OPERATION MANUAL

WHEEL LOADER | MP36

MICHIGAN®

MAYO 2025

Skid Steer Loader
Operation and Maintenance Manual

Dear user:

Thank you for using Michigan skid steer loader!

This Operation and Maintenance Manual briefly introduces safety instructions, performance parameters, structural principle, and requirements for operation, maintenance and adjustment of the skid steer loader, which can be used and referenced by machine operators, maintainers and technical management personnel.

This Operation and Maintenance Manual is a guide for correct use and maintenance of the machine. Please read and comprehend this Manual carefully before using and operating the machine, and operate, lubricate, maintain and repair the machine in strict accordance with requirements of this Manual. Considerable failures of the loader were caused by human factors such as the operator's failure to carefully read the Operation and Maintenance Manual. A high level of safety awareness and proper maintenance can make the loader run safely and efficiently, thus bringing you more benefits. Therefore, please read and understand the safe operation instructions before operating the loader and operate the loader in strict accordance with the instructions. Wrong operation, lubrication and maintenance of the loader are dangerous and may result in personal injury or death.

We will continually upgrade the product quality and improve the comprehensive product performance, so as to make the machine more cost-effective and more efficient. Changes to contents of this Manual thereby will be made without prior notice. Technical parameters involved in this Manual are not used as the basis for inspection or testing by the third party.

In order to provide better service for you and improve the product and services quality, we hope you will inform us of the problems you found and improvement suggestions in the process of using Michigan products and the Operation and Maintenance Manual.

The Manual is the first edition.

Wish your career more prosperity!

Foreword

Documentation

This Operation and Maintenance Manual shall be placed in the cab and properly kept, making it convenient for reading at any time. Please be sure to read and comprehend contents of this Manual.

Contents for continuous product improvement and renewal may not be included in this Manual.

Some structures or accessories in photos or pictures of this Manual may be different from those of your machine.

When you have doubts about the machine or this Manual, please inquire the latest relevant information from the agent of Michigan.

Structure of this Manual

This Manual consists of six parts: Preface, Chapter I Safety Part, Chapter II Product Information, Chapter III Machine Operation, Chapter IV Maintenance Part, Chapter V Lifting, Transportation and Fixation of Skid Steer Loader, Chapter VI Common Faults and Troubleshooting, and Reference Table of Densities of Common Materials.

Safety part

Basic safety precautions are listed in the Safety Part. In addition, contents and positions of various warning signs and stickers on the machine are listed in this part in detail.

Product Information Part

Purpose, performance and parameters of the product are listed in this part.

Machine Operation Part

It refers to operation and use, startup and shutdown, and operation control of instrument, switch and machine.

Maintenance

It includes maintenance intervals of various parts of the machine. Maintenance items listed in the maintenance interval table shall be maintained within the specified maintenance period.

Descriptions on Lifting, Transportation and Fixation of Skid Steer Loader

This part includes lifting and transportation information.

Common Faults and Troubleshooting

This part introduces common faults of the machine and methods for removing these faults.

Attached Schedules

Reference Table of Densities of Common Materials

Table of Contents

Chapter I Safety Part

Please read this Manual carefully and make sure that you fully understand the precautions stated in this Manual and by the safety signs on the machine. Strictly observe these precautions when operating or repairing the machine.

1 Safety Part

1.1 Safety Tips

1.1.1 Only trained and qualified designated persons are allowed to operate the machine.

1.1.2 The majority of accidents that happened during operation, maintenance and repair of the product are caused by non-conformance to basic safety rules or preventive measures. If all kinds of potential dangers can be recognized before an accident happens, such an accident can often be avoided. Workers must be warned of all kinds of potential dangers. Workers must be trained to enable them to master necessary skills and correct operation methods.

1.1.3 Improper operation, maintenance or repair of the product is dangerous and may cause personal injury or death.

1.1.4 Modifying the machine without permission may damage functions of the machine or reduce safety, and affect the service life of the machine.

1.1.5 Safety protection measures and warnings are provided in this Manual and on the product. Ignoring these warnings will cause personal injury and economic loss to yourself or others.

1.1.6 "Safety warning symbol" and "logo text", such as "Danger", "Warning" and "Caution", are used to identify a danger.

1.2 Safety Signs

1.2.1 Stick some dedicated safety signs on your machine. This part will point out exact locations of these signs and describe the dangers. Please be familiar with all safety signs.

1.2.2 Ensure that all safety signs are legible.

1.2.3 If the handwriting is unclear, clean or replace the safety sign.

1.2.4 If the icon on the sign is unrecognizable, please replace the sign.

1.2.4 When cleaning a safety sign, clean it with cloth, water and soap. Never clean a safety sign with solvents, gasoline or other violent chemicals. These cleaning solvents may cause the adhesive used for sticking signs to lose its viscosity, and further cause safety signs to fall off the machine.

1.2.5 Replace any damaged or lost safety sign.

1.2.6 If a safety sign is stuck on the part that is replaced, stick this safety sign on a part as a replacement.

1.2.7 Any after-sales service agency can provide various brand-new safety signs.

1.3 Comprehending Signal Vocabulary

1.3.1 On a safety sign of the machine, vocabularies indicating the degree or level of hazard - DANGER, WARNING or CAUTION - are used together with the sign "Caution!".

1.3.2 "Danger" refers to a case where a direct danger exists. If it is not avoided, it will cause deaths or serious injuries.

Fig. 1

1.3.3 "Warning" refers to a case where a potential danger exists. If it is not avoided, it may cause injuries and deaths.

Fig. 2

1.3.4 "Caution" refers to a case where a potential danger exists. If it is not avoided, it may cause minor or moderate injuries.

Fig. 3

1.3.5 "Danger" or "Warning" safety sign is set near a specific hazard. See "Caution" safety sign for routine safety protection measures.

1.3.6 Vocabularies specified above are not used on some safety signs after safety alarm signs are used for the machine.

1.4 Schematic Diagram for Distribution of Machine Safety Signs and Additional Signs

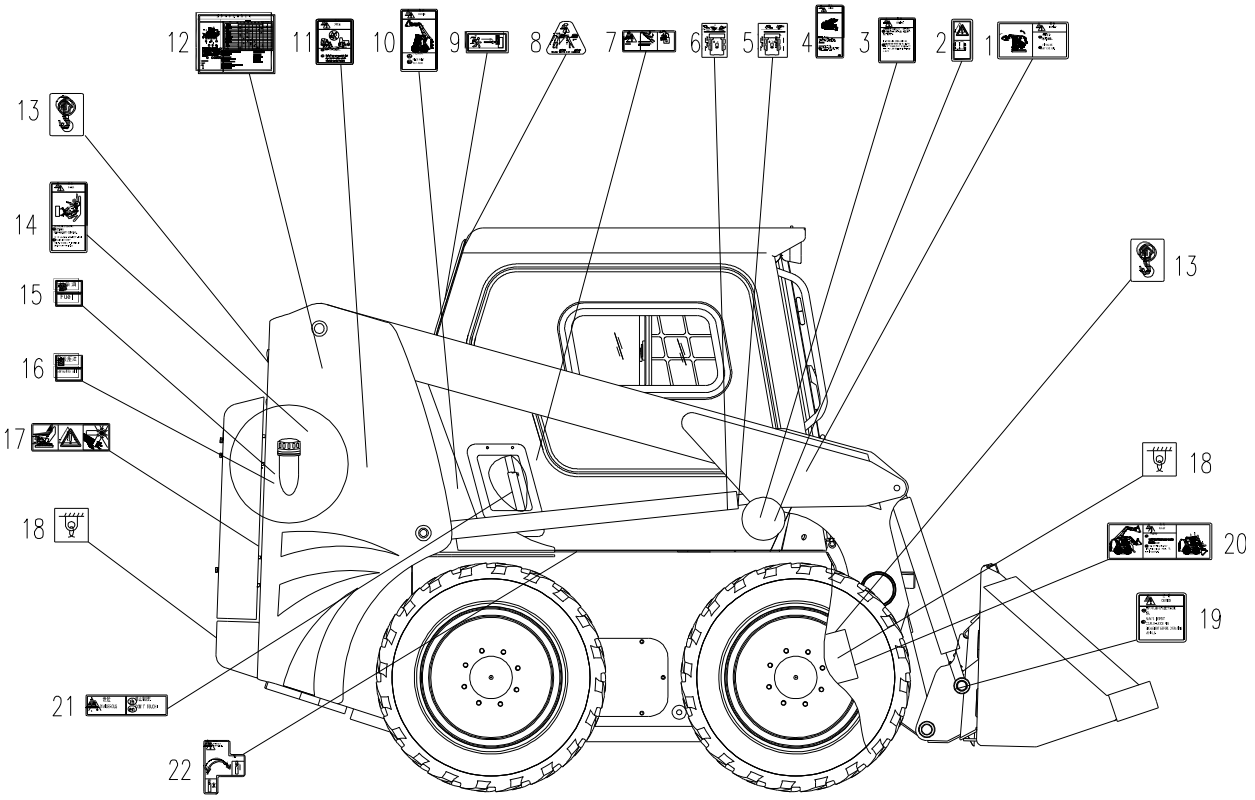


Fig. 4

Warning Sign for Overturning Danger (1)

This warning sign is located inside the right boom.

Load which the loader carries shall be within the rated load and shall never ever exceed the rated load, so as to avoid overturning; otherwise, the machine will be damaged or a personal safety accident will be caused.

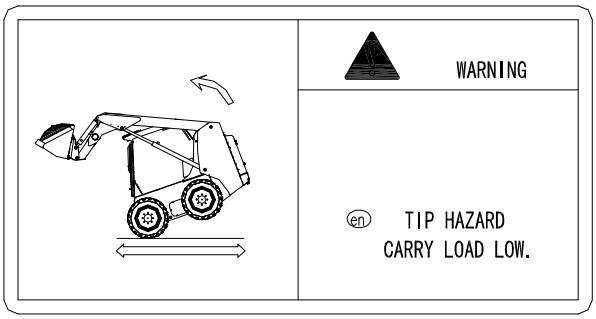


Fig. 4-1

User Warning Sign (2)

This warning sign is located inside the cab.

Never operate the loader or work on the loader without reading and comprehending instructions and warnings in the Operation Manual, for failure to comply with instructions or ignoring the warnings may lead to a casualty accident. It is the driver's duty to strictly observe operation procedures.

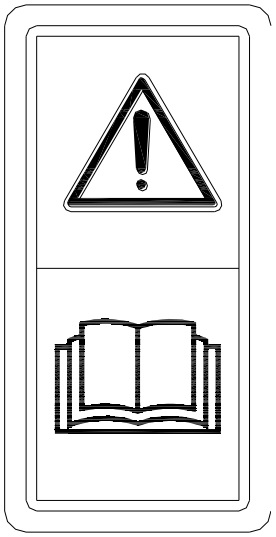


Fig. 4-2

Warning Sign for Locking Pin Opening (3)

This warning sign is located inside the cab.

Please be sure to operate the machine according to contents on the sign, otherwise, the machine will be damaged or a personal safety accident will be caused.

Fig. 4-3

Crushing Danger Sign (4)

This warning sign is located inside the cab.

Please be sure to operate the machine according to contents on the sign, otherwise, the machine will be damaged or a personal safety accident will be caused.

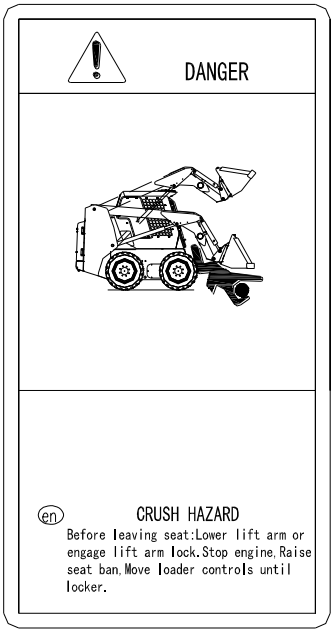


Fig. 4-4

Right-Hand Control Handle Function Sign (5)

This sign is located inside the right control handle guard.

Inform the user that he/she can use the right control handle to control the bucket, rotating bucket and unloading of the machine as well as lifting, lowering and floating with the boom.

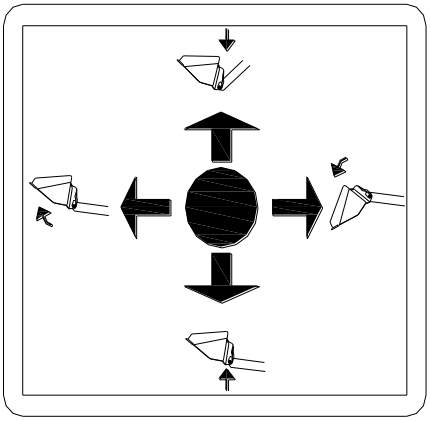


Fig. 4-5

Left-Hand Control Handle Function Sign (6)

This sign is located inside the left control handle guard.

Inform the user that he/she can use the left control handle to control the machine to travel to the left and right.

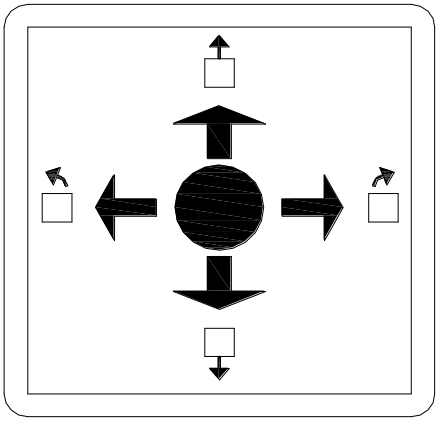


Fig. 4-6

Warning Sign for Safety Stay Rod (7)

This sign is located outside of the safety stay rod of the right boom.

In case that the boom is lifted for maintenance, please lower down the safety stay rod, otherwise a personal safety accident will be caused.

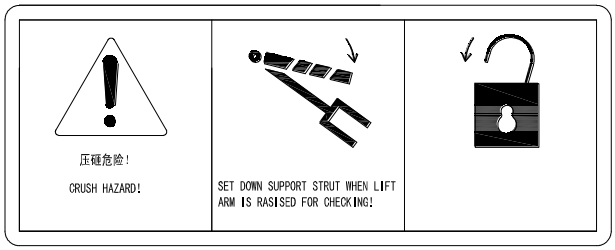


Fig. 4-7

Emergency Exit Warning Sign (8)

This sign is located on the left rear inside the cab.

Inform the user that this is an emergency exit.

Fig. 4-8

Safety Exit Warning Sign (9)

This sign is located on the rear glass inside the cab.

Inform the user that this is an emergency exit.

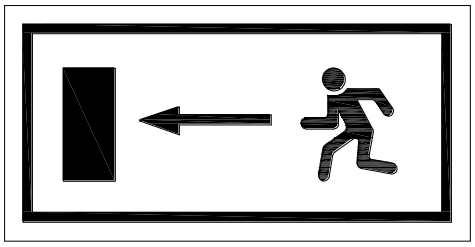


Fig. 4-9

"Mind Your Hand" Warning Sign (10)

This sign is located at the rear position on the right side of the frame when the boom is lowered down.

Never expose any part of your body to this position to prevent injury.

