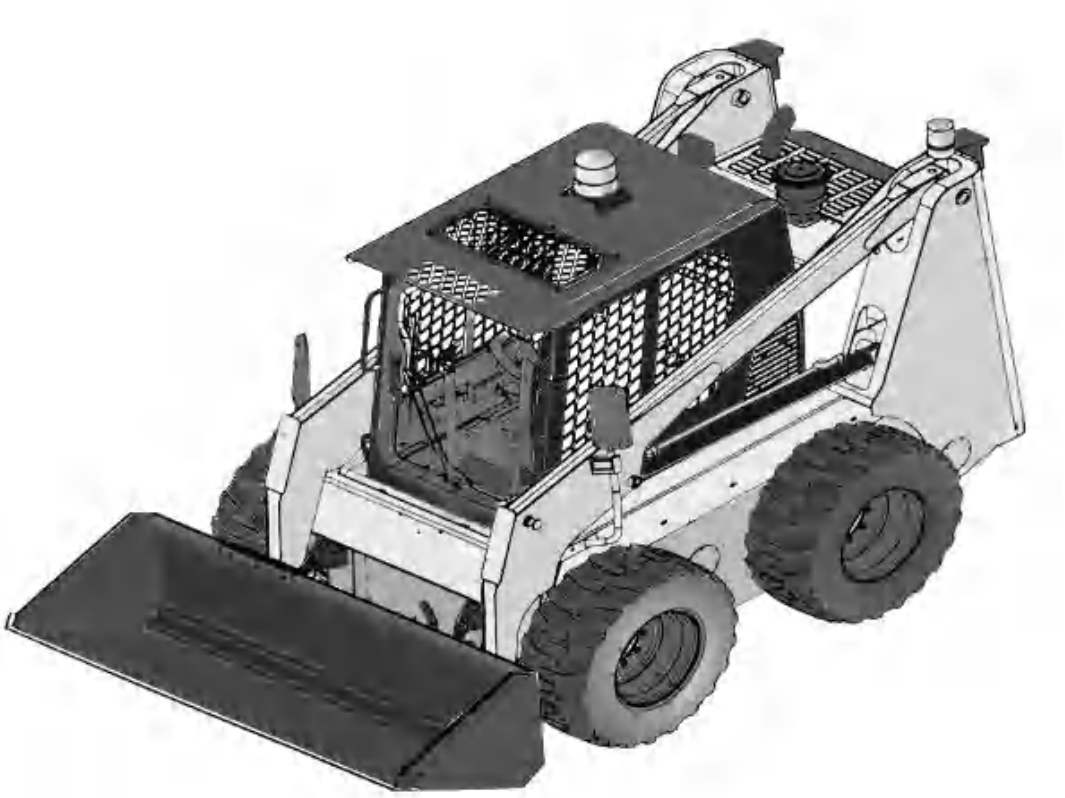
Skid steer loader（HN50/60）

# User and Maintenance Manual

(2025 version)



Shandong Huacheng Guanyue Engineering Machinery Co., Ltd

# Chapter 1: Names and Labels of Each Part

## 1 Name of each department

There are two images on this page, one side view and one rear oblique view. The items to be introduced include: bucket, working arm, front headlights, cab, hydraulic fuel tank, fuel tank, rear headlights, tires, engine hood, and rear tailgate.

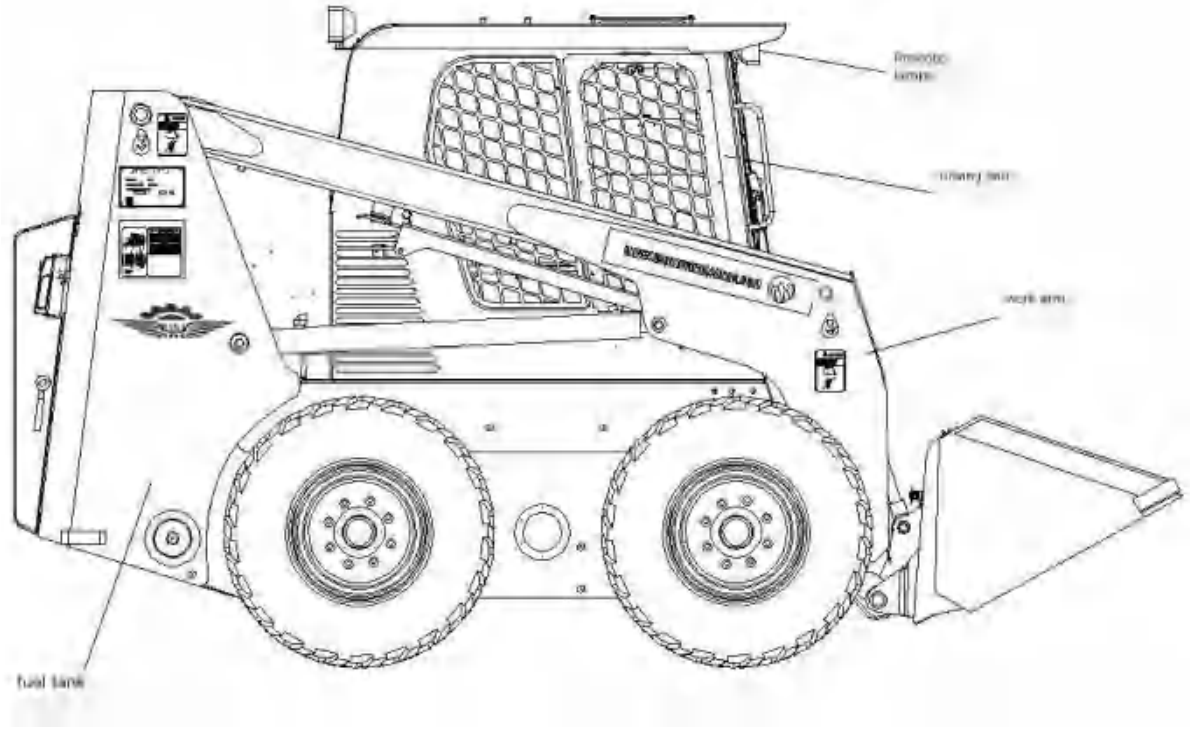



Figure 1-1

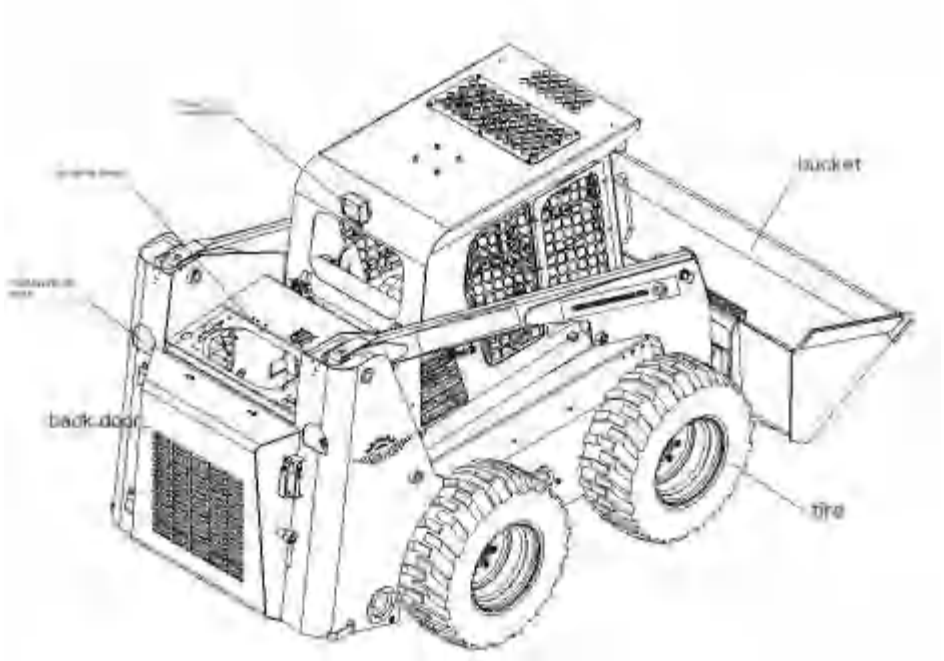



Figure 1-2

## **2** Nameplate and number

☆ Vehicle nameplate

Nail on the upper right side of the frame to indicate the vehicle model, product number, date of manufacture, and manufacturer

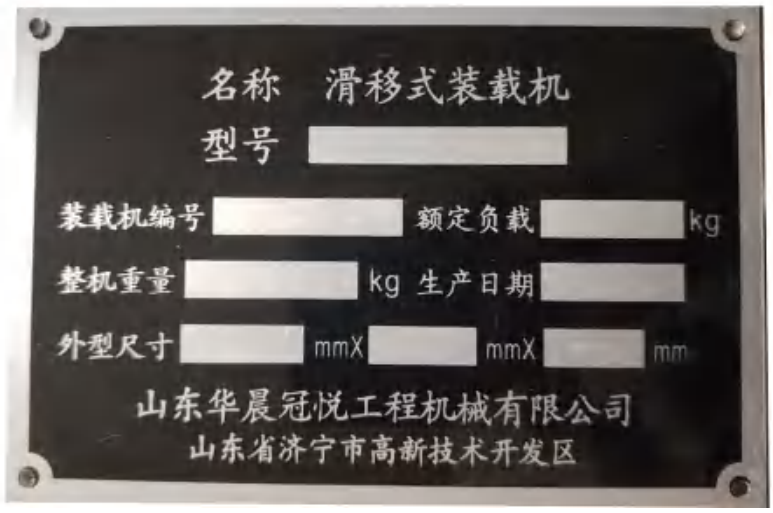



Figure 1-3

☆The combination logo oF Huan chen guan yue Company is affixed to the outside of the boom.

☆ Engine nameplate

Nail it onto the engine body.


Figure 1-4

☆On all major components of the vehicle, signs or imprints are used to indicate product form, manufacturing number, manufacturer, and other information.

## **3** Safety signs and auxiliary signs

### **3.1** Logo Overview

There are many safety signs and auxiliary signs on this machine. This section introduces the actual location and hazard description of these signs. The operator needs to be familiar with these safety signs before using the machine.

All signs should be kept clean and prominent. If the text or graphic symbols in these signs cannot be read clearly, please

Replace or clean these signs with a cloth, soapy water, and do not use solvents, gasoline, or strong chemicals to clean the safety signs. Solvent, gasoline, or strong chemical agents can cause the adhesion of the logo to loosen, resulting in the logo falling off.

If the signs are damaged, lost, or cannot be read after cleaning, they must be replaced. If you want to replace parts with signs, please note that the new signs should be installed on the replaced parts. Fuwei's agents can provide new safety signs and auxiliary signs.

Attention: Before operating this machine, it is essential to have a clear understanding of the contents of these symbols. The following figure 1-5 shows the location of safety signs and auxiliary signs for the WS series skid steer loader.

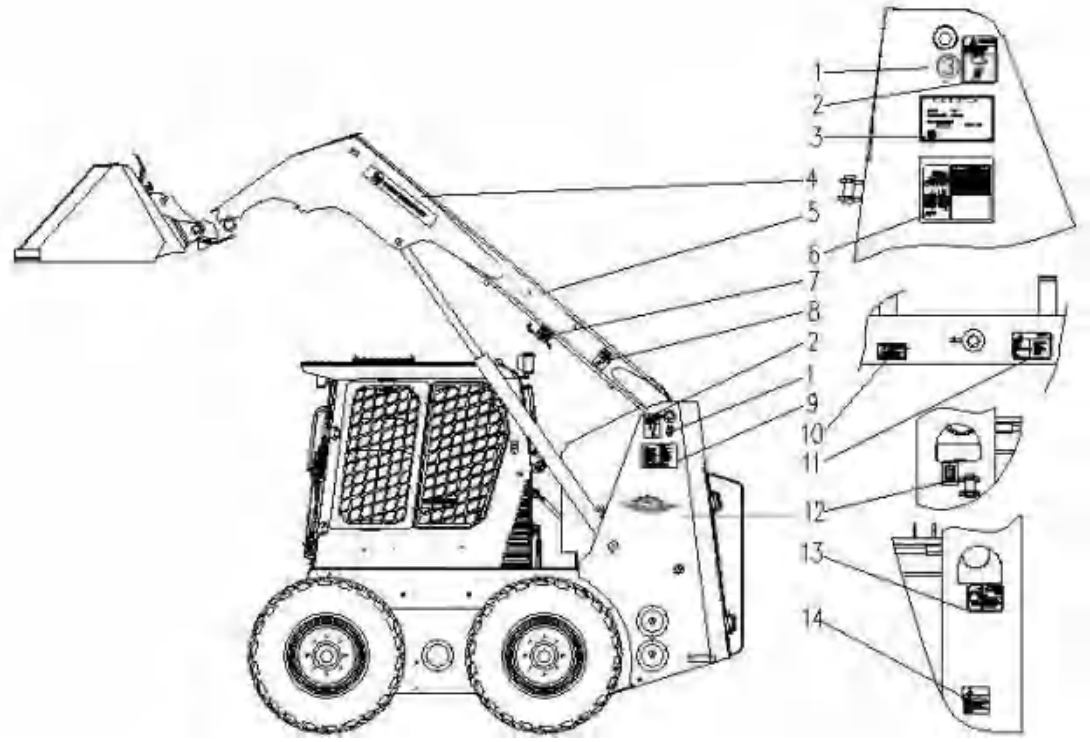



Figure 1-5 Location Map of Safety Signs and Auxiliary Signs

| | | | |
|---|---|---|---|
| 1. Loader lifting handle marking | 2.Lifting safety warning sign | 3. Nameplate logo | 4. Model of Huachenguanyue complete machine |
| 5. Huachenguanyue logo | 6. Slip lubrication maintenance mark | 7. Oil cylinder locking mark | 8. Warning sign for working arm |
| 9. Preparation prompt signs before startup | 10. Warning sign for radiator coolant | 11. Warning sign for radiator | |
| 12. Hydraulic oil filling mark | 13.Fuel label | 14. Filter replacement warning sign | |

## **3.2** Explanation of safety signs and auxiliary signs

Below are detailed explanations of the safety signs and auxiliary signs used in this machine, as listed in the above figure.

1) Warning sign for working arm

The warning signs for the working arm are pasted on the outer sides of the rear end of the working arm, indicating that it is strictly prohibited to stand under the boom and bucket, as there is a risk of falling objects or unpredictable falling of the boom and bucket,

A certain safe distance should be maintained from it. As shown in Figure 1-6.


Figure 1-6

2) Cylinder locking mark

The oil cylinder locking mark is pasted on the outside of the safety rod of the boom hydraulic cylinder, indicating that when it is necessary to lift the boom for maintenance, this device must be used to correctly and securely lock the boom hydraulic cylinder. Otherwise, it may cause the boom to become unpredictable Knowing the danger of falling. As shown in Figure 1-7 on the right.

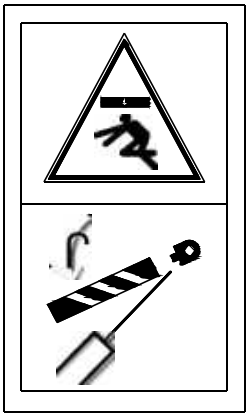


Figure 1-7

3) Lifting safety warning signs

The lifting safety warning sign is pasted near the lifting hook of the boom and frame, indicating that it is strictly prohibited to stand below or near after the whole vehicle is lifted,

Because there is a risk of buckets or unpredictable falling objects falling,

A certain safe distance should be maintained from it. As shown in Figure 1-8 on the right.

4) Slip lubrication maintenance mark

The sliding lubrication maintenance sign is pasted under the lifting handle on the right side of the machine, indicating the inspection, cleaning, lubrication, and maintenance of the machine

The content, location, cycle, and requirements for replacement and refueling. Following the requirements will reduce the occurrence of malfunctions, improve the efficiency and service life of the machine. As shown in Figure 1-9 on the right


Figure 1-8

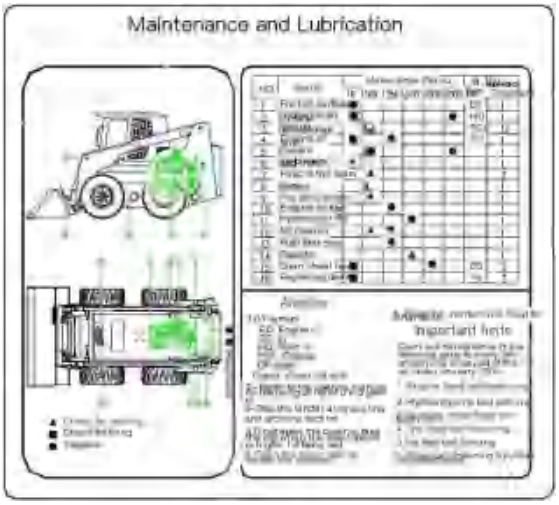



Figure 1-9

Figure 1-10

5 Lifting handle mark of loader

indicating that when the machine needs to be lifted during transportation or loading and unloading, it can be lifted with the help of this lifting point. The pattern is shown in Figure 1-10.

6 Fuel label

The fuel label is affixed to the rear of the diesel tank of the entire machine, indicating that this is the location of the diesel tank of the entire machine and diesel should be filled here. The diagram is shown in Figure 1-11.

be careful:

a.Smoking is not allowed when refueling diesel, and refueling or maintenance is not allowed near flames or spark areas.
b.The engine must be stopped before refueling.
c. Diesel fuel should be added outdoors.
d. Tighten the fuel tank cap.

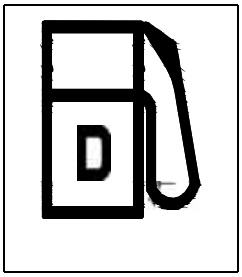



Figure 1-11

7 Hydraulic oil marking

The hydraulic oil label is affixed to the rear of the hydraulic oil tank, indicating that this is the location of the entire hydraulic oil tank Hydraulic oil should be added here, as shown in Figure 1-12.

be careful:

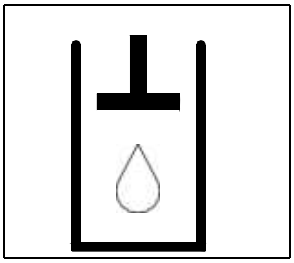


Figure 1-12

1 Before opening the hydraulic oil tank cap, the engine should be stopped.

2 The fuel tank cap should be slowly removed to prevent burns from hot oil.

8 Anti rollover and anti falling object signs

The anti rollover and anti falling signs are pasted on the inside of the right rear pillar of the cab, indicating that this loader has passed the anti rollover and anti falling measure

Standard certification.

Attention: When modifying the cab due to certain circumstances, in order to avoid the possibility of weakening the rollover protection device and falling object protection device, please consult with Fuwei Heavy Industry Manufacturing Co., Ltd. If the structure is damaged or overturned, its protective performance will be weakened.

9 Filter replacement warning sig

The warning sign for replacing the filter element is pasted on the rear of the machine, under the fuel filling port, indicating the basic conditions and requirements for replacing the filter element. Replacing the filter element as required can extend the service life of hydraulic components. The pattern is shown in Figure 1-13.


diagram 1-13

10 Seat belt

When using the machine, it is necessary to fasten the seat belt. Please fasten it before

starting the machine. If you don't fasten your seat belt properly, you may collide or be thrown out of the driver's cabin and fall.

11 emergency exit

In case of emergency, you can break the glass to escape through this window.

12 Read the instruction manual

Before operating the machine, it is necessary to read the user manual. If you have any questions, please consult your employer or Fawei agent. Please keep the user and maintenance manual clean. Please do not operate the machine when the user manual is not with you or when you have any questions. If you operate the machine without reading the manual, it may cause harm to you or those next to you.

13 Warning sign for radiator

The radiator warning sign is affixed to the top of the radiator. Indicates that the coolant temperature is very high within 30 minutes of machine operation and shutdown, and burns should be avoided.
The pattern is shown in Figure 1-14 on the right.


Figure 1-14

# Chapter 2 Purpose, Technical Performance and Parameters

## 1 Purpose and Characteristics

The WS series skid steer loader is the latest generation of small multifunctional equipment developed by Fuwei Company, which integrates machinery, electricity, and hydraulics. It is an efficient, beautiful, safe, and reliable new generation product. It is a small construction machinery developed on the basis of similar product technologies at home and abroad, using modern design methods such as virtual prototyping and finite element analysis. Its performance is significantly superior to similar products and has reached the international advanced level. The machine has a compact structure, flexible movements, easy operation, efficient work, and powerful functions. Especially suitable for urban infrastructure, roads or construction sites, factory workshops, warehouses, docks, ship decks, and even ship cabins with narrow spaces and frequent changes in work content. By replacing different working devices, operations such as shoveling, lifting, excavating, drilling, crushing, grabbing, loosening soil, road cleaning, and road compaction can be achieved.

**This loader is a regular construction machinery and is not suitable for underwater operations or other purposes.**

**·Overloading is prohibited.**

**·Do not directly hang the lifting rope on the bucket teeth to lift heavy objects.**

**Our company is not responsible for any machine damage caused beyond the scope of use.**

Overview of the main features of this machine:

1 The hydraulic oil tank and fuel tank are integrated with the chassis, saving space and making the machine more robust.

2 We use internationally renowned Weichai engines and Rexroth hydraulic components to ensure that the machine is capable of performing various tasks.

3 The proportional control pilot handle is easy to operate and labor-saving, allowing operators to quickly and proficiently operate the machine without fatigue.

4 The advanced hydraulic system design can perform both boom lifting and bucket rotation actions simultaneously, enabling faster completion of tasks.

5) The driver's cabin is spacious with a good view. All instruments are arranged in an easily observable location in the front, and all button switches are within reach. The safety armrest can prevent people from accidentally leaving the seat and is equipped with four safety measures to ensure the safety of operators.

6 Adopting internationally recognized quick change devices, various accessories can be quickly and conveniently replaced. The quick connector of the pipeline is also standard. The vast majority of accessories from other manufacturers can be used on this skid steer loader.

7 The driver's cab can be flipped back at a large angle; The throttle of the engine has two forms: manual control and foot pedal acceleration control, which greatly facilitates operation; Multiple accessories can be replaced.

# 2 Technical Parameter

## 2.1 Dimensions

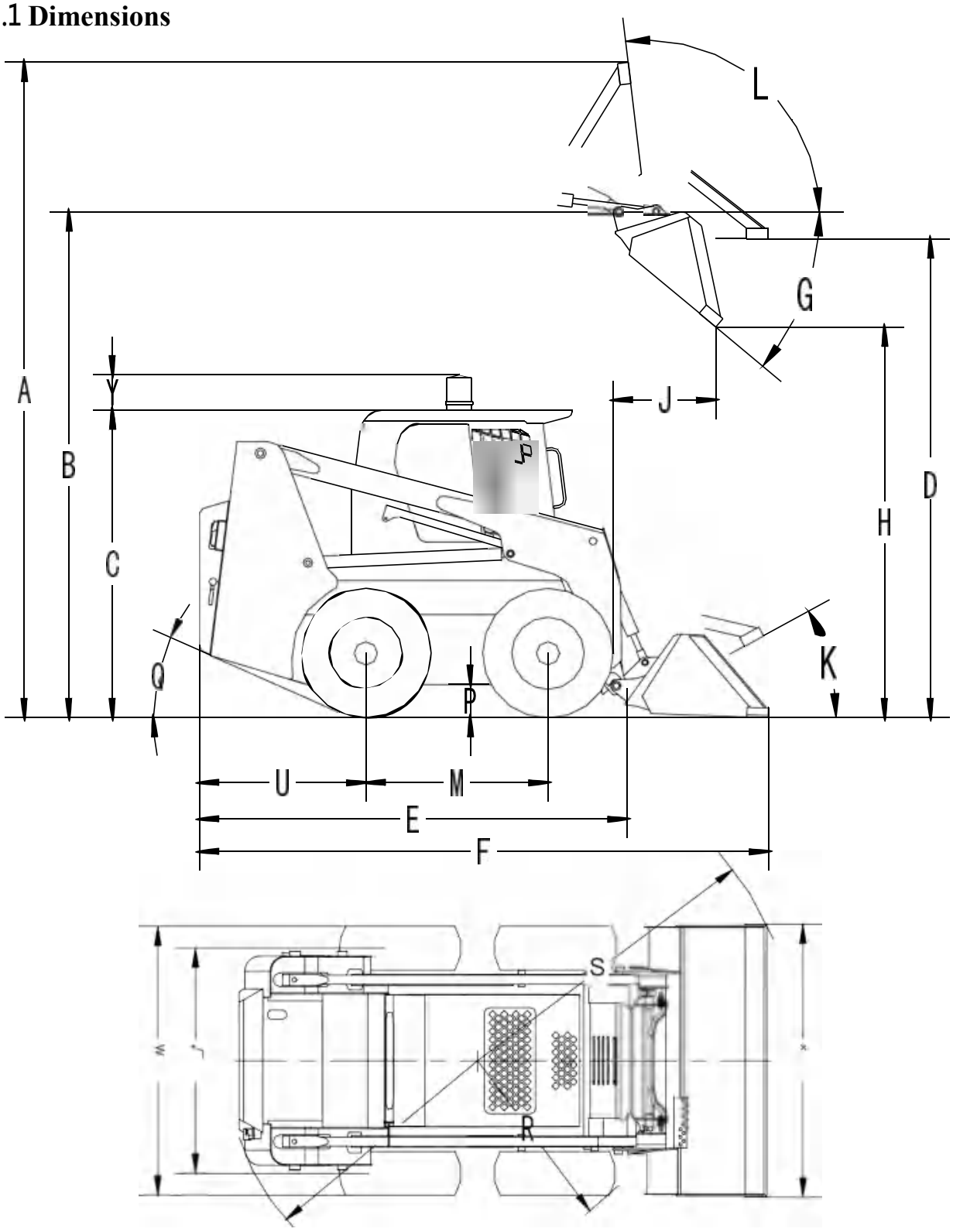



图 2-1

Figure 2-1

| code | project | ws60 | | | |
|---|---|---|---|---|---|
| A | Vehicle operating height | 4058mm | | | |
| B | Bucket hinge pin height | 3077 mm | | | |
| C | Maximum height at the top of the cab | 1900mm | | | |
| D | Horizontal height of bucket bottom | 2908mm | | | |
| E | Total length (without attachments) | 2641 mm | | | |
| F | Total length (with standard shovel) | 3413 mm | | | |
| G | Unloading angle (at maximum height) | 40° | | | |
| H | Unloading height (working arm fully raised) | 2300mm | | | |
| J | Unloading distance (fully raised working arm) | 675mm | | | |
| K | The collecting angle of the bucket on the ground | 30° | | | |
| L | The reverse angle of the bucket at the highest point | 103° | | | |
| M | axle | 999 mm | | | |
| P | Ground clearance | 185mm | | | |
| Q | Departure angle | 22° | | | |
| R | Front turning radius (without attachments) | 1230 mm | | | |
| S | Front turning radius (bucket on the ground) | 2075 mm | | | |
| T | Rear turning radius | 1627 mm | | | |
| U | Tail length | 1042 mm | | | |
| V | Track width | 1469 mm | | | |
| W | Total width (tire edge) | 1740 mm | | | |
| X | Total width (bucket edge) | 1700mm | | | |
| Y | Height of overhead warning light | 190mm | | | |

## 2.2 performance parameter

| performance parameter | ws50 | ws60 | | | |
|---|---|---|---|---|---|
| Rated load capacity | 750kg | 750kg | | | |
| Rated bucket capacity | 0.36m$^3$ | 0.36m$^3$ | | | |
| Whole machine weight | 2835 kg | 2835 kg | | | |
| Maximum driving speed | 12 km/h | 12 km/h | | | |
| maximum traction force | ≥25.40K N | ≥25.40KN | | | |
| gradeability | 25° | 25° | | | |
| Maximum digging force | ≥18.4KN | ≥18.4KN | | | |
| Boom lifting time | <5s | <5s | | | |
| Three terms of time and | <10.5s | <10.5s | | | |
| hydraulic system pressure | 21MPa | 21MPa | | | |
| Tire inflation pressure | 0.41-0.45MPa | 0.41-0.45MPa | | | |
| System Voltage | 12V | 12V | | | |
| Fuel (diesel) filling amount | 68 L | 68 L | | | |
| Engine lubricating oil filling amount | 10 L | 10 L | | | |
| Hydraulic oil filling amount | 70 L | 70 L | | | |
| Filling amount of left and right chain transmission oil | Each 17L | Each 17L | | | |

## 3. Engine

| engine parameter | ws50 | ws60 | | | |
|---|---|---|---|---|---|
| model | Perkins 404D | New Chai 498BG-506A | | | |
| type | Vertical inline water-cooled four stroke system | Vertical inline water-cooled four stroke system | | | |
| rated power | 35.7KW | 45KW | | | |
| rated speed | 2500 r/min | 2500 r/min | | | |
| MAXIMUM TORQUE | 115N.m (1800 r/min) | 143N.m (1800r/min) | | | |
| Rated fuel consumption rate | ≤238g/Kw.h | ≤238g/Kw.h | | | |
| Start mode | Electric starter | Electric starter | | | |
| Shutdown method | Manually turn off the engine | Manually turn off the engine | | | |

The preventive measures for operation, maintenance, and safety operation procedures provided in this manual are applicable to the intended use of this machine. If it exceeds the scope of use specified in this manual, Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. will not bear any safety responsibility, and the safety responsibility in such operations shall be borne by the user. Under no circumstances should operations prohibited by this manual be carried out.

