time to run the engine at medium speed.

4.2.4.1.1 Automatic warming-up operation (in cold area)

- a) When starting the engine in cold areas, you should perform automatic warming-up operation before starting the engine.
- b) If the engine coolant temperature is low (below 10 °C) when starting the engine, warming-up operation should be done automatically (this function needs to be set by entering user settings).
- c) If the engine coolant temperature reaches the required temperature (30 °C), the automatic warming-up operation will be canceled.



1. If want to cancel the warming-up operation in the warming-up process, tap the “cancel the warming-up operation” button on the monitor. (It is recommended that the user should not stop the warming-up operation at will, so as to prevent any damage to the machine.)
2. In the warming-up process, all levers do not work; only when the warming-up operation is finished or canceled, can the levers be operated and work properly.
3. When the hydraulic oil is still at low temperature, do not operate the machine or suddenly operate the lever. The warming-up operation should be continued till the hydraulic oil temperature rises to about 30 °C, which helps extending the life of the machine.
4. Prior to the completion of the warming-up operation, do not accelerate the engine suddenly. Do not run the engine at low speed or high speed continuously for more than 20 minutes, otherwise it will cause oil leakage at the oil supply line of turbocharger. If you have to run the engine at idle speed, you should apply load from time to time to run the engine at medium speed.

4.2.4.1.2 Manual warming-up operation

If the user wants to operate warming-up manually, please follow these steps:

- a) Turn the fuel control knob to the medium speed position as shown in Figure 4-21.

b) Put the safety locking lever to the free position and raise the bucket from the ground.

c) Slowly operate the bucket control lever and arm control lever to move the bucket cylinder and arm cylinder rods to stroke end.

d) Operate the bucket and arm for five minutes; switch between bucket operation and arm operation with a cycle of 30 seconds.



1. when retracting a working device, be careful not to interfere with the machine or the ground.

e) After the warming-up operation is performed, check whether all gauges and indicator lights on the monitor and controller are in the following states:

- Coolant level too low alarm: no alarm
- Battery voltage too low alarm: no alarm
- Fuel level too low alarm: no alarm
- Coolant temperature too high alarm: no alarm
- Engine oil pressure too low alarm: no alarm
- Air filter blocked alarm: no alarm
- Hydraulic oil temperature too high alarm: no alarm
- Coolant thermometer: the pointer is within the blue area
- Hydraulic oil thermometer: the pointer is within the blue area
- Fuel level gauge: the pointer is within the blue area

Check steps:

a) Check whether the color of exhaust, noise and vibration are normal; any abnormality found should be repaired.

b) If the “air filter blocked” indicator light flashes, you should immediately clean or replace the filter. See the maintenance manual for the method of cleaning filter

c) Turn the fuel control knob to the high-speed (MAX) position, as shown in Figure 4-23 and perform a 3-5 minute check to see whether all gauges and instruments are in normal states.

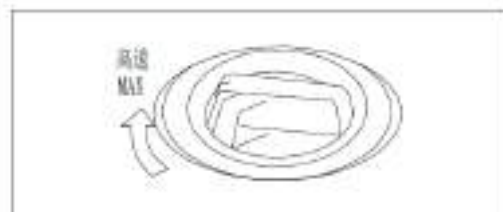


Figure 4-23 High speed position on fuel control knob

d) Repeat the following operations 3-5 times and operate slowly.

Boom operation lift ↔ lower

- Arm operation retract ↔ extend
- Bucket operation digging ↔ unload
- Slewing operation turn right ↔ turn left
- Traveling (low speed) operation forward ↔ backward

e) Select the work mode to be used with the power mode button on the monitor.

Notes:

Without the above operations, there will be a delay in reaction when starting or stopping an operating mechanism and you should continue the operation until it becomes normal.

4.2.4.2 New machine running-in



1. Before delivery, the Zoomlion machines have gone through thorough debugging and testing. However, operation of a machine started in harsh conditions may have adverse effects on the machine's performance and shorten its service life.

2. In the first 100 hours (according to the hour meter), be sure to run in the machine. A new machine can only run at high gear after passing the run-in period. During the running-in operation, you should comply with the precautions listed in this manual.

Precautions:

- a) After starting the engine, you should keep it running at idle speed for 15 seconds and do not operate the lever or the fuel control knob now.
- b) After the engine is started, it should run for 5 minutes at low speed.
- c) Avoid heavy-duty operation or high-speed operation; instead, the machine should be run in with a load of about 80% of the maximum load.
- d) Except in emergencies, sudden startup, acceleration, turn and stop should be avoided.

Without run-in operation, sintering or stuck fault may occur, which will greatly shorten the service life of the machine.

4.2.5 Shut down the engine



1. If the engine is abruptly shut down without being cooled down, its service life will be greatly shortened. Therefore, do not shut down the engine suddenly unless an emergency takes place.

2. Do not shut down the engine suddenly especially when the engine is overheating; instead, keep

it running at medium-speed till the engine gradually cools down and then shut down the engine.

Steps for engine shutdown:

- a) Run the engine at low speed for about 5 minutes, so that the engine gradually cools down.
- b) Turn the starter switch key to the OFF position as shown in Figure 4-24 to turn off the engine.
- c) Remove the starter switch key.

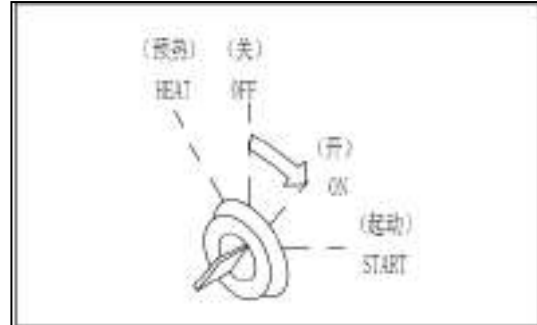


Figure 4-24 Key switch

4.2.5.1 Checks after shutting down the engine

Check according to the following steps:

- a) Conduct an inspection of the machine on the working devices and the upper and lower parts of the machine. Check for oil or water leaks. For any abnormalities found, repairs should be done.
- b) Check whether there are any paper scraps and debris in the engine room; clear them (if any) to avoid a fire hazard.
- c) Remove the soil adhering to the lower part of the machine.

4.3 The excavator operating techniques

4.3.1 Transfer of excavator

Turn the fuel control knob to high-speed position to increase engine speed, as shown in Figure 4-23.



1. Check the direction of the crawler frame before operating steering lever.
2. If the sprocket is in the front, the operation of the traveling lever is in the opposite direction.
3. Before moving the machine, please ensure that it is safe around the machine and honk the horn.
4. Do not let anyone get close to the surrounding area of the machine.
5. Clear all obstacles in the route of traveling.
6. The rear of the machine is a blind area, so please pay special attention during backing-up.
7. When the auto-idle function is activated, the engine speed will suddenly increase if you operate the lever, so be careful in the operation.
8. For a machine with a traveling alarm (optional), you should check whether the alarm device is working properly.

4.3.1.1 Move the machine forward

Steps for moving the machine forward are as follows:

a) Put the safety locking lever to the free position, fold the working device and lift it off the ground for 400 to 500mm (16-20in) as shown in Figure 4-25.

b) When the sprocket is in the rear of the machine, slowly move the lever forward or depress the front of the pedal to move the machine (Figure 4-26).

c) When the sprocket is in the front of the machine, slowly move the lever backward or depress the rear of the pedal to move the machine.

Notes:

If the machine's traveling speed is abnormal in cold weathers, carry out a thorough warming-up operation.

In addition, if the lower part of the machine is clogged by soil, the machine may not move with normal speed, so you should remove the dirt and mud..



Figure 4-25 The position of the working device while the machine is moving forward

4.3.1.2 Move the machine backward

a) Put the safety locking lever to the free position, fold the working device and lift it off the ground for 400 to 500mm (16-20in).

b) Operate the left and right traveling levers or the left and right traveling pedals as follows:

- When the sprocket is in the rear of the machine, slowly move the lever backward or depress the rear of the pedal (Figure 4-27) to move the machine.

- When the sprocket is in the front of the machine, slowly move the lever forward or depress the front of the pedal to move the machine.

Notes:

- If the machine's traveling speed is abnormal in cold weathers, carry out a thorough warming-up operation.

- In addition, if the lower part of the machine is clogged by soil, the machine may not move with normal speed, so you should remove the dirt and mud.

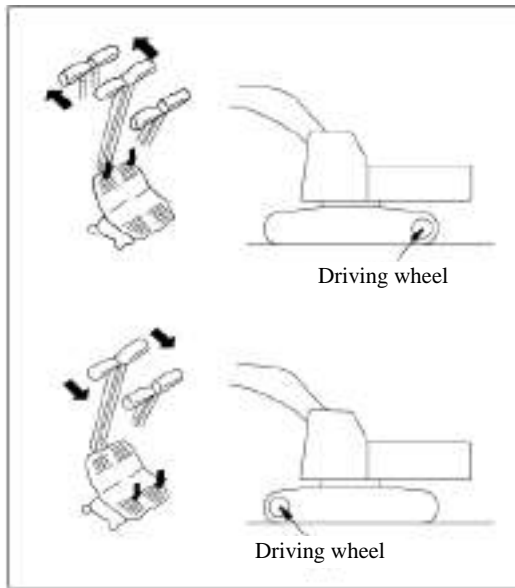


Figure 4-26 Traveling pedal operation for moving machine forward

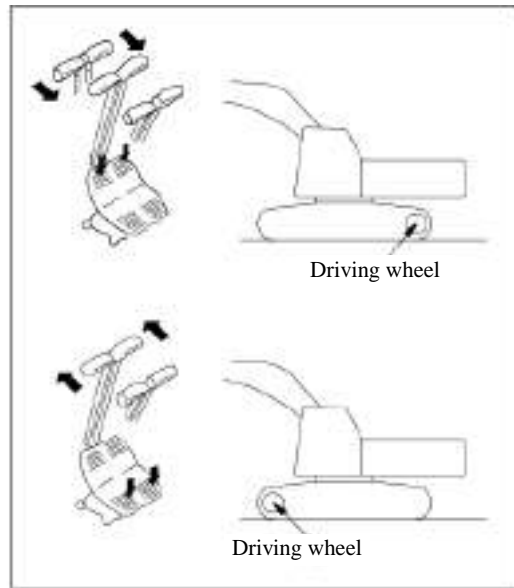


Figure 4-27 traveling pedal operation for moving machine backward

4.3.1.3 Braking operation



- 1. Avoid sudden stop of the machine and keep safe parking distance.**

Place the left and right levers in the neutral position as shown in Figure 4-28 and then stop the machine.

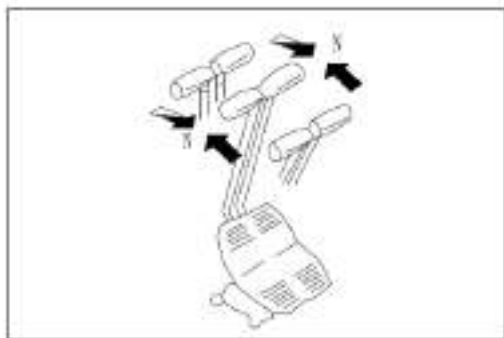


Figure 4-28 Lever

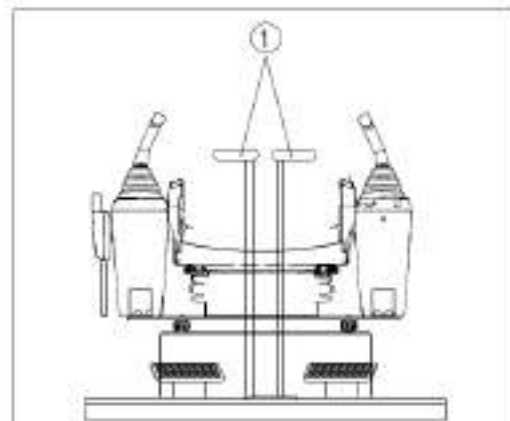


Figure 4-29 Traveling lever

4.3.2 Turning



- 1. Before operating the traveling lever, you should check the location of the sprocket. If the sprocket is in the front, the lever operation should be in the opposite direction.**

Change the direction by operating the traveling lever, as shown in Figure 4-29.

Avoid a sudden change of direction, especially when performing a reverse rotation (turning on the spot); stop the machine before turning.

4.3.2.1 Turning when the machine stops

For turning left, the operating method is as follows:

When traveling forward, move the right traveling lever forward and the machine turns left. When traveling backward, move the right traveling lever backward and the machine turns left (See Figure 4-30)..