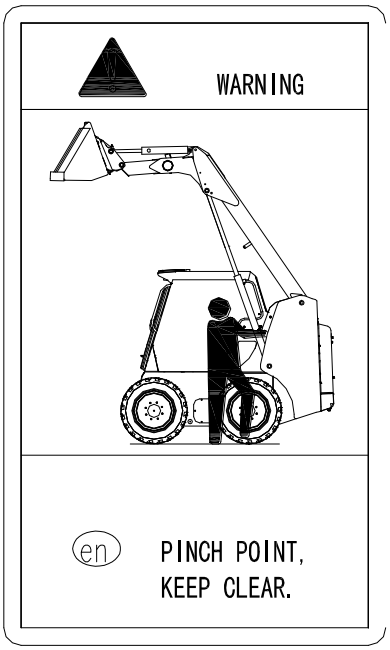


Fig. 4-10

Engine Start Danger Sign (11)

This sign is located at the engine starter.

Please be sure to operate the machine according to contents on the sign, otherwise, the machine will be damaged or a personal safety accident will be caused.

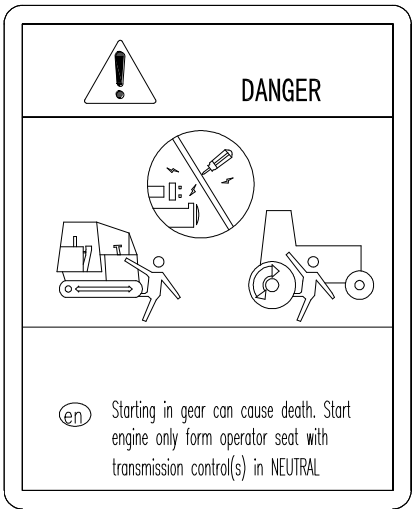


Fig. 4-11

Maintenance and Lubrication Sign (12)

This sign is located on the left rear side of the frame.

Please be sure to maintain and lubricate the machine according to contents on the sign, otherwise, the machine will be damaged.

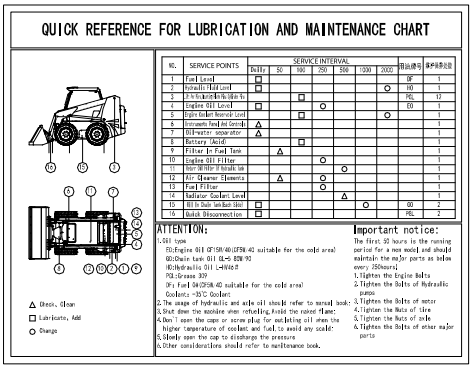


Fig. 4-12

Lifting Sign (13)

Such signs are located on both upper rear sides of the frame and on both front sides of the frame.

When the skid steer loader is lifted, lifting hooks can be used to hook lifting lugs on the vehicle body. Please adjust the length of each strand of rope before lifting, so as to keep the whole vehicle basically level. Please pay attention to keeping hooks fastened firmly during lifting. Please use a special lifting tool for lifting, so as to prevent the hood, cab, etc. from being damaged by steel wire ropes.

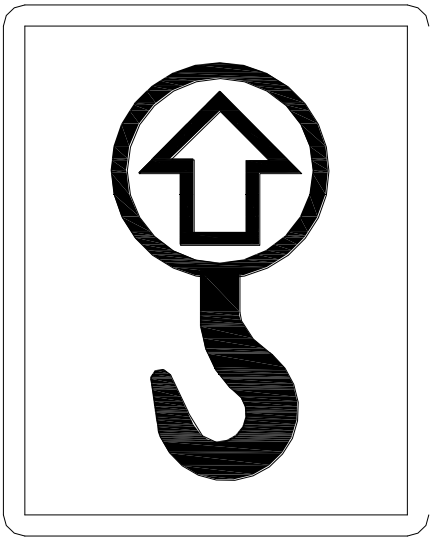


Fig. 4-13

Danger Sign for “Ethyl Ether is Prohibited” (14)

This sign is located on the right rear side of the frame.

Please be sure to operate the machine according to contents on the sign, otherwise, the machine will be damaged or a personal safety accident will be caused.

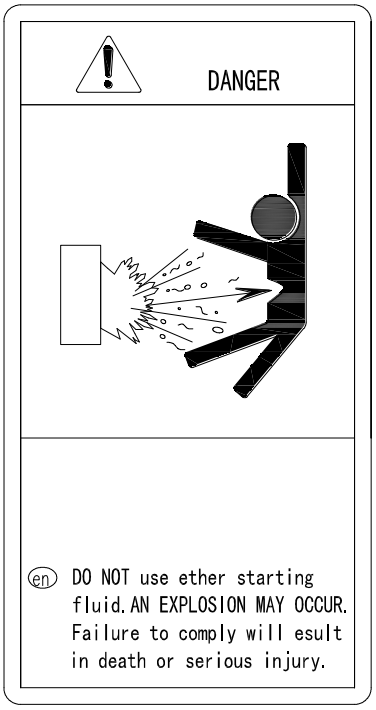


Fig. 4-14

Fuel Sign (15)

This sign is located inside the oil tank of the frame.

Please add diesel timely to prevent the engine from stopping working. Adding a fluid incorrectly will disable the machine to work and even cause damage to the machine.

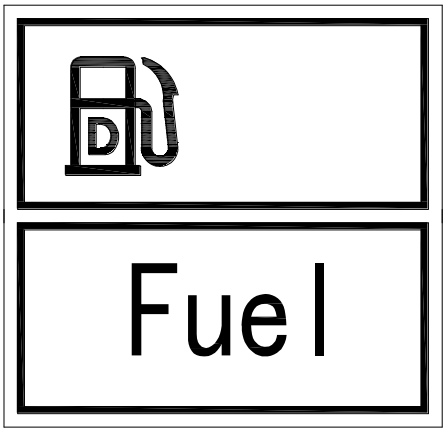


Fig. 4-15

Hydraulic Oil Sign (16)

This sign is located inside the hydraulic oil tank of the frame.

Please add hydraulic oil timely to prevent the loader from stopping working. Adding a fluid incorrectly will disable the machine to work and even cause damage to the machine.

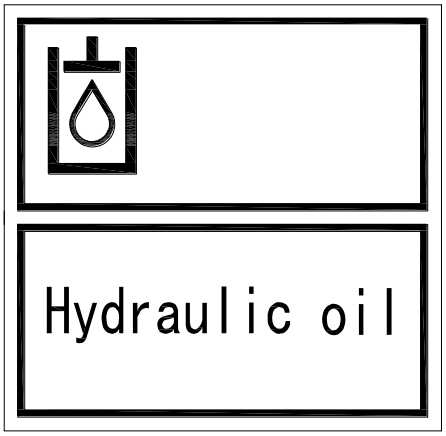


Fig. 4-16

Radiator and Fan Warning Sign (17)

This sign is located on the radiator.

Do not touch the radiator when warming up the engine to avoid scalding. Keep your hands away from the fan when the engine is running, otherwise, serious injury or death may be caused.

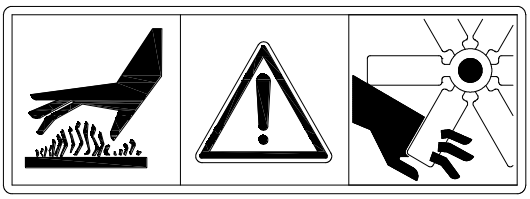


Fig. 4-17

Binding Position Sign (18)

Such signs are located in front of the frame and behind the counterweight.

Inform the user that here is the binding position for transportation and he/she has to bind this position with the transport vehicle during transportation to fix the whole machine.

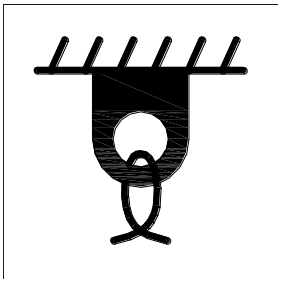


Fig. 4-18

Sign for Quick-change Connection Check (19)

This sign is located on the crossmember of bucket seat body.

Please be sure to operate the machine according to contents on the sign, otherwise, the machine will be damaged or a personal safety accident will be caused.

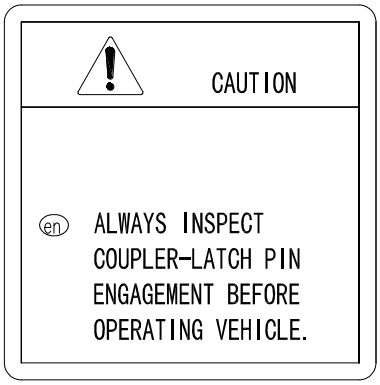


Fig. 4-19

Warning Sign for Tamping Danger (20)

This warning sign is located on the front side of the frame.

Please do not stay under the boom when the boom is lifted, unless the boom is supported.

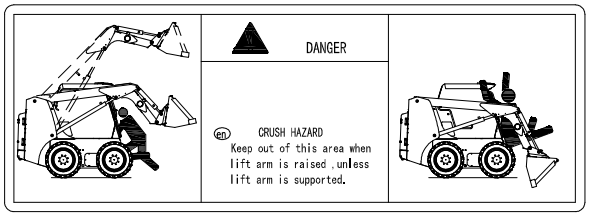


Fig. 4-20

"No Touch" Warning Sign (21)

This warning sign is located on the air spring on the lower left side of the cab.

In case that the cab is turned up, do not touch the air spring with any part of your body.

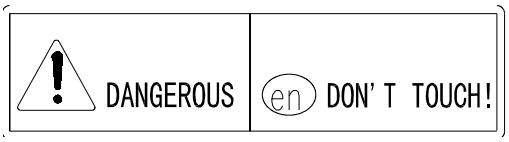


Fig. 4-21

Chipped Glass Danger Sign (22)

This warning sign is located on the air spring on the lower left side of the cab.

When the glass here is chipped, using this machine may cause serious injury. This machine has to be repaired before use.

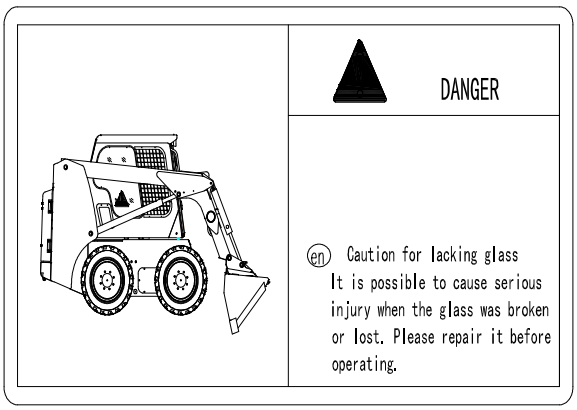


Fig. 4-22

1.5 Other Safety Information

1.5.1 Observation of safety instructions

1.5.1.1 Before maintaining the equipment, hang a safety warning sign on the starting switch or control handle, such as “Operation prohibited” sign or similar warning sign.

1.5.1.2 Learn about the width of the operating machine, so that the operator keeps a distance from the machine when operating near a fence or boundary obstacle.

1.5.1.3 Beware of HV wires and cables that are built into the ground. If the machine touches any of these dangerous wires and cables, casualties may be caused due to electric shock.

1.5.2 Safety protection

1.5.2.1 When operating the machine, do not wear loose clothes or jewelry, for these articles may trip or jam the operating handle or other parts of the equipment.

1.5.2.2 Make sure that all guard plates and covers have been fixed well at corresponding positions of the equipment.

1.5.2.3 Never pile up sundries on the machine. Remove fragments, fluid, tools and other sundries from floor, channel and stair of the machine.

1.5.2.4 Properly keep scattered items, such as lunch boxes, tools and other items that are not machine parts.

1.5.2.4 Be familiar with specific gesture signals used on the construction site; gesture signals only sent by a person shall be received.

1.5.2.5 Please do not smoke when repairing the air conditioner. Do not smoke in a place where there may be any refrigerant gas. Inhalation of smoke released by burning materials containing the air conditioner refrigerant may cause personal injury or death.

1.5.2.6 Never put the maintenance fluid in the glass container. Drain the whole maintenance fluid into a suitable container.

1.5.2.7 The machine shall not work in any polluted area. If the machine is used in the polluted area and there are hazards, special preventive measures shall be taken to protect the driver against existing dangers.

1.5.2.9 If there is a risk of debris splashing due to such reasons as operation with a hydraulic hammer, protective devices such as impact-resistant material protection device and mesh protection device or those with equivalent protective effects should be installed.

1.5.2.10 The cab is an important structure to protect the driver. If any part of the cab is affected by plastic deformation or fracture, the cab should be replaced.

1.5.2.11 Use a cleaning solution as required by the manufacturer and report all items required for maintenance.

1.5.3 Machine check

1.5.3.1 Before starting the machine each time, walk around the machine for a turn and carefully check the machine, to avoid economic losses or personal injuries.

1.5.3.2 Check whether each instrument works normally. It is only allowed to start the engine in the cab. Making the starter motor terminal or battery short-circuited is absolutely not allowed, for any short circuit will make the circuit bypass the normal starting system of the engine and may also cause damage to the circuit system.

1.5.3.3 Adjust the seat to the degree that the driver can still depress the pedal fully when sitting close to the backrest position.

1.5.3.4 Check states of the seat belt and its fasteners, and replace any damaged or worn part. Regardless of the appearance, any seat belt which has been used for three years must be replaced.

1.5.3.5 Make sure that there is a good view around the cab and that the driver can clearly see the scene outside the cab.

1.5.3.6 Make sure that the lighting system of the machine can meet requirements of working conditions and that all lamps can work properly.

1.5.3.7 Do not leave parts and tools around the operator's seat. In case of vibration generated during traveling and operation, such articles may fall and damage the control lever or switches, or cause the control lever to move to start the working device, resulting in accidents.

1.5.3.8 Check the cooling water level, diesel level and engine lubricating oil level, and check whether the air filter is blocked.

1.5.3.9 We recommend that, the machine should be equipped with a fire extinguisher, and the operator should know the storage location of fire extinguisher and be familiar with the use method of fire extinguisher.

1.5.4 Cab entry

1.5.4.1 Before getting on the cab, clean sludge and fine sand grains stuck on shoes, for these pieces of muddy sand will accumulate on fulcrums of accelerator pedal and brake pedal, which will hinder the reset of these pedals and may lead to accelerated wear of the push rod. If pieces of muddy sand accumulate at these places, they shall be cleaned immediately.

1.5.5 Pressure trapped in the system

1.5.5.1 Pressure may be trapped in the hydraulic system. When pressure trapped in the system is released, the machine or optional parts may suddenly move. Take care when removing the hydraulic pipe or its joint. The released high-pressure fluid will enable the oil pipe to wobble, and may be sprayed out. If this fluid penetrates into the body, serious personal injury and even death will be caused.

1.5.6 Injury caused by fluid penetration

1.5.6.1 Even if the engine has been shut down for a long time, there may still be pressure in the hydraulic circuit. If pressure is not released correctly, objects such as hydraulic oil or pipe plug will be caused to be ejected at a high speed.

1.5.6.2 Before pressure release, never remove any hydraulic part, otherwise personal injuries will be caused.

1.5.6.3 When checking for leakage, please always use a wooden board or cardboard as a baffle. Fluid ejected under pressure may penetrate human tissues. If this fluid penetrates into the body, serious personal injury and even death will be caused. Even a pinhole-sized leak may cause serious personal injuries. If this fluid is sprayed on your skin, you must be treated immediately. Please seek a doctor who is familiar with this kind of injury for

treatment.