# Chapter 3 Manipulation and Use

## 1 Management and usage methods for vehicles

The cab of the WS series skid steer loader is carefully designed according to ergonomics to provide you with a pleasant and comfortable operating environment.

First, let's familiarize ourselves with:

☆ Key: The WS series skid steer loader is equipped with three keys:

One electrical switch and engine key; One hydraulic oil tank and one fuel tank; One rear hood and door key.

☆Electrical instruments

Control panel and pedal

New vehicles undergo rigorous inspection and trial operation before leaving the factory. However, it is necessary for users to perform 8-10 hours of running in operation before starting to use them. Starting from idle operation, gradually increase the load, drive the vehicle empty, and operate the working devices to break in the friction parts of the machine. This can help the vehicle smoothly reach normal working conditions and extend the service life of the machine.

When using a new vehicle, please follow the following instructions:

☆Avoid letting the engine idle at high speed without load, especially when the engine has not yet warmed up.

☆Except in emergency situations, avoid sudden driving, sharp turns, and unnecessary sudden braking.

☆During the break in period, it is advisable to load loose materials and not operate too aggressively or quickly. During the running in period, the loading weight shall not exceed 70% of the rated load, and the driving speed shall not exceed 70% of the rated maximum speed.

☆Pay attention to the lubrication of the machine and replace or add lubricating oil according to the prescribed time.

☆Check the tightening of bolts and nuts of each component.

The following work should be carried out after 10 hours of running in and after the running in period of the new car:

1 ） Thoroughly inspect the tightening of bolts and nuts of all components, especially the fixing bolts of diesel engine cylinder head, hydraulic pump, hydraulic motor, and wheel rim nuts, which should be checked once.

2 ） Clean the oil filter and fuel filter.

3 ） Check the tightness of the fan belt, generator belt, and air conditioning compressor belt.

4 )Tighten the battery connector.

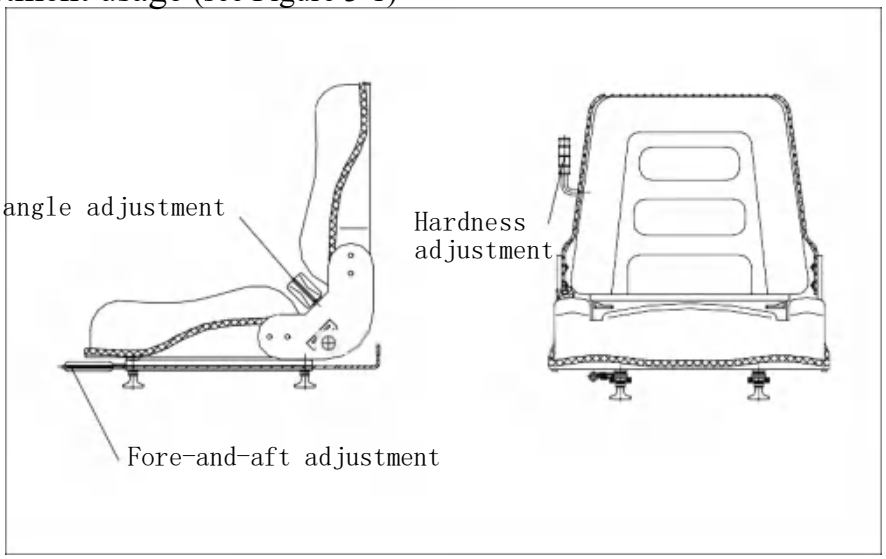
5 )Check the sealing of the hydraulic system.

6 )Check the connection and fixation of each control rod.

7 )Check the temperature and connection status of various components in the electrical system, the power supply status of the generator, and the working condition of lighting and turn signal lights.

## 2 Cab instruments and controls

### 2.1 Seat adjustment usage (see Figure 3-1)




Schematic diagram of seat adjustmentFigure 3-1

Function Introduction:

1 krest angle can be adjusted.

2 The seat cushion and backrest of the seat have good elasticity and shock absorption performance, increasing comfort.

### 2.2 Instrument display (see Figure 3-2):

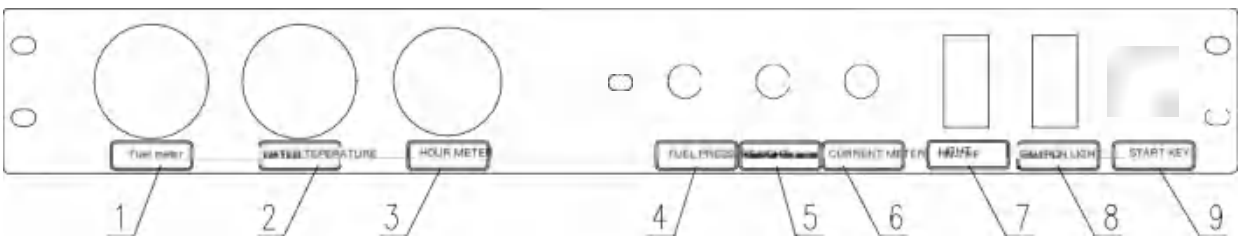
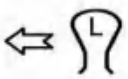
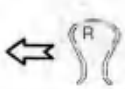
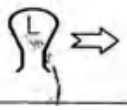
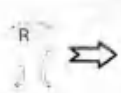



Figure 3-2 Schematic diagram of switch instrument

1 Fuel gauge 2 Water temperature gauge 3 Timetable 4 Engine lubricating oil pressure indicator light 5. Indicator light for plunger pump filter 6 Charging indicator light 7 Headlight switch 8 Warning light switch

9. Start key

| Position of left joystick | Whole machine action | Right joystick position | Whole machine action |
|---|---|---|---|
|  | forward |  | Lower the boom |
|  | backward |  | Lift the boom |
|  | 45 ° to the left front |  | Lift the boom while opening the bucket |
|  | 45 ° to the right front |  | Lift the boom and simultaneously retract the bucket |
|  | Left rear 45 ° |  | Lower the boom and open the bucket at the same time |
|  | 45 ° to the right rear |  | Lower the boom while retracting the bucket |
|  | turn left |  | Open the bucket |
|  | turn right |  | Retract the bucket |

## **2.4** Description of each operating component and indicator

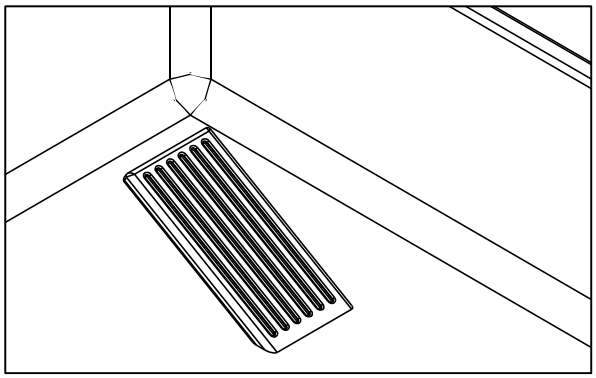
1 Pilot joystick

This machine adopts an advanced pilot control system, and only the pilot control handle needs to be operated to perform the operation of the working device and the walking of the whole machine Please pay attention to the signs on the control panel and operate correctly.

2 Throttle Control

There are two throttle control levers in the cab: the manual throttle control lever and the foot throttle pedal. The manual throttle control lever can be pulled back and forth and can be fixed at any position during its travel. The front end of the manual throttle control lever stroke is the minimum speed,

The final end is the maximum speed. The speed range is approximately 800-2450m. Fix the manual throttle control lever in the appropriate position according to the working conditions. The foot accelerator pedal is usually used to temporarily accelerate the engine. Use the foot accelerator pedal to accelerate the engine. It can control the engine speed from the set speed of the manual throttle control lever to the maximum.



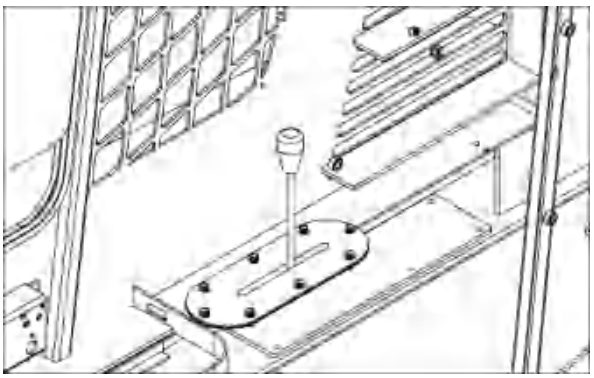


Figure 3-3

Attention: The manual throttle can only be operated after stepping on the foot throttle.

3 Auxiliary equipment control pedal

The auxiliary equipment control pedal is located in front of the operator and is used to control the flow of oil to the auxiliary equipment. There is a safety device on the assistive device control pedal, which must be lifted before using the pedal. Machines can be equipped with auxiliary tools such as excavators, shovels, hammers, milling machines, and so on.

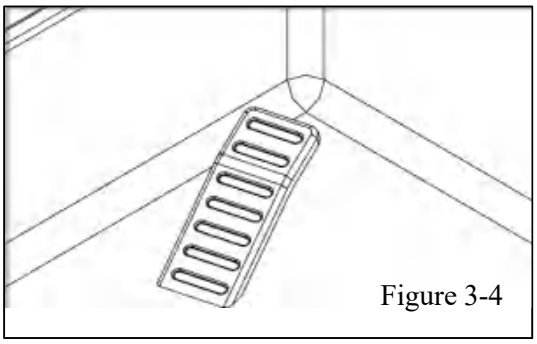


Figure 3-4

·Neutral: Hydraulic oil will not flow to the auxiliary equipment.

·Right gear: Hydraulic oil flows from a pipe to the accessory and then from

The other pipe flows back.

·Left gear: Hydraulic oil flows from one pipe into the accessory and then back from another pipe. In this case, the flow of oil is usually opposite to the right gear.

The control lever has the following functions:

·When the control lever is in the initial position, the auxiliary pedal will return to neutral when the pedal is not pressed.

·When pushing the control lever to the front position, once the pedal is pressed to the left, the auxiliary pedal will be locked. It remains on the left until the control lever is pushed forward to release the device.

When not using assistive devices, activate the safety brake.

·Do not use auxiliary equipment not provided or recommended by Fawei Heavy Industries.

·Always lock the safety brake when not using the auxiliary pedal.

·When connecting accessories, make sure the pedal is in neutral and lock the safety brake.

4 Parking brake system

Lift the cab safety lever and activate the solenoid valve. The hydraulic oil flowing to the brake is turned off, and the motor brake is applied. In this situation, the walking system is locked. Put down the cab safety lever and the parking brake will be cancelled.

5 The ignition switch

The ignition switch is used to control the ignition, shutdown, preheating, and circuit connection of the engine. It has three positions: off, on, and start.

a .The key must be turned to the "off" position before starting the engine; The engine ignition key can only be removed when the ignition switch is in the "off" position; Turn the key to the "off" position during engine operation to stop the engine.

b .Turn the ignition key to the "start" position to start the engine.

c .Immediately release the key after starting. When the key is released from the "start" position, the engine start key will automatically return to the "on" position.

Attention: If the engine cannot be started, turn the key to the "off" position first and start the engine again.

6 Oil pressure alarm indication

When the engine oil pressure is too low, this warning will be displayed. The machine should be stopped immediately, the engine should be stopped, and the cause of the fault should be identified. Do not operate the machine until the fault is resolved.

7 Safety Bar

The safety pole is very important for operational safety. If the vehicle suddenly stops during driving, it will provide protection for the operator and prevent them from rushing forward. It is also a safety device that locks the motor handle, and when it is held in a vertical position, the motor handle cannot work. To unlock, lower the safety lever to a horizontal position. This locking function is achieved through sensors located near the safety pole support.

8 charge indicator

This alarm indicates a charging system malfunction. The machine can operate when this warning is displayed. If the display does not disappear, immediately check the electrical components of the charging circuit and perform necessary repairs.

9 Reverse alarm

When reversing the entire machine, this device will automatically send an alarm message to remind nearby personnel to pay attention to safety.

10 Filter blockage indicator light

The filter blockage warning light will light up when the hydraulic oil filter is clogged. Stop the engine and replace the filter element.

11 Fuel level gauge

This level gauge displays the fuel level. The fuel tank capacity is approximately 80 liters. The red range indicates that the fuel level is less than

8 liters. When the machine is working, if the liquid level displays within the red range, please stop the engine and refuel.

12 voltmeter

This instrument indicates the system power supply voltage. Before starting the engine, the measured voltage is the battery voltage, which should be around 12V. After starting the engine, the measured voltage is the generator voltage, which should be around 14V.

13 engine oil pressure gauge

This gauge measures the engine oil pressure. If the engine oil pressure is too low, the machine should be stopped immediately, the engine should be stopped, and the cause of the fault should be identified. Do not operate the machine until the fault is resolved.

14 coolant temperature gauge。

This gauge indicates the temperature of the engine coolant. After starting the engine, please keep it idling until the coolant temperature reaches the green range before starting the operation. Once the temperature reaches the red range of overheating, please stop the engine immediately, check and analyze the cause, and carry out maintenance treatment.

15 wiper switch

This switch is located on the left-hand handle and is used to control the operation and shutdown of the front windshield wiper.

16 Far/low beam switch

This switch manages the operation of the front headlights. When the headlights are turned on at night, when the machine is traveling on the road and encountering other vehicles, it should be switched to low beam and the rest to high beam.

17 hours

In order to accumulate the working time of the loader (which is usually the power on time, i.e. the running time of the diesel engine), an hour meter is installed on the loader. The hour meter is an electronic structure.

# **3** manipulate

## **3.1** start

Before starting, a comprehensive inspection should be carried out around the machine, including the wear of belts, pipe joints, parts, working devices and hydraulic systems, as well as the liquid levels of engine oil, hydraulic oil, sprocket oil, coolant and fuel.

Before starting, the manual throttle control lever should be set to neutral, and the handle and accessory control should be set to neutral. Press the parking brake control handle, turn on the main power switch, lightly press the throttle, and then turn the key switch to the "on" position to start the diesel engine. After checking and confirming that all parts are normal, the engine can be started.

be careful:

1 The starting time should not exceed 5 seconds, and if it needs to be restarted, there should be a 2-minute interval. If it fails to start for three consecutive times, the cause should be identified before restarting.

2 The engine can only be started when seated correctly in the operating seat and the safety lever is lowered.

3 Before starting the engine, make sure there are no people or obstacles in the surrounding area, then honk the horn and start the engine.

4 Do not use startup aids as they can cause explosions.

After starting, let the diesel engine run at idle for 5-10 minutes, and closely monitor whether the monitoring and instrument displays are normal. Afterwards, before starting the car, the following should also be checked:

Are all switches, lighting fixtures, speakers, wipers, and control levers functioning properly.

Is there any leakage in each system.

Is there any abnormal noise from the engine and transmission system.

Is the braking reliable.

Is the working device functioning properly.

Do not operate or start the machine suddenly when the hydraulic oil is at low temperature.

When the coolant temperature reaches 60 ℃, lower the safety lever and slowly operate all the working device cylinders for a while.

## **3.2** Drive

### **3.2.1** Normal driving

After starting the engine, lower the safety lever, operate the right handle, lower the boom to the lowest position, retract the bucket, keep the center of gravity of the whole machine at the lowest position, turn the manual throttle control handle to the appropriate position, and operate the left handle to start driving.

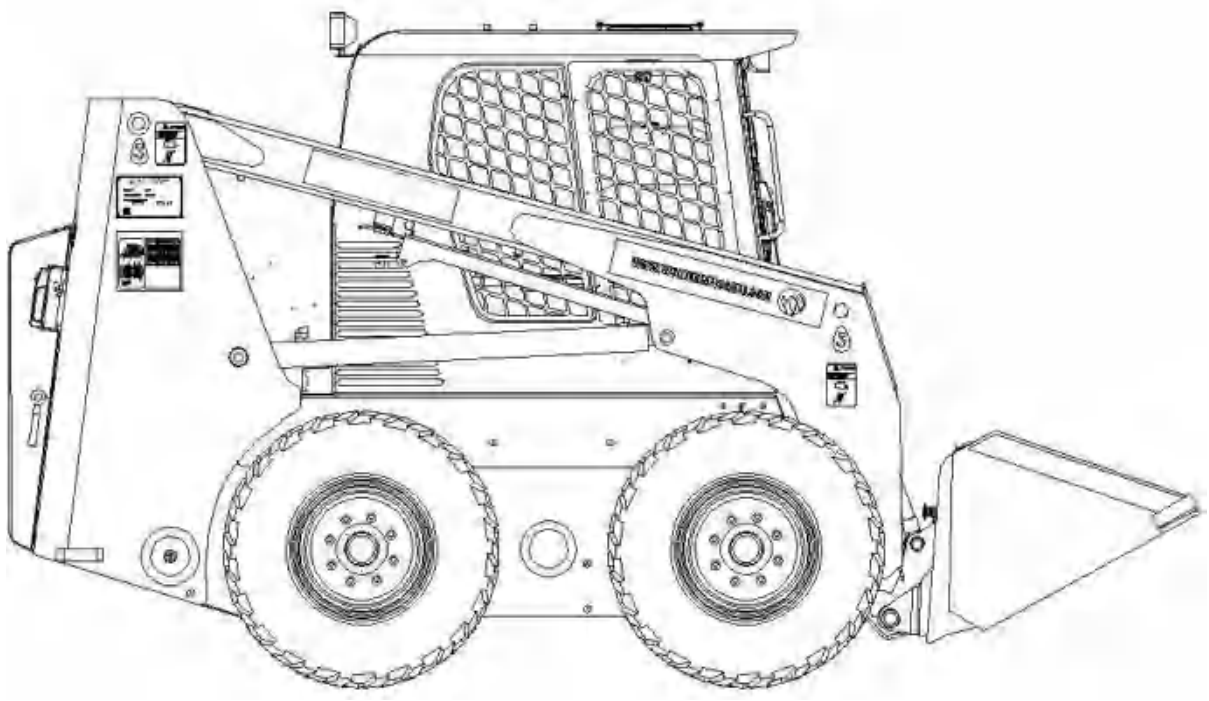


Figure 3-5

be careful:

·Before starting the machine, make sure to know all control functions and all safety regulations. Incorrect use of the machine may result in fatal consequences for the operator or the machine.

·When leaving, check if the area to be passed is safe and honk the horn before driving. If necessary, clean up all people and obstacles on the machine or route.

t start suddenly, as this will pose a danger to the operator and the machine.

·Be particularly careful when turning, reduce speed when turning, and do not suddenly change direction when the machine is driving at high speed.

·Do not operate the working device when the machine is driving at high speed.

·Before starting the machine, turn the rearview mirror to the appropriate position for you, and be very careful when reversing.

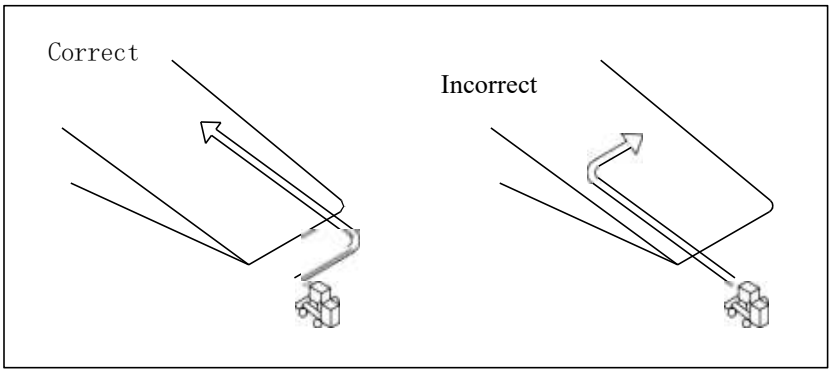
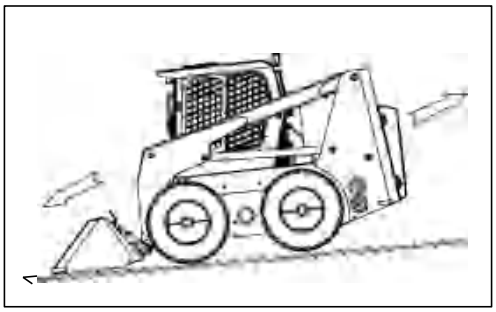



Figure 3-6

### **3.2.2** Driving on a slope

·Before driving up a slope, make sure that the parking brake control is in good condition.



·Do not change direction when driving on a slope and avoid driving diagonally on the slope.

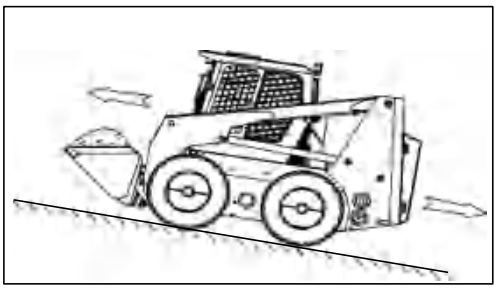
·When the bucket is empty, keep the bucket down, and when loading, keep the bucket up.

·Try to keep the bucket lowered and retracted as much as possible.

·In emergency situations, immediately place the bucket on the ground to assist in stopping the machine.

·When there is wet grass or thick layers of leaves covering the slope, it becomes very slippery. Do not drive on such slopes.

·Do not drive on slopes with an inclination of more than 15 degrees.



·When the fuel level is displayed within the red range, stand upright

Add fuel. If the fuel level is very low, machine diagram 3-7

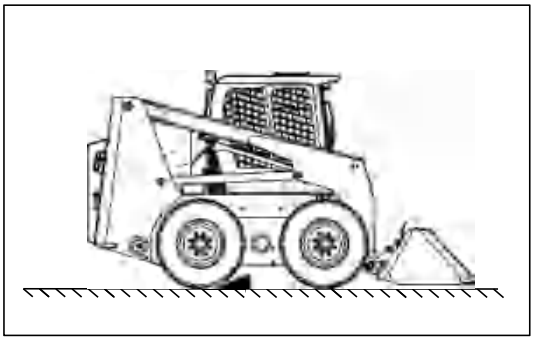
Tilting will cause the engine to suck in air and the engine will suddenly then stop.

### **3.2.3** Driving on non ordinary surfaces

·When driving on slippery surfaces, maintain low speed and prevent sudden stops or turns.

·When driving on an unstable surface, do not let the machine get too close to the edge of cliffs or deep ditches, otherwise it may cause the machine to tip over and fall.

·If it is inevitable to pass over obstacles, make sure that the obstacles will not cause the machine to tilt more than 10 degrees, maintain low speed, and try to keep the working device as low as possible to the ground.



## **3.3** Parking machines

·Keep the bucket level with the ground and grounded.

·Be sure to choose a safe place (flat and spacious) when stopping the vehicle.

Figure 3-8

·When maintaining the lifting of the boom, the safety device must be locked.

·If you want to park machines on the highway, please provide signal devices according to local regulations.

·If you need to park the machine on a slope, please follow the following procedure:

(1)When parking the machine, the bucket should be lowered.

(2) Lower the bucket and turn forward to stop on the field.

(3) Activate the parking brake.

(4) Stop the engine.

(5) Insert the wedge-shaped block under the wheel.

## **3.4** Stop the engine

Stop the engine according to the following steps.

1 Let the engine idle at low speed for about 5 minutes to gradually cool down.

2 Turn the ignition key to the off position to stop the engine.

3 Remove the ignition key from the switch.

4 Turn off the main power switch to prevent battery leakage.

If the engine suddenly stops, its working life will be reduced. Do not stop the engine suddenly unless it is an emergency.

### When transferring by truck

Use wedges and wire ropes to completely secure the vehicle on the carriage, preventing it from moving. Especially during loading and unloading, as well as when transferring on ordinary roads, attention must be paid to length, width, height, and weight to ensure safety.