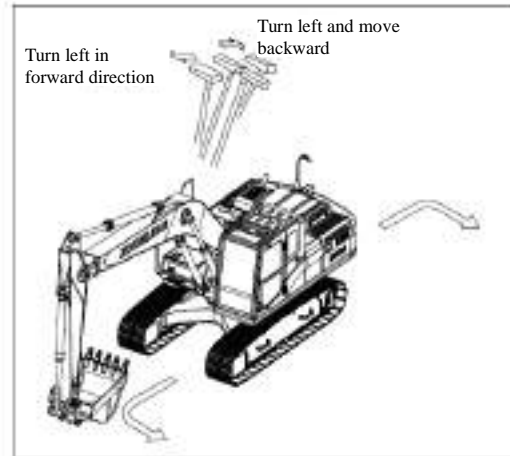


Figure 4-30 Traveling lever operation when the machine is travelling

4.3.2.2 Turning during driving

Return the left traveling lever to the neutral position and the machine will turn left, as shown in Figure 4-31.



1. Return the right traveling lever to the neutral position and the machine will turn right.

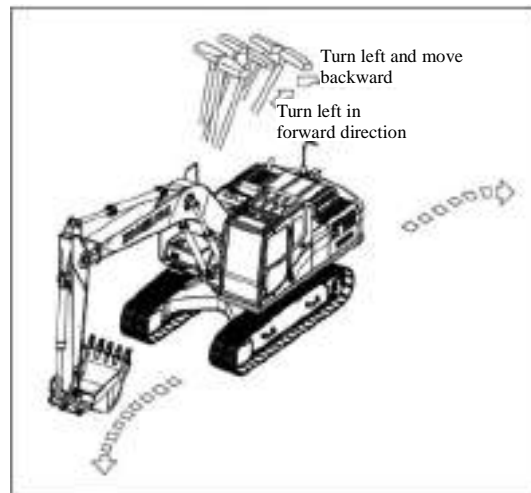


Figure 4-31 Traveling lever operation for turning

4.3.2.3 Turning on the spot

If you want to turn the machine to the left on the spot, move the left lever backward and move the right lever forward, as shown in Figure 4-32.



1. If you want to turn the machine to the right on the spot, move the right lever backward and move the left lever forward.

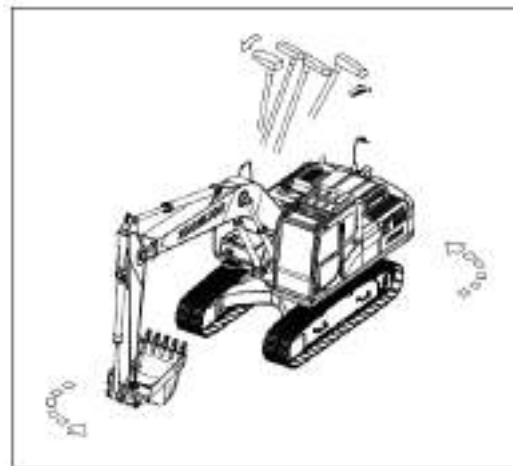


Figure 4-32 Traveling lever operation for turning on the spot

4.3.3 Control and operation of the working device



1. If you operate the lever when the auto-idle function works, the engine speed will suddenly rise, so pay special attention to the lever operation.

2. If you operate the lever for the working devices in a fast way, the working device will move quickly; if you slowly operate the lever for the working devices, the working device will move slowly.

The working devices are controlled by the left and right levers for working devices. The left lever controls the arm and slewing; the right lever controls the boom and the bucket. The movements of the lever and the working devices are shown in Figure 4-33. Release the lever and it will automatically return to the neutral position, and the working devices will stop moving. When the machine is stationary and the lever for the working devices is placed in the neutral position, the engine will always run at low speed even if the fuel control knob is turned to MAX position due to automatic idling function.

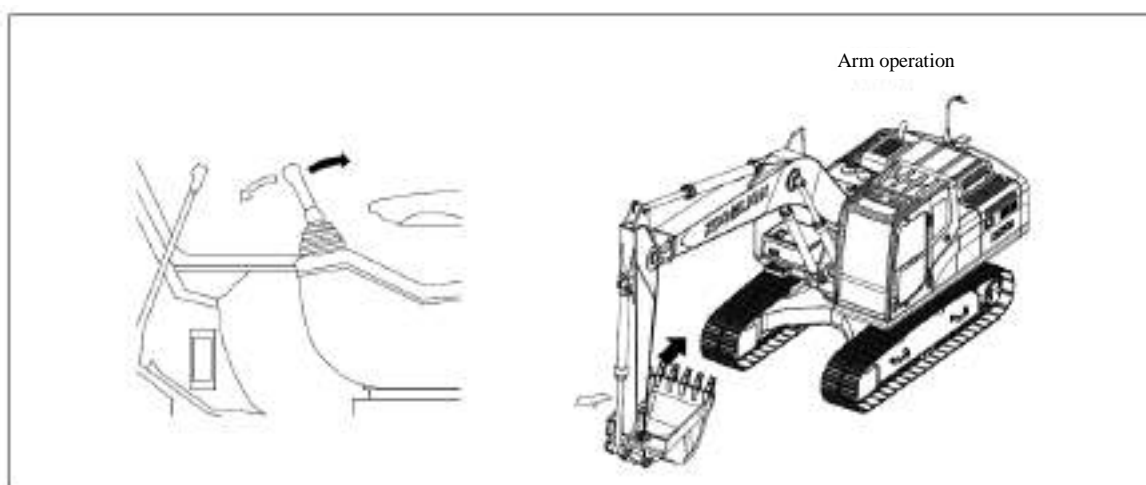


Figure 4-33 Arm operation



The working devices can be lowered to the ground if you operate the lever within 15 seconds after shutting down the engine. You can operate the lever to release the residual pressure within the hydraulic circuit and lower the boom when the machine is loaded on a trailer.

4.3.3.1 Bucket arm operation

Move the left lever for the working devices forward or backward to operate the arm as shown in Figure 4-33.

4.3.3.2 Slewing operation



1. For the rear part of the machine extends beyond the track width, you should check whether the surrounding area is safe before slewing the upper structure.
2. Operate the slewing lever fast and the superstructure will turn quickly; slowly operate the slewing lever and the superstructure will turn slowly.

Operate the left lever for the working devices to control the slewing operation, as shown in Figure 4-34. When the lever is in N (neutral) position, the spring brake is working. Move the left lever to the left or right to slew the upper structure.

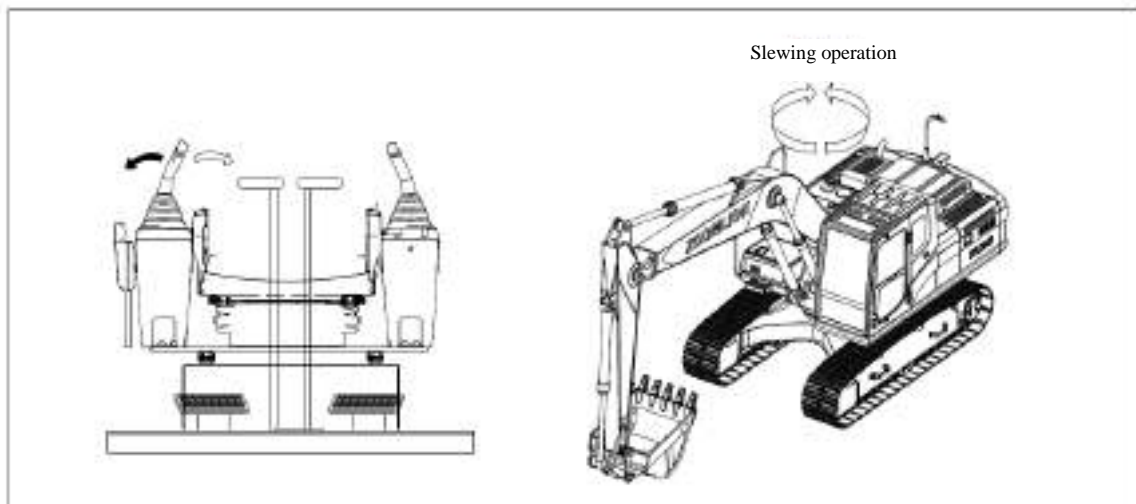


Figure 4-34 slewing operation

4.3.3.3 Boom operation

Move the right lever for the working device forward or backward to operate the boom, as shown in Figure 4-35.

4.3.3.4 Bucket operation

Move the right lever for the working devices to the left or right to operate the bucket, as shown in Figure

4-36.

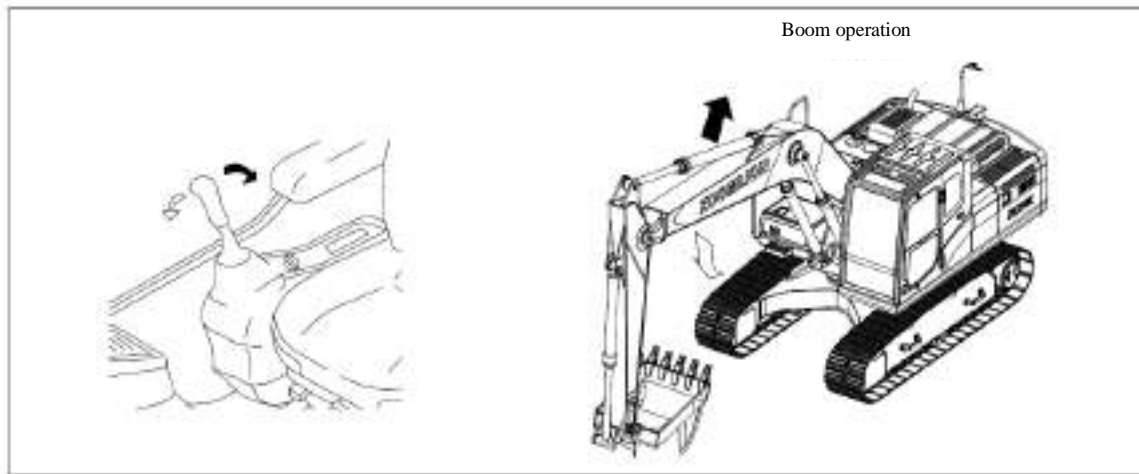


Figure 4-35 Boom operation

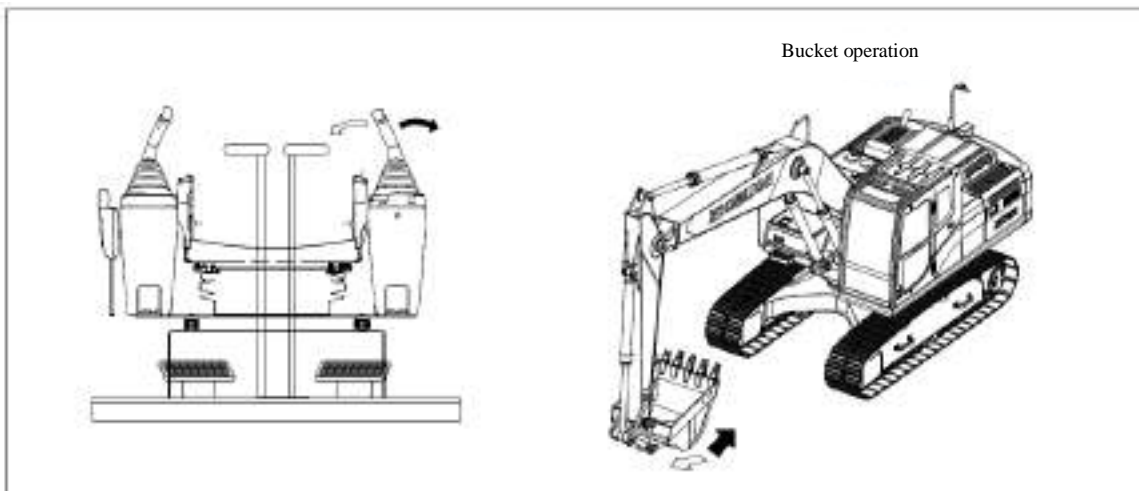


Figure 4-36 Bucket operation

4.3.3.5 Bucket replacement



1. When you strike the pin with a hammer, metal shavings may fly into the eyes, causing serious injury. When conducting this operation, always wear goggles, helmets, gloves and other protective equipment.

2. Remove the bucket and put it away.

3. If you strike hard at the pin, the pin may fly out and injure personnel in the surrounding area. Therefore, make sure the surrounding area is safe before striking the pin.

4. When you disassemble the pin, pay special attention not to stand under the bucket and not to put your feet or any part of the body below the bucket.

5. When removing or installing a pin, be careful not to bruise the hand.

6. When aligning the pin with the hole, do not put fingers into the pin hole.

Park the machine on a solid and flat ground. When doing the connection work, fully understand the signals and work carefully to ensure safety.

a) Lower the bucket on a flat ground.