1.5.7 Compressed air and high-pressure fluid

1.5.7.1 Compressed air or pressurized water will splash fragments or hot water, which may cause personal injuries.

1.5.7.2 When cleaning with compressed air or pressure, wear protective clothing, protective shoes, goggles or protective mask.

1.5.7.3 The maximum pressure of air used for cleaning must be lower than 0.2 MPa.

1.5.7.4 The maximum pressure of water used for cleaning must be lower than 0.25 MPa.

1.5.8 Prevention from crushing and cutting

1.5.8.1 Operation or maintenance under the equipment can be performed after the equipment is supported properly. Don not support the equipment with the hydraulic oil cylinder. If the operating handle is moved or the hydraulic pipe breaks, the working device may fall down.

1.5.8.2 When performing operations under the cab of the machine, be sure to support the cab properly.

1.5.8.3 Unless otherwise instructed, never make any adjustment when the machine is moving or the engine is running.

1.5.8.4 As long as there is a linkage mechanism to operate the equipment, the clearance in the linkage system will change with the movement of the equipment or machine. Keep away from areas where clearances may suddenly change due to movement of the machine or equipment.

1.5.8.5 Avoid all rotating and moving parts.

1.5.8.6 Some protective covers have to be removed during maintenance, and these covers that have been removed must be reinstalled after maintenance.

1.5.8.7 Keep objects away from rotating fan blades, which will throw objects away or cut them.

1.5.8.8 Never use any twisted or worn steel wire rope. When touching the steel wire rope, wear gloves.

1.5.8.9 When the locating pin is hammered too hard, the pin may fly out and the loose locating pin may cause injury to people. When knocking the locating pin, make sure that there are no other persons nearby, and wear safety goggles to prevent your eyes from being hurt. When you knock an object, debris or other fragments will fly out. Before knocking any object, make sure that no one will be hurt by flying fragments.

1.5.9 Fire prevention and explosion prevention

1.5.9.1 All fuel, most lubricating oil and some cooling water mixtures are flammable.

1.5.9.2 When a flammable fluid leaks or splashes on a hot surface or electrical appliance part, fire may be caused and thus personal injuries and property losses will be caused.

1.5.9.3 Remove flammable objects that adhere to the machine surface, and never let any flammable object accumulate on the machine surface.

1.5.9.4 It is forbidden to operate the machine near open flames.

1.5.9.5 It is forbidden to perform welding on pipelines or oil tanks containing flammable fluids. It is forbidden to perform flame cutting on pipelines or oil tanks containing flammable fluids. Before performing welding or flame cutting on these pipelines or oil tanks, clean them thoroughly with nonflammable solvents.

1.5.9.6 Check all wires before starting the machine each day. Before operating the machine, repair loose or worn wires, and clean and tighten all line joints.

1.5.9.7 Check all pipelines for aging or damage before starting the machine each day, and timely replace the aged or damaged pipeline to avoid fire caused by fluid leakage. Ensure that pipelines of the machine are in good available condition.

1.5.9.8 Take care when filling in the machine with diesel, lubricating oil or other fluids. Neither smoke when adding diesel, lubricating oil or other fluids, nor fill in the machine with diesel, lubricating oil or other fluids near open flames or sparks. Be sure to remember to shut down the engine before adding diesel, and be sure to fill in the diesel tank with diesel outdoors.

1.5.9.9 Gas emitted from the battery will explode. Keep open flames or sparks away from the top of the battery. Do not smoke in a place where batteries are charged.

1.5.9.10 To check the battery charging condition, you shall not use the method of bridging a metal object on the terminal, but you must use a voltmeter or hydrometer.

1.5.9.11 Incorrect connection of jumper cable may cause explosion and thus personal injuries. For detailed descriptions, please see the description part of Usage & Maintenance and Precautions of Matching Battery of Loader in this Manual.

1.5.10 Pipeline

1.5.10.1 Please do not bend the high-pressure pipeline. Do not knock the high-pressure pipeline. Do not install any bent or damaged pipeline.

1.5.10.2 Please repair all loose or damaged pipelines. As leakage can cause fire, please consult the Michigan agent about part repair or replacement.

1.5.10.3 Carefully check the pipeline, and do not check for leakage with bare hands. Please check for leakage with a wooden board or cardboard.

1.5.10.4 In any of following cases, please replace the accessories:

1. Damage or leakage of end joint

2. Wear or cut of outer layer

3. Metal wire exposure to the outside

4. Outer layer bulging and swelling

5. Distortion of hose

6. End joint displacement

1.5.10.5 Make sure that all clamp pipes, protective articles and heat shields are installed correctly, so as to help to prevent vibration, mutual friction between parts and overheating when the machine works.

1.5.11 Description on tires

1.5.11.1 Explosion of the pneumatic tire is caused by gas explosion due to heating inside the tire, while explosion caused by a heat source may be caused by welding, heating on rim parts and external kindling.

1.5.11.2 Tire explosion is more lethal than tire break. Tires, rim parts and axle parts can be thrown 500 m or more away from the machine under the impact of its explosive force. The explosive force and thrown parts can cause damage to buildings and casualties.

1.5.11.3 Stay away from any hot tire. Do not use water or calcium as the counterweight of tires. It is recommended to inflate a tire with dry gas. In order to avoid over-inflation, providing the professional inflation equipment and giving training on correct use of the equipment are necessary. Improper equipment or improper use of equipment can lead to tire break or rim damage.

1.5.11.4 When inflating a tire, stand behind the wheel surface.

1.5.11.5 Repairing tires and rims is a dangerous operation. This repair work shall be done by trained personnel with correct tools and working procedures. During tire and rim repair, if a wrong working procedure is used, the explosive force will cause installation parts to burst, which will lead to casualties.

1.5.12 Prevention from lightning damage

1.5.12.1 When there is lightning in the adjacent area of the machine, the operator shall never ever perform following operations:

1. Get on the machine.

2. Get off the machine.

3. In case of lightning, do not leave the cab if you are in the cab. In case of lightning, please stay away from the adjacent area of the machine if you are on the ground.

1.5.13 Engine starting

1.5.13.1 If there is a warning label attached to the engine starter switch or control device, do not start the engine or pull the control device.

1.5.13.2 Before starting the engine, move all control handle levers to the NEUTRAL position.

1.5.13.3 The exhaust gas of diesel engine contains combustion products harmful to human body. Be sure to operate the engine in a well-ventilated place. If you are to operate in a closed place, you shall discharge exhaust outdoors.

1.5.14 Safety when getting on and off the machine

1.5.14.1 Before getting on the machine, clean the ladder and handrail. Check the ladder and handrail. Carry out all necessary cleaning.

1.5.14.2 When getting on and off the machine, face the machine, and keep three-point contact with the ladder and handrail. Note: Objects for three-point contact can be two feet and one hand, and also be one foot and two hands.

1.5.14.3 It is forbidden to get on and off the moving machine; never jump off the machine. Do not carry tools

or articles when getting on or off the machine. Pull the equipment onto the platform with hand pulling ropes. When entering or leaving the cab, do not use the operating lever as a handrail.

1.5.15 Before operation

1.5.15.1 Make sure that no one is around the machine.

1.5.15.2 Remove all obstacles on the route where the machine is running. Beware of dangerous obstacles, such as wire, ditch, etc.

1.5.15.3 Make sure that all windows are clean; doors and windows shall be fixed in the open or closed position.

1.5.15.4 Adjust the rearview mirror to get the optimum view around the machine.

1.5.15.5 Make sure that the horn, reversing alarm and all other alarm devices on the machine work properly.

1.5.16 Operation

1.5.16.1 You can operate the machine only when you sit on the driver's seat. You must fasten the seat belt when operating the machine. You can operate the control lever only when the engine is running.

1.5.16.2 Operate the machine and operation tools in the open ground, and check whether all manipulators and protective facilities act correctly.

1.5.16.3 Before starting the machine, make sure that no one is in the dangerous area.

1.5.16.4 No extra person shall be allowed to get on the machine unless there are additional seats and seat belts on the machine.

1.5.16.5 When the machine is running, pay attention to and report which part has to be repaired.

1.5.16.6 Keep away from cliffs, tunnels and edges of cliffs.

1.5.16.7 Avoid operating the machine across a slope. Make the machine operate uphill and downhill as much as possible at all times. Once the machine slips on the slope, loads on the machine shall be unloaded immediately and the machine shall be driven downhill.

1.5.16.8 Avoid any case which may cause the machine to turn over. The machine may turn over when operating on a shore and a slope. When crossing a trench, ridge or other unexpected obstacles, the machine may also turn over.

1.5.16.9 Keep the machine in control, and do not let the load beyond the capacity of the machine.

1.5.16.10 Make sure that there are enough hooks and dragging devices. The traction equipment can only be connected to traction pins or hooks. Do not let people straddle the steel wire rope.

1.5.16.11 Before triggering the machine, make sure that there are no other person between the machine and the machine tool. Underlay the hook of the traction equipment so that the traction equipment is aligned with the traction pin, and trigger the machine. Connect the machine to the equipment used for dragging. You should know the maximum size of your machine.

1.5.17 Engine shutdown

1.5.17.1 Do not shut down the engine immediately after the engine has been working under load, which will cause overheating and accelerated wear of engine parts.

1.5.17.2 After the engine is shut down and the parking brake has been engaged, let the machine run for five minutes and then shut it down. In this way, high-temperature parts of the engine can be gradually cooled down.

1.5.18 Parking

1.5.18.1 Park the machine on the level ground. If the machine must be parked on a downhill slope, tires shall be wedged with wedge blocks.

1.5.18.2 Shut down the engine.

1.5.18.3 Turn the electric key switch on the instrument controller to the STOP position and pull out the key.

1.5.18.4 Turn the power main switch to the OFF (○) position to prevent the battery from discharging due to short circuit, electric leakage of some parts or man-made sabotage.

1.5.19 Operation on slope

1.5.19.1 Different machines have different performance. Safe operation of the machine under different conditions depends on: machine configuration, machine maintenance, running speed of machine, workplace conditions, tire pressure, etc. Driving skills and judgment of machine operators are the most important.

1.5.19.2 Operators should receive training on good operation shills. These training courses enable trainees to have the ability to observe the working environment, operate the machine, identify potential dangers, etc.

1.5.19.3 When the machine operates on a slope or steep slope, following important factors should be considered:

1. At a higher speed, the stability of the machine deteriorates due to inertia;

2. On a rugged terrain, the stability of the machine will deteriorate;

3. The machine will slip on grassy, muddy, and gravel roads;

4. Maintain the balance of the machine;

5. Overload may cause the machine to turn over;

6. The machine shall not operate on a crosswise slope, and shall be kept facing uphill and downhill at any time;

7. Operating the machine on a slope will affect the normal performance of the machine and increase unstable and unsafe factors.

1.5.20 Containing over-spilled fluid

1.5.20.1 During inspection, maintenance, testing, adjustment and repair of the machine, take care to ensure that the over-spilled fluid is contained properly. Before opening any chamber or disassembling any parts containing liquid, please prepare suitable containers for holding liquid.

Chapter II Product Information

2 Product Data

2.1 Machine Appraisal

2.1.1 Some signs are installed on the machine to manage each machine produced by Michigan. Signs are installed at different positions of the machine, and these signs are described below.

2.1.2 Machine appraisal sign and product identification number

For the machine appraisal sign, see the front position of the frame.

2.1.3 Machine S/N

For machine S/N, see the right position of the frame.

2.1.4 Engine appraisal sign

For the engine appraisal sign, see the engine nameplate.

2.2 Machine Configuration

For details, please see the Operation and Maintenance Manual for the diesel engine configured for this model.

2.3 Application of Machine

2.3.1 The skid steer loader is very applicable to a narrow operation site with the uneven ground, where operation contents change frequently. It can also be used as the auxiliary equipment for large-scale engineering machinery and construction machinery. It is widely used in road maintenance, pipeline laying, cable laying, landscaping, snow clearing, cargo transfer, digging and crushing, etc.

2.3.2 Based on user needs, the model can be optionally equipped with multi-functional accessories, such as sweeper, snow remover, screw auger, fork, four-in-one bucket, milling machine, etc.

2.4 Hydraulic System

2.4.1 Working hydraulic system

2.4.1.1 The working hydraulic system is used to control actions of the bucket, and includes oil tank, working pump, multi-way valve, boom oil cylinder, rotating bucket oil cylinder, leveling valve, oil pipe, etc.

2.4.1.2 When the working device does not work, the hydraulic oil from the working pump is added to the working distribution valve and flows back to the oil tank through the oil return chamber of the distribution valve.

2.4.1.3 If a bucket is required for loading and unloading, operate the right handle. The working oil from the working pump flows into the rear chamber or front chamber of the rotating bucket cylinder through the distribution valve so as to turn the bucket up or down, while the working oil from the oil pump flows into the lower chamber or upper chamber of the boom oil cylinder through the distribution valve so as to lift or lower the boom and the bucket.

2.4.1.4 When the external load exceeds the lifting or turning-up capacity of the system or the piston of boom oil cylinder reaches the end of the oil cylinder (the piston of the rotating bucket oil cylinder reaches the front end of the oil cylinder), and the system pressure rises to the set pressure of the system, the pressure oil will top the safety valve to overflow and unload, and then flow back to the oil tank through the distribution valve.

2.4.1.5 When the oil pressure at the front chamber of the rotating bucket oil cylinder exceeds the set pressure of the double-acting safety valve at the front chamber of the multi-way reversing valve, the pressure oil will top the safety valve to overflow and unload, and then flow back to the oil tank through the distribution valve. When the bucket has to float up and down (for loading and unloading bulk materials), the working oil from the oil pump can enter upper and lower chambers of the boom oil cylinder through the distribution valve, and is connected with the oil tank at the same time. The working oil at upper and lower chambers of the oil cylinder is in a low pressure state, the bucket is in a free floating state under its own weight, and the bucket works close to the ground.

2.4.1.6 Working pump

The gear pump is used as a working pump. The working pump is coaxial with the traveling plunger pump and the engine, so as to provide power for the working system.

2.4.2 Traveling hydraulic system

The traveling hydraulic system is used to control the traveling of the machine, and includes oil tank, variable piston pump, traveling motor, unlocking solenoid valve, oil pipe, etc.

2.4.2.1 Variable piston pump

The variable piston pump is connected with the engine through a coupling to provide driving power for the traveling system.