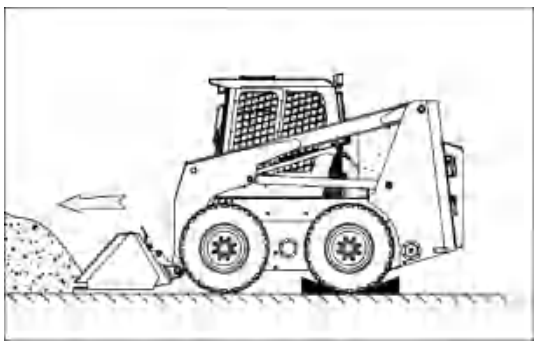
### ☆ Flatten the bucket

When parking or working, if you want to place the bucket flat on the ground, the boom lifting and bucket rotation of this machine can be combined simultaneously.

## **4** school assignment

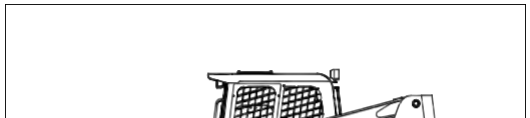
## **4.1** Loading operation

### **4.1.1** Loading on flat ground



1 The boom is fully lowered, and the bucket pen is facing forward, moving forward towards the bottom of the material to be loaded.

2 Drive forward towards the material, gradually lift the boom when the bucket is full, and retract the bucket to the end of the



stroke. Reduce the driving speed until the loading is complete.

3) The machine retracts and unloads the material at the location you want to stack.

Figure 3-9

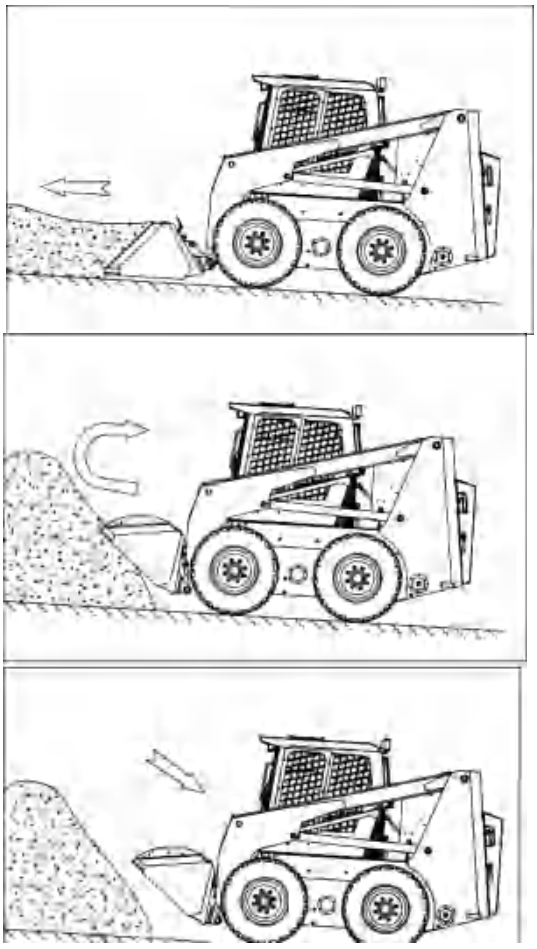


Figure 3-10

## **4.1.2** Loading on a Slope

·When loading on a slope, it is necessary to follow the rules for driving on the slope.

• ·Only load on slopes when absolutely necessary.

·When opening upwards, the bucket should move forward, and when opening downwards, move backwards and lower the bucket.

·Do not load materials from a higher position downwards, as this can easily cause the machine to tip over.

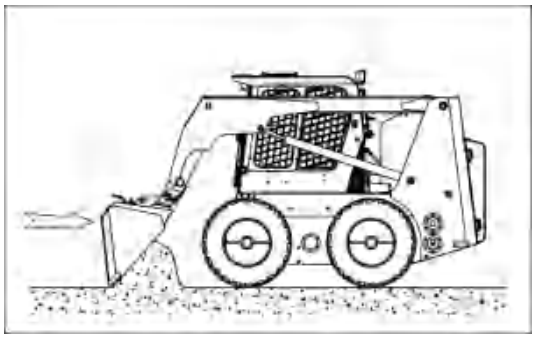
·Keep the bucket as low as possible at all times.

1 Lower the boom completely and push the bucket straight forward towards the bottom of the material to be loaded.

2 Drive forward towards the material, gradually lift the boom when the bucket is full, and retract the bucket to the end of the stroke. Reduce the driving speed until the loading is complete.

3 Lower the bucket and reverse it before unloading the material at the location you want to stack.

## **4.2** Land preparation operation



Utilize the angle formed by the loading bucket tip and the bottom surface. It can carry out land preparation operations such as sprinkling and leveling. Land preparation for business must be carried out with the vehicle moving backwards. Please follow these steps:

1 Tilt the bucket forward .

2 Lower the boom until the front wheels are slightly lifted. reverse side start the machine and evenly distribute the materials.

Figure 3-11

## **4.3** Soil spraying operation

Use a loading bucket to shovel into the sand, and while the vehicle is in reverse, tilt the loading bucket by 10 ° to 15 ° to evenly scatter the sand.

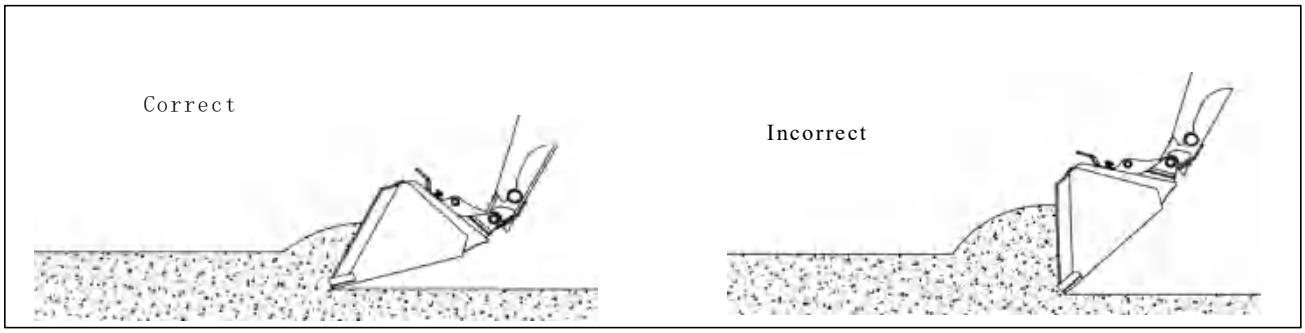



Figure 3-12

## 4．4 Excavation assignments

Incorrect mining operations can damage the machine. When mining, follow these steps and the correct mining method:

1 Adjust the bucket angle to the appropriate excavation direction at the beginning of the work.

2 Once the front edge of the bucket reaches the desired depth, move the machine forward and begin loading.

3 To increase efficiency, the combination position of the bucket and boom should be adjusted during loading.

4 The excavation depth must be suitable for the machine. Different types of

The ground will affect the excavation depth, and excessive excavation depth will make the loader unable to move or even stop the engine.

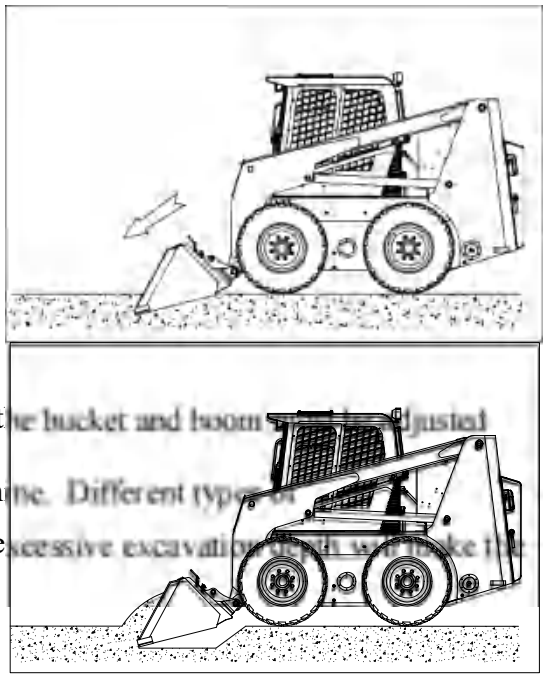


Figure 3-13

## 4.5 Snow removal operation

Please pay special attention to the following:

Although the snow removal operation of this vehicle is the same as general loading and unloading operations, it is different from general operations due to snow covered roads, resulting in wheel slippage and difficulty in steering.

Please avoid rushing forward, stopping, or rotating quickly, and work slowly and carefully.

Snow removal operation instructions:
When the visibility is affected by fog, please confirm safety before proceeding.

·Please be aware of any obstacles that are not under the snow

·To confirm the location of the road ditch and curbstone

·To use tire anti-skid chains, install them on the driving wheels. This vehicle requires 4 tire anti-skid chains.

# **5** The use of quick change devices

## **5.1** Points for attention

The machine is equipped with a quick change device to facilitate the installation of buckets or other suitable accessories. The quick change device is suitable for different types of work devices recognized by Fuwei Heavy Industry. Some preventive measures for locking and releasing work devices:

·Choose a flat surface to load and unload the bucket and ensure that the machine is stably parked on the ground.

·Before releasing the bucket, lower it to the ground so that the bottom of the bucket is directly on the ground.

·Do not turn the quick change device while driving.

·After installing the bucket and before starting the operation, check that the pin is correctly inserted.

·Do not align the pin with your hands, as this may cause injury.

·Keep the surrounding area of the institution clean.

·After parking brake, get off the machine and then turn the two handles, otherwise it may cause you injury or death.

·When the boom is lifted, do not release the bucket or other auxiliary equipment.

## **5.2** Lock the bucket

Please follow the steps below to install the bucket or other auxiliary equipment:

1) Rotate the two handles to completely unlock the connecting pin.

2 Start the machine and align the quick change device with the bucket.

3 Slowly start the machine and bring the quick change device closer to the bucket until surface A contacts surface B.

4 Raise the boom and retract the quick change device to ensure proper connection with the bucket, then fully retract the bucket.

5 Stop the engine, release residual pressure, apply the parking brake, lift the safety lever, and leave the machine.

6 Rotate the handle backwards to the locked position.

7 Check if the locking pin is correctly inserted into the fixed position.

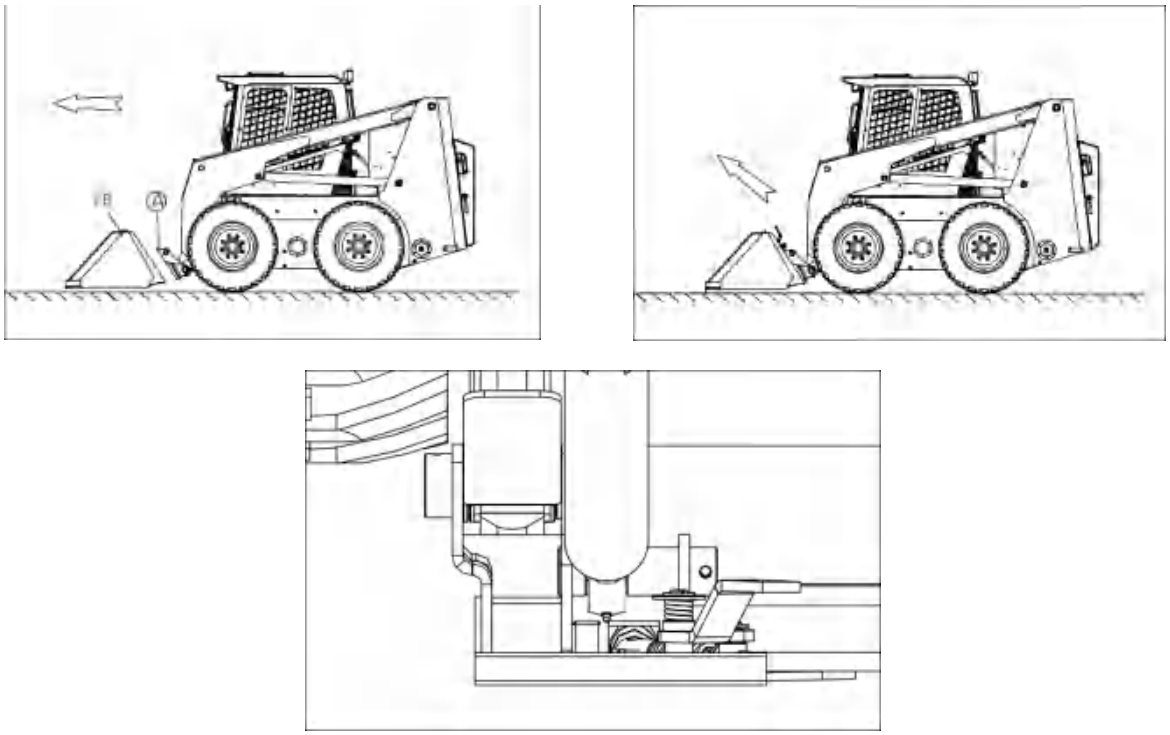



Figure 3-14

## **5.3** Release the bucket

Follow these steps to release the bucket or other attachments:

1 )Drive the machine to a level and stable ground.

2 )Place the bucket on the ground and tilt it forward to ensure that the bottom is firmly resting on the ground.

3 )Stop the engine, release residual pressure, lift the safety lever, and leave the machine.

4 )Rotate the handle to completely unlock the connecting pin.

5 )Enter the machine, start the engine and release the parking brake.

6 )Slowly reverse, while lowering the boom a bit and turning the quick change device forward, its upper part will leave the bucket seat.

7) Place the bucket on the ground and tilt it forward to ensure that the bottom is firmly resting on the ground.

8) Stop the engine, release residual pressure, lift the safety lever, and leave the machine.

9) Rotate the handle to completely unlock the connecting pin.

10) Enter the machine, start the engine and release the parking brake.

11) Slowly reverse, while lowering the boom a bit and turning the quick change device forward, its upper part will leave the bucket seat.

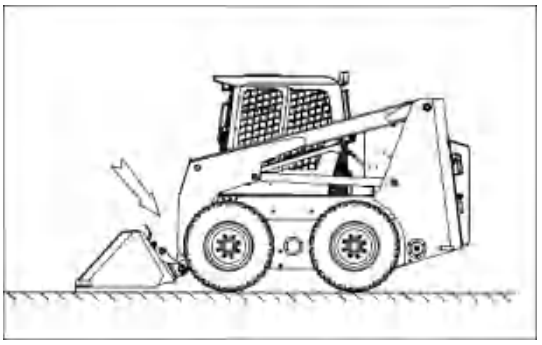


Figure 3-15

## **5.4** Adjusting the quick change mechanism

·Make sure the bucket is securely parked on the ground before adjusting the quick change mechanism.

·Quick change devices must be adjusted regularly to ensure they function properly.

·The mechanism has a spring used to adjust the force required to rotate the handle.

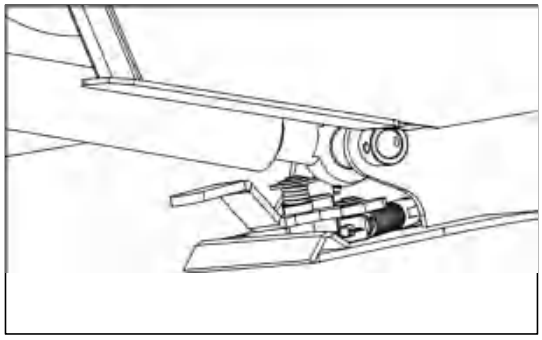


Figure 3-16

## **6** Maximum height immersed in liquid

·If water enters the engine compartment, it will cause damage to the machine.

·Try not to immerse the machine in liquids deeper than 200mm.

·Ensure that the bottom surface is strong enough.

·After immersing the machine in liquid, clean the machine and lubricate it as shown in sliding joint

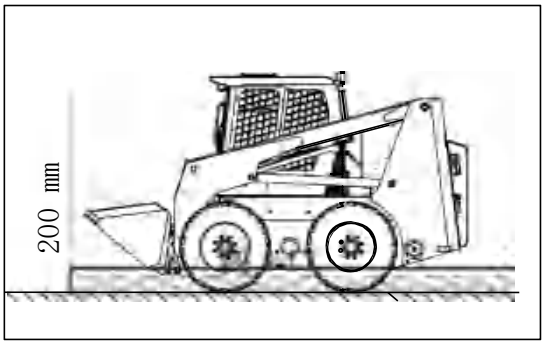
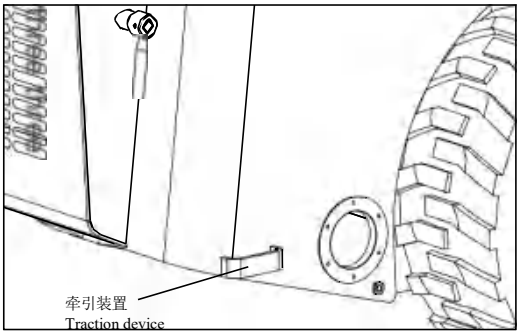



Figure 3-17

## **7** Move the machine with a towing hook




·Use only strong enough cables to drag the machine.

·Do not drag the machine for long distances

·If the machine gets stuck in the mud or loses control, other equipment is needed to move the machine, using a strong enough cable to pass through the towing hook at the back of the machine to drag it.

## **8** Start the machine through auxiliary wires

Before starting the machine with auxiliary wires, carefully read the safety regulations. Always strictly adhere to safety regulations.

·Ensure that the voltage of the two machines is the same and the capacity of the auxiliary battery is greater than or equal to the other battery.

·Ensure that the auxiliary wires can accommodate sufficient current and are in good condition.

·When connecting wires, avoid any connection between the two terminals (+and -). To connect the auxiliary wires and start the engine, follow these steps:

1 Bring the two machines closer and reach a distance suitable for connecting auxiliary wires, but do not let the two machines come into contact.

2 Connect the positive terminals of two electrical appliances with a wire.

3 Connect the negative terminal of the auxiliary battery to the ground terminal of the exhausted machine engine.

4 Start the engine of the machine with auxiliary batteries and reduce its speed.

5 Start the engine of a machine with a depleted battery. After starting the machine, release the auxiliary wires as follows:

1 First, loosen the negative connection from the engine ground, and then loosen the connection from the battery.

2 First, release the positive connection from the rescue battery, and then release the connection with low battery life.

## **9** Usage and Instructions

The WS series skid steer loader is a complex engineering machinery product composed of many components. It is necessary to master the correct and reasonable usage methods in order to better exert the performance of the whole machine and ensure the safety of the user.

## **9.1** Explanation on Driver Training

The driver of this machine must undergo specialized operation training, be familiar with the structure, performance, and working principle of the loader, and pass the examination before operating this loader.

## **9.2** Instructions for pre start inspection

Before starting work every day, carefully inspect the machine and adhere to daily maintenance and upkeep work. If any abnormal state is found, immediately report to the management personnel for repair before starting the operation.

1 Check all fasteners for looseness or loss.

2 Check if the electrical wiring harness is worn or scratched, if the fuse is intact, and if the connectors are securely connected.

3 Check whether all structural components and coverings have been deformed or damaged by impact, and whether they have been installed correctly and firmly.

4 Check if the engine and fuel system oil levels are normal, and promptly drain any water or sediment from the oil-water separator.

5 Check whether the hydraulic system leaks oil, and inspect whether the hoses and steel pipes are worn with other parts.

6 Check whether all safety protection devices such as doors, guards, covers, etc. are installed correctly. If they are damaged, they should be repaired in a timely manner.

7 Wipe away dust from the machine, especially from the engine area.

8 Replace all damaged or lost parts according to the manual requirements and perform necessary lubrication work according to the lubrication points on the regular maintenance table.

9 Foreign objects or grease on the pedals and handrails can cause accidents, and the pedals and handrails should be kept clean.

10 Remove all loose objects from the cab, as they may affect handling and cause accidents.

11 Ensure that all windows in the machine cab are clean and the wipers are functioning properly.

12 Check whether the tires are worn and whether the tire pressure is normal.

13 Before operating at night, check all lighting equipment to ensure that the lighting system is in good condition.

14 Adjust the rearview mirror to the appropriate position so that the operator has a good field of view. If the glass of the rearview mirror is damaged, it should be replaced with a new one.

15 Adjust the operator's seat to an easy to operate position and check whether the seat belt and its fixing device are damaged. After three years of use, seat belts must be replaced.

16 Check if the fire extinguisher is functioning properly.

## **9.3** Instructions for checking after starting the machine

Before operating the machine after starting it, the following checks should be carried out to ensure that there are no safety hazards.

1 Check if there is any abnormal noise or vibration when the engine is running. If there is, it indicates that the machine may have a malfunction and should be immediately reported to the management personnel for repair before starting the operation.

2 In neutral mode, check the engine speed control.

3 Observe instruments, devices, and warning lights to ensure they are functioning properly and within the designated operating range.

4 Manipulate all control levers to ensure flexibility and ease.

5 Ensure that the backup alarm is functioning properly.

6 Before driving the machine, ensure that the parking brake is in the disengaged position.

## **9.4** Instructions for getting on and off the bus

1 Before getting on and off the machine, check the handrails or steps. If there are oil stains, lubricants, or sludge, they should be wiped clean immediately. In addition, damaged parts need to be repaired, and loose bolts need to be tightened.

2 Only climb up and down the machine where there are ladders and escalators.

3 When climbing up or onto a machine, one must face the machine and grab the escalator with both hands. Pull the armrest with your hands, step on the steps, and maintain three-point contact (two feet, one hand or two hands, one foot) to ensure a stable body.

4 Never grab any control lever when getting on or off the machine.

5 It is strictly prohibited to climb up or down while the machine is in motion.

6 It is strictly prohibited to jump on and off the machine.

7 Do not climb up or down the machine when carrying tools or other items. Use ropes to lift the required tools onto the operating platform.

## **9.5** Instructions for Driving and Working on a Slope

1 There is a risk of vehicles tipping over when crossing or changing directions on a slope. Such dangerous operations are not allowed.

2 Avoid turning on slopes. Only turn when the vehicle reaches a flat surface. On hills, embankments, or slopes

When doing homework, reduce the speed and use a small angle steering.

3 Drive at low speed and always pay attention to the tilting of the machine.

4 Try to avoid the machine working sideways on slopes as much as possible.

5 If the machine slides downhill, immediately unload the load and drive the machine down the slope.

6 Choose a suitable speed before going downhill and do not change it during the downhill process.

7 When walking on a slope, due to the vehicle's center of gravity moving to the front or rear wheels, careful handling is necessary and sudden braking should never be used.

8 When driving on hills, embankments, or slopes, keep the bucket close to the ground, about 20-30cm (8-12 inches) above the ground. In emergency situations, quickly lower the bucket to the ground to help the vehicle stop or prevent tipping over.

9 If you need to park on a slope, use wedges to cushion the machine tires.

## **9.6** Instructions for operating in enclosed spaces

1 When operating in a closed space, due to the risk of poisoning from the exhaust gas, good ventilation equipment should be used to introduce fresh air.

2 Additional fire extinguishers need to be installed, and their storage location and usage methods should be remembered.

## **9.7** Instructions for operating under special climatic conditions

1 When used in freezing weather, users should add antifreeze correctly and reasonably according to the actual minimum temperature in the local area, following the recommended ratio by the antifreeze manufacturer, to ensure that the coolant does not freeze at the lowest ambient temperature. If this cannot be guaranteed, the engine and water tank should be drained of coolant when not in use.

2 In freezing weather, high-quality diesel suitable for low temperatures should be used, and high-quality low viscosity hydraulic oil and engine oil should be used.

3 When working in cold regions, after completing the task, remove all water, snow, or mud stuck to wires, wire connectors, switches or sensors, and their coverings. If these things are not removed, the water in between them will freeze and cause the machine to malfunction during the next use, which may result in unexpected malfunctions.

4 When working in cold regions, thorough preheating work should be carried out. Before starting to operate the joystick, if the machine is not thoroughly warmed up, its response will be delayed, which may cause unexpected accidents. Operate each control lever to circulate the hydraulic oil in the hydraulic system (raise the system pressure to the set pressure, release the pressure, and return the oil to the hydraulic oil tank), in order to heat the hydraulic oil. This ensures that the machine has a good response and prevents malfunction.

5 Under abnormally high temperature conditions, attention should be paid to the engine water temperature indicator at all times to prevent overheating. If it exceeds the allowed

maximum temperature, it should be stopped for a period of time to cool down before use.

6 Heavy rain or dense fog can reduce visibility, making it easy to cause accidents. So glass, mirrors, and lighting fixtures should be kept clean and in good condition, and the speed should be reduced and appropriate lighting should be used until they can

Fully see all objects within the scope of work before proceeding with the operation.

7 When working continuously on rainy days, caution should be exercised as the working environment may change compared to when it first started raining.

8 When working in snow, the loading process can vary greatly depending on the type of snow. So the loading capacity should be reduced and care should be taken not to cause the machine to slip.

9 Working at altitudes exceeding 1500 meters will result in a decrease in machine performance.

10 This machine is only suitable for working under conditions of -10 ℃~40 ℃.

## **9.8** Instructions for operating under special environmental conditions

1 In areas with hazardous materials such as oils, cotton, paper, dry grass, chemicals, or flammable objects, be careful not to let the muffler spray or approach flammable materials.

2 In flammable and explosive environments, additional fire extinguishers should be installed and their storage location and usage methods should be remembered.

3 When working in noisy environments, appropriate hearing protection devices such as ear tips or earplugs should be worn to avoid damage to hearing caused by loud noise.

4 When working in a toxic gas environment, appropriate safety protective equipment should be worn and effective ventilation devices should be provided.

5 When working at the seaside, the machine should be thoroughly cleaned with clean water after operation, and electrical components should be regularly maintained to avoid corrosion.

6 When working in a dusty environment, the maintenance cycle should be shortened. Clean the air filter element at a shorter interval than the normal maintenance cycle; The exterior of the radiator should be cleaned regularly to avoid blockage of the radiator core; The fuel system filter element should be cleaned in a short cycle; The terminals of the AC generator and starter motor should be cleaned regularly.

7 When working in water or swamp areas or passing through sandy embankments, the first thing to check is the ground condition, water depth, and water flow velocity. It must not exceed the allowed water depth. After the work is completed, the lubricating oil filling area should be cleaned and inspected.

8 When walking in damp or soft places, attention should be paid to the sinking of the wheels or the braking effect.

9 After earthquakes and explosions, there are accumulations on the site, so be especially careful when working.

10 When working in areas with dangerous situations or poor visibility, one person should be designated to direct the traffic on the construction site.

11 Before entering narrow areas such as tunnels, overpasses, garages, etc., the site cleaning situation should be checked first.

12 When working at night, please remember the following points:

(1) Ensure that sufficient lighting equipment is installed.

(2) Ensure that the work lights on the loader are working properly.

(3) Working at night can easily create illusions about the height and distance of objects.

(4) During night work, it is necessary to frequently stop the machine. When stopping the machine, it is important to inspect the surrounding area and park in a safe location. When inspecting the vehicle, one must remain vigilant.