1. When disassembling the pin, place the bucket in a position just contacting with the ground.

2. If the bucket completely falls to the ground, resistance will increase so that it will be difficult to remove the pin.



1. Remove the pin and make sure that the pin will not be contaminated by sediments and the seals at both ends of the shaft sleeve are not damaged.

b) Remove the double nuts from the lock bolt for each pin on the arm and rod to remove the bolt, and then remove the arm pin (A) and the connecting rod pin (B) to remove the bucket, as shown in Figure 4-37.

c) Align the arm with the hole ① and the connecting rod with the hole ②, coat them with grease and install the pin (A) and (B).

Notes:

- 1). The installation of the device is in reverse order with the dismantling.
- 2). Before installing the bucket, install an O-ring at the arm pin location on the bucket as shown in the picture. Insert the pin and put it into the appropriate slot. At the location of the connecting rod (B), install the bucket in case that the O-ring is mounted into the appropriate slot.
- 3). Install the lock bolts and nuts for each pin, and then coat the pins with grease.

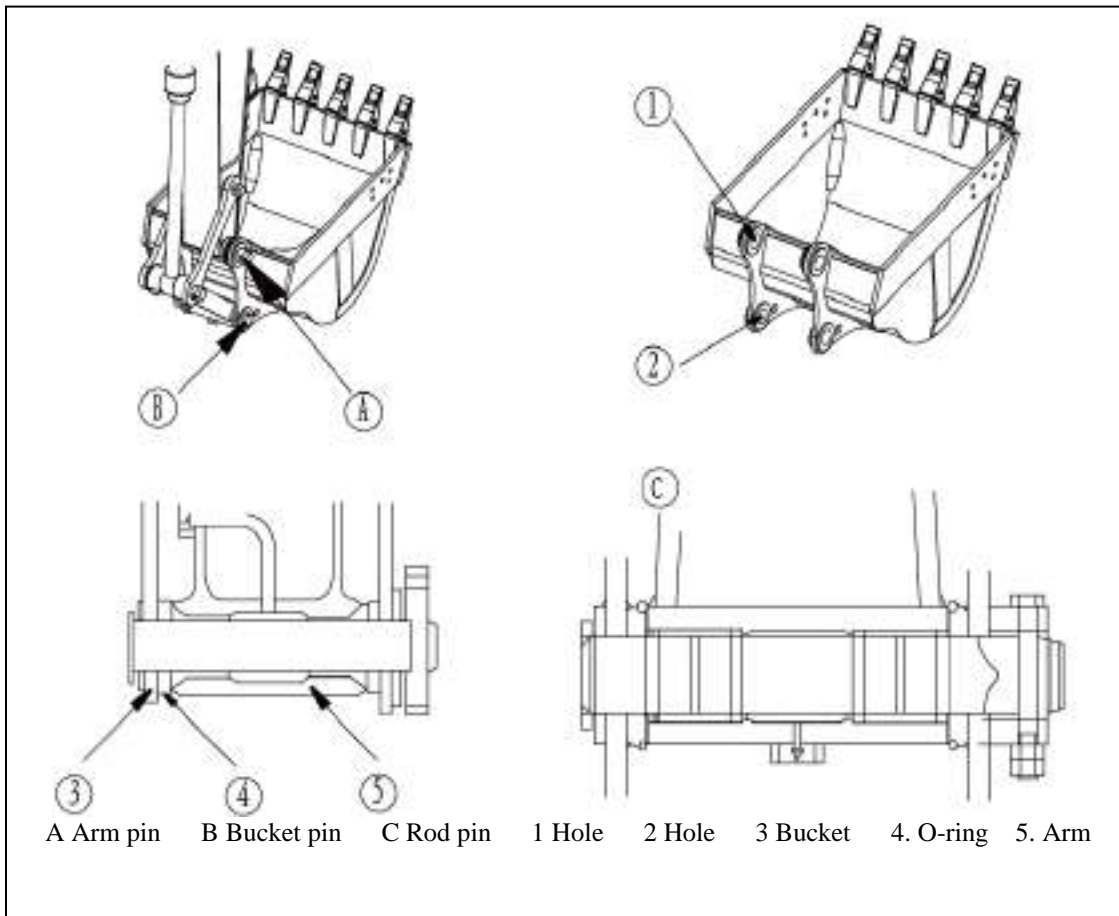


Figure 4-37 bucket replacement

4.3.4 Work modes

4.3.4.1 Power mode:

When the starter switch is turned to the ON position, the power mode is set to the E mode, and you should select the mode that matches with the working conditions through the Work Mode switch as shown in Table 4-1, so as to carry out effective operations.

Table 4-1 Work mode and corresponding range of application

Work mode	Range of application
P mode	Heavy-load mode: the complete machine can give full play to its maximum working potential.
E mode	Standard mode: the power input of the complete machine is about 85% of the engine's maximum power.
L mode	Light-load mode: the power input of the complete machine is about 65% of the engine's maximum power.
B mode	Used for operations with such auxiliary devices as breaking hammer.

4.3.4.2 Power enhancing button:

a) During operation, in order to increase the power, you can use the touch-style power enhancing switch shown in Figure 4-38. This function should be used effectively in view of the working conditions whenever necessary.

b) Press the button shown in the right and power will increase. However, the increased power will automatically be cancelled in 8 seconds.

c) After a power increase, another power increase can only be done after an interval of three seconds.

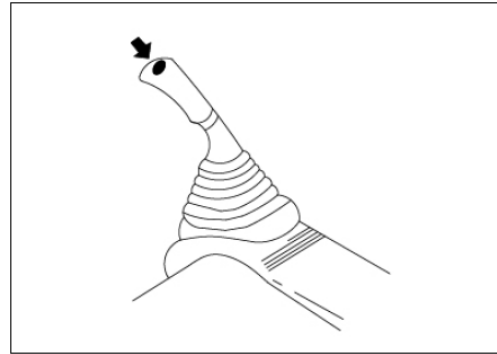


Figure 4-38 Instantaneous power enhancing button

4.3.5 Prohibited operations



1. If you have to operate the lever for the working devices when the machine is traveling, you should be especially careful with the operation.

2. If you operate any of the levers when the automatic idling works, the engine speed will be suddenly increased, so be careful.

4.3.5.1 No operation with slewing force

Do not use slewing force to compact the ground or break objects. This is not only dangerous but also will significantly shorten the life of the machine or damage the machine (see Figure 4-39).

4.3.5.2 No operation with traveling force

Do not dig the bucket into the earth and excavate with traveling force, for this will damage the machine or working devices.

4.3.5.3 No operation with the hydraulic cylinder fully extended or retracted

During operation, do not apply force on a hydraulic cylinder that is fully extended or retracted, for this will cause impact on the working devices and damage the hydraulic cylinder (see Figure 4-40).

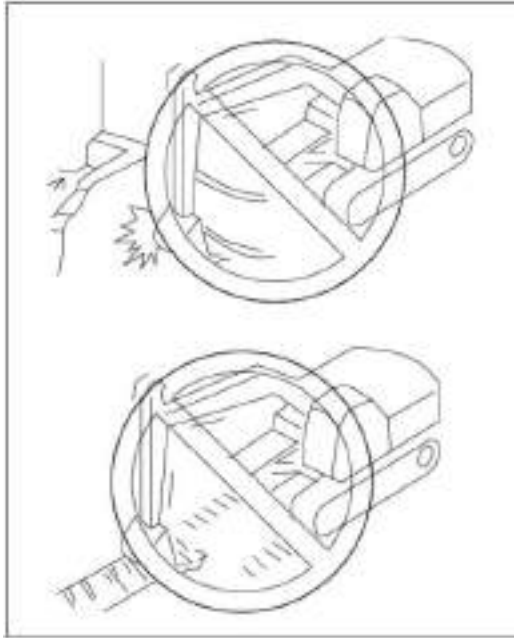


Figure 4-39 No operation with slewing force

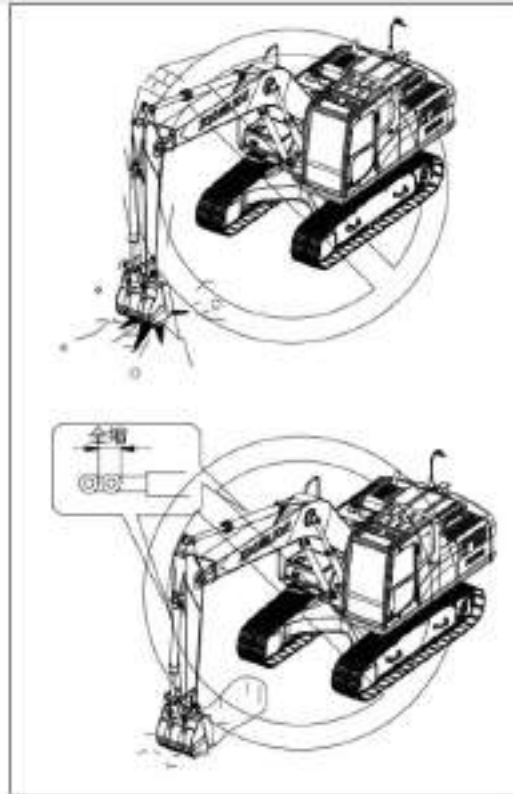


Figure 4-40 No operation when the hydraulic cylinder is fully

4.3.5.4 No operation with falling force of bucket

Do not use the falling force of bucket for digging or use a falling bucket as pickax, breaker or piling machine, for this will significantly shorten the life of the machine (see Figure 4-40).

4.3.5.5 No operation with falling force of machine

Do not dig with the falling force of machine, as shown in Figure 4-41.

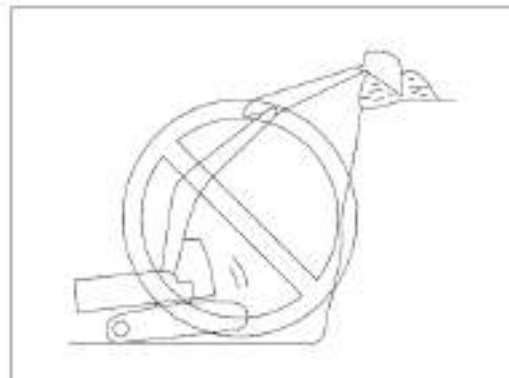


Figure 4-41 No operation with falling force of machine

4.3.5.6 No excavation of hard rock ground

Do not use excavators to dig hard rocky ground and you had better excavate after the ground is crushed with other methods. This will not only reduce the damage to the machine but also is economical.

4.3.5.7 Jerky operation of lever at high traveling speed



1. Do not move the lever jerkily, otherwise it will cause a sudden start, shown in Figure 4-42.

2. Avoid moving the lever from the forward to backward position suddenly (or from backward to forward position).

3. Avoid jerky lever operation, such as releasing the lever to stop the machine when it is traveling at high speed.

4.3.5.8 No hoisting operation

Under general circumstances, the machine is prohibited to be used as crane. Please contact Zoomlion or its authorized agent for details.

4.4 Safe operation

4.4.1 Safe traveling

When traveling on such obstacles as gravels and stumps, the machine (especially the lower part) will suffer from great impact, as shown in Figure 4-43. Therefore, driver should reduce the driving speed and keep the center of the track cross over the obstacles. Try to remove such obstacles or avoid driving on them.

The machine should travel at low speed on such uneven roadbed as stone embankment or uneven road with large stones. **When the machine is traveling at high speed, the idler should be set in forward direction.**

To change speed, press the traveling speed selective switch. The track icon is displayed on the monitor to display the traveling speed.

4.4.2 Allowed water depth



1. If the inclination of the machine is larger than 15 °C when the machine walks out from water as shown in Figure 4-44, the rear of the superstructure will dip into the water and the cooling fan will screw the water, resulting in radiator damage.