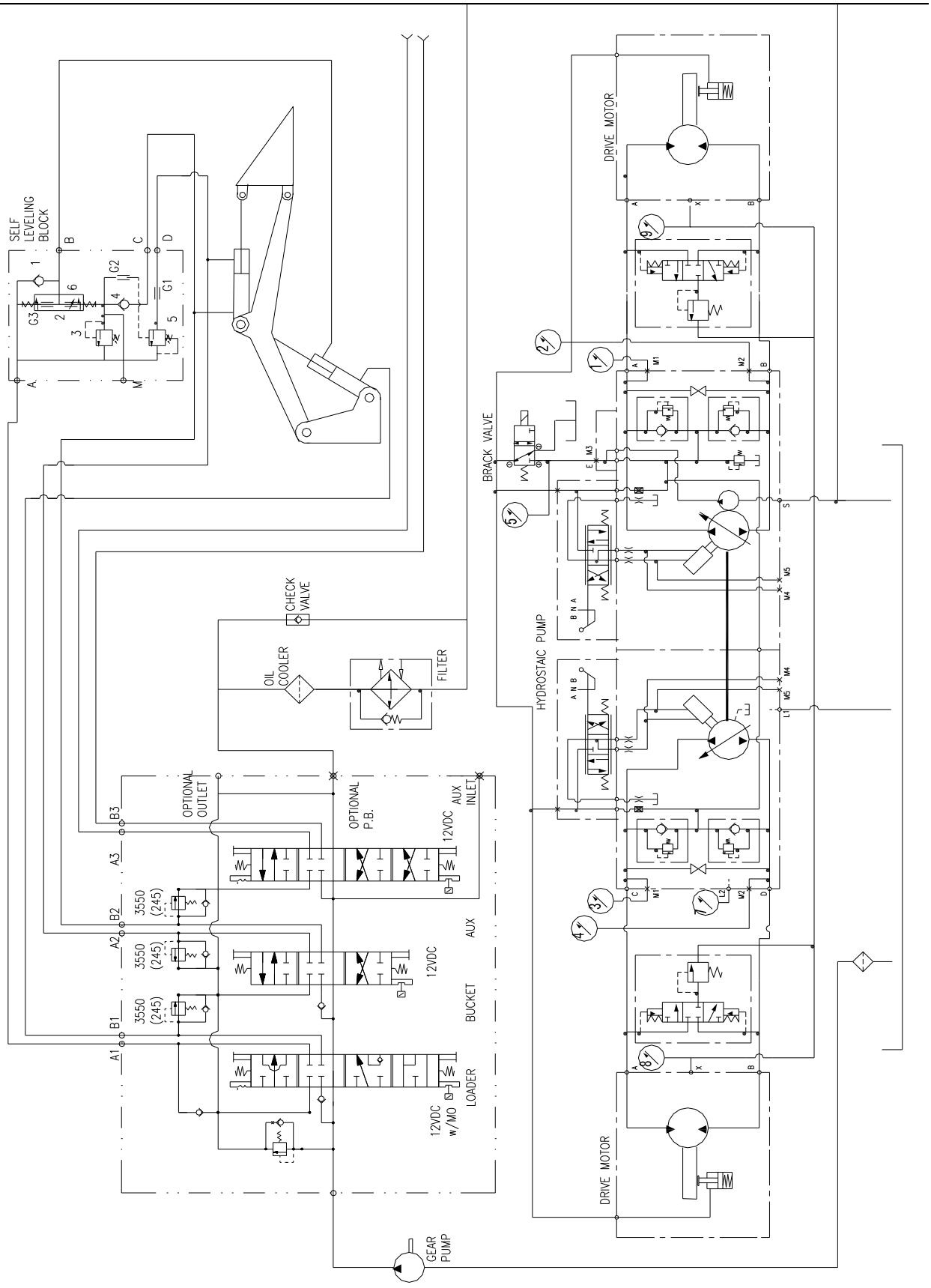


Fig. 6 Schematic Diagram of Hydraulic System

2.5 Working Device

2.5.1 The working device of the loader mainly consists of boom, bucket seat and bucket, as shown in Fig. 7.

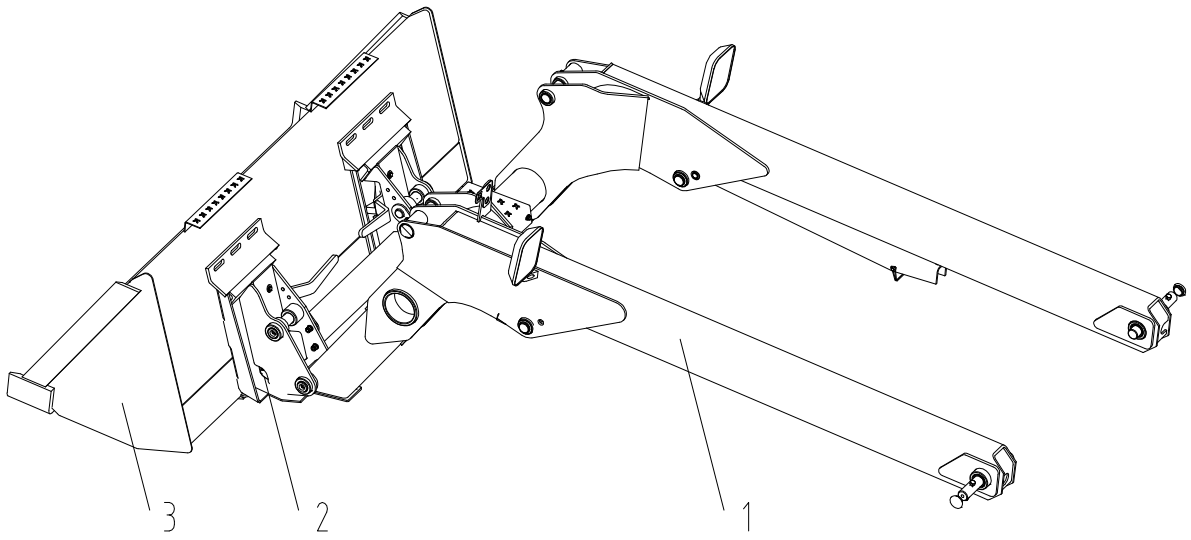


Fig. 7 Working Device Diagram

1. Boom 2. Bucket seat 3. Bucket

2.6 Frame

2.6.1 The frame is the basic body for connecting and installing all parts of the whole machine. The high-strength welding process is adopted for the frame, so as to ensure that requirements for continuous operation under harsh working conditions are met. The fuel tank and the hydraulic oil tank are of integrated design with the vehicle body, which greatly improves the effective utilization rate of the volume and space of tanks, as shown in Fig. 8.

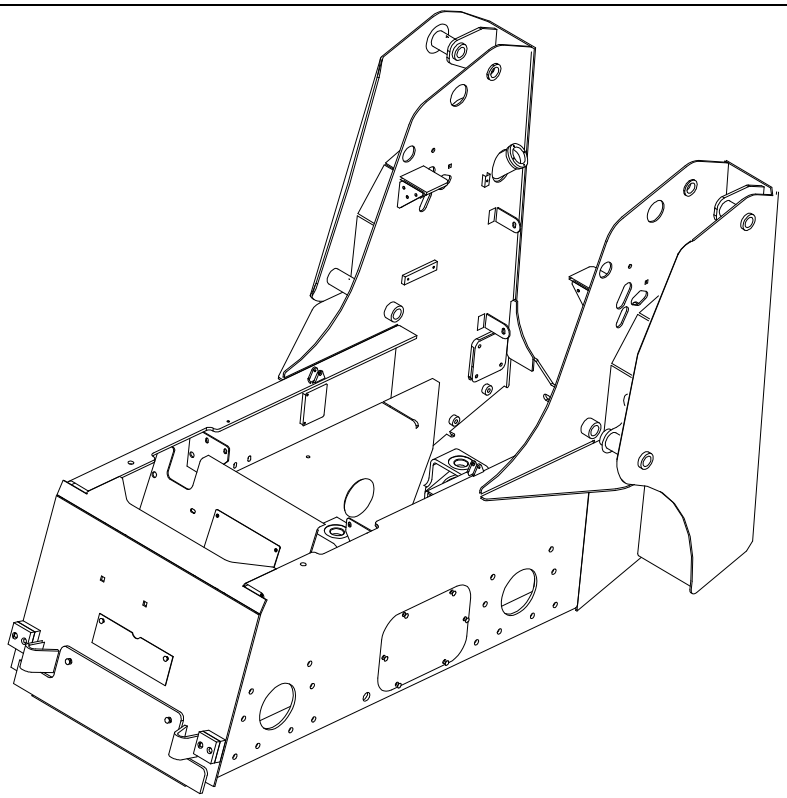


Fig. 8 Frame

2.7 Electrical System

2.7.1 Organizational structure of electrical system

2.5.1.1 The electrical system consists of the built-in silicon rectification generator; starter motor (all matched with diesel engine); battery; lighting system; oil pressure, oil temperature and cleanliness monitoring system of oil line; LV alarm device and instrument.

2.7.2 Description of power supply system

2.5.2.1 The whole machine system has the rated voltage of 12 V, with its negative electrode grounded and the single wire system adopted for its line. For wiring, see the electrical schematic diagram (Fig. 9). The maintenance-free battery (N120 120Ah) is mainly used as the power supply of starter motor. During normal operation, the generator matched with the diesel engine charges the battery. If the battery cannot be recharged or cannot be charged properly due to a certain reason, the battery shall be removed from the vehicle for charging.

2.7.3 Battery charging

2.5.3.1 The battery shall be charged as regulated. If the vehicle is parked for a long time, its battery shall be charged once every three months or its engine shall be started once every a period of time, and the battery can be fully charged after the vehicle has been running for a period of time. After each operation, disconnect the power main switch to prevent electric leakage.

2.7.4 Precautions

2.7.4.1 The electric lock on the instrument panel shall be powered on before startup, and be powered off after the engine shuts down.

2.7.4.2 After the diesel engine starts normally, it is not allowed to turn off the power main switch at will, so as to avoid the sudden rise of the no-load voltage of the generator and burnout of the electric equipment.

2.7.4.3 Turn off the electric lock and the main switch in following cases, and an accident can be avoided:

1. Large current out of control when starter motor contacts get sticky;

2. Circuit grounding caused during vehicle repair;

3. Electric equipment short circuit and grounding;

4. Always remember to turn off the power supply when parking to ensure the safety of the machine and personnel. After each operation, disconnect the power main switch to prevent electric leakage.

Table 5

Electrical System Parameters of Skid Steer Loader	
System voltage	12V
Battery	120Ah.
Single wire system	Negative electrode grounded
Diesel engine start	Electric start, 12 V

Please see the maintenance part in Usage & Maintenance and Precautions of Matching Battery of Skid Steer Loader.

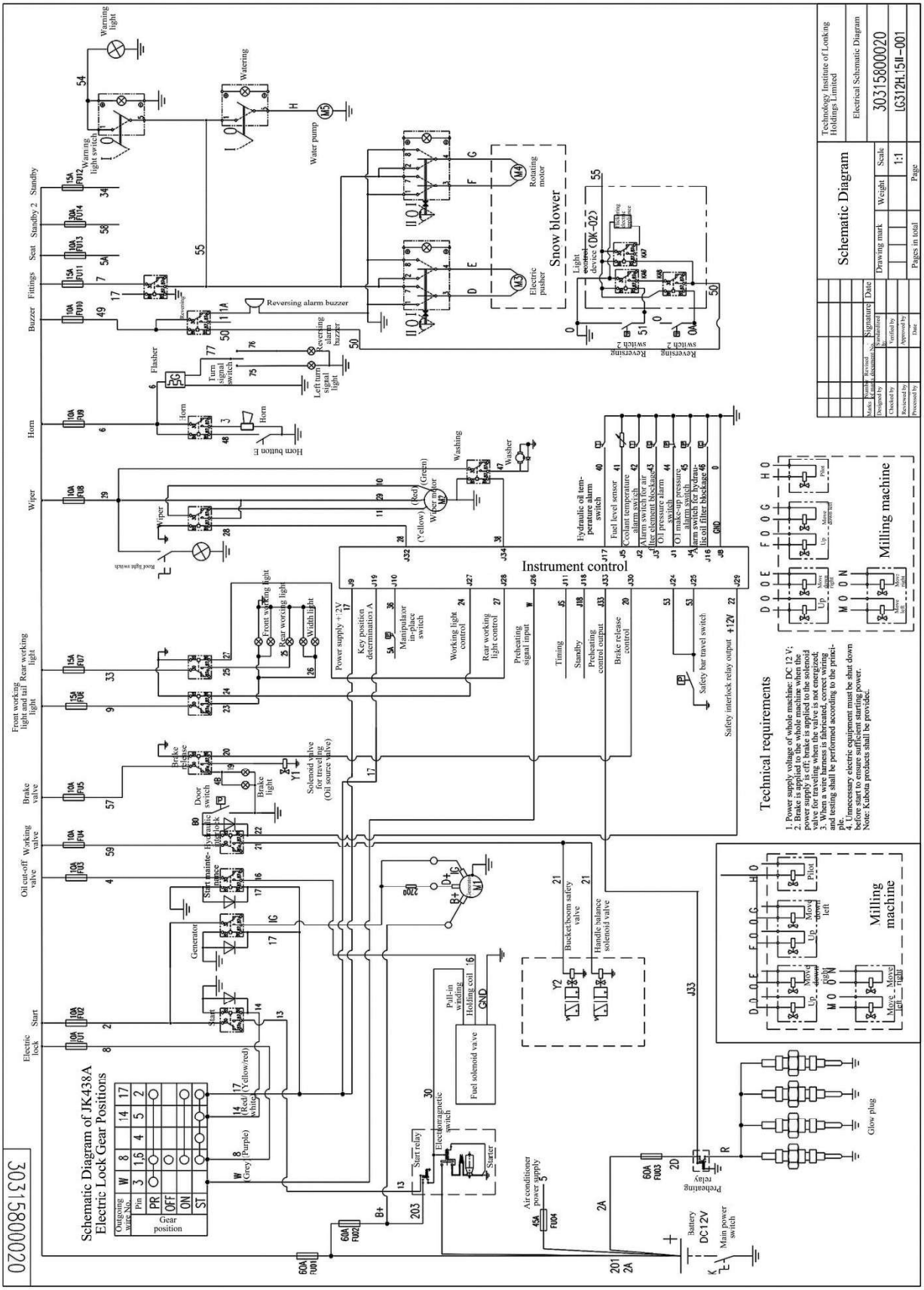


Fig. 9 Electrical Schematic Diagram

Chapter III Machine Operation

3.1 Control Mechanism and Instrument

3.1.1 Instrument and indicator light:

The instrument panel is located at the right front of the cab. The operator can easily see instrument lights and indicator lights, and have a clear and wide working field of vision, as shown in Fig. 10. Fig. 11 is a schematic diagram of electric lock key gear.