13 Instructions for working at high-voltage cables

1 Do not allow the machine to come into contact with overhead cables. Even close to high-voltage cables can cause electric shock. The safety distance shown in the table below should be maintained between the machine and the cable.

| | voltage | Minimum safety distance | |
|---|---|---|---|
| low pressure | 100~200V | 2m | 7ft |
| | 6，600v | 2m | 7ft |
| | | 2m | 7ft |
| high pressure | 22，000v | 3m | 10ft |
| | 66，000v | 4m | 14ft |
| | 154，000v | 5m | 17ft |
| | 187，000 | 6m | 20ft |
| | 275，000v | 7m | 23ft |
| | 500，000v | 11m | 36ft |

2 When there is a risk that the machine may come into contact with cables on the construction site, it is necessary to consult with the power company before starting the operation and check whether the actions determined according to current relevant regulations are feasible.

3 Put on rubber boots and rubber gloves. Place a rubber pad on the operator's seat and be careful not to let any exposed parts of the body touch the metal chassis.

4 Designate a signalman to issue a warning signal if the machine is too close to the cable.

5 If the working device touches the cable, the operator should not leave the cab.

6 When working near high-voltage cables, no one should be allowed to approach the machine.

7 Before starting the homework, check the voltage of the cables with the power company.

## **9.9** Instructions for using safety protection equipment and devices

1) When operating or maintaining machines, the necessary personal protective equipment should be determined based on the specific work situation.

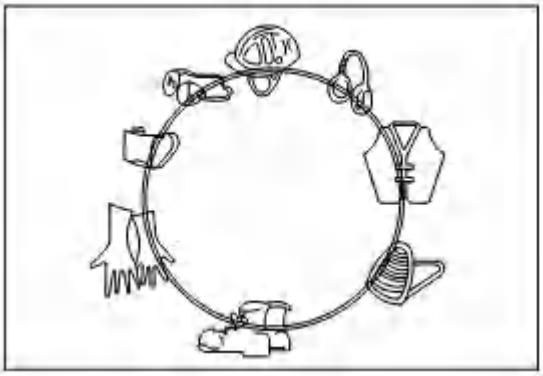


Figure 3-19

2 )When operating or maintaining the machine, hard material hats and safety glasses should be worn, safety shoes, reflective vests, face masks, earplugs, and gloves should be worn. When scattering metal shavings and small debris, especially when using hammers to nail pins and compressed air to remove air filter impurities, remember to wear safety goggles, hard material caps, and thick gloves.

Do not wear loose clothing, as it may buckle or get caught up in control systems or moving parts, causing serious injury or death.

3 )Remember not to wear greasy clothes to prevent ignition.

5 )All protective equipment should be checked for proper functionality before use

6 )Before operating the machine, check the condition of the seat belt and fasteners, replace damaged or worn parts, and fasten the seat belt. After three years of use, seat belts must be replaced.

7 )The entire cab is equipped with an efficient fire extinguisher, and the operator should know how to use it correctly before operating the machine.

8 )Be sure to have a first aid kit at the work site. Regular checks should be conducted, and if necessary, additional medication should be added.

9 ) It is necessary to select the phone numbers of some personnel (such as doctors, emergency centers, fire stations, etc.) so that they can be contacted in case of emergency. These contact phone numbers should be posted in designated places to ensure that all personnel know these numbers and the correct contact methods.

## **9.10** Instructions for using tires

(1) Tires filled with gas can explode due to the heating of the gas inside the tire. Heating is generally caused by welding or heating of the wheel rim, external flames, or excessive braking that causes gas expansion

(2) A tire explosion is much more powerful than deflation, as it can cause the tire, wheel rim, and transmission components to fly out. The explosive force and debris can cause casualties and property damage.

(3)It is recommended to use dry nitrogen gas (N2) to fill the tires. If the tire was originally filled with air, it is recommended to adjust its pressure with nitrogen gas, which can be mixed with atmospheric gas. Tires filled with nitrogen can reduce the possibility of explosions, as nitrogen is non flammable and helps prevent oxidation, rubber aging, and corrosion of wheel rim components.

(4)In order to avoid excessive inflation, appropriate equipment and personnel training are needed to ensure that air leaks or wheel rim damage are caused by incorrect or improper use of inflation equipment.

(5)When inflating, stand on the side of the tire and use an automatic clamping clamp. When adjusting pressure, try to stay as far away from the tire as possible, and always stand behind the tire surface when adjusting.

(6)Repairing and replacing tires and rims may be dangerous and should only be done by trained personnel. If the correct methods are not followed to repair tires and rims, the entire assembly may explode and cause serious personal injury or death. Repairs should be carried out strictly in accordance with the operating procedures provided by tire or wheel maintenance personnel or agents.

(7)When checking the tire, do not enter the front and rear areas where the tire rotates, and should be done from its side. When dismantling or unloading tires, other tires must be fixed with wedges.

(8)When welding near the tire, special attention should be paid as the tire may explode.

(9)When replacing tires, it is necessary to ensure that the specified tire specifications are used, and the specifications and patterns of each tire should be consistent.

(10)As a basic principle, tires must be stored in a warehouse and unauthorized personnel are

not allowed to enter. If it is necessary to store tires outdoors, a fence should be set up around the tires and a "No Entry" sign should be hung.

(11)When storing tires, they should be placed in a dry and clean place. Moisture can accelerate the oxidation of rubber, and dirt or oil can be harmful tires cause corrosion. When storing tires, try to block light, insulate them from heat, and avoid air circulation. Tires stored should be covered with canvas, plastic cloth, or other dust-proof cloth. Incorrect storage will seriously affect the quality and service life of tires.

(12)Place the tire on a level surface and firmly wedge it with a wedge, so that even if someone touches it without consent, it will not fall over. If the tire is placed upside down with its side touching the ground, it will be flattened and its quality will decrease. Tires should be rotated at least once a month (90 ° rotation).

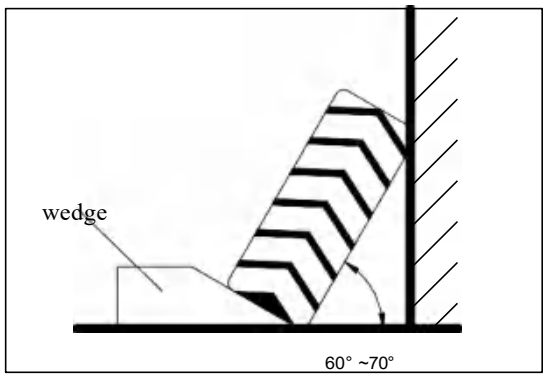



Figure 3-20

(13)If the tire is about to collapse, it should be avoided as soon as possible. The tires of construction machinery are very heavy, and attempting to hold them may actually cause serious injuries.

## **9.11** Instructions for using the bucket

(1) During driving, the bucket should be retracted to lower the center of gravity of the entire machine.

(2) When parking, the bucket should be placed flat on the ground.

(3) Pre confirm the weight and center of gravity of the load to avoid overloading.

## **9.12** Instructions for Rollover Protective Devices **(ROPS)** and Falling Object Protective Devices **(FOPS)**

(1) The rollover protection device ROPS and falling object protection device (FOPS) of Shandong Huachen Guanyue Engineering Machinery Co., Ltd are placed inside the cab frame structure and integrated with the cab. The installation of FOPS&ROPS is to prevent heavy objects from falling from above during machine operation and to protect operators in case the machine overturns. The RORS device can not only support the machine the load during tipping and the ability to absorb impact energy.

(2) If damaged due to falling objects or tipping, its strength will decrease and it will not be able to meet its normal protective function. In such a situation, you should contact Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. or its designated distributor to inquire about repair methods.

(3) Even if RORS is installed, effective protection can only be obtained if the operator wears a seat belt. When operating the machine

Be sure to fasten your seat belt. Even if no abnormalities are found, the seat belt should be replaced every three years.

(4) It is strictly prohibited to drill or weld holes inside or outside the cab to avoid damaging the built-in ROPS.

(5) When modifying the cab due to certain circumstances, in order to avoid the possibility of weakening the rollover protection device (ROPS) and falling object protection device (FOPS), please consult Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. If the structure is damaged or overturned, its protective performance will be weakened.

## **9.13** Instructions for using batteries

The electrolyte of a battery contains sulfuric acid, which can generate hydrogen gas. Therefore, improper handling of the battery can lead to serious injury or fire. Therefore, the following precautions must be strictly followed.

(1) After the battery is installed in the battery box, it must be securely fixed to prevent damage from bumps during driving.

(2) The terminals connected to the battery terminals must be tightly connected.

(3) It is necessary to keep the exterior of the battery clean and dry regularly.

(4) Metal objects should not be placed on the battery to avoid short circuits. Do not use metal tools such as screwdrivers or wires to directly short-circuit and generate sparks on the battery terminals to check if the battery is charged, in order to avoid burning out the battery terminals and causing further loss of battery capacity.

(5) Before performing any work on the electrical system and when removing the battery cable, to avoid self discharge or short circuit of the battery, the power switch should be turned on.

(6) Never place lit cigarettes or open flames near batteries.

Figure 3-21

(7) When working with batteries, wear safety goggles and rubber gloves.

(8) If the electrolyte in the battery splashes onto clothing or skin, immediately rinse with plenty of water.

(9) If the electrolyte in the battery splashes into the eyes, it can cause blindness. If electrolyte splashes into the eyes, rinse immediately with plenty of water and go see a doctor immediately.

(10) If you accidentally drink electrolyte, you should drink plenty of water or milk, raw eggs or vegetable oil, and immediately call for help from a doctor or emergency center.

(11) Before carrying out any work related to the battery, turn off the engine.

(12 ) To avoid short circuiting between the positive (+) and negative (-) terminals of the battery due to accidental contact with metal objects (such as tools).

(13) When installing a battery, the first step is to connect the positive (+) terminal. When disassembling the battery, first disconnect the negative (-) terminal (on the ground side).

(14) When disassembling or installing a battery, first check which one is the positive (+)

terminal and which one is the negative (-) terminal, and tighten the nut firmly.

(15) When cleaning the top surface of the battery, use a cloth to wipe it. Never use gasoline, solvents, any other organic solvents or cleaning agents.

(16) If the electrolyte of the battery has frozen, do not charge the battery and do not use other power sources to start the engine. This is dangerous and can cause the battery to catch fire. When charging or using other power sources to start the engine, the electrolyte of the battery should be melted and checked for leaks before starting.

(17)When repairing electrical systems or performing welding operations on machines, the negative (-) pole of the battery should be removed to prevent current flow.

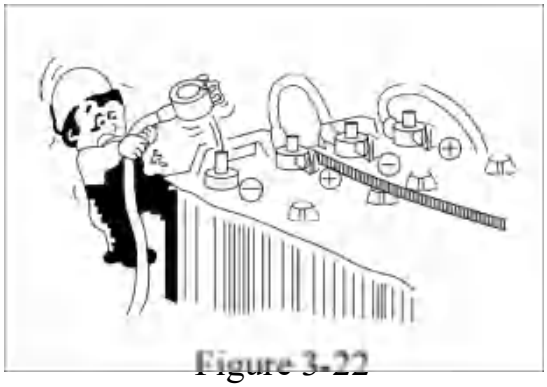


Figure 3-22

## **9.14** Instructions for Battery Charging

If the battery is not handled correctly during charging, there is a risk of explosion. Therefore, it should be carried out in accordance with the handling procedures of the battery and the charging procedures in the instruction manual, and the following precautions should be followed.

(1) Charging should be done in a well ventilated area, and the top cover of the battery should be removed. This can promote hydrogen diffusion and prevent explosions.

(2) Set the voltage of the charger to match the voltage of the charged battery. If the voltage setting is incorrect, it can cause the charger to overheat and catch fire, and may lead to an explosion.

(3) Connect the positive (+) charging clip of the charger to the positive (+) terminal of the battery, and then connect the negative (-) charging clip to the negative (-) terminal of the battery. Be sure to firmly tighten the two terminals.

(4) If the charging rate of the battery is less than 1/10, perform high-speed charging and set the charging current value below the rated capacity of the battery. If the charging current is too high, it may cause leakage or evaporation of the electrolyte, which may result in fire or explosion.

## **9.15** Information on the use of electrical devices

In order to ensure the safe operation of the loader, meet the needs of night operation of the loader, and improve the comfort of the loader's operation, this loader is equipped with lighting equipment, signal devices, as well as auxiliary equipment such as air conditioners and wipers.

1 lighting

The electrical system of the WS85 skid steer loader is equipped with lighting devices such as front headlights, rear headlights, work roof lights, and instrument lights. By manipulating the various light control switches on the dashboard, the on and off of these lighting devices can be controlled.

2 signal device

The local signal device includes turn signal lights, brake signal lights, alarm devices, horns, etc.

(1)Direction indicator lamp

The turn signal is used to indicate the direction of travel of the loader, with an orange lampshade controlled by the turn switch on the dashboard.

(2)Alarm device

In order to ensure safe driving and operation, and improve the reliability of the vehicle, an alarm device is installed on this loader. When the oil pressure is too low, the alarm device will emit an alarm signal. Alarm devices generally consist of sensors, red warning lights, and buzzers

(3)speaker

In order to ensure the safety of the loader during operation and to warn pedestrians and other vehicles, this loader is equipped with an electric horn that relies on electromagnetic force to vibrate the metal diaphragm and produce sound.

3 Auxiliary electrical devices.

The auxiliary electrical devices of this loader include electric wipers, air conditioning systems, etc

(1)Electric wiper

In order to ensure the normal driving and operation of the loader in rainy and snowy weather, an electric wiper is installed on the windshield, which consists of an electric motor, an automatic sprinkler, and a wiper switch. The operation of the electric wiper can be controlled by manipulating the wiper switch on the left switch box.

(2)Air drying device

The main function of the air conditioning system is to regulate the temperature, humidity, and flow rate of the air inside the cab, and to remove any strange odors

Harmful gases and dust are required to create a comfortable working environment. The air conditioning system mainly consists of an air conditioning compressor, condenser, liquid storage tank, evaporator, and pipelines.

Its working principle is that the air conditioning compressor is driven by the engine through the air conditioning belt, compressing the refrigerant into hot high-pressure steam. The hot high-pressure steam is sent to the condenser through a high-pressure pipe for heat dissipation. After the temperature drops, it becomes high-pressure liquid, which is sent to the storage tank for drying, and then sent to the expansion valve through a hydraulic pipe. After being throttled, depressurized, and cooled by the expansion valve, it enters the evaporator. Low temperature and low-pressure refrigerant liquid absorbs heat and vaporizes in the evaporator, causing the evaporator temperature to decrease. A hair dryer blows fresh air over the surface of the evaporator to cool it down and obtain cool air. The refrigerant vapor that absorbs heat and vaporizes in the evaporator is sucked into the compressor again through the suction pipe. Then repeat the above process, and the refrigerant circulates in the refrigeration system, continuously providing cold air to the cab.

## **9.16** Explanation of Electromagnetic Compatibility

The electromagnetic compatibility of the WS series skid steer loader meets the requirements of ISO 13766:1999 and IEC61000, which means that it can work normally in the electromagnetic environment of the machine and does not cause unbearable electromagnetic interference to anything in that environment.

## **9.17** Explanation on the attachment

1 When installing and using spare accessories, please read the instructions and manuals related to the accessories.

2 Do not use auxiliary equipment without the permission of Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. or its designated distributor. Using unauthorized assistive devices may pose safety issues, hinder the normal operation of the machine, and affect its lifespan.

3 Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. is not responsible for any damages, accidents, or machine damage caused by the use of unauthorized assistive devices.

4 Place the auxiliary equipment removed from the machine in a safe place and ensure that it does not fall off. Place railings around the assistive devices and hang "No Entry" signs to prevent unauthorized personnel from approaching.

## **9.18** Instructions for using commonly used spare parts - wedges

1 When the vehicle needs to park on a slope, after activating the parking brake, wedges should be used to pad under the two tires to prevent the entire vehicle from sliding down.

2 When transporting vehicles, wedges should also be used to block the front and rear of the entire machine to prevent its movement.

3 When the vehicle is not in use, wedges should also be used to block the front and rear tires of the entire machine to prevent unpredictable movement and avoid accidents.

## **9.19** Explanation on Waste Management

1 Improper disposal of waste liquids can harm the environment and ecology.

2 Before disposing of waste, appropriate disposal methods for waste liquid and batteries should be identified from the local environmental protection bureau.

3 Do not pour oil onto the ground, into ditches, or into rivers, ponds, or lakes

4 When dealing with waste liquid, appropriate containers should be used and food or beverage containers should not be used as they may cause accidental ingestion by others.

5 When the battery cannot continue to be used due to aging plates or other reasons, it should not be discarded at will, and the acid should not be poured randomly, otherwise it may harm oneself or other people and animals around, and pollute the surrounding environment. Waste batteries should be sent to the waste recycling department for disposal.

6 When dealing with harmful substances such as lubricating oil, fuel, coolant, solvents, filters, batteries, and other substances, relevant laws and regulations must be followed.

## **9.20** Explanation of Noise and Vibration

According to EU standards, the following noise levels are allowed:

$L_{PA}$: 85 dB (A)

$L_{WA}$: 101 dB(A)

$L_{PA}$: 85 dB (A)
$L_{WA}$: 101 dB(A)
The vibration value of the driver's seat is lower than the standard requirement. ( 98 / 37 /EC)

## **9.21** Information on training and qualification assessment for maintenance and repair personnel

The safety precautions section of this manual introduces the safety issues that should be paid attention to during machine operation, daily maintenance, and repair. Most accidents related to product operation, maintenance, and repair are caused by neglecting basic safety rules or protective measures. By paying attention to potential safety hazards before an accident occurs, accidents can be avoided. Relevant personnel must be familiar with potential accident hazards, undergo necessary training, possess certain skills, use tools, and troubleshoot. Incorrect operation, lubrication, maintenance, and repair can be dangerous and may result in personal injury or death. Before reading and understanding the content of operation, lubrication, maintenance, and repair, no operation, lubrication, maintenance, or repair can be carried out on the machine. The safety precautions and warnings are listed in this manual and on the product. Ignoring these warnings may result in injury or death to relevant personnel. We cannot predict

every hazardous work environment, therefore, the warnings in this manual and on the product cannot be comprehensive. If a tool, program, working method, or operating technique is not specifically recommended for use by us, you should pay attention to your own or others' safety. You should be able to ensure that the operation, lubrication, maintenance, or repair procedures you choose will not damage or put the machine in an unsafe state.

## **9.22** Instructions before maintenance

Before maintenance, the machine should be parked as follows, unless maintenance needs to be carried out in other parking methods.

1 Park the machine on a flat surface.

2 Lower the bucket to the ground. If it is necessary to lift the bucket for maintenance, be sure to use a hydraulic cylinder locking device to securely and safely lock the hydraulic cylinder.

3 Reduce the engine speed to idle. And run for 3 minutes.

4 Stop the engine: Turn the key switch to OFF and remove the key from the switch. If it is necessary to run the engine

(When carrying out maintenance, do not leave the machine unattended)

## **9.23** Precautions during maintenance process

1) When checking the engine oil level or changing the engine oil, the engine oil may be quite hot, so be careful not to get burned by the hot oil.

2) When cleaning the air filter element, the pressure of the compressed air should be reduced. Call on bystanders around to prevent flying debris and wear personal protective equipment, including goggles or safety goggles.

3) Do not loosen the radiator cooling water injection cap unless the engine has cooled down. You should slowly release the lid to the bottom and release all pressure before removing the lid.

4) Antifreeze is toxic, and if not careful, it may cause serious damage or death. If antifreeze is accidentally sprayed into the eyes, rinse the eyes with water for 10-15 minutes and implement emergency medical treatment. If accidentally ingested, causing vomiting, emergency medical treatment should be sought immediately.

5) When cleaning the exterior of the radiator with compressed air, the pressure should be reduced, bystanders should be moved away, debris should be avoided from flying, and personal protective equipment, including eye protection, should be worn.

6) When replacing hydraulic oil or oil suction filter, the hydraulic oil may be quite hot and should be left to cool before starting work.

7) During the operation, the components of the hydraulic system will become very hot, and the mechanical cooling must be allowed before starting the inspection.

8) Battery gas can cause explosions. Keep sparks and flames away from the battery and use a flashlight to check the electrolyte level.

9) The sulfuric acid in the battery electrolyte is toxic and highly corrosive, which can burn the skin. If splashed into the eyes, it may cause blindness.

If you are splashed with sulfuric acid yourself:

(1) Rinse your skin with water.

(2) Use caustic soda or lime to help neutralize the acid.

(3) Rinse your eyes with water for 10 to 15 minutes and immediately perform medical treatment. If sulfuric acid is accidentally swallowed:

(1) Drink a lot of water and milk.

(2) Then drink magnesium oxide lotion, stirred

egg liquid or vegetable oil.

(3) Immediate implementation of medical treatment

10) When performing battery maintenance, the grounded battery clamp should be disconnected first and then installed last.

## **9.24** Explanation on Maintenanc

Engine, hydraulic motor, working pump, walking pump, multi way valve and other hydraulic valve blocks, oil cylinders, pilot control handles and other components are relatively precise matching parts and require professional adjustment by skilled personneldoor execution. The rest of the daily maintenance and upkeep can be repaired by the operator.

## **9.25** Explanation on Regular Replacement of Wear Parts and Safety Critical Components

1 To ensure the safety of the loader during use, users must adhere to regular maintenance and upkeep. In addition, to further improve safety, users should regularly replace the parts given in the table. Because these parts are crucial in terms of safety.

2 The materials of these parts deteriorate over time or become more prone to wear and corrosion. Moreover, it is difficult to simply judge the condition of these parts based on regular maintenance. Therefore, regardless of their usage status, these parts should be replaced regularly to ensure their performance.

3 If it is not time to replace them but they are found to be not working properly, repair or replace them immediately.

4 When replacing the hose, be sure to replace the "O" ring, gasket, and other similar parts at the same time.

5 Please contact Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. or its designated distributor to replace safety critical parts.

## **10** Other important precautions

1) The driver of this vehicle must undergo specialized training and be familiar with this manual. They should learn the materials randomly provided by the machine, learn about the structure, operation, and maintenance of the machine, familiarize themselves with the positions and functions of various buttons, handles, instruments, alarm devices, etc., thoroughly understand the various rules and regulations in operation, and learn to use all signals in work.

2) New cars must be run in according to regulations before they can be put into normal operation.

3) After starting the cold car, the engine speed should be slowly increased until the engine oil temperature and pressure are normal before it can start working.

4) Please maintain low speed when starting and shoveling operations.

5) It is not advisable to drive at high speeds when going downhill.

6) High speed reversing is strictly prohibited in narrow areas.

7) Please slowly operate the handle of the walking and working device.

8) After the boom is lifted, no one is allowed to stand under the bucket and boom.

9) Please use the following prescribed oil products. Before refueling, please allow the oil to settle thoroughly before refueling. Diesel: Use 0 # or 10 # in summer; Winter -10 # or -30#
Engine oil: Mobil 15W-40

Chain drive oil: 85W/ 90GL-5

Wear resistant hydraulic oil: L-HM46 -10 ℃~40 ℃

Engine coolant: YF-2 -35 ℃~107 ℃

10)Various filters and cores should be cleaned regularly, especially when dust pollution is severe.

11)All kinds of pivot points should be filled with butter in a timely manner.

12)In cold regions, when the loader is not in use, the cooling water in the engine and water tank should be drained to prevent the engine and water tank from freezing and cracking.

13)Any modification without the permission of Shandong Huachen Guanyue Engineering Machinery Co., Ltd may lead to danger. Before modifying the machine, please consult Shandong Huachen Guanyue Engineering Machinery Co., Ltd. or its designated dealer. Shandong Huachen Guanyue Engineering Machinery Co., Ltd. is not responsible for any damage caused by unauthorized modifications.

14)Only authorized personnel are allowed to operate and maintain the machine.

15)Be familiar with and comply with all safety regulations, precautions, and instructions when operating and maintaining the machine.

16)Liquids such as fuel, lubricating oil, coolant, etc. should be stored in containers marked with corresponding labels, placed in a fixed location, classified and stored to prevent non staff use.

17)During operation, always sit in the seat and ensure that the seat belt and safety protection device are fastened. The vehicle should always be in a controllable state.

18)If driving on highways or expressways, you should first refer to the product manual, familiarize yourself with and comply with local regulations and road rules, ensure that signs, warning lights, and warning signs are in place, and turn on the warning lights used for slow driving signs. Be careful not to cause obstacles to road traffic, especially at intersections where you should pass quickly.

# Chapter 4 Main Component Structure and Working Principle

This machine consists of a power system, transmission system, hydraulic (including steering) system, braking system, working device, frame, and cab electrical equipment.

## 1 dynamical system

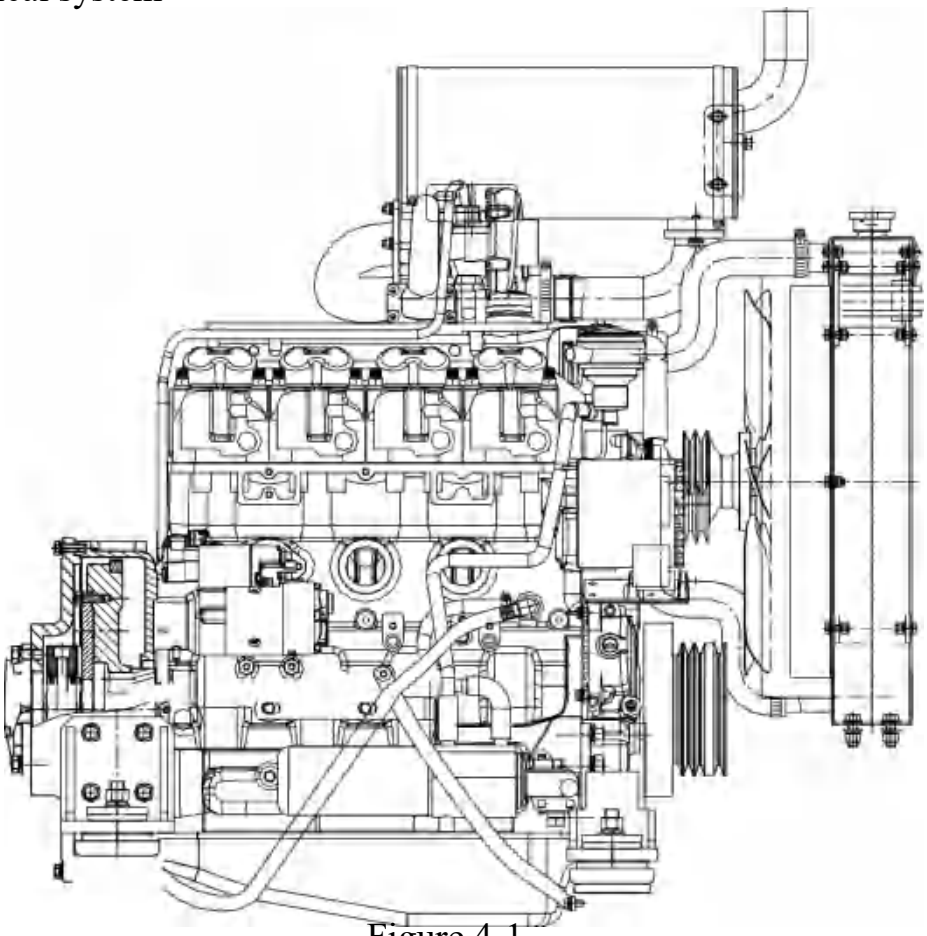


Figure 4-1

The power system of this machine mainly consists of the engine, air filter, muffler, radiator, diesel tank, throttle control system and its pipelines.