2. Be especially careful when driving the machine out of water.

3. Do not drive the machine in water with level higher than the centerline of the sprocket ①.

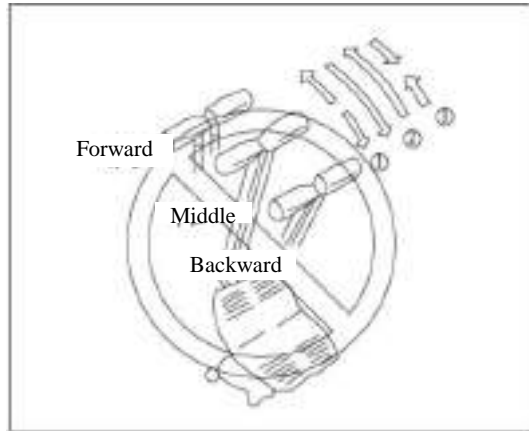


Figure 4-42 sudden conversion of levers at high traveling speed is prohibited

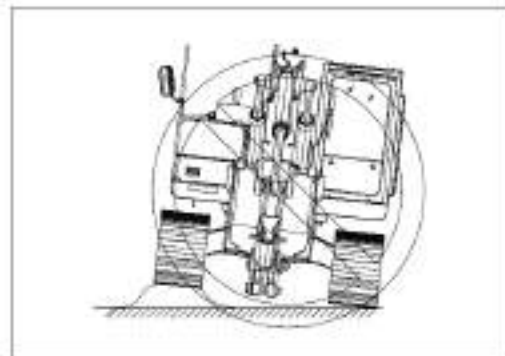


Figure 4-43 No traveling on obstacles

4. Apply grease on parts which have already soaked underwater for a long time until the old grease is completely squeezed out (especially around the bucket pins).

4.4.3 Traveling on the slopes



1. When driving, raise the bucket off from the ground for about 200 - 300 mm (8-12in) and do not travel downhill backward.

2. When the machine is traveling on bumps or other obstacles, make sure that the working device gets close to the ground and drive slowly.

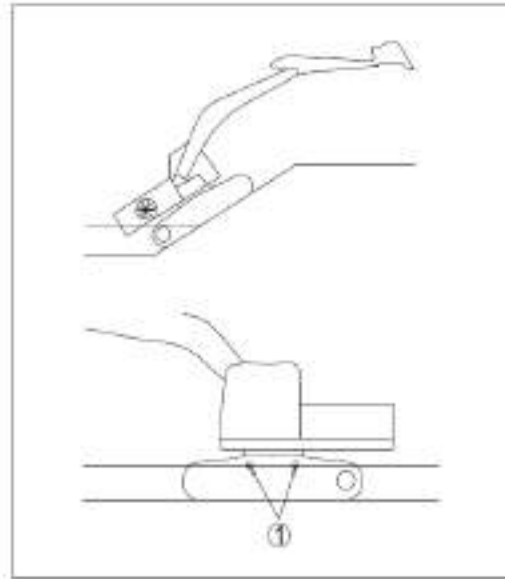


Figure 4-44 Allowed water depth

3. Do not turn on slopes or travel across the slope as shown in Figure 4-45. These operations must be carried out on a further but safer flat ground.

4. When the machine is working on slopes, turning or operating working devices will make the machine lose balance and overturn, so this operation should be avoided.

5. When the bucket is loaded, slewing towards the downhill direction is very dangerous. If you must carry out this operation, you should pile up a platform with soil on the slope, so as to keep the machine in balance during operation.

6. Do not drive uphill or downhill on steep slopes, for the machine may risk overturning.

7. When traveling uphill, if the track shoe slips or cannot travel with only track force, do not travel with the help of arm's pulling force as shown in Figure 4-46, since this may cause machine overturning.

When traveling downhill, drive the machine at low speed by operating the traveling lever and fuel control knob. When traveling downhill on a steep slope with an angle larger than 15 °, the working device should be adjusted to the state shown in Figure 4-47 and the engine speed should be reduced.

Note: if the sprocket side faces downward when the machine goes downhill, the crawler will often slack, resulting in risk of gear jumping;

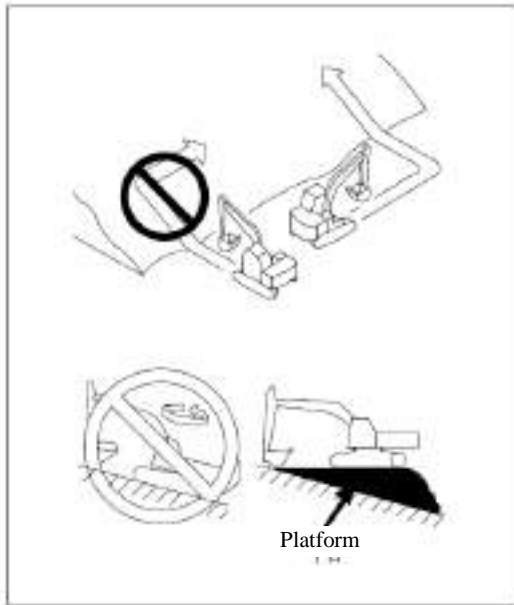


Figure 4-45 Safe operation signs for traveling on slopes

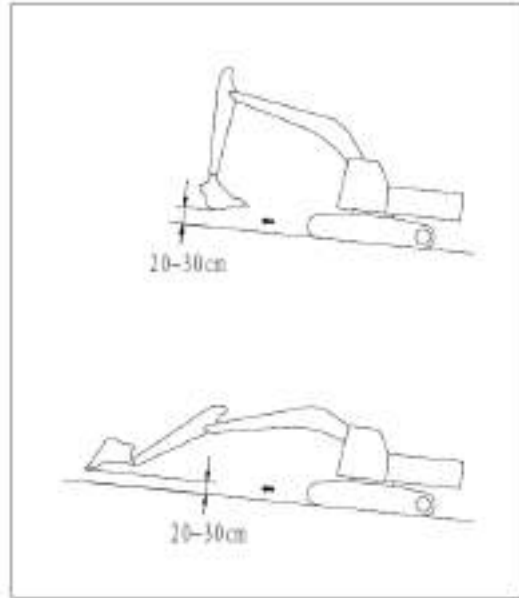


Figure 4-46 Bucket position while traveling uphill

- When the machine is going uphill, in order to ensure balance, you should stretch the working devices forward and keep them away from the ground for 200-300 mm (8-12in) and drive at low speed.

- When the machine is going downhill, in order to brake the machine, the traveling lever should be placed in the neutral position, so that the machine will automatically stop.

- If the engine is shut down when the machine is going uphill, all levers should be put in the neutral positions before restarting the engine.

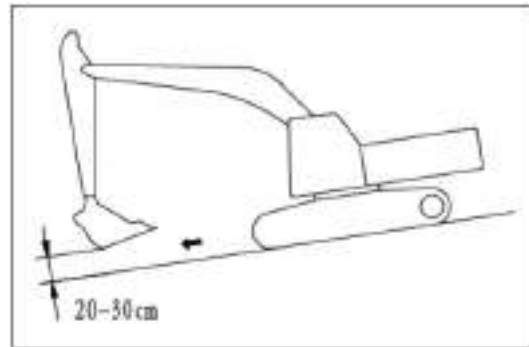


Figure 4-47 Working device location when working downhill



1. If the engine is shut down when the machine is traveling on a slope, do not perform slewing operation by operating the left lever for the working devices. The superstructure will rotate under its own weight.

2. When opening or closing door on a slope, be especially careful that the door will suddenly open or close due to its own weight. Make sure that the door is firmly locked.

4.4.4 Escape from the mud

Always be careful to avoid falling into the mud. If the machine falls into the mud, drive it out according to the following steps.

a) One track has fallen into the mud:



1. When the machine is lifted by the boom or arm, be sure that the bottom of the bucket contacts with the ground (Do not use the bucket teeth to push). The angle between the boom and the arm should be between 90 ° and 110 °. These rules are also applicable when using the bucket that is reversely installed.

2. If only one track has fallen into the mud, lift the crawler with the bucket, and then pad wood or logs to drive the machine out of the mud. If necessary, also place wood under the bucket, as shown in Figure 4-48.

b) Both tracks have fallen into the mud:

If both tracks are in the mud, slip and can not move, pad logs or timbers as described above. Dig the bucket into the ground in front, operate the arm in the same way as digging operation and move the traveling lever to the forward position to pull out the machine, as shown in Figure 4-48.

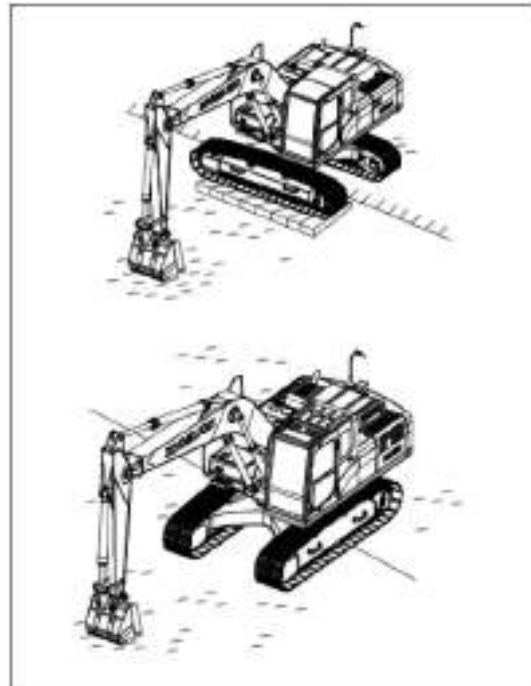


Figure 4-48 Escape from mud

4.4.5 Stop the excavator



1. Avoid sudden stop of the machine and leave adequate space for parking the machine.

2. Park the machine in solid and flat ground.

3. Avoid parking the machine on the slopes.

4. If you must park the machine on a slope, pad the crawler with blocks and insert the working device into the ground to prevent machine movement, as shown in Figure 4-49.

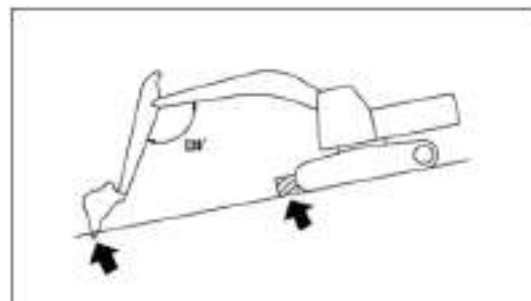


Figure 49 Gesture for parking the machine on the slope

5. If you accidentally touch the lever for the working devices, the working device or the machine will suddenly move, causing serious personal injury or accident. Therefore, before standing up from the seat, make sure that the safety locking lever is firmly placed in the locked position.

Steps for parking the machine:

- a) Place the left and right traveling levers in the neutral positions to stop the machine.
- b) Turn the fuel control knob to reduce the engine speed to low speed, as shown in Figure 4-50.
- c) Lower down the bucket horizontally, until the bottom of the bucket touches the ground, as shown in Figure 4-51.
- d) Place the safety locking lever in the locked position.

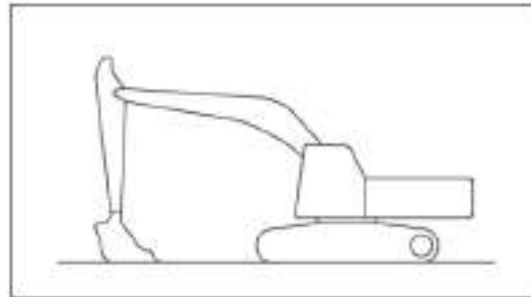


Figure 4-51 Safe parking state



Figure 4-50 Stop the machine

4.4.6 Operation in special weather

4.4.6.1 Operation in cold weather

If the temperature is low, the engine will not start easily and the coolant will freeze, so follow these steps:

- a) Fuel and lubricants

All the components should use fuel and lubricants with low viscosity. Please refer to the maintenance manual for details about the velocity.

- b) Coolant

The antifreeze is toxic, so be careful not to let the antifreeze splash into the eyes or on the skin. If any antifreeze splashes into the eyes or on the skin, you should rinse with a lot of clean water to and seek medical care immediately.



1. The antifreeze is toxic, so be extremely careful when you deal with it. Before replacing antifreeze or dealing with coolant when repairing radiator, please contact Zoomlion distributor or

local antifreeze suppliers. Be careful not to allow the liquid flow into sewers or onto the ground.

2. The antifreeze is flammable, so keep it away from fire and do not smoke when dealing with antifreeze.



1. Do not use methanol, ethanol or propanol-based antifreeze.

2. Avoid the use of any leak-proof agents absolutely, whether being used alone or mixed with antifreeze.

3. Do not mix different brands of antifreeze.

During cold seasons, only ethylene glycol antifreeze which does not contain preservatives is available in the region where permanent antifreeze is out of reach. In this case, the cooling system should be cleaned twice a year (spring and fall). When filling the cooling system, antifreeze should be added in the fall instead of in the spring.

About antifreeze mixing ratio for replacing the coolant, see "Maintenance Manual".

c) Battery



1. The battery produces flammable gas, so keep it away from fire or sparks.

2. The battery electrolyte is dangerous. If it enters into eyes or skin, you should rinse with a lot of water and go to a doctor immediately.

3. The battery electrolyte dissolves the paint, so you should immediately wash the machine with water if the electrolyte is sprinkled on the machine.

4. If the battery electrolyte is frozen, do not charge the battery or start the engine with different power sources, because this may result in risk of battery explosion.