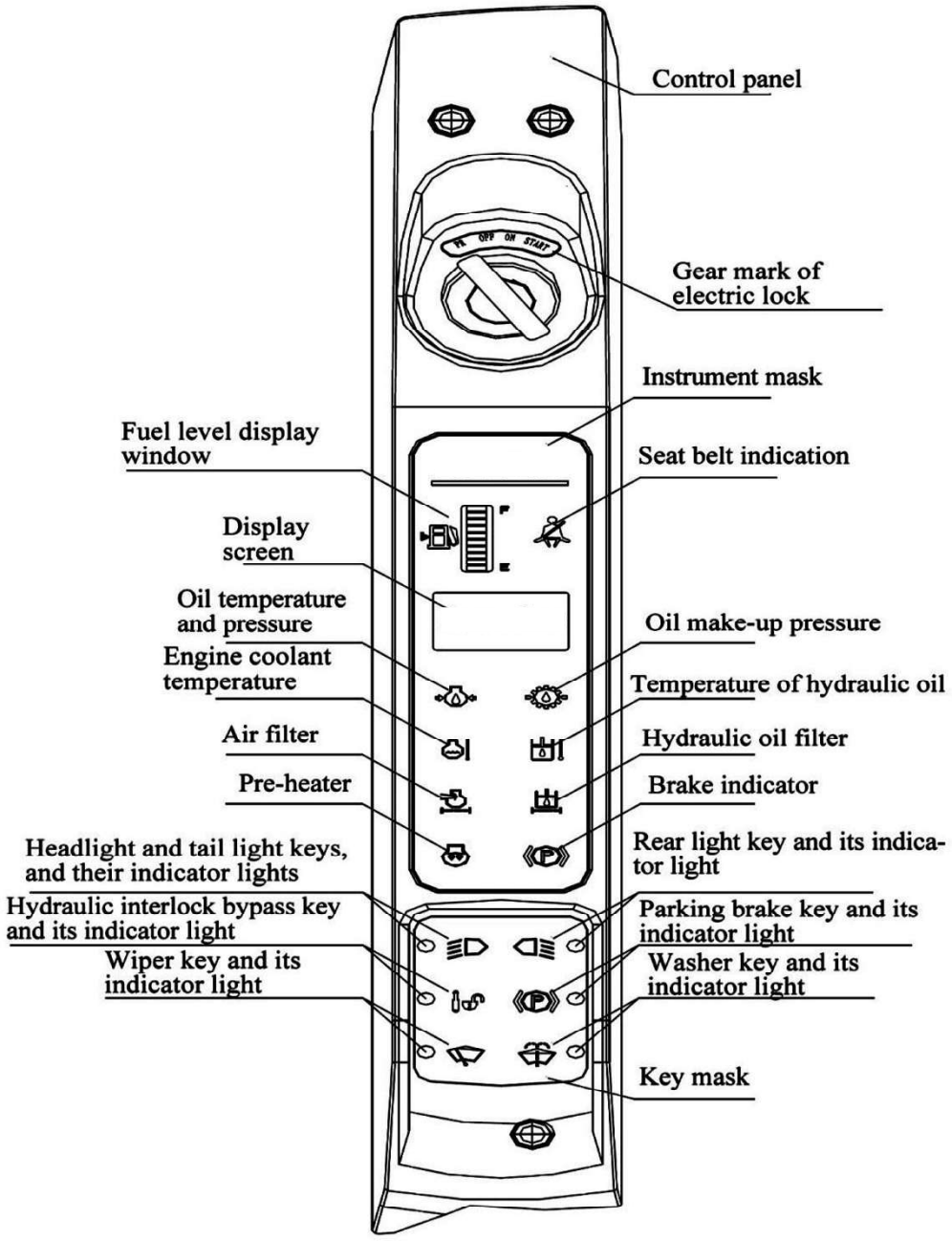


Fig. 10 Instrument

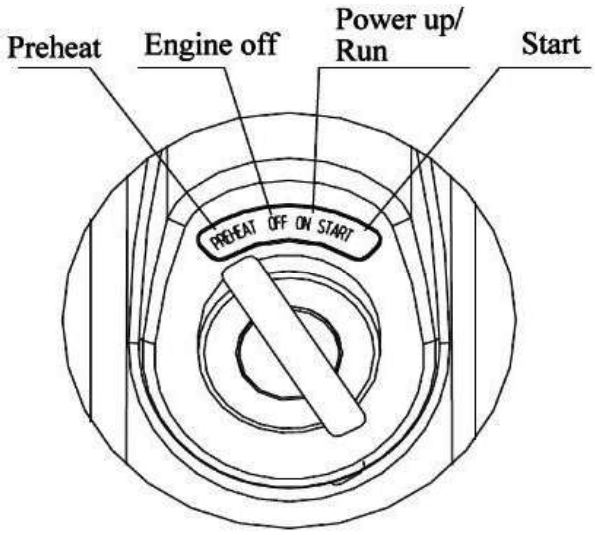


Fig. 11 Schematic Diagram of Electric Lock Key Gear

3.2 Operation and Use of Skid Steer Loader

3.2.1 Precautions for Use

3.2.1.1 Diesel used for the skid steer loader must be pure and have been subject to precipitation for at least 72h, and the diesel grade shall conform to specified quality requirements.

3.2.1.2 The skid steer loader must be regularly maintained and lubricated as regulated.

3.2.1.3 After engine start, the engine idles until the water temperature reaches 55 °C and then the vehicle starts running, so as to avoid early wear of moving parts.

3.2.1.4 Generally, if the temperature is below 10 °C, it is required to perform electric preheating on the engine before the engine is started. If you cannot start the engine 10s later since the start position is engaged, please wait for 30s and then start the engine repeatedly.

3.2.1.5 The engine can run under full load only when the water temperature of diesel engine is higher than 55 °C and the engine oil temperature is higher than 45 °C. During operation, water temperature and oil temperature of the engine shall not exceed 95 °C; as water temperature and oil temperature during heavy-load operation exceed allowed values, the vehicle shall be stopped for cooling.

3.2.1.6 It is not allowed to lift the bucket to the highest position for materials carrying; during materials carrying, the lower hinge point of boom shall be kept about 400 mm above the ground to ensure that the vehicle is running stably.

3.2.1.7 As the power of the diesel engine used for the skid steer loader decreases with the increase of altitude, ambient temperature and relative temperature, the user must correct the actual power according to the power correction requirements in the Operation and Maintenance Manual for Equipped Diesel Engine when using the loader, so as to use the skid steer loader correctly.

3.2.1.8 In order to improve the comfort of loader operators in hot and cold areas, the air conditioner or warm

air blower can be optionally installed as required.

3.2.1.9 In cold weather, please connect the warm air blower switch when the water thermometer indicates above 78 °C after waiting the engine to run for a period of time (warming-up) rather than use the warm air blower when the whole machine is started, so as not to affect the heating effect.

3.2.2 Correct method of getting on and off skid steer loader

3.2.2.1 Never jump up or down when entering or leaving the cab of skid steer loader, otherwise the operator may be injured. The operator shall enter and leave the cab in a correct way. He/she shall lower down the boom to the ground when entering or leaving the cab. As shown in the figure, use the handrail (fixed in front of the cab) and the pedal for getting on and off the loader (fixed on the boom) to enter the cab. Always remember to keep the handrail and the pedal clean, and avoid injuries due to slipping on the oil-stained ground. If the operator is to leave the cab when the boom is lifted, lock the boom locking pin and stop the engine.

Fig. 12 Schematic Diagram for Getting on the Loader Correctly

3.2.3 Description on seat adjustment

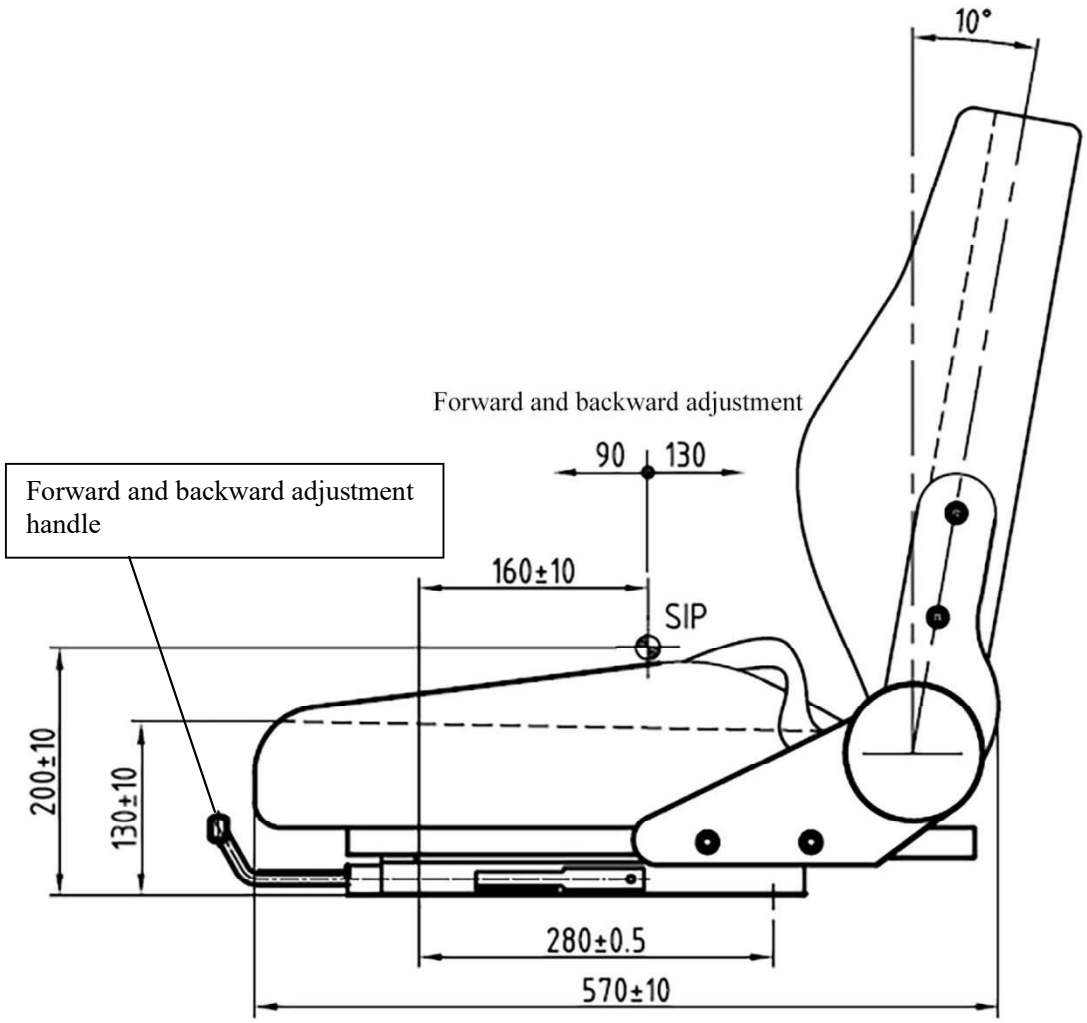


Fig. 13 Schematic Diagram of Seat and its Adjustment

1. Forward and backward adjustment: Pull the forward and backward adjustment handle outward by hand, then move the seat backward and forward till it reaches an ideal position. Release the handle, and the seat is locked automatically. The adjustment range is 220 mm, 90 mm forward and 130 mm backward.

Note: The handle shall be pulled in place for forward and backward adjustment to ensure that the mechanism is completely disengaged before adjustment. After adjustment, the handle shall return in place to ensure that parts are locked reliably.

3.2.4 Use of seat belt

1. Seats of the machine are provided with seat belts. When operating the machine to do tasks, the driver shall fasten the seat belt. Before using the seat belt, check the degree of wear and firmness of the safety belt, and

replace it if necessary.

2. The length of the seat belt should be adjusted before use, so as to ensure that the seat belt can play the role of safety guarantee and has a certain degree of comfort.

3. Before using the seat belt, please check whether the fastener of the seat belt can be properly locked and released.

3.2.4 Use of safety bar in cab

3.2.4.1 Before starting the skid steer loader, put the safety bar at the lowered position, i.e., lock state. See Fig. 14:

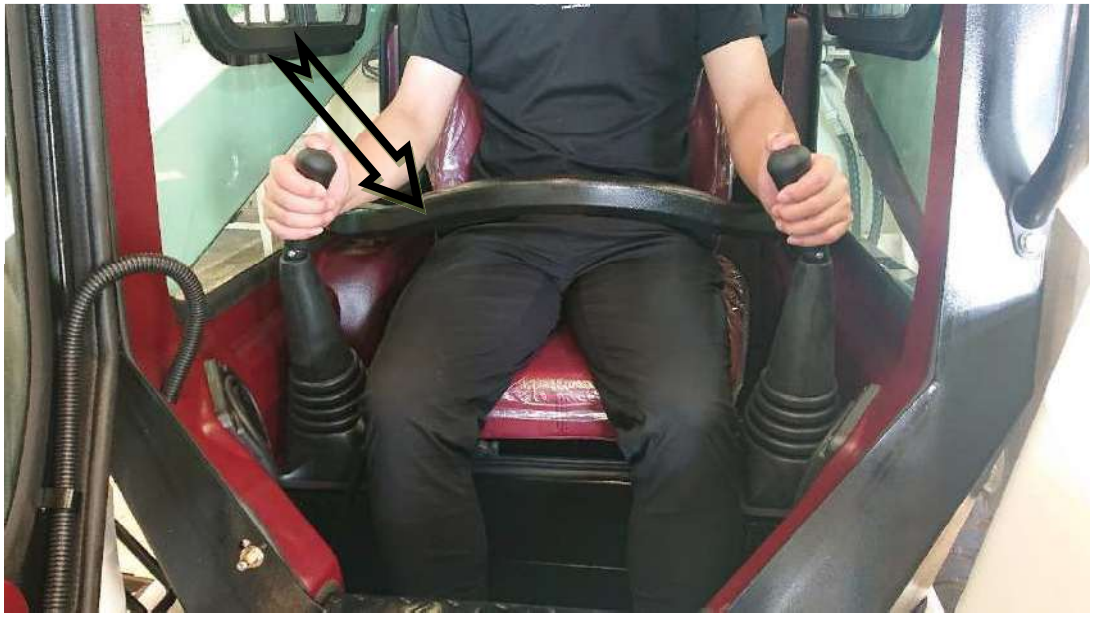


Fig. 14 Schematic Diagram of Safety Bar

3.2.4.2 Safety bar: The safety bar is very important for the operation safety. When the vehicle suddenly stops running, the safety bar will protect the operator from forward impact; the safety bar and the seat belt are jointly used to fix the driver in the driver's seat, and at the same time the safety bar can also be used as an armrest.

3.2.4.3 When the safety bar is lifted, the sensor contact of the safety bar is disconnected (Fig. 14), the safety brake will be locked, the hydraulic system of the whole machine will be locked, and the traveling drive, boom and bucket will not work. The safety bar is lowered to the horizontal position, and the sensor contact is connected (the seat switch contact is also closed when the driver sits in the seat). The electric appliance instrument meets unlocking conditions. At this time, click on the unlocking key P on the operating instrument controller to turn off its indicator light. When the system is connected to the traveling hydraulic system, boom and bucket hydraulic system, operations can be performed.

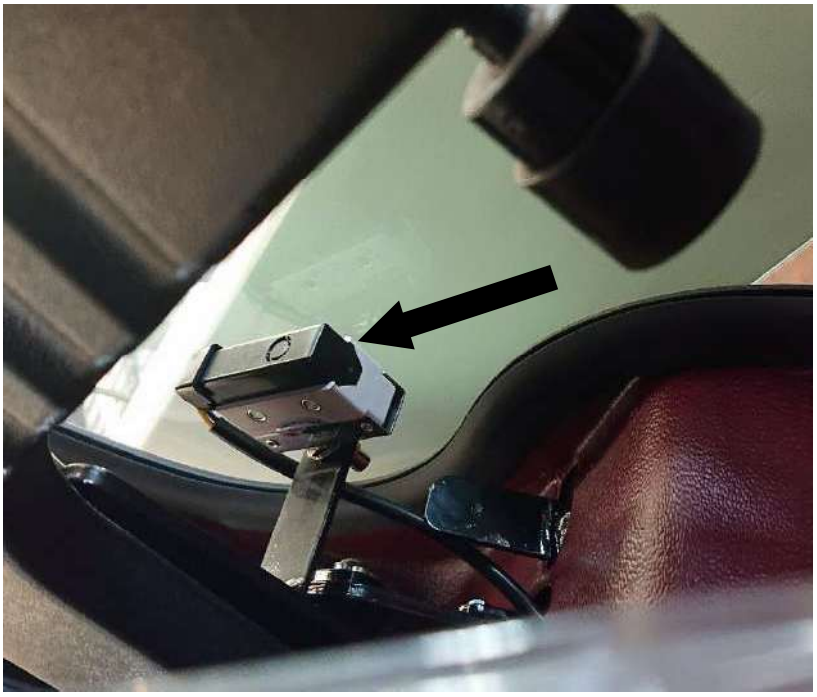


Fig. 15 Microswitch of Safety Bar

3.2.5 Machine operation

3.2.5.1 Left control handle: The left control handle is used to control the left traveling and boom of the machine, and its operation position and corresponding functions are shown in the following table.