1) engine

The engine has good starting performance and low fuel consumption. For the structure, performance parameters, usage, technical maintenance, and troubleshooting of this diesel engine, please refer to the accompanying diesel technical data.

2)air filter

This machine adopts an air filter. This type of air filter is a paper filter that uses a blade non swirl coarse filter and an automatic dust removal rubber dust bag, which can automatically remove dust and has an ideal separation effect on rain and snow. The filter paper has a large area, low air intake resistance, high filtration efficiency, large dust storage capacity, long maintenance cycle, and long service life.

The air filter should be shut down for maintenance every 50 hours of use, and the filter element should be removed by blowing compressed air from the inside out or tapping lightly

Maintain the end cap and do not clean the filter element with oil or water. Replace the

filter element if it is damaged or has been used normally 5-6 times. The rubber dust bag should be vertically downward, and it is strictly prohibited to work without a rubber dust bag.

3)radiator

The radiator assembly consists of a water radiator and a transmission oil radiator, which respectively provide forced blowing and heat dissipation for circulating water and hydraulic oil.

The radiator must not have any leakage. The exterior of the radiator should be kept clean, and the interior should be kept unobstructed for good heat dissipation.

4)diesel tank

The diesel tank is located on the lower right side of the chassis and is mainly used for storing fuel. It consists of a tank body, a level gauge, a filter, etc. matters needing attention:

(1) In severe cold weather (where the ambient temperature is below freezing point) and antifreeze is not added to the coolant, when the vehicle is transported for a long distance or stopped, the engine body and radiator drain switch should be turned on to drain the water completely to prevent freezing and cracking.

(2) Regularly check whether the fixing screws of the fan are loose during use.

(3) Rainwater, softened tap water, or clarified river water should be used as cooling water, and well water should not be used as a substitute, otherwise it may cause scale formation in the diesel engine water chamber and lead to malfunctions. Diesel engines used in cold regions or winter can have antifreeze added to the cooling water to prevent it from freezing after parking. The commonly used antifreeze formulas are as follows:

(a) Alcohol 43% glycerol 15% water 42% (weight ratio)

(b)Ethylene glycol (ethylene glycol) 50% water 50% (volume ratio)

(c)Glycerol 66.7% water 33.3% (weight ratio)

(4) When refueling the diesel tank or maintaining the fuel system, it should be done outdoors, smoking is not allowed, and refueling and maintenance are not allowed near flames or spark areas. Before refueling, the engine must be stopped.

## **2** drive system

The transmission device consists of double row small chain wheels, transmission chains, large chain wheels, half shafts, wheel rims, tires, etc. Choose branded accessories that are reliable in performance and easy to maintain.

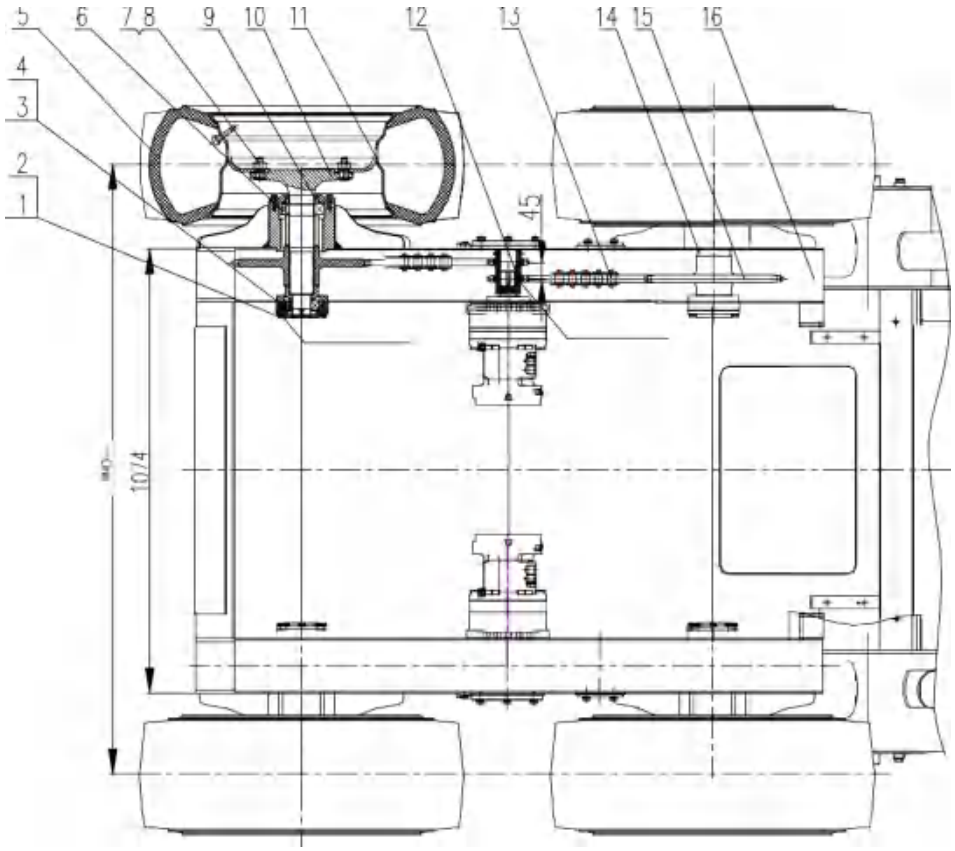



Figure 4-2

1. Bolt; 2. Spring washer; 3. Round nut; 4. Lock washer; 5. Tires; 6. Bearings; 7. Spherical nut; 8. Tire bolts; 9. Oil seal; 10. Output shaft; 11. Wheel rim; 12. Active chain wheel; 13. Chain; 14. Spacer sleeve; 15. Output large sprocket; 16. Vehicle body

## **3** Hydraulic system (including working and walking hydraulic systems)

Figure 4-3 shows the hydraulic system schematic of the WS series skid steer loader. It consists of the working system oil circuit and the walking system oil circuit.

The working system mainly consists of a quantitative gear pump, a multi way valve, an electromagnetic valve, a working pilot handle, a foot operated pilot valve, a boom lifting cylinder, a tipping cylinder, a hydraulic oil tank, an oil dispersion and its pipelines. Its function is to operate each pilot valve to apply pilot oil to the corresponding valve stem of the multi way valve, causing it to change position and control the lifting of the gear pump The supplied hydraulic oil acts on each corresponding cylinder to complete the correct action. Low pressure small flow controls high pressure large flow, making the operation more lightweight, flexible, smooth and reliable.

The walking hydraulic system is a static hydraulic variable closed system, mainly composed of a static hydraulic closed walking series pump, a static hydraulic closed walking motor, a walking pilot handle and its pipelines, etc.

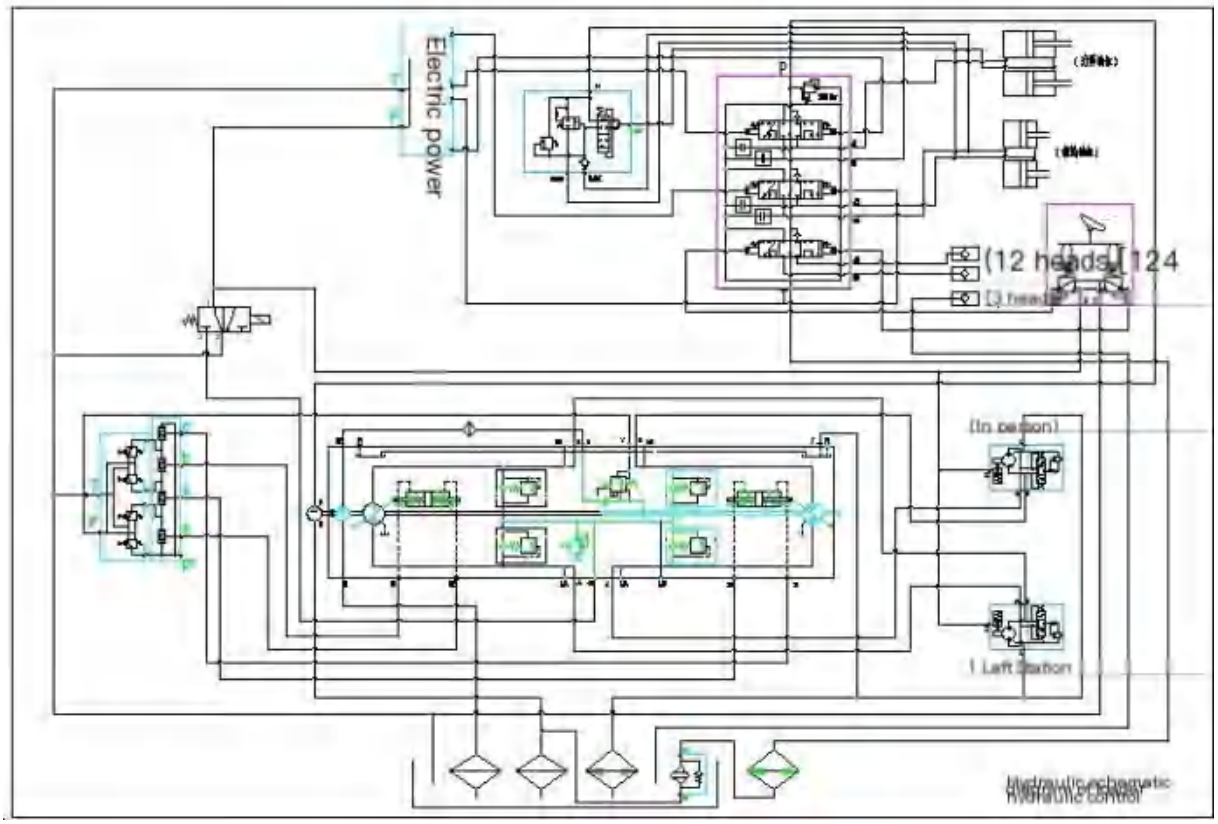



Figure 4-3 Schematic diagram of hydraulic system

After the hydraulic oil from the replenishment pump in the walking series pump enters the closed system, the pilot oil controls the corresponding plunger inclined plate of the walking series pump through the operation of the walking pilot handle, thereby controlling the displacement of the walking series pump, providing the motor, and obtaining the corresponding walking speed.

1）hydraulic oil tank

The hydraulic oil tank is located on the left rear side of the frame and consists of a casing, an oil gauge, a filter, and a return oil filter.

2)gear pump

This machine adopts a positive displacement external gear pump with fixed axial clearance.

When the oil pump is working, the driving gear rotates, increasing the volume of the oil chamber in the pump body. A local vacuum is formed in the disengagement area of the two gears, and hydraulic oil enters the suction chamber of the oil pump under atmospheric pressure. The oil between the two gears is enclosed by the side plate and the pump body cavity, and as the gears rotate, the oil is carried to the outlet chamber. At one end of the pump body's oil outlet chamber, due to the continuous rotation and meshing of gears, the volume of the oil chamber gradually compresses and shrinks, and the oil is discharged from the outlet and enters the working oil circuit. Under the action of external load, oil pressure is formed, thus completing the boosting effect on the hydraulic oil.

3)multi-way valve

The function of a multi way valve is to change the relative position between the valve core and the valve body, control the connection, disconnection, or change the flow direction of the corresponding oil circuit, thereby controlling the movement direction and speed of the boom cylinder or the tipping bucket cylinder, and achieving lifting actions at different working speeds.

4)Walking series pump

This machine adopts a slant disc axial piston variable displacement pump. Pilot oil applies hydraulic pilot pressure directly to the stroke piston through the pilot control port on the pump, thereby regulating the pump's displacement.

5)traveling motor

This machine adopts an internal curved radial piston quantitative motor with shaft output. According to the oil source provided by the variable pump, achieve its corresponding rotational speed and direction.

6)solenoid valve

Control the on/off of the working and walking pilot oil circuit through an electromagnetic directional valve.

7)pilot

Using a hydraulic pilot handle to control the oil source of the working and walking pilot oil circuit. The handle is in accordance with IS010968: 1995

Designed.

8)hydro-cylinder

This machine has two boom cylinders and two tipping bucket cylinders. The multifunctional auxiliary equipment oil cylinder selects different oil cylinders according to different auxiliary equipment. The structure and principle of these piston type double acting single rod oil cylinders are basically the same, mainly composed of cylinder body, piston, piston rod, and guide sleeve. As shown in Figure 4-10.

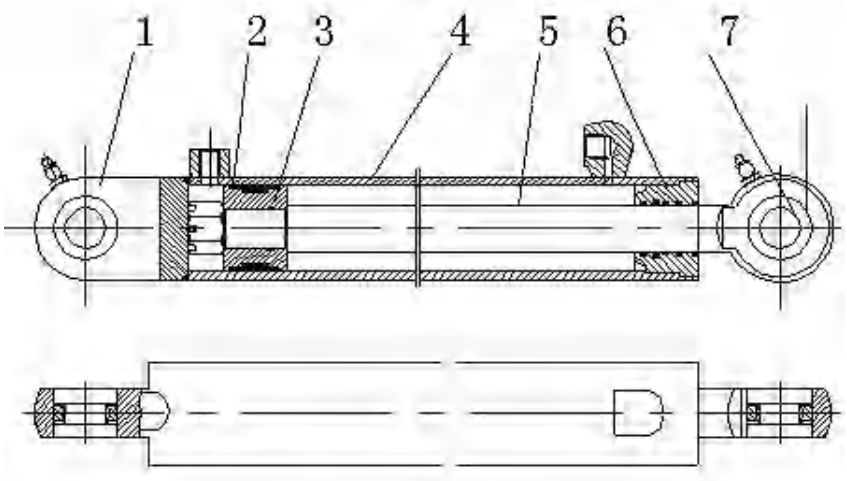


Figure 4-4 Schematic diagram of oil cylinder processing

1. Cylinder body 2.Sealing ring 3. Piston 4.Cylin
5. Piston rod 6.Guiding sleeve 7. Joint bearings 8.Earrings

For the convenience of analyzing problems, it is customary to divide oil cylinders into rod chambers (on the side with piston rods) and rodless chambers. Pressure oil enters the left chamber of the oil cylinder from the left oil port, pushing the piston to move to the right, and the hydraulic oil in the right chamber is discharged through the right oil port; On the contrary, if hydraulic oil enters the right chamber of the hydraulic cylinder from the right oil port, pushing the piston to move to the left, the hydraulic oil in the left chamber will be discharged through the left oil port. The characteristic of this single piston rod hydraulic cylinder is that the pressure bearing area on both sides of the piston is not equal, and the larger the diameter of the piston rod, the greater the difference in pressure bearing area. Therefore, when the oil supply pressure of the two chambers is equal, the thrust of the piston in both directions is not equal; When hydraulic oil with the same flow rate is input into both chambers, the speed of the piston's left and right reciprocating motion is also not equal.

During normal use, the operation of this hydraulic system is reliable, but if used and maintained improperly, various malfunctions may occur. Therefore, proper use and maintenance of hydraulic systems are important factors in extending their service life, ensuring stable, sensitive, and reliable operation. Therefore, the following points should be noted during use and maintenance:

1) When refueling the fuel tank, it is necessary to strictly filter and regularly check and clean the oil filter, and pay attention to maintaining the normal oil level height (at the center of the fuel gauge).
2) The oil quality in the system should be regularly checked and replaced according to the season. Generally, the oil should be changed after working for about 500 hours.
3) When starting the hydraulic system, the air should be completely expelled, and the machine should idle for 5 minutes before preventing air from entering the hydraulic system again.
4) All safety valves, leveling valves, overflow valves, etc. in the system must not be arbitrarily adjusted after factory settings. Each hydraulic component should not be easily disassembled. When complex hydraulic components need to be disassembled and repaired, it is best to send them to the manufacturer for maintenance.
5) During the operation of the system, in addition to constantly paying attention to the oil quantity, oil temperature (generally not exceeding 85 ℃), pressure, noise, etc., it is also necessary to check the working conditions of the oil pump, oil cylinder, multi way valve, motor, etc. For problems such as leakage and vibration in the entire system, the cause should be identified and eliminated in a timely manner.
6) For detailed instructions on the use of hydraulic pumps, multi way valves, motors, etc., please refer to the user manuals of the corresponding components.

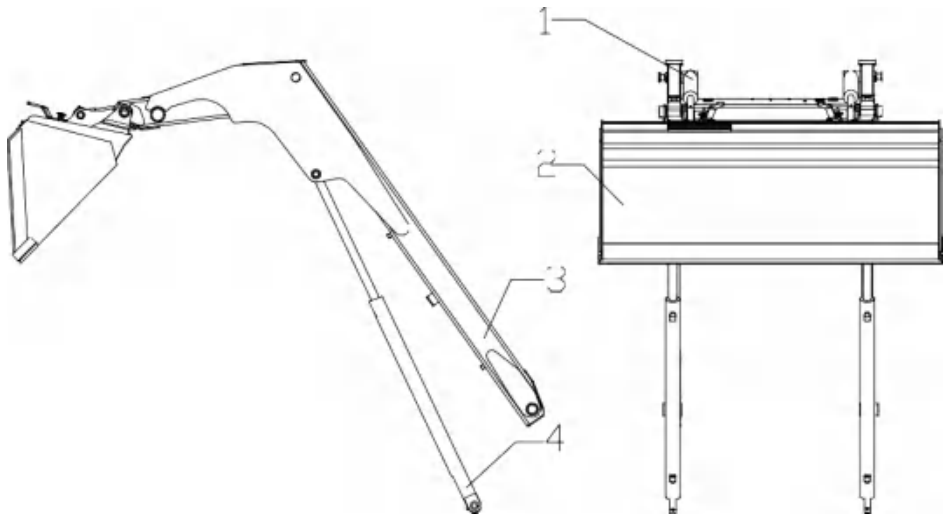
## **4** .Working device

The working device of a skid steer loader is the main working component of the machine. By replacing different tools such as buckets, cleaners, forks, and spiral drills, various tasks such as loading, cleaning the road surface, forklift loading, drilling, etc. can be achieved.

This machine is a small loader, and its working device mainly consists of a boom, a tipping bucket cylinder, a boom cylinder, and a bucket (see Figure 4-11). The unloading distance, digging force, and bucket tilt angle of this machine are all relatively large, making it easy to fill the bucket and preventing materials from scattering during the lifting process. During the work process, the boom lifting and bucket flipping can perform composite actions simultaneously. The boom adopts equalThe wide section rectangular tube arm structure is

supported on the front frame at the rear end, connected to the bucket at the front end, and connected to the boom cylinder in the middle. When the boom cylinder extends and retracts, the boom rotates around the rear end pin axis to achieve the lifting or lowering of the bucket. The rotary bucket oil cylinder is connected to the boom. When the rotary bucket oil cylinder extends and retracts, the bucket opens and closes and rotates, cooperating with the boom lifting and vehicle advancing and retreating to complete various operations.
The following issues should be noted when using the working device:

1) The loader should not be overloaded during operation. Frequent overloading can accelerate the wear and tear of the connecting pins and (shaft) sleeves, shorten their service life, and in severe cases, cause cracks and bending deformation in the welds of various components of the working device.
2) Butter (lubricating grease) should be regularly added to the pins and shafts of the connecting parts of the working device to extend their service life and ensure the normal operation of the working device.

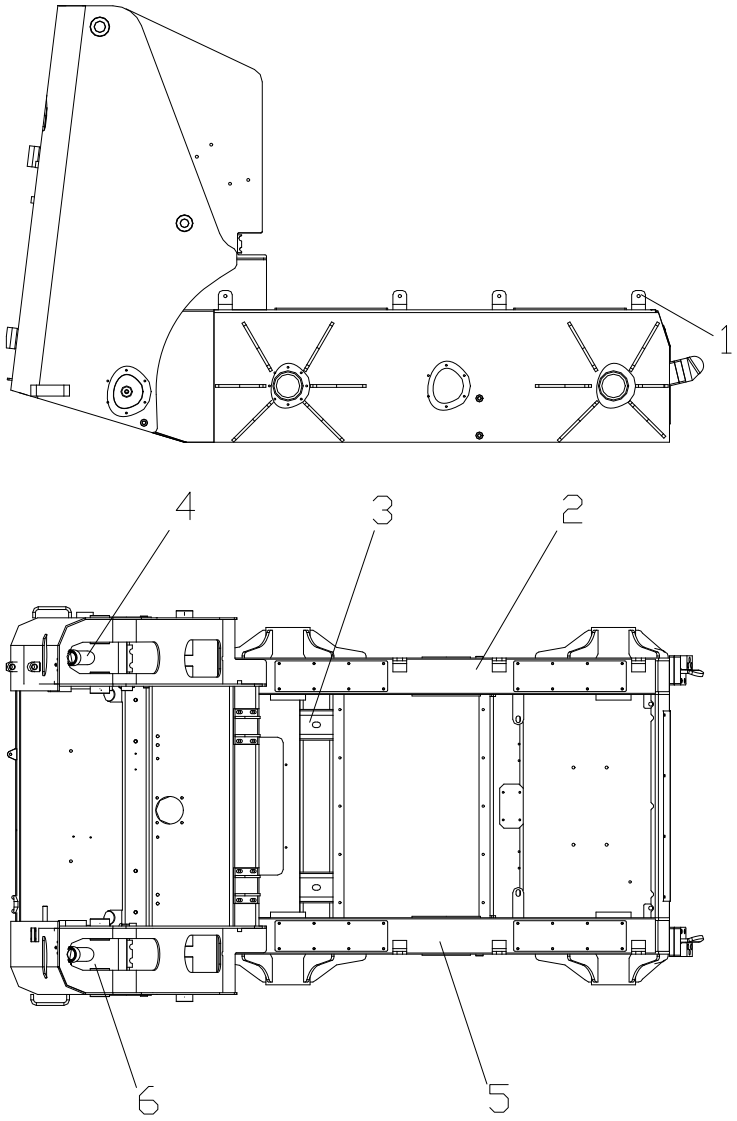



1. Rotary bucket cylinder 2. Bucket 3。 Boom 4. Boom cylinder

Figure 4-5

## **5 .**frame

=The frame is the base for connecting and installing all parts of the entire machine, mainly composed of four parts welded together: the fuel tank, hydraulic tank, and left and right sprocket boxes. The engine, mudguard, various hydraulic components, working arm, etc. are all installed on it. The frame has the characteristics of high reliability and reasonable layout after structural strength analysis.




| | | |
|---|---|---|
| 1. Mud blocking tile bracket | 2. Left sprocket box | 3. Engine bracket |
| 4. Hydraulic oil tank | 5. Right sprocket box | 6. Fuel tank |

Figure 4-6

## **4** electrical system

The electrical system consists of a generator, regulator, battery, starter motor, and lights

The electrical system of this machine is a 12V single wire system with a negative grounding. Key points for the use and maintenance of its main electrical components

The following is clear:

1) Generator: This system uses the built-in generator of Weichai engine, which is grounded with negative pole. The positive and negative poles cannot be reversed, otherwise the motor will be burned out. During use and maintenance, the following points should also be noted:

(1) When repairing the generator, it is not allowed to use a megohmmeter (shaking meter) or a 220V AC power supply to test the insulation performance of the motor. Only high internal resistance meters are allowed for measurement.

(2) It is strictly prohibited to short-circuit or conduct short-circuit tests on the positive and negative poles to avoid burning out the rectifier components.

2) Voltage regulator: Built in voltage regulator that can automatically stabilize the output voltage of the generator within a certain range.

3) Battery: This machine uses Walther 6-QW-100E maintenance free battery, 12V. 100Ah. This battery does not suffer from acid contamination; The fully sealed battery structure can completely prevent pollution and corrosion of the electrical circuit of the machine; Batteries do not require routine testing.

The battery is used to supply power to the starter motor and store excess electricity generated by the generator. When the generator is running at low speed or not working, the battery supplies the stored electrical energy to various electrical equipment of the loader.

The use and maintenance of batteries should pay attention to the following points:

(1) Every 150-200 hours of battery operation, the specific gravity of the electrolyte should be checked. When the specific gravity of the electrolyte drops below 1.150, the battery should be removed for recharging and charged to a specific gravity of 1.250 ± 0.005 in summer and 1.280 ± 0.005 in winter, indicating sufficient charge.

(2) The battery cannot be discharged at high speed for a long time, otherwise it will cause the terminal voltage of the battery to drop rapidly. If it drops below the termination voltage value (1.7 volts for a single cell battery) and continues to be used, it will prematurely damage the battery. Therefore, it is required that each discharge time should not exceed 10 seconds, and the interval between two discharges should not be less than 45-50 seconds.

(3) Although batteries have an extremely low self discharge rate. But the storage period after charging should not exceed 6 months.