5. When the ambient temperature drops, the battery capacity declines. If the battery charge ratio is low, the battery electrolyte will freeze. So maintain the battery charge capacity close to 100% and isolate battery from low temperature, so that the machine can be easily started next morning.

Notes:

1). Measure the proportion of electrolyte and get the converted charge ratio from Table 4-2.

Table 4-2 Relationship between charge ratio and liquid temperature

Charge ratio	Liquid temperature			
	20℃	0℃	-10℃	-20℃
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

2). At low temperatures, the battery capacity will significantly decrease, so pack the battery or remove it from the machine to a warm place, and load it into the machine next morning.

3). If the electrolyte level is low, add distilled water to it in the morning before starting work. Do not add water after finishing the daily work so as to prevent the liquid inside the battery from freezing at night.

4.4.6.2 Operation in snow weather

Surface covered with snow or frozen is very slippery. Be especially careful when operating machinery. Do not impose sudden operation on the lever.

Even small slopes may make the machine slip. Therefore, when operating on slopes, particular attention should be paid.

a) For the frozen ground, the ground becomes soft when the temperature rises,, which may cause machine overturning.

b) If the machine falls into deep snow, there will be risk of overturning or being buried in the snow. Be careful not to leave the road shoulder or fall into the snow.

c) When cleaning the snow, road shoulder and nearby objects are buried in the snow and can not be seen, so the machine may overturn or hit the buried objects, so be sure to operate carefully.

When the season changes and weather gets warmer, do according to the following steps:

Replace the fuel and engine oil of all components with the specified viscosity. See "Maintenance Manual" for details. If only ethylene glycol-based antifreeze (for winter use) is available instead of permanent antifreeze or if there is no antifreeze, the cooling system should be cleaned completely, then clean the internal cooling system thoroughly and add fresh soft water.

4.4.7 Work after operation

4.4.7.1 Check and clean the machine

Check the engine coolant temperature, hydraulic oil temperature and fuel oil level on the monitor, so as to clear the mud and water on the lower part of machine. Besides, the following steps should be performed:

a) The engine works at low speed, slew the machine for 90 °to turn the working devices to one side.

b) Jack up the machine, so that the crawler is slightly lifted off the ground, and then idle the crawler.

Repeat the operation for the left and right tracks.



1. Crawler idling is dangerous, so stand as far as possible from the crawler.

2. When the operation is completed, fill the fuel tank to prevent the formation of water when the temperature drops due to condensation of moisture in the empty box.

To prevent mud and water from getting frozen on the lower part of the machine and causing that the machine can not move in the next morning, observe the following precautions:

a) Completely clear mud and water off the machine, so as to prevent damage to the seal due to mud and dirt flowing into the seal along with water.

b) The machine should be parked on the hard and dry ground. If possible, park the machine on wood which can prevent the crawler from being frozen in mud, so that the machine can start next morning.

c) Open the drain valve to discharge water accumulated in the fuel system to prevent freezing.

4.4.7.2 Lock

Lock these parts, as shown in Figure 4-52:

- ①. Engine hood
- ②. Left door of the machine
- ③. Cab door
- ④. Battery cover
- ⑤. Oiling port of the fuel tank
- ⑥. Right door of the machine
- ⑦. Oiling port of the hydraulic tank

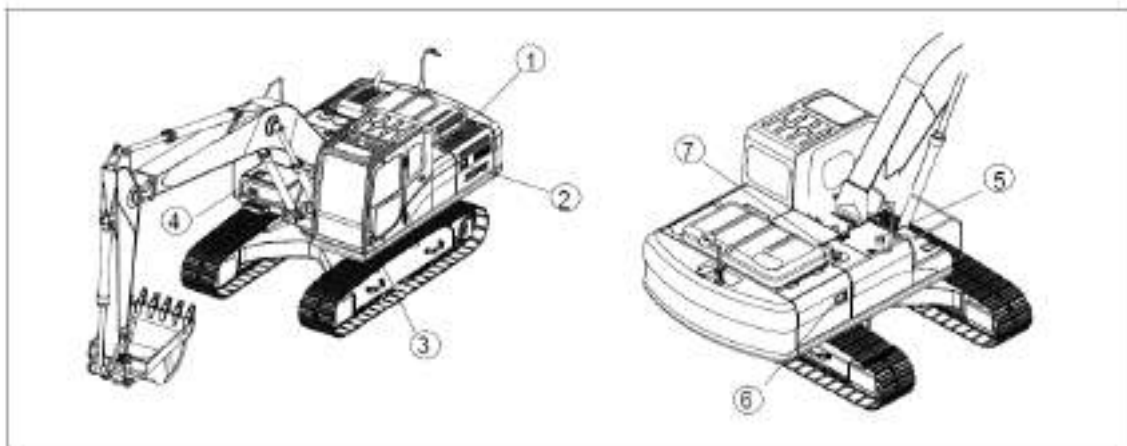
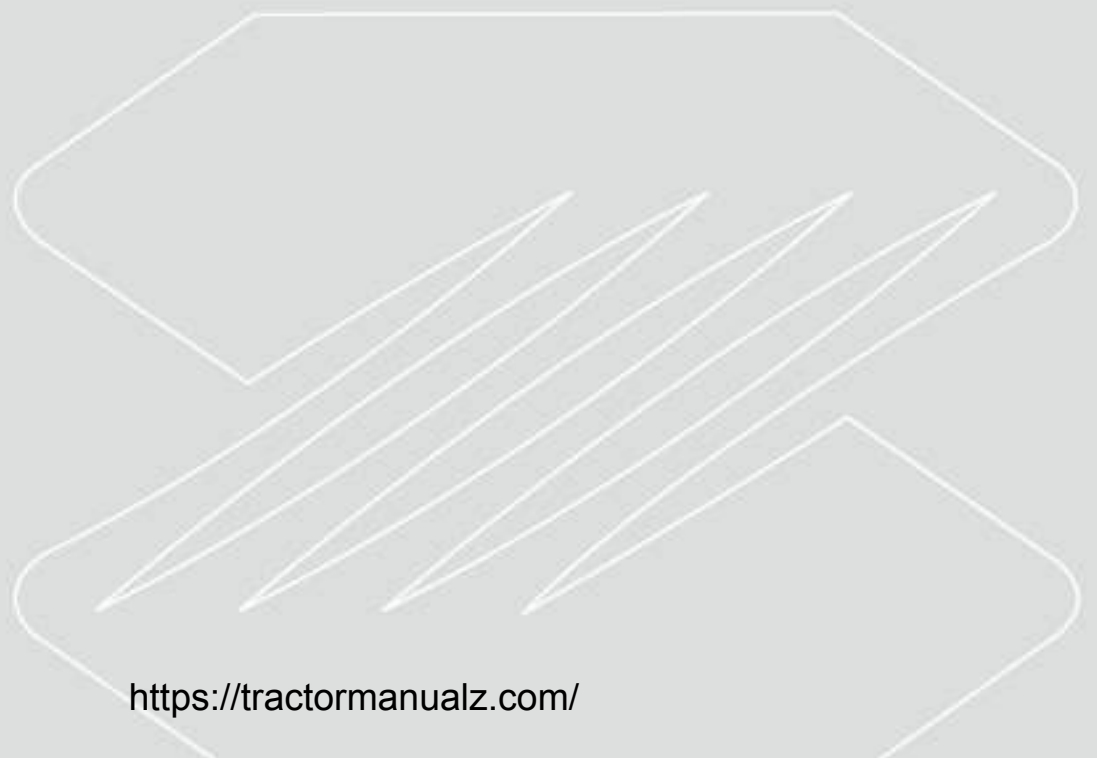


Figure 4-52 Parts with locks



ZE205E/ZE230E HYDRAULIC EXCAVATOR
OPERATION MANUAL

Chapter Five: Accessories and options



Chapter Five: Accessories and options

5.1 General Notes

5.1.1 Safety precautions

a). The installation of options and accessories concerns security or legal constraints, so please contact Zoomlion or Zoomlion dealer in advance. Otherwise, we assume no responsibility for accident or damage.

b). Zoomlion will not be responsible for any injury, accident or product failure caused by accessories or options used without Zoomlion's approval. These accessories or options will not only affect the life of the machine, but also cause potential security hazard.

c). When installing and using the optional accessories, read relevant parts instructions and general notes in this manual about the accessories.



1. The accessories are powerful tools. Please use them in the correct way in order to prevent serious injury or damage.

2. Read through the instruction manual of the accessories and do not use the accessories until you completely understand the contents of the manual. If you have lost the instruction manual, you may request the manufacturer or accessories sales company for a new one.

3. According to the accessory's condition, shield should be installed on the front of the machine if necessary.

4. Vibration and noise may make it difficult for coworkers to convey the instructions. Before you begin, assign a commander and determine the signal to be used.

5. When the accessory is bearing heavy load, do not slew to the side and it is very dangerous to do so on slopes.

6. Compared to the machine with the bucket, the machine equipped with a breaker bears a heavier and unstable load in the front of the working device. Do not operate the machine when the accessory turns to the side, so as to prevent overturning.

7. When accessories are installed, the slewing scope and gravity center of the machine is not the same and the machine may move accidentally. So you must fully understand the machine's conditions.

8. Before operation, set a cordon around the machine to prevent persons from entering. Do not operate the machine when any people is nearby.

9. In order to prevent serious accidents caused by wrong operations do not put your foot on the pedal except that when you are operating the pedal.

5.1.2 Precautions for disassembling and installation operation

When disassembling or installing the accessories, be sure to do according to the following steps in order

to ensure safe operation:



1. Carry out disassembling and installation operations on a solid and flat surface.
2. When there are more than two people involved in the operations, determine the signals and comply with these signals in operation.
3. When lifting or handling heavy objects (over 25 kg or 55lb), be sure to use a crane.
4. When removing heavy components, support them before removal. When the crane is doing lifting job, pay special attention to the location of the gravity center.
5. Operation while the crane is lifting load is dangerous. A bracket should be set to ensure safety.
6. When placing the removed accessories or when mounting the accessories, make sure they are in stable condition and will not tip over.
7. Do not walk under the load lifted by the crane, and stand at a place where there is no danger even if the load falls.



1. A qualification certificate is necessary for operating cranes. Do not allow unlicensed personnel to operate cranes.
2. For operation details of removal and installation, please contact Zoomlion or Zoomlion dealer.

5.1.3 Precautions for accessory installation

Long device will reduce the stability of the machine, so if slewing operation is done on slopes or when the machine is walking downhill from steep slopes, the machine will lose balance and tip over.

The following operations are particularly dangerous, so do not operate the machine in the following manner:

a). If a heavy device is mounted on the machine, the slewing distance will increase (there will be a distance

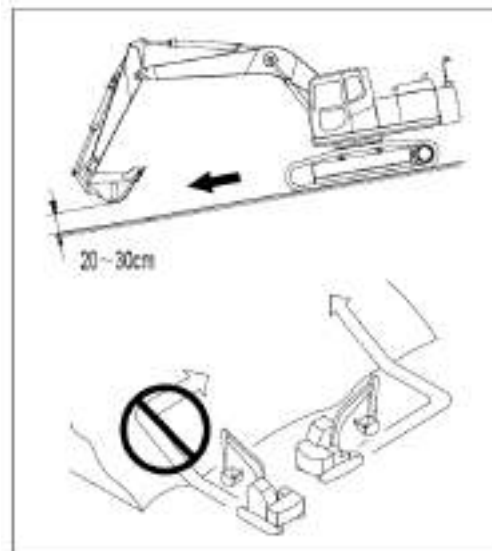


Figure 5-1 Prohibited movement with long device (I)

between the expected stop position by lever operation and the position where the upper structure completely stops). As a result, there will be risk of wrong judgment of distance or risk of hitting certain objects. So there should be room left for the upper structure to stop. In addition, hydraulic drift will increase (when the working device is stopped in mid-air, it will decline under its own weight) (Figure 5-1).

b). When installing the boom and arm, be sure to follow the correct procedures. If not, it may cause serious damage or injury. Therefore, please contact with Zoomlion or Zoomlion dealers during installation.

c). If a long working device is mounted on the machine, the operating range will suddenly get larger, so there will be misjudgment of distance and risk of hitting certain objects. When operating a working device, be sure to leave some space for any object within the region (Figure 5-2).