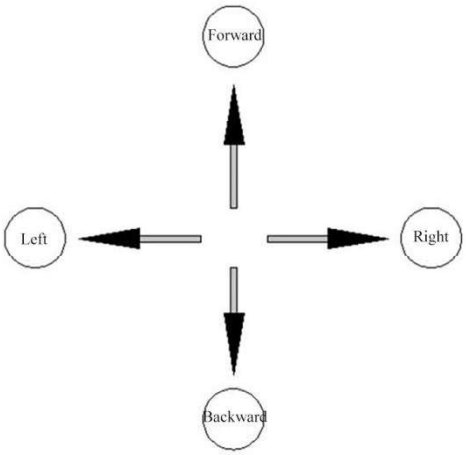


Fig. 16 Schematic Diagram of Left Handle Operation

Direction	Function
Forward	Left wheel forwarding
Backward	Left wheel reversing
Left	Lifting of boom
Right	Lowering of boom

3.2.5.2 Right control handle: The right control handle is used to control the right traveling and bucket of the machine, and its operation position and corresponding functions are shown in the following table.

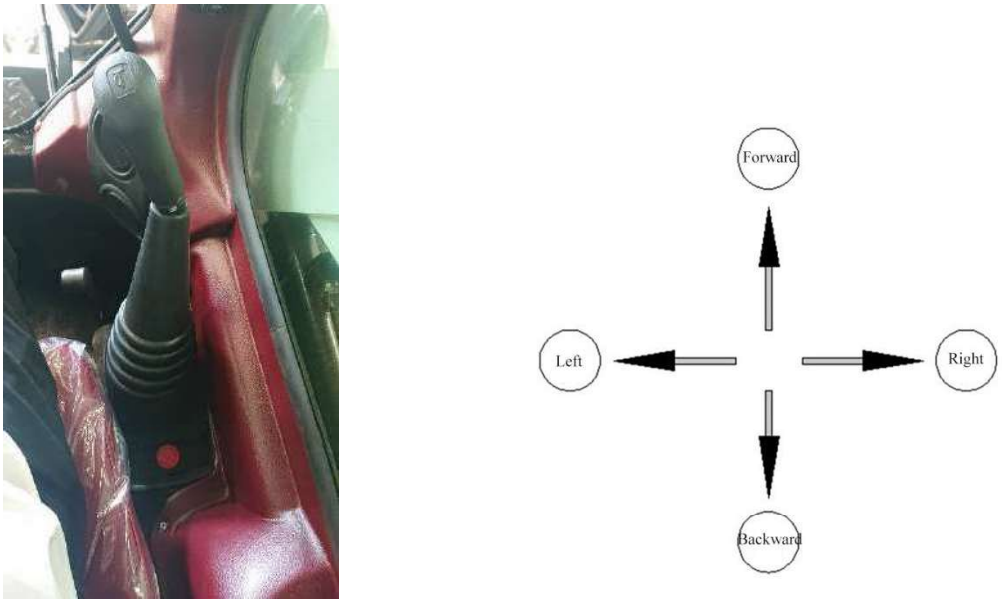


Fig. 17 Schematic Diagram of Right Handle Operation

Direction	Function
Forward	Right wheel forwarding
Backward	Right wheel reversing
Left	Bucket extending
Right	Bucket retracting

3.2.6 Rear window

3.2.6.1 The rear window is an emergency exit for the operator. In case of an accident, when the conventional exit cannot be used, the operator can open the rear window as an emergency exit in following steps:

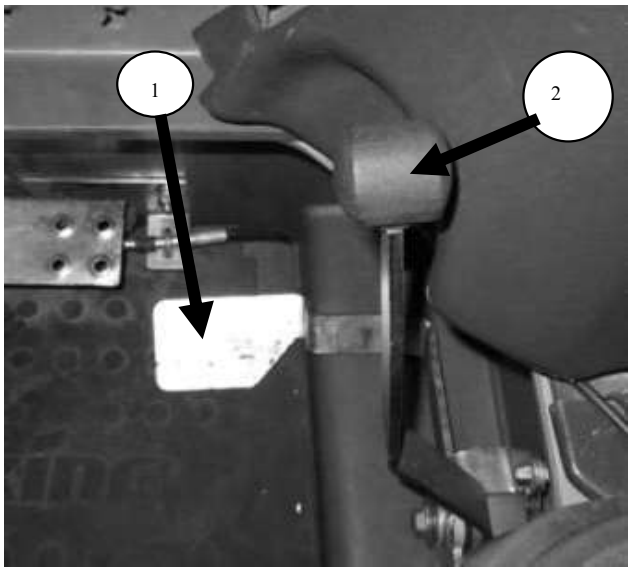
1. Remove the rubber batten, and let it pass through the nameplate of escape window. Pull the nameplate, and the front part of the rubber batten can be removed, as shown in Fig. 18.

2. Open the window glass with foot, and go out from the window.

Fig. 18 Rear Window

3.2.7 Throttle control

3.2.7.1 There are hand throttle and foot throttle for the throttle control, as shown in Fig. 19.



1 Foot throttle 2 Hand throttle

Fig. 19 Throttle Control

1. Hand operated throttle

Push the hand throttle backward to increase the engine speed, and push the hand throttle forward to decrease the engine speed. The hand throttle should be used under most operating conditions. When the throttle reaches the maximum position, the hydraulic pump from the pressure reduction drive and equipment can provide the maximum hydraulic flow, thus increasing the drive and load speed as well as the corresponding reaction speed.

2. Foot operated throttle

When you depress the foot throttle, the engine speed increases; when the pressure on the pedal decreases, the engine speed decreases. The foot throttle is used in case that the operator has to control the machine to the maximum extent, such as maneuvering control requirements under extremely harsh conditions. When the foot throttle is used, the hand throttle should be set at the required minimum engine speed.

3.2.9 Auxiliary hydraulic accessory control and foot throttle device

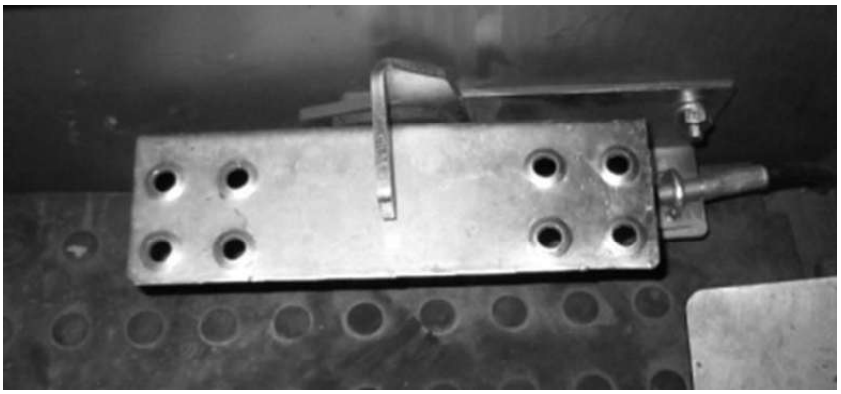


Fig. 20 Auxiliary Hydraulic Accessory Control and Foot Throttle Device

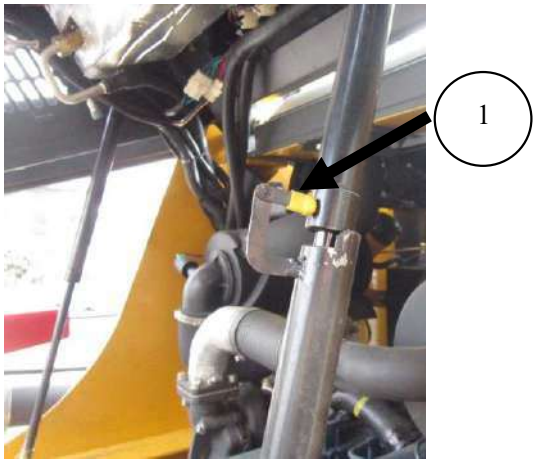
3.2.9.1 Auxiliary hydraulic accessory control: The control pedal controls the flow direction of hydraulic oil flowing to the front accessory (hydraulic quick-change connector on the left boom). Whether the pedal is depressed to the left or right is determined by the hydraulic oil flow direction required for the accessory. When the pedal is released, the pedal will return to the closed position again.

3.2.9.2 If the operation performance of accessories is just opposite to that shown, two hydraulic pipe joints can be exchanged.

3.2.9.3 If continuous hydraulic power is needed for accessories, step on the pedal at the required position with one foot and move the bayonet pin control valve in the same direction with the other foot. In this way, the pedal will be fixed in the power position, and the pedal can be fixed in either of left and right directions.

3.2.9.4 Note that you should release the pipeline pressure when installing or removing accessories or fittings. When releasing the pressure, turn off the engine first, and then depress the auxiliary hydraulic pedal to the left and right once to release the residual pressure in the hydraulic pipeline of fittings. Due to the change of air temperature, there may be residual pressure in fittings. If the connection resistance of fittings is large, loosen the connecting joint with tools to release pressure before connecting the joint with the main machine, and take care to avoid any damage caused by high-pressure fluid injection.

3.2.10 Tilting of cab



1 Handle

Fig. 21 Air Spring Unlocking Mechanism

3.2.10.1 When the cab is tilted up, the support air spring at the left side of the cab is automatically in the unlocking state. In this case, if you want to lower the cab, you must put the handle in the position shown in the figure, pull the cab down slowly and put the cab away.

Warning: After two tilting support air springs in the cab are damaged or one of them is damaged and leaks air, lifting tools or reliable support tools shall be used during repair of the tilting cab to prevent the cab from falling down. All parts of the body and other articles must not be located in the falling area during unlocking and lowering.

3.2.11 Flexible shaft for pressure relief of boom

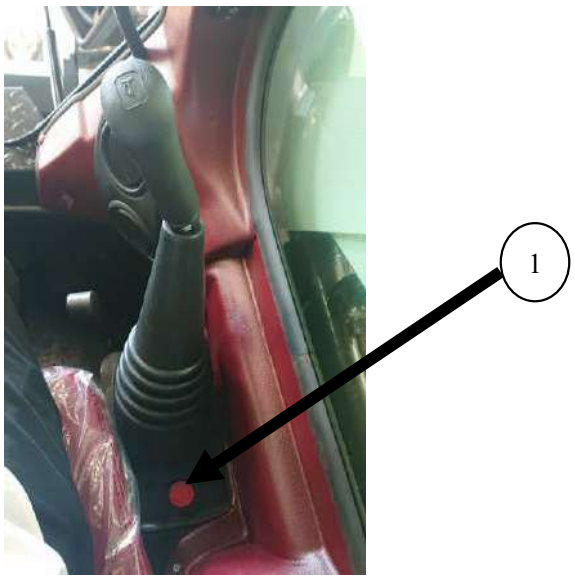
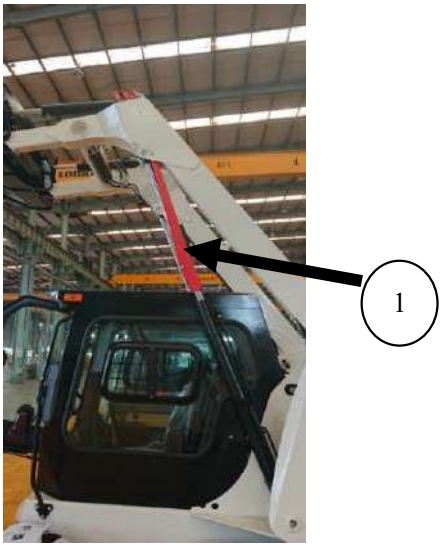


Fig. 22 Flexible Shaft for Pressure Relief of Boom

3.2.11.1 When the boom is lifted, if the hydraulic system fails, the boom fails to be lowered to the originally lowest position by pushing the operating handle, while it can be lowered to the lowest position by pulling up the flexible shaft here and swinging the control handle at the same time.

3.2.12 Safety bar of boom oil cylinder



1. Safety bar

Fig. 23 Safety Bar of Boom Oil Cylinder

3.2.12.1 When the boom is raised for repairing the machine, install the safety bar of boom oil cylinder in the position shown in the figure. The safety bar can be used to avoid damage to the machine or any personal safety accident caused by the boom falling when the boom oil cylinder fails.

Warning: When the boom is raised for repairing the machine, the boom must be prevented from falling by using the safety bar of boom oil cylinder in the propped state or by lifting tools or reliable support tools.

3.3 Main Technical Data for Normal Use

3.3.1 Engine

3.3.1.1 Circulating cooling water temperature (°C)

1. Suitable temperature of inlet water: 45 ~ 60

2. Suitable temperature of outlet water: 60 ~ 90

3. Maximum temperature of outlet water: 95

3.3.1.2 Engine oil temperature (°C)

1. Lowest temperature in oil sump: 45

2. Suitable temperature in oil sump: 80

3. Highest temperature in oil sump: 95

3.3.1.3 Readings on engine oil pressure gauge (MPa)

1. 0.1, at idle speed

0.35 ~ 0.55, at rated speed

3.3.2 Indication of voltmeter

3.3.2.1 The rated working voltage of the system is 12 V, and the voltage displayed on the voltmeter is within the range of 12 V ~ 14 V, which means that the power supply of the system is normal. When the voltage is lower than 12 V or higher than 14 V, please check whether the relevant system or equipment is abnormal.

3.4 Fuel, lubricating oil, grease and cooling water

3.4.1 Fuel and hydraulic oil

3.4.1.1 Solemn tips:

Please be sure to choose diesel engine oil, diesel, hydraulic oil and other fluid products according to requirements of the Manual (see Table 6). Although counterfeit fluid products are cheap and the purchase cost is low, these products will fail early, lose their proper functions, induce a fault of the skid steer loader, and cause internal damage to the machine. The damaged machine will be difficult to work normally, bringing in a huge potential safety hazard and even causing personal injury or property loss!

Table 6

Type	Name & grade	Refueling quantity (L) (Reference value)	Applied to	Remarks
Fuel	No. 0 light diesel oil	83	Powertrain	-10 # light diesel oil and -35 # light diesel oil are used in north of China in winter or exported to cold areas
Hydraulic oil	L-HM 46# Anti-wear hydraulic oil	65	1. Traveling system 2. Working system	HV46# low temperature antiwear hydraulic oil; L-HS 46# synthetic low-temperature antiwear hydraulic oil is used in north of China in winter or exported to cold areas

3.4.1.2 Fuel: When the fuel level reaches the middle position of the oil dipstick, refueling shall be considered. When the fuel level reaches the lower position of the oil dipstick, fuel must be added immediately, otherwise, faults such as diesel engine flameout may be caused.

3.4.1.3 Hydraulic oil: Hydraulic oil shall be added till the oil level reaches above the middle position of the oil dipstick. When hydraulic oil is added for the first time, all hydraulic system elements shall run for one circle, then the bucket shall be laid flat on the ground, and the oil level shall be above the middle position of the oil dipstick.

