



U17 Hydraulic Excavator

Operator's manual

Q/YCG 2038

广西玉柴装备科技有限公司

GUANGXI YUCHAI EQUIPMENT TECHNOLOGY CO., LTD

Warning

Improper operation of the machine may cause injury or death. The following shall be done before using the machine:

- **Keep in mind the safety regulations and correct usage specifications of the machine.**
- **Read and understand the relevant description of the instruction on safe operation of the machine.**
- **Understand and be familiar with all safety markings on the machine.**
- **Keep the irrelevant personnel be away from the working area.**
- **Before formally operating the machine in the working area, the safety operation training of the machine shall be carried out in advance.**

You are responsible for complying with relevant laws and regulations and the instructions of Yuchai Heavy Industry on machine operation and maintenance.

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To users

Dear users,

Thanks for selection of the excavator from Yuchai Heavy Industry and thanks for your great support for Yuchai business.

This manual is for safety guidance and the correct use and maintenance of the machine. Before starting and operating the machine for the first time, and before repairing the machine, please carefully read this manual and fully understand the safety regulations, operation guidelines, and maintenance instructions until the relevant information has been fully understood. For ease of reference, please keep this manual properly in a designated location for qualified machine operators to read regularly. Please immediately order this manual from us or our agent in case that this manual is lost, damaged, or difficult to read. When transferring this machine, please also give the new owner this manual so that he can use this machine correctly.

Please entrust Yuchai agent or the maintenance station to overhaul and adjust the machine, and the original accessories and spare parts from Yuchai shall be used. If non original accessories or parts are used, it may exert no obvious impact on the machine at that time, but it is likely to cause a series of adverse consequences in the future. If the machine failure is caused by the use of non original accessories and parts or maintenance by an unauthorized unit, Yuchai Heavy Industry will not undertake the three guarantee warranty business (repair, replacement and return) even within the guarantee period.

With adherence to the principle of "customer first", Yuchai Heavy Industry continuously improves its products to provide the best products to users as far as possible. Therefore, the improvement may be implemented at any time. For the products being sold, the document will not be changed, for which prior notice will not be provided.

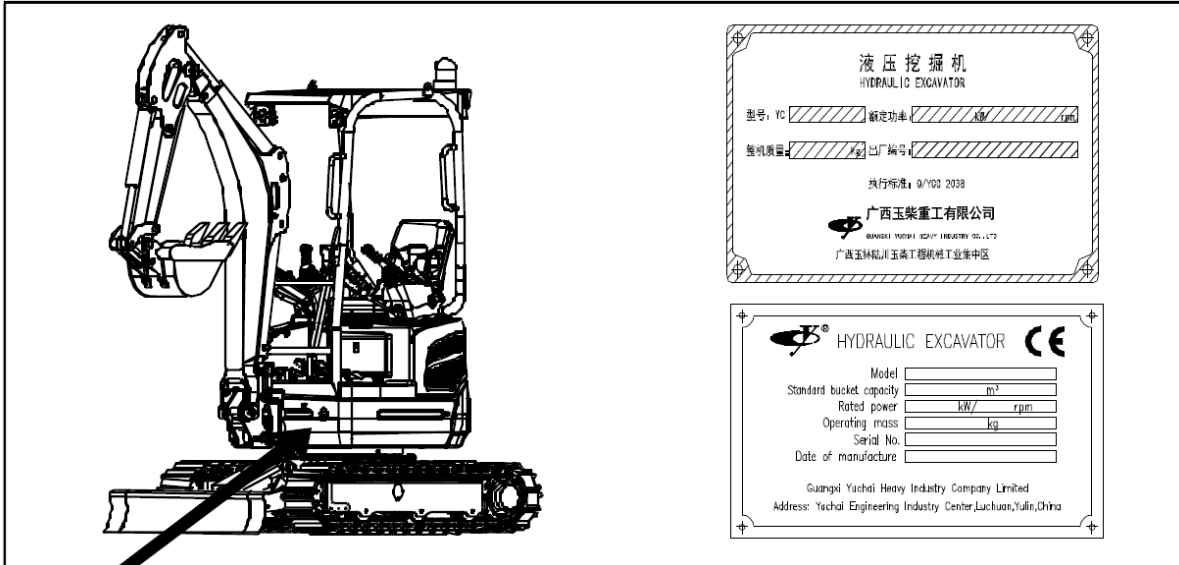
We sincerely hope that this machine can serve you better to create greater value with correct use and precious good care.

GUANGXI YUCHAI EQUIPMENT TECHNOLOGY CO., LTD

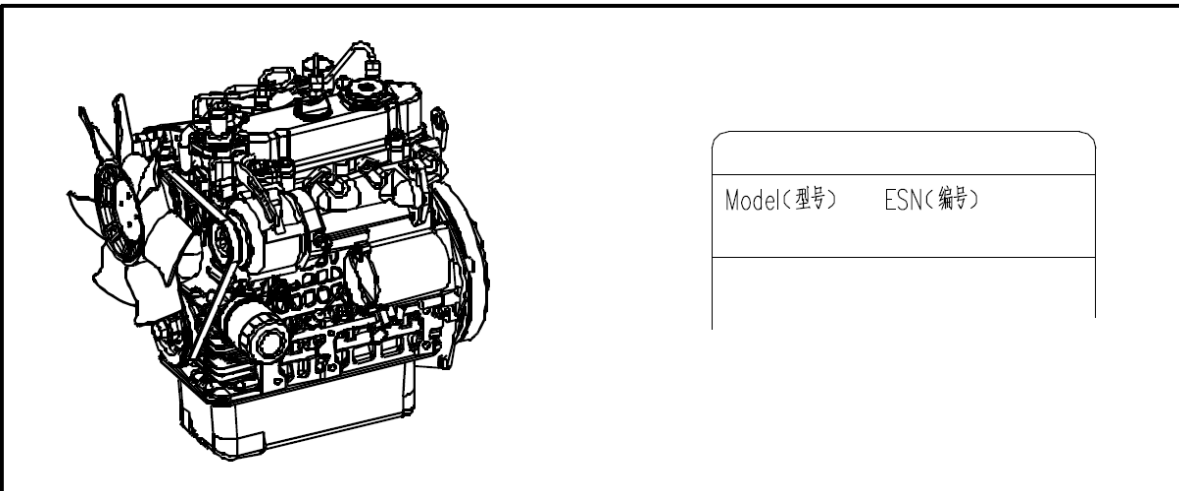
Product Information

When you need to know the basic information of the machine, you can check it according to the position shown in the figure.

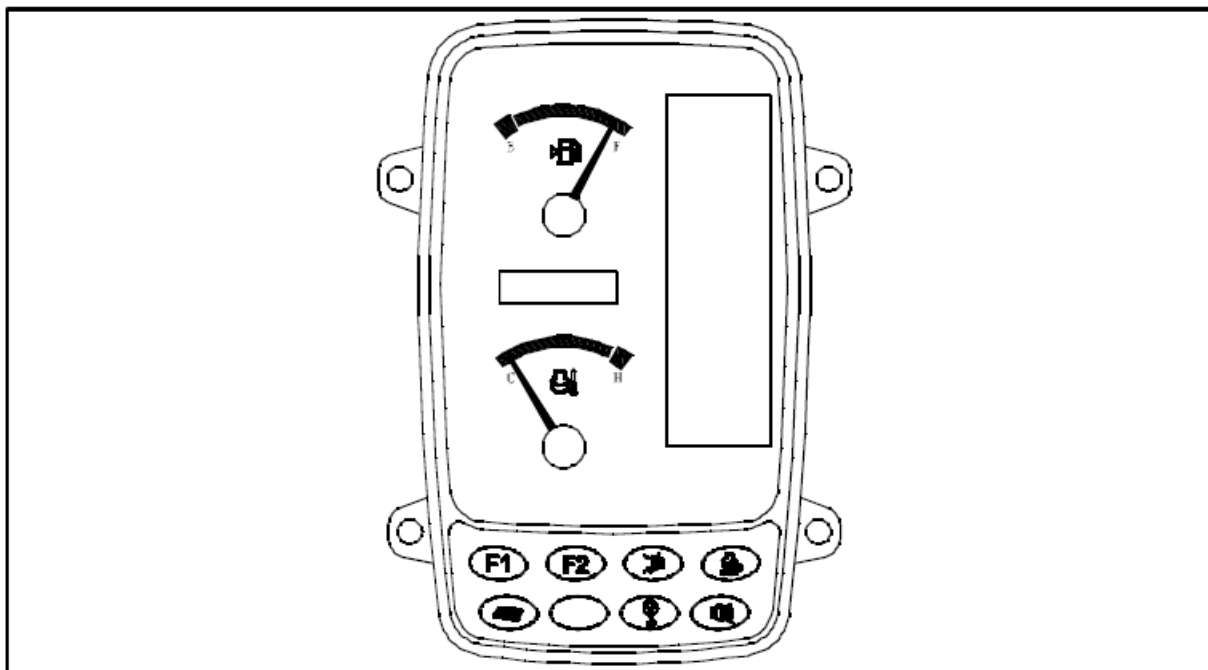
- Machine information (the nameplate of the machine is in the right front of the platform)



- Information on the engine



- Machine operation information (engine timer is located on the combination instrument on the right control box of the machine)



Machine archive

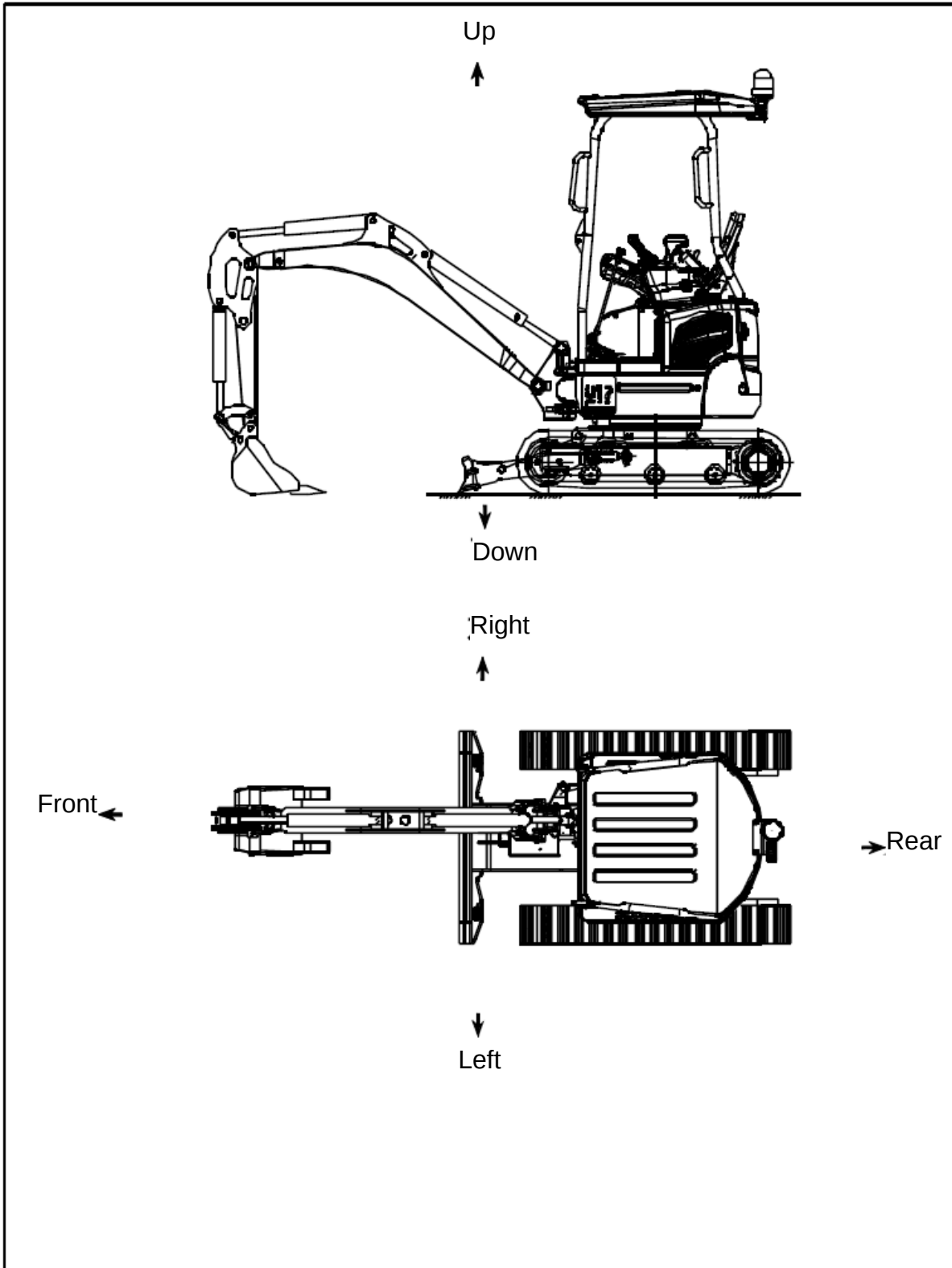
Fill the machine serial number and engine number in the below table. When you need to purchase machine parts or want to obtain relevant information, you can inform Yuchai of these codes.

Please record these numbers and keep them together with the product certificate. If your machine has been stolen accidentally, you can submit the information to the local public security agency.

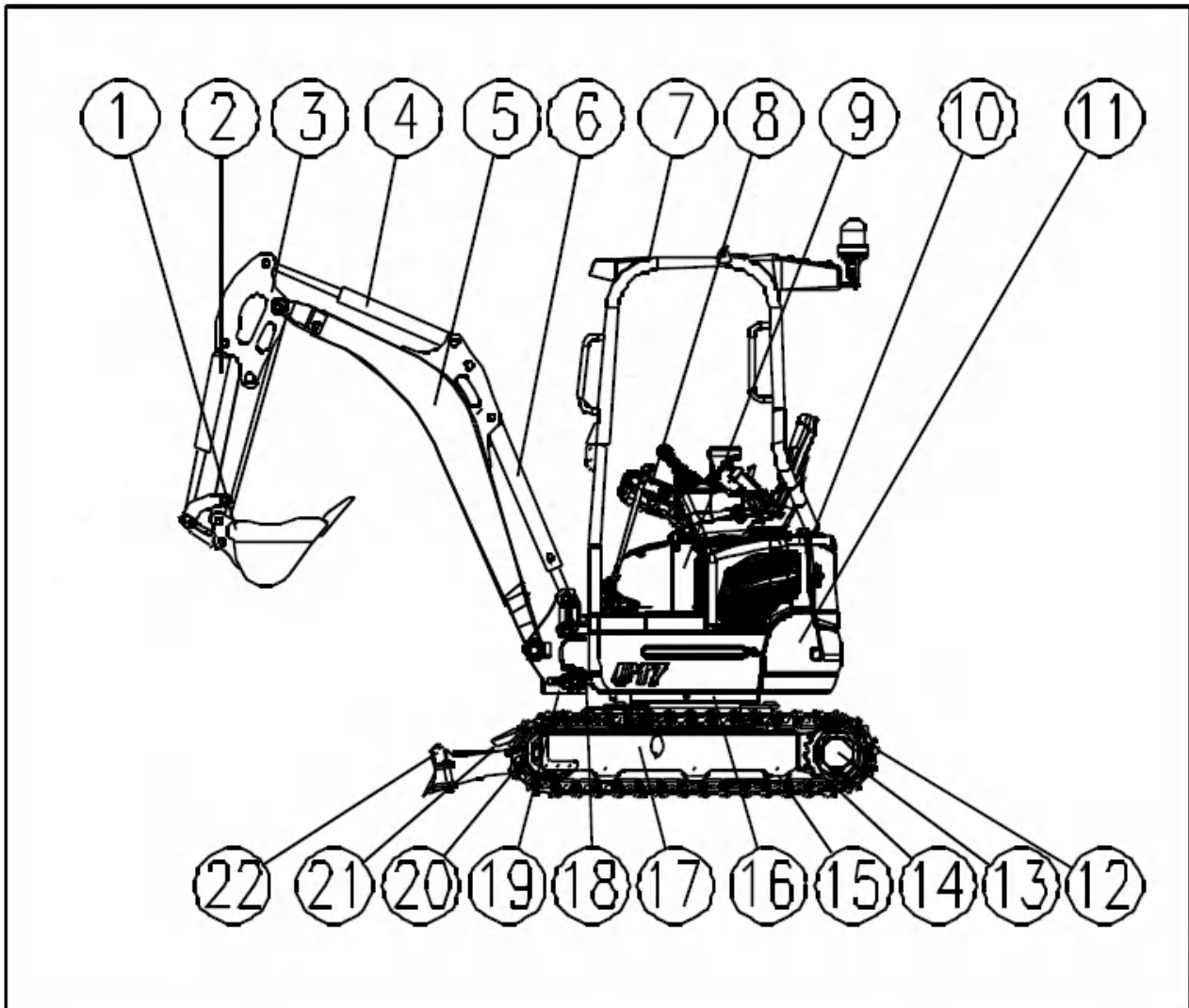
	● Machine model	_____
	● Machine serial number	_____
	● Engine number	_____
	● Distributor information	_____

Machine direction

The front, rear, left, right, up, and down in this manual refer to the various directions of the illustrated state.



Composition of the machine



- | | | | |
|-----|---------------------|-----|-----------------|
| 1. | Bucket | 12. | Track |
| 2. | Bucket cylinder | 13. | Travel reducer |
| 3. | Bucket arm | 14. | Drive wheel |
| 4. | Bucket arm cylinder | 15. | Track roller |
| 5. | Boom | 16. | Slewing bearing |
| 6. | Boom cylinder | 17. | Frame |
| 7. | Driving cab | 18. | Swing cylinder |
| 8. | Instrument | 19. | Steering head |
| 9. | Foot assembly | 20. | Tensioner |
| 10. | Covering parts | 21. | Dozer cylinder |
| 11. | Platform | 22. | Dozer blade |

Overview of the machine

Designated operations

This machine is mainly used for the following operations:

- Excavation operation
- Trenching operation
- Loading operation
- Leveling operation

For a detailed explanation of the operation essentials, please refer to the content of the operation guide and the attachment guide.

Running-in operation

This machine has undergone sufficient adjustment and inspection before delivery. Any forced operation at the beginning will accelerate the performance degradation and shorten the service life of the machine. Therefore, please control the load to 80% of the full load for running in within the initial 100 hours (indicated by the instrument).

Safety-related information

Most accidents related to operation, inspection, maintenance, and repair operations are caused by neglecting basic safety precautions and hazard predictions.

By predicting potential hazardous situations, accidents can be prevented in advance.

Therefore, attention must be paid to the location and type of danger. (In order to carry out such operations correctly, operators must undergo relevant training as required, possess relevant skills and tools.)

Please carefully read this manual and all safety precautions, warnings, and accident prevention methods on the machine, and understand its content until fully mastering such information. Otherwise, it is forbidden to operate, inspect, and maintain the machine. Ignoring these warnings may result in personal injury or death accidents.

The safety instructions in this manual and the safety signs used on the machine are distinguished by the following warning signs to indicate the level of danger that may occur. In addition, it also includes preventive measures to avoid danger.

-  **Danger:** it indicates that the consequences of danger will lead to death or serious injury if not avoided. It is only applicable to a few occasions with the most dangers.
-  **Warning:** it indicates the potentially dangerous consequences may lead to death or serious injury if not avoided.
-  **Attention:** it indicates that the consequences of potential hazards may lead to low or medium injury if not avoided, and it can also be used to prompt unsafe operations that may lead to personal injury.

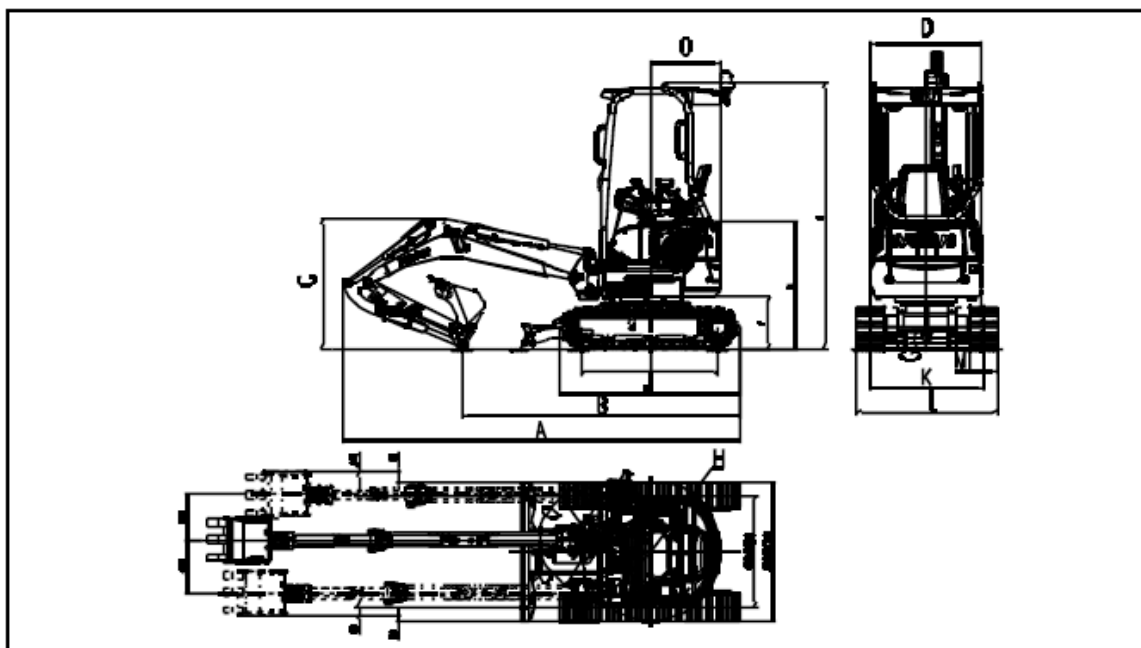
The manufacturer cannot predict all the hazards that may occur during operation, inspection, maintenance, and repair in all environments. Therefore, the warnings indicated in this manual and on the machine do not cover all situations. Please consider the necessary safety precautions on your own in case of operations, inspections, maintenance, and repairs not covered herein. The user is responsible for taking necessary safety measures on his own.

Technical specifications

1. Structural size parameters

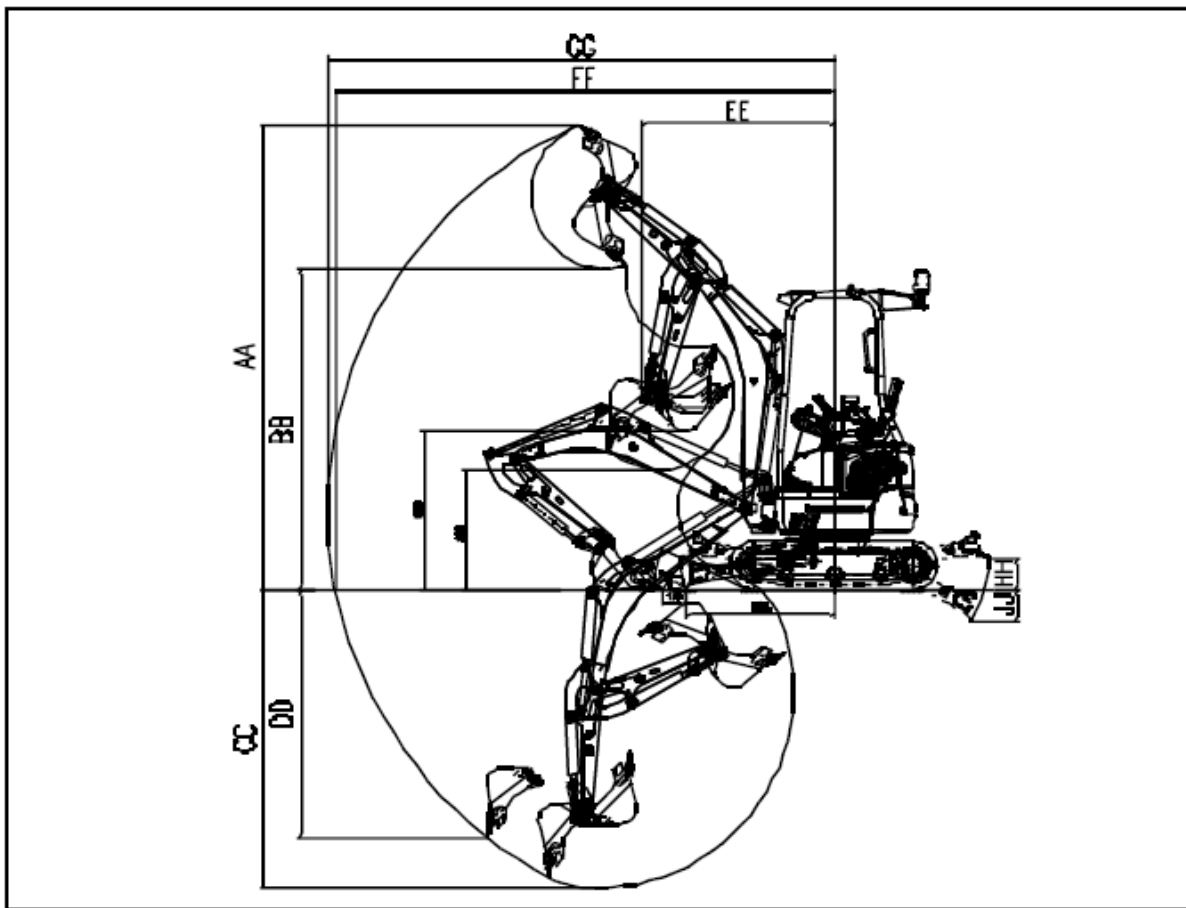
Code	Item	Unit	U17-AFS1
	Operation weight	kg	1720 (Rubber tracks, four-pillar cab, full tank of fuel, standard bucket)
	Standard bucket capacity	m ³	0. 05
	Engine model		Kubota D902-EF08 (Euro V/T4)
	Engine power	kW/rpm	11.8/2300
A	Total length (during transportation)	mm	3530
B	Total length of ground touch	mm	2450
C	Total height (to boom top)	mm	1150
D	Total width	mm	990
E	Total height (during transportation)	mm	2340
F	Counterweight ground clearance	mm	450
G	Minimum ground clearance	mm	145
H	Tail turning radius	mm	620
1	Ground touch length of the track	mm	1230
1	Track length	mm	1600
K	Track gauge	mm	760/1010
L	Full track width	mm	990/1240
M	Track width	mm	230
O	Hood height	mm	1120
P	Distance from the slewing center to the rear end	mm	620
	At the highest slewing speed	rpm	8. 5~10. 5
	Travel speed	km/h	2. 0/4. 0

Note: The above structural parameters are nominal values, and no prior notice will be given if they are changed by the manufacturer.



2. Work parameters

Code	Item	Unit	U17-AF51
AA	Maximum excavation height	mm	3600
BB	Maximum unloading height	mm	2485
CC	Maximum excavation depth	mm	2310
DD	Maximum vertical excavation depth	mm	1920
EE	Minimum slewing radius of the attachment	mm	1500
FF	Maximum ground excavation radius	mm	3870
GG	Maximum excavation radius	mm	3930
HH	Maximum pushing height of dozer blade	mm	300
JJ	Maximum pushing depth of dozer blade	mm	205
	Maximum excavation force of the bucket	kN	17.2
	Maximum excavation force of the bucket arm	kN	9.5
	Maximum left swing angle of the boom	°	60
	Maximum right swing angle of the boom	°	55



Note: No prior notice will be given if they are changed by the manufacturer.

3. Travel mechanism

Independent drive is achieved by a hydraulic motor through a multi-stage planetary reducer.

	Travel speed (km/h)	Climbing capacity
High speed	4.0	58%(30°)
Low speed	2.0	

4. Hydraulic system

Load sensitive system

Maximum system flow rate: 64.4L/min(@2300rpm)

Rated pressure of the system: 24Mpa

Slewing pressure: 9MPa

Attachment 1 working pressure/flow rate: 24MPa, large chamber 18/small chamber 10Lpm (small flow rate)

Attachment 2 system pressure/flow rate: 21MPa/36Lpm (high flow rate)

Pilot pressure: 3.5MPa

10 μ M filter element for return oil

Oil suction filter: metal filter element

5. Electrical system

Voltage: 12V

Battery: 36AH

6. Environment for use

Temperature: -15~40°C

RH: <85%

Altitude: $\leq$ 1500m

Transportation and storage environment temperature: -15~40°C

7. Mechanical interference of the machine

Due to the possibility of interference with the boom cylinder or lower cover plate when non-standard attachments are installed in various series of excavators, so for machines equipped with non-standard attachments, attention should be paid to the angle between the bucket rod and the boom when retracting to prevent interference with the boom cylinder and damage to the body.

The following are all non-standard attachment attachments provided by the manufacturer:

Buckets	Bucket accessories directly mounted on the bucket arm
	Bucket accessories for use with quick change couplings
	Bucket accessories for use with quick change devices
Crushing hammer	Crushing hammer directly mounted on the bucket arm
	Crushing hammer for use with quick change devices
Drilling tools	Drilling device directly mounted on the bucket arm
	Drilling device for use with quick change devices
Grab bucket	Grab bucket directly mounted on the bucket arm

If the model you purchased has any of the above configurations, please pay attention to the issues mentioned above.

2

Safety regulations

General safety rules

Following the relevant safety regulations in this manual can avoid most accidents that endanger the operation and maintenance of the machine. Before the operation or maintenance of the machine, please read and understand all the safety information and the safety markings of the machine in this instruction.

The safety related description in this instruction points out the possible problems during the normal operation and maintenance of the machine, and it provides the possible troubleshooting to these problems.

Please refer to each chapter of this instruction for the description related to safety, which constitute the general guidance on safety with the description in this chapter.

The safety information in this instruction and the machine does not include all potential hazards and possible countermeasures. If you adopt the methods or actions not recommended or allowed in this instruction and the machine, necessary measures shall be taken to ensure safety.

Under no circumstances shall it engage in the use or operation prohibited by the instruction.

The excavator shall be operated and maintained by trained and qualified personnel.

Before starting, all functions of the machine shall be checked. If you find the machine is abnormal, stop it immediately to find out the cause, and work after troubleshooting.

The inspection, maintenance and service shall be carried out in strict accordance with the provisions of this instruction, and the operator shall work and operate in accordance with the operation methods, safety provisions and the working scope of the machine specified in this instruction.

If you are under the influence of alcohol or drugs, please do not operate or maintain the machine, it will make you and the people around you very dangerous.

Do understand the meaning of the relevant signals and gestures.

During moving on the road, please be familiar with the relevant laws and regulations of the local country or region and strictly abide by them.

Please ensure that there are no other people in the work area before operating the machine.

This machine is only used for normal excavation working conditions on the ground, please do not use it under dangerous conditions such as underwater, culverts, explosive places and toxic environments.

Safety warning

1. Warning signs



In this instruction, this warning marking points out important information about safety. If you find the sign, please carefully read the information and advice to avoid possible casualty accident.

2. Safety reminders

This instruction provides precautions, signs and descriptions of potential hazards for the safe use of the machine. Before operating, maintaining or repairing the machine, please read this manual and the safety signs affixed carefully, and work in accordance with the relevant procedures.

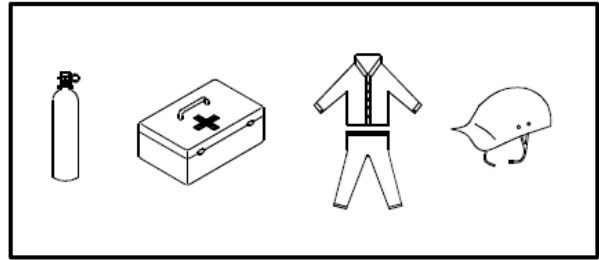
The safety prompts of this machine are indicated with words such as "**Danger**", "**Warning**" or "**Note**". Their explanations are as following:

-  **Danger:** it indicates that the consequences of danger will lead to death or serious injury if not avoided. It is only applicable to a few occasions with the most serious danger.
-  **Warning:** it indicates the potentially dangerous consequences may lead to death or serious injury if not avoided.
-  **Attention:** it indicates that the consequences of potential hazards may lead to low or medium injury if not avoided, and it can also be used to prompt unsafe operations that may lead to personal injury.

Safety equipment

1. Protective equipment for operators

- 1) The operator must wear tight-fitting and suitable work clothes, safety helmets, working leather shoes and other related safety protection equipment (such as: protective earplugs, gloves, protective glasses, seat belts, etc.) before operation or maintenance.
- 2) If the operator's hair is too long, please tie it up and cover it with a safety cap, which will prevent your hair from being entangled by the machine.
- 3) The user must provide emergency medicines in the machine, conduct regular inspections, and add medicines when necessary, so that they can be used when they are urgently needed.
- 4) Before operation or overhauling, please be sure to check whether all protective equipment functions normally.



Safety signs



Warning: Failure to understand the safety signs or loss of safety signs may result in injury or death. Please replace the missing or damaged signs in time, and keep the surfaces of all safety signs clean and easy to distinguish.

Before operating, maintaining, and repairing the machine, you must carefully read the operating instructions and the warning signs affixed to the machine to ensure that you fully understand its contents and follow the relevant procedures.

Check the signs before starting the machine every day. If you can't see clearly, please clean it.

When cleaning the signs, only cotton cloth, water and soap can be used. Do not use organic solvents, gasoline, etc., as that will easily cause the signs to fall off.

If the signs are damaged, lost or illegible, please replace them. If the label is on the part that needs to be replaced, make sure that the new part is equipped with a sign.

Please contact Yuchai agent to obtain a new safety mark.

1. Classification of safety signs

The safety marks in this manual and on the machine adopt "graphic safety sign" and "graphic and text safety sign".

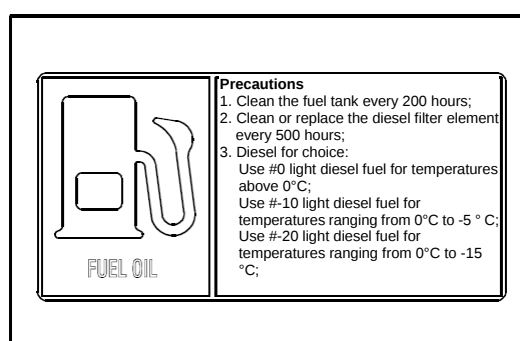
A. Graphic safety signs

This kind of safety sign uses graphics to show safety warning information, which is easy to understand and clear at a glance.