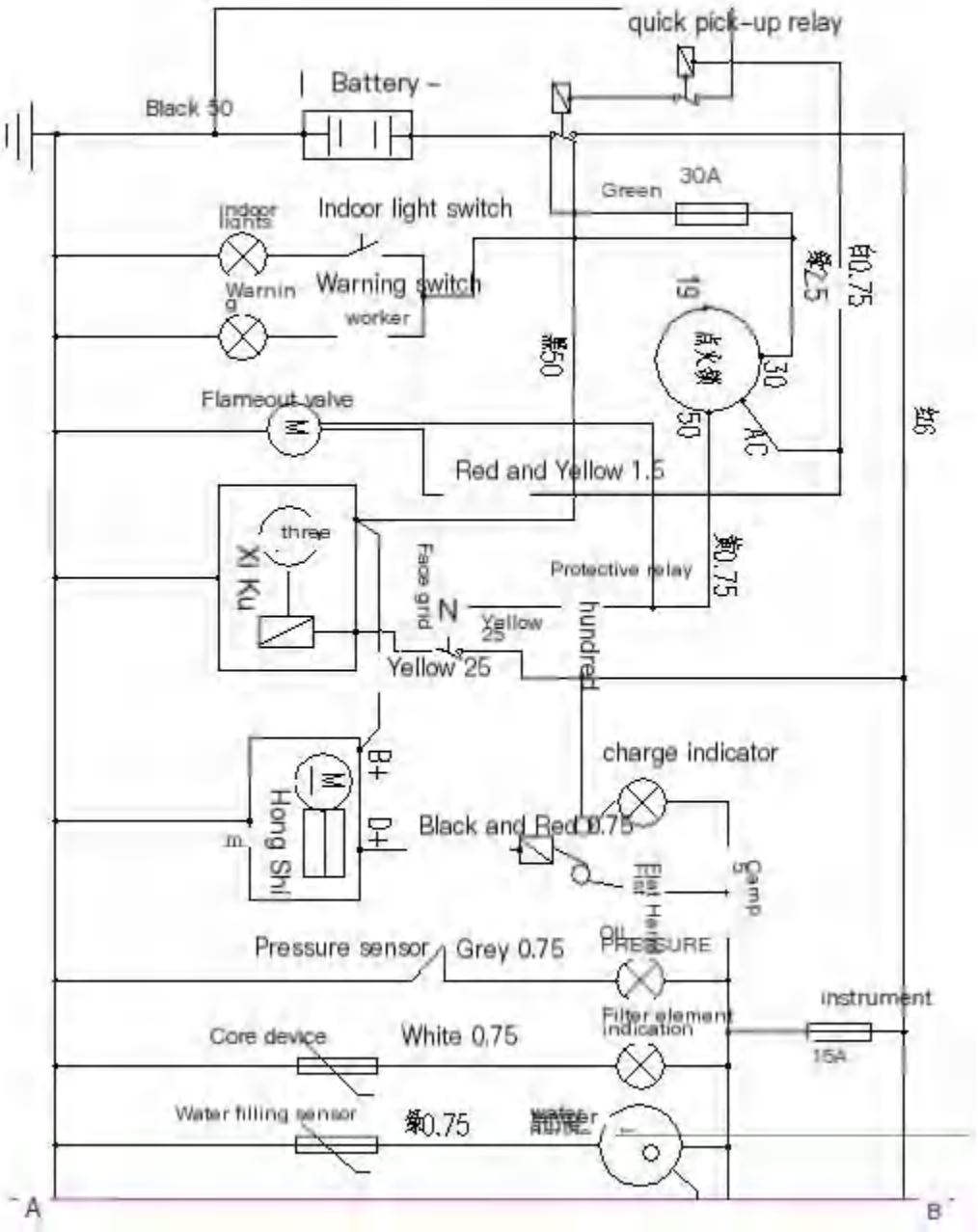
4)Attention should be paid to the following points when using the starter motor:

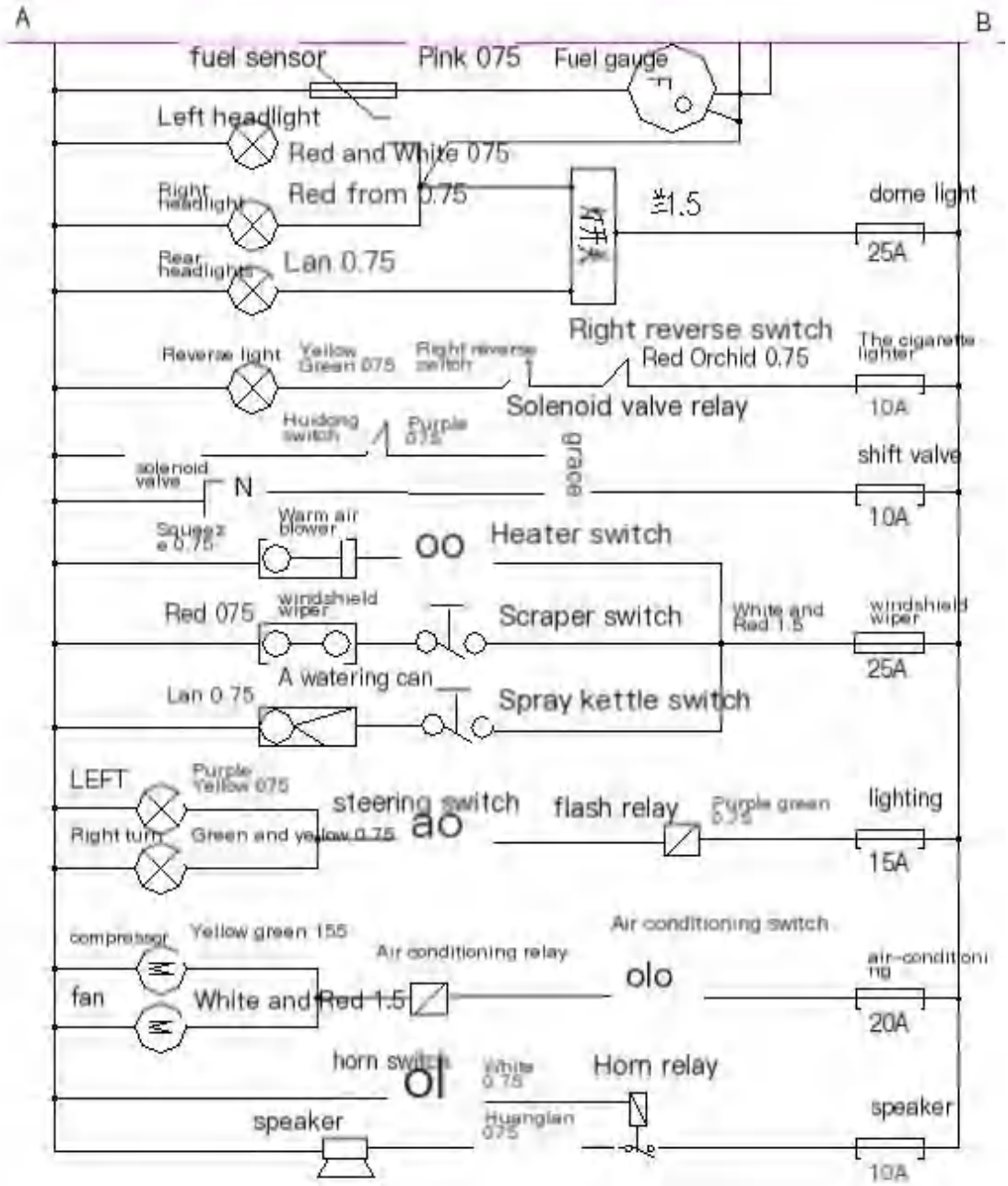
a.The working time of the starter motor should not exceed 10 seconds each time, and the interval between two starts should not be less than 45-50 seconds.

b. Regularly check whether the motor fasteners are firmly connected, whether the wire contact is good, and whether the wire insulation is damaged.

c. Regularly (usually every 250 hours of operation) remove the dust cover, check whether the commutator surface is smooth, and whether the electric brush is in good condition

Is there any jamming phenomenon inside the brush holder? Is the pressure of the brush spring normal? If excessive wear of the brush is found, severe sintering on the surface of the commutator or other faults, it should be immediately removed and repaired.


quick pick-up relay
Battery -
Black 50
Green
30A
Indoor light switch
Indoor lights
Warnin g
Warning switch
worker
19
30
50
AC
Flameout valve
Red and Yellow 1.5
three
Xi Ku
Face grid
N
Yellow 25
Protective relay
hundred
Yellow 25
charge indicator
B+
D+
Hong Shi
Black and Red 0.75
Flat
Clamp
Pressure sensor
Grey 0.75
PRESSURE
Filter element indication
instrument
15A
Core device
White 0.75
Water filling sensor
A
B


A
B
fuel sensor
Pink 075
Fuel gauge
Left headlight
Red and White 075
Right headlight
Red from 0.75
1.5
dome light
25A
Rear headlight
Lan 0.75
Right reverse switch
Reverse light
Yellow Green 075
Red Orchid 0.75
The cigarette lighter
Solenoid valve relay
10A
Hudong switch
Purple 075
grace
shift valve
solenoid valve
N
10A
Squeez e 0.75
Warm air blower
oo
Heater switch
Red 075
windshield wiper
Scraper switch
White and Red 1.5
windshield wiper
25A
A watering can
Lan 0.75
Spray kettle switch
LEFT
Purple Yellow 075
steering switch
ao
flash relay
Purple green 0.75
lighting
Right turn
Green and yellow 0.75
15A
compressor
Yellow green 155
Air conditioning relay
Air conditioning switch
olo
air-conditioning
fan
White and Red 1.5
20A
horn switch
ol
White 0.75
Horn relay
speaker
Huanglan 075
speaker
10A

# Chapter 5 Safety Precautions

This machine belongs to engineering machinery and plays a significant role in construction operations such as handling, loading, excavation, and land preparation. If used correctly, it can safely and fault free improve work efficiency. However, if used improperly, accidents and malfunctions may occur.

Drivers must undergo training on traffic rules, machine structure principles, practical operations, etc., and be able to comply with relevant laws and regulations on labor safety and road traffic before they can carry out driving and operations.

**For the happiness of you and others, do not forget to operate safely!**

## **1** common sense

### **1.1** General safety regulations

The following content is very important and operators must carefully read and follow it when operating and maintaining:

- Only authorized and experienced personnel are allowed to use or maintain the machine.
- The use and maintenance must be carried out in accordance with the safety regulations described in this manual.
- Use this machine only under good operating conditions.
- Do not overload.
- Operate the machine only when the operator is seated correctly in the driving position
- Before performing any maintenance, stop the machine on a stable level ground, lower the working device to the ground, lock the safety device of the working device, and stop the engine,
- It is prohibited to change the pipelines and safety settings of the hydraulic system. Please contact your dealer before making any changes. Any unauthorized changes may result in injury to the operator or damage to the machine. Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. shall not be held responsible for any consequences resulting from such unauthorized modifications.
- Only install approved accessories. Attachments other than those listed in this manual are not functioning properly and may even cause damage to the machine or harm to personnel.
- Before driving on the highway, make sure that the lights, signals, and safety devices are in good condition and use the relevant safety devices.
- Do not use the machine before reading and understanding this manual. Any inappropriate use of this machine is very dangerous for the operator and those around the machine. Many accidents are caused by insufficient understanding of the safety regulations described in this manual

Caused by.

• It is very dangerous to operate machines under the influence of alcohol and drugs. Do not drink alcohol or take medication before or while using the machine, as they may cause drowsiness or anesthesia.

## **1.2** Clothing and personal protection

• Inappropriate clothing can cause injury to the operator. Please wear protective clothing such as helmets, goggles, protective gloves, safety shoes, and earplugs during operation.

• If you have long hair, please tie it up before approaching the machine, otherwise it will entangle the moving parts of the machine and cause serious injury or damage.

• If working continuously for 8 hours under conditions above 90 decibels, earplugs need to be worn.

• When working in special hazardous areas, additional protection is required based on the conditions.

## **1.3** Entering and leaving the cab

Use appropriate pedals and handrails when entering and leaving the cab.

• Unless the situation is urgent, only enter and exit the machine when it is not moving.

Do not hold the joystick to enter or exit the cab.

• Always use appropriate handrails when entering and exiting the machine.

• Be careful at all times when entering and exiting the cab, and maintain balance throughout the entire process of entering and exiting the machine.

• Before entering or leaving the cab, ensure that there is no oil, grease, ice, or other slippery material on the pedals and handrails. If there is, please remove it carefully immediately.

• If the machine is very wet, be extra careful as it may become slippery.

• Before leaving the cab, please follow these steps in order:

1 Park the machine in a safe place.

2 Lower the working device and place it on the ground.

3 Activate the parking brake.

4 Open the attachment control pedal stopper.

5 Lift the safety pole.

6 Stop the engine.

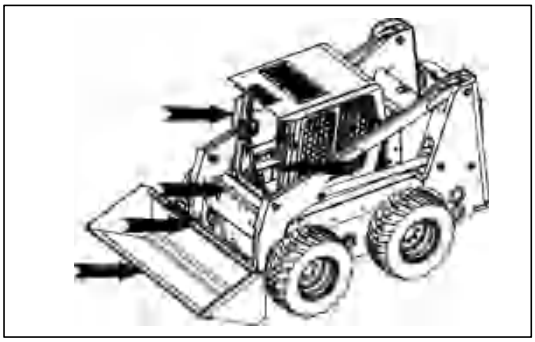


Figure 5-1

## **1.4** Keep fire away from fuel and oil

• Fuel and oil are prone to catching fire when exposed to open flames.

• Always keep open flames away from fuel and oil.

• Stop the engine and do not smoke while refueling.

- Only add fuel and oil in well ventilated areas.
- Cover the safety cover after adding oil or fuel.
- Do not fill the fuel tank to leave space for fuel expansion.
- If there is any fuel or oil splashing out, it should be wiped off immediately.

### **1.5** Prevent burns

- After a period of operation, the engine, coolant, hydraulic oil, engine oil, radiator, and pump are all hot until they cool down before they can be touched.
- If it is necessary to operate on hot oil, hot coolant, and hot hydraulic oil, please wear protective gloves, protective clothing, and safety goggles before any inspection and maintenance.
- Before opening the coolant safety cover, slowly loosen it to release the residual pressure inside the box. If the coolant is hot, it may spray out and cause serious burns.
- Before checking the coolant, hydraulic oil, and engine oil levels, stop the engine and wait for them to cool down.

### **1.6** Prevent injuries caused by working devices

- Do not stand within the range of motion of the working device while the machine is running, otherwise it may cause serious injury or even death.
- Before starting the working device, the operator must ensure that no one is within the dangerous area of the working device's movement range.
- When parking the machine, try to lower the working device to the ground as much as possible.
- During maintenance, ensure that the lifting device is properly locked before entering the area below it.

## **2** Protection during operation

### **2.1** Safety check before work

#### **2.1.1** Inspect the workplace

- Before carrying out any work, a thorough inspection of the work site should be conducted to ensure that the ground conditions are suitable for machine operation.
- Ensure that there is sufficient space for machines to enter and exit the workspace.
- If there are water pipes, gas pipes, telephone lines or electrical wires underground in the workplace, please contact the relevant department to find their exact location and stop using them throughout the construction process.
- If working in a place with poor ventilation conditions, additional ventilation should be provided during the operation. The gas emitted by the engine is harmful to people around it.
- Do not use the machine in flammable gases, such as explosive gases, gas, or dust that may cause explosions.

#### **2.1.2** Check the machine

- Before work, perform a machine inspection tour to ensure that there are no damaged parts. If necessary, repair or replace any damaged parts

The parts.

- Before starting work, please ensure that all lights are in good condition, the rearview mirror is clean and in the appropriate viewing angle, and the wipers are functioning properly.
- Keep the machine clean before work, wipe off any leaked oil and fuel before work, as they can cause fires.

## **2.2** Start the engine

- Start the engine only when fully seated and fasten the seat belt.
- When starting the engine, sound the horn to warn people around that the machine is about to start.
- Always start the engine according to the methods specified in this manual.
- When it is necessary to start the engine with a boost wire, please follow these steps. Incorrect connection methods can cause battery explosions.

(1) Always wear safety goggles and rubber gloves when starting the machine with a booster wire.

(2) When starting the machine with a booster wire, two people are required, one sitting in the seat and the other operating the battery.

(3) When starting with the battery of another machine, do not touch both machines. Ensure that the voltage of the normal battery is the same as that of the faulty machine's battery

(4) Turn the ignition keys of both the faulty machine and the normal machine to the "off" position when connecting the wires.

(5) The correct connection method is to connect to the same pole (positive pole connected to positive pole, negative pole connected to negative pole)

(6) When installing the boost wire, first connect the positive pole "+", and when loosening the boost wire, first loosen the negative pole "-".

## **2.3** machining

- Sound the horn before starting the machine to warn people around.
- When starting the machine, lower the boom and fully retract the bucket for better stability. At the same time, it can maintain sufficient space for movement.
- Maintain low speed when driving on uneven and hard surfaces.
- When reversing, check the area behind the machine and ensure that there are no people or obstacles behind it.

## **2.4** Prevent electric shock

- Do not drive or operate machines near electrical wires. In work areas where machines may come into contact with wires, please follow the following regulations, otherwise electric shock that can cause serious injury or even death may occur.
- Before starting work near the wires, consult the energy department for the voltage of the wires and inform them of the work you are about to carry out. If necessary, remind them to pay attention.
- To prevent possible emergency accidents, please wear rubber shoes and gloves. Prepare to immediately notify the power department of all necessary items in case of an accident.

- Even close proximity to high-voltage power lines can cause electric shock, so it is important to maintain a safe distance at all times.
- If the machine is too close to the wires, there needs to be someone dedicated to providing the signal.
- If the machine is in close proximity to or tangled with wires, do not leave the cab and do not allow others to approach the machine until the current is turned off.

## **2.5** Limitations on Machines

- This machine is only for one operator to ride, and it is very dangerous to have more than one passenger on board. Do not use the machine to carry more than one passenger.
- Overloading can cause serious injury or even death. Do not overload. Please refer to the specifications in this manual for the specific loading capacity of the machine. Do not make any unauthorized changes to the machine in order to achieve better performance.

## **2.6** Transportation

- Special care must be taken when loading and unloading the machine.
- Try to load and unload on a stable and level ground or a platform specifically designed for loading and unloading.
- Use slopes with sufficient strength and width. The surface of the slope must be clean. The slippery material on the inclined surface before unloading must be cleaned thoroughly. On rainy days, there are special treatment is necessary for the inclined surface. Slope inclination The degree shall not exceed 15 degrees.

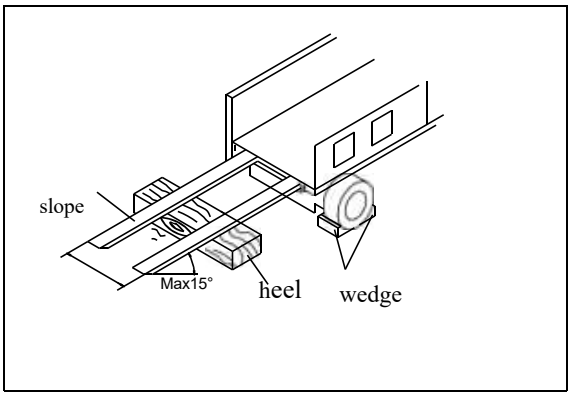



diagram 5-2

- During the loading and unloading process, the edges of the wheels of the transport vehicle must be fixed, and the slope must be firmly secured to the transport vehicle.
- The two slopes must be parallel and not slip when driving on the slope. If the direction of the machine is not consistent with the direction of the slope, please come down from the slope and try again.
- Always maintain a low speed when loading and unloading the machine, and be careful not to let any parts other than the wheels touch the surrounding goods, as this may change the driving path.
- It is advisable to place the bucket downwards on a slope when it is unloaded. At the connection between the slope and the transport vehicle, the center of gravity of the machine will suddenly change, so it must be driven very slowly to maintain balance.

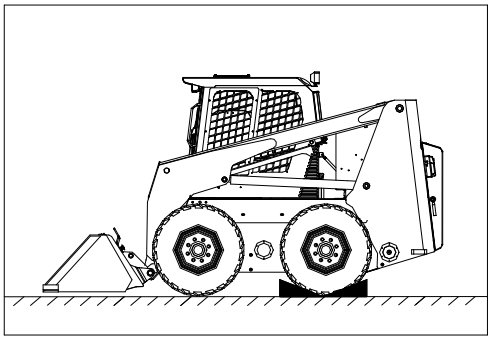
# **3** Protection during maintenance process

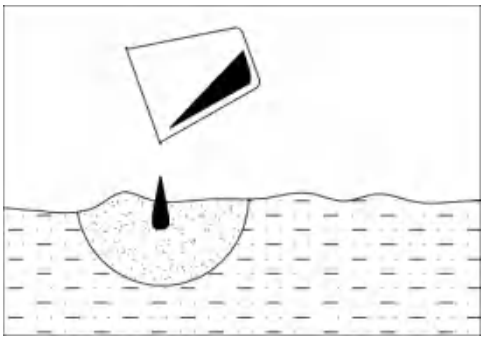
## **3.1** general rule

- When performing any maintenance, park the machine on a stable and flat surface, park the bucket on the ground, lock the safety device, activate the parking brake, and stop the engine. If necessary, insert wedge-shaped blocks under the wheels to secure the machine,

- Before maintenance, place the warning sign "Do Not Operate" on the control lever and ignition switch to ensure that no one else is operating the machine except for those who are performing maintenance with you.
- Only authorized and formally trained personnel can carry out repairs, and only perform the maintenance you have determined. If you have any questions, please contact the dealer.
- Keep the machine and surrounding environment clean. Place the parts and tools in the appropriate positions.
- To prevent pollution, do not discharge fuel, oil, and grease directly onto the ground. Use containers to hold fuel, oil, and grease and discharge them according to local regulations.

Figure 5-3



## **3.2** Running the engine during maintenance

- If maintenance must be carried out while the engine is running, there must be accompanying personnel. There must always be a staff member sitting in the driver's seat and ready to stop the engine at any time.
- Lock the safety device during maintenance.
- Do not touch rotating parts such as fans and fan belts while the engine is running, as these rotating parts can be very dangerous as they can entangle you in the machine. Be careful not to get too close to these areas.

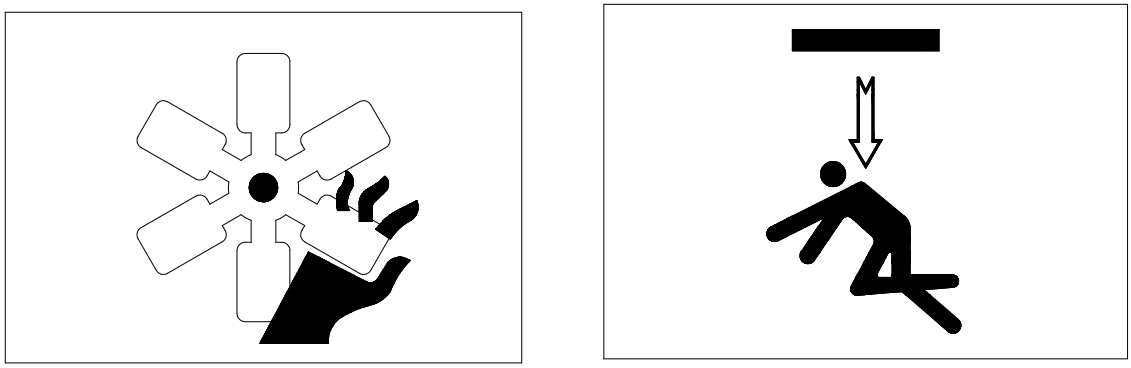


Figure
5-4

## **3.3** Working under working devices and machines

- If repairs and maintenance need to be carried out under the working device or machine, the working device or machine should be supported with wooden blocks and a sturdy frame to support its weight.
- Lower the working device to the ground or to the lowest position before working under the machine.

## **3.4** Protection related to high-pressure oil and high-pressure pipes

- The hydraulic system is always in a safe pressure state. Before inspecting and replacing any hoses, always lower the working device and ensure that the pressure in the hydraulic cycle has been released.
- The high-pressure oil leaking from the hose can penetrate the skin or harm your eyes. Be very careful when checking for high-pressure oil leaks. Wear goggles and thick gloves. Use cardboard instead of hands to check for oil leaks.
- Damaged hoses are very dangerous and can cause serious injury. Replace the damaged hoses and fittings and quickly connect them.
- If high-pressure oil is sprayed and harms the skin and eyes, immediately wash the skin and eyes with clean water and see a doctor.

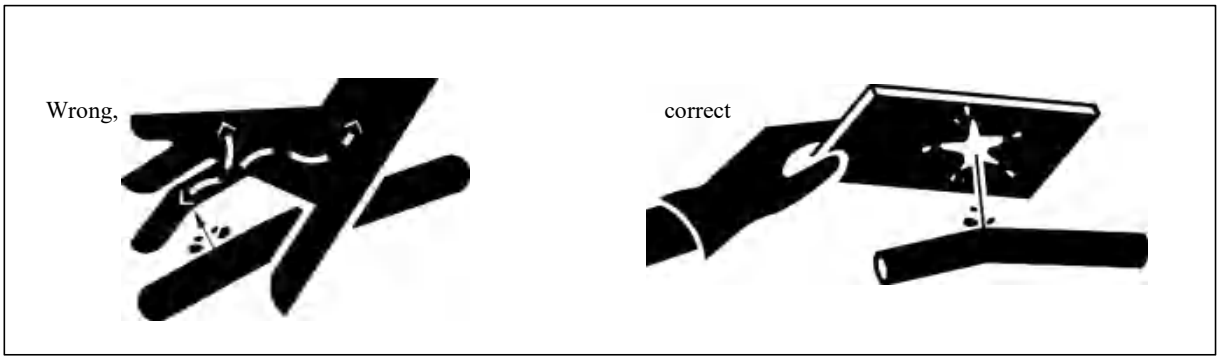



Figure 5-5

## **3.5** Protection for Starters and Batteries

• Before conducting any inspection on the circuit, disconnect the battery to cut off the power supply.

If any welding is to be performed on the machine, it is necessary to disconnect the battery and the AC generator.

• Do not attempt to start the engine by connecting the starter, as this is very dangerous for the operator.

## **3.6**Protection against hazards caused by batteries

The battery electrolyte contains sulfuric acid and produces flammable hydrogen gas. Sulfuric acid is very harmful to the human body.

• Accident handling methods:

(1) If the electrolyte comes into contact with the eyes, immediately rinse with plenty of water and see a doctor. Acid can cause blindness.

(2) If the electrolyte comes into contact with the skin, rinse immediately with plenty of water.

(3) If you accidentally drink acid, immediately drink a large amount of milk, eat eggs or vegetable oil, and call a doctor immediately.

Please always follow the following precautions:

• Disconnect the negative pole first and then the positive pole. When connecting, connect the positive pole first and then the negative pole.

• Do not connect tools or other metal objects between the two poles of the battery.

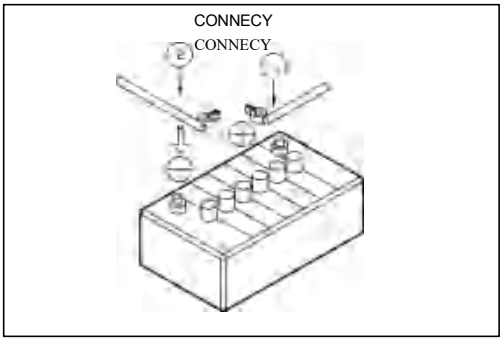
• Always wear goggles and gloves when operating batteries.

• Stop the engine and remove the key before operating the battery

• Do not smoke or use any open flames near the battery.

• Always tighten the terminals, loose terminals or caps may cause fire or explosion.

• If welding is to be performed on the machine, please disconnect the battery before operation.