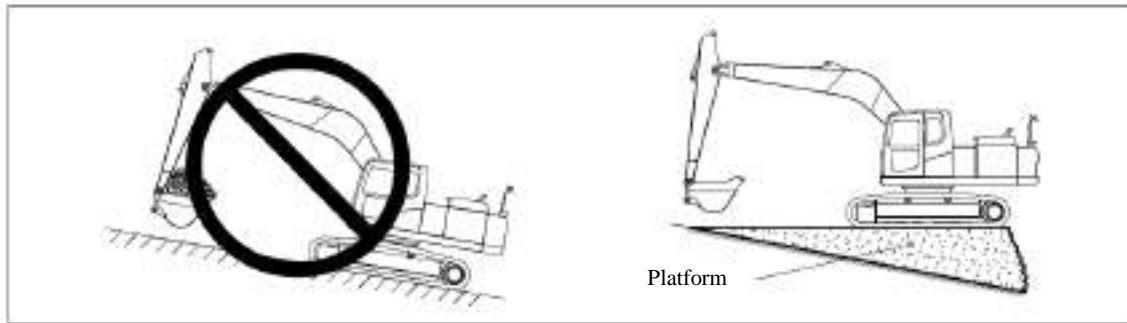


Figure 5-2 Prohibited movement with long device (II)

5.2 Options and accessories operation guides



1. Please read the accessories instructions and related sections in this manual.
2. Installation of accessories or options concerns security issues. Therefore, prior to installation, please contact Zoomlion or Zoomlion dealers.
3. Zoomlion will not be responsible for accessories or options used without Zoomlion’s approval. These accessories or options will not only affect the life of the machine, but also cause potential security hazard, resulting in injury, accident or product failure.
4. Zoomlion will assume no responsibility for any harm, accident or damage caused by the use of unauthorized accessories or options.

5.2.1 Combination of the working device



1. According to the type or combination of working devices, there may be risk of the working device’s collision on the cab or machine body.
2. Before using unfamiliar device for the first time, be sure to check whether there is any risk of interference and be careful in operation.

Table 5-1 lists all the accessory combinations which can be installed to long stick (standard), short stick, and bucket.

Table 5-1 Working device combination

Bucket name	Bucket capacity(m ³)	Use	Standard boom (5700/5850mm)		Notes
			Standard Arm (2955/3045mm)	Short Arm (2500/2400mm)	
Overloaded bucket	1	gravel operations	●	●	ZE205E/ZE230E
Universal bucket	0.85/1.1	ordinary diggings	◎/◎	●/●	
Enlarged bucket	1.1/1.2	Light-load operations	○/○	◎/◎	
Loading bucket	1.3	loading operations	△	○	

Notes:

1) Symbols in table 5-1 represent respectively:

- : For operation of materials with density no more than 2000kg / m³
- ◎: For operation of materials with density no more than 1800kg / m³
- : Operation of materials with density no more than 1500kg / m³
- △ : Operation of materials with density no more than 1200kg / m³ and only for loading

2) Use category

General digging: digging or loading of sand, gravel, clay.

Light-load digging: digging or loading of dry, loose soil and sandy soil, sludge, etc.

Loading: loading of dry, loose soil and sand.



- 1. When the arm is lengthened, it will interfere with the bucket if the bucket gets close to the machine. Be careful to operate lengthened arm.**
- 2. During bevel digging, the boom will interfere with the lower part of the machine when the boom is completely lowered down. Be careful to operate the boom.**
- 3. For excavation or loading of hard soil or rock, it is recommended to use the reinforced bucket with high strength and high wear resistance.**

5.2.2 Track shoe selection

Please select appropriate track shoe suitable for operating conditions. Determine the category according to their uses listed in Table 6-2, and then select the appropriate track shoe in table 5-3.



1. B-type and C-type are wide track shoes, so their uses are restricted. When using these track shoes, a thorough investigation and study should be carried out on the conditions of use, so as to determine whether these track shoes are applicable.

2. When selecting the width of track shoe, try to select the narrowest track shoe according to the floatability and ground pressure. If the width of the track shoe used is larger than that of the required, the load of the track shoe will increase and the track shoe may have the risk of plate bending, chain breakage, pin breakage, loose bolts and other problems.

Table 5-2 Selection of track shoe

Type	Use	Precautions for use
A	Stone ground, riverbed, common soil	Travel at low speed on rough ground with large obstacles such as boulders and fallen trees.
B	Common soil, soft ground	These track shoes can not be used for traveling on rough ground with large obstacles such as boulders and fallen trees. Travel at high speed or medium speed on level ground only; if it is inevitable to cross an obstacle, slow down and travel at half of the slow speed.
C	Very soft ground (swamp surface)	They are applicable only when the machine subsides at places where A or B track shoe is not applicable. These track shoes can not travel on rough ground with large obstacles such as boulders and fallen tree. Travel at high speed or medium speed on level ground only; if it is inevitable to cross an obstacle, slow down and travel at half of the slow speed.

Table 5-3 Selection of appropriate track shoe

	Technical Specification	Category
Standard	600mm three-tooth track plate	A
Optional	700mm three-tooth track plate	B
Optional	800mm three-tooth track plate	C

5.2.3 Use of trapezoidal bucket

This bucket is used for digging trapezoidal ditches on farmland etc. With a mobile board equipped, it can dig three kinds of ditches (45°, 40° and 38°) (Figure 5-3)

The mounting position of the mobile board changes according to the trench slope (45°, 40° or 38°).

a) Digging steps:

- 1). Operate the boom, arm and bucket to keep the

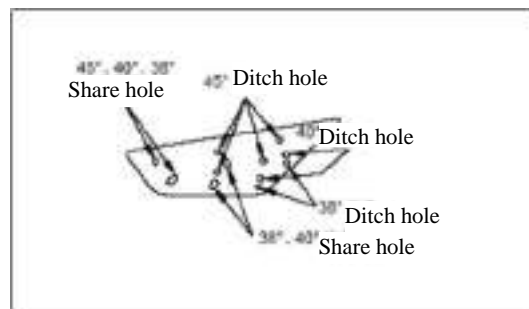


Figure 5-3 Use of trapezoidal bucket

line at the side plate of the bucket (A) vertical to the ground, as shown in Figure 5-4.

2). Check the guide plate (B) at this position and ensure that it is installed next to the bucket pin, as shown in Figure 5-5. Keep the plate horizontal when digging.

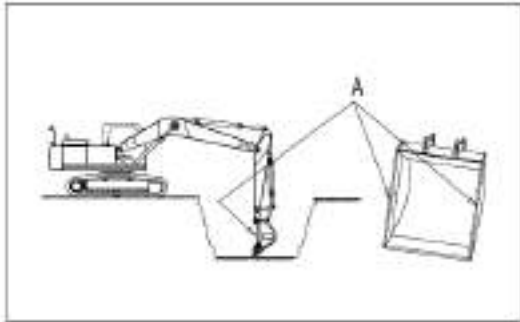


Figure 5-4 Digging steps for trapezoidal bucket (I)

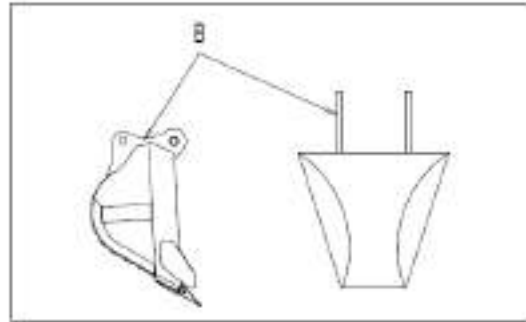


Figure 5-5 Digging steps for trapezoidal bucket (II)

b) Digging of ditch with a slope of 45 °

Select the corresponding ditch hole, mount on the bucket or mobile board, and perform the excavation with the above method.

c) Digging the ditch of the 40 °and 38 °slope

Select the corresponding ditch hole, mount on the mobile board, and perform the excavation according to the above method (Figure 5-6).

Even if the trapezoidal bucket is equipped with a mobile board, excavation should still be done under the condition that the bucket side is perpendicular to the ground.

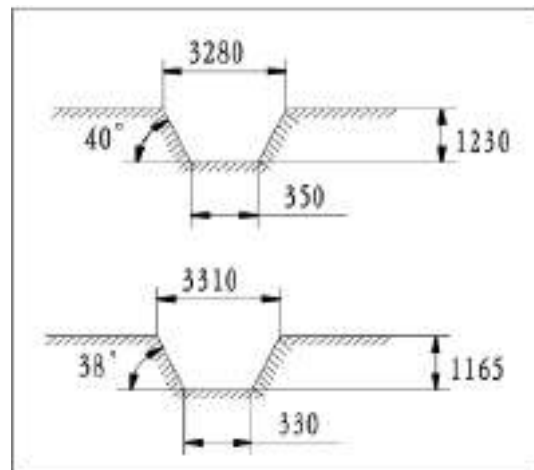


Figure 5-6 Trapezoidal bucket digging slopes of 40 °and 38 °

5.2.4 Use of the lengthened arm

When the machine is equipped with lengthened arm (Figure 5-7), retracting the arm may cause the bottom of the boom cylinder and the turntable interfere with the bucket, so please pay attention to the following points during operation and transportation:

a) When the machine is equipped with a lengthened arm, you should use the narrow bucket without side cutting edge.

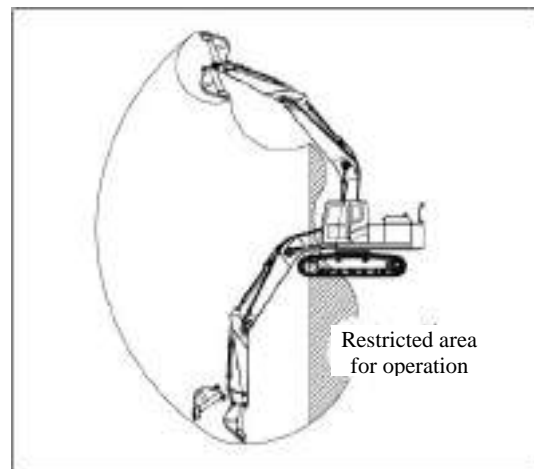


Figure 5-7 Operation of lengthened arm

The standard bucket will make the machine unstable and the retracting of arm may make that the bucket and the cab interfere with each other, so do not install the standard bucket.

b) Working on hard ground or rocky ground will shorten the service life of the lengthened arm, boom and arm.

In this case, you'd better not use lengthened arm.

5.2.5 Use of grab

This grab (Figure 5-8) is used for excavation or loading at one side of the trench or a confined space.

a) Digging method

This grab excavates by pushing the boom towards the ground.

During the grab operation, carry out excavations at the same time when the boom is gradually rising.

If the grab rotates, you should release the bucket cylinder pressure and then adjust the lever to the neutral position so that it temporarily stops rotating.



Figure 5-8 Grab

b) Precautions for use



1. For your safety, be sure to avoid sudden traveling, rotation and stop.
2. Dig with the bucket teeth remaining vertical.
3. Do not crush stones or cut into the soil by way of the slewing grab.
4. Do not pile or pull pile with the bucket.
5. Before leaving the machine, open the grab, and lower it onto the ground.

Note: During the transport of the machinery, the grab should be removed from the stick.

c) Lubrication

Prepare a grease gun.

- 1). Stop the machine on hard and level ground, lower the working device to the ground and turn off the engine.
- 2). Pump in the grease with the grease gun through the grease nozzle indicated by the arrow.
- 3). After lubrication is done, wipe the old grease being squeezed out.

5.3 Operation of recommended options

This section describes the precautions to be observed for operation of machine equipped with the options (mainly hydraulic excavator hydraulic hammer).



1. Select the accessories that are suitable for the machine.
2. Machine models for accessory installation are different. For selection of accessories and machine model, please contact Zoomlion or Zoomlion dealers.

5.3.1 Hydraulic hammer

5.3.1.1 Purpose of hydraulic hammer

Hydraulic hammer can be used for a wide range of operations, including building demolishing operations, road crushing operations, tunnel work, slag breaking operations, stone breaking operations and crushing operations at quarries.

5.3.1.2 Precautions for using hydraulic hammer



1. For installation of hydraulic hammer, be sure to contact Zoomlion or authorized Zoomlion dealers.

Please note the following while using a hydraulic hammer:

a). During crushing operations, the chisel should be perpendicular to the impact surface (Figure 5-9).

b). When the impact is applied, press the chisel down to the impact surface, so that the chassis is about 50mm (2 in) off the ground, and do not let the machine leave the ground too much.

c). If the chisel can not penetrate into or break the surface with continuous impact on the same surface within 1 minute, you should change the impact position to one close to the edge to break the surface (Figure 5-10).

d). The penetration direction of chisel and the direction of breaker body will deviate from the straight line they were in at first. Therefore, you should keep adjusting the bucket cylinder to keep both in a straight line (Figure 5-11).

e). Make sure that the chisel always appropriately imposes impact on the surface, so as to avoid applying impact when there is no resistance.