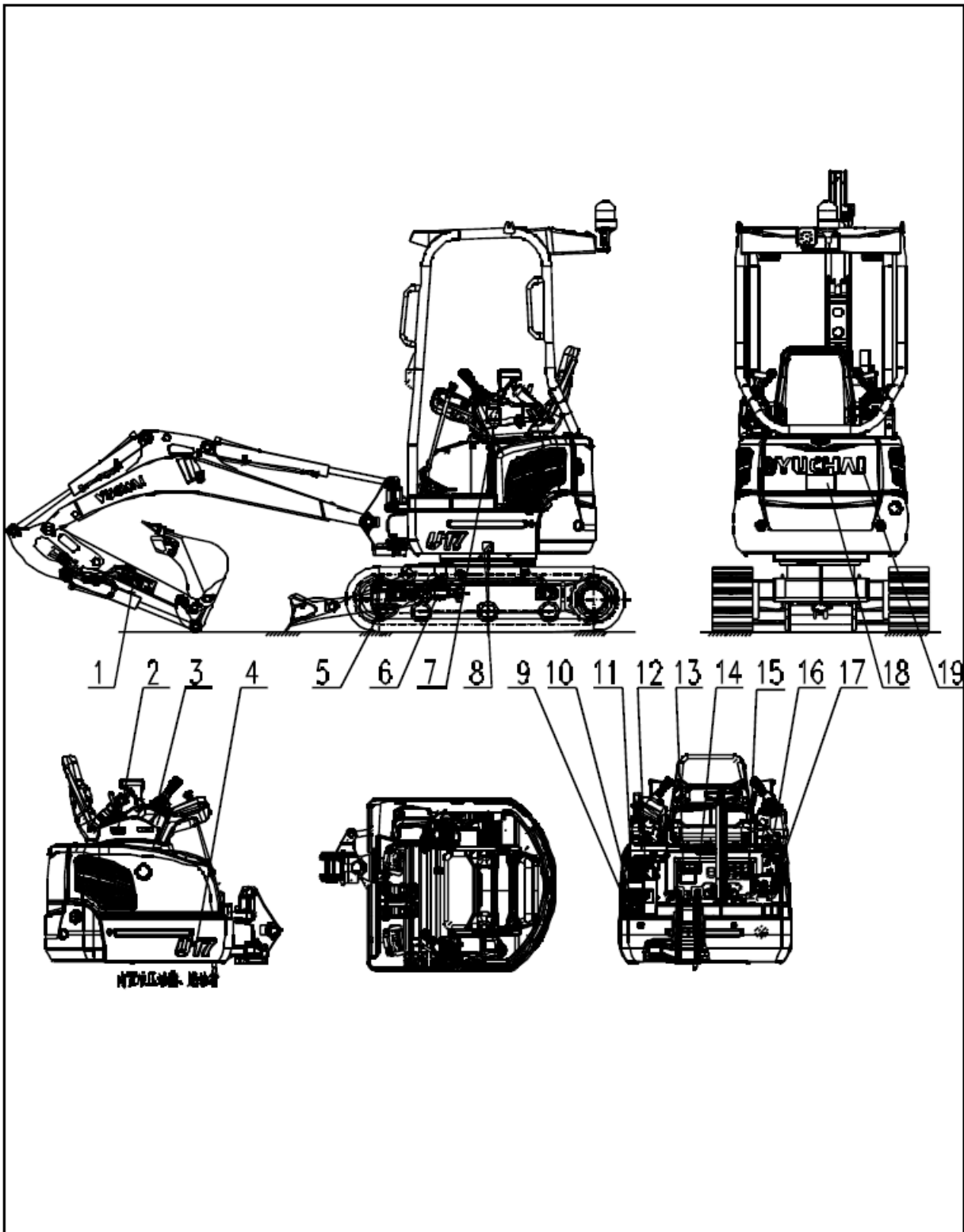
B. Graphic and text safety signs

This safety sign is provided with graphics and corresponding explanatory text, which is used where the graphics cannot fully express safety information and requires text for further explanation.



2. Safety sign pasting location

The sign shown in the graphics is only the "safety sign" part of all signs, and the rest of the function signs will be introduced in the following chapters.



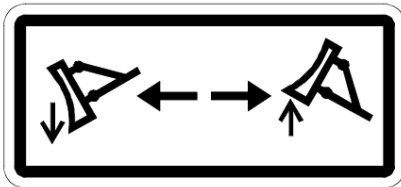
3. Safety sign diagram and instructions

1) Pay attention to and stay away from the attachment



Movement of the attachment can cause personal injury. Keep a safety distance away from the attachment area.

2) Bulldozing operation signs



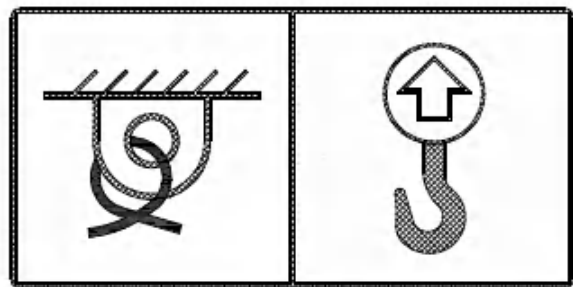
3) Accelerator plate



4) Right sign



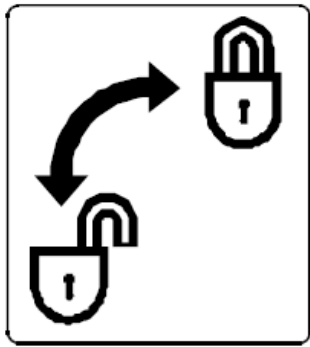
5) Lifting combination sign



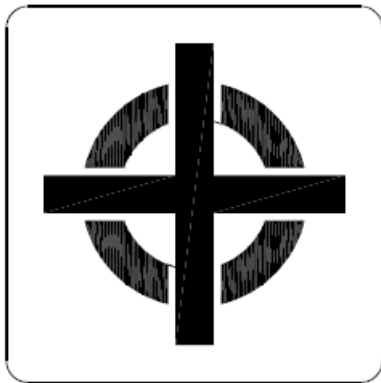
6) Warning sign



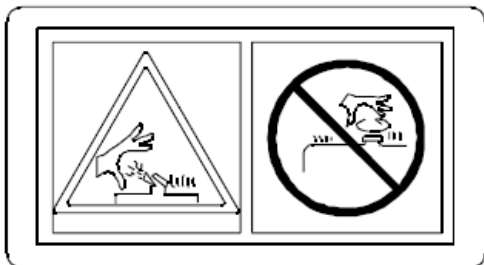
7) Safety switch sign



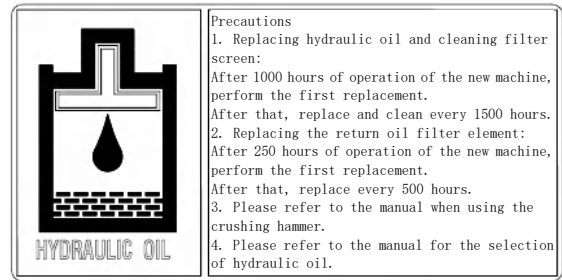
8) Slewing center sign



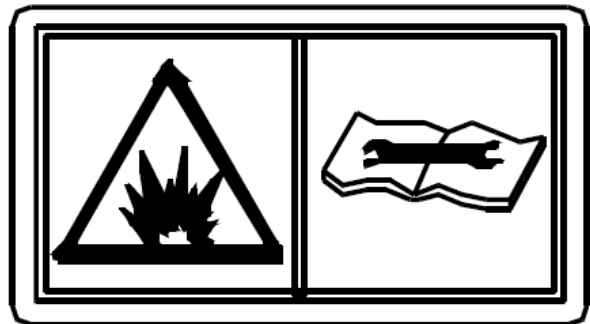
9) Warning sign



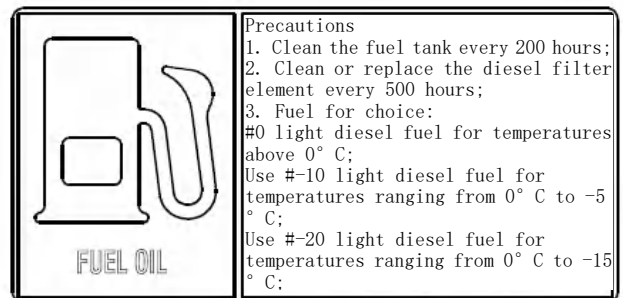
10) Hydraulic oil refilling sign



11) Warning sign



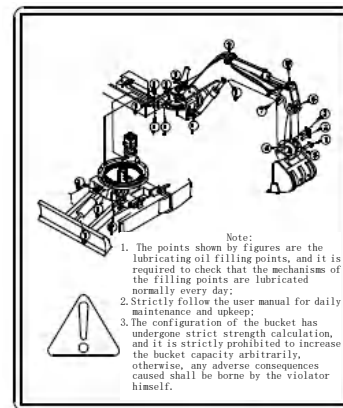
12) Fuel refilling sign



13) Read the signs in the manual



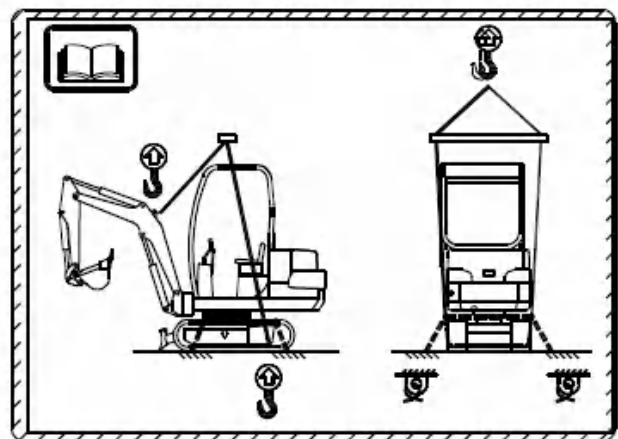
16) Oil refilling sign



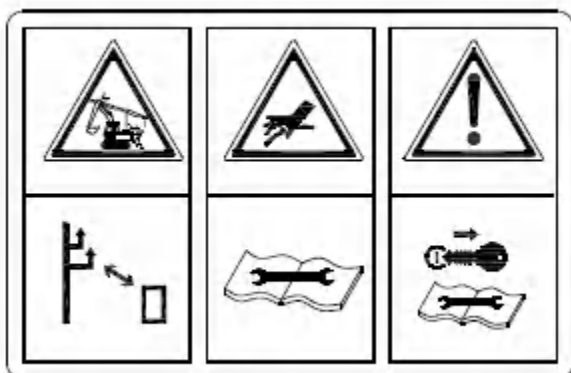
14) Operation sign



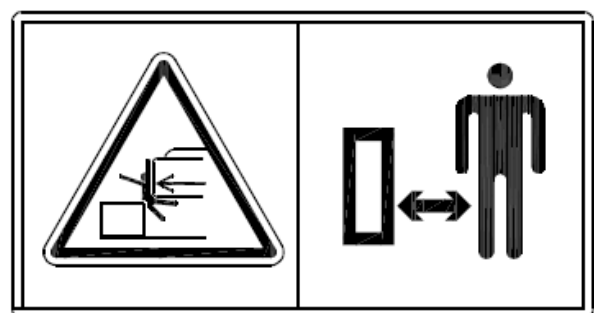
17) Overall machine lifting sign



15) Warning sign



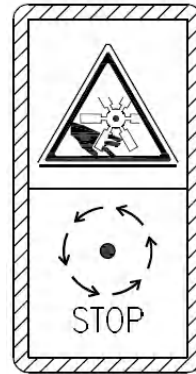
18) Safety sign



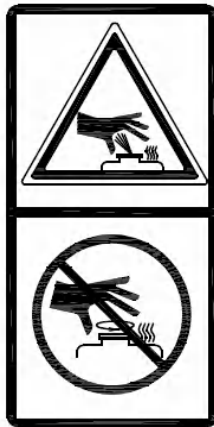
19) Trademark at the rear end

YUCHAI

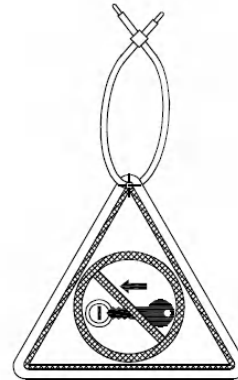
22) Warning sign



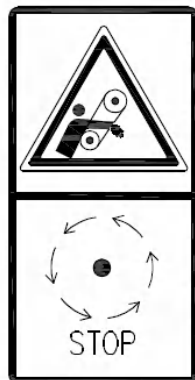
20) High temperature warning sign



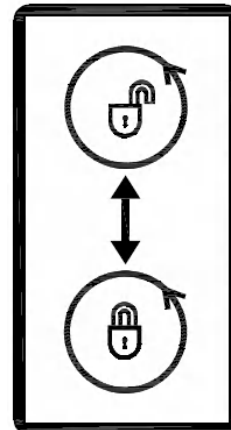
23) Maintenance warning sign



21) Stopping the engine sign



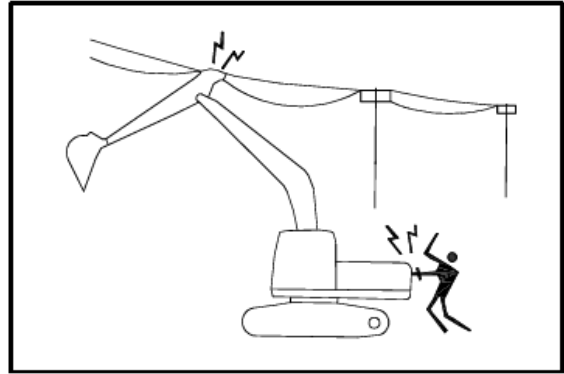
24) Slewing locking sign



Safety in the workplace

Know the area where you will work as much as possible in advance. Please check:

1. Location of the slope.
2. Open ditch.
3. Falling objects or hanging objects.
3. Soil condition (soft or hard).
4. Standing water and swamp area.
5. Rocks and stumps.
6. Boundary of buried foundations, pillars or walls.
7. The boundary of burying garbage or filling soil.
8. Holes, obstacles, mud or ice.
9. Traffic volume.
10. Dense dust, dense smoke, dense fog.
11. The exact location of buried or suspended pipelines for electricity, gas, telephone, water, sewage or other public pipelines. If necessary, ask the utility company to mark, close or move these facilities before you start work.



Warning: Before starting the excavation project, please contact the local utility service system and department.

12. When constructing in a building, figure out the headroom for the head, the porch and the aisle, etc., and the load-bearing capacity of the floor and ramp. Ensure adequate ventilation during indoor operation. What you are unclear about will hurt you.
13. Understand the precise distances between wires, telephone lines and machines, and distances between machines and the ground. If possible, it is best to cut off the power supply. If you can't cut off the power, ask the signalman for guidance.



Warning: Touching or approaching the power supply or the machine connected to the power supply can cause electric shock. Do not let any part of the machine get close to the power cord in the air unless the necessary safety preventive actions have been taken.

14. Learn the depth of underground gas pipes, cables, telephone lines, and water pipes, and avoid working in these areas to avoid damaging these public facilities.



Warning: if you look in from the damaged cable end, the cut optical fiber will seriously hurt your eyes.

15. It is forbidden to use this machine in culverts operations.
16. It is prohibited to operate in mud, mire and marsh.
17. It is forbidden to operate in places where there are chemical hazardous substances.
18. It is forbidden to use in explosive situations.

Safe operation



Warning: It is strictly prohibited to transport or lift personnel with the excavator.

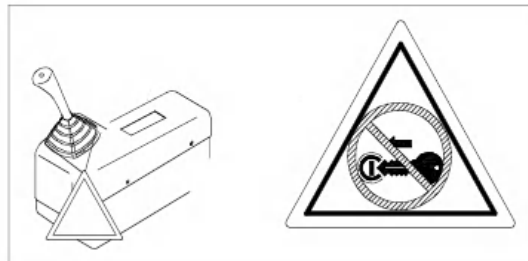


Warning: before operating the machine, you must wear a seat belt, honking the horn, and confirm that there is no one around the working area before starting work.

1. Start the engine

A. Safety rules for starting the engine

- 1) The horn warning must be sounded before starting the engine.
- 2) Except for the operator, no other people are allowed.
- 3) Only allowed to sit on the seat to operate the machine.
- 4) It is not allowed to start the engine by short-circuiting the starting motor.
- 5) The machine must be preheated in cold weather.



Warning: Do not start the engine when there is engine start warning sign on the joystick.

B. After starting the engine

The following must be checked after the engine is started:

- 1) Whether the seat belt is fastened.
- 2) Whether the attachment, dozer unit, traveling, slewing, attachment swing and other moving parts are normal.
- 3) Whether the sound, vibration, smell or instrument of the machine is abnormal.
- 4) Check for oil and fuel leaks.

2. Traveling and slewing

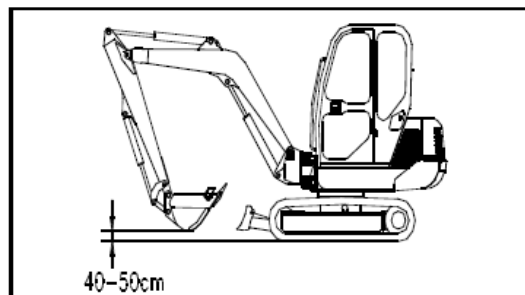
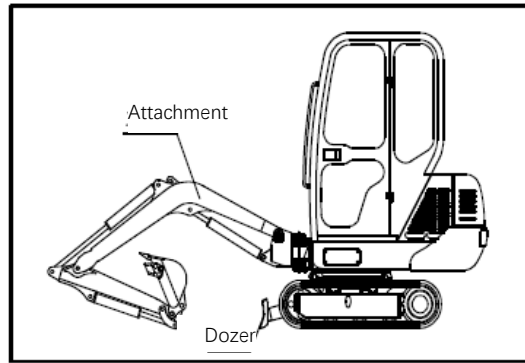
1) Before traveling, please turn the upper part of the machine platform to a suitable position, with the attachment in the same direction as the dozer blade. If the attachment is in the opposite direction of the dozer blade, the operation is reversed.

2) Before traveling and slewing, sound the horn to warn people in the work area from approaching.

3) The excavator must travel and operate on solid ground that is over 1.5 times of its width.

4) If there is an area at the back of the machine that cannot be seen before the machine moves back or turns, a signal commander should be arranged for giving instructions.

5) Before traveling, the cab door must be closed and locked. The cab windows, flip windows, and skylights are allowed to be opened, but must be locked.

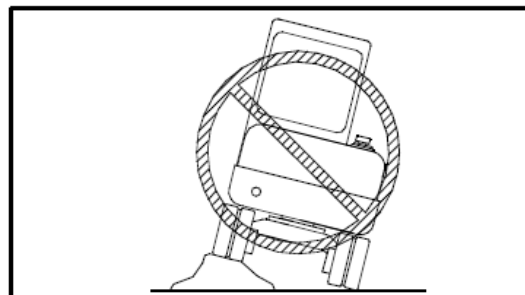


● Safety rules for traveling

1) When traveling on a flat road surface, it is necessary to lower the boom, retract the bucket arm, maintain the optimal position of the center of gravity, and keep a 40-50 cm clearance from the bottom of the bucket to the ground.

2) Travel slowly on rough and uneven roads; no sudden turning should be allowed, otherwise it may cause the machine to overturn and endanger personal safety.

3) The machine should not travel on obstacles leaning towards one side, as this may cause the machine to tip over.

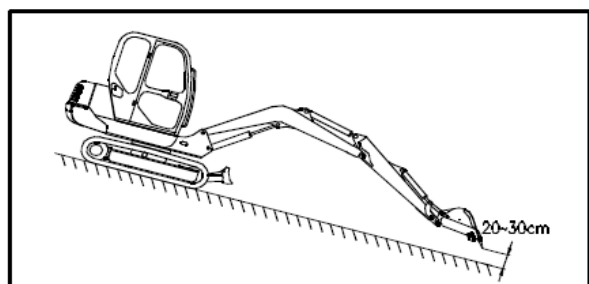
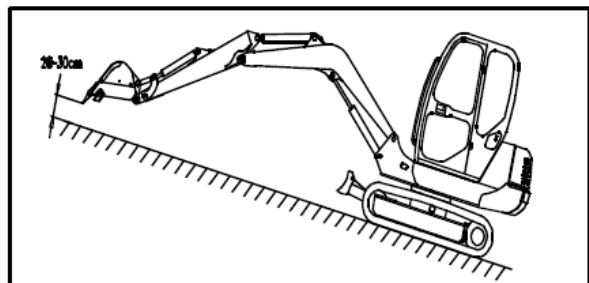


- 4) During traveling or operating, it is important to maintain a safe distance from people, buildings, or other machines to avoid contact.
- 5) When traveling through height-restricted areas such as underground passages, bridges, or power lines, it is necessary to ensure command by a specially designated personnel. In addition, a safety distance must be kept.
- 6) Be sure to lock the platform when going uphill or downhill.
- 7) When passing across bridges, buildings, or supports, it is necessary to first confirm whether they are sufficient to support the weight of the machine.
- 8) If it needs to drive on the highway, first consult the local traffic management department and obtain permission before starting traveling on the road.

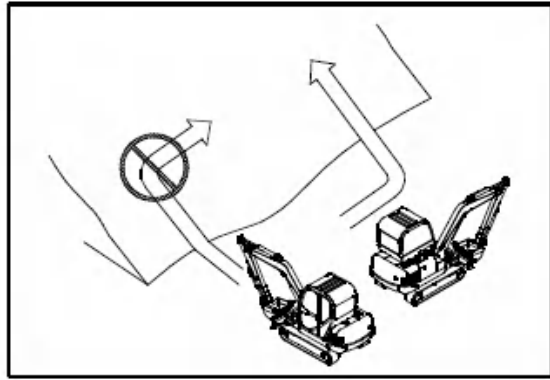
3. Traveling or working on slopes

It is extremely dangerous for traveling and operating the excavator on slopes, therefore, special care must be taken in this case.

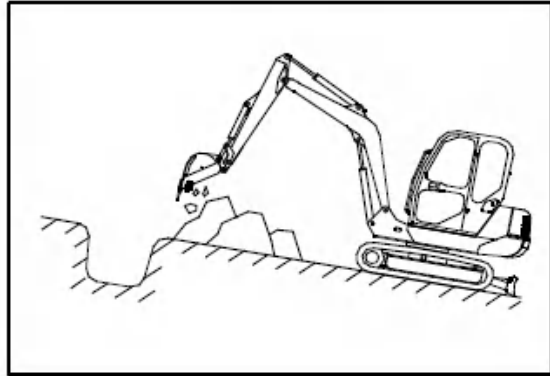
- 1) It is not recommended climbing or descending on long slopes greater than 20 degrees.
- 2) The operator shall fasten the seat belt when the machine is in operation, especially on slopes and in hazardous areas.
- 3) When the excavator is going uphill, the driving wheels should be in the downhill direction. The boom and bucket arm should be fully extended parallel to the slope, and the bucket teeth should be 20-30 cm away from the ground. After locking the platform, drive the excavator uphill at low speed.
- 4) When the excavator is going downhill, the platform should be locked, the driving wheels should be in the uphill direction, the boom and bucket arm should be fully extended, and the bucket teeth should be 20-30 cm away from the ground, drive the excavator downhill at low speed.



5) Do not turn on slopes or cross slopes. Be sure to go down to a flat area and change the position of the machine before climbing up the slope.



6) When working on a slope, it is necessary to start from a high place and gradually excavate towards the downhill direction, with the dozer blade at the back and pressing against the ground, and the unloading position is in the uphill direction.



7) Travel at low speed on grass, fallen leaves, or wet steel plates, as even on small slopes, there is a risk of machine slipping.

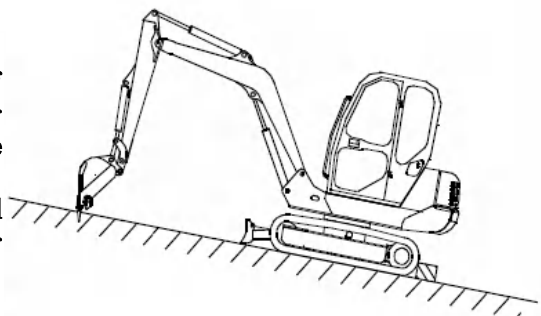
8) It is strictly prohibited to make sharp turns when going uphill or downhill, otherwise the machine may tip over.

9) When stopping on a slope, the front dozer blade must be lowered and inserted into the soil. Only after it has stopped steadily can the engine be stopped and the driver be allowed to get off.

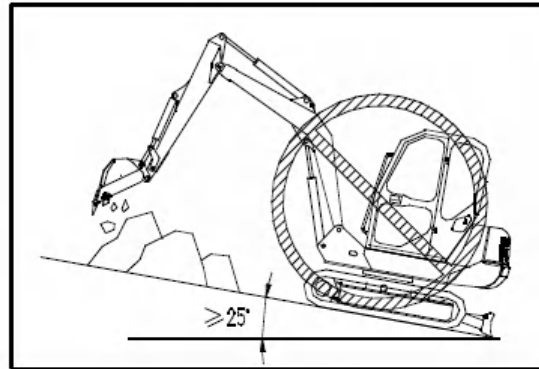


Danger

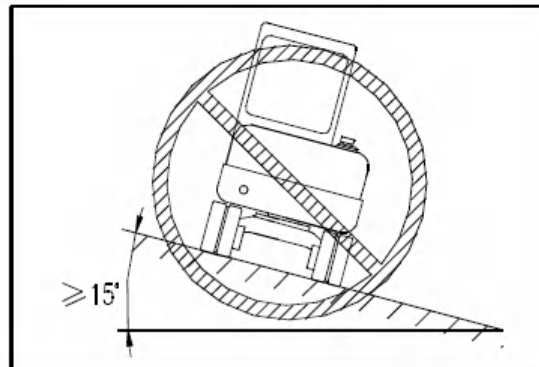
It's very dangerous to stop on the slope! If unavoidable, it is necessary to do as follows: if the engine stalls on a slope, immediately lower the dozer blade and bucket to the ground, place all levers in the center position, and then restart the engine. Even if the machine is stopped for a short time on a slope, the bucket and dozer blade should be lowered to the ground, and all levers should be pulled to the center position. At the same time, sufficient obstacles should be placed at the lower end of the track for securing.



10) It is strictly prohibited to travel on slopes with a longitudinal slope direction greater than 25 degrees.



11) It is strictly prohibited to travel and work on slopes with a transverse slope greater than 15 degrees.

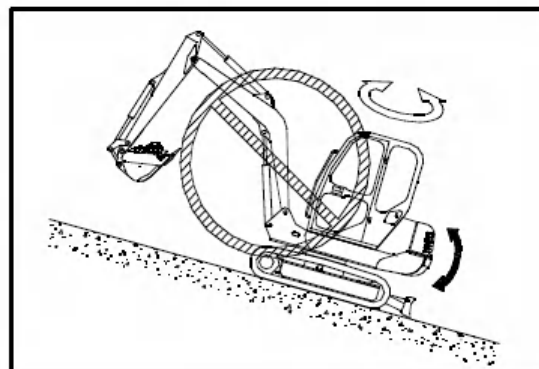


12) Try to maintain machine balance and strictly prohibit traveling on rocks or crossing obstacles.

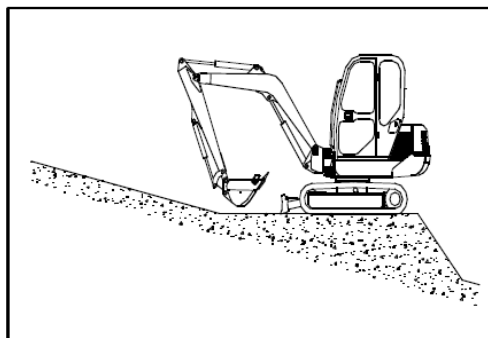
13) No reversing is allowed on slopes.

14) When going uphill, it is necessary to ensure that the engine and hydraulic oil are properly preheated, otherwise it may cause accidents.

15) When the excavator is on a slope with two tracks at a 90 degree angle to the slope, turning is very dangerous and should be avoided. When it is necessary to rotate, make the bucket close to the ground and also close to the machine, with the track facing towards the top of the slope, and rotate slowly.



16) When working on slopes, there is a risk of the machine losing balance and tipping over when operating for slewing and the attachment. This can cause serious injury or equipment damage, therefore, when performing these operations, it is necessary to pile up a sturdy and level platform with soil.



4. Safe excavation operation

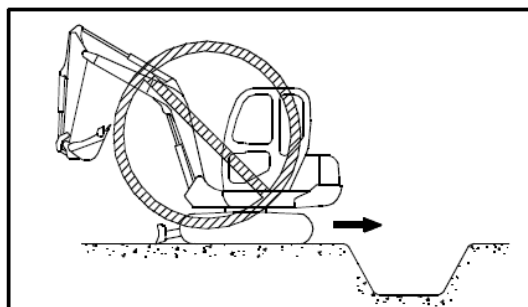


Warning: The operator must memorize the functions of each operating lever to avoid misoperation.

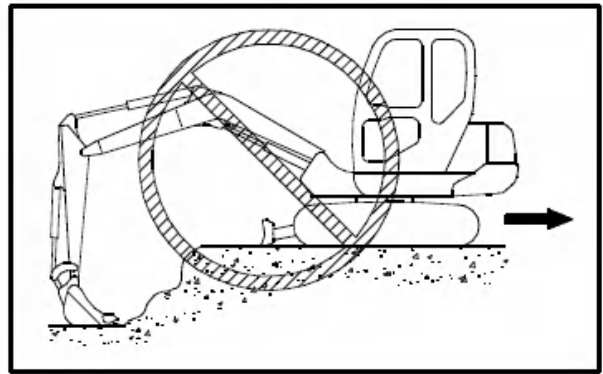


Warning: Improper use of the excavator may result in tipping and slipping. Remembering this section provides correct guidance for ensuring your personal safety.

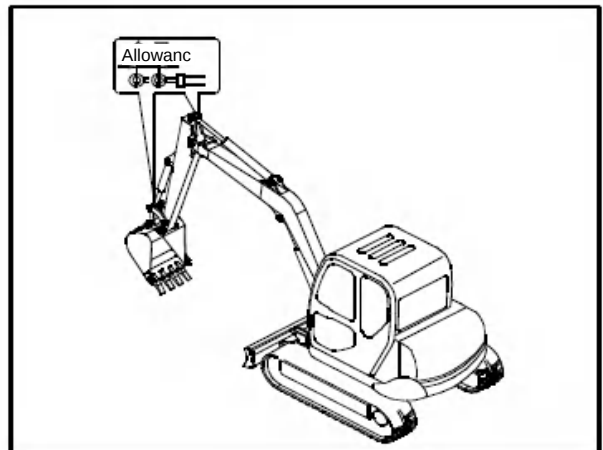
- 1) Before work, idle personnel inside the excavation site should be cleared out.
- 2) Confirm that the workplace can fully support the machine before driving in.
- 3) The two tracks of the excavator should be kept on the same plane as much as possible before operation.
- 4) Confirm that there are no cables, gas pipes, or water pipes underground in the workplace, or that their specific locations have been identified before excavation can be carried out.
- 5) When the machine is working backwards (such as digging trenches), it should be checked whether the movement route is flat and free of obstacles. Only when safety is ensured can the machine be moved, otherwise it may cause the machine to tip over.



6) When the bucket is subjected to special resistance on the ground, do not travel or rotate, otherwise the machine may be damaged.



7) During operation, if the hydraulic cylinder is operated to the end of its stroke, the force will act on the limit ring inside the cylinder, thereby reducing the service life of the machine. To prevent this situation from happening, a small margin should always be left when operating the hydraulic cylinder.



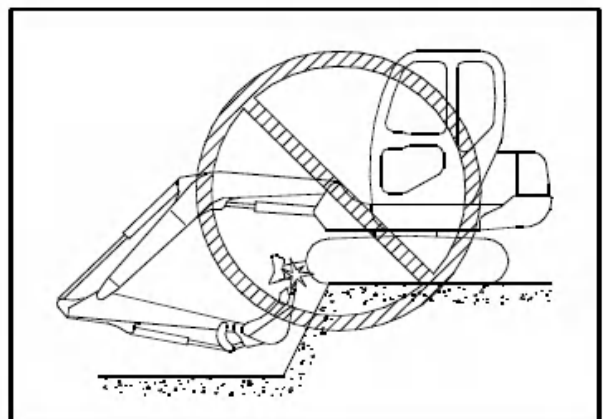
8) For deep excavation, it is necessary to avoid the bottom of the boom or the hose of the bucket cylinder from touching the ground.

9) When operating the machine, it is necessary to avoid foreign objects from touching the boom, bucket arm, bucket, and cab.

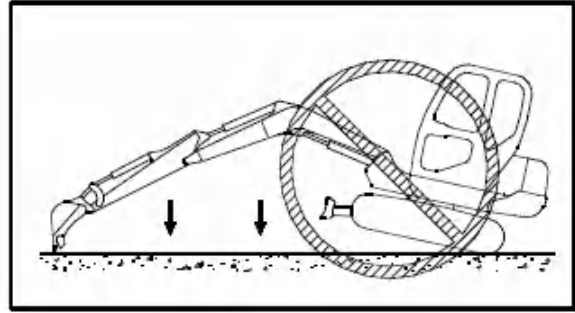
10) For rotating the machine, it is necessary to avoid touching the engine hood and rear counterweight.

11) When lowering the boom, never stop suddenly to avoid machine operation damage and improve work safety.

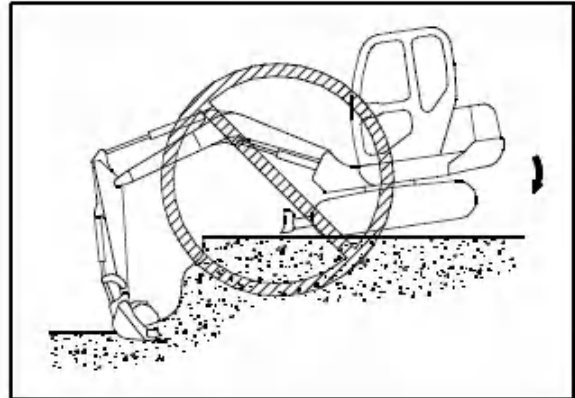
12) Do not excavate towards the machine body.



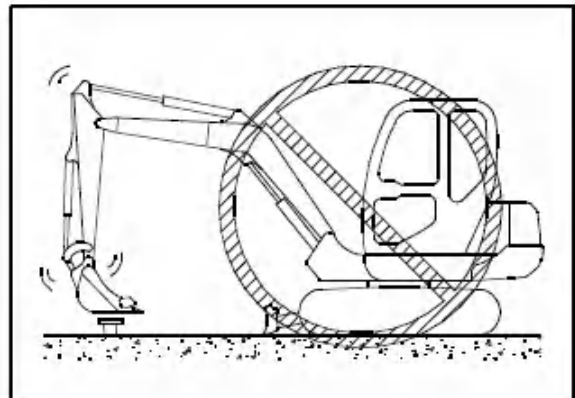
13) Do not carry out excavation operations when the track is off the ground, which may cause damage to the machine and structure.



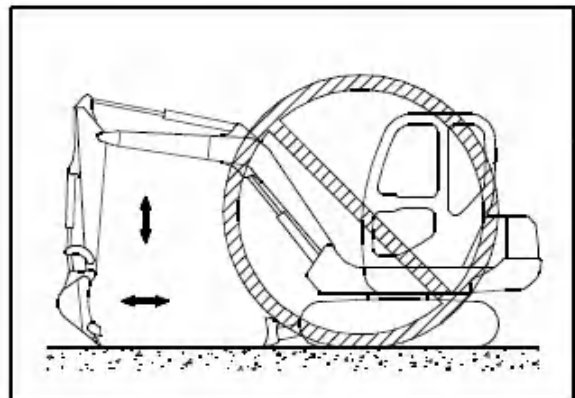
14) Do not use the weight of the machine to increase its excavation force.



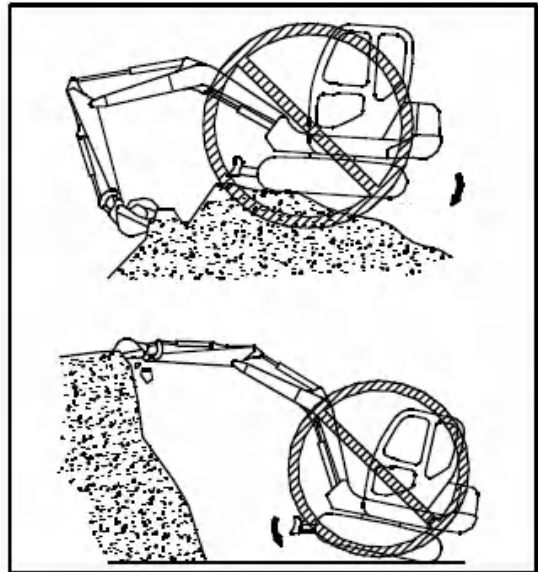
15) Do not use the downward force of the bucket as a hand pick, crusher, or pile driver, which will cause excessive force to be applied to the rear of the machine. This not only damages the machine, but also is very dangerous.