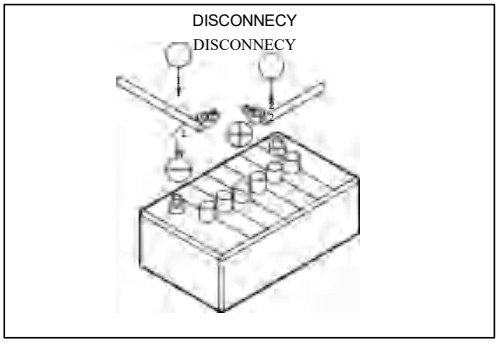




Figure 5-6

## **3.7**Protection when inflating tires

- Considering that the tire may suddenly burst during the inflation process, inflate the tire bit by bit.
- Use an air compression gun with an extended end and measuring gauge to inflate the tire and control the pressure inside the tire.
- Perform tire maintenance as described in the relevant sections of this manual.

·When inflating the tire, do not stand too close to the tire and make sure that no one else is standing too close.

·Follow the stress recommendations provided in the relevant sections of this manual. Ensure that the pressure of the tires on both sides of the machine is the same.

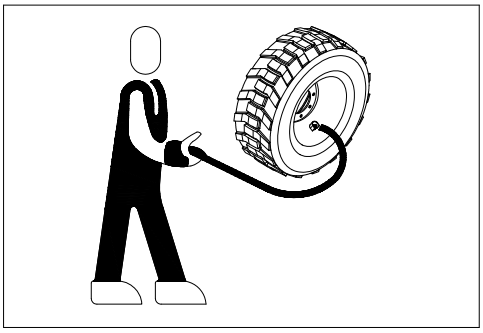


Figure 5-7

# Chapter 6 Inspection and Maintenance

The view that high-performance vehicles cannot be separated from regular inspections and maintenance is absolutely wrong. It is believed that the vehicle does not need to be inspected and maintained if it can be used normally.

Proper inspection and maintenance can not only extend the service life of vehicles, but also detect and handle faults early, thus reducing repair time and saving repair costs.

## **1** Maintenance suggestions

- Always keep the machine clean and tidy up, so that it is easy to identify the problem.
- Follow the safety requirements outlined in this manual.
- Before opening the engine hood, make sure that all safety devices are running and the engine is not running.
- When you need to check the hydraulic system, lower the boom and bucket to the ground.
- Open the parking brake when exiting the machine.
- Follow the relevant recommendations when flipping up the cab.
- Always use the recommended oil and grease in this manual.
- Place a warning sign before any maintenance to ensure that no one is operating the machine.
- Ensure maintenance is carried out on a stable and flat surface.
- Check and replace the oil on a clean surface to prevent dust or impurities from entering the fuel tank.
- Wait for the hydraulic oil to cool down before performing maintenance work.
- Do not use flammable liquids to clean the machine.
- Do not spray high-pressure water onto the radiator as it may damage it.
- Do not spray water directly into the cab, as this may wet the electrical system connections or ignition switch.
- When working in a dusty environment, it is necessary to inspect the air filter, radiator, filter, and electronic components more frequently than usual.
- Be careful to lubricate the machine before using it on muddy or rainy days. In humid conditions, the machine should be cleaned immediately after work to prevent rusting of components.
- Using other types of oil can damage the machine. It is recommended not to mix different brands of oil or add different grades of oil.



- When discarding oil, filters, coolant, and batteries, follow current rules as they can damage the environment.
- Avoid skin contact with used oil as it can irritate the skin. If oil enters the eyes, rinse with plenty of water. If there is still discomfort, see a doctor.
- If you accidentally drink oil, please contact a doctor as soon as possible.

## **2** General information for maintenance

### **2.1** Oil and coolant

- Only use the oil and coolant recommended in this manual.
- Using different oils can reduce machine efficiency and even damage the machine.
- Do not mix different types of oil. If only different types of oil are used, please drain all the oil in the machine first.

1 Oil grade and dosage

| type | Name and brand | | Refueling quantity | Refueling area | notes |
|---|---|---|---|---|---|
| | summer | winter | | | |
| fuel | 0#、10# light diesel oil | -10#、-35# light diesel oil | 88L | fuel tank | |
| engine oil | CH-4 level 15W40 | | 14L | engine | |
| Hydraulic oil | 30 # anti-wear hydraulic oil | | 70L | hydraulic oil tank | |
| Main transmission oil | L-AN100 | L-AN68 | 2×15L | Left and right sprocket boxes | |
| grease | L-XACFA lithium based grease | | 4 kilograms | Each hinge point of the working device is used to pin uranium and doors<br>Joint pin, engine fan, and water pump bearings | |

Note: The quality level of CC grade diesel engine oil in China is equivalent to that of similar foreign products, and the product standards are also based on reference

The development of CC grade oil standards in SAEJ183-84. That is, L-ECC40=CC40, L-ECC30=CC30.

2 Reference Comparison Table for Foreign Oil Products:

(1) Hydraulic oil:

| Domestic oil grades | Viscosity（40° C） $mm^2/S$ | Brands similar to foreign products | | | | | |
|---|---|---|---|---|---|---|---|
| | | BP | CALTEX | CASTROL | ESSO | MOBIL | SHELL |
| Advanced anti-wear hydraulic oil L-HM32 L-HM46 （GB111 19-89） | 28.8-35.2 41.4-50.6 | Energol HLP65 Energol HLP80 | Rando Oil HD32 Rando Oil HD46 | Hyspin Aws32 HYSPIN Aws46 | NutoH44 Standard NH-45 Unto H44 Standard NH48 | D、T、E、 24 D、T、E、 25 | Tellus27 Tellus29 |
| Low pour point hydraulic oil L-HV32 L-HV46 （GB7631.2-87） | 28.8-35.2 41.4-50.6 | Energol SHF80 Energol SHF100 | Rando Oil HD AZ | Hyspin AWH46 Nuto | Nuto H44 Vnivis J58 Nuto H48 Nuto H44 Vnivis J58 Nuto H48 | D、T、E、13EP D、T、E、23 D、T、E、15 | Hydro-Kiretic Tellus T27 46 |

(2) Lubricating grease

| Domestic oil grades | Brands similar to foreign products | | | | | | |
|---|---|---|---|---|---|---|---|
| | BP | | CALTEX | CASTROL | ESSO | MOBIL | SHELL |
| lithium base grease L-XACFA3 | Universal grease | | Marfak all pupose Marfak all pupose Mdy Tex grease Mdy Tex grease | | Estan EP | Mobil-grease Special(Mos2) | Retinax Anl (Mos2) Alvania Retinax |
| | car body | Ener Increase L21M (lithium) | Marfak all pupose Marfak | MS Grease | EP | Mobil-grease Special | Retinax Anl |
| | chassis fat | (Mos2) | Multi purpose | MS3 purpose | | Mobil-grease MP | (Mos2) |

## **3** Main lubrication points

### Maintenance and Lubrication Chart

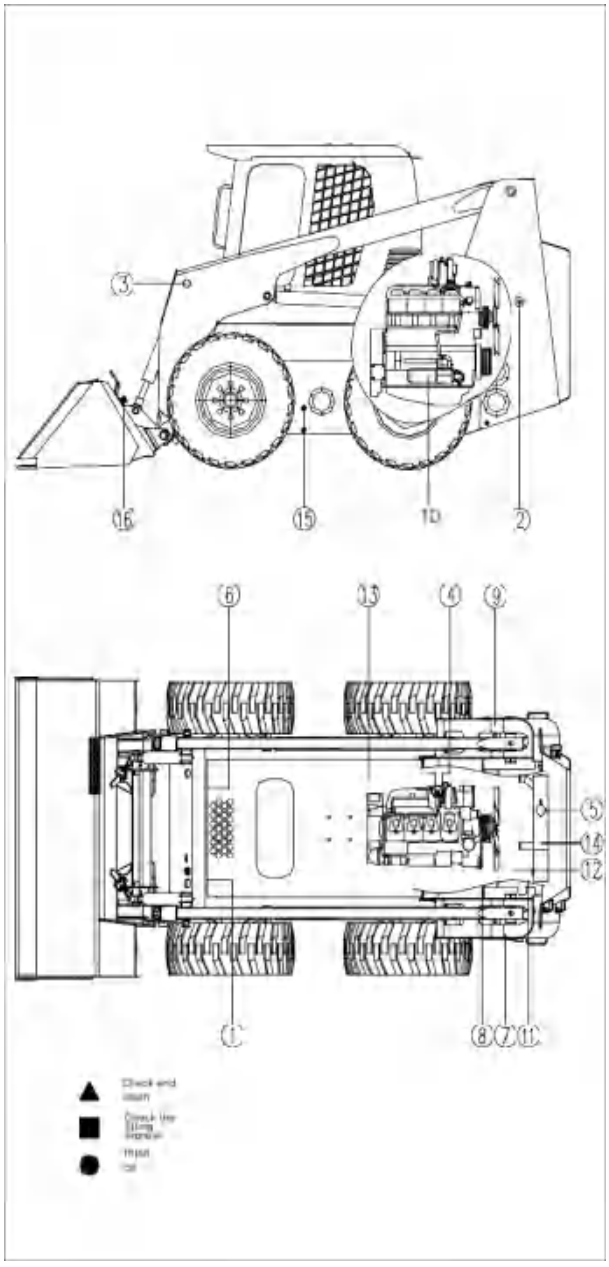



Figure 6-1

| NO | project | Maintenance cycle | | | | | | Oil symbol | Number of maintenance locations |
|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 100 | 250 | 500 | 1000 | 2000 | | |
| 1 | Fuel level | ■ | | | | | | DF | 1 |
| 2 | Hydraulic oil level | ■ | | | | | ● | HO | 1 |
| 3 | Working device pin shaft | | ■ | | | | | PGL | 12 |
| 4 | engine oil level | ■ | | ● | | | | EO | 1 |
| 5 | Coolant | | ■ | | | | ● | | 1 |
| 6 | Instruments and indicator lights | ▲ | | | | | | | 1 |
| 7 | Oil-Water Separator | | ▲ | | | | | | 1 |
| 8 | Battery (electrolyte) | | ■ | | | | | | 1 |
| 9 | Fuel tank filter mesh | | ▲ | | | | | | 1 |
| 10 | engine oil filter | | | ● | | | | | 1 |
| 11 | hydraulic return filter | | | | ● | | | | 1 |
| 12 | air cleaner | | ▲ | ● | | | | | 1 |
| 13 | Fuel filter | | | ● | | | | | 1 |
| 14 | radiator | | | | | ▲ | | | 1 |
| 15 | Chain wheel box | ■ | | | | | ● | GO | 2 |
| 16 | Quick change device | ■ | | | | | | PGL | 2 |

Precautions

1 Oil symbol:

● EO: The

● GO: Gear oil

● HO: Hydraulic oil

● PGL: Butter

● DF: Diesel

● Coolant: 50/50 water and antifreeze.

2 Refer to the operating manual for the use of hydraulic oil and gear oil.

3 Stop the machine when refueling to avoid open flames.

4 Do not open the cover when the coolant or oil temperature is high . Tighten the bolts of other important components. Or drain the oil plug to avoid burns.

5 Slowly open the lid to release pressure.

For other instructions, please refer to the maintenance manual.

Important Notice

New car 50 hour break in period and every following components must be treated with engine oil after 250 hours of use maintenance.

1. Tighten the engine fixing bolts.。

2. Tighten the fixing bolts of the hydraulic pump.。

3. Tighten the fixing bolts of the walking motor.

4. Tighten the tire fixing bolts.

5. Tighten the fixing bolts of the wheel axle machine.

# 4 Description of machine maintenance

The following projects describe different parts or systems of the machine for a better understanding of maintenance. This manual attempts to provide a more detailed description of the parts or systems that require more attention during maintenance.

## 4.1 Engine Description

This section provides general recommendations for engine maintenance. For more information on the engine, please refer to the engine manual provided with this manual. This section provides general recommendations for engine maintenance. For more information on the engine, please refer to the engine manual provided with this manual.

- **The engine can be said to be the heart of a machine, so special attention needs to be paid.**
- Special attention should be paid to engine oil, as good lubrication can extend the life of the engine.
- Only use the oil recommended in this manual.
- Coolant containing antifreeze is flammable, do not touch such coolant with open flames.
- Only use the coolant recommended in this manual and do not use any other coolant as it may damage the rubber connection.
- Be particularly careful with engine fuel, as incorrect fuel can damage the engine.
- Do not fill up the fuel tank, leave enough space for fuel expaWhen the fuel is depleted or the fuel filter needs to be replaced, it is necessary to drain the pipeline.
- The fuel tank is located at the rear of the machine and has a capacity of 88 liters.
- Replace all fuel hoses every 2 years or 4000/hour (whichever comes first).

## 4.2 Hydraulic system description

- Be particularly careful when performing operations related to hydraulic components, as they can pose a danger under high pressure.
- Be careful when operating the hydraulic system after homework, as it is hot and can cause danger.
- Before replacing hydraulic oil or hydraulic oil filter, drain the hydraulic circuit first. Follow the steps below to discharge the circuit:

1 Start the hunger engine.

2 Slowly move all cylinders and stop when they are about 100mm away from the end of the stroke.

3 Slowly move the oil cylinder several times until the end of the stroke.

- Regularly check hydraulic connections as they have been subjected to high pressure for a long time.
- When replacing hydraulic components, check the washers and O-rings, which is a great opportunity to replace them.
- Replace all hydraulic hoses every 2 years or 4000 hours (whichever comes first).

## 4.3 electrical system

- Do not wet any electronic components, as wet electronic components can cause damage.

Do not remove any installed electronic components and install any other components of different specifications.

- If it is necessary to operate while the components are wet, disconnect the battery and generator.

安全带

## **4.4** safety belt

- Replace the seat belt every 4 years.
- Regularly check the condition of seat belts.

## **5** maintenance plan

This manual provides a maintenance plan to maintain the functionality of the machine and its components. Recommend maintenance according to this plan. Understand maintenance time through the integrated time table.

Record all the maintenance performed on the machine to develop a suitable maintenance plan. Maintenance must be carried out by recognized and qualified personnel. But if the working conditions are too harsh, timely inspection and adjustment should be carried out.

The following table summarizes the entire maintenance plan:

| task | Before startup | 50 | 100 | 250 | 500 | 1000 | 2000 | When required |
|---|---|---|---|---|---|---|---|---|
| 1. Check the engine oil level | √ | | | | | | | |
| 2. Check the engine coolant level | √ | | | | | | | |
| 3. Check the fuel level | √ | | | | | | | |
| 4. Check the hydraulic oil level | √ | | | | | | | |
| 5. Check the wires | √ | | | | | | | |
| 6. Check the tires | √ | | | | | | | |
| 7. Check the seat belt | √ | | | | | | | |
| 8. Check for oil leaks | √ | | | | | | | |
| 9. Check the quick change device | √ | | | | | | | |
| 10. Check the oil-water separator | √ | | | | | | | |
| | | | | | | | | |
| 11. Check the cooler pipeline | | √ | | | | | | |
| 12. Check the coolant level | | √ | | | | | | |
| 13. Check tire pressure | | √ | | | | | | |
| 14. Lubricate the pins of the boom and cylinder | | √ | | | | | | |
| 15. Check the tightening torque of tire nuts | | √ | | | | | | |
| | | | | | | | | |
| 16. Clean the battery terminals | | | √ | | | | | |
| 17. Clean the hydraulic oil tank vent | | | √ | | | | | |
| 18. Check the oil cylinder piston rod | | | √ | | | | | |
| 19. Lubricate all pin shafts | | | √ | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20. Check the tension of the chain | | | | √ | | | | |
| 21. Adjust the chain as needed | | | | √ | | | | |
| 22. Check the fan belt | | | | √ | | | | |
| 23. Clean the radiator | | | | √ | | | | |
| 24. Check the oil level in the sprocket box | | | | √ | | | | |
| task | Before startup | 50 | 100 | 250 | 500 | 1000 | 2000 | When required |
| 25. Change engine oil | | | | √ | | | | |
| 26. Replace the engine oil filter | | | | √ | | | | |
| 27. Replace the fuel filter | | | | √ | | | | |
| 28. Check the tightening torque of the hydraulic motor and axle support nuts | | | | √ | | | | |
| 29. Clean the oil-water separator | | | | | √ | | | |
| 30. Check if the installation screws of the pump are tightened | | | | | √ | | | |
| 31. Check the battery liquid level position | | | | | √ | | | |
| 32. Replace the hydraulic oil filter | | | | | √ | | | |
| | | | | | | | | |
| 33. Replace the oil in the sprocket box | | | | | | √ | | |
| 34. Replace hydraulic oil and clean the suction port | | | | | | √ | | |
| 35. Replace the air filter | | | | | | √ | | |
| 36. Check the pressure of the pump and valve | | | | | | √ | | |
| 37. Replace the hydraulic oil tank respirator | | | | | | √ | | |
| 38. Check the tightening torque of the cylinder head screws of the oil cylinder | | | | | | √ | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 39. Check the looseness of the valve | | | | | | √ | | |
| 40. Replace the coolant | | | | | | | √ | |
| 41. Replace the oil suction filter element | | | | | | | √ | |
| 42. Check the starter and generator | | | | | | | √ | |
| 43. Emission fuel tank | | | | | | | | √ |
| 44. Release the parking brake | | | | | | | | √ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 45. Check the battery charging capacity | | | | | | | | √ |
| 46. Rotate the tire | | | | | | | | √ |

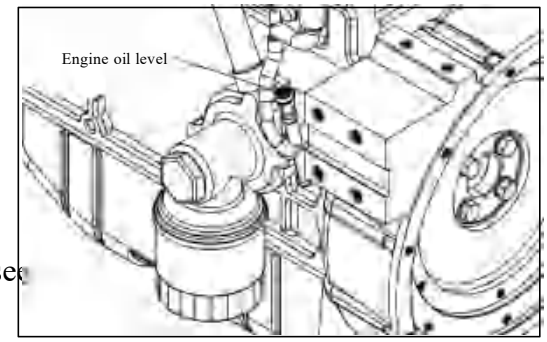
## **6** Regular maintenance and upkeep

Appropriate lubrication and maintenance can ensure the trouble free operation and long service life of the skid steer loader. Due to the extension of the operating period of the wheel loader and the reduction of operating costs, it greatly compensates for the time and cost required in planned regular maintenance.

☆ Before startup

Regular maintenance is divided into: 50,100,250,500,1000,2000 hours.

### **6.1** Check the engine oil level



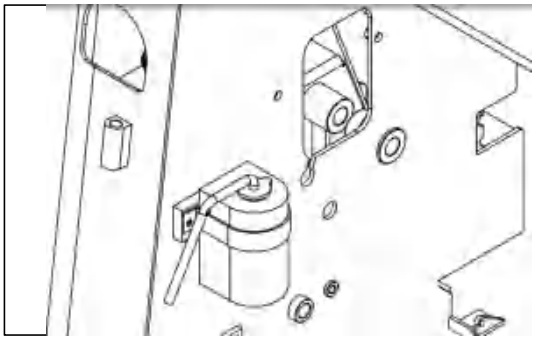

• If the engine has been running before, let the oil cool down first. In this case, wait for 15 minutes for the oil to cool down before conducting the inspection.

·To check the oil level, lift the dipstick (see Right picture) and read the oil scale on top. The oil scale must be between the maximum and minimum values on the dipstick.

• If the fuel level is below the minimum value, refuel as soon as possible. Figure 6-2

Add engine oil through the inlet shown in the figure on the right.

### **6.2** Engine coolant level



• If the engine has been running before, wait for 15 minutes before checking to allow the coolant to cool down first.

• The coolant level in the coolant tank must be between two limit marks.

• If necessary, add coolant through the coolant cap

(See the image on the right). Figure 6-3

• Do not move the coolant cap when the liquid is still hot,Because the liquid can splash

out suddenly and cause injury.

### **6.3** Check the engine fuel level

• Use the gauge on the dashboard to check the engine fuel level. The indicator will light up when the ignition key is in the "on" position.

• If the fuel level is low, refuel before starting the engine.

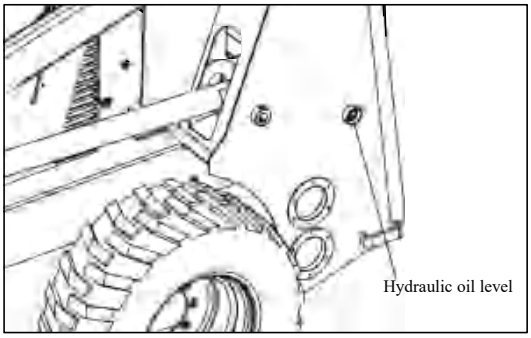
## **6.4** Check the hydraulic oil level

• Check the oil level through the oil gauge located on the side of the hydraulic oil tank. The oil level must be at the center of the oil gauge. If necessary, add an appropriate amount of oil.

• Do not exceed the maximum limit scale when adding hydraulic oil (see figure on the right).

• The liquid level must be checked after the machine is stopped on a level surface and the oil has cooled down.

• If an abnormal decrease in oil level is observed, check the hydraulic circuit.




• Before checking the liquid level, loosen the fuel cap,

Release the pressure in the hydraulic oil tank as shown in Figure 6-4

• Before checking the liquid level, slowly release it

Low hydraulic cylinders are used to release pressure in the circuit.

## **6.5** Check the wires

• Ensure that the relay and fuse are securely fastened and there are no loose wires or circuits.

Ensure that there is no short circuit in the electrical system.

• Ensure that there are no corroded wires or fuses. If available, replace with the same specifications.

## **6.6** Check the tires

• During the operation of the machine, tires that are excessively inflated or overheated may explode.

• Check the condition of the tires to ensure that there are no cracks or abrasions.

• Check by hand whether all nuts are tightened.

## **6.7** Check the seat belt

• Check the screws and nuts that secure the seat belt to ensure they are all tightened.

## **6.8** Check for oil leakage

• Inspect the hydraulic oil circuit and confirm that there are no leaks. If a leak occurs, repair it immediately.

• Clean up any spilled oil, if any.

## **6.9** Check the quick change connection

• Check that the two connecting pins have been properly inserted. If there is any looseness in the device (indicating that one or both pins are not properly inserted), people around will be injured or even killed.

• Do not stand under the bucket when lifting the boom.

## **6.10** Check the oil-water separator

• The fuel filter has a separator that separates water and sediment. It is recommended to place this separator before starting the engine each time.

• The oil-water separator is located in the engine compartment.

• When the annular material in the separator floats on the water surface, it needs to be discharged. Perform the following operations:

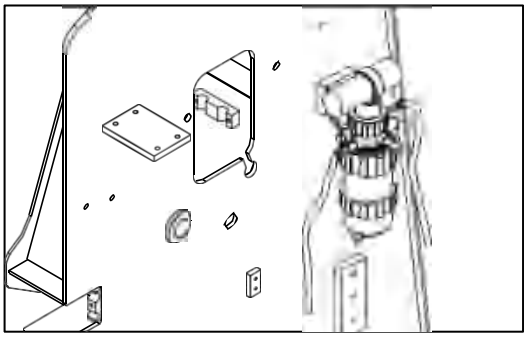


Figure 6-5

1 Close the handle to cut off the fuel flowing into the separator.

2 Release the switch at the bottom of the separator to drain water until clean oil flows out, and then close it.

3 Open the handle to allow fuel to flow into the separator.

4 Exhaust fuel tank.

5 Open the fuel supply circuit.

☆ Maintenance every 50 hours

## **6.11** Check the cooling pipeline

• Check if there are any leaks in the entire cooling pipe. If there is a large amount of coolant leakage, the machine may overheat. If a large amount of oil leaks out, the hydraulic circuit will be damaged.

• The operator must pay attention to the cooling system and hydraulic circuit.

## **6.12** Check the coolant level

• If the engine has just stopped, please wait for 15 minutes for the engine to cool down before checking.

• Inspect on a flat surface.

• Slowly loosen the radiator cap to release the pressure in the radiator

• If necessary, add coolant to the radiator.

• Do not open the radiator cap when the liquid is hot, as the liquid can splash out violently and cause injury.

• Make sure the water tank pipe is not leaking, otherwise an incorrect coolant level will be displayed.

## **6.13** CHECK TYRE PRESSURE

• Do not exceed the recommended pressure in this manual, otherwise the tire may explode and you or those around you may be at risk.

• Do not stand on the edge of the tire when inflating it.

- When inflating tires, make sure to use the correct equipment.
- Once a tire leaks, only professionals can repair it.

## **6.14** Lubricate the pins of the boom and cylinder

- Lubricate the pin located at the top of the boom (see lubrication point diagram).
- Lubricate the pin shaft connecting the oil cylinder (see lubrication point diagram).

## **6.15** Check the tightening torque of the wheel nuts

Check the tightening torque of the wheel nuts every 50 hours. The tightening torque for both the front and rear wheels during installation is 200N-m.

☆ Every 100 hours of operation

## **6.16** Clean the battery terminals

- Keeping the battery terminals clean is crucial as it ensures good current flow.
- Wear rubber gloves to clean the battery terminals and do not directly clean the terminals with your hands.

## **6.17** Clean the fuel tank respirator

- It is very important to keep the fuel tank respirator clean as it ensures the release of pressure in the fuel tank.

## **6.18** Check the piston rod of the oil cylinder

- Ensure that the cylinder piston rod is not corroded or damaged. All of these will reduce the efficiency of the machine.

## **6.19** Lubricate all shafts

- Lubricate the specified pivot on the previous page.

☆ Maintenance every 250 hours

## **6.20** Check the tension of the transmission chain

- Each side of the transmission has 2 chains, with one chain driving one wheel. Check the tension of the rear drive chain as follows:

1) Press the parking brake button to lock the machine.

2) Insert wooden blocks under the machine and lift the rear of the machine for maintenance.

3) Mark a point around the tire, preferably at the highest position.

4) Try turning the entire tire.

5) If the angle between the initial position and the rotated position of the point is greater than 2 degrees, then the transmission chain is loose. Use the same steps to check the other rear transmission chain.

Use the same steps to check the front drive chain.

## **6.21** If it is necessary to replace the chain

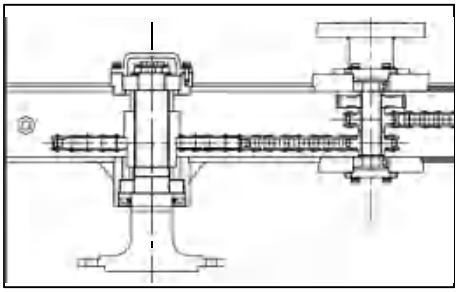


Figure 6-6

Replace the chain as follows:

1)Lift up the side box to lift the tires off the ground.

2)Unscrew the bolts on the top cover of the side box and remove the top cover.

3)Rotate the tire and find the interface of the chain.

4)Remove the hinge pin of the chain and take out the chain.