3.4.2 Cooling water

1. Generally, antifreezing fluid should be applied. Ingredients of commonly used antifreezing fluid are as follows:

1) Alcohol 43%, glycerin 15%, water 42% (weight ratio)

2) Ethylene glycol (glycol) 50%, water 50% (volume ratio)

3) Glycerin 66.7%, water 33.3% (weight ratio)

3.4.2.1 In order to ensure that the diesel engine cooling system can work normally under different working conditions and in different environments, it is recommended to use the long-acting cooling water specially used by Michigan.

3.5 Pre-trip Check Each Day

3.5.1 Electrical and instrument parts of engine

3.5.1.1 Check the water level of the water tank.

3.5.1.2 Check the fuel volume of the fuel tank.

3.5.1.3 Check the oil amount of the engine oil sump.

3.5.1.4 Check the tightness of each oil pipe, water pipe and each component.

3.5.1.5 Check the battery wiring.

3.5.2 Chassis part

3.5.2.1 Check the volume of hydraulic working oil.

3.5.2.2 Check the hydraulic system pipeline and accessories for airtightness.

3.5.2.3 Check whether each control lever is flexible and placed in a neutral position.

3.5.2.4 Check whether tire pressure is normal.

3.5.3 Starting engine

3.5.3.1 Check whether indications of each instrument are normal.

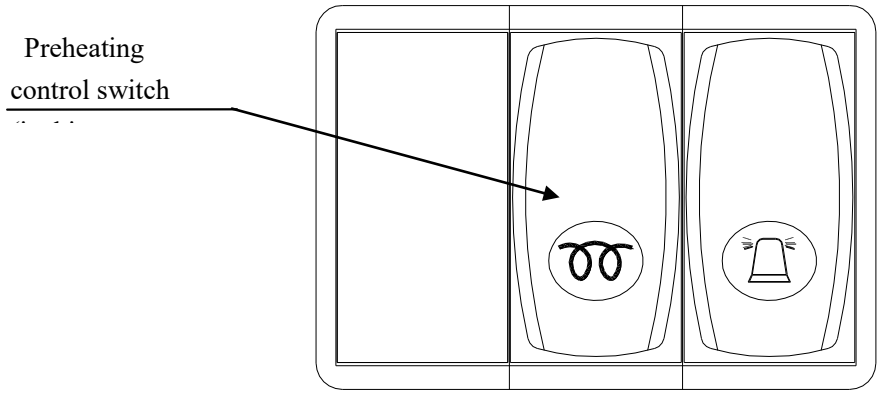
3.5.3.2 Check working conditions of lighting equipment, indicator lights, horns, wipers and oil dipsticks.

3.5.3.3 Operate the working device to check its actions.

3.5.3.4 Listen to whether the engine works normally when the engine runs at a low speed.

3.5.3.5 Start in cold weather

In cold weather, it is necessary to perform electric preheating on the engine before the engine is started.



(1). Turn the electric key switch to the "Power on/off" position, and press the preheating control switch once to preheat the control circuit so as to supply power to the engine preheating plug (the preheating frequency is 5S/time, and the instrument preheating indicator light goes out after 5S);

The following table shows the standard preheating time at various temperatures. However, following operations are unnecessary after the engine is preheated.

Table 7

Ambient temperature	Preheating time
Above 10°C (50°F)	Not required
10°C (50°F) ~ -5°C (23°F)	About 5s
Below - 5°C (23°F)	About 10s
Limits on continuous use	20 seconds

(2). After the preheating indicator light goes out, turn the electric key to the "Start" position, and the engine will start.

(If the engine still cannot be started after 10s, please turn off the engine for 5~30s. Then repeat (1) and (2).)

3.5.4 Inspection and maintenance after each shift

3.5.4.1 Check the fuel reserve.

3.5.4.2 Check the engine oil sump for oil level and cleanliness. If it is found that the oil level is too high and oil becomes dilute, identify the symptom reason and remove the symptom.

3.5.4.3 Check the oil pipe, water pipe and accessories for leakage.

3.5.4.4 Check whether the hydraulic oil pump is fixed and sealed, and whether the oil pump is overheated.

3.5.4.5 Check whether fixing portions of rim bolts and shaft pins are loose.

3.5.4.6 Check whether conditions of the working device are normal.

3.5.4.7 Check whether tire appearance and air pressure are normal.

3.5.4.8 When the air temperature is lower than 5 °C, cooling water shall be discharged, but if antifreezing fluid has been added, cooling water may not be discharged.

3.5.4.9 Press to fill in oil filling points of working device with butter as specified.

3.5.4.10 Clean the machine appearance and remove soil and sundries inside the bucket.

3.6 Start and Stop

3.6.1 Startup

3.6.1.1 Before starting the machine, please make sure that there are no persons working around the machine, and at the same time honk the horn to remind persons around to stand in a safe place before starting the machine.

3.6.1.2 Before starting the machine, please check whether brakes of the machine are effective.

3.6.1.3 Before starting the machine, please adjust, fix and lock the seat and fasten the seat belt.

3.6.1.4 Put down the safety bar, and the whole machine can be started only when the safety bar falls down.

3.6.1.5 Warm up the engine at an idle speed after the whole machine is started. The engine is allowed to run under full load only after the outlet water temperature reaches 55 °C and the engine oil temperature reaches 45 °C.

3.6.2 Park the machine on the horizontal ground if possible, and place wedge blocks in front and rear of tires so as to prevent the machine from sliding. If the machine has to be parked on a slope temporarily, stable wedge blocks shall be placed diagonally below the wheels to prevent the machine from sliding.

3.6.3 Shutdown

3.6.3.1 If the machine has been running under full load before, let the engine idle for 5 min under no load, so that all parts of the engine can cool down slowly.

3.6.3.2 Turn the electric lock key to the “Power on/off” position (as shown in Fig. 11), and the engine is normally powered off.

3.6.3.3 Please lower the boom to the ground before getting off the machine.

3.6.3.4 Pull out the key, lift the safety bar to lock the loading control lever, unfasten the seat belt, and leave the cab by using the armrest and pedal.

3.7 Operation Control

3.7.1 Preparations before operation

3.7.1.1 The speed of shovel loader shall be lowered below 4 km/h.

3.7.1.2 Clean the operation site, fill and level up pits, and use the shovel to remove obstacles that hinder the operation and damage tires such as sharp stones.

3.7.2 Operation mode

3.7.2.1 General operation

Warning: During the operation, any part of your body shall not leave the cab at all time. Before leaving the cab, always remember to lower down the bucket to the ground and shut down the engine. Failure to follow these steps will result in a casualty accident.

Warning: During loading, the bucket shall be placed as low as possible, so that the driver's vision will be wider and the machine will be better kept stable. In case of operation on the rough ground, when the bucket is fully loaded, you shall slow down the operation speed. Too high vehicle speed may possibly make the vehicle out of control and even roll over.

Warning: If the driver is not in the cab when the bucket is lifted, a casualty accident may be caused. Therefore, when the driver leaves the cab, he/she must lower the bucket to the ground, or lock the boom locking pin and shut down the engine.

Warning: The loader cannot steer or travel quickly by lifting the boom, otherwise a rollover accident will easily occur.

1. Lower the boom to the lowest position, raise the engine speed to the maximum speed, and then shovel in materials at 2.4 km/h (as shown in Fig. 21).

2. Retract and lift the bucket.

3. Keep the bucket about 300 mm off the ground during transportation (as shown in Fig. 22).

4. When the loader arrives at the designated place, you lift the boom and dump materials. All operations shall be smooth.

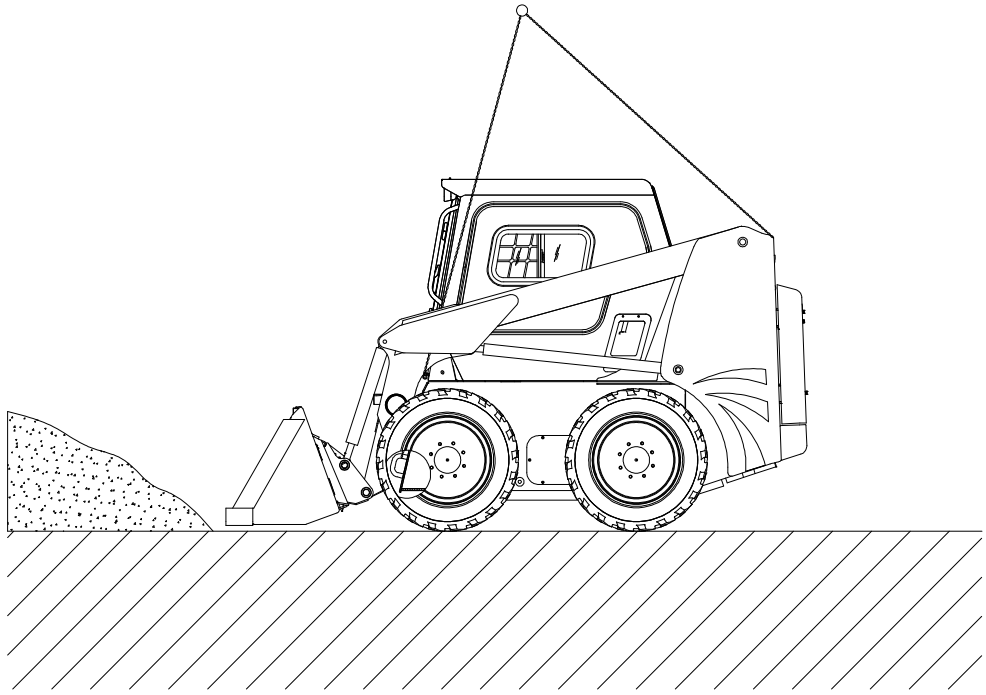


Fig. 21 Soil Shoveling

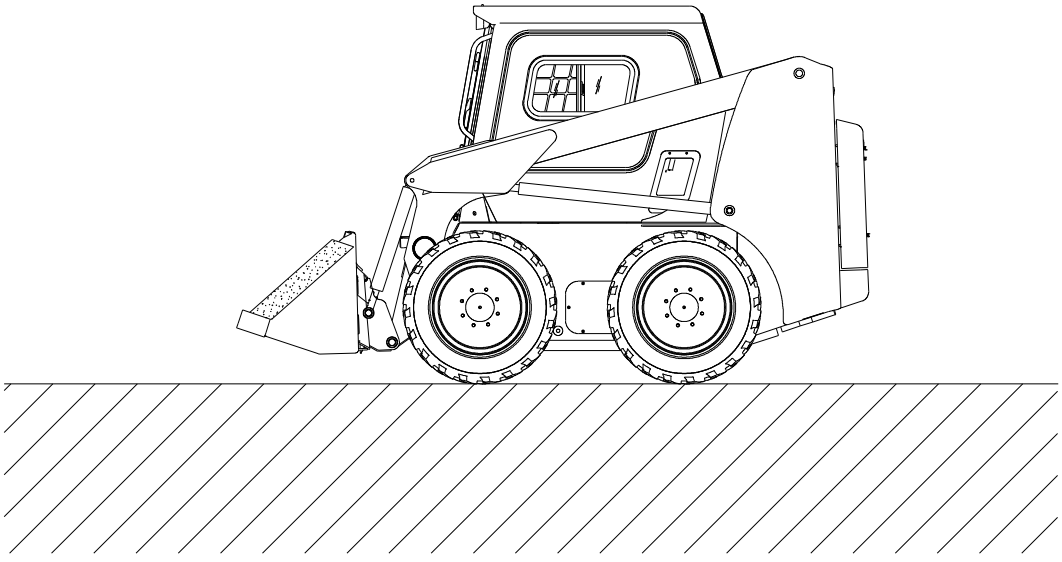


Fig. 22 Transportation

Warning: During soil shoveling, as the cutting edge of bucket and the bucket teeth may touch articles such as frozen soil or rock buried to the ground, please check and make marks in advance before operation. During operation, keep the bottom of the bucket level with the ground, avoid obstacles, and the speed shall not be too fast.

3.7.2.2 When the loader works on a hillside or slope:

Warning: It is very dangerous for the loader to work on a hillside. You shall pay attention to checking the situation on the ground, as the state of ground will become complicated due to rain, snow, ice, loose gravel or soft soil. You must make an accurate judgment on whether it is safe to operate the machine on a hillside or slope.

Warning: When operating on a hillside, you must take great care not to drive the skid steer loader near the edge of the mountain to avoid overturning.

3.7.2.3 Operations during climbing when there are materials in the bucket:

If the bucket is full of materials, you should drive the loader uphill positively when the loader runs uphill, and reverse the loader when the loader runs downhill to avoid a safety accident due to front heaviness (as shown in Fig. 23 and Fig. 24).

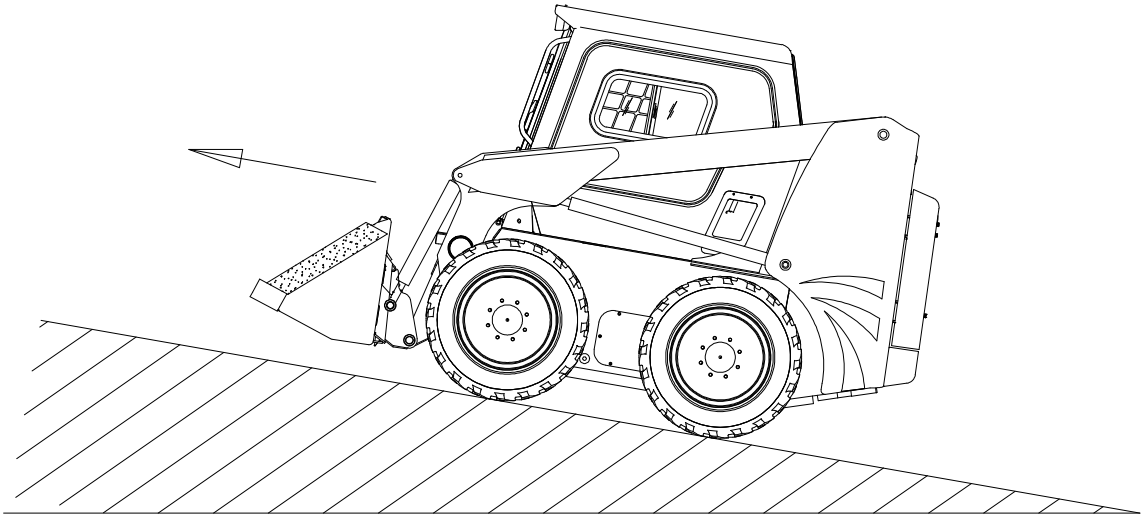


Fig. 23 Running Uphill When the Bucket is Fully Loaded

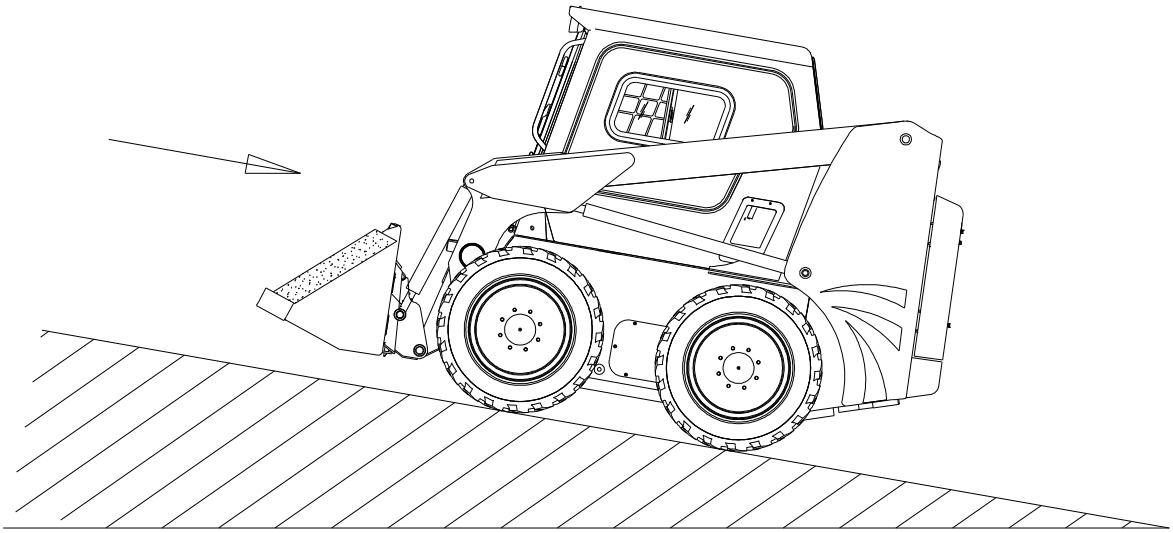


Fig. 24 Running Downhill When the Bucket is Fully Loaded

3.7.2.4 When the bucket is empty:

1. If the bucket is empty, you should drive the loader positively downhill, and reverse the loader uphill when the loader runs uphill (as shown in Fig. 25 and Fig. 26).