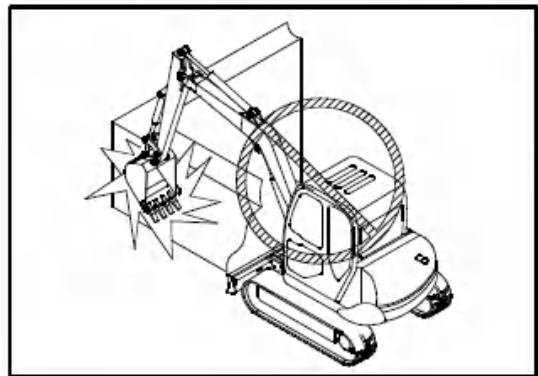
16) Do not use the bucket too much to level the road surface, otherwise the machine may be damaged due to overloaded operation of various components.



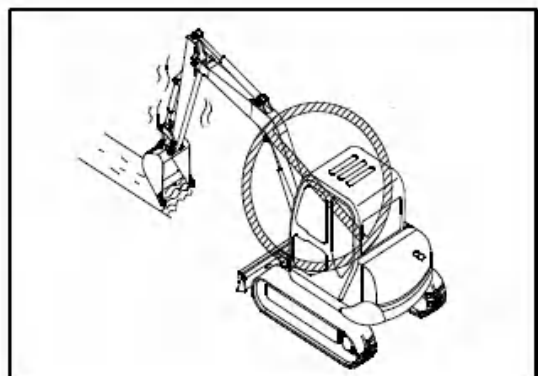
17) Do not use the downward force of the machine for excavation, as it may damage the machine.



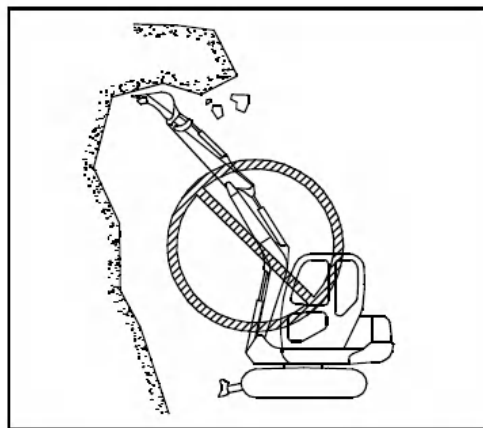
18) Do not use the rotational force to compact soil or damage soil piles and walls. When rotating, do not insert the bucket teeth into the soil, which will damage the attachment.



19) Do not excavate with the traveling force by digging the bucket into the ground, which will cause excessive force on the rear of the machine.



20) Do not excavate the working surface below the suspended part, as there is a risk of falling rocks or the suspended part collapsing and hitting the machine.



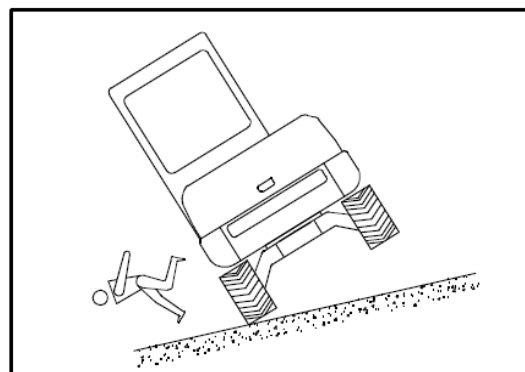
5. Prevention of tipping, slipping and handling during operation



Warning: 1) Only big-curve turning is allowed when it is necessary to turn on a slope. When the machine is about to turn right, extend the boom bucket arm to the left, with the bucket about 30 cm above the ground, and then lock the platform. And vice versa.
 2) When slipping, the dozer blade and bucket should be immediately pressed underground.
 3) When the machine is overturned, the driver should firmly grasp the pillar of the cab instead of jumping out of the cab. Jumping from a cab can easily cause injury or death accidents.

The machine is extremely prone to overturning in the following situations that must be avoided:

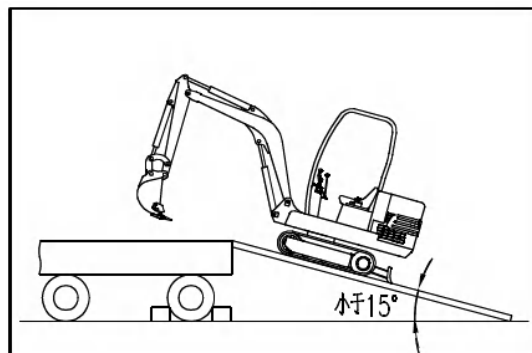
- 1) When the machine moves on uneven ground, the two tracks are high on one side and low on the other, or more than half of one track is suspended.
- 2) When one track is on loose soil while the other track is on solid soil.
- 3) When there are karst caves or mud pits underground on one side of the machine.
- 4) When traveling on slopes with a longitudinal slope greater than 25° while unloading in the downhill direction.
- 5) When traveling on slopes with a transverse slope greater than 15° while unloading in the downhill direction.
- 6) On a slope, the two tracks are in a 90° direction with the slope, and the platform rotates for more than 90° .
- 7) When working on slopes, the machine makes sharp turns, the platform quickly turns, or suddenly stops.
- 8) When the machine swings 180° downwards on a slope.
- 9) When moving backwards (digging trenches, etc.), the road surface is uneven.
- 10) When the machine excavates deeply under the machine.
- 11) Traveling on frozen ground.
- 12) When there is oil or lubricating oil on both tracks, the machine is prone to slipping.



Transport, load, unload the excavator

The transportation (loading and unloading) of the excavator must strictly follow the safety principles.

- Transportation of the excavator shall comply with relevant national and local industry safety transportation (loading and unloading) rules or good practice.
- When transporting the excavator, it is strictly prohibited to carry any personnel or other items inside the cab, and it is strictly prohibited to transport people and machine together. When loading and unloading excavators, no people or object that may hinder loading and unloading is allowed
- within the radius of the lifting arm (including the lifted object).
- During loading and unloading of the excavator, no person or other objects that hinder loading and unloading is allowed within the travel range of the excavator being loaded and unloaded (including the rotation range of the excavator).
- In addition to lifting method or directly driving from the dock, two sufficiently strong landing plates can also be used to allow the excavator to drive onto the transport vehicle. The inclination angle of the landing plate should be less than 15° , the length of the slope should be over 3.5 times the height, and the width of the landing plate should be equal to 1.2-1.5 times the width of the track.
- Before going up and down the ramp, be sure to put down the positioning lever of the slewing platform to prevent it from slewing.
- During going up and down the ramp, it is not allowed to pull any other lever except the traveling lever.
- The machine must be parked on a solid and flat face.
- When driving the machine on the road, it is necessary to ensure that clearance flags, lights, and warning signs are ready and visible to others. Ensure that vehicles behind can see the 'Slow Moving Vehicle' sign.
- Tracked machines may damage the road surface and may be subject to some restrictions when driving on the road. Therefore, please use trucks for transportation when driving on these roads.



<15°

Downtime for maintenance

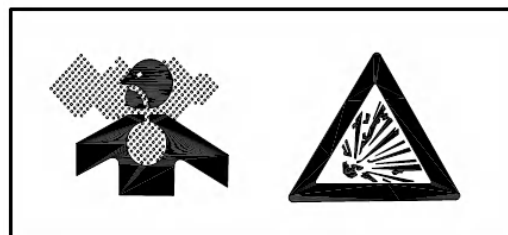
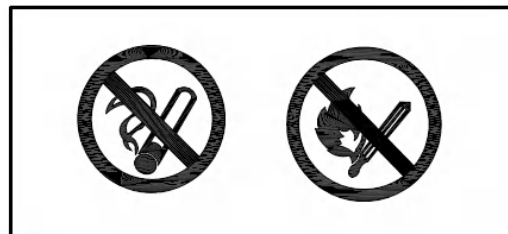


Warning: When carrying out any maintenance work on the machine, the warning sign “No Operation” must be hung on the joystick.

- The machine must be parked on solid and flat ground.
- After the excavator has stopped, it is necessary to lower the bucket to the ground, run the engine at low idle for three minutes, stop the machine, and finally remove the switch key.
- Fully release the hydraulic system pressure.
- When the machine is forced to stop on a slope, the sufficient obstacles should be set up in the downward direction of the crawler tracks on both sides.
- Be sure to keep a certain distance from other machines when parking.
- When repairing electrical systems or welding, it is necessary to remove the negative cable of the battery to prevent the current flow.
- Before servicing the machine, if you need to support the machine or accessories to work, support the machine or accessories firmly, and do not work with only one jack supporting the machine.
- After the machine is started, do not lubricate or repair, and do not let your hands, feet or clothing contact the power rotating parts.
- To carry out maintenance work while the engine is running, the machine must be supervised by someone.
- Do not store loose items in your pocket to prevent them from falling into the moving parts.
- The high pressure liquid will splash the eyes or skin, so it should be avoided during maintenance.
- Clean up all the sundries inside the machine to prevent possible wrong operation, causing injury to personnel or damage to the machine.
- Properly dispose the waste liquid. Do not pour oil into the ground, drainage ditch, stream, pond or lake. When discharging oil, fuel, antifreeze, plastics, batteries, and other hazardous waste, environmental regulations should be followed.

Fire, explosion and poisoning prevention

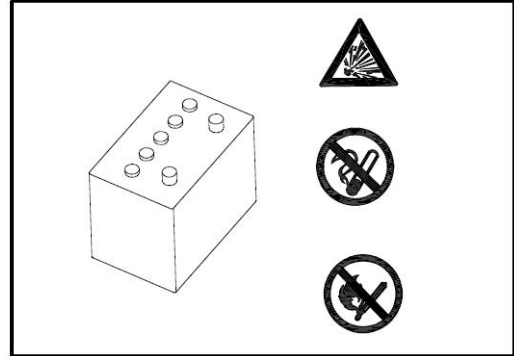
- Avoid contact with wires when the excavator is transported, walked, or excavated, otherwise it will cause serious casualties.
- The electrical appliances and wiring of the excavator should be checked frequently. If they are found to be damaged, or aging, they must be replaced in time to prevent a short circuit of electrical wiring and causing fire.
- Keep the wire connectors clean and securely fixed. Check whether the wires are loose or damaged every day, tighten loose joints or wire clamps, and repair the damaged wires.
- Do not place flammable and explosive materials inside the excavator to prevent fires.
- When refueling, the engine must be stopped, and refueling in a place far from the ignition source and the machine should not be left alone.
- Do not allow fuel to spill onto overheated surfaces or electrical system components during refueling.
- After refueling, wipe off any spilled fuel or oil and tighten the fuel and oil tank cap.
- Timely remove the leaves, wood chips, paper chips and other inflammable materials accumulated or stuck inside the engine, exhaust pipe, muffler, and interior of engine compartment.
- Do not place oil-soaked rags in the machine to avoid spontaneous fire and burning.
- The user should configure a fire extinguisher in the machine and put it in a place where it is easily accessible.
- When welding the machine, it is strictly forbidden to do without isolating the hydraulic oil pipeline and the fuel pipeline.
- To prevent fires caused by hydraulic pipelines: check whether the clamps, guards, and cushions of all hoses and pipes are firmly fixed in place. If it is loose, it will vibrate and rub against other parts during operation, causing hose damage, high pressure oil spraying, and fire hazards or serious injuries.
- Keep the battery away from fire and avoid high temperature, otherwise, it will cause an explosion.
- For excavators with sealed cabs, the sealing of the middle partition should be checked to prevent engine exhaust gas from entering the cab and causing poisoning to the driver.
- It is strictly forbidden to work in poorly ventilated areas to prevent the driver from suffocating.
- In the event of a fire, do not use water to extinguish the fire. Use a powder fire extinguisher or sand to extinguish the fire. You can also use a cover or tarp to extinguish the fire.



Battery

Safety rules for the battery

The electrolyte of a battery contains sulfuric acid, which can produce flammable and explosive hydrogen gas. Incorrect operation can cause serious injury or fire, so the following precautions must be followed:



- The battery cover is provided with an indicator that displays the charge state of the battery. When the indicator displays green, the battery can be used normally. When the indicator shows black, the battery should be charged in a timely manner. When the indicator shows white, it should be replaced immediately.
- When operating the battery, wear safety glasses and rubber gloves.
- Smoking or open flames are not allowed near the battery.
- If sulfuric acid splashes on eyes, clothes, or skin, immediately rinse with plenty of water and seek medical attention.
- Before operating the battery, turn the key switch to the OFF position.
- Check the electrolyte level with a flashlight and turn off the engine during the inspection.
- The expansion of the closed end of the battery indicates that the battery has frozen. When the battery freezes, do not charge the battery or jump start the engine. Do not heat a frozen battery above 15 °C, otherwise the battery may explode.

Explosion prevention of the battery



Warning: Electric sparks or flames can cause hydrogen gas in the battery to explode. To prevent explosion, please note:

- 1) To disconnect the battery cable, the negative (-) cable should be disconnected first;
- 2) To connect the battery cable, the negative (-) cable should be connected finally;
- 3) Do not short circuit the terminals of the battery with metal components;
- 4) Do not weld, grind, or smoke near the battery.

Due to the risk of sparks, the following steps should be followed:

- Firmly install the battery in the designated position.
- Do not allow tools or other metal objects to come into contact between the battery terminals. Do not leave tools or other metal objects near the battery.
- Connect or disconnect the positive and negative poles of the battery in the correct order. The battery terminals should be securely fixed.
- When charging a battery, flammable hydrogen gas will be generated. Therefore, before charging, remove the battery from the lower body of the vehicle, place it in a well ventilated area, and remove the battery cover.
- Tighten the battery cover securely.

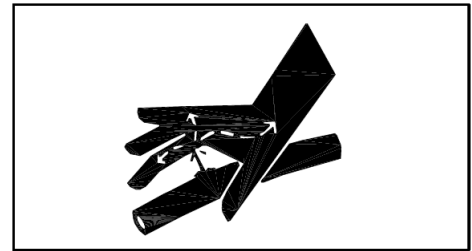
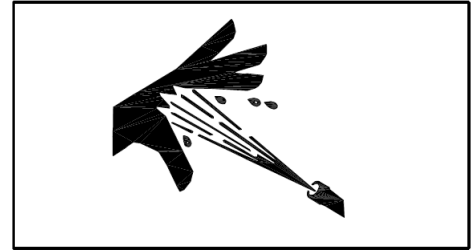
Attention: When repairing electrical systems or welding, it is necessary to remove the negative terminal of the battery to prevent the current flow.

Hydraulic system

1. Safety rules for high pressure oil

There is always pressure inside the hydraulic system. When inspecting or replacing pipes or hoses, be sure to check whether the pressure in the hydraulic oil circuit has been released. If the oil circuit is still under pressure, serious injury or damage will be caused, so follow these regulations:

- 1) Do not check or replace when there is pressure in the hydraulic system.
- 2) If there is any leakage in the pipe or hose, the surrounding area is wet, so check if the pipe or hose is broken and the hose is swollen. Wear goggles and leather gloves when performing an inspection.
- 3) The high-pressure oil leaking from the small holes will penetrate into the skin, and there will be a risk of blindness if it directly touches the eyes. If you are injured by high pressure oil hitting your skin or eyes, rinse with clean water and contact your doctor for treatment immediately.



2. Safe operation of high pressure hoses

If the high pressure hose leaks oil or fuel, it may cause a fire or operation failure, resulting in serious injury or damage. If the bolts are found to be loose, stop the work and tighten the bolts to the specified torque. When welding the machine, it is strictly forbidden to do it without isolating the hydraulic oil pipeline (hose). If any damage to the hose is found, stop the operation immediately and get in touch with the Yuchai agent.

If the following problems are found, replace the hose:

- 1) Damaged or leaking hydraulic pipe joints;
- 2) The cladding is worn or broken, or the steel wire of the reinforcing layer is exposed;
- 3) The cladding swells in some places;
- 4) The movable part is twisted or crushed;
- 5) There are impurities in the cladding.

3. Safety rules for hot oil

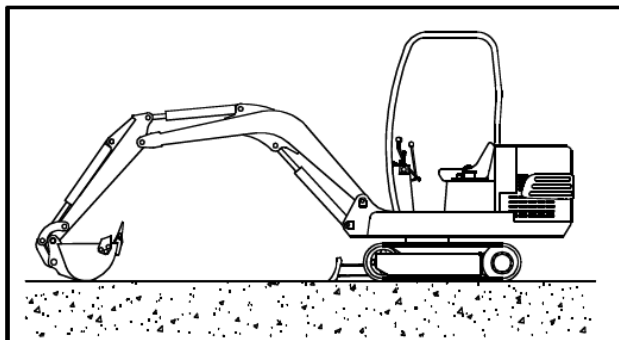
The hydraulic oil that is not cooled during or after work is at high temperature and high pressure. When checking or draining the oil, in order to prevent burns caused by sprayed oil or contact with hot parts, before starting the operation, wait until the oil has cooled to a temperature that can touch the cover. Even if the oil has cooled, unload it. Before lowering the cover, slowly loosen the air filter of the hydraulic oil tank to drain the pressure inside the hydraulic oil tank.

4. Release the internal pressure of the hydraulic system

At the break of the operation of the machine, the hydraulic oil in the pipeline is in a high-temperature and high-pressure state. When disassembling the oil port, oil may spray out, so rotate the oil filler cap before removing the cap to release internal pressure.

1) If the attachment is not in the state as shown in the figure, start the engine to run at low speed, extend the bucket cylinder, and retract the bucket arm cylinder. Then drop the bucket and the dozer blade to the ground, and turn off the engine.

2) Within 15 seconds after shutting down the engine, turn the start switch to the ON position and operate the joystick (attachment, traveling, slewing) in all directions to release internal pressure.



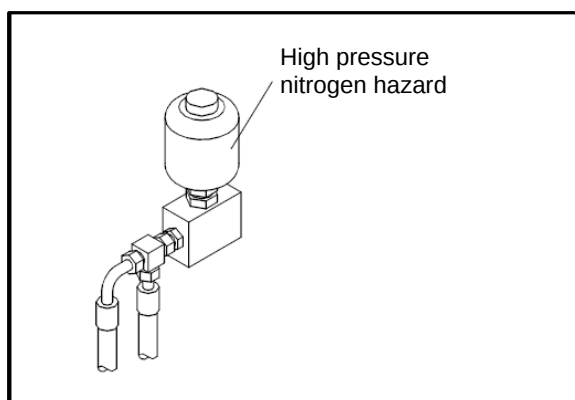
5. Operation safety of accumulator



Warning: The accumulator is a component filled with high pressure nitrogen, which may cause explosion and other hazards if used incorrectly. The accumulator cannot be disassembled, and the operation such as drilling and welding also cannot be carried out on it. Avoid the accumulator from being close to the fire source, and avoid collision and impact on the accumulator. Professional personnel shall be invited to dispose the accumulator.

The machine is equipped with accumulators in the control pipeline. The accumulators in the control pipeline are the pressure storage devices. When these devices are installed, the control pipeline can be operated for a short time even after the engine stops.

By operating the joystick, the attachment can be lowered under its own weight.



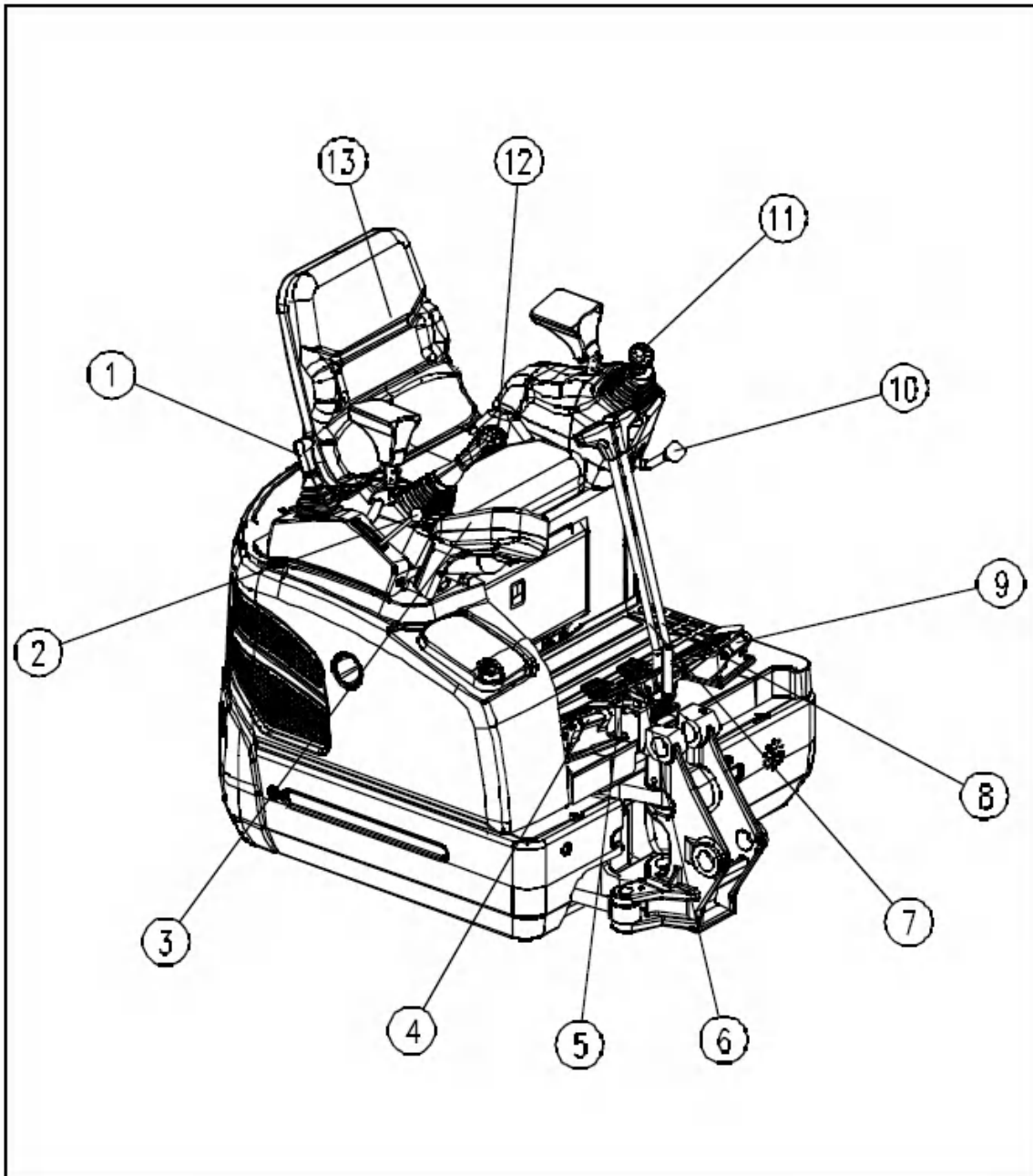
Pressure relief method for the control pipeline of the machine equipped with accumulators

- 1) Lower the attachment to the ground, and then disable the hydraulic crushing hammer and other accessories.
- 2) Turn off the engine.
- 3) Turn the start key to the ON position again to allow the current to flow in the circuit.
- 4) Adjust the safety lock control lever to the free position, and then operate the attachment joystick and accessory control pedal (if equipped) in full travel forward, backward, left, and right to release the pressure in the control pipeline.
- 5) Turn the safety lock joystick to the locked position to lock the control lever and accessory control pedal.

3

Introduction of components

Overview of controls



0. Manual main power switch (rear door opening)

1. Dozer joystick

2. Accelerator joystick

3. Instrument

4. Right auxiliary attachment pedal

5. Rotary locking lever

6. Travel pedal

7. Travel right joystick

8. Travel left joystick

9. Left auxiliary attachment pedal

10. Hydraulic pilot lock lever

11. Left pilot lock lever

12. Right pilot lock lever

13. Seat

Safety lock parts

1. Safety lock



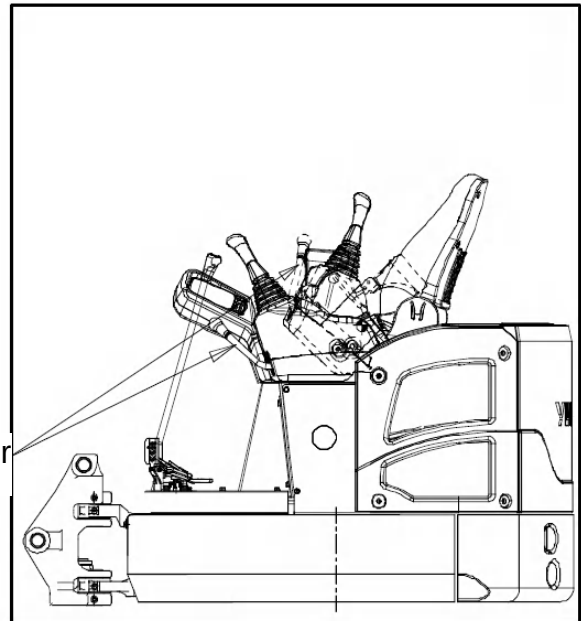
Warning: the safety lock mechanism of the attachment is an important part of the machine safety system. Safety lock must be enabled before the driver leaving the cab. If the joystick locking device is not in the locked position, the lever may move to cause the attachment to move and result in an accident.

Pilot locking and unlocking

Pull the pilot safety lock lever to the end position, lift the left control box, and then start the engine. When the overall control of the pilot system is not supplied with oil, the machine attachment, platform rotation, etc. cannot work (except for left and right travel controls), which provides safety protection for the machine.

Push the pilot safety lock lever forward and press it all the way down. After lowering the left control box, the pilot system is connected to the oil pressure source, now the machine can operate normally.

Pilot safety lock lever



2. Platform locking mechanism (optional)

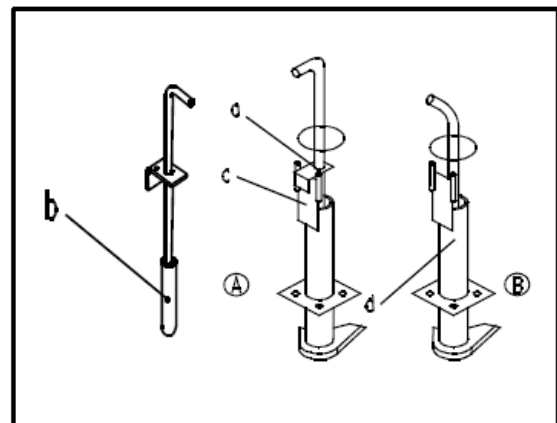


Warning: the platform lock mechanism is an important part of the machine safety system. When the machine is in transportation, traveling, ! parking or stopping on a ramp, the platform must be locked.

Pilot locking and unlocking

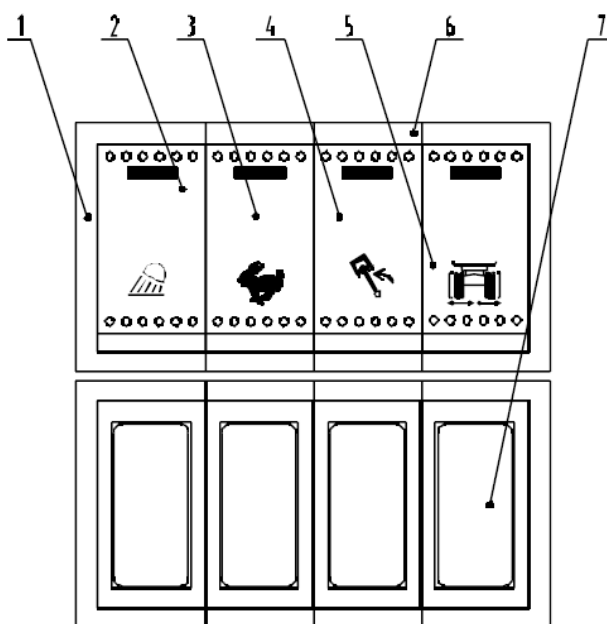
Lift up the locking pin of the platform, as shown in the figure, with the upper bent plate a at the lower box c to release the locking between the platform and the chassis. Lower the locking pin, place the bent plate at the lower box d, and lock the platform and the chassis with the pin shaft b, which cannot rotate each other.

When locking, be sure to align the locking pin holes on the platform and chassis.



Switch assembly

Switch assembly 1 of the left control box



1. Side single frame

2. Work lamp switch

Press the rocker switch, and the side with a switch mark is ON, while the other side is OFF.

3. Fast travel switch

Press the rocker switch, and the travel motor is in a high-speed low torque travel state.

4. Swing switch (or on the pilot lever)

Press the rocker switch and operate the left pilot lever to operate the swing head left or right; Press the rocker switch again and the swing head can switch back to the default platform left or right slewing action.

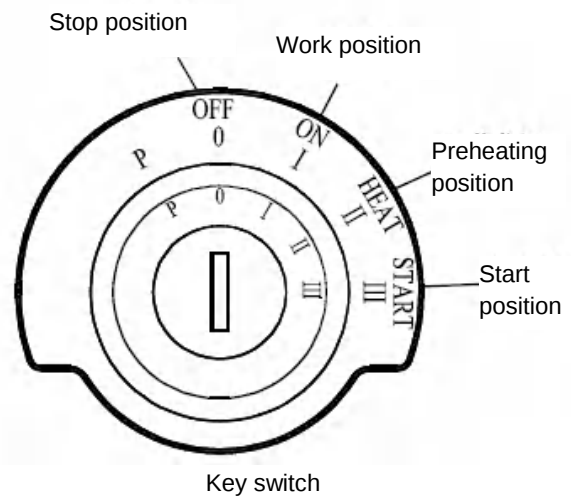
5. Chassis telescopic switch

Press the rocker switch to switch the dozer lever to the chassis telescopic state.

6. Middle single frame

7. Cover plate

Manipulator electrical panel



1. Operation of the key (start) switch

Stop position: The electrical system of the entire machine is stopped.

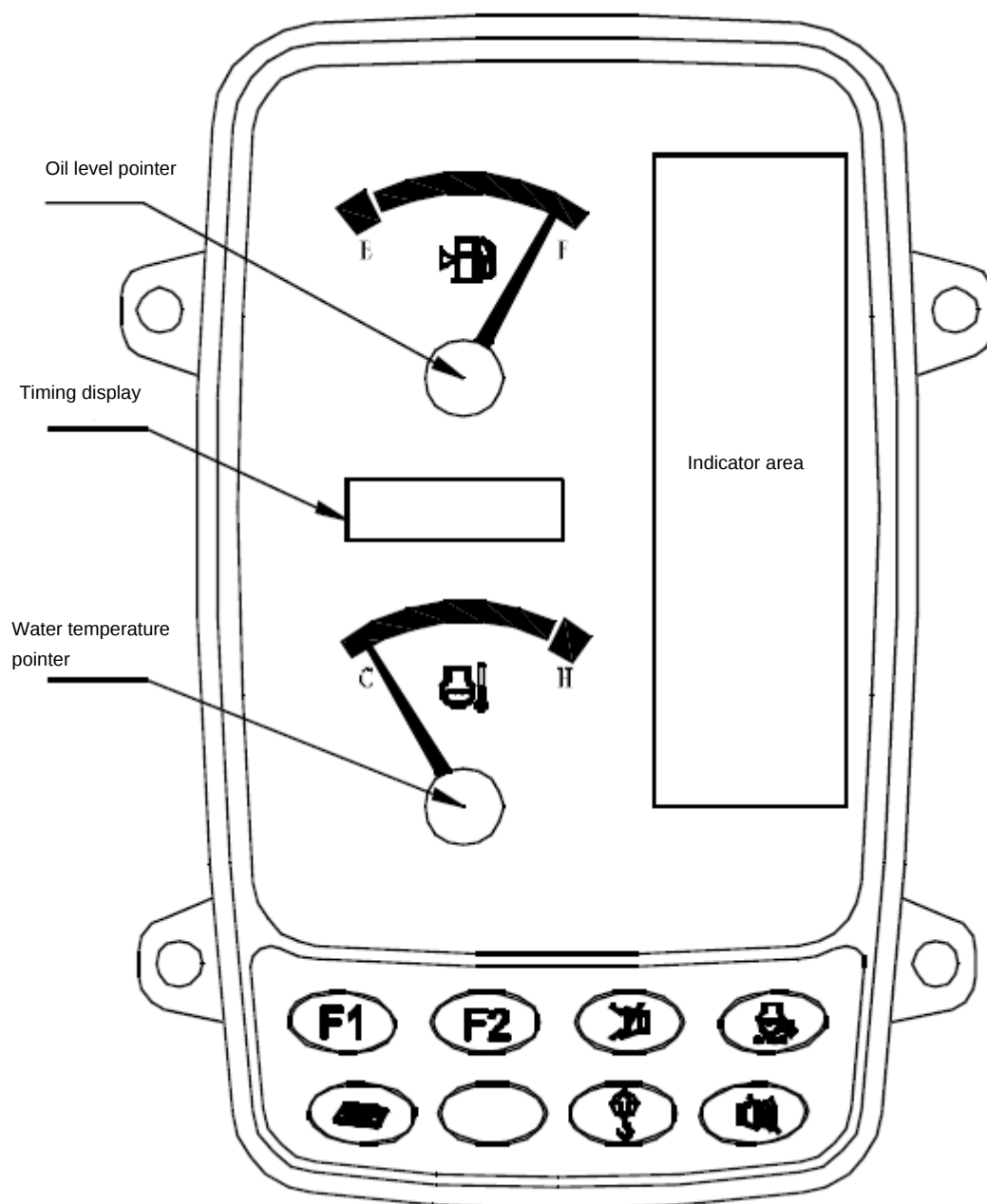
Work position: The electrical working status of the entire machine is normal.

Start position: Turn the key clockwise from the initial position to the start position, and the engine starter starts running.

Preheating position: When the key is turned to the preheating position, the engine starts to intake and preheat; now the preheating indicator light goes on. It should be noted that the preheating time should not exceed 30 seconds. This position can be reset automatically.

2. Cigarette lighter

Panel instrument



Operation of the attachment and slewing mechanism

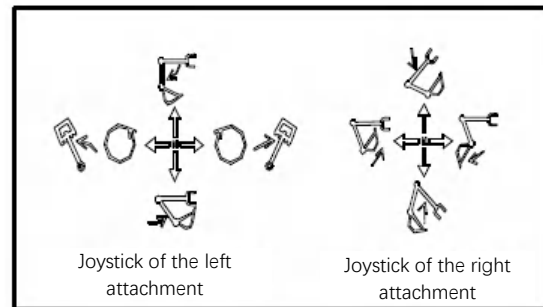
- Operation of the excavation attachment and platform slewing mechanism
- Operation of the excavation attachment and platform slewing mechanism

A. Left pilot valve lever

Bucket arm control: The arm extends outward when being pushed up; retracts inward when being pulled back.

Platform slewing: The platform turns right when it swings right; turns left when it swings left.

Boom slewing: The boom slews right when it swings right; slews left when it swings left.



B. Right pilot valve lever

Boom control: The boom goes down when being pushed forward; goes up when being pulled back.

Bucket control: The bucket flips outward when it swings right, turns inward when it swings left.