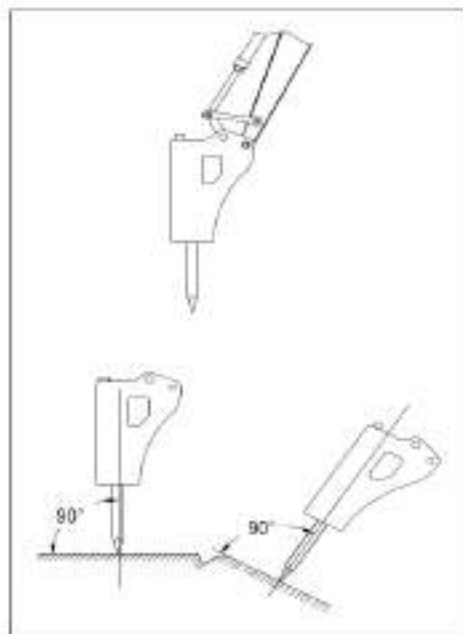


Figure 5-9 Precautions for use of hydraulic hammer (I)

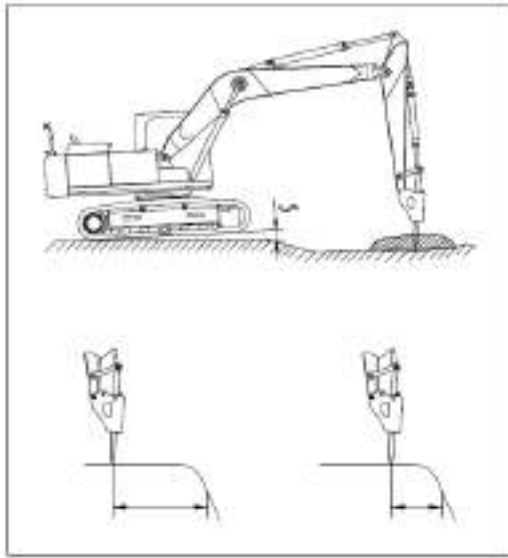


Figure 5-10 Precautions for use of hydraulic hammer (II)

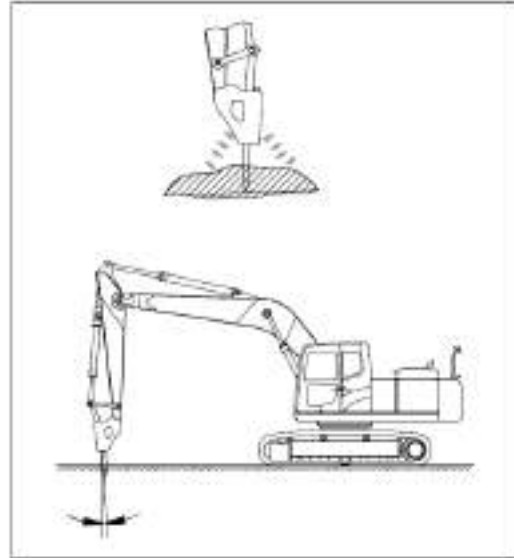


Figure 5-11 Precautions for use of hydraulic hammer (III)

5.3.1.3 Prohibited operations

To ensure long service life and safe operation of machines, do not operate the machines in the following ways (Figure 5-12 to 5-14):

- a) Do not fully extend or retract the cylinders and always retain a distance of 50mm (2 in).
- b) Hitting rocks with the device is prohibited.
- c) Operation with gyroscopic force is prohibited.
- d) Movement of chisel during impact operation is prohibited.
- e) Applying impact force horizontally or upward is prohibited.
- f) Swinging of chisel when it penetrates the rock is prohibited.
- g) Pecking operation is prohibited.
- h) It is prohibited to raise the machine off the ground when the bucket cylinder is fully extended.

5.3.1.4 Lubrication of hydraulic breaker

Lubricate the hydraulic breaker in the correct positions (Figure 5-15).



If the lubrication is done at incorrect positions, excessive grease may be added and cause the earth and sand entering into the hydraulic oil circuit, and the use of breaker will damage the hydraulic device. Therefore, lubrication must be applied in the right place.

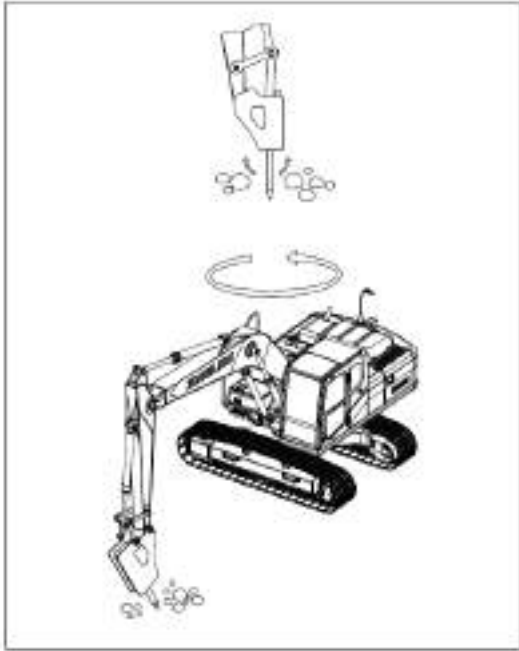


Figure 5-12 Prohibited operation (I)

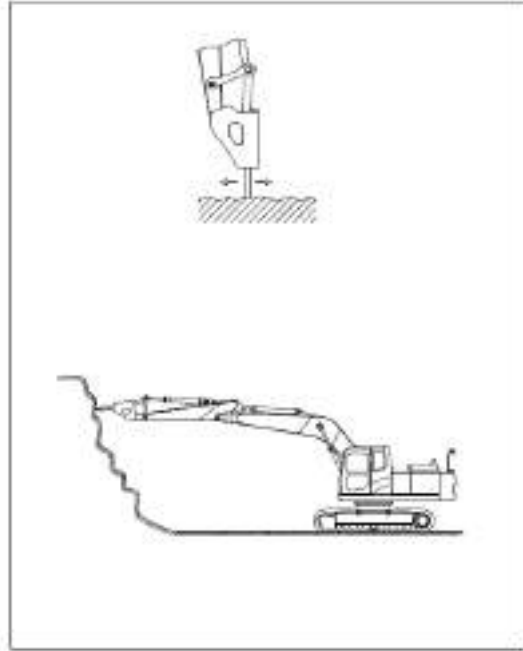


Figure 5-13 Prohibited operation (II)

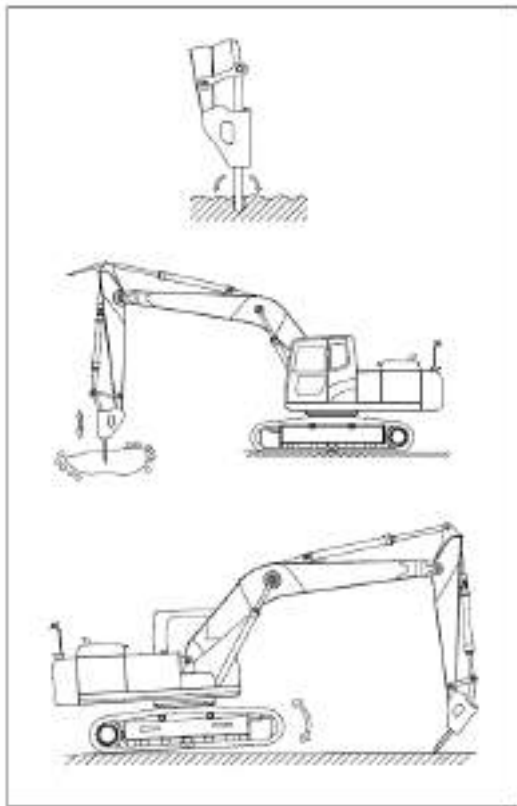


Figure 5-14 Prohibited operation (III)

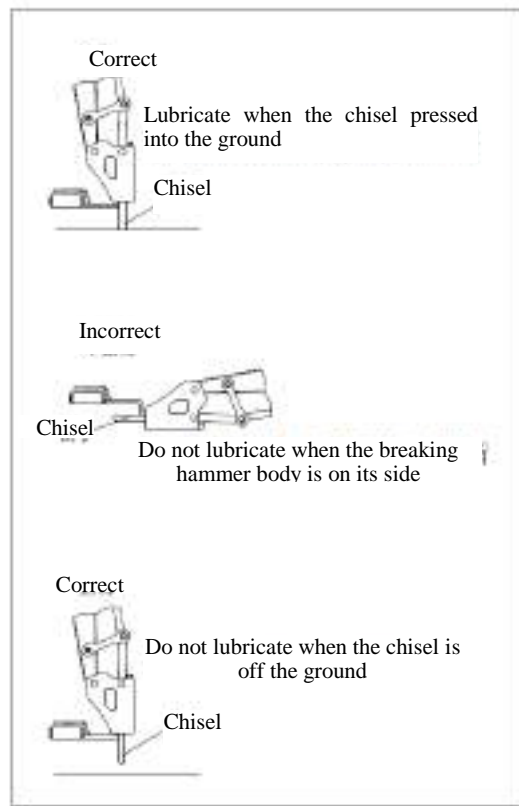


Figure 5-15 Method of adding lubricating grease to hydraulic hammer



ZE205E/ZE230E HYDRAULIC EXCAVATOR
OPERATION MANUAL

Chapter Six: Transportation and storage of the excavator



Chapter Six: Transportation and storage of the excavator

6.1 Transport of the excavator

For transport safety, the machine can be divided into several parts. Please contact ZOOMLION or ZOOMLION dealer for details.

Usually a trailer matching the weight and size provided in the technical specifications is required for transportation. Please note that the value of weight and transportation size provided in the technical specifications will vary with different types of track shoes, arms or accessories. During transport, do comply with the following provisions:

a). Study all the restrictions and local regulations on transport load, width and length; if necessary, disassemble the working devices. Different working devices may be different in width, height and weight. Therefore, the determining of the transport routes should take this point into account.

b). Before crossing the bridges or private lands, you should first check whether the structural strength is strong enough to support the weight of the machine. On highway transport, request the authorities to do inspections and follow their guidance.

Here are the specific steps of transport.

6.1.1 Loading and unloading of the machine



1. While performing the loading/unloading operations, turn the automatic idle button to OFF position (canceled). If the automatic slow-down button is still at the ON position, the machine will move suddenly.

2. When the machine is mounted on or unloaded from the trailer, run the machine at low speed and do not operate the traveling speed selective switch.

3. Run the engine at low speed and operate the machine with low speed while loading/unloading.

4. Do not load/unload the machine during automatic warming-up operation.

5. Load/ unload the machine on solid and flat ground, and maintain a safe distance from the edges of the road.

6. Use the ramp with adequate width, length, thickness and strength, and the loading/unloading slope should be no more than 15 ° (Figure 6-1). When bulldozing slopes, the soil should be compacted securely and measures should be taken to prevent slope collapse.

7. In order to prevent the machine from slipping on the ramp, remove all mud and dirt on the track before starting the operation. Please make sure that the ramp surface is clean with no water, snow, ice, grease or oil.

8. Do not steer the machine on the ramp, otherwise the machine may risk overturning. If you must turn, you should exit the ramp and then enter it again after adjusting the direction.

9. Do not use the working devices for loading/unloading operations, for it is dangerous.

10. When the machine is on the ramp, do not operate any lever other than the traveling lever.

11. Gravity center of the machine will suddenly change at the junction between the ramp and the trailer and thus the machine may lose balance. Therefore, travel slowly while crossing the site.

12. When slewing the upper structure of the machine on the trailer, the trailer is unstable, so retract the working devices and slew slowly.

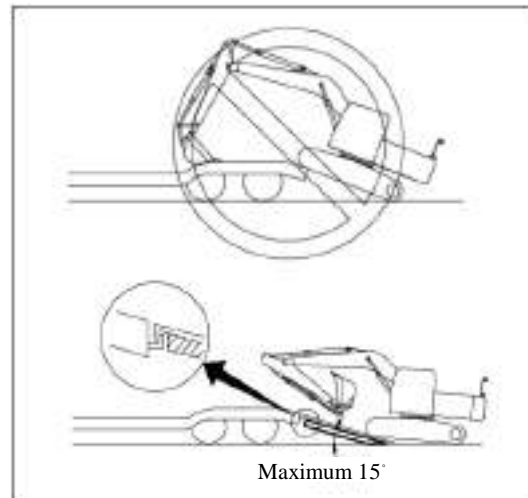


Figure 6-1 Precautions for loading and unloading

6.1.1.1 Loading

When loading excavator, be sure to use the ramps and platforms and operate according to the following steps:

a). The machine can only be disassembled on solid and flat ground, and maintain a safe distance from the edges of the road.

b). Apply proper braking force to the trailer and put pads under the tire, so as to ensure that the trailer does not move. Then install the ramps between the trailer and the machine. Ensure that both ramps are in the same horizontal plane. The slope of the ramp should be no more than 15°. The distance between the ramps should be adjusted to match the track center (see Figure 6-2).