5)Install a new chain that meets the requirements.

6)Install the cover and tighten the bolts.

7)Put down the side box and let the tires touch the ground.

## **6.22** Check the fan belt

- Refer to the engine manual.

## **6.23** Clean the radiator

- Clean the radiator by spraying pressurized air or low-pressure water.
- If necessary, use commercially available products specifically designed for cleaning radiators.
- Do not use oily products as they can cause dust to accumulate and reduce the effectiveness of the radiator.

## **6.24** Check the oil level in the sprocket box

- The inspection must be conducted on a level surface

Check the oil level in the sprocket box as follows:

1) Loosen the screw plug located on the side of the side box.

2) If the oil reaches the height of the hole, the oil is sufficient. If the oil is lower than the hole, add this manual to push Recommended oil.

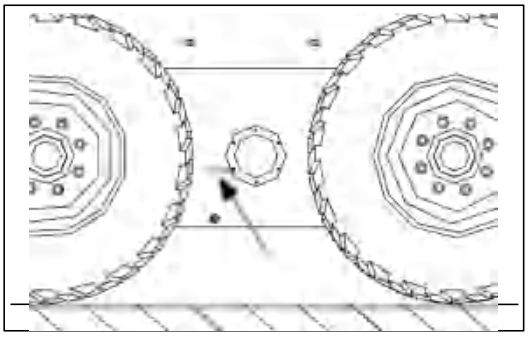


Figure 6-7

## **6.25** Change engine oil

·Follow the steps below to change the engine oil, and refer to the engine operation and maintenance manual before changing the engine oil.

1) Put a suitable container to hold the discharged oil.

2) Open the oil drain bolt to allow oil to flow into the container.

3) Open the engine fuel cap when oil flows out to facilitate flow.

4) Check and clean the engine oil drain plug and sealing surface

5) Add the recommended engine oil in this manual.

6) Add fuel to the engine until the oil level reaches the mark H on the dipstick.

7） Close the fuel cap.

• Do not change the engine oil immediately after stopping the engine, as the oil is still hot. Wait for a moment until the oil cools down

• Oil is a special waste and should be collected according to current environmental regulations.

## **6.26** Replace the engine oil filter

Follow these steps to replace the engine oil filter:

1）Use a suitable tool to loosen the filter head.

2）Clean the filter bracket.

3）Lubricate the new filter oil seal.

4）Rotate the filter half a turn by hand.

5）Fill the engine with new oil, which must be the recommended oil in this manual.

6）Start the engine and ensure that the engine oil pressure indicator is in the green area.

• Make sure to use the filter recommended in this manual.

• Do not replace the engine oil filter immediately after stopping the engine, as the oil is still hot. Wait a moment until the oil cools down.

• Oil filters are special waste and should be collected according to current environmental regulations.

• Use a specialized wrench to prevent damage to the filter.

## **6.27** Replace the fuel filter

• Considering that fuel is flammable,

be careful when handling it.

• Always use the recommended fuel filter in this manual. Follow the steps below to replace the fuel filter inside the engine compartment (see figure on the right).

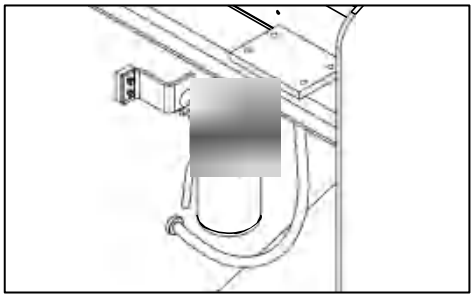


Figure 6-8

1） Remove the fuel filter.

2） Clean the gasket surface of the filter head with a soft cloth.

3) Discard the O-ring.

4） Install a new O-ring.

5） Fill the new filter with clean fuel and lubricate the O-ring seal with clean engine oil.

6） Install a new filter.

• Make sure to use the filter recommended in this manual,

• Do not replace the fuel filter immediately after stopping the engine, as the engine body is still hot.

• Oil filters are special waste and should be collected according to current environmental regulations.

• Use appropriate tools to avoid damaging the filter.

## **6.28** Check the tightening torque of the hydraulic motor nut

• To ensure the safety of the operator, check the installation screws that fix the hydraulic motor.

• The tightening torque for the fixed hydraulic motor is 160N-m.

☆ Every 500 hours of operation

## **6.29** Clean the oil-water separator

Clean the oil-water separator as follows:

1)Rotate the handle to shut off the fuel flowing into the separator

2)Release the oil-water separator with a dedicated snap ring (see figure on the right)

3)Clean the inside of the separator with fuel

4)Then install the separator with a snap ring.

5)Release the handle to allow oil to flow into the separator.

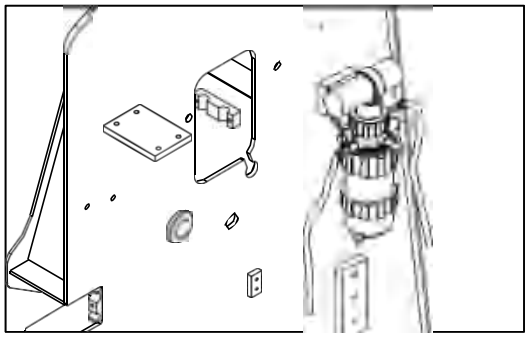


Figure 6-9

6)Turn the ignition key to the start position within 20 seconds exhaust fuel circuit.

• Cool the engine before cleaning the separator.

• After discharging the circuit, turn the ignition key to the preheating position for about minutes before starting the engine.

• Considering that fuel is a flammable liquid, remove spilled fuel to prevent fire hazards.

## **6.30** Check if the installation screws of the pump are tightened

• Check the screws at the installation point of the gear pump and tighten them if necessary.

## **6.31** Check the battery liquid level position

Check the battery liquid level position as follows:

1 Open the plug on the top of the battery.

2 Check the liquid level of the acid. The acid must be 6mm higher than the edge of the board.

3 If necessary, add distilled water.

4 Put back the plug and tighten it.

• Before checking the liquid level, stop the machine on a flat surface.

• In case of contact with electrolyte, immediately clean with plenty of water and see a doctor.

• If the terminal is oxidized, please clean it with a specialized antioxidant.

## **6.32** Replace the hydraulic oil filter

• Do not replace the hydraulic oil filter when the oil is hot.

• Used oil filters must be collected in accordance with local regulations. Replace the hydraulic oil

filter as follows:

1) Open the fuel tank cap to release the residual pressure in the tank.

2) Unscrew the oil filter.

3) Replace the gasket when installing the new filter.

4) Cover the fuel tank cap.

☆ Every 1000 hours of operation

## **6.33** Replace the oil in the sprocket oil tank

Replace the oil in the sprocket oil tank according to the following procedure.

1) When the oil is hot (only after using the machine), loosen the drain plug located at the front of the chassis.

2) When draining oil, unscrew the screws located on the top of the chassis.

3)After draining the oil, tighten the front plug and start from above add oil to the fuel port on the side until the oil reaches the lower edge of the hole.Only add approved oils from this manual.

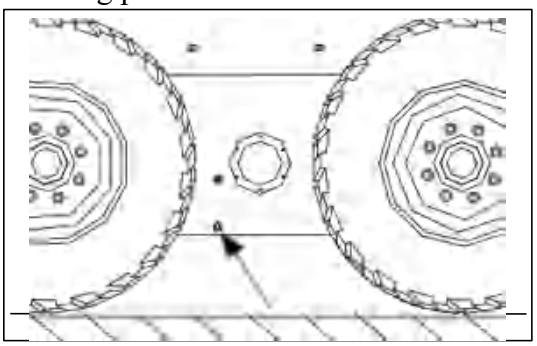


Figure 6-10

4)Tighten the screws on the side.

## **6.34** Replace hydraulic oil and clean the suction port

Replace the hydraulic oil according to the following process.

1) Stop the machine on a flat surface and release residual pressure by moving all cylinders for a few minutes.

2) Wait a few minutes for the oil to cool down.

3) Remove the fuel cap from the hydraulic oil tank.

4) Place a suitable container at the bottom of the machine to hold the discharged hydraulic oil.

5) Unscrew the screw plug located on the side of the hydraulic oil tank.

6) Fill the circuit with the hydraulic oil recommended in this manual.

7) Ensure that the hydraulic oil reaches the required scale.

After the hydraulic oil reaches its mark, when the plug of the plunger pump is opened, the hole is filled with oil.

8)Also check the oil level of the oil gauge located on the side.

9)If the oil level has not reached the midpoint of the oil gauge and the pump bore has been filled, then top up with the recommended oil in this manual.

10)Wait a few minutes before operating the machine

11)Slowly move all the oil cylinders

12)Check the oil gauge again and add more oil if necessary.

- **Do not start the engine when the fuel tank is empty, as this can damage the hydraulic**

**components.**

- **Hydraulic oil can damage the environment. Please handle according to local rules.**

## **6.35** Replace the air filter

- When the air filter pressure indicator on the dashboard lights up, replace the air filter.
- Do not clean the air filter, only replace it with a new one.Do not run the engine without an air filter. Replace the air filter as follows:

1) Stop the engine until it cools down

2) Loosen the three flanges and remove the cover

3) Remove the filter from inside if necessary.

4) Clean the inside of the filter box.

5) Carefully place the new filter into the filter box.

6) Cover the flange switch tightly with the air filter box. Ensure that the discharge outlet is located below the air filter.

7) Make sure the switch is connected properly.

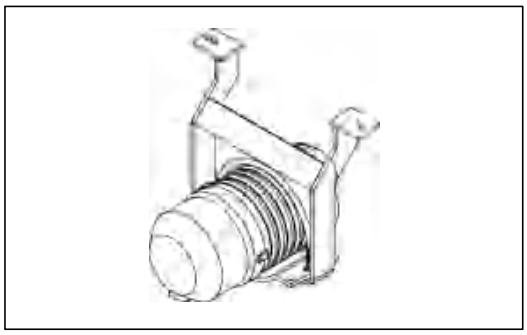


Figure 6-11

☆ Every 2000 hours of operation, as shown in

## **6.36** Replace the coolant

- Do not replace the coolant immediately after stopping the engine, as the coolant is still hot. Let the coolant cool to below 40-45 ° C.
- Do not loosen the coolant cap when the coolant is still hot. Hot water can suddenly splash out and cause burns.
- Always slowly loosen the coolant cap to release the pressure in the coolant tank. Replace the cooling water according to the following process:

1) Slowly loosen the coolant tank cap.

2) Open the drain plug located at the bottom of the radiator.

3) Open the emission plug located at the bottom of the engine.

4) Drain the coolant until it stops flowing out.

5) Cover and tighten the two discharge plugs again.

6) Add the approved coolant described in this manual

7) Start the engine and let it idle for a while.

8) Stop the engine.

9) Check the coolant level and add coolant if necessary until the level reaches the correct position.

## **6.37** Drain the fuel tank when necessary

- If the temperature exceeds 0 ℃, the fuel tank should be drained before starting the machine;

- If the temperature is below 0 ℃, drain the fuel tank after use to prevent condensation.

Discharge the fuel tank according to the following process:

1) Open the fuel tank cap. located on the side of the vehicle.

2) Place a container under the discharge outlet

3) Loosen the screw plug.

4) Completely discharge the fuel.

5) Close the discharge outlet.

6) Fill the fuel tank with the recommended oil in this manual.

# Chapter 7: Loading, Unloading, Transportation, and Storage

## 1 load and unload

### 1.1 Lifting

When carrying vehicles to the ship or lifting them onto other vehicles for transportation, please use the lifting hook on the frame for operations inside the cabin. There are clear lifting signs indicating the positions of the front and rear lifting hooks.

- When lifting, the rope can only pass through the lifting hook!
- Lower the working device to the ground.
- Lock all control levers with locking devices.
- Turn off the engine, lock all devices with the key, and remove the key.
- Please be careful to avoid damaging the hydraulic pipelines.
- When lifting, do not allow pedestrians or vehicles to enter under the lifting vehicle.
- The weight of this machine is 3900kg, and the lifting equipment should have sufficient lifting capacity.
- When lifting, ropes should be arranged reasonably to prevent wear and tear on the surface of the vehicle.
- The operator must leave the cab before lifting.
- After the vehicle is accurately and slowly placed on the transport vehicle, the distance between the highest point and the ground should be measured, and should not exceed the passage space limited by the transportation route.

Requirements for lifting equipment: One lifting ring must have four equally long hooks to ensure that all four lifting ears are simultaneously stressed during lifting, and to maintain the machine in a horizontal position after lifting.

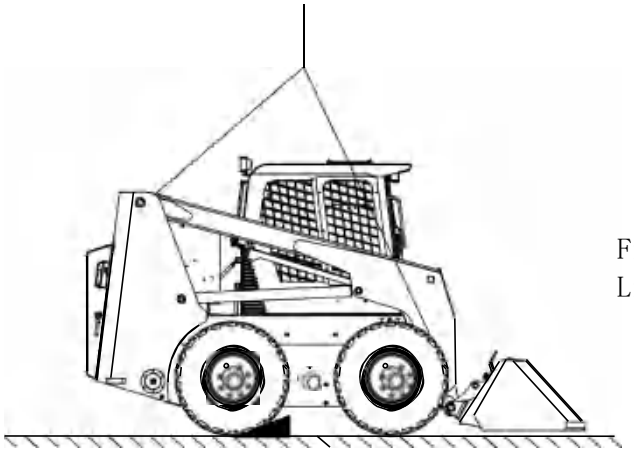


Figure 7-1
Lifting Diagram

## **2** transport

The transportation of this machine can be carried out by railway freight cars, trucks weighing over 5 tons, or ships.

### **2.1** Instructions for getting on the vehicle

Always follow safety regulations when loading machines on other modes of transportation. Any disregard for safety regulations may lead to serious accidents.

Load the machine onto the transport vehicle as follows:

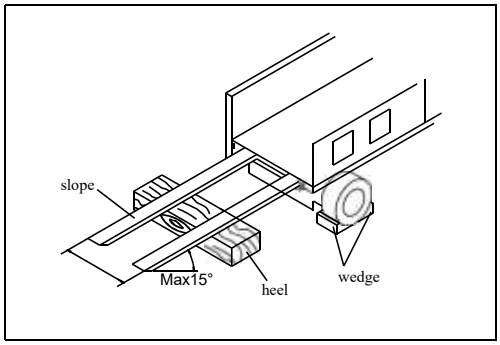



Figure 7-2

1) Park the transport vehicle on a stable and level ground and apply the brakes. Insert the wedge-shaped block into the wheel below are fixed transport vehicles.

2)Fix the loading and unloading rack on the vehicle with a maximum inclination angle of 15 °, and the two slopes must be parallel.

3) Drive the machine onto a slope, reverse it, and ensure that the direction of movement is parallel to the slope.

4) Slowly move the machine on the vehicle. Do not change the direction of travel on a slope.

### **2.2** Transport machinery

After driving the machine onto the transport vehicle, in order to ensure safety during transportation, the machine must be protected according to the following steps:

1 Lower the bucket to the ground and keep the bottom of the bucket close to the ground, as shown in the following figure:

2 Lift the safety pole, stop the engine, and remove the key from the ignition switch.

3 Insert the wedge-shaped block under the wheel.

Secure the chain or cable through a fixed point.

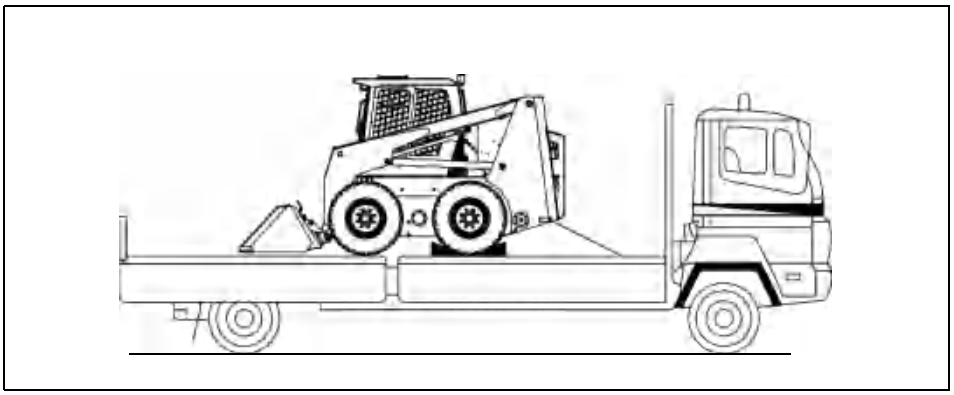


Figure 7-3

### **2.3** Uninstalling the machine

1) Always follow safety regulations when unloading machines from transport vehicles. Any

disregard for safety regulations may lead to serious accidents. Follow these steps to unload the machine from the transport vehicle:Park the transport vehicle on a stable and level ground and apply the brakes. Insert wedge-shaped blocks under the wheels to secure the vehicle.

2) Fix the slope onto the vehicle. The maximum inclination angle is 15 °, and the two slopes must be parallel.

3) Drive the machine onto the slope. Keep the empty bucket moving forward, and the direction of movement must be parallel to the slope.

4) Slowly turn off the machine from the vehicle. Do not change the direction of travel on a slope.

### **2.4** Explanation of Road Transportation

1) When using a trailer to transport this machine, it is necessary to comply with national and local laws regarding weight, height, width, and length. All relevant traffic regulations should also be followed.
2) When determining the transportation route, the weight, height, width, and length of the machine should be considered.
3) When passing through bridges or structures on private land, the first thing to check is whether their strength can support the weight of the machine. When walking on public roads, one must first comply with relevant regulations and abide by them.
4) When using other transportation methods, this machine may need to be disassembled. Please contact Zhejiang Fuwei Heavy Industry Manufacturing Co., Ltd. or its designated distributor.

## **3** Long term storage

### **3.1** Before long-term storage, the following steps must be taken:

- Place the machine in a safe place. Lower the boom and place the bucket on the ground.
- Thoroughly clean the machine.
- Drain and replace all fluids in the machine (engine oil, engine coolant, hydraulic oil, main transmission oil). Fill up with specialized anti-corrosion coolant and specialized cleaning and protective fuel
- Replace filters (engine fuel filter, engine oil filter, hydraulic oil filter).
- After replacing all liquids and filters, run the machine for a while to remove residual normal fuel.
- Remove the battery and store it at an appropriate temperature and humidity. Regularly charge the battery.
- Lubricate all connections.
- Retract the hydraulic cylinder to keep the piston rod inside the cylinder. This can prevent oxidation of the piston rod.
- Seal the end of the exhaust pipe.
- Press the parking brake button to lock the machine.

### **3.2** During long-term storage

- Start, operate and operate the machine once a month for a while. Confirm to ventilate the storage room before starting and operating.

- Charge the battery once a month.

## **3.3** After long-term storage

After long-term storage, follow the steps below to operate:

- Thoroughly clean the machine.
- Exhaust pipe for emissions.
- Check all liquid levels of the machine.
- Install the battery and make sure it is full.
- Turn the key to the "preheating" position and check if all indicators (fuel level indicator, oil pressure indicator, warning light, preheating light) are working properly. Keep the key in this position until the preheating light goes out.
- Start the engine and keep it idling for 15 minutes.
- Ensure that all functions of the machine are functioning properly.
- Start slowly operating the machine to preheat the hydraulic system.

# Chapter 8 Common Malfunctions and Troubleshooting Methods

The WS85 skid steer loader is composed of multiple components and has a complex structure. There are various reasons for the formation of faults, and their external manifestations are complex and intricate. The cause of a certain fault can lead to multiple fault phenomena, and a single fault phenomenon may also be caused by multiple reasons. Therefore, in order to quickly and accurately diagnose faults, it is necessary to start with the symptoms of the fault, collect and master first-hand information, analyze and summarize based on the timing, characteristics, and accompanying fault phenomena, combined with their structural characteristics and working principles, and gradually inspect in the order of simplicity to complexity, ease to difficulty, and table (external) to internal (internal)
Check and identify the cause of the malfunction.

| fault | reason | Troubleshooting |
|---|---|---|
| electrical system | | |
| Even if the engine is spinning at high speed, the lights cannot function properly | • Circuit malfunction<br>• The fan belt is not tensioned | • Check and repair any loose terminals and connections<br>• Check the belt tension and adjust it |
| When the engine is running, the light is on and off intermittently | | If replacement is necessary |
| When the engine is running, even at high speeds<br>The charging indicator light does not turn off | •AC generator malfunction<br>• Circuit malfunction | •••• Replacement<br>• Check and repair |
| Abnormal engine sound | • AC generator malfunction | • replace |
| Cannot start when the key is turned to the start position | • Circuit malfunction<br>• Low battery level<br>• Main fuse malfunction | • Check and repair<br>• CHARGE A BATTERY<br>• replace |
| When starting the engine, the starter gear sometimes works and sometimes does not work | • Insufficient battery charging | • CHARGE A BATTERY |

| | | |
|---|---|---|
| When the engine stops, the oil pressure warning light does not light up | • Light bulb malfunction<br>• PRESSURE SENSOR FAILURE | • replace<br>• replace |
| The charging indicator light does not light up when the engine is stopped | • Light bulb malfunction<br>• Circuit malfunction | • replace<br>• Check and repair |
| hydraulic system | | |
| The pump makes an abnormal sound | • There is no oil in the fuel tank<br>• pump failure<br>• Hydraulic oil is not suitable for ambient temperature | • come on<br>• Check, then repair or replace |

| | | |
|---|---|---|
| | linear measure | More oil change |
| fault | reason | Troubles hooting |
| The device only operates at low speeds | • pump failure<br>• The maximum pressure setting of the valve is incorrect, or due to the closure of the impurity valve<br>• The emission filter is dirty | • Check, then repair or replace<br>• Restart or replace<br>• replace |
| dynamical system | | |
| When the engine is running at high speed, the oil pressure warning light still lights up | • Oil level too low<br>• Oil filter blockage<br>• Oil is not suitable for the surrounding environment | • come on<br>• Replace filter<br>• replace |
| Steam is emitted from the ventilation holes of the radiator | • Low coolant level<br>• Leakage of radiator | • come on<br>• repair |

| | | |
|---|---|---|
| The engine coolant temperature indicator has reached the overheating range | • Loose fan belt<br>• Sludge or lime accumulation in the cooling system<br>• Damage or blockage of radiator blades<br>• Temperature regulation device malfunction<br>The radiator cover is loose or damaged<br>• Working at high altitudes | •Check the belt tension and adjust it<br>• Replace the coolant and clean the cooling system<br>• Repair or clean<br>replace<br>• Tighten the lid or replace the component |
| The coolant temperature indicator is always at the end of the normal scale | • instrument failure | • replace |
| The engine cannot start when the starter is running | • No fuel<br>• There is air in the fuel system<br>• Compression failure | • come on<br>• drain off system<br>• Adjust the clearance of the valve |
| • Sometimes the sound of burning is similar to panting | • Injector malfunction | • replace |
| The emitted gas is white or bright blue | • Too much oil<br>• Inappropriate fuel | • Drain some oil<br>• Replace the correct fuel |
| The emitted gas sometimes tends to be black | • Air filter malfunction<br>• Injector malfunction<br>• Compression failure | •Clean or replace<br>• replace<br>• Adjust the clearance of the valve |
| Abnormal sound (combustion or mechanical parts) | • Low cetane content<br>• overheat<br>• Internal damage to exhaust muffler | • Replace the correct fuel<br>• replace<br>• Adjust the clearance of the valve |
| | • The valve clearance is too large | |

| fault | reason | Troubleshooting |
|---|---|---|
| walking system | | |
| The machine cannot move forward or backward | LOW OIL LEVEL<br>• Blockage of suction filter<br>• Coupling failure<br>• The maximum pressure of the valve is incorrect or the valve is dirty<br>• Hydraulic pipeline is not connected<br>• Walking motor malfunction | • come on<br>• replace<br>• Replace the coupling<br>• Clean or replace the valve<br>• reinstall<br>• Repair or replace |
| The machine moves slowly (accompanied by abnormal noise) | • Low oil level<br>• Presence of foam<br>• The oil suction pipe is too small<br>• Blockage of suction filter<br>• Walking motor malfunction | • come on<br>• Use recommended oil<br>• Check and eliminate leaks<br>• replace<br>• Repair or replace |
| Insufficient traction in both directions | • The engine has not reached its maximum speed<br>• Auxiliary fuel pump malfunction (gear pump)<br>• Improper setting of the maximum pressure of the valve<br>• Servo control connection failure or incorrect control angle<br>• Improper setting of pressure reducing valve<br>• oil overheating<br>• Walking motor malfunction | • Replace the diesel filter and check the injection pump<br>• Repair or replace<br>• restart<br>• reinstall<br>• restart<br>• Check the oil level and clean the radiator<br>• Repair or replace |
| Insufficient traction in only one direction | • Engine overload<br>The pressure setting of the valve in this direction is incorrect | • load shedding<br>• regulating valve |

| | | |
|---|---|---|
| oil overheating | • Low oil level<br>• Blocked or unclean radiator<br>• The oil is not suitable<br>• The oil suction pipe is too small<br>• Maximum pressure of regulating valve<br>• Walking motor malfunction<br>• The pressure reducing valve is set too large | • come on<br>• Check and replace if necessary<br>• Replace the correct oil<br>• Check and eliminate leaks<br>• Inspect, install, repair or replace<br>• Repair or replace |
| | | • regulating valve |
| fault | reaso<br>n | Troubleshooting |
| The machine cannot reach its maximum speed | • Suction filter plug<br>• The engine has not reached its maximum speed<br>• Auxiliary pump (gear pump) malfunction<br>• Insufficient pilot pressure<br>• Improper setting of pressure reducing valve | • replace<br>• Replace the diesel filter and check the injection pump<br>• Check, repair or replace<br>• adjust<br>• Adjust the proportional valve |
| Discontinuous deceleration of the machine | • The connection between the mechanism and the servo control rod is too tight | • Check if the rotation is stable |
| The machine accelerates slowly | • Engine power reduction<br>• Improper setting of pressure reducing valve | • Check if the fuel filter, injection pump, and valves are clogged<br>• Adjust to rated value |

| | | |
|---|---|---|
| Oil leaks from the engine drive shaft or pump | • Damaged sealing ring<br>• High pump casing pressure<br>• The pressure setting of the diversion valve is too high | • replace<br>• Blocked or damaged pipelines for emissions<br>• Check and repair |
| other | | |
| Fuel depletion | • Fuel depletion | • Add fuel and exhaust system before restarting the engine |
| The battery is completely depleted | • generator failure | • Repair or replace |
| | • The battery runs out when the engine stops | • CHARGE A BATTERY<br>• Or start the engine with a boost wire |
| The machine is stuck in the mud | • I can't come out on my own | • Use appropriate metal cables<br>Pass through the towing hook to tow the machine |