- Selection and manipulation of slewing and swing (optional, this manual button can be selected for switching the lever)

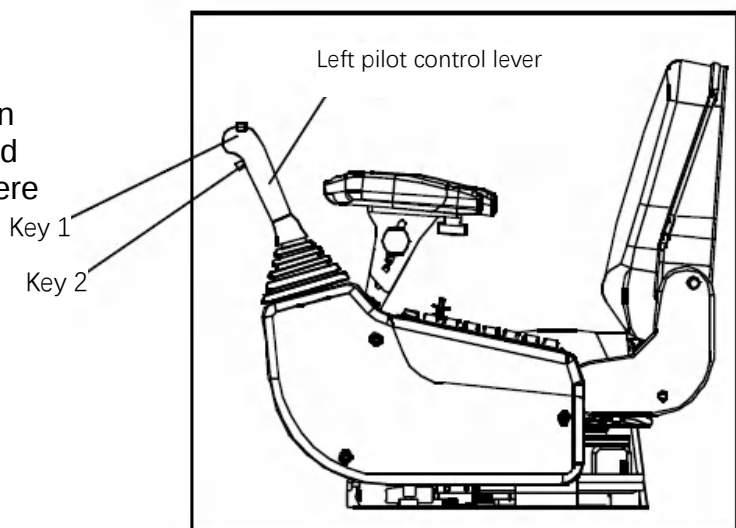
Both slewing and swing are controlled by the right pilot lever

Default as slewing operation

Press key 1 to for slewing.

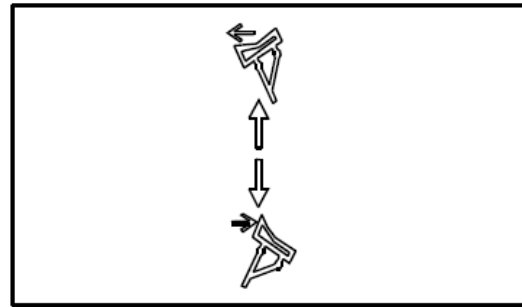
Press key 2 for both resetting and executing the default slewing operation

Note: If the right control box is provided with a swing switch, no such setting here



- **Dozer blade operation**

Push the joystick downward and the dozer blade cuts down. When being pulled up, the dozer blade is lifted.



- **Operation of the auxiliary attachment**

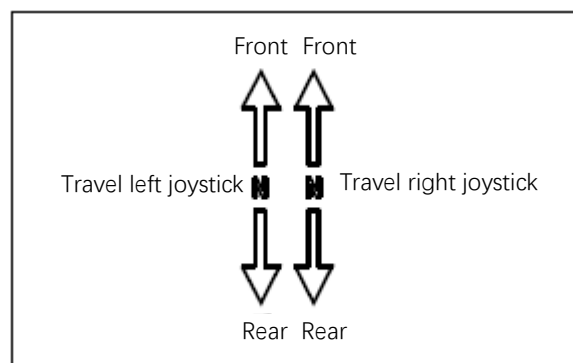
When the machine is equipped with an auxiliary attachment, pressing the pedal of the auxiliary attachment can connect the auxiliary oil source.

Travel control

- **Direction control**

Operate the left and right travel joysticks to control the left and right tracks of the machine for traveling.

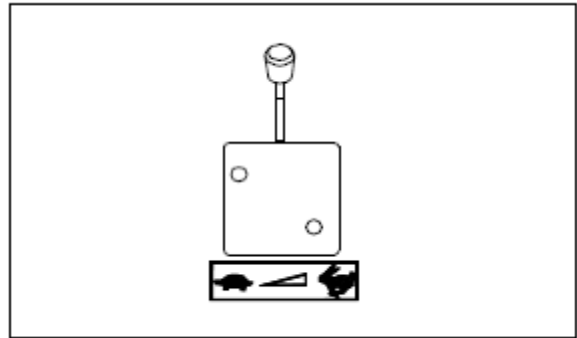
Control of the joystick on one side can achieve single side steering of the machine.



Accelerator lever and stop lever

1. Accelerator lever

Push the engine throttle lever forward to increase the accelerator. Before stopping the engine, pull the accelerator lever all the way back.



2. Shutdown lever

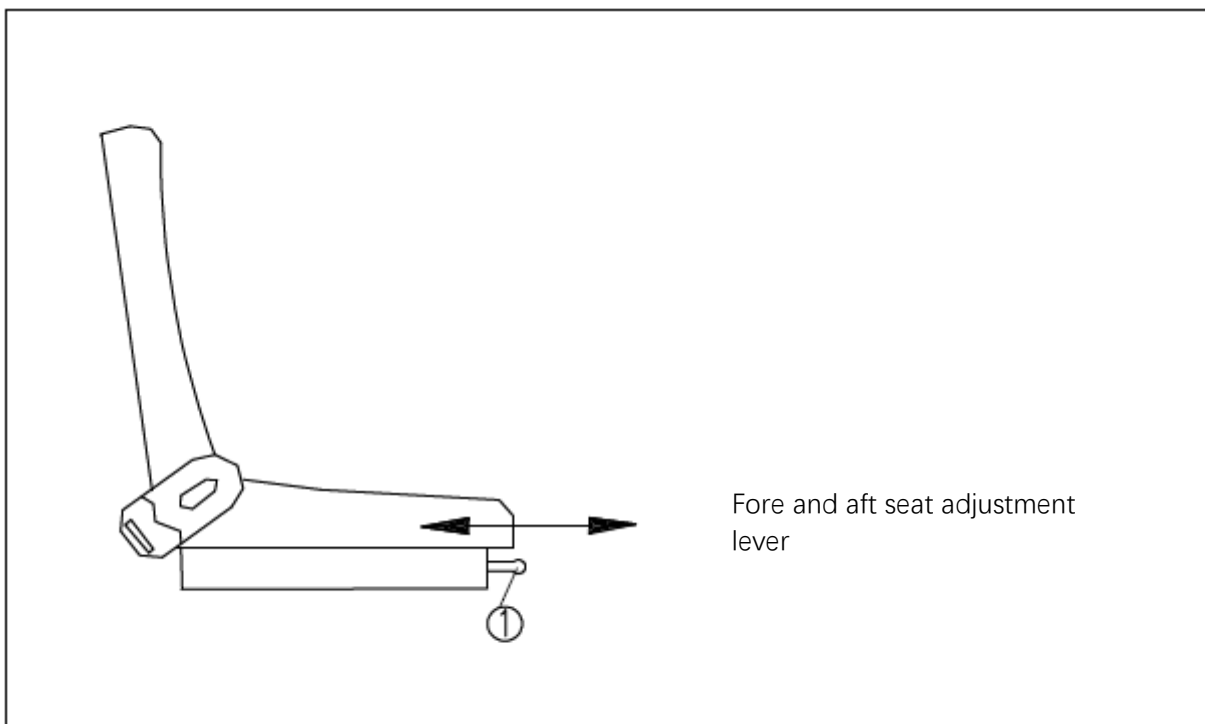
Before stopping the engine, pull the stop lever all the way back.

After stopping the engine, push the stop lever all the way forward.

Driver seat



Warning: Accidental tipping or sudden movement of the machine may cause injury or even death. Therefore, for safety reasons, it is important to fasten the seat belt and adjust the seat before starting the machine.



- **Fore and aft seat adjustment:** Twist the fore and aft seat adjustment lever to allow fore and aft movement of the seat. Release the lever and the seat will be locked.

Attention: When adjusting the seat, stop the machine. After adjusting, gently shake the seat to ensure reliable locking.

Seat belt



Warning: the seat belt is an important part of the machine safety system. Before operation, you must wear a seat belt. If you do not wear a seat belt, the cab or the machine may press on your body and cause injury when the machine tipped over.



Warning: before using the seat belt, check the installation of the seat belt for abnormalities. If the seat belt is worn or damaged, replace it.

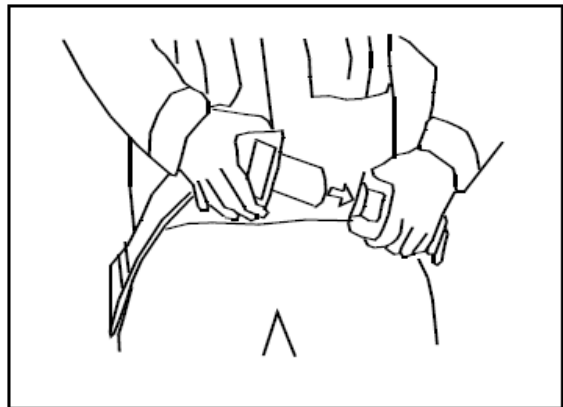
- Even if you do not see any abnormality in the seat belt, you must replace the seat belt every 3 years. The production date of the seat belt is displayed on the manufacture date label of the seat belt.
- During operation, be sure to wear a seat belt.
- When wearing a seat belt, do not twist the seat belt.

1. Secure the seat belt

Hold the seat belt clip, check whether it is twisted, adjust the length of the seat belt, and then insert the tongue firmly into the buckle. Pull the seat belt slightly to check whether the seat belt is properly locked.

2. Remove the seat belt

Press the red button on the buckle and remove the tongue from the buckle to remove the seat belt.



4 **Operation guide**

Preparation before operating the machine

- 1) The excavator should be operated by trained drivers who meet the specific requirements for drivers in each region before independent operation.
- 2) Drivers are strictly forbidden to manipulate before reading the instruction manual.
- 3) Drivers must wear tight-fitting and suitable clothing and relevant safety protection equipment adapted to the work before operation, such as safety helmets, leather shoes, gloves, protective glasses, seat belts, etc.
- 4) Check the machine carefully according to the usage requirements before starting every day.
- 5) Check whether the attachment, oil cylinder and hose are damaged.
- 6) Clean the dust and dirt around the engine, radiator, and battery.
- 7) Check the hydraulic device, fuel tank, hose and joints for oil leakage (you can check whether there are obvious oil traces on the parking floor).
- 8) Check whether each component (tracks, drive wheel, guide roller etc.) of the lower frame are damaged and whether the bolts are properly secured. The bolt connection between the frame and the platform is properly secured.
- 9) Check that all meters and monitors are not damaged.
- 10) Clean the rearview mirror, check for damage, and adjust the angle so that you can see the correct field of view.
- 11) Check that the seat belt is not damaged.
- 12) Make sure that the correct maintenance has been carried out in accordance with the specified requirements.



Warning: Before operating the machine, you should ensure that you have understood and memorized the contents of the safe operation of the machine in the "Safety Regulations" of this manual.

Engine operation



Warning: Before starting the engine, please refer to the safety details in this manual. Read all safety signs on the machine. There must be no other people in the workplace. Before operation, learn and practice safe operation. When operating the machine, you must be clear about and follow the relevant operation and maintenance sections of the manual, and comply with the corresponding laws and regulations.

1. Check before starting the engine

- 1) Check whether the seat belt is fastened, honking the horn, and confirm whether there are people around the working area and on or under the machine.
- 2) Check whether each window glass and rearview mirror can provide a good field of vision.
- 3) Check for dust or dirt around the engine, battery, and radiator, and clean as necessary
- 4) Check the attachment, cylinder, connection rod, and hydraulic hose for cracks, excessive wear or clearance. If an abnormality is found, it must be replaced and repaired.
- 5) Check the hydraulic device, hydraulic oil tank, hoses, and joints for oil leakage.
- 6) Check the lower body (tracks, sprockets, guide roller, etc.) for damage, wear, loose bolts, or oil leakage.
- 7) Check whether the display of the meter is normal, whether the work lamps can work normally, and whether there is an open circuit in the electrical circuit.
- 8) Check if the coolant level, fuel level, hydraulic oil level, and engine oil level are between the upper and lower limits.
- 9) In cold weather, it is necessary to check whether the coolant, fuel, hydraulic oil, battery electrolyte, engine oil, and lubricating oil are frozen. If so, they must be thawed before starting the engine.
- 10) Check if the hydraulic safety lock is in the locked state.
- 11) Check the working condition, direction, and position of the machine in order to provide relevant information for the operation.

2. Start the engine



Warning: Do not start the engine when there is engine start warning sign on the joystick.



Warning: Before starting the engine, it is necessary to confirm that the safety lock lever is in the locked position to prevent accidental contact with the control lever during starting, resulting in sudden action of the attachment and causing accidents.



Warning: The engine to start in cold weather must be preheated. If the machine is not fully warmed up before operating the control lever, it will become unresponsive, which can lead to unexpected accidents.



Warning: If the battery electrolyte freezes, do not charge the battery or start the engine with a different power source. Doing so poses a risk of battery ignition. Before charging or using a different power source for the engine, the battery electrolyte should be melted and checked for freezing and leakage before starting.

Before starting the engine, insert the key into the start switch and turn it to the ON position. Check the display status of all indicator and alarm lights on the digital combination instrument. If an alarm is found, please first troubleshoot the relevant faults before starting the engine.

A. Starting the engine at normal temperature

When the ambient temperature exceeds 5 degrees Celsius, turn the key clockwise to the ON position, and the alarm indicator light will turn off to indicate that the machine can start normally. Continue to turn to the START position and hold it in this position for no more than 15 seconds. After the engine is started, release the key and it will automatically return to the ON position. If the engine fails to start, it will take 30 seconds to restart.

B. Start the engine at cold temperatures

When the ambient temperature is below 5 degrees, the key must be turned counterclockwise to the HEAT position for warm-up. After about 6 seconds, the preheating is completed, the preheating indicator light goes out, and then turn the key clockwise to the START position to start the engine.

Attention: The preheating time should not exceed 30 seconds.

Attention: The continuous starting time should not exceed 15 seconds. The interval between two starts should not be less than 30 seconds. When the engine cannot be started for three times consecutively, check all the systems of the engine are normal.



Warning: 1) Do not turn the key when the engine is in operation, which may damage the engine.
2) Do not start the engine while dragging the excavator.
3) Do not start the engine by short-circuiting the starting motor circuit.

- Start the engine with an auxiliary cable.



Warning: When the battery electrolyte freezes, if you (1) attempt to charge or (2) jump start the engine, the battery may explode. To prevent the battery electrolyte from freezing, it is necessary to keep it fully charged. Failure to follow these instructions may cause personal injury.

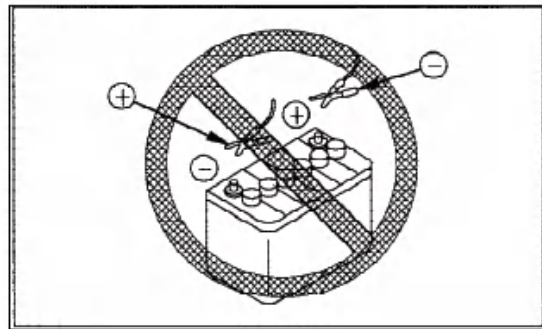


Warning: The battery can produce explosive gases. Keep away from sparks, flames, and fireworks. When charging or using the battery in enclosed areas, it is important to maintain ventilation and wear eye masks when working near the battery.

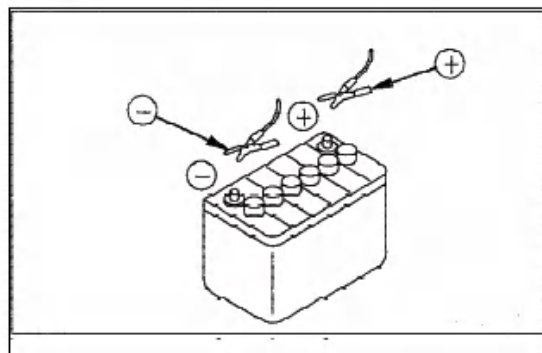
Incorrect auxiliary cable connection can cause battery explosion. Therefore, it is necessary to abide by the following regulations.

- 1) When starting with an auxiliary cable, two people are necessary for the operation (one person to sit in the operator's seat and the other to operate the battery).
- 2) When starting with another machine, the two machines should not come into contact.
- 3) When connecting auxiliary cables, turn the key switches of the normal and faulty machines to the OFF position. Otherwise, there is a danger of the machine moving when the power is turned on.

(1)



(2)



- 4) When installing auxiliary cables, be sure to first connect the positive pole (+). When removing the auxiliary cable, the ground or negative (-) cable (ground side) should be disconnected first.
- 5) When disassembling the auxiliary cables, be careful not to let the auxiliary cable clamps come into contact with each other or with the machine.
- 6) When starting the engine with an auxiliary cable, be sure to wear protective goggles and rubber gloves.
- 7) When connecting a normal machine to a faulty machine with auxiliary cables, use a normal machine with the same battery voltage as the faulty machine.

3. After the engine is started

A. Engine warm-up and machine heating

The normal operating temperature of hydraulic oil is between 50 °C and 80 °C. Operating hydraulic oil below 20 °C will damage hydraulic components. So before starting work, if the oil temperature is below 20 °C, the following preheating process must be followed.

- 1) Run the engine at a speed above idle speed 200rpm for 5 minutes.
- 2) Run the engine with the throttle in the center position for 5-10 minutes.
- 3) At this speed, extend and retract each cylinder several times, and gently operate the slewing and traveling motors to preheat the cylinders. Only when the oil temperature reaches 20 °C or above can it work. If necessary, the bucket cylinder can be extended or retracted to the end of the stroke, and the hydraulic oil can be preheated at full load, but each time it should not exceed 30 seconds. It can be repeated until the oil temperature requirement is met.

B. Check after starting the engine

- 1) Check if all the indicator lights are off.
- 2) Check for oil leakage (lubricating oil, fuel) and water leakage.
- 3) Check for any abnormalities in the sound, vibration, heating, odor, and instrument of the machine. If an abnormality is found, repair immediately.

4. Turn off the engine

Attention: If the engine is suddenly shut down before cooling, its service life will be greatly shortened. Therefore, do not suddenly shut down the engine except in emergency situations.

If the engine is overheated, do not suddenly shut down it. Instead, run the engine at idle speed to gradually cool down, and then shut down the engine.

- 1) Run the engine at low idle for approximately 5 minutes to gradually cool down.
- 2) Push the accelerator all the way forward and pull the shutdown lever all the way back.
- 3) Turn the key switch to the OFF position and turn off the engine. All the indicators go off.
- 4) Take off the key.
- 5) After the engine shuts down, push the shutdown lever all the way forward.

5. Check after starting the engine

- 1) Regularly check the attachment, machine exterior and chassis, and check whether there is water leakage or oil leakage. If an abnormality is found, repair it.
- 2) Refuel the fuel tank.
- 3) Check the engine compartment for paper scraps and debris. Remove paper scraps and debris to avoid a fire.
- 4) Remove the mud attached to the chassis.

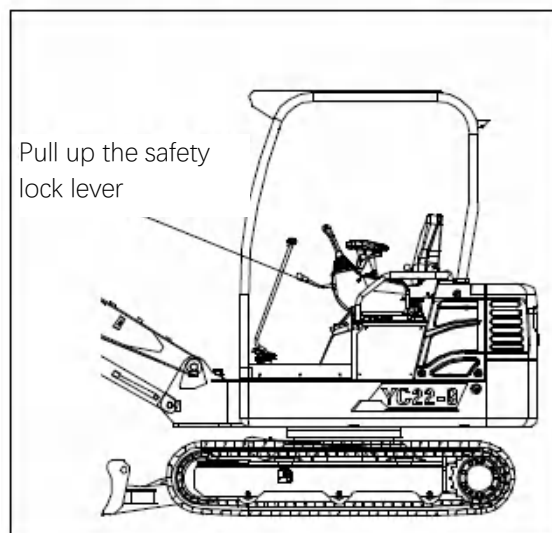
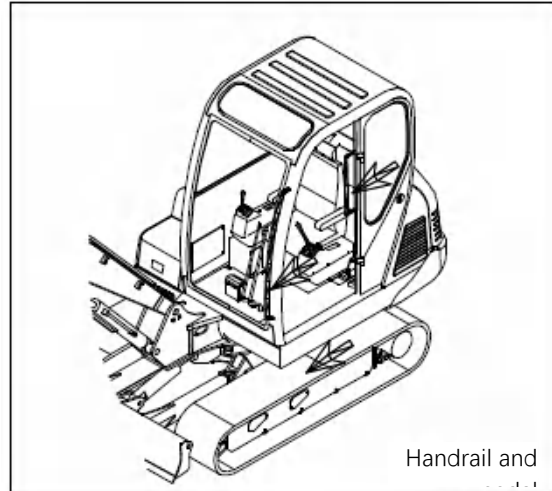
Get on/off the machine

- 1) Ensure to firmly grasp the handrail at the cab door or the pillar of the four-pillar cab as shown in the picture.
- 2) Ensure that the foot is firmly pressed on the track.
- 3) When getting on and off the machine, it is not allowed to grasp the joystick for security.
- 4) Before getting on or off the machine, it is necessary to confirm whether there are substances such as mud, grease, etc. on the surface of the handrails and tracks that can cause slipping. If there are any, clean them up.
- 5) Do not jump on or off the machine, and do not get on or off the machine while it is in motion.
- 6) Before leaving the machine, the attachment must be completely lowered to the ground and the engine must be turned off. Then use the safety handle of the pilot valve to pull up the left control box and keep it in a fully locked state until the next time the machine is operated.

Attention: Please remove the key and lock all doors and windows when leaving.

It is not allowed to climb to the top of the fuel tank, engine hood, and cab.

No matter in what state, no people is allowed on the attachment (such as the bucket, bucket arm, boom, and accessories).



Movement of the machine

1. Safety rules for moving the machine

- 1) Before starting the excavator, it is required to be familiar with the surrounding environment of the site, whether there are pedestrians, obstacles, ground bearing capacity, etc.
- 2) Before starting the excavator, the horn should be sounded to alert the people nearby to pay attention.
- 3) It is strictly prohibited for the driver to start and operate the machine while standing on the ground.
- 4) The excavator must travel and operate on solid ground that is over 1.5 times of its width.
- 5) When traveling through areas such as underground passages, bridges, or high-voltage power lines, it is necessary to ensure command by a specially designated personnel.
- 6) When traveling, it is necessary to lower the boom and bucket arm to maintain the optimal position of the center of gravity.
- 7) When the machine is moving, only the driver is allowed to drive on the machine and no passenger is allowed on the machine.
- 8) Before operating the steering joystick, check the direction of the track frame.
- 9) If the dozer blade is in the rear side, the operation of the travel joystick is reversed.
- 10) No one is allowed in the area around the machine.
- 11) Clear all obstacles on the travel route of the machine.
- 12) The rear of the machine is a blind spot, so special attention should be paid for reverse traveling.

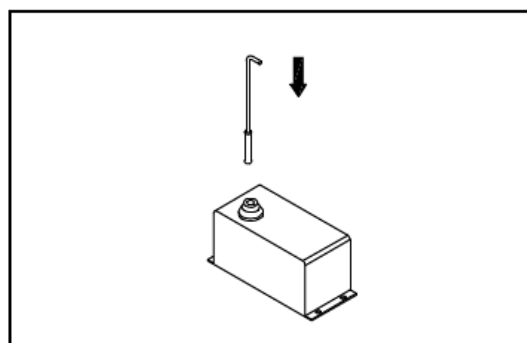


Warning: Sudden switching of the joystick during high-speed traveling can be dangerous.

- 1) Do not suddenly switch the joystick, otherwise it may cause sudden start.
- 2) Avoid sudden switching of the joystick from forward to reverse (or from reverse to forward).
- 3) Avoid sudden changes in the joystick, such as sudden stops from high speed (releasing the joystick).

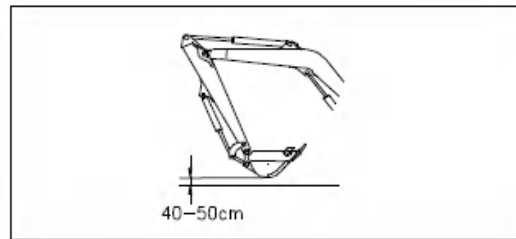
2. Preparation for moving the machine

- 1) Put down the platform locking pin and lock the platform for slewing.
- 2) Turn the accelerator lever to the high speed position to increase the engine speed.



3. Move the machine forward

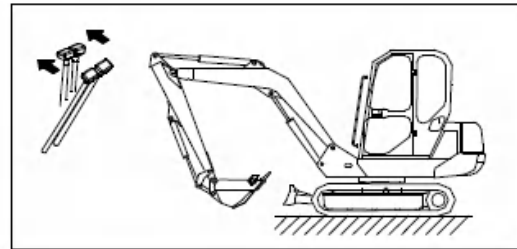
1) Lower the left control box, raise the attachment and lift it 40 to 50 cm off the ground.



2) Follow the steps below to operate the left and right travel joystick.

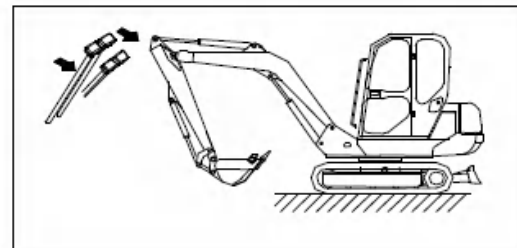
When the dozer blade is in front:

Slowly push the front of the joystick forward to move the machine.



When the dozer blade is in the rear of the machine:

Slowly pull back the joystick to move the machine.

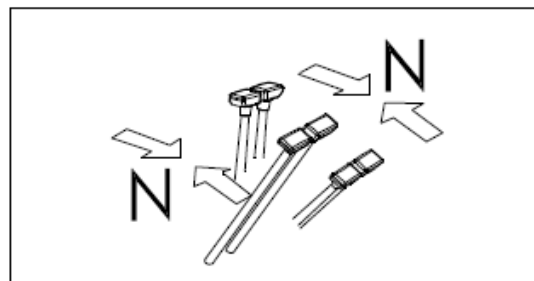


Attention: If the travel speed of the machine is abnormal at low temperatures, it is necessary to thoroughly warm up the machine. In addition, if the lower body of the machine is blocked by soil and the travel speed is abnormal, please make sure to remove the dirt and soil.

4. Reverse the machine

1) Lower the left control box, raise the attachment and lift it 40 to 50 cm off the ground.

2) The operation is in reverse order for moving forward.



5. Park the machine

Place the left and right joysticks in the center position to park the machine.

Attention: Avoid sudden stopping of the machine while traveling; there should be sufficient space for parking.

Steering of the machine

Attention: Before operating the travel joystick, check the position of the dozer blade. If the dozer blade is in the rear side, the operation of the travel joystick is reversed.

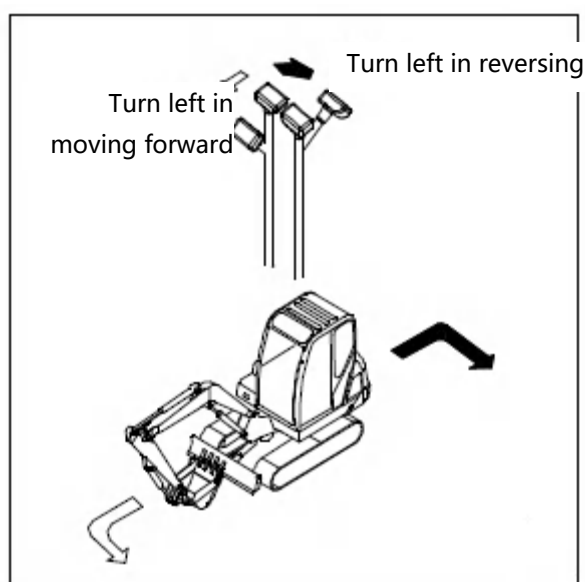
Use the left and right travel joystick to change the direction of travel. Try to avoid sudden changes in direction as much as possible. Especially when turning in reverse (turning in place), park the machine before turning.

1. Steering when the machine is parked

Steering left:

When traveling forward, push the right travel joystick forward to turn the machine to the left. When reversing, pull the right travel joystick back to turn the machine to the left.

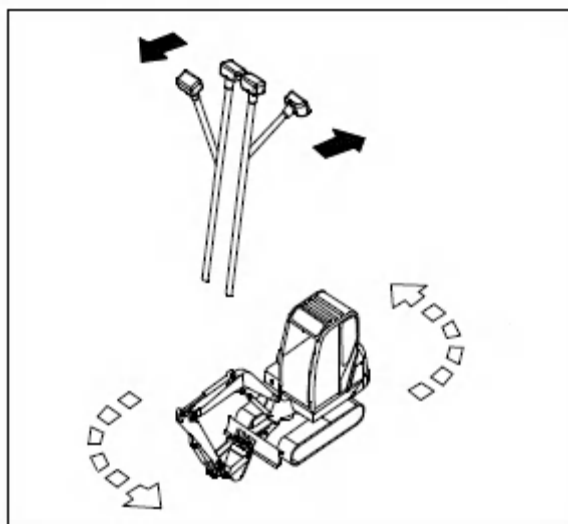
When turning to the right, operate the left travel joystick in the same way.



Steering in place

When making a left turn in place, pull the left travel joystick back and push the right travel joystick forward.

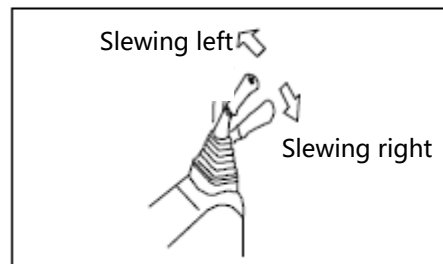
When making a right turn in place, pull the right travel joystick back and push the left travel joystick forward.



Slewing of the machine

- Before rotating the upper structure, check the surrounding area for safety.
- Confirm that the platform locking pin has been lifted and the platform has been unlocked from the chassis.
- If the left pilot valve lever is quickly operated, the machine platform will rotate quickly. If the left pilot valve lever is slowly operated, the machine platform will slowly rotate. Attend to the operating speed of the pilot valve lever.

- 1) Before operating for slewing, lift the platform locking pin to unlock the platform from the chassis.
- 2) Disconnect the swing switch and the machine is in a platform-slewing state.
- 3) Operate the left pilot valve lever for slewing operation. When swinging left, the platform turns left; when swinging right, the platform turns right.



- 4) When no slewing operation is needed, the platform positioning pin should be inserted to lock the platform rotation.

Operation of the attachment

If the joystick of the attachment is quickly operated, the attachment will move quickly. If the joystick of the attachment is slowly operated, the attachment will move slowly.

The attachment is operated by the left and right control pilot valves. The left control pilot valve operates the bucket arm and slewing (if equipped with a steering yoke, the left control pilot valve can also control the steering yoke to swing). Joystick of the right attachment controls the boom and bucket.

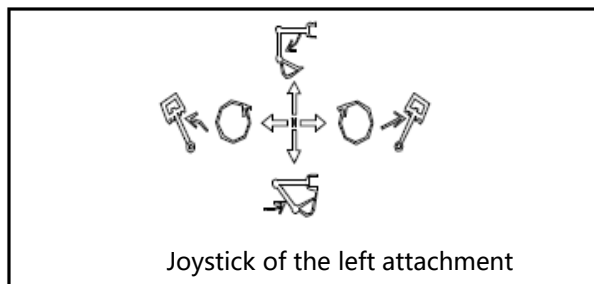
When the pilot valve lever or dozer joystick is released, they will automatically return to the center position and the attachment or dozer unit will stop operation.

If the pilot valve is operated within 15 seconds of shutting down the engine, the attachment can still be lowered to the ground.

In addition, the control pilot valve can be operated to release the remaining pressure in the hydraulic oil line and lower the boom after the machine is mounted on the trailer.

1. Bucket arm control

Push forward the left control pilot valve to extend the bucket arm; pull it back to retract the bucket arm.



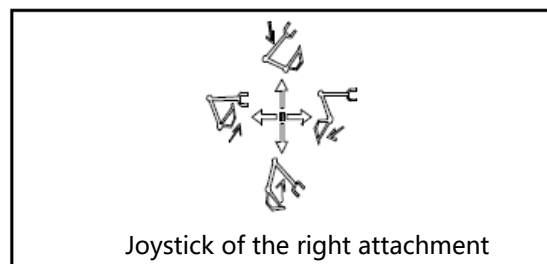
2. Slewing control

When the left control pilot valve swings left, the platform turns left; when it swings right, the platform turns right.

Before turning, it is necessary to ensure that the machine is in slewing state.

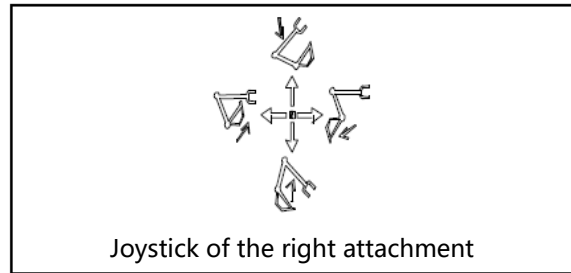
3. Boom control

Push the right control pilot valve forward to lower the boom; pull it back to lift the boom.



4. Bucket control

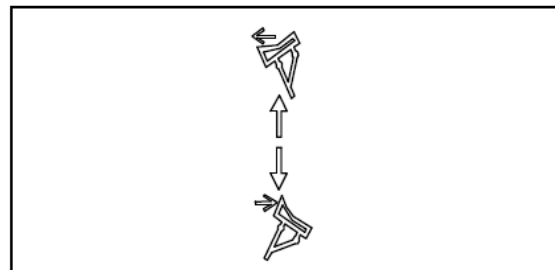
Swing the right control pilot valve right to turn the bucket out; swing it left to turn it back.



Joystick of the right attachment

5. Boom swing (steering yoke) control

When the left control pilot valve swings left, the steering yoke turns left; when it swings right, the steering yoke turns right. Make sure that the machine is in boom swing mode before the boom swings.



6. Dozer blade operation

Push the dozer joystick downward and the dozer blade cuts down. When being pulled up, the dozer blade is lifted.

Attention: There may be stagnation during the operation of the bucket arm, which is not a mechanical fault but a normal phenomenon of the excavator, as the weight of the bucket arm itself during movement may accelerate the movement of the arm and cause insufficient fuel supply.

Work on slopes or in water



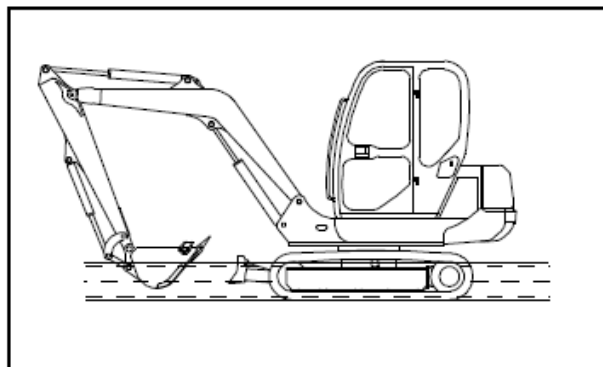
Warning: Construction near the foothills and slopes is very dangerous. Different operating conditions such as rainwater, muddy ground, snow covered ground, icy ground, loose sand, and soft ground can pose potential hazards to operational safety. Therefore, when constructing in dangerous areas such as foothills or ramps, it is necessary to make a correct judgment on whether safe operations can be carried out in order to make a decision.

- For traveling, lift the bucket approximately 20-30 cm above the ground.
- Don't travel backwards downhill.
- When walking on bumps or other obstacles, keep the attachment close to the ground and travel slowly.
- Do not turn on slopes or cross slopes. The direction can be changed in advance on a flat place.
- When working on a slope, turning the machine or operating the attachment can cause the machine to lose balance and tip over, so it is important to avoid such operations. When the bucket is loaded, slewing towards the downhill direction is very dangerous. If this operation is necessary, a platform should be piled up on the slope with soil so that the machine can maintain balance during operation.
- Do not climb or descend steep slopes as there is a risk of the machine tip-over.
- When traveling uphill, if the track shoes slip or the force of the track alone cannot climb the slope, do not help the machine climb the slope with the pull of the bucket arm, as there is a risk of the machine tip-over.
- When going uphill, it is necessary to ensure that the engine and hydraulic oil are properly preheated, otherwise it may cause accidents.

Allowed water depth

Do not drive the machine in water with a depth exceeding the centerline of the rail support plate.

Add grease to parts that will be immersed in water for a long time until the used grease is completely squeezed out.