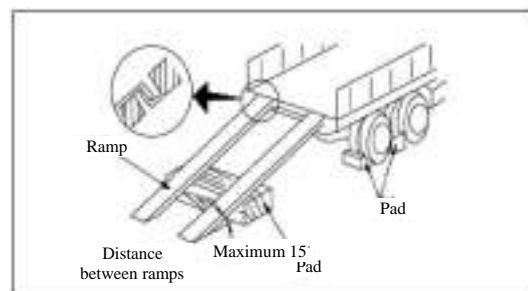


Figure 6-2 Precautions for loading (I)

c). Make sure that the machine is at low speed position.

d). Deactivate the auto-idle function and then operate the fuel control knob to adjust the engine speed to low speed.

e). If the machine is equipped with a working device, put the device in the front and travel forward for loading; if there is no working device, then travel backwards for loading.

f). Align the traveling direction with the ramp and travel slowly. Try to lower down the working device without causing any impact. When the machine is on the ramp, you can only operate the traveling lever and any other lever or pedal cannot be operated (Figure 6-3).

g). When the machine travels to the top of the trailer's rear wheels, it gets unstable, so drive slowly and carefully (no steering).

h). Right when the machine passes the rear wheels of the trailer, it will tilt forward, so be careful not to let the working devices impact on the trailer body. Drive the machine forward to the specified location and then stop.

i). Slowly slew the upper structure for 180° so that the working device faces the rear (Figure 6-4).

j). Park the machine at the specified location on the trailer.

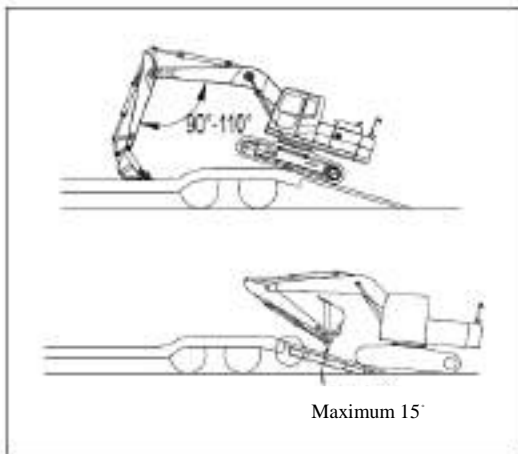


Figure 6-3 Precautions for loading (II)

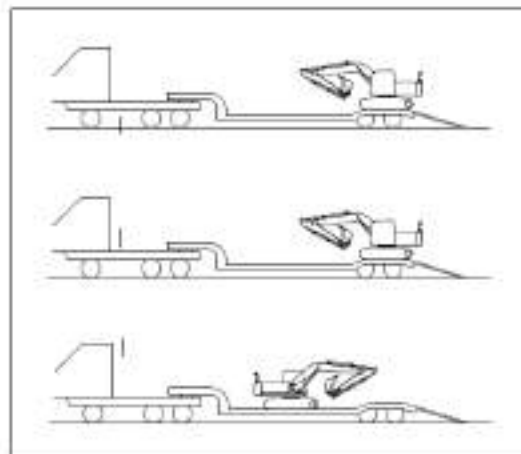


Figure 6-4 Precautions for loading (III)

6.1.1.2 Fix the machine



1. Retract the radio antenna. Remove the rear-view mirror, and attach the removed parts securely to the trailer.

2. In order to prevent the bucket cylinder from being damaged during transport, wooden pad should be placed at one end of the bucket cylinder to prevent it from touching the floor (Figure 6-5).

Fix the machine according to the following steps when the machine is loaded on the trailer:

- a). Fully extend the bucket cylinder and the arm cylinder, and then slowly put down the boom.
- b). Turn off the engine and remove the key from the starter switch.
- c). The safety locking lever is in the locked position.
- d). Lock the cab, side doors, battery lid and engine hood.

Place pads below both ends of the track to prevent the machine from moving during transit, and tether the machine securely with chains or wire rope (see Figure 6-6). Pay special attention to fix the machine firmly so that it will not slide to one side.

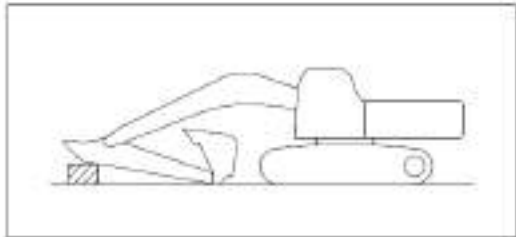


Figure 6-5 Precautions for fixing the machine (I)

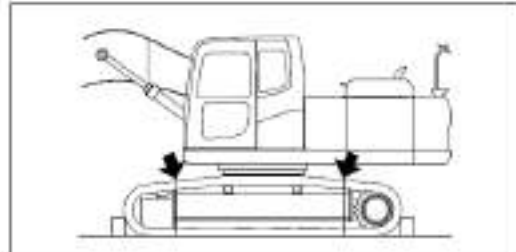


Figure 6-6 Precautions for fixing the machine (II)

6.1.1.3 Unloading

When unloading the machine, be sure to use the ramps and platforms, and comply with the following steps in the operation:

a). Only load and unload on solid and flat ground, and maintain a safe distance from the edges of the road.

b). Apply braking force to the trailer properly, and put pads under the tires to ensure that the trailer does not move. Then set the ramps between the trailer and the machine. Ensure that both ramps are at the same horizontal plane. The ramp slope does not exceed 15 ° Adjust the distance between the ramps to the match that of crawler center.

c). Remove the chains or wire rope that fix the machine

d). Start the engine, and perform a thorough warming-up operation in cold weather.

e). Put the safety locking lever to the free position.

f). Confirm that the machine is running at low speed.

g). Deactivate the auto-idle function and operate the fuel control knob to adjust the engine speed to low speed.

h). Raise the working device, retract the arm under the boom, and then move the machine slowly.

i). Stop the machine when the machine is located at the top of the trailer rear wheel.

j). When moving towards the ramp from the rear of the trailer, adjust the angle of the stick and the boom to 90-110 ° Drop the bucket to the ground, and then move the machine slowly (Figure 6-7).

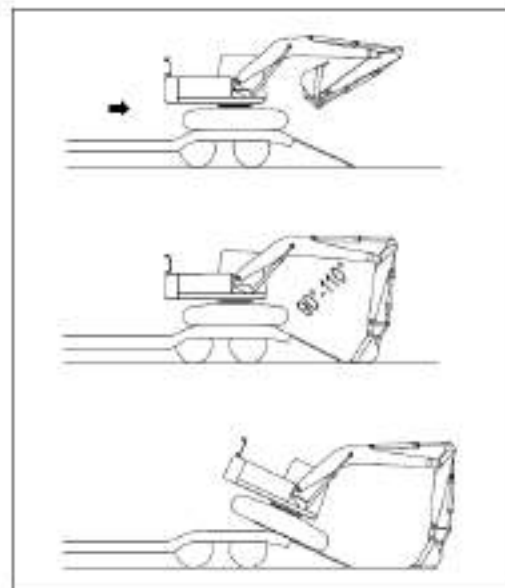


Figure 6-7 Precautions for unloading

k). When the machine moves to the ramp, slowly operate the boom and the arm and carefully drive the machine until the machine is completely off from the ramp.

6.1.2 Hoist the machine



1. Do not hoist the machine with people on it.
2. Ensure that wire rope used for hoisting the machine is strong enough to withstand the weight of the machine.
3. In addition to the posture provided in the following procedures, do not hoist the machine in any other posture, otherwise the machine will risk losing balance.
4. Do not hoist the machine when the upper structure is slewed to one side of the machine. Before hoisting, turn the working device to the one end of the sprocket and keep the track parallel to the upper structure.
5. Keep the machine horizontal while hoisting it. Walking under a machine being hoisted is dangerous.
6. In this case, do not walk under the machine.



1. The hoisting procedures apply to the machine with standard technical specifications.
2. Lifting method will be different according to the actual installation of accessories and options. In this case, please consult Zoomlion or Zoomlion dealer.

When lifting the machine, follow these steps on flat ground:

- a). Slew the upper structure, so that the working device is at one end of the sprocket.
- b). Fully extend the bucket cylinder and arm cylinder, and then use the boom cylinder to lower the working device down to the ground, as shown in Figure 6-8.
- c). Turn off the engine, ensure that the cab is surrounded by nothing, and then leave the machine. Close the cab doors and the windshield.
- d). Pass wire rope through the first and second track rollers in the front and the first and second track rollers in the rear. However, for machines equipped with track roller retaining plate, the wire rope should be passed under the crawler.
- e). Adjust the lifting angle of the wire rope to $30^{\circ} \sim 40^{\circ}$ and then slowly lift the machine (Figure 6-9).
- f). After the machine is lifted off the ground, check carefully whether the machine is balanced and then lift it slowly.

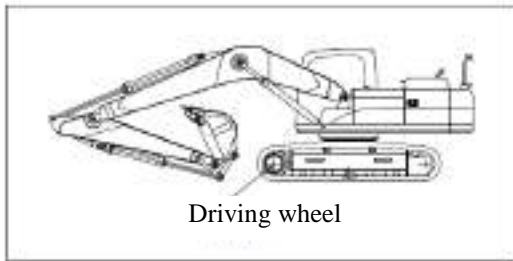


Figure 6-8 Correct posture before hoisting machine

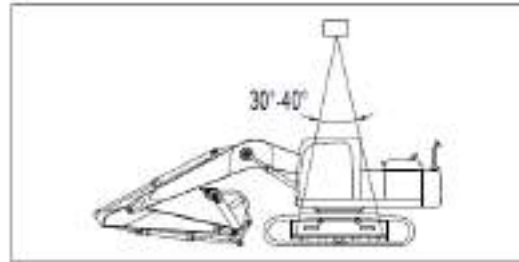


Figure 6-9 Hoisting posture of the machine



1. The lifting hole for the counterweight cannot be used to (only for counterweight lifting) lift the machine; otherwise major accidents will be caused.

6.2 Storage of the excavator

6.2.1 Precautions before storage

While storing the machine, adjust the machine into the posture shown in Figure 6-10 to protect the cylinder rod (to prevent the cylinder piston rod from rusting).

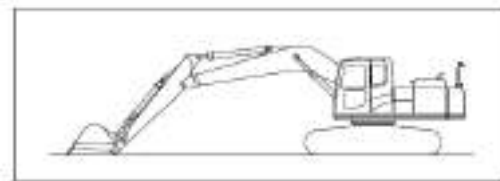


Figure 6-10 Correct posture for machine storage

For long-term storage of the machine, do according to the following steps:

- a) Clean and wash all the parts, and then put the machine into the room. If the machine has to be stored outdoors, select a flat surface and cover the machine with drop cloths.
- b) Before storage, fill the fuel tank and lubricate and change engine oil.
- c) Coat the metal surface of the piston rod with a thin layer of grease.
- d) Disconnect the negative terminal of the battery and cover the battery or remove the battery from the machine and have it stored separately.
- e) If the expected ambient temperature drops below 0 °C (32 °F), add antifreeze in the coolant.
- f) Place the safety locking lever in the locked position and lock the locking device of the pedal.
- g) Place the cut-off valve (if installed) for accessory installation on the machine in the locked position, and screw a plug in the elbow.
- h) Place selection valve (if installed) for mounting accessories on the machine in "no accessory to install" position.

6.2.2 Precautions during storage

**Attention**

1. When the machine is stored in the room, rust-proof operation is necessary, so open the doors and windows to promote air circulation and prevent gas poisoning.

2. During storage, the machine should be operated once a month, and apply the surface of the moving parts with a layer of new oil film. The engine should be started and run for 10 minutes on a regular basis, check whether all the meters are normal. For machine equipped with A/C, A/C should also be run.

3. Battery cable of the machine stored in the warehouse should be removed; remove the battery to prevent loss of electricity (if there is a negative terminal, disconnect it).

4. Turn the track.

6.2.3 Precautions after storage

**Attention**

1. If a machine has to be used when the monthly antirust operation has not been performed yet, please contact Zoomlion or Zoomlion dealers.

2. When using a machine after long-term storage, do according to the following steps prior to use.

- Wipe off the grease applied to the surface of the cylinder rod.
- Fill engine oil to and lubricate all parts.

• When a machine has gone through long-term storage, the moisture in the atmosphere has entered into the oil. Before or after starting the engine, check the oil of all parts. If the oil is mixed with water, replace all the oil.