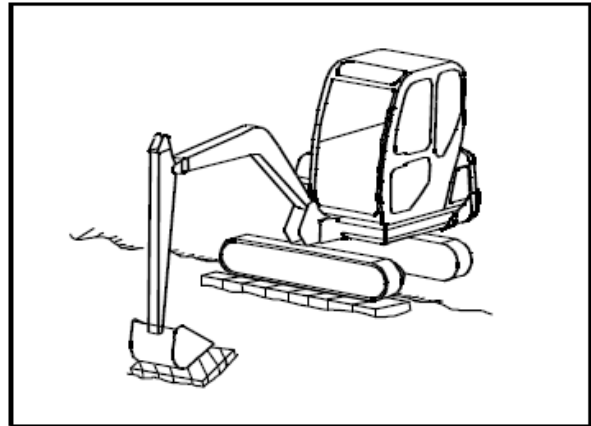
Keeping away from muddy environment

Always handle with caution to avoid getting stuck in the mud. If the machine gets stuck in mud, follow the steps below to drive the machine out.

A. The track on one side stuck

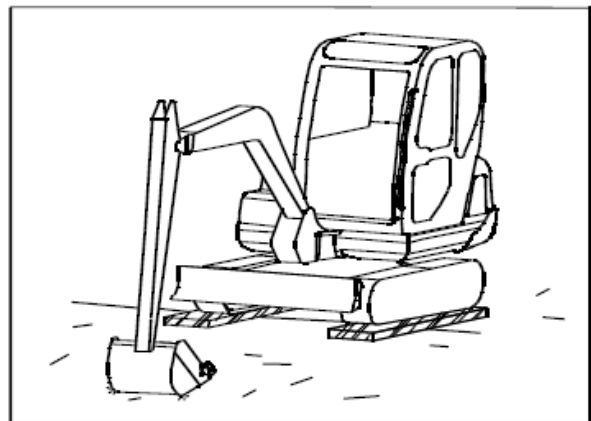
Attention: When lifting the machine with a boom or bucket arm, make sure that the bottom of the bucket is in contact with the ground. (Do not push with the bucket teeth.) The angle between the boom and the bucket arm should be 90-110 degrees.

When only one side of the track is stuck in the mud, lift the track with the bucket, and then place a wooden board or log under it to drive the machine out. If necessary, place wooden boards under the bucket as well.



B. Both the tracks stuck

If the tracks on both sides are stuck in mud, slipping, and cannot move. Pad wooden boards or logs in the above way. Dig the bucket into the ground ahead, operate the bucket arm in the same way as during excavation, and adjust the travel joystick to the forward position to pull out the machine.



Operation guide for construction

1. Backhoe operation

Backhoes are suitable for digging below the machine.

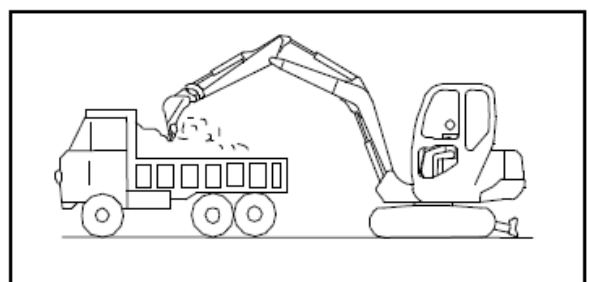
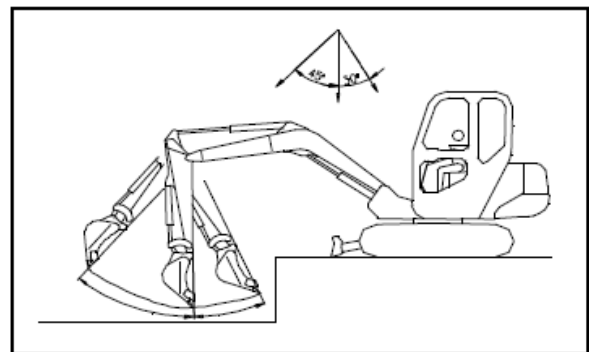
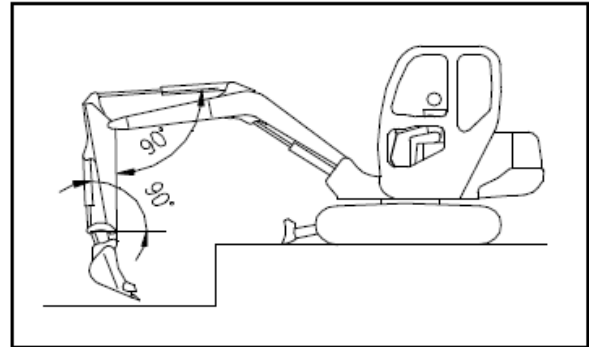
When the machine is in the state shown in the right figure, that is, when the bucket cylinder is at a 90° angle to the connecting rod and the bucket arm cylinder is at a 90° angle to the bucket arm, the maximum push-excavation force of the bucket can be obtained.

Effectively using this angle during excavation can optimize work efficiency.

The excavation range of the bucket arm is from a 45° angle away from the machine to a 30° angle towards the machine.

Depending on the depth of excavation, there may be some differences, but it is important to operate within the above range as much as possible, rather than operating the cylinder to the end of its stroke.

Note: For hard rock ground, it is recommended to crush the ground first with other method before the excavation, which not only minimize the damage to the machine, but also is economical.



2. Loading operation

In areas with small turning angles, park the dump truck in a location that is easily visible to the operator to improve work efficiency.

Loading from the rear of a dump truck is more convenient and has a larger loading capacity than loading from the side of the truck.

3. Trenching operation

Position the dozer blade at the rear and anchor it into the soil surface.

Extend the boom and bucket arm, and insert the bucket teeth into the soil surface.

During the excavation process, adjust the excavation and loading angles of the bucket in a timely manner using the bucket arm cylinder, or switch to using the bucket cylinder for excavation. When excavating, do not insert the bucket teeth too deep into the soil to avoid being unable to dig due to hydraulic system overload. If the soil cannot be excavated, the boom can be lifted appropriately for improvement. After the bucket is filled, lift the boom and bucket arm to raise the bucket above the ground, and rotate the platform to the appropriate position to unload the soil.

Note:

1) Do not touch the overhead electric wires.

2) Only after the situation of underground pipelines and cables have been learned can excavation begin to avoid damaging the pipelines and causing electric shock accidents.

3) When an electric shock accident occurs, the driver should not leave the seat and warn others not to approach. Drive the machine to a safe area and cut off the power before leaving.

4. Backfill or leveling

In order to fill the trench flat, the excavator should travel perpendicular to the trench. After cutting the dozer blade into the soil to a certain depth, release the dozer joystick, start the machine to move, and push the soil into the trench with the dozer blade.

5. Shake off the sediment and soil from the bucket

Place the bucket arm in an approximately horizontal position with the bucket in the unloading position. If sediment and soil cannot fall off, operate the bucket joystick several times to shake the sand and soil out of the bucket. Avoid using the method of shock vibration at the end of the bucket cylinder stroke to shake off sand and soil.

6. Precautions for using related components

A. Precautions for use of the track

1) Too much debris entering the track will increase the working strength of the track and cause damage.

2) Avoid sudden turns on roads with strong friction.

3) Try to avoid getting contaminated with salt water or salty gases, as salt can corrode the tracks.

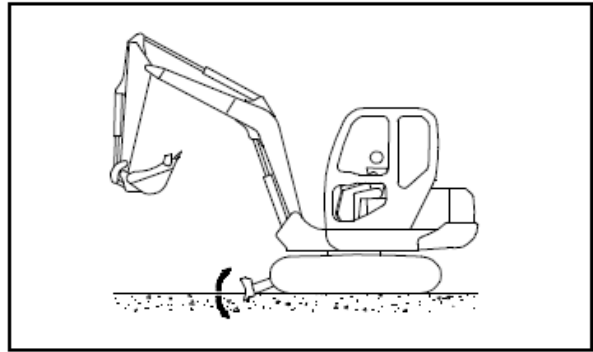
4) Tracks that will not be used for a considerable period of time should be stored in a cool and dry place.

5) When one track and the front device are jacked up, the other track should not be used for traveling, which can cause wear and tear.

6) The track during traveling should not be loose, otherwise it may fall off or be damaged.

B. Precautions for use of the dozer blade

- 1) The dozer blade can only be used to move soil instead of digging, otherwise the dozer blade or track system may be damaged. (see the right figure.)
- 2) The dozer blade cannot withstand large or unstable weights, otherwise the dozer blade or track system may be damaged.
- 3) The dozer blade should not hook any object during traveling of the machine, otherwise the dozer blade or track system may be damaged.
- 4) When using the dozer blade to lift the machine, it is necessary to ensure that the road surface is flat and the dozer blade touches the ground steadily.



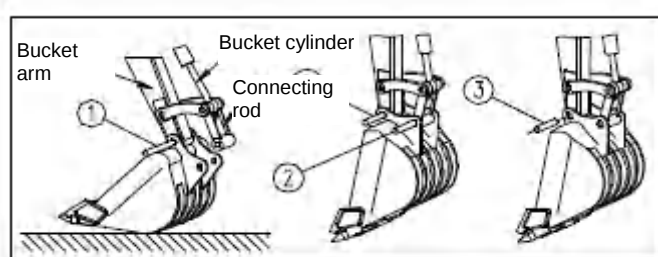
Disassembly and installation of the bucket

Safety rules

- When hitting the pin shaft with a hammer, metal shavings may fly into the eyes, causing serious injury. When performing this operation, always wear goggles, safety helmets, gloves, and other protective equipment.
- Removed bucket should be placed stably.
- Forcefully hit pin may fly out and harm personnel in the surrounding area. Therefore, before striking the pin shaft, ensure that the surrounding area is safe.
- When disassembling the pin shaft, be particularly careful not to stand under the bucket, and do not place any part of your feet or body under the bucket.
- When disassembling or installing the pin shaft, be careful not to injure your hands.
- When aligning the holes, do not put your fingers into the pin shaft.

Installation

Park the machine on a solid and level surface. In case of connection work, for safety reasons, it is important to understand the signals of each other and work carefully.



Place the excavator in working condition and operate the bucket arm by facing the bucket until the holes in the bucket arm and the bucket align. Insert a $\Phi 30$ mm steel rod ① into the hole.

Lift the boom and bucket arm so that the bucket is vertically suspended from the bucket arm.

Operate the bucket arm cylinder to align the holes of the connecting rod with the connecting holes of the bucket. Install shaft ②, remove steel rod ① and install shaft ③.

Disassembly

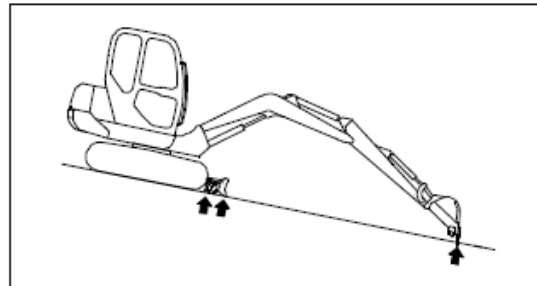
Park the machine on a solid and level surface. It is required to place the bucket in a position that is in direct contact with the ground. If the bucket falls heavily to the ground, it will increase resistance and make it difficult to remove the pin shaft.

Remove the double nuts from the locking bolt of each pin shaft on the bucket arm and connecting rod, remove the bolts, and then remove the bucket arm pin shaft ③ and connecting rod pin shaft ②, and remove the bucket.

Park the machine

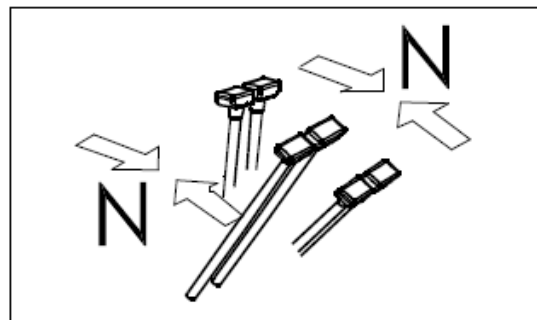
Safety rules

- 1) Avoid sudden stop. When parking the machine, leave as much space as possible.
- 2) Park the excavator on solid and level ground. Avoid park the machine on a slope. If it is necessary to park the machine on a slope, place a pad under the track and insert the attachment into the ground to prevent the machine from moving.
- 3) If the left and right pilot valve levers or the left and right travel joystick are accidentally touched, the attachment or machine will suddenly move, causing serious personal injury or accidents. So, before standing up from the seat, be sure to lift the left control box to keep the machine in a locked state.



Park the machine

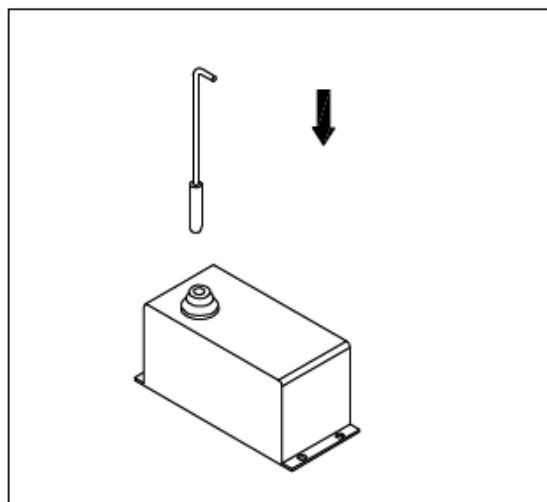
- 1) Place the left and right travel joysticks in the center position. Park the machine.
- 2) When the engine is operating under heavy load, do not stop it immediately. Run it at low speed for 1-2 minutes to remove overheat and then stop.
- 3) Drop the bucket and dozer blade to the ground.
- 4) Push the accelerator all the way forward and pull the shutdown lever all the way back (if installed).
- 5) Turn the start key to the "OFF" position (all indicator lights turn off).



6) After the engine shuts down, reset the shutdown lever.

7) Lock the platform.

8) Pull up the left control box with the pilot valve safety lever and place the machine in a locked state.



After operation

1. Check

Check the engine water temperature, hydraulic oil temperature, oil pressure, fuel level, etc. on the digital monitor of the machine.

2. Locking

The following positions should be locked.

- 1) Fuel tank filling port
- 2) Engine hood

Attention: When opening the engine hood, no one should stand at the rear of the hood. Bounce-up of the engine hood may cause injury.

Loading/unloading and transport of the machine

1. Safety rules for shipment of the machine

- 1) Run the engine at low speed and operate the machine slowly during loading/unloading.
- 2) Do not load/unload the machine during automatic warm-up operation.
- 3) If the automatic warm-up operation is cancelled during the loading/unloading operation, the speed will suddenly change.
- 4) When loading/unloading the machine, it is necessary to choose a solid and flat ground. Maintain a safe distance from the edge of the road.
- 5) To use a ramp with sufficient width, length, thickness, and strength, the width of the landing plate should be 1.2 to 1.5 times the width of the track. To avoid any accidents, it is recommended that the loading/unloading slope should be less than 15°, or the length of the slope should be greater than 3.5 times the height. When soil slope is used, it is necessary to completely compact the soil and take measures to prevent slope collapse.
- 6) To prevent the machine from slipping on the ramp, remove all soil and dirt from the tracks before starting. Ensure that the surface of the ramp is clean and free from water, snow, ice, grease, or oil.
- 7) Do not correct steering on a ramp, as there is a risk of the machine tipping over. If it is necessary to turn, drive out of the ramp to correct the direction, and then enter the ramp again.
- 8) Do not use the attachment for loading and unloading operations, which will cause danger.
- 9) When on a slope, do not operate any joystick other than the traveling joystick.
- 10) At the junction between the ramp and the transportation vehicle, the center of gravity of the machine will suddenly change, posing a risk of the machine losing its balance. Therefore, travel slowly when crossing this area.
- 11) When rotating the upper structure on a transport vehicle, the transport vehicle is unstable. Therefore, it is necessary to retract the attachment and slowly rotate it.
- 12) Whether getting on or off the vehicle, the wheels of the transportation vehicle should be wedged.
- 13) Keep the excavator in a fixed position with a wooden wedge on the transportation vehicle during transportation. Tie the excavator to the transport vehicle with a rope.
- 14) Before the work or operation is completed, the driver should first lift the left control box to cut off the source of the pilot control oil line and avoid misoperation of the machine due to errors or unintentional touch with the joystick.
- 15) Before going up and down the ramp, be sure to put down the positioning lever of the slewing platform to prevent it from slewing.

2. Truck loading

1) Truck loading can only be allowed on solid and flat ground, and a certain safe distance should be maintained from the edge of the road.

2) Appropriately apply brakes to the transport vehicle, and put a pad under the tire to ensure that the transport vehicle does not move.

3) Install a ramp between the transportation vehicle and the machine, ensuring that both sides of the ramp are on the same level. The maximum slope of the ramp shall not exceed 15 degrees. Adjust the space between the ramps to match the center of the track.

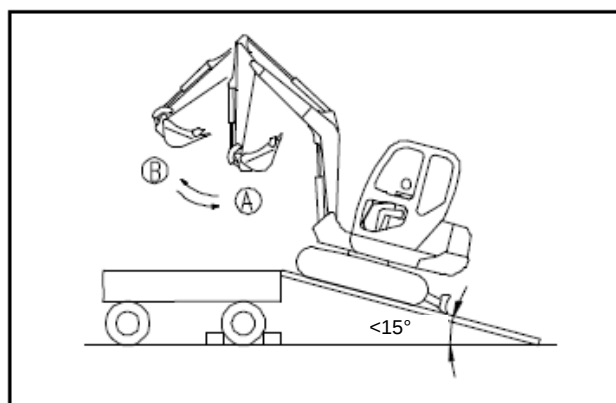
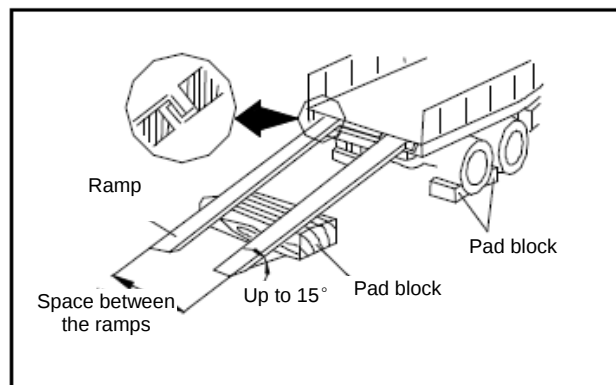
4) Lock the slewing platform

5) Align the excavator with the ramp and place the dozer blade at the rear. For safety reasons, the excavator should approach and slowly climb up the ramp until the end of the slope.

Attention: When on a ramp, only the travel joystick can be operated. Do not operate any other joystick or pedal.

6) Stop driving and extend the bucket arm (position B in the figure), so that the front of the excavator track tilts down onto the bottom plate of the transport vehicle. Make sure the attachment does not touch the transport vehicle body when the machine tilts down. Continue driving the machine to the designated position on the transport vehicle.

7) Lower the bucket arm and place the bucket on the floor. Lower the dozer blade and park the machine in the designated position on the transport vehicle.

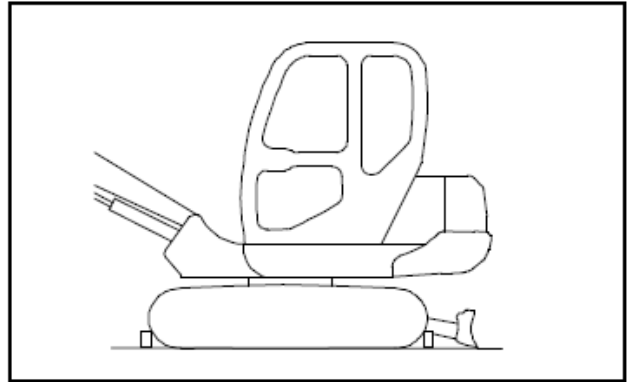


Before the work or operation is completed, the driver should first pull up the safety lock/lever to lift the left control box to cut off the source of the pilot control oil line and avoid misoperation of the machine due to errors or unintentional touch with the joystick.

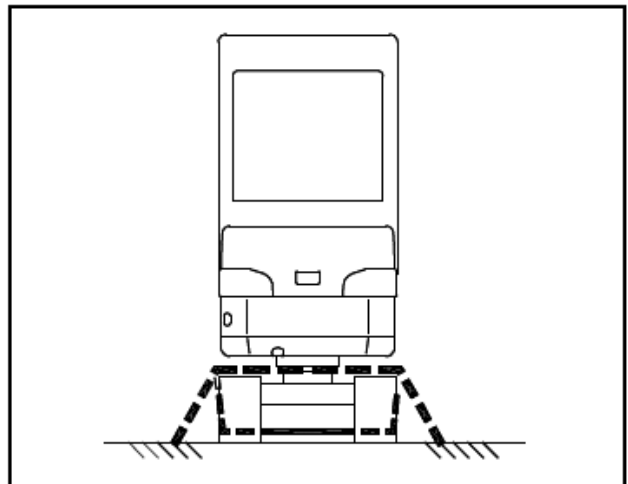
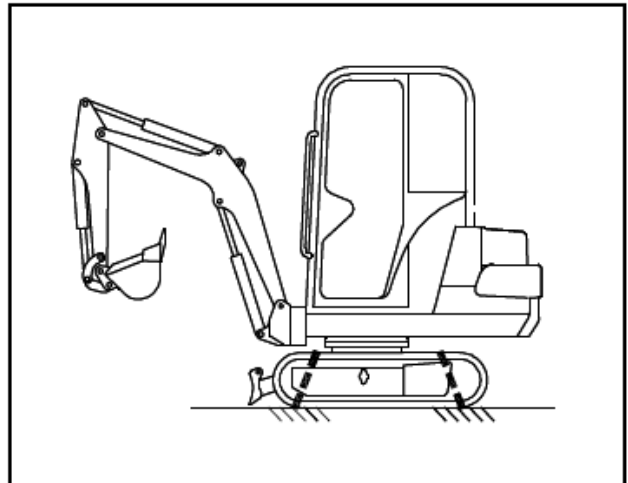
Attention: Please choose a transport vehicle that matches the weight and dimensions provided in this manual.

3. Securing the machine on the transport vehicle

- 1) Well arrange the attachment.
- 2) Turn off the engine and remove the key from the start switch.
- 3) Lock the platform.
- 4) Lock the cab and engine hood.



- 5) Place blocks under both ends of the track to prevent the machine from moving during transportation, and secure the machine with wire ropes. Make sure to secure the machine firmly so that it will not slide to one side.



4. Unloading from the transport vehicle

- 1) Truck loading/unloading can only be allowed on solid and flat ground, and a certain safe distance should be maintained from the edge of the road.
- 2) Apply the brake of the transport vehicle, and put a pad under the tire to ensure that the transport vehicle does not move.
- 3) Install a ramp between the transportation vehicle and the machine, ensuring that both sides of the ramp are on the same level. The maximum slope of the ramp shall not exceed 15 degrees. Adjust the space between the ramps to match the center of the track.
- 4) Remove the wire rope securing the machine.
- 5) Start the engine. In winter, thoroughly warm up the engine.
- 6) Lower the left control box.
- 7) Lift the bucket arm and bucket, and raise the dozer blade.
- 8) Check that there are no obstacles within the range of excavator activity.
- 9) Pull out the locking pin of the platform to rotate it 180 degrees, with the excavation device facing the slope and the excavator in the forward direction.
- 10) Drive the excavator slowly forward until it reaches the top of the landing plate, extend the bucket arm outward, cause the excavator track to tilt down onto the slope, and then slowly advance until it reaches the ground.

5. Lifting the machine

A. Safety Precautions

- 1) Do not lift the machine when there are people on it.
- 2) Ensure that the steel wire rope used for lifting the machine has sufficient strength to withstand the weight of the machine.
- 3) Do not lift the machine in any position other than the one provided in the following procedure, as there is a risk of the machine losing its balance.
- 4) Do not lift the machine with the upper structure turning to the side. Before lifting, rotate the platform so that the attachment is in the same direction as the dozer blade and the lower track is parallel to the upper structure.
- 5) When lifting, keep the machine level.
- 6) It is very dangerous to walk under the machine when lifting it. Do not walk under the lifted machine.

B. Lifting procedures - machines with standard technical specifications

Attention: The lifting procedures are applicable to standard technical specifications. The lifting tool should be a specialized one with a lifting capacity that meets the weight of the machine.

Machines equipped with lifting holes should be lifted according to the following steps. (see the left figure.)

1) Rotate the platform so that the attachment is in the same direction as the dozer blade. Start the engine and adjust the attachment to the position shown in the right figure, with the boom fully raised and the bucket arm and bucket fully retracted.

2) Shut down the engine, lift the left control box, and place the machine in a locked state.

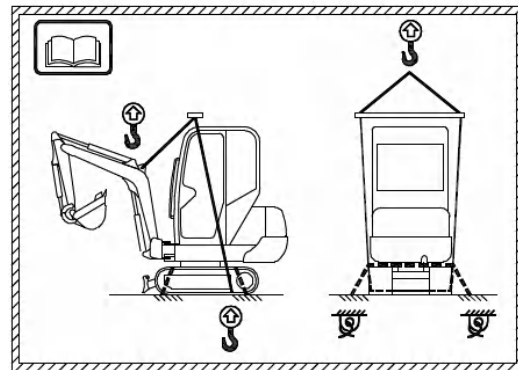
3) Check if the area around the machine is safe and then get off the machine. Close the cab doors and windows, and engine hood.

4) Attach the hook firmly onto the lifting hole on the boom (marked with a lifting hook), and then use a steel wire rope to pass between the driving wheel and the first track roller.

5) Select the lifting position of the steel wire rope so that it is directly at the center of gravity of the machine (the center of gravity of this model is located above the center of rotation), as shown in the right figure.

6) When lifting, check if the hydraulic oil leakage at the top of the boom cylinder will cause a change in posture.

7) When the machine leaves the ground, stop the lifting operation and check if the machine is balanced. When the machine is stabilized, continue the lifting operation.



Operation in cold/hot weather

1. Operation in cold weather

Cold weather can cause special problems, so special attention should be paid to protection to prevent serious damage to the machine. Maintenance in cold weather will extend the service life of the machine.

- 1) Electrical system: Keep the battery clean and fully charged. Check the battery cables and connectors, clean the connectors, and apply a layer of grease to prevent corrosion.
- 2) Lubricant: Apply each joint with lubricating oil of the appropriate viscosity. Please use the recommended oils.
- 3) Fuel system: Is the fuel supply suitable for the cold weather at that time. Change to low viscosity fuel.

Check the water in the fuel system. Cold weather can concentrate water in the fuel tank. Check the water in the fuel filter every 50 hours of operation. If there is no water present, the inspection cycle can be extended. Check the fuel tank for any water present.

- 4) Cooling system: Before operating the machine in cold weather, check the coolant to adjust the appropriate mixing ratio. Use antifreeze suitable for the ambient temperature conditions.
- 5) Working device: Before operating the machine, shift to low gear and slowly start the machine, then stop the machine and operate the attachment for about 10 minutes, or until all hydraulic cylinders are considered to be working properly before starting the operation.

2. Operation in hot weather

In order to prevent damage to the machine, please do as follows:

- 1) Ensure that the amount of coolant in the radiator is normal.
- 2) Check the radiator before the start of the hot season and replace the coolant if necessary.
- 3) Remove all dirt and scale from the radiator and engine surfaces.
- 4) Check the fan rotation belt.
- 5) Use lubricating oil of appropriate viscosity.
- 6) Use a suitable proportion of coolant in the cooling system.
- 7) It is necessary to regularly check the air filter for working in extremely poor conditions such as high dust.

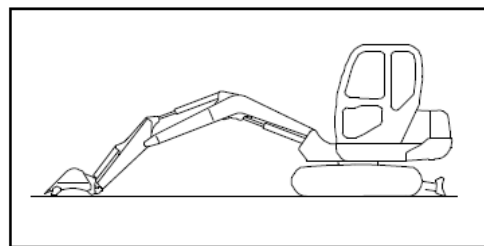
Storage of the machine

1. Preparation for the storage

To store the machine for a long time, do as follows:

- 1) Clean and flush all components before placing the machine indoors. If the machine has to be stored outdoors, choose a flat ground and cover it with canvas.
- 2) Apply a thin layer of lubricating grease to the metal surface of the piston rod. Lubricate all the lubricating points.
- 3) Remove the battery, charge it, and store it in a dry and non-freezing place.
- 4) Drain the engine oil when it is still hot and fill with corrosion-resistant oil. The corrosion-resistant oil used for piston engines is MIL-L-21260 type. For storage in winter, Grade 1 or 2 SAE10W should be used; for storage in summer, Grade SAE30 should be used.
- 5) Add 4-6% of the same type of corrosion-resistant oil to the fuel and mix the two well. To prevent condensation, the fuel tank needs to be refilled with this mixed fuel.
- 6) Check the antifreeze performance of the coolant and add antifreeze to ensure its antifreeze strength is at least -20 °C. Coolant not containing anti-corrosion agents due to climate reasons should be added with the agents (such as 5% anti-corrosion agent according to MIL-G4339C).
- 7) Start the engine and let it run for more than 15 minutes, with different speeds but without load. When draining the lubricating oil of hydraulic components and reducers, it should also be allowed to run and drain, and then replaced with new oil for storage.
- 8) Close the inlet of the air filter and the outlet of the exhaust pipe. For this, it is recommended to use thick plastic paper and adhesive tape.
- 9) Lock the platform and lift the left control box to ensure that all joysticks and pedals are in a locked state.
- 10) Place the shut-off valve for installing accessories on the machine in the locked position. Install a screw plug on the elbow.
- 11) Keep the machine clean and store it in a dry place.

Attention: When storing the machine, adjust it to the position shown in the right figure to protect the cylinder piston rod and prevent rust on the piston rod.



2. During the storage

- 1) During storage, the machine should be operated once a month to apply a new oil film to the surface of the moving parts. At the same time, charge the battery.
- 2) The air conditioner (if any) on the machine should also be run.
- 3) Run the track



Warning: If rust prevention operations for machine stored indoors are necessary, open the doors and windows to improve the air circulation to prevent gas poisoning.

3. Recovery from storage

Before using a machine that has been stored for a long time, the following steps should be followed.

- 1) Wipe off the lubricating grease applied to the surface of the cylinder piston rod.
- 2) Fill all parts with oil and grease.
- 3) When the machine is stored for a long time, water in the atmosphere will enter the oil. Before or after starting the engine, check the oil in all parts. If there is water in the oil, replace all the oil.

Attention: 1) Under normal climatic conditions, the storage method mentioned earlier can allow the excavator to be stored for one year. However, after 6 months of storage, each component should be run for 15 minutes without loading. At the same time, lubricating oil should also be added to each component.

2) Before putting the excavator that have been stored for a long time back into use, necessary work and inspections must be carried out. After the excavator has been stored for one year, the oil in the reducer and hydraulic line also needs to be replaced.

Troubleshooting

Fault	Causes	Solutions
1. The engine cannot or is difficult to start	• Faulty starter motor	• Replace or repair the starter motor
	• Insufficiently charged battery	• Charge or replace a new battery
	• Improper use of preheating lines or plugs	• Repair or replace the preheating plug
	• Abnormal injection timing	• Check the injection timing
	• Oil pipeline blockage	• Clean the oil line
	• The fuel filter is blocked	• Clean or replace the fuel filter
	• Water, dust, or air in the fuel system	• Purge the air and clean the oil line
	• Dirty fuel injector or low fuel injection pressure	• Have it repaired by the local repair point
	• Malfunction of the fuel injection pump	• Consult with dealers of the manufacturer
	• Insufficient fuel	• Refill the oil
2. Engine knocking, irregular operation, or shutdown	• Blocked intake and exhaust system	• Smoothen the intake and exhaust system
	• Massive gas release	• Consult with dealers of the manufacturer
	• The fuel filter is blocked	• Clean the oil filter
	• Dirt or air in the fuel system	• Purge the air and clean the oil line
	• Oil filter clogged, dirty or faulty nozzle	• Have it repaired by the local repair point
	• High pressure oil pipe damage	Replace the high pressure oil pipe
	• Insufficient fuel	• Refill the oil
	• Governor connection cannot be adjusted	• Consult with dealers of the manufacturer
	• Failure of fuel spray pump	• Consult with dealers of the manufacturer
	• Incorrect fuel injection timing or stuck fuel injection nozzle	• Check the injection timing and oil nozzle
3. Engine power drop	• Air in the fuel	• Exhaust the air
	• Oil supply is not smooth	• Check and clean
	• Change of injection timing	• Adjust according to the specified value
	• Poor operation of fuel injector	• Check the working pressure and spray atomization
	• Air filter blocked	• Clean the filter.
	• Incorrect clearance between intake and exhaust valves or unsealed valves	• Adjust the valve clearance
	• Damaged or leaking cylinder gasket	• Replace the cylinder gasket
	• Poor operation of fuel injection pump	• Consult with dealers of the manufacturer
	• Overheated engine	• Check if the coolant used is correct. If there is any looseness in the water pump and belt, it should be repaired or replaced, and the blockage in the water channel should be removed

Fault	Causes	Solutions
4. Engine overheated	• Low coolant level	• Add coolant
	• Faulty temperature sensor	• Replace the sensor
	• Air filter blocked	• Clean the air filter
	• Loose or faulty fan belt	• Retighten or replace
	• Dirt in the cooling system line	• Clean the coolant line
	• Poor or excessive oil quality	• Replace the oil
5. Low oil pressure	• Low oil level	• Refill the oil
	• Oil filter blocked	• Clean oil filter
	• Oil pipeline leakage	• Retighten or replace
	• High engine cooling water temperature	• Correct mixing ratio for coolant preparation or consult with local dealers of the manufacturer
6. The engine emitting gray black smoke	• Poor fuel quality	• Use the correct fuel
	• Air filter blocked	• Replace the filter element
	• Abnormal injection timing	• Adjust according to the specified value
	• Poor nozzle atomization	• Check and replace the parts
7. The engine emitting white smoke	• Poor fuel quality	• Use the correct fuel
	• Excessive engine oil	• Restore to the recommended oil level
	• Abnormal injection timing	• Adjust according to the specified value
	• There is water in the cylinder and fuel	• Check and replace the fuel
8. Failure of battery charging	• Loose or rusty connection	• Clean or retighten
	• Generator belt loose and faulty	• Retighten or replace
	• Generator charging failure	• Consult with dealers of the manufacturer
	• Electrolyte failure of the battery	• Replace the battery
	• Electrolyte failure of the battery	• Replace the battery
9. The starter does not work or rotates slowly	• Loose or rusty connection	• Clean or retighten
	• Insufficiently charged battery	• Replace
	• Damaged circuit	• Consult with dealers of the manufacturer
10. Engine running and generator alarm light on	• Generator failure	• Consult with dealers of the manufacturer
	• Electronic regulator malfunction	• Replace
	• Circuit failure	• Maintenance
11. Hydraulic system components move too slowly	• Cold hydraulic oil	• Control action heating up
	• Low pilot system pressure	• Consult with dealers of the manufacturer
	• Incorrect hydraulic oil used	• Use the correct hydraulic oil
	• Slow engine RPM	• Consult with dealers of the manufacturer

Fault	Causes	Solutions
12. High hydraulic oil temperature	• Incorrect hydraulic oil used	• Use the correct hydraulic oil
	• Oil path blocked	• Consult with dealers of the manufacturer
	• Hydraulic oil filter blocked	• Clean or replace
	• Worn oil pump	• Consult with dealers of the manufacturer
	• Oil cooler blocked	• Clean oil cooler
	• Oil cooler failed	• Consult with dealers of the manufacturer
	• The pressure of the main safety valve or the relief valve of the slewing system is too high	• Consult with dealers of the manufacturer
	• Dirty oil	• Replace the oil
	• Faulty sensor	• Replace
13. Hydraulic oil emulsified or with foam	• Air leakage in the pipeline between the oil tank and the oil pump	• Maintenance and retighten
	• Incorrect hydraulic oil used	• Use the correct hydraulic oil
	• Water in hydraulic oil	• Replace the oil
	• Low oil level	• Correct the oil level
14. Oil pressure too low or no pressure	• Hydraulic pump damaged	• Consult with dealers of the manufacturer
	• Insufficient oil in the system	• Refill the oil
	• Safety valve failure	• Consult with dealers of the manufacturer
15. No part can work	• Hydraulic pump damaged	• Consult with dealers of the manufacturer
A. Noise of the oil pump	• Lack of hydraulic oil	• Refill the oil
	• Oil suction pipe leaking	• Repair or replace
B. Oil pump noise unchanged	• Auxiliary pump damaged	• Replace
	• Hydraulic safety control device not functioning	• Check and repair
16. Each oil cylinder or motor works insufficiently or fails to work	• Hydraulic pump damaged	• Consult with dealers of the manufacturer
	• Low pressure of the main safety valve	• Re-adjust the pressure
	• Low oil pressure and level	• Refill the oil
	• Oil suction filter blocked	• Clean the oil filter
	• Oil seal damaged	• Repair or replace
	• Piston rod damaged, leading to oil leak	• Repair or replace
	• Pilot valve out of work	• Replace
	• Pilot valve broken or oil leaking	• Repair or replace
17. The two traveling devices do not work	• Oil leakage of the central swivel joint	• Consult with dealers of the manufacturer
18. One traveling device does not work	• Traveling device damaged	• Consult with dealers of the manufacturer
	• Control mechanism damaged	• Maintenance

Fault	Causes	Solutions
19. Abnormal traveling	• The track is too tight or loose	• Re-adjust
	• Reduced oil pump performance	• Consult with dealers of the manufacturer
	• Crawler frame distorted	• Repair or replace
	• Crushed stones or rocks in the track chain	• Take the stone out and repair
	• Oil leakage of the control valve	• Consult with dealers of the manufacturer
	• Reduced motor performance	• Consult with dealers of the manufacturer
20. Abnormal slewing	• Reduced oil pump performance	• Consult with dealers of the manufacturer
	• Slewing motor damaged	• Consult with dealers of the manufacturer
	• Pilot valve out of work	• Consult with dealers of the manufacturer
21. Discontinuous slewing	• Worn slewing gear	• Consult with dealers of the manufacturer
	• Slewing bearing or ball bearing damaged	• Consult with dealers of the manufacturer
	• Lack of grease	• Consult with dealers of the manufacturer
	• Oil leakage of the control valve	• Consult with dealers of the manufacturer
22. Air conditioning system noise	• Loose electrical connectors causing abnormal clutch noise	• Insert the connector securely or repair as necessary
	• Loose belt	• Tighten appropriately, replace if damaged
	• Loose blower blades	• Reassemble securely
	• The blower does not work normally	• Repair or replace
	• The fan does not work normally	• Repair or replace
	• Damaged compressor bearing	• Replace
	• Damaged tensioner bearing	• Replace
23. Air conditioner cooling does not work	• Electrical circuit failure	• Repair or replace
	• Air conditioning switch failure	• Repair or replace
	• No refrigerant	• Check for leakage, repair, and refill refrigerant
	• System blockage	• Clean or replace
	• Belt loose or broken	• Adjust or replace
	• Expansion valve failure	• Clean or replace
	• The compressor operates abnormally	• Repair or replace
	• Pressure switch failure	• Replace
24. Unsteady cooled air	• Poor circuit contact	• Maintenance
	• Loose belt	• Adjust the belt tension
	• Improper adjustment of air conditioning switch cooling degree	• Re-adjust
	• Too much water in the system and internally blocked with ice	• Replace the drying bottle
	• The electronic fan or its relay is damaged	• Repair or replace

5

Maintenance

Common sense for maintenance

New machine running-in

The initial 100 hours of the machine are the running-in period. During this period, it is important to use the machine with caution and not use it for tasks with excessive load or work intensity. During the first 50 hours of the running-in period, only 80% of the working load is allowed. The quality of the running-in period affects the service life of the machine.

After the first 50 hours of work, the first inspection and maintenance of the machine should be carried out according to the inspection and maintenance checklist. At the same time, check the contamination level of hydraulic oil, and the value should not exceed grade NAS9. Otherwise, replace the hydraulic oil.

When the hydraulic system is not working, the engine should not be run at high speed. Only when the hydraulic oil temperature exceeds 20 degrees Celsius can the attachment be operated.

Construction on a dusty site

Operation on dusty site shall be done with the following procedure finished:

- Clean the radiator core frequently to avoid blockage.
- Frequently clean and replace the fuel filter element.
- Clean the electrical components, especially starting motors and alternators, to avoid dust accumulation.
- During checking or replacing the oil, move the machine to a dust-free place to prevent dust from entering the oil.

Oil and filter element

Please use clean oil and grease, and prevent impurities from entering the container of the oil.

After replacing the oil or the filter, check the waste oil and filter element for metal chips or impurities. If a large amount of metal chips or impurities are found, report it to the person in charge of the machine and take appropriate measures.

Do not mix different grades of oil together. If different oil brand need to be added, the old oil should be drained and replaced with the new brand oil.

Timer reading

Check the timer on the dashboard every day to check if it is time for maintenance according to the number of working hours.

Use original accessories

The use of original Yuchai accessories is an important factor in ensuring the normal operation of the machine and prolonging the service life of the machine.

Waste disposal

For environmental protection, special attention should be paid to the disposal methods of waste:

- Put the oil discharged from the machine into a container. Do not discharge the oil directly onto the ground, or pour it into sewers, drains, rivers, oceans or lakes.
- When handling harmful substances such as oil, fuel, coolant, antifreeze, plastic accessories, solvents, filter cartridges, batteries, and other harmful substances, relevant environmental regulations should be followed.

Prevent articles from falling into the machine

- When opening the tank filling port for inspection, be careful not to drop bolts, nuts, gaskets, or tools into the interior of the machine. Otherwise, this will cause damage and malfunction of the machine, and may lead to accidents. If foreign material falls into the machine, take it out immediately.
- Before and after the inspection, check the tools and parts you carried to make sure that nothing has fallen into the machine.

Regular inspection and maintenance

Regular inspection and maintenance shall be carried out in accordance with the items listed in the "Regular Inspection and Maintenance Table", which is an important prerequisite for ensuring the normal operation of the machine and prolonging its service life. Be sure to observe the inspection and maintenance cycle.

Recheck after inspection and maintenance

If there is no recheck after each inspection and maintenance, there is a possibility of unexpected failure, leading to serious injury or damage. Make sure to check as follows:

- Are there any missing parts that should be inspected and maintained.
- Have all inspection and maintenance items been carried out correctly.
- Check if any tools or parts have fallen into the machine. It is very dangerous for parts to fall into the machine and get stuck in the linkage mechanism.
- Check around the machine to see if there is any water or oil leakage, and whether all the bolts have been tightened.

Maintenance outline

Lubricating oil

- Oil that meets the grade and temperature given in the "Oil Selection Table" of this manual should be used. Within the specified time, even though the oil is not dirty, it must be replaced.
- Pay attention to preventing impurities (water, metal particles, dust, etc.) from entering the lubricating oil. Most problems with the machine are caused by impurities entered.
- Do not mix lubricants of different grades or brands together.
- Refill according to the prescribed amount of the oil. Too much or too little oil can cause malfunctions.
- When changing the oil, it is necessary to replace the relevant filter element, especially when replacing the oil filter element. Before installation, the new filter element must be filled with oil with cleanliness as regulated.

Fuel

- When storing or adding fuel, special care should be taken not to allow impurities to enter.
- Be sure to use the fuel specified in the "Oil Selection Table" of this manual. Fuel should be selected based on the ambient temperature, otherwise it can easily solidify at low temperatures (especially when it is below -15 °C (5 °F)). Therefore, it is necessary to replace fuel that matches the ambient temperature.
- To prevent moisture in the air from condensing and forming water in the fuel tank, the fuel tank should be filled up after daily work.
- Before starting the engine, or after adding fuel for 10 minutes, drain the sediment and water from the fuel tank.
- If the engine has run out of fuel or if the filter element has been replaced, the air in the oil circuit must be exhausted.

Grease

- Lubricating grease is used to prevent twisting and noise at the connection.
- If any component appears inflexible or produces noise after prolonged use, lubricating grease should be added.
- Wipe off the old grease that is squeezed out during the lubrication process.
- Any old grease visible should be wiped off as sand or dust sticking to the grease can cause wear on rotating parts.

Coolant

- Antifreeze shall be used in any weather.
- Check the coolant level as regulated and refill as necessary. Coolant insufficiency will cause engine overheat.
- According to the ambient temperature, mix the coolant and antifreeze in an appropriate ratio.
- Do not add coolant when the engine is overheated and not yet cooled.

Filter element

- Regularly replace all filter elements. However, when working in harsh conditions, the filter element should be replaced in a shorter period based on the lubricating oil and fuel (sulfur content) used.
- Do not reuse the filter element after cleaning it (filter element type). Replace with a new one.
- When replacing the filter element, check if there are metal particles adhering to the old filter element. If metal particles are found, please contact your Yuchai dealer.
- Do not open the packaging of the spare filter element before use.

Hydraulic system

- During and after work, the hydraulic system is at high temperatures. In operation, it is still in high pressure state. Therefore, when inspecting and maintaining the hydraulic system, make sure that the temperature has dropped and the pressure has released in the hydraulic cylinder pipeline.
- When loosening plugs, screws, or hose connections, do not stand in front of the parts. Before disassembly, gradually loosen to release the internal pressure.
- When inspecting or maintaining the hydraulic oil line, it is necessary to exhaust the air to release the internal pressure.
- The inspection or maintenance of the hydraulic system includes checking the hydraulic oil level, replacing the filter element, and refilling hydraulic oil.
- When disassembling the high-pressure hose, check for damage to the O-ring. Replace if damaged.
- When disassembling parts in areas sealed with O-rings or gaskets, clean the mounting surface and replace with new parts.
- When installing hoses, it is not allowed to twist the hoses or bend them into small diameter rings, which will damage the hose and obviously shorten the service life of the hose.

Electrical system

- It is very dangerous for electrical equipment to become damp or the insulation layer of wires to be damaged, which will cause electrical leakage and cause machine malfunction. Do not flush the inside of the cab with water. When flushing the machine, make sure not to allow water to enter electrical components.
- Maintenance of the electrical system: check and maintain the battery fluid level; replace the light bulbs; replace fuses and relays, etc.
- Do not install any electronic components other than those specified by Yuchai.
- When working on the beach, it is important to carefully clean the electrical system to prevent corrosion.
- Any cab air cooler or other electrical equipment to be installed should be connected to a dedicated power connector. The selected power source should not be connected to fuses, start switches, or battery relays.

Wearing parts

Parts that are prone to wear such as sealing rings, filter elements, bucket teeth, and blade plates should be replaced during regular inspection and maintenance or when the wear limit is reached, so that the machine performance will not be affected.

Genuine parts from Yuchai can be ordered from the dealer based on the part numbers (P/N) in the table or in the part catalog.

Item	P/N	Name of the part	Qty.	Model
	818V-0501200	Hydraulic oil return filter element	1	TL253H
	801-0521500	Oil suction filter	1	WU-63X100-J
		O-ring	2	15×2.65GB/T3452.1
		O-ring	2	18×3.55GB/T3452.1
		O-ring	1	22.4×2.65GB/T3452.1
		O-ring	4	6.5×1.5ISO
		O-ring	4	8x 1.5ISO
		O-ring	2	11x2ISO
		O-ring	3	10×1.9GB/T3452.1
		O-ring	3	14×1.9GB/T3452.1
		O-ring	3	11.8×2.4GB/T1235
		O-ring	1	13.8×2.4GB/T1235
		Combined sealing washer	3	18BS/A 18.7×27×2ISO
		Combined sealing washer	2	22BS/A 22.7×30×2ISO
		Straight-through pressure filling cup	5	M10x1JB/T7940.1
		Spare fuse	1	

Mandatory replacement parts

With the accumulation of machine working time, some parts that play an important role in safety, mainly some oil hoses, will age, wear or deteriorate in material, affecting their normal function and also becoming potential safety hazards. Such phenomena are not easy to determine. So these parts must be forcibly replaced after the specified usage period.

If these parts exhibit abnormalities before the specified time limit, they must be repaired or even replaced immediately. When replacing the hose, also replace the corresponding seal.

Oil Selection Table

Select suitable oils based on factors such as environmental temperature and operating conditions. Oil that meets the following specifications must be used.

	Lubricating oil or fuel	Operating temperature	Viscosity	Recommended substitute oil
Engine lubricating oil	CH4 15W/40 CH4 5W-30	-15 °C ~+40 °C -25 °C~+30 °C		
Hydraulic oil	Low temperature areas: HS46+; General area: HMP46+	Above -35 °C Above -25 °C	@ 40 °C 46±4.5 (m ² /s)	Hydraulic oil that meets the requirements of Yuchai Enterprise Standard "Technical Specification for Hydraulic Oil of Construction Machinery"
Traveling reducer lubricating oil	Heavy-duty vehicle gear oil (GL-5)	For use both in summer and winter		SAE80W/90
Rotary reducer lubricating oil	Heavy-duty vehicle gear oil (GL-5)	For use both in summer and winter		
Guide roller and support roller lubricating oil	Axle oil Hz-23 lubrication	Various temperature	@ 50 °C 20~25 (m ² /s)	
Grease	Molybdenum Disulfide Lithium Grease (No. 3)	-20 °C~160 °C		
Fuel	In summer: 0# light diesel In winter: -10 # light diesel -20 # light diesel -35 # light diesel	>0 °C 0 °C~-5 °C -5 °C~-15 °C -15 °C~-28 °C		
Coolant (antifreeze) (ethylene glycol engine)	JT 225-1996 -25# -35# -45#	>-15 °C >-25 °C >-35 °C		

● Oil capacity data

Type	Unit	Value
Fuel tank	Litre	23
Engine oil	Litre	3.4
Hydraulic oil tank	Litre	20

Tightening torque

The tightening torque of each bolt and nut on the machine shall refer to the values in the table below. If the bolts or nuts are not tightened to the specified torque, the fastened or connected parts will become loose or even damaged, causing machine failure or affecting operation.

Tightening torque of general parts

Bolt strength grade	Yield strength N/mm ²	Nominal bolt diameter mm							
		6	8	10	12	14	16	18	20
		Tightening torque N.m							
8.8	640	9~12	22~30	45~59	78~104	124~165	193~257	264~354	376~502
10.9	900	13~16	30~36	65~78	110~130	180~210	280~330	380~450	540~650
12.9	1080	16~21	38~51	75~100	131~175	209~278	326~434	448~597	635~847

Bolt strength grade	Yield strength N/mm ²	Nominal bolt diameter mm						
		22	24	27	30	33	36	39
		Tightening torque N. m						
8.8	640	512~683	651~868	952~1269	1293~1723	1759~2345	2259~3012	2923~3898
10.9	900	740~880	940~1120	1400~1650	1700~2000	2473~3298	2800~3350	4111~5481
12.9	1080	864~1152	1098~1461	1606~2142	2181~2908	2968~3958	3812~5082	4933~6577

Tightening torque of hydraulic hose

Metric threaded rotary nut			
Metric thread	Outer diameter of steel pipe	N.m	
		Nominal moment	min./max
M12X1.5	6	20	15~25
M14X1.5	8	38	30~45
M16X1.5	8 10	45	38~52
M18X1.5	10 12	51	43~85
M20X1.5	12	58	50~65
M22X1.5	14 15	74	60~88
M24X1.5	16	74	60~88
M26X1.5	18	105	85~25
M30x2	20 22	135	115~155
M36x2	25 28	166	140~192
M42x2	30	240	210~270
M45x2	35	290	255~325
M52x2	38 42	330	280~380

Tightening torque of hydraulic hose

BSP thread and swivel nut		
BSPP thread	Metric torque	N.m
		min./ max
G1/4	20	15~25
G3/8	34	27~41
G1/4	60	42~76
G5/8	69	44~94
G3/4	115	95~135
G1	140	115~165
G1.1/4	210	140~280
G1.1/2	290	215~365
G2	400	300~500

ORFS rotary nut			
UNF thread	Marking specifications	N.m	
		min	max
9/16~18	-4	14	16
11/16~16	-6	24	27
13/16~16	-8	43	47
1~14	-10	60	68
1.3/16 ~12	-12	90	95
1.3/16 ~12	-14	90	95
1.7/16 ~12	-16	125	135
1.11/16 ~12	-20	170	190
2~12	-24	200	225

Regular Inspection and Maintenance Schedule

According to the table below, regularly inspect and maintain the machine according to the working hours indicated by the engine timer. If the machine is in poor working condition or has high working intensity, or is equipped with accessories such as hydraulic crushing hammers, the inspection and maintenance interval of certain components needs to be reduced.

S/N	Page	Inspection and maintenance details	Maintenance period (total working hours)					
			10	50	100	250	500	1000
1		Routine inspection						
		• Any leakage of oil, water, and fuel	▲					
		• Appearance of mechanical parts and hoses	▲					
		• Fixation of bolts and hydraulic joints	▲					
		• Operating conditions of control components, work lighting, and indicator lights	▲					
		• Diesel engine work conditions	▲					
2		Engine fuel system						
		• Check the fuel level and refill	▲					
		• Eliminate the condensate and impurities			▲			
		• Clean the tank				▲		
		• Check the fuel injection pressure					▲	
		• Replace the filter element		☆		▲		
3		Engine cooling system						
		• Check the condition of rubber hoses and clamps	▲					
		• Check the cooling water level	▲					
		• Clean the radiator fins					▲	
		• Replace coolant		☆				■
		• Check the coolant concentration	▲					
4		Engine lubricating system and others						
		• Check the oil level (refill as necessary)	▲					
		• Replace the oil		☆		▲		
		• Replace the oil filter element		☆		▲		
		• Check the tension of the fan belt		☆	▲			
		• Check the valve clearance					☆	▲
		• Check the tightness of the cylinder head					☆	▲
		• Check the tightness of the engine support		☆			▲	

Regular Inspection and Maintenance Schedule (contd.)

S/N	Page	Inspection and maintenance details	Maintenance period (total working hours)						
			10	50	100	250	500	1000	2000
5		Engine air intake system							
		• Empty the dust accumulation tank	▲						
		• Clean the air filter element			▲				
		• Replace the air filter element					▲		
6		Hydraulic system							
		• Check the hydraulic oil level (refill as necessary)	▲						
		• Remove water and dirt from the oil tank				▲			
		• Replace the hydraulic oil, clean the oil suction screen.							☆ ▲
		• Replace the filter element for the hydraulic oil return and pilot oil line				☆	▲		
7		• Check the system pressure					▲		
		Battery							
		• Check the electrolyte level		▲					
8		• Check acidity and charging status					▲		
		Travel reducer							
		• Check the oil level and refill				▲			
9		• Replace the oil						☆ ▲	
		■ Check the tightening torque of the connecting bolts of the reduction gear		☆			▲		
10		Track							
		• Check and adjust the track tension	▲						
		Track roller, support roller, and guide roller							
11		• Check the tightening torque of the track roller bolts		☆			▲		
		• Check the oil level of the guide roller and support roller						▲	
11		Lubrication							
		• Refill lubricating oil to each lubrication point		▲					

 Follow the normal period
  Conduct upon the first maintenance
  Once a year in spring and autumn

Routine inspection

Perform a general routine inspection of the machine every day or every 10 hours.

- 1) Leakage inspection to check for oil, water, and fuel leaks in various parts of the machine.
- 2) Check for scratches, breaks or deformations on the elastic connectors and accessories.
- 3) Check the fixation and connection of the hydraulic devices.
- 4) Check the appearance of mechanical parts.
- 5) Check the working conditions of operating devices, control indicator lights and various indicators.
- 6) Check the operation of the engine. Check for any problem with the exhaust color, any abnormal sounds, and determine the location of the abnormal sounds.

Engine fuel system

Maintenance instructions

Oil tank capacity	16L
Oil level inspection	10h
Drain water and impurities from the tank	100h
Clean the tank	250h
Check for oil spray pressure	500h
Replace the fuel filter element	250h

1. Oil level check and refilling

The oil level or the oil level gauge on the instrument panel of the right control box can be checked. Check once every day or every 10 hours.

To avoid the formation of condensate, the tank should be filled up after daily work. The filler is located on the left side of the seat.

2. Drain water and impurities from the tank

Condensate and sediment are discharged every 100 hours.

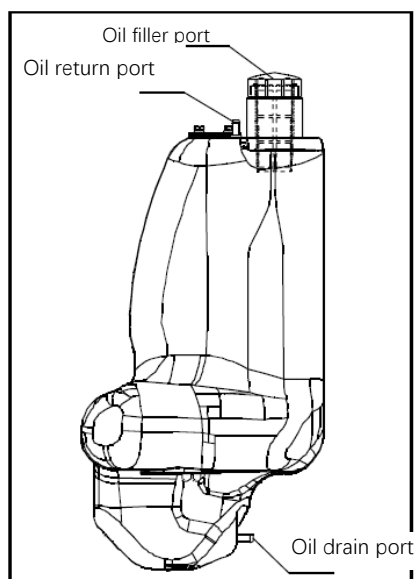
Loosen the oil plug to allow condensate and sediment to flow out. Once fuel flows out, reinstall the drain plug. Based on the quality of the fuel used, users can redefine the cycle for discharging condensate water themselves;

3. Clean the fuel tank

Clean once every 250 hours.

- 1) Prepare a container for the fuel drained out
- 2) Remove the oil drain plug and remove the filter screen located inside the fuel refiller port. Fill half of the fuel tank and empty again.
- 3) Clean the refueling filter screen and reinstall it in its original position.
- 4) Reinstall the oil drain plug and fill it with fuel through the filter in the refiller port.
- 5) Eliminate the air from the oil line.

Attention: Only diesel instead of trichloroethylene should be used for flushing the interior of the fuel tank.



4. Check the fuel injection pressure

Check once every 500 hours.

Regularly check the fuel injection pressure according to the maintenance schedule. Adjust as necessary. This check is performed by the agent of the manufacturer.

The work efficiency of the engine basically depends on the working condition of the fuel injection nozzle, so regular maintenance is necessary to ensure its normal operation.

In order to better use the engine, the excavator driver should pay attention to signs that indicate poor operation of the fuel injection nozzle:

A. The impact sound of a single or multiple cylinder; B. Engine overheating; C. Reduced efficiency; D. The exhaust turns black; E. Increased fuel consumption.

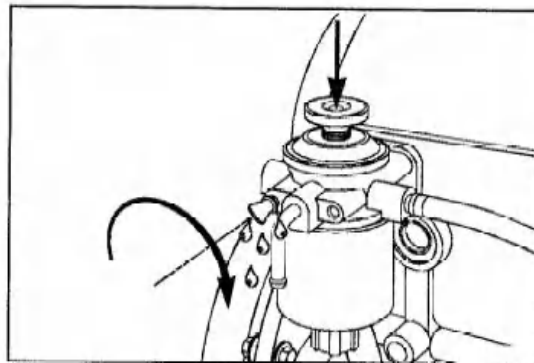
These signs may also be caused by the following reasons, so the following checks should be conducted first:

A. Poor sealing of the intake and exhaust valves; B. Incorrect adjustment of the fuel injection nozzle; C. Dirty or damaged fuel filter; D. Poor fuel quality; E. Water in the fuel; F. Dirty or blocked air filter.

5. Exhaust of the fuel line

If air flows into the fuel line due to replacing the fuel filter element, disconnecting the fuel pipeline, cleaning the fuel filter or inadvertently emptying the fuel tank, the air shall be removed before restarting the engine.

- 1) Open the exhaust screw on the fuel filter base;
- 2) Run the filling pump plug until there is no air in the fuel flowing out of the exhaust screw;
- 3) Close the exhaust screw on the fuel filter base;



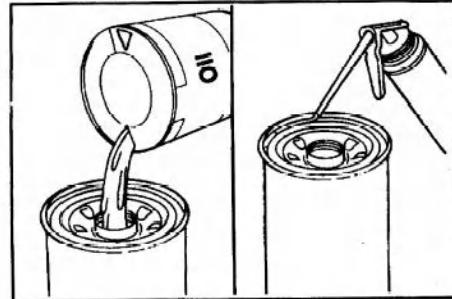
Warning: The fuel pressure in the high-pressure fuel pipe is sufficient to penetrate the skin and may cause serious personal injury. Gloves and protective clothing should be worn before operation.

6. Replace the fuel filter element or fuel filter

Perform the first replacement after 50 hours of operation, and replace the fuel filter every 250 hours or 3 months thereafter. Make sure to use genuine filter element.

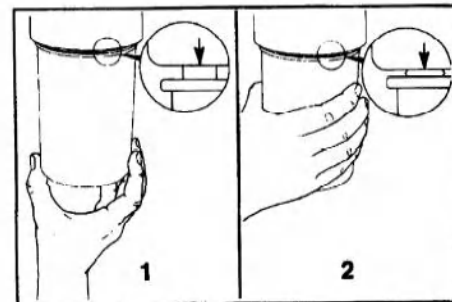
A. Replace the fuel filter element

- 1) Remove the fuel filter element;
- 2) Clean the sealing gasket surface of the filter seat with a lint free cloth;
- 3) Remove the old O-ring;
- 4) Install new O-ring;
- 5) Fill the new filter with new fuel and lubricate the O-ring with clean engine oil;
- 6) Install the fuel filter as specified by the filter manufacturer.
- 7) After replacing the filter element, start the engine and inspect the sealing surface of the filter element for oil leakage.



7. Replace the fuel filter

- 1) Remove the fuel filter from the bracket, and remove the clamp and rubber hose;
- 2) Install a new filter;
- 3) Fill the new filter with new fuel and lubricate the O-ring with clean engine oil;
- 4) Eliminate the air finally.



Note: To reduce the possibility of fuel leakage, ensure that the fuel filter is installed firmly but not too tightly. Excessive mechanical tightening will damage the fuel filter.

Engine cooling system

Maintenance instructions

Coolant level checkevery day or every 10 hours of operation
Check the condition of rubber hoses and clamps.....every day or every 10 hours of operation
Clean the radiator bladesevery 500 hours of operation
Coolant replacementonce a year in spring and autumn
Coolant concentration checkevery day or every 10 hours of operation

1. Check the coolant level

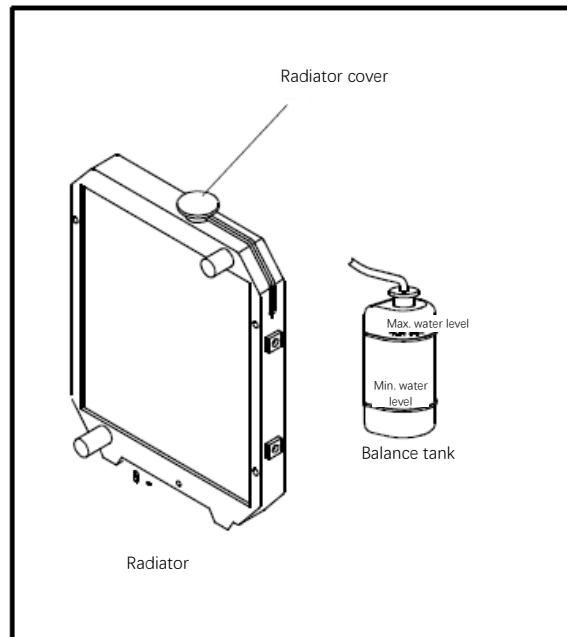
Before starting a new machine, the coolant level in the radiator should be checked, after that, it should be checked every day or every 10 hours.

Remove the radiator (water tank) cap and check the level of the coolant.

If the engine is cold, the coolant level shall be between the upper and lower levels of the balance tank.

Observe the position of the coolant level in the balance tank.

If the engine is cold, the coolant level shall be between the highest and lowest water levels.



Warning: When the radiator cap is unscrewed, hot coolant will spray out. Cover unscrewing method: After the system cools down, slightly loosen the cover and wait for the pressure to fully release. If the cover is unscrewed too quickly, coolant may spray out, which may cause personal injury.

2. Check the condition of rubber hoses and clamps

Check every 10 hours or every day.

Check the rubber hose. If there are cracks or if it becomes hard due to aging, replace it with a new one.

Check if the hose clamp is locked tightly, and if there is looseness or damage, replace it in a timely manner.



3. Clean and inspect the radiator fins

Check once every 500 hours.

Dust on the surface of the radiator (water tank) can affect the cooling effect and must be cleaned in a timely manner.

Open the engine hood and use high-pressure water or compressed air to blow away debris such as dust or leaves that clog the radiator fins, oil cooler fins. At the same time, clean the protective strainer in front of the oil cooler. For machines equipped with air conditioning, it is also necessary to clean the condenser fins.



Warning: If compressed air, high-pressure water, and steam directly hit the body, or are used to blow away dust or dirt, there is a risk of serious injury. Therefore, it is necessary to use goggles, dust masks, and other protective masks.

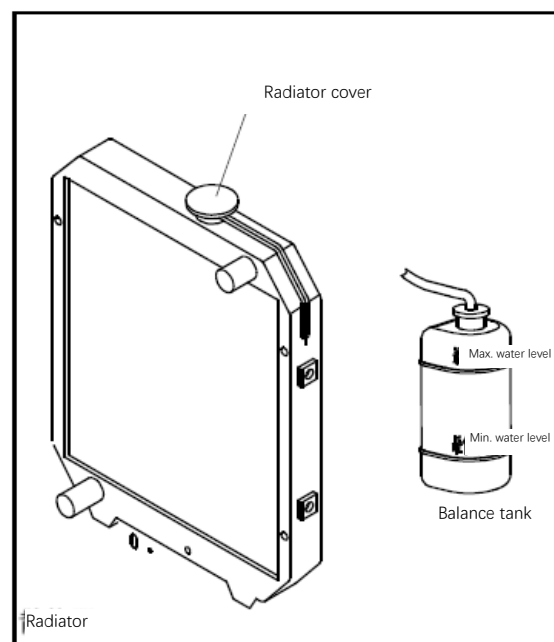
Attention: To prevent damage to the heat sink, the distance between the nozzle of high-pressure water or compressed air and the surface of the radiator (water tank) should be over 500 mm.

Damaged heat dissipation fins can cause water leakage or overheating. In dusty areas, check the heat dissipation fins daily, which shall not be limited by the maintenance intervals.

4. Replace the coolant

After 50 hours of operation, perform the first replacement. Replace every 1000 hours after that.

- 1) Remove the radiator (water tank) cover and open the water valve to allow the coolant to flow out;
- 2) Clean the cooling line, close the drain valve, top up the dedicated cleaning solution, start the engine to let it run at low speed for 10 minutes, and then stop the machine to drain the cleaning solution;
- 3) Close the drain valve again;
- 4) Top up the coolant and let the engine idle for a few minutes to fill the entire cooling line with coolant;
- 5) Check the coolant level and refill as necessary



Warning: Do not open the radiator (water tank) cover from a hot engine. The radiator cover should not be opened until the coolant temperature drops below 50 °C. Otherwise, the spraying of high-temperature coolant or steam may cause personal injury!

5 Check the coolant level

Before the start of the cold season, check the concentration of the coolant. The coolant should be able to operate at an ambient temperature of minus 20 degrees Celsius. If the ambient temperature is lower, the amount of the antifreeze should be increased.



Warning: The coolant is toxic. Avoid children and pets coming into contact with the coolant. If no longer used, dispose of it in accordance with local environmental regulations.



Warning: Antifreeze shall be used in any weather.

Do not use only water as coolant. Otherwise, it may be damaged due to corrosion.

River water contains a large amount of calcium and other impurities. If river water is used, scale will form and adhere to the engine cooling water channel and radiator, causing heat exchange failure and overheating.

Antifreeze is flammable, so be particularly careful not to approach open flames.

If antifreeze splashes into the eyes, it should be immediately washed with water and the patient should be promptly sent to the hospital for treatment.

Engine lubricating system

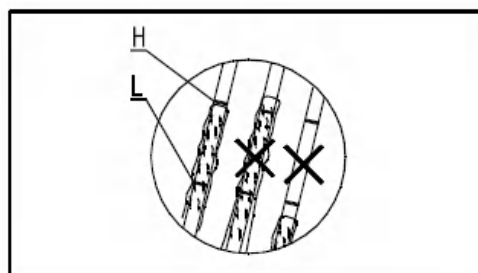
Maintenance instructions

Oil volume	3.7L
Oil level check	Every 10 operation hours or every day
Replacement of oil or oil filter element	Every 250 operation hours

1. Check the oil level

Before starting a new engine, check the oil level once, and thereafter check every 10 hours.

- 1) Park the excavator on level ground and stop the engine.
- 2) Open the engine hood, take out the oil dipstick to observe the oil sticking area on it. The oil level should be between the lower (L) and higher (H) markings.
- 3) If necessary, oil can be added from the oil port to reach the specified level.

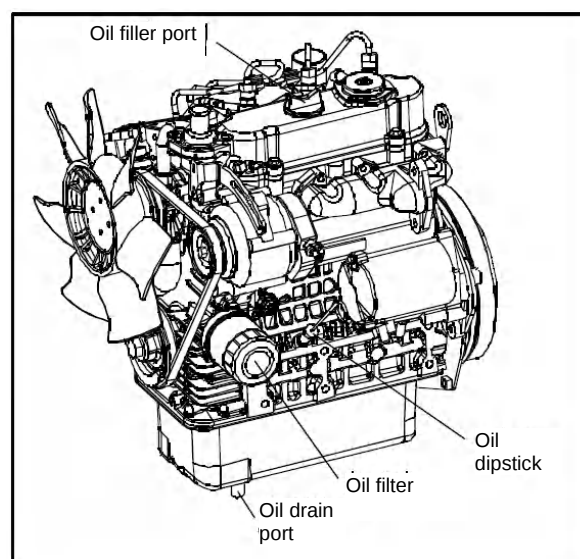


Warning: The components and oil are still at high temperatures upon shutdown of the engine, which can cause serious burns. Maintenance is allowed only after the temperature has dropped.

2. Change the engine oil

After the new machine is put into use, it will be replaced for the first time after working for 50 hours, and every 250 hours thereafter.

- 1) Park the excavator on level ground and stop the engine. Drain the engine oil while it is hot.
- 2) Remove the oil drain plug to allow all oil to flow out.



Yanmar 3TNV76-PYU



Avoid inhaling oil vapor, swallowing, and prolonged contact with used oil.

- 3) Clean the drain plug and reinstall it. If the sealing ring is damaged, replace it.
- 4) Open the oil filling port
- 5) Inject new engine oil again until the oil level reaches the "maximum" mark H on the dipstick.
- 6) Cover the oil cap and allow the engine to idle for 5 minutes.
- 7) After 10 to 20 minutes of engine shutdown, check the oil level. Refill oil as necessary.

3. Replace the engine oil filter element

For new machine, the first cleaning shall be done after 50 hours of operation, after that, it shall be cleaned or replaced every 250 hours.

Replace oil filter

- 1) Release and remove the oil filter element;
- 2) The gasket of the new filter element should be coated with oil and positioned in the ring groove on the end face of the filter housing.
- 3) Start the engine and check the installation tightness of the oil filter,
- 4) Stop the engine to check the oil level. Refill oil as necessary.

Engine air intake system

Maintenance instructions

Dust collector cleaning frequency Every 10 hours or every day

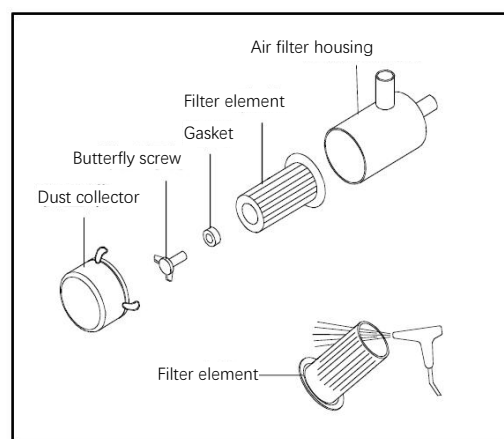
Air filter element cleaning frequency Every 100 operation hours

Air filter element replacement frequency..... Every 500 operation hours

1. Clean the dust collector

Clean the dust collector every 10 hours of operation or every day.

- 1) Remove the dust collector and regularly empty it (for dusty environments, it should be emptied once a day);
- 2) Clean the dust collector
- 3) Check the tightness of the filter element by hand;
- 4) Inspect the inner housing of the filter and no impurities are allowed to enter the interior of the filter.
- 5) Reinstall the dust collector.



Warning: If it is checked, cleaned, or replaced while the engine is running, dust will enter the engine and cause damage. Therefore, please turn off the engine before starting these operations. When using compressed air, there is a risk of dirt flying out to cause injury. Wear protective glasses, dust masks, or other protective devices.

2. Clean the air filter element

Clean the air filter element every 100 hours.

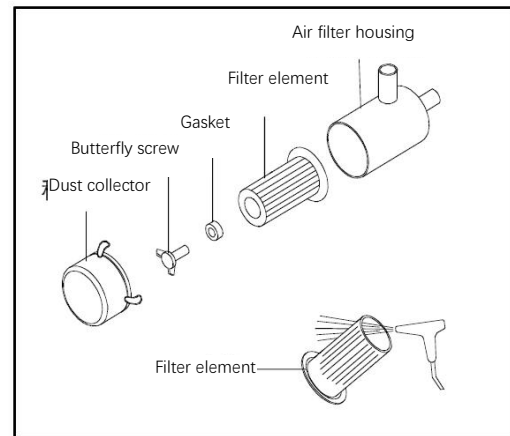
- 1) Remove and empty the dust collector, loosen the butterfly screw and take out the sealing washer;
- 2) Take out the air filter element and blow it clean with compressed air. The maximum pressure of compressed air is 6 Pa. The direction of the compressed air pipeline is from high to low, 3 cm away from the filter wall. When cleaning, compressed air should be used to blow from the inside to the outside of the filter element.
- 3) After drying the filter element (not exceeding 50 °C), reinstall it.
(Never clean the filter element by tapping it on a hard surface.)

Attention: Before installing a cleaned filter element or replacing it with a new one, check it for damage. Method: Place a light source inside the filter element and check for any holes in the filter element. If holes are found, this filter element should not be used.

3. Change the air filter element

Replace the filter element that has been cleaned 6 times or has been used for 500 hours.

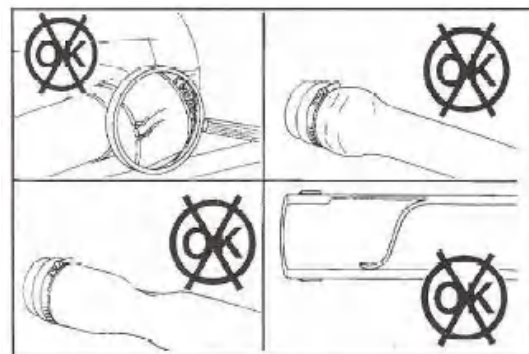
- 1) Follow the same procedure as the cleaning instructions;
- 2) Check the quality of the new filter element with the light irradiation method;
- 3) Install a new filter element;
- 4) Install the butterfly screw and dust collector.



4. Check the air intake pipeline

Check the intake pipe every day for signs of wear, pipe damage, loose clamps, or pipe breaking that may damage the engine.

If necessary, replace damaged pipes and tighten loose clamps to ensure that the intake system does not leak.



Other maintenance of the engine

Warning: To prevent injury, do not perform maintenance while the engine is running. If maintenance must be carried out with the engine running, it should be carried out with at least two people and in accordance with the following regulations:



There must always be one person sitting in the operator's seat and ready to turn off the engine at any time. All the personnel shall keep touch with each other.

Great caution should be made when operating near fans, fan belts, or other rotating components for there is a risk of being caught by the components.

Do not drop or insert tools or other objects into the fan or fan belt. Otherwise, it may cause the parts to break or fly out.



Warning: Too high noise of the machine may cause temporary or permanent hearing problems. When performing engine maintenance and working under prolonged exposure to noise, ear muffs or earplugs should be worn.

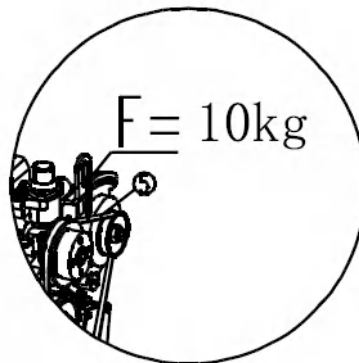
- **Check the tension of the fan belt**

After 50 hours of operation of the new machine, perform the first inspection. Check once every 100 hours thereafter.

In order to ensure the normal operation of the generator and the service life of the belt, it is necessary to tension the fan belt correctly.

For a correctly tensioned belt, apply 10 kg perpendicular to the belt between the fan pulley and the generator pulley, and the sinking amount for the belt is about 10 mm.

If the belt is found to be damaged, it shall be replaced.



- **For the maintenance cycle and specific methods of other components of the engine, please refer to the "Diesel Engine User Manual" attached to this machine.**

Hydraulic system

Maintenance instructions

Hydraulic oil tank capacity	16L
Oil level inspection	Every 10h
Filter element change	Every 2000 hours
Hydraulic oil change	Every 2000 hours
System pressure check	Every 400 hours



Warning: If hydraulic oil or grease is injected into the skin, it can cause serious injury and death. Prevent your hands or body from approaching the area of pressure oil leakage. Check for leaks with cardboard or paper. If hydraulic oil accidentally injected into the skin, immediately seek for medical attention.



Warning: To avoid burns, maintenance should be carried out only when the hydraulic oil has cooled down or before daily work. In order to prevent oil from spraying out, it is necessary to slowly rotate the cover to release internal pressure when removing the fuel filler flange cover.

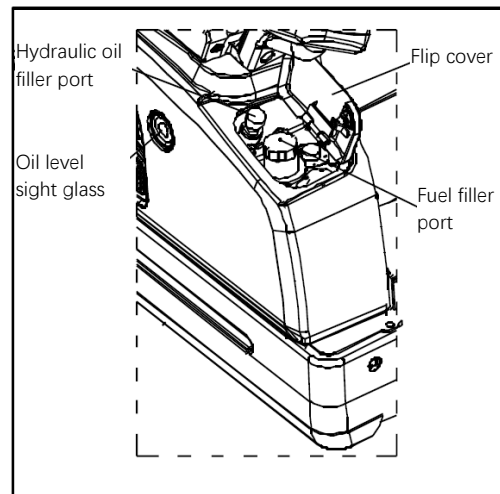
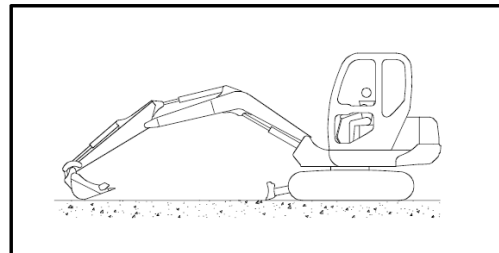
1. Check the oil level of the hydraulic tank

Check the hydraulic oil tank level every 10 hours.

- 1) Park the machine on a level ground.
- 2) Start the engine to cause each cylinder to move back and forth.
- 3) Retract the bucket arm cylinder, extend the bucket cylinder, and then land the bucket. Place the dozer blade on the ground and turn off the engine. As shown in the figure.
- 4) Observe the hydraulic oil level through the oil leveler on the hydraulic oil tank.

The level of the hydraulic oil shall be observed through the oil leveler hole. The hydraulic oil level shall be clearly seen on the oil leveler, and the oil shall not be filled over much, otherwise the level can not be seen through the oil leveler. Since this may cause damage to the hydraulic oil line or injection of oil. If the refueling is too full, stop the machine and drain the excess oil from the oil drain plug after the oil cools. If the oil gauge shows that the liquid level is too low or the liquid level is not visible, oil shall be refilled in time through the oil filler port on the top of the hydraulic oil tank.

Attention: The hydraulic oil level will change with the increase of oil temperature during operation. Before operation, the oil level is in the middle of the oil leveler. During normal operation, the oil temperature rises and the oil level will approach the upper end of the oil leveler.



2. Remove water and dirt from the hydraulic oil tank

Drain the water and dirt from the hydraulic oil tank every 250 hours.

- 1) Exhaust the air in the oil tank after stopping the machine and waiting for the oil temperature to decrease, or before starting work every day.
- 2) Slowly loosen the oil drain valve or plug at the bottom of the fuel tank (as shown in the figure).
- 3) Drain water or dirt until clear and transparent hydraulic oil is discharged. Close the drain valve again or tighten the screw plug.
- 4) If the oil level in the fuel tank is too low, refill.

3 Replace the hydraulic oil, clean the oil suction screen.

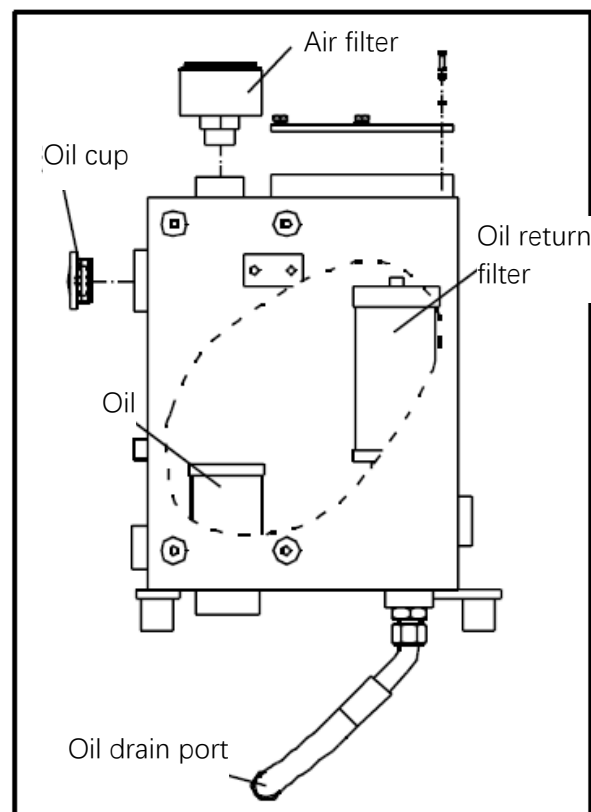
Replace the hydraulic oil as shown in Figure 5-31.



Warning: 1) To avoid burns, oil draining should be carried out only when the hydraulic oil has cooled down or before daily work.
2) In order to prevent oil from spraying out, it is necessary to slowly rotate the cover to release internal pressure when removing the fuel filler flange cover.
3) When changing the oil, make sure no water, dirt, mud, etc. enter the oil tank.

Clean the oil tank

- 1) Drain the hydraulic oil when the hydraulic oil is hot.
- 2) Fully extend the piston rod of the hydraulic cylinder.
- 3) Stop the engine.
- 4) Remove bolts 1, cover 3, and washer 4.
- 5) Remove the screen 5 when the hydraulic oil tank is drained.
- 6) Carefully clean the filter screen and reinstall it.
- 7) Reinstall the drain plug.
- 8) Fill the hydraulic oil to the maximum level.
- 9) Operate the engine.
- 10) Extend and retract each cylinder of the excavating device.
- 11) Extend the piston rod of the hydraulic cylinder.
- 12) Fill the oil tank to the highest oil level.
- 13) Close the oil tank again to make the engine work.



14) In order to pressurize the hydraulic oil tank to retract the piston rod of the hydraulic cylinder.

Note: The oil level in the hydraulic oil tank will be slightly increased after this last operation.

Replace hydraulic oil return filter element

Perform the first replacement after working for 2000 hours, and replace every 2000 hours thereafter.

- 1) Fully extend the piston rod of each hydraulic cylinder, and then stop the engine. It shall be replaced or cleaned every 2000 hours thereafter.
- 2) Remove the oil tank plug to depressurize it.
- 3) Screw out the filter element 6 and replace it with a new one (grease the sealing washer before installation).
- 4) Start the engine and operate the excavating mechanism.
- 5) Check the hydraulic oil level and replenish it if necessary.
- 6) Retighten the screw plug and close the sight glass cover.
- 7) Increase the pressure of hydraulic oil tank to retract the piston rod of the hydraulic cylinder.

4. Exhaust the air in the hydraulic system

A. Exhaust the air in the pump

- 1) Loosen the exhaust screw plug in the exhaust port, and check whether there is oil flowing out. The exhaust is completed.
- 2) Tighten the screw plug after the exhaust is completed.

Note: If the pump is operated if the pump is not full of oil, it will be abnormally heated and cause premature damage to the pump.

B. Discharge the air between the pump and the hydraulic oil tank

- 1) Start the engine and keep it running at medium and low speeds.
- 2) Operate the working device slowly for about 5 minutes to discharge the air.

Note: If the air between the pump and the fuel tank is not discharged to allow the engine to run at a high speed, it will also cause the pump to be heated and damage the pump.

C. Discharge the air in the oil cylinder

- 1) At low engine speed, extend and retract the oil cylinder to the position about 100 mm from the stroke end for 4-5 times. (Be careful not to extend or retract to the stroke end).
- 2) Then, operate each cylinder to the end of its stroke 3 to 4 times.
- 3) Finally, operate each cylinder to the end of its stroke 4~5 times to completely exhaust the air.

Note: If the engine is operated at high speed or the oil cylinder is operated to the end of the stroke immediately after starting the machine, the air in the oil cylinder will damage the piston seal and damage the oil cylinder.

D. Discharge the air in the swing motor (when the oil in the housing of the swing motor is discharged)

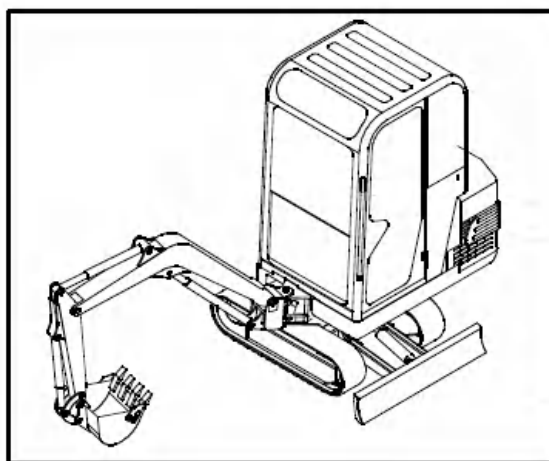
Note: During the exhaust, the machine cannot be rotated under any circumstances.

- 1) Run the engine at idle speed, loosen the exhaust plug, and check whether the oil flows out from the exhaust plug.
- 2) If there is no oil flowing out, remove the exhaust plug and fill the motor housing with hydraulic oil.
- 3) After the exhaust is completed, tighten the exhaust plug.
- 4) Finally, run the engine at a low idle speed and slowly turn the upper part of the car body left and right at least twice. So that the air is completely exhausted.

Note: If the air in the motor is not exhausted, the bearings of the swing motor may be damaged.

E. Discharge the air in the walking motor (when the oil in the casing of the walking motor is discharged)

- 1) Run the engine at idle speed and loosen the exhaust plug. If oil comes out, tighten the screw plug.
- 2) Run the engine at idling speed and rotate the working device 90 degrees so that it is located on the side of the crawler. (As shown on the right)
- 3) Jack up the machine with the working device, keep the crawler on one side slightly away from the ground, and rotate the crawler for 2 minutes under no load. Repeat this action on the left and right tracks and rotate the tracks forward and backward equally.



F. Exhaust the air in the accessories

If the accessory is installed, run the engine at idle speed and operate the accessory pedal several times (about 10 times) until the air is discharged from the accessory oil circuit.

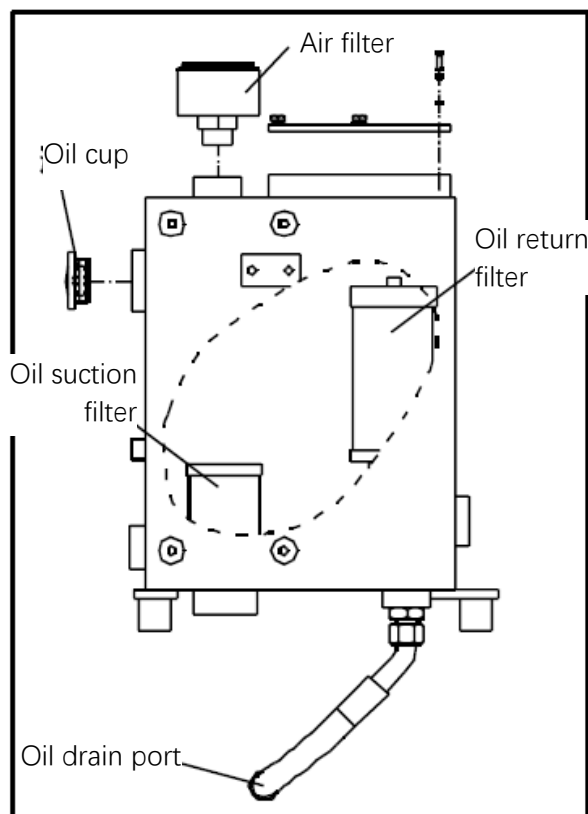
Note:

1. If the manufacturer specifies a specific exhaust method, which shall be followed strictly.
2. After the exhaust operation is completed, turn off the engine and let the machine stand for at least 5 minutes before starting operation to eliminate air bubbles in the oil in the hydraulic cylinder.
3. There shall be no leakage during the inspection. Wipe the spilled oil if any.
4. After the exhaust operation is completed, check the oil level, and fill if the oil level is low.

5. Replace the oil return filter element

The first replacement shall be carried out after working for 2000 hours, and thereafter it shall be done every 2000 hours. The oil return filter is in the hydraulic oil tank, so:

- 1) Fully extend the piston rod of each hydraulic cylinder, and then stop the engine.
- 2) Remove the oil tank bolt 1.
- 3) Screw out the filter element 6 and replace it with a new oil return filter element (grease the sealing washer before installation).
- 4) Start the engine and operate the excavating mechanism.
- 5) Check the hydraulic oil level and replenish it if necessary.
- 6) Retighten the screw plug and close the sight glass cover.
- 7) Increase the pressure of hydraulic oil tank to retract the piston rod of the hydraulic cylinder.

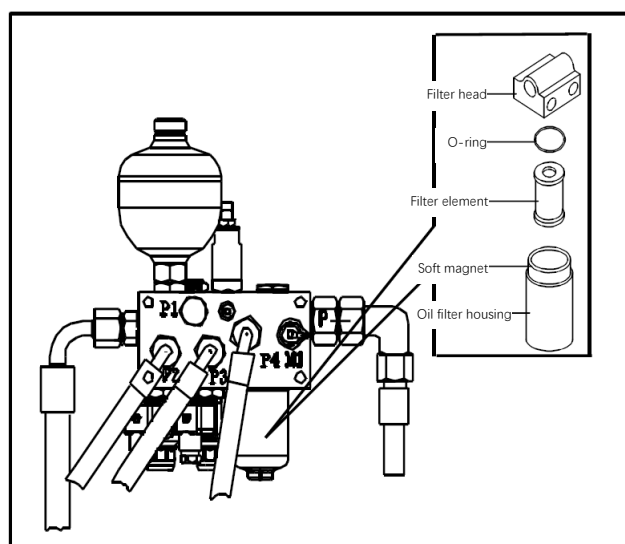


6. Replace the fuel filter element of pilot oil circuit

The first replacement shall be carried out after 1000 hours working for a new machine, and thereafter it shall be done every 1000 hours.

Attention: Be sure to discharge the air pressure in the hydraulic oil tank before removing the filter element.

- 1) Unscrew oil filter housing.
- 2) Remove the filter element.
- 3) Install the new O-ring in the filter head groove.
- 4) Before assembling the new filter element, apply a layer of hydraulic oil on the sealing surface of the filter element and install the filter element into the filter head.
- 5) Clean the oil filter housing and soft magnet, and be careful not to allow dirt, dust or water to enter the oil filter housing.
- 6) Tighten the oil filter housing and filter head with a torque of 25~35N.m.
- 7) Connect the pipeline and start the engine slowly. Operate continuously for 3-5 minutes to discharge the air in the system.
- 8) Park the machine on the level ground, stop the machine to check the oil level, and add oil if necessary. Pay attention that the oil filling shall not exceed the required maximum oil level limit.



■ **During using accessories (such as breaker hammer), the replacement cycle of hydraulic oil and filter elements shall be shortened.**

Since if the hydraulic hammer is used, the pollution of the hydraulic system is increased and corrosion is accelerated. Compared with excavating devices, the replacement cycle of hydraulic oil and filter elements shall be shortened accordingly, so as not to damage the hydraulic pump and other hydraulic components. The recommended replacement cycle is as follows: (unit: hour)

Hydraulic hammer operating rate	Hydraulic oil changing cycle	Replacement cycle
50%	500	500
100%	250	250

The above table is suitable for the 100% operation of bucket and hydraulic hammer. The replacement cycle shall be adjusted according to the use time of hydraulic hammer or bucket when the hydraulic hammer or bucket is operated intermittently.

Note: If a hydraulic hammer is used, the system pressure shall be adjusted appropriately according to the requirements of the hydraulic hammer.

Battery



Warning: 1) The battery contains sulfuric acid liquid, which is highly corrosive. Please keep it away from children. Users should wear protective glasses and rubber gloves when operating the battery. Once the eyes, skin and clothes are splashed with sulfuric acid, wash them with plenty of water immediately, and go to the hospital for treatment in serious cases.
2) The battery will generate hydrogen and oxygen during charging. Once it catches an open flame or the exhaust port is blocked, it will cause explosion. Therefore, the battery should be far away from the open flame to avoid short circuit.
3) The battery case is made of polypropylene by injection molding, which is flammable and should be kept away from open fire.

1. Battery storage

- 1) This series of products are lead-acid batteries with charged fluid. They should be stored in a dry, clean and well ventilated environment at 5~25 °C. They should be free from direct sunlight and at least 2 m away from the heat source. If the ambient temperature is too high, the performance of the battery will be greatly affected.
- 2) It shall not be placed upside down or horizontally, and shall not be subjected to any mechanical impact and heavy pressure.
- 3) The storage period of this series of batteries at room temperature is 6 months, and the batteries can be used without recharging within 6 months. If the storage period of the battery exceeds 6 months, it can still be used after recharging.

2. Charge the battery

Hydrogen and oxygen are produced by electrolyzing water in the later stage of battery charging, which causes water loss. The higher the charging voltage, the more water loss. This series of batteries do not need to be filled with water during use, so the constant voltage charging method is highly recommended and the constant current charging method is avoided as far as possible.

2.1 Recharge the battery

2.1.1) Constant current charging method

Charge the battery for 2-4 hours at the current (A) that is one tenth of the battery rated capacity at the rate of 20 hours.

2.1.2) Constant voltage charging method

Charge the battery at a constant voltage of 16V for 16h (the maximum current shall not exceed 25A).

2.2 Normal battery charging

2.2.1) Charge the battery at the current {A} that is one twentieth of the battery rated capacity at the rate of 20 hours until the battery voltage reaches 14.4V, and continue charging for 2-3 hours.

2.2.2) Charge the battery at a constant voltage of 16.0V for 24h (the maximum current shall not exceed 25A).



1) The battery will produce gas during charging, and the vent hole on the battery should be checked regularly to avoid being blocked, so as to avoid battery explosion.
2) When charging the battery, connect the positive pole of the charger with the positive pole of the battery, and connect the negative pole of the charger with the negative pole of the battery. Reverse charging is strictly prohibited.
3) During the charging process, if the temperature of battery electrolyte exceeds 45 °C, the charging voltage or charging current should be reduced as appropriate to prevent electrolyte splashing due to excessive temperature.

3. Install the battery

- 1) Before installing the battery, please pay attention to the safety signs on the battery label to prevent unnecessary accidents.
- 2) A small amount of Vaseline oil shall be coated on the end post of the battery before installation to prevent corrosion. The wiring shall be firm and reliable. It is strictly prohibited to knock the end post to prevent the battery from leaking acid due to the loosening of the end post.
- 3) When installing the battery, first connect the positive pole of the battery with the positive pole of the automobile generator, and then connect the negative pole of the battery with the negative pole of the generator.
- 4) The battery shall be firmly installed on the battery rack by upper fixing or lower fixing to avoid battery damage caused by looseness.

4. Battery maintenance

- 1) The battery cover is equipped with an indicator to display the charge state of the battery. When the indicator displays in green, the battery can be used normally. The battery shall be charged in time when the indicator displays in black, and the battery shall be replaced immediately when the indicator displays in white.
- 2) The battery with power loss caused by various reasons during use shall be charged in time to prevent performance degradation caused by the sulfated battery.
- 3) The battery shall be strictly prevented from overcharging during use and charging to avoid premature failure due to excessive water loss, longer grid and lead paste falling off.
- 4) The battery that has been installed and used in the machine shall be removed from the machine and stored in a ventilated and dry place if it is not used for a long time (generally more than 15 days). The battery shall be recharged every 3-6 months (depending on whether the indicator is black).
- 5) For the battery in question, please contact Yuchai Heavy Industry dealer in time to solve it.

Travel reducer

Maintenance instructions

Rotary reducer lubricating oil capacity0.5 liters
 Rotary reducer lubricating oil capacity1 liters (each side)
 Check the lubricating oil level and add oilevery 250 hours of operation
 Change the lubricating oilevery 1000 hours of operation
 Check the tightening torque of the connecting bolts of the reducerevery 500 hours of operation



Warning: The oil in the reducer will heat up shortly after the machine moves. After stopping the equipment, the travel reducer and oil are still at a high temperature, which can cause severe burns. Before operation, wait for the oil to cool down. Loosen the exhaust screw plug by two to three threads and release the air pressure in the box before removing the screw plug. It is dangerous to remove the plug quickly. It is dangerous to remove the screw plug quickly.

A: Walking reducer

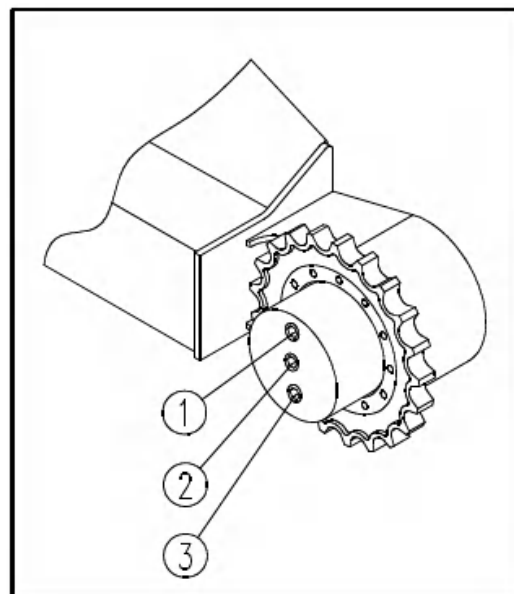
1. Check the lubricating oil level of the travel reducer and fill oil



Warning: The oil in the reducer will heat up shortly after the machine moves. After stopping the equipment, the travel reducer and oil are still at a high temperature, which can cause severe burns. Before operation, wait for the oil to cool down. Loosen the exhaust screw plug by two to three threads and release the air pressure in the box before removing the screw plug. It is dangerous to remove the plug quickly. It is dangerous to remove the screw plug quickly.

Check it every 1000 hours.

- 1) Prepare an Allen wrench.
- 2) Park the excavator on level ground.
- 3) Rotate the walking reducer to make the 3 screw plugs on its outer end are perpendicular to the ground, and then stop the machine.
- 4) Open the screw plug ① and check the position of the lubricating oil level, which should reach the lower part of the screw plug hole
- 5) Refill the engine oil if necessary (according to the following steps those are used for changing the lubricating oil)
- 7) Clean the screw plug ① and reinstall it.



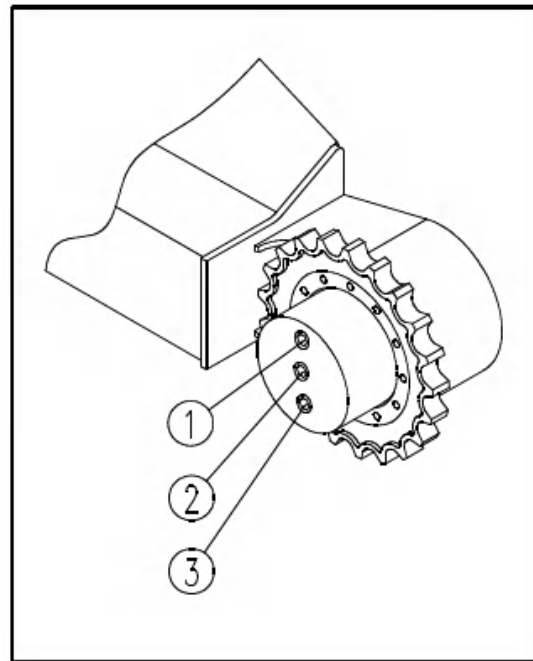
2. Replace the lubricating oil (for each reducer)

The first replacement shall be carried out after 1000 hours working for a new machine, and thereafter it shall be done every 1000 hours.

- 1) Park the excavator on level ground.
- 2) Rotate the reducer to make the 3 screw plugs on its outer end perpendicular to the ground, and then stop the machine.
- 3) Drain the oil when the reducer oil is hot.

Note: Don't burn yourself by hot oil.

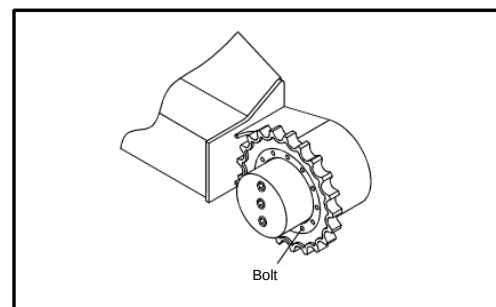
- 4) Loosen screw plug ③ to drain oil, and loosen screw plug ① to drain oil completely.
- 5) Loosen the bolt ②.
- 6) Add the specified lubricating oil from the oil filling hole ① until oil flows out from the oil level inspection hole ②.



3. Check the tightening torque of the connecting bolts of the walking reducer and the rotary reducer

The tightening inspection of the connecting bolts of the walking reducer

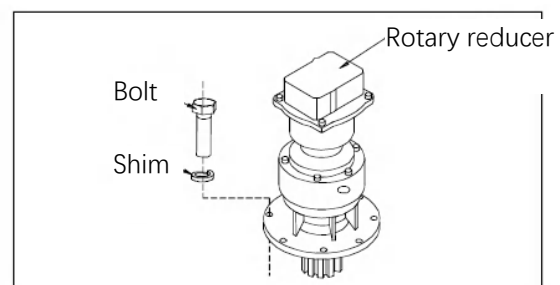
Perform the first inspection after new machine works for 50 hours and then every 500 hours.



B. The tightening inspection of the connecting bolts of the rotary reducer

The first inspection after working for 50 hours and then every 500 hours.

Tighten the bolts connecting the reducer and the platform.

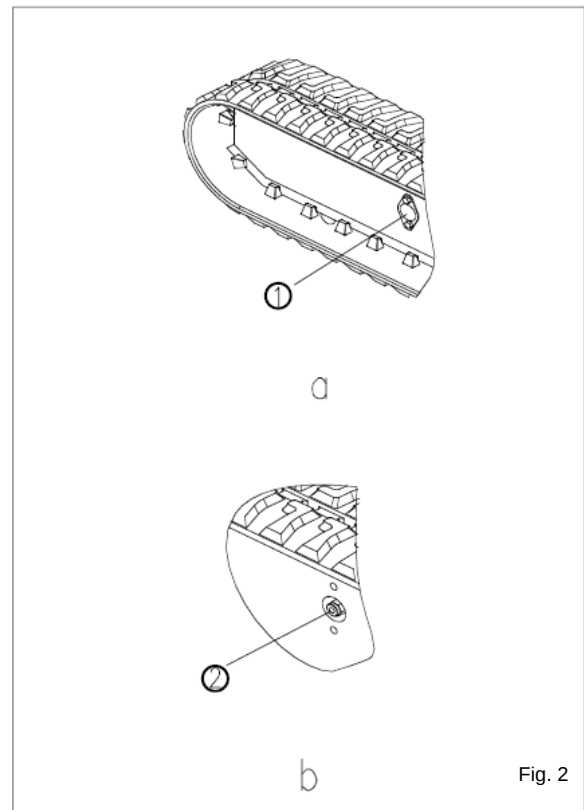
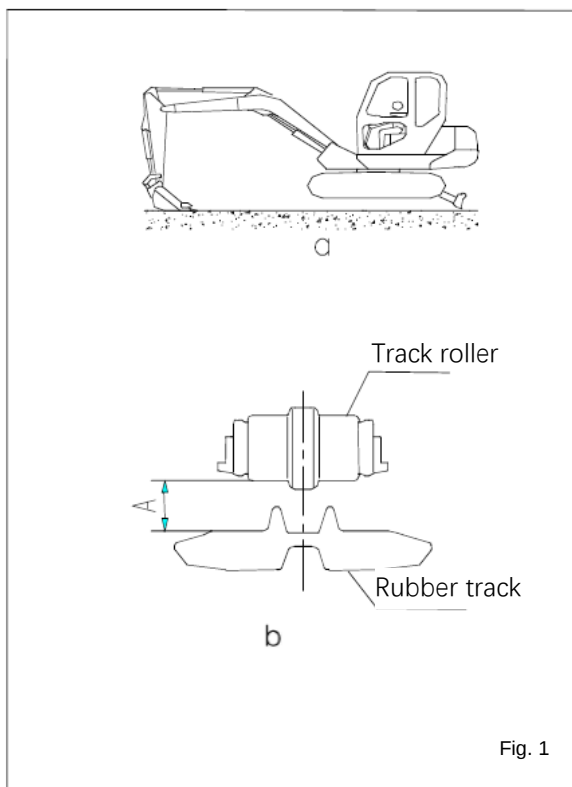


Track

Check and adjust the tension of the track

Check every 10 hours.

- 1) Park the excavator on a level and solid ground.
- 2) Put the bulldozing blade at the back and extend the piston rod of the bulldozing cylinder until the crawler is slightly lifted.
- 3) Support the bucket on the ground and manipulate the boom cylinder to raise the front of the excavator (as a in Figure 1).
- 4) Properly tension the track so that there is a deflection of 10-15 mm at A between the middle support roller and the track (b in Figure 1).
- 5) Remove the cover ① (a in Fig. 2) on each track frame, and expose the fuel nozzle of the tensioner (② in Fig. 2).
- 6) In order to loosen the track, first loosen the joint ② (Fig. 2) to let the grease flow out, and then retighten it after getting the correct tension.
- 7) In order to tension the track, connect the joint of grease gun (provided as a random tool) with the joint ② (Fig. 2). Then add oil by using a grease gun until it is correctly tensioned.



Track roller, support roller, and guide roller

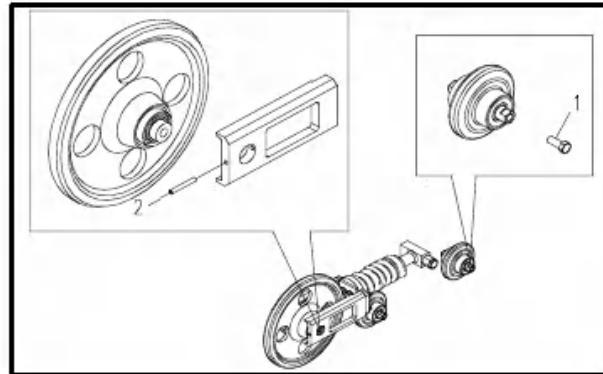
1. Check the tightening torque of the track roller

The first inspection after working for 50 hours and then every 500 hours.

The tightening torque of bolt ① shall be 110 N·m.

If the bolts loose, unscrew the bolts, remove the thread locking agent between the bolt threads, and then apply the thread locking agent to the threaded joints and tighten them as per the specified torque.

If the bolts must be replaced, they shall be replaced with bolts of the same specification and strength class.



1. Track roller bolt

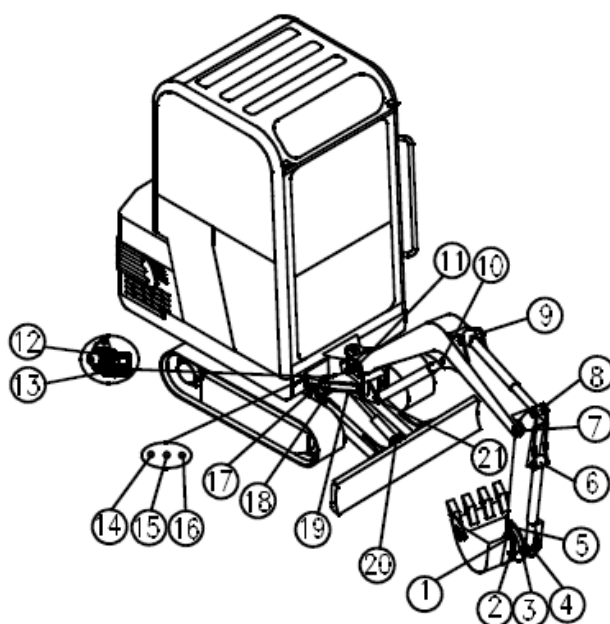
2. Guide roller stop pin

Lubrication

Lubricate the lubrication points of the machine every 50 hours.

Lubrication steps:

- 1) Start the working device and put the bucket on the ground.
- 2) Put the bulldozing shovel on the ground.
- 3) Stop the engine.
- 4) Wipe clean the filling nozzles of each oil cup.
- 5) Lubricate each lubrication point and wipe off excess grease squeezed out.



1. Hinge point between stick and bucket
 2. Hinge point between connecting rod and bucket
 3. Hinge point between rocker and connecting rod
 4. The lubrication point of the bucket cylinder head
 5. Hinge point between rocker and stick
 6. Lubrication point at the tail of bucket cylinder

7. Hinge point between rocker and stick
 8. The lubrication point of the stick cylinder head
 9. Lubrication point at the tail of stick cylinder
 10. Lubrication point at the boom cylinder head.
 11. Hinge point between boom and platform
 12. Lubrication point at the upper pin of the steering head

13. Lubrication point at the lower pin of the steering head
 14. Lubrication point of the swing cylinder
 15. Lubrication points inside the rotary motor raceway
 16. Lubrication point at the rotary support gear ring
 17. Lubrication point at the head of the swing cylinder.
 18. Hinge point between bulldozer shovel and frame

19. Lubrication point at the bulldozing cylinder head
 20. Lubrication points on the end of the bulldozing cylinder
 21. Lubrication point at the tail of the boom cylinder

Note:

- 1) If there is abnormal noise in the lubrication area, the additional lubrication beyond the maintenance interval is required.**
- 2) When operating the machine for the first 50 hours, lubricate it every 10 hours.**
- 3) If the excavation operation is carried out in water, lubricate the pin shaft immersed in water before and after the operation.**
- 4) When carrying out heavy load operation or deep excavation, lubricate the mounting pins of the working device before each operation, and then operate the boom, stick, bucket and blade several times before applying grease. In addition, lubricate it every 10 hours.**
- 5) Please fill molybdenum disulfide lithium grease (No. 3), and fill the rotary support and bulldozer with molybdenum disulfide lithium grease (No. 2).**

Bucket teeth replacement

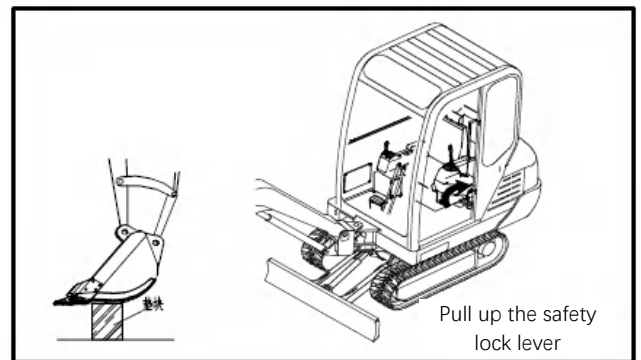
Replace the bucket teeth before the bucket teeth base is worn.



Warning: When replacing the bucket teeth, it is very dangerous if the working device moves accidentally due to wrong operation. Therefore, before replacing the bucket teeth, turn off the engine and then lift the left control box to place the attachment in a locked state. During replacement, wear necessary protective equipment to prevent the lock pin from flying out.

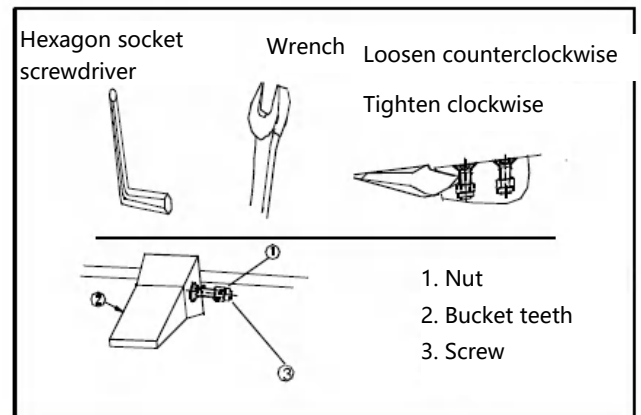
Replace the bucket teeth

1) Place the bottom of the bucket on blocks for removal. Check that the working device is in a stable state and the bucket is placed horizontally. Turn off the engine.



2) Loosen the screw and nut on the bucket teeth by using the hexagon socket screwdriver and wrench to remove the bucket teeth.

3) Clean the mounting surface. Install the new bucket teeth into the teeth base, and then tighten the screw and nut by using the hexagon socket screwdriver and wrench to install the bucket teeth on the tooth base.



Washing of floor mats

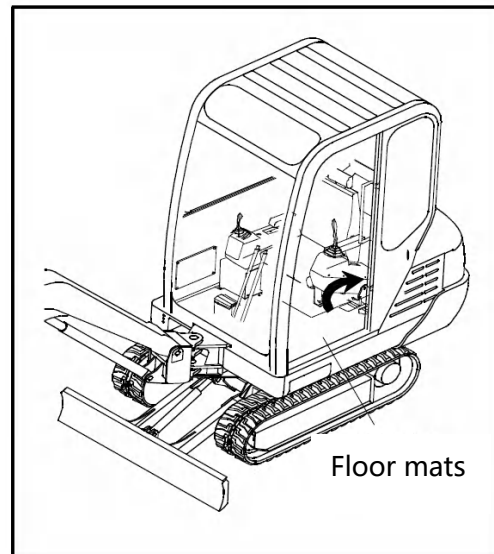
If the floor rubber mats are dirty, clean them at any time to prevent accidents due to slipping and falling of the floor.



Warning: If you accidentally touch the pilot valve lever, joystick, the attachment or machine will suddenly move, causing serious accidents. Therefore, be sure to stop the machine on a solid and flat ground before removing the rubber floor mat. Be sure to turn off the engine before removing the rubber floor mat.

Washing steps of floor mats

- 1) Take out the floor rubber mat in the cab.
- 2) Remove dirt with a brush to or directly rinse the floor mat with water.
- 3) Mop the floor in the cab clean.
- 4) After the floor rubber mat is blown dry, recover the mats in the cab.



6

Accessories guide

Safety Precautions

If you install accessories or options that are not approved by Yuchai, it will not only affect the service life of the machine, but also cause some safety problems.

During installing accessories that are not approved by Yuchai, please contact Yuchai dealer in advance.

If not, we will not be liable for any accidents or damages caused.

1. Safe operation accessories

- The accessories have powerful auxiliary functions. To prevent serious injury or damage, the accessories shall be used correctly.
- Do not use the accessories before reading and understanding the instruction thoroughly. If the instruction is lost, please ask the manufacturer or accessory sales company for a new one.
- Install the necessary front guard on the machine as per condition of the accessories.
- According to the condition of the accessories, vibration and noise can make it difficult for colleagues to convey operating instructions. Before starting the operation, a commander shall be assigned and the signal to be used shall be determined.
- If there is a heavy load on the accessories, do not make turning to the side, especially on slopes, it is very dangerous.
- Compared with a machine equipped with a bucket, the load at front of the working device is larger and is unstable for the machine equipped with a breaker hammer. To avoid the risk of tipping, do not operate if the accessory is turned to the side.
- After installing the accessories, the rotation range and the center of gravity of the machine are different, and the machine may move unexpectedly. Be sure to properly check the condition of the machine.
- Before starting operation, set a cordon around the machine to prevent personnel from entering. Do not operate the machine if there are people near the machine.
- To prevent serious accidents caused by wrong operation, do not put your feet on the pedals except operating the pedals.

2. Disassembly or assembly of accessories

During accessories disassembly or assembly, be sure to follow the steps below to ensure safety.

- Disassembly and assembly on a firm and level ground.
- If there are two or more people performing operations, ensure and follow these signals during operation.
- A crane shall be used during lifting or carrying heavy objects (over 25Kg).
- During disassembling heavy parts, support the parts before disassembling. During lifting with a crane, pay special attention to the position of the center of gravity.
- It is dangerous to operate if the load is lifted by a crane. Prepare a support and keep it safe.
- During placing disassembled accessories or assembled accessories, make sure that they are in a stable state and will not tip over.
- Do not walk under the load lifted by the crane. Stand in a safe place where there is no danger even if the load falls.

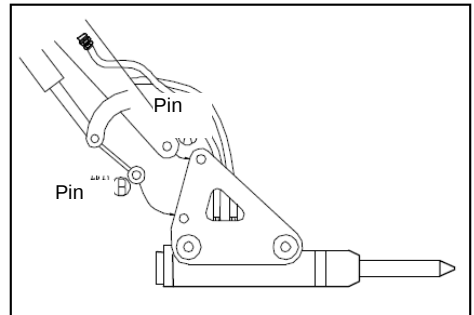
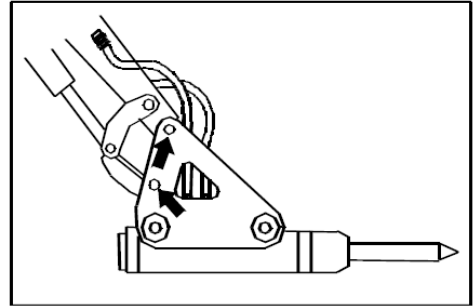


Warning: A qualification certificate is required to operate a crane. Unqualified personnel are not allowed to operate the crane. For details on disassembly and assembly operations, please contact Yuchai Heavy Industry dealer.

Assembly/disassembly steps of accessories

1. Disassembly steps

- 1) Put the accessories on the ground and turn off the engine.
- 2) Turn the start switch to the ON position and push the left control box to the free position.
- 3) Operate the operating levers and accessory control pedals of the attachment 2 to 3 times in full travel forward, backward, left, and right to eliminate internal pressure in the hydraulic pipeline.
- 4) After confirming that the oil temperature has decreased, lock the rotary valves connected to the inlet and outlet pipes on the stick side.
- 5) Remove the hose on the accessory side, put the plug on the combined washer and tighten it to the two outlets.
- 6) Remove the accessories by removing the pins (2pcs). Then install the bucket.
- 7) Wrap the unconnected ends of the two rubber tubes of the hydraulic hammer with a clean plastic bag, and dust-proof measures shall be taken. Keep well the accessories.



2. Assembly steps

- 1) Remove the bucket.
- 2) Put the accessory on a flat place, and connect the stick and the hydraulic hammer and the connecting rod and the hydraulic hammer with pin A and pin B in turn.
- 3) After confirming that the oil temperature has decreased, remove the plugs from the outlet and inlet respectively. Be careful to prevent dust, dirt, etc. from sticking to the hose port. If the combination gasket is damaged, replace it with a new one.
- 4) Connect the hose on the accessory side. During connecting, check the flow direction of the oil, and be careful not to make a wrong connection.
- 5) Unlock the rotary valves connected to the inlet and outlet pipes on the stick side.
- 6) After installing the accessories, confirm whether the oil level in the hydraulic oil tank is proper .

Accessories operation guide

This section introduces the precautions that shall be observed for operating hydraulic excavators equipped with accessories.

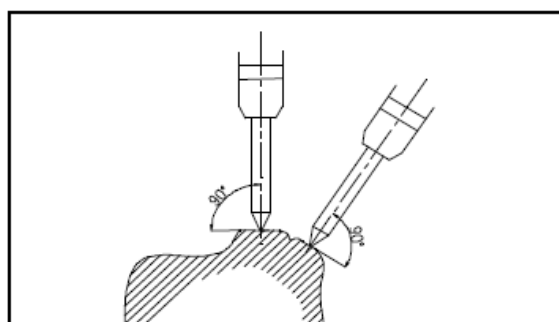
Note: Select the most suitable accessory for the main engine. The models of machines that can install accessories are different. For the selection of accessories and machine models, please contact your Yuchai dealer.

Hydraulic breaker hammer

1. Guidelines for the use of hydraulic breaker hammer

Hydraulic breaker hammer is the most common work accessory. It is widely used in the demolition of buildings, road cracking, tunnel operations, steel slag crushing, stones, and crushing operations in quarries.

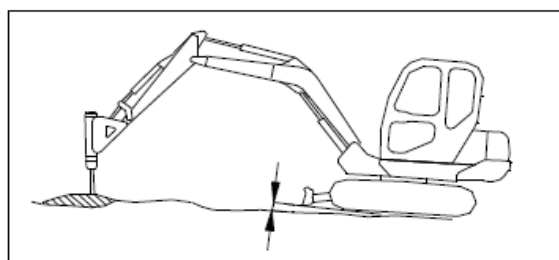
1) During crushing operations, please make sure that the direction of the apex of the hammer drill rod is perpendicular to the surface of the broken object, and keep it as long as possible. If it is inclined to the surface of the broken object, the drill rod may slip off the surface, which may damage the drill rod and affect the piston.



The direction of the apex of the hammer drill rod shall be perpendicular to the surface of the broken object

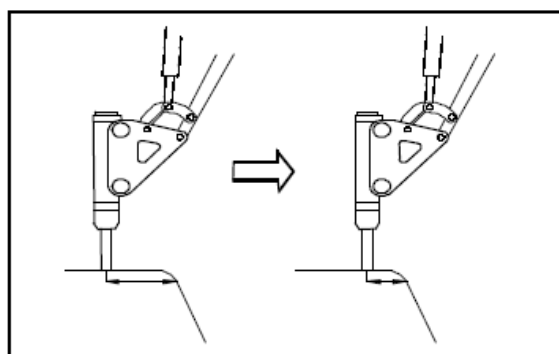
During crushing, please select the appropriate hitting point, and confirm that the drill rod is indeed stable before hitting.

It is required to keep adjusting the bucket cylinder during operation to keep the penetration direction of the drill rod and the direction of the breaker hammer body in a straight line.



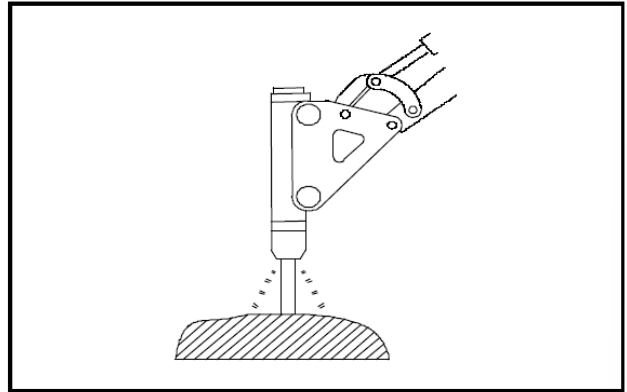
2) During impacting, press the drill rod onto the impact surface to make the chassis is about 5 cm off the ground, and the machine shall not be away from the ground too much.

3) During continuous impacting to the same impact surface, if the drill rod cannot penetrate or break the surface within 1 minute, change the impact position to break it near the edge.



4) Make sure that the drill rod always impact the surface properly to prevent the impact force from being used if there is no resistance.

If the rock or the target has been crushed, stop the action of the breaker hammer immediately. The continuous aimless impacting will cause the front part and the main bolts to loosen and damage, and even damage the excavator itself.



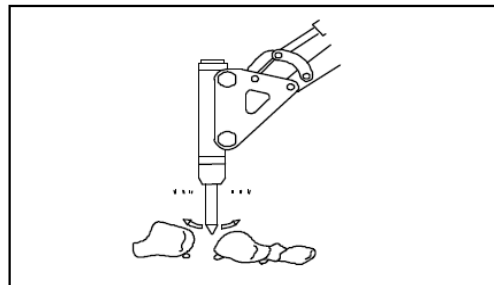
Aimless impacting comes from improper insertion and shaking during use of the breaking hammer.

2. Operation taboos for hydraulic breaker hammer

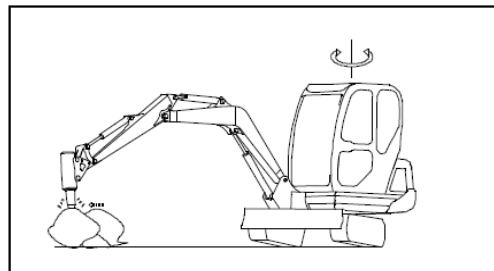
In order to ensure longer service life and safe operation, do not operate the machine in any of the following:

Note: Do not operate all cylinders to the end of the cylinder stroke, and always leave a margin of about 5 cm.

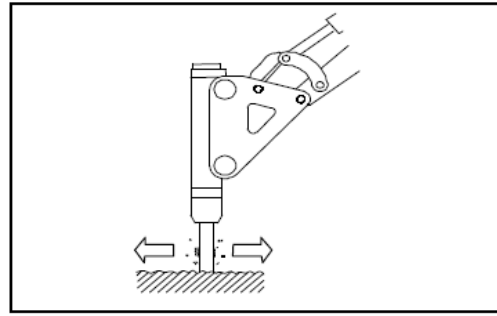
1) Push heavy objects or large rocks with the breaking hammer.



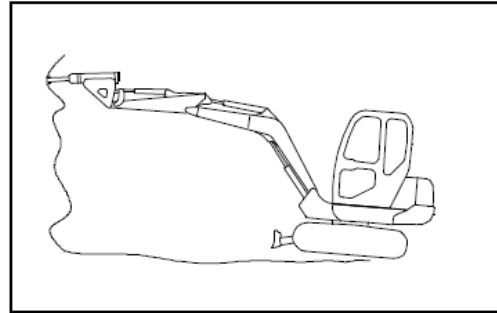
2) Operate with turning force.



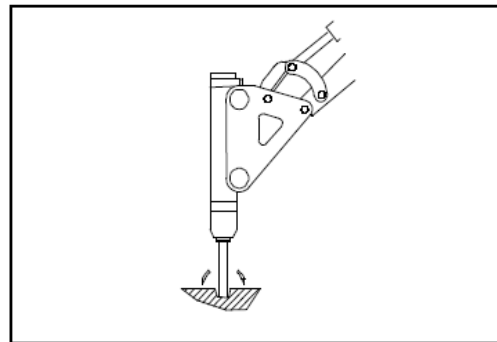
3) The drill rod is moved during impact operation.



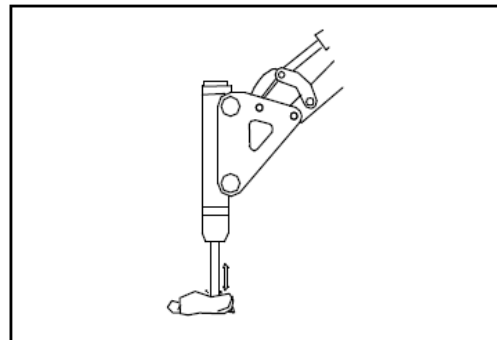
4) Apply impact force horizontally or upward



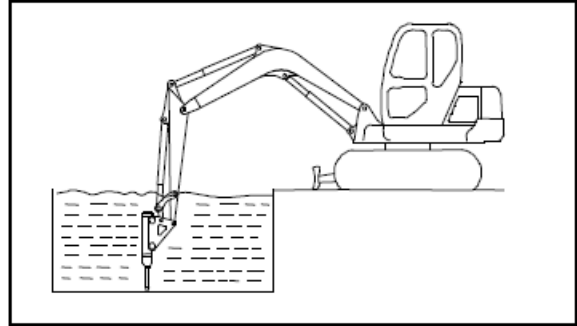
5) Swing the breaker after it has penetrated the rock



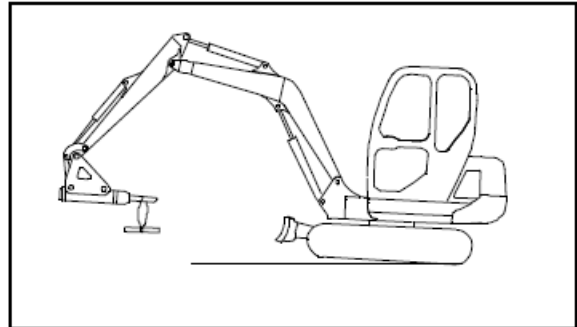
6) Pecking operation



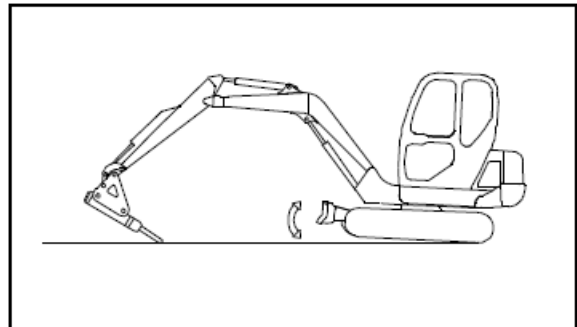
7) Carry out crushing operations in water or muddy ground



8) Use the breaking hammer as a tool for lifting heavy objects.

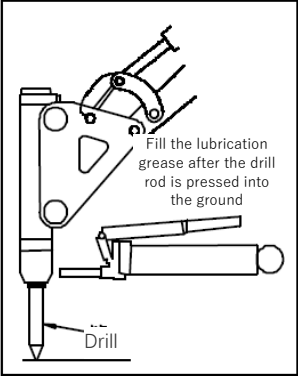


9) The bucket cylinder is fully extended to lift the machine off the ground.



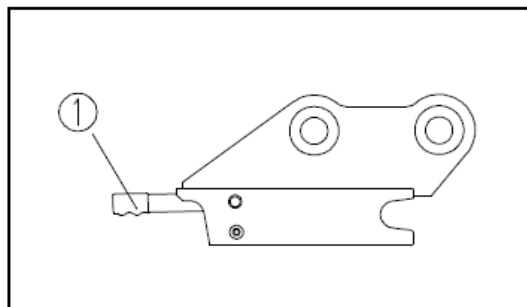
Daily inspection of hydraulic breaker hammer

Carry out the daily inspection and maintenance of the hydraulic breaker hammer according to the following table.

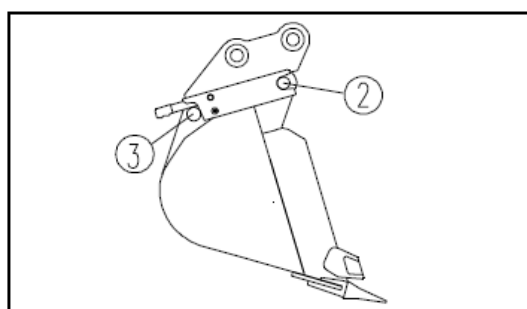
Serial number	Inspection or maintenance items	Check points	Maintenance method
1	Check whether the bolts and nuts are loose or missing	Body bolts and side plate bolts	Tighten the bolts or reinstall new bolts
2	Check the hose parts for looseness, hose damage or oil leakage	High pressure tubing of breaker hammer hydraulic pipeline	Re-tighten the loose part and replace the severely damaged part
3	Lubrication 	Before operation and after 2 to 3 hours of continuous operation, it is advisable to lubricate with lubricating oil at 10ml/time. Lubricating oil shall be filled at 5-10 times for each lubrication.	Fill lubricating oil from the lubricating oil filling hole at front of the breaking hammer
4	Check the capacity and pollution of hydraulic oil	Condition of hydraulic oil	The hydraulic oil quality changes due to different working environments. The simple way to judge the quality of the oil is to observe whether the color of the oil changes. If the oil quality deteriorates seriously, please drain the hydraulic oil in the hydraulic oil tank and clean the oil tank before filling new hydraulic oil.

Quick coupler

1) Pry up with a crowbar ①.



2) Put the bucket pin into ②③, put down the crowbar, and the bucket is installed.



2. Unloading the bucket

1) Pry up ① with a crowbar.

2) Unload the bucket.

Grab bucket

The grab buckets are used for digging or loading on one side of a ditch or confined space. It is applicable to the foundation works such as cleaning up the sundries in the sewage ditch and dredging the passageway of the upper and lower sewers.

1. Grab bucket installation

- 1) First remove the bucket, bucket cylinder, connecting rod, rocker or other accessories (as shown by the arrow in Figure 1);
- 2) Install the grab bucket directly on the stick (as shown by arrow ① in Figure 2);
- 3) Install the relevant grab bucket pipe assembly onto the connecting seat of the stick body (as shown by arrow ② in Fig. 2);
- 4) Then connect the oil inlet of the large chamber of the original bucket oil cylinder to the oil inlet of the large chamber of the grab bracket oil cylinder, and connect the oil inlet of the small chamber of the original bucket oil cylinder to the oil inlet of the small chamber of the grab bucket oil cylinder (as shown by the arrow ③ in Fig. 2).

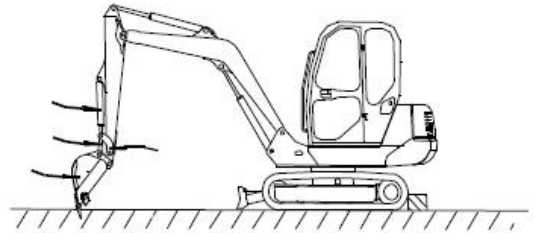


Fig. 1

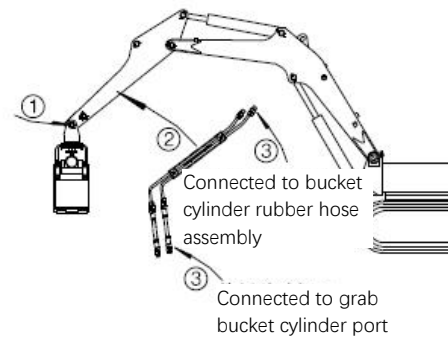


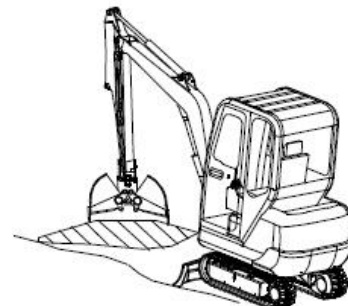
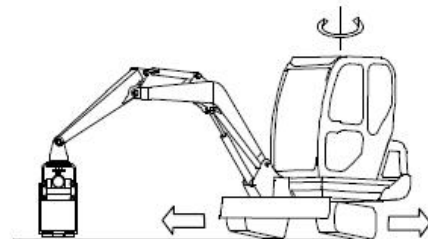
Fig. 2

2. Grab bucket operation

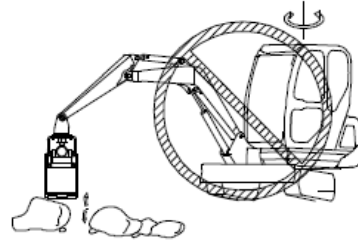
You can control the stick to operate the distance of the grab bucket by operating the left pilot valve handle; you can control the lifting and lowering of the boom and the retraction of the grab bucket by operating the right pilot valve handle, in order to carry out excavation operations.

3. Precautions for grab bucket operation

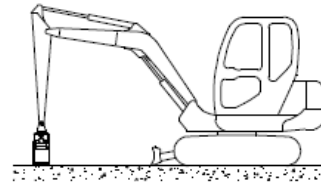
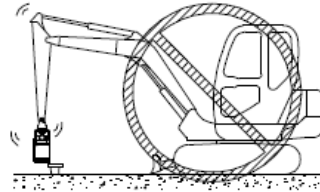
- 1) For safety, it is necessary to avoid sudden walking, turning and stopping of the machine.
- 2) Make the bucket teeth vertical when digging.



3) Do not use a grab bucket to crush stones or cut into the soil.

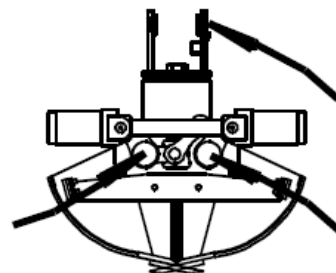


4) Do not use grab bucket to drive or pull piles.



5) Before leaving the machine, open the grab bucket and lower it to the ground.

Note: remove the grab bucket from the stick when transporting the machine.



4. Grab bucket maintenance

- Lubrication

1) Park the machine on a hard and level ground, lower the working device to the ground, and then shut down the engine.

2) Use a grease gun to inject grease into the grease fitting as shown by the arrow in the right figure. (There are two grease fittings on the left and right sides of the grab bucket and one grease fitting on the pin connected to the stick)

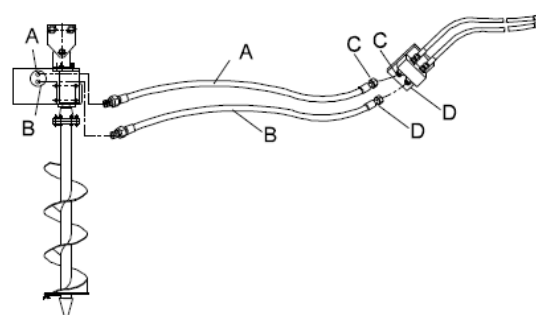
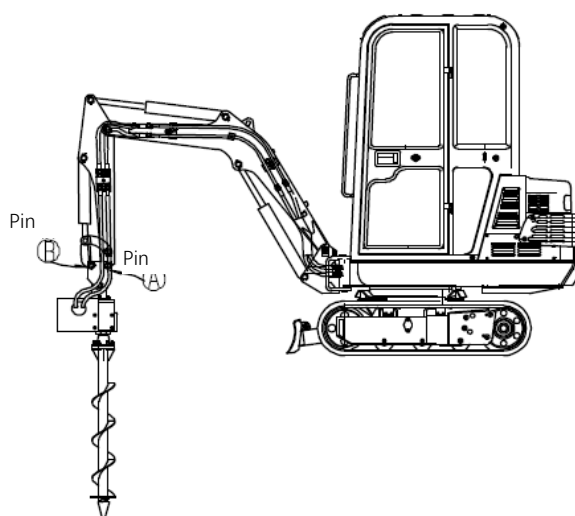
Drilling device

1. Installation of drilling device

- 1) Remove the bucket or other accessories.
- 2) Put the accessory on a flat place, and connect the stick and the drilling device and the connecting rod and the drilling device with pin A and pin B in turn.
- 3) After confirming that the oil temperature has decreased, remove the plugs from the outlet and inlet respectively. Be careful to prevent dust, dirt, etc. from sticking to the hose port.

If the combination gasket is damaged, replace it with a new one.

- 4) Connect the hose on the accessory side. During connecting, check the flow direction of the oil, and be careful not to make a wrong connection.
- 5) Unlock the rotary valves connected to the inlet and outlet pipes on the stick side.
- 6) After installing the accessories, confirm whether the oil level in the hydraulic oil tank is proper .



2. Operation of drilling device

- 1) Operate the pilot valve handle that controls the boom and stick, and lift the top of the drilling tool vertically. Operate the boom oil cylinder to gently press the drill bit against the ground, lift the front part of the machine, and exert pressure on the drill bit during drilling.
- 2) Step down the auxiliary control pedal, and the drilling tool starts to work (rotate) when it reaches a certain depth. Operate the boom cylinder and stick cylinder to pull the drill bit out of the drill hole when the drilling tool still rotates.
- 3) If there is mud on the drilling tool, the drilling tool can rotate reversely by operating the solenoid valve, and the mud will fall off.

3. Precautions for operation of drilling device

1) Please make sure that the direction of the drill bit is perpendicular to the working surface when drilling and keep this state as far as possible. If it is inclined to the working surface, the drilling tool will be damaged in this case. During drilling, please select the appropriate drilling point, and confirm that the drill bit is indeed stable before drilling.

It is required to keep adjusting the bucket cylinder during operation to keep the penetration direction of the drilling tool and the direction of the drilling tool body in a straight line.

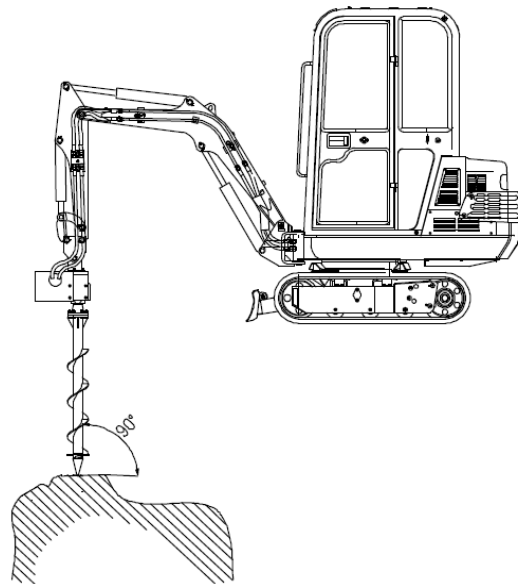
2) If there is not enough depth, pull out the drilling tool first, and then restart the operation.

3) It can only be used to drill holes in the mud when the drilling tool is connected to the top of the machine, and it must not be used to drill holes on stones or mixed stones.

4) Avoid pulling out the drilling tool when it is not rotating, which may cause bending and damage.

5) The connecting seat of the drilling tool should be vertical when drilling to prevent the drilling tool from falling off, otherwise the screw of the adjusting seat will be damaged.

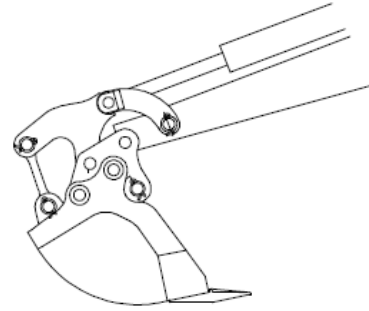
6) It is prohibited to use drilling devices for oblique drilling operation.



Backhoe bucket with scraper

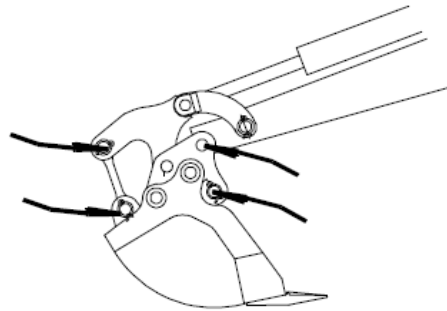
1 . Backhoe bucket installation

It is installed in the same way as the bucket.



2. Operation of the backhoe bucket

By operating the handle of the right pilot valve, the scraper of backhoe bucket will retract inwards and the backhoe bucket will turn outwards when swinging to the right, the scraper of backhoe bucket will push outwards and the backhoe bucket will retract inwards when swinging to the left.



3. Maintenance of the backhoe bucket

Lubrication

1) Park the machine on a hard and level ground, lower the working device to the ground, and then shut down the engine.

2) Use a grease gun to inject grease into the grease fitting.

(As shown by the arrow in the right figure)



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