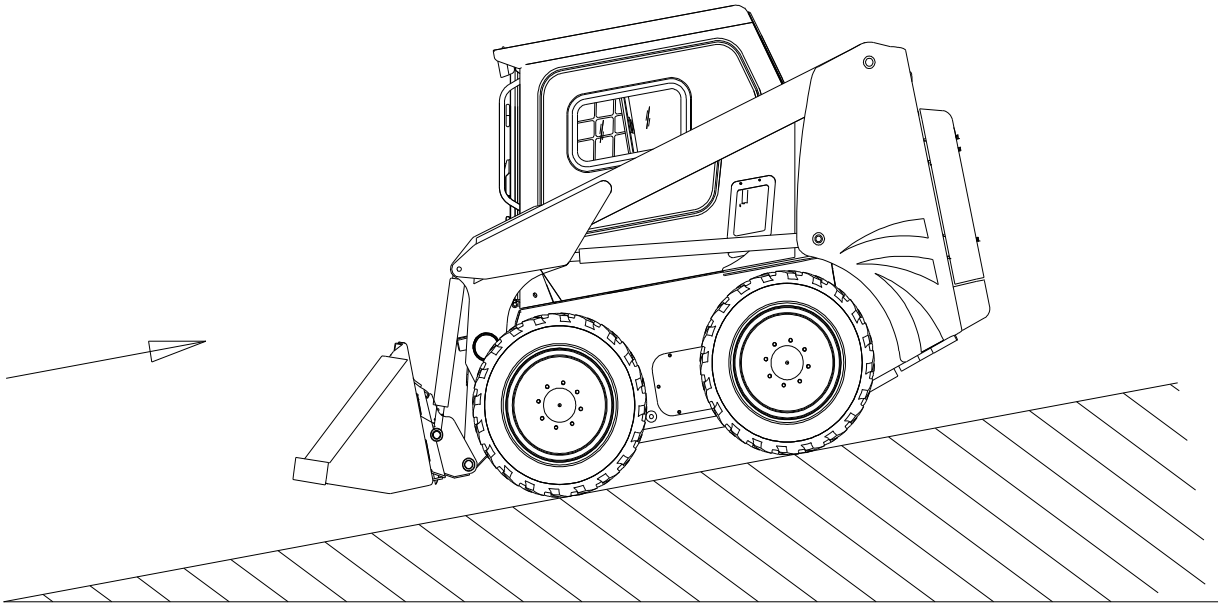


Fig. 25 Running Uphill When the Bucket is Empty

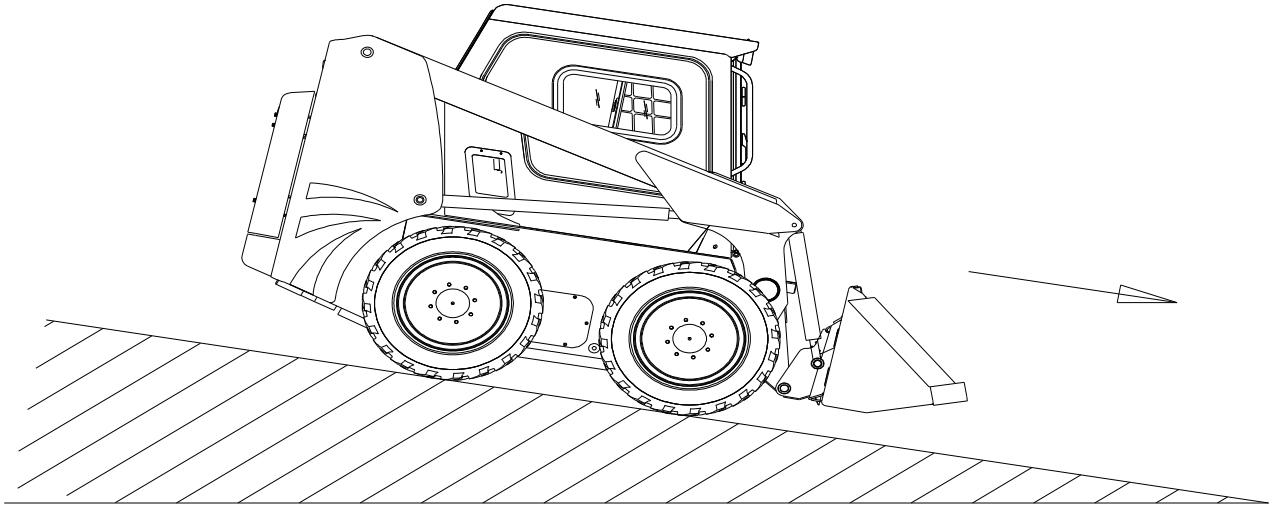


Fig. 26 Running Downhill When the Bucket is Empty

Chapter IV Maintenance Part

4.1 Descriptions on Maintenance and Precautions of Skid Steer Loader

4.1.1 After the user picks up a new vehicle, he/she must perform new vehicle running-in at first. During running-in, refer to following regulations and pay attention to usage and maintenance. Precautions during new vehicle running-in

4.1.1.1 The new vehicle running-in period is 100h in total. Running-in is arranged evenly in driving and reversing directions.

4.1.1.2 Load loaded and unloaded within the running-in period shall not exceed 70% of the rated load.

4.1.1.3 Note the lubrication condition of the machine, and change or add the lubricating grease at the specified time.

4.1.1.4 Be sure to note the hydraulic oil temperature and the temperature of water tank. If there is a symptom of overheating, identify the reason and eliminate the symptom.

4.1.1.5 Check bolts and nuts of parts for fastness.

4.1.1.6 During running-in, it is suitable to shovel loose materials, and actions to shovel them should not be too violent or too urgent.

4.1.1.7 After cold start, let the engine idle for 10 min and then let the vehicle travel.

4.1.2 Following tasks will be carried out after the new vehicle runs in for 20h:

4.1.2.1 Comprehensively check bolts and nuts of parts for fastness, especially cylinder head bolts, exhaust pipe bolts, rim nuts, connecting bolts, etc.

4.1.2.2 Clean coarse and fine oil filters and fuel filters.

4.1.2.3 Check the fan belt for tightness, and note whether the generator charges the battery normally.

4.1.2.4 Check the airtightness of hydraulic system and brake system.

4.1.2.4 Check control levers, throttle flexible shafts, etc. for connection and fixation.

4.1.2.5 Check the connection of various parts of the electrical system, the power supply status of the engine, lighting and turn signal lights.

4.1.3 The following work will be carried out after the end of vehicle running-in

4.1.3.1 Change the engine oil.

4.1.4 All checks and maintenance shall be performed in a spacious, flat and clean place under a shutdown condition! The operating bucket shall be laid flat before shutdown. Before repair, cut off the power supply (turn it on only when necessary), pull out the key of power switch, and hang the "No Operation" sign on the starter switch or control lever! Before adding and discharging a fluid, slowly loosen the seal cover several times after the fluid temperature drops, release the pressure, and take it down after confirming safety to prevent

scalds! Two wrenches shall be used to tighten and loosen pipe fittings, so as to ensure that pipe fittings and their weld seams are not cracked due to torsion!

4.1.5 Solemn tips

4.1.5.1 Please be sure to choose diesel engine oil, diesel, hydraulic oil and other fluid products according to requirements of the Manual.

4.1.5.2 Although counterfeit fluid products are cheap and the purchase cost is low, these products will fail early, lose their proper functions, induce a fault of the loader, and cause internal damage to the machine. The damaged machine will be difficult to work normally, bringing in a huge potential safety hazard and even causing personal injury or property loss!

4.1.6 Harm of non-conforming fluid

4.1.6.1 Under high temperature and high pressure, the non-conforming diesel oil gels, deposits carbon, ages and loses its bearing capacity and its cooling and lubrication functions, resulting in early wear of matching parts of the diesel engine and other parts. In this case, serious faults such as blow-by, abnormal noise, engine oil burning, insufficient power and even cylinder scoring and journal sticking.

4.1.6.2 The content of impurities, paraffin, water and sulfide in the non-conforming diesel exceeds the standard, and the calorific value is insufficient, which will cause corrosion and early wear of fuel injection pump matching parts, blockage of fuel injection nozzles, and result in faults such as black smoke of diesel engine, carbon deposition and insufficient power.

4.1.6.3 The non-conforming hydraulic oil will also gel and age early under high temperature and high pressure, which will reduce the transmission efficiency, block pipelines and valve lines, damage seals, weaken and even lose the bearing capacity and the lubrication function, rust and damage the hydraulic cylinder, and resulting in abnormal operation of the operating system and the working device & system.

4.1.6.4 Please pay special attention to the fact that, even for conforming oil and fluid products, it is also absolutely not allowed to mix similar products of different brands!! As products of different brands are still different in composition, mixing them may cause a chemical reaction and result in a failure. Therefore, it is recommended to use oil or fluid products dedicated or designated by Michigan.

4.1.6.5 Please ensure the cleanliness of fluid.

4.1.7 Some customers of skid steer loaders work in harsh environments with high dust concentrations. In these environments, elements of some oil lines and circuits are polluted or blocked, thus affecting the normal operation of the loader. Please check oil lines and circuits frequently to ensure normal sealing and smoothness. Special attention shall be paid to following parts: air filter of diesel engine and its pipeline, water tank oil dispersion tube clearance and pipeline, filter of hydraulic system, seals at both ends of various flexible operating shafts, damping holes of oil pressure gauge, plugs of instruments and electrical appliances, etc.

4.1.8 Timely maintenance

4.1.8.1 As the skid steer loader is a tool for you to create wealth, please take good care of it. There is a common saying that goes: Sharpening your axe will not delay your job of chopping wood. Please maintain the skid steer loader in time according to regulations in the Operation Manual, which can effectively eliminate the hidden fault, reduce the downtime and reduce frequencies of major overhaul, medium repair and minor repair. In this way, the normal operation of the skid steer loader is ensured and the maintenance cost is also reduced.

4.1.8.2 Select genuine parts.

1. Like oil & fluid products, genuine parts are the guarantee for performance and reliability of the skid steer loader. Counterfeit products correspond to major faults and potential safety hazards, and a high price will be paid for selection of counterfeit products.

2. You can easily obtain oil or fluid products dedicated or designated by Michigan and genuine parts from Michigan Spare Part Co., Ltd. or franchised distribution service providers in different regions.

4.2 Maintenance of Main Structural Parts

4.2.1 Precautions for diesel engine maintenance

4.2.1.1 For details, please see the Operation and Maintenance Manual for the diesel engine configured for this model.

4.2.1.2 Precautions:

1. In severe cold weather (ambient temperature is lower than freezing point temperature), when no antifreezing fluid is added in the cooling water, and the vehicle has to transport goods in a long distance and has to be shut down, water drain switches of the diesel engine body, water pump, oil cooler, and water chamber under the water tank shall be turned on to drain away all water and to avoid frost crack.

2. If there is oil in the cooling water or water at the oil sump of the diesel engine, repair and check shall be performed; after maintenance, it is required to discharge all oil and water and refill oil and water.

4.2.2 Maintenance of working device and frame

4.2.4.1 Regularly check whether weld seams of parts of working device and frame are cracked, bent, or deformed, etc. In case that any part is cracked, bent or deformed, timely repair or replace this part. Moving parts equipped with oil cups shall be regularly filled with grease, to ensure that moving parts operate flexibly and to prolong their service life.

4.3 Descriptions on Usage & Maintenance and Precautions of Matching Battery of Skid Steer Loader

After the whole machine is equipped with the battery, due to different durations for the new machine to circulate inside and outside the factory, the actual storage capacity of the battery is also different, and the discharge degree of the battery is also different. Therefore, the close attention shall be paid to the actual storage capacity of the battery during the for-sale period of the whole machine. The storage capacity cannot be too low, and the battery shall be charged timely when the battery power is too low.

4.3.1 Maintenance of battery in use

4.3.1.1 Often check whether the battery clamp is connected firmly. Loose connection of the clamp is easy to ignite or burn out the pillar.

4.3.1.2 The connecting part of pile head can be cleaned with the cloth or brush rather than water. Upon installation of the battery, the pile head and the connecting pin part can be applied with Vaseline, so as to protect the pile head.

4.3.1.3 During normal operation of the whole machine, if the whole machine stops working at ordinary times or at night, it is necessary to ensure that pieces of all electrical equipment have been shut down normally.

4.3.1.4 During daily work, as the current is too large when the starter motor works, the duration for using the starter motor each time should not be too long (3 ~ 5s). In case of continuous start, the interval between starts shall be 10 ~ 15s, and the frequency should not be too high. If starting the engine continuously for three times gets failed, identify the fault and then start the engine, so as to avoid deformation and damage of the counter electrode inside the battery due to too long high current discharge time.

4.3.2 Maintenance of battery of machine in stock

4.3.2.1 The battery shall be fully charged before being stored for a long time. It is best to disconnect the negative clamp of the battery of machine in stock at ordinary times, to reduce the self-discharge of battery.

4.3.2.2 It is best to recharge the battery every three months during storage or start the engine once at set intervals, and operate the engine for a period of time to fully charge the battery.

4.3.2.3 For an under-voltage battery that has been stored for more than half a year, if the battery is not recharged in time, the use effect of the battery will be directly affected, and even the battery will be scrapped.

4.3.2.4 In case that the vehicle is sold, be sure to check the state of charge of the battery. The under-voltage battery (voltage lower than 12.4 V) must be fully charged (voltage above 12.5 V) before being delivered to the user, otherwise, the battery use by the user will be affected.

4.3.3 Standard for battery inspection

4.3.3.1 Visual inspection: The appearance is good without damage, fluid leakage and bruise due to falling down.

4.3.3.2 Open circuit voltage: not less than 12.4 V.

4.3.3.3 Discharge voltage: discharge at 5 rates (or discharge at Is current according to GB/T5008.2-2005), and the voltage is higher than 9 V in 5s.

4.3.3.4 Starting current:

N120 120Ah 850CCA

4.3.4 Charging method of battery

4.3.4.1 DC charger: Charge the battery at a current (A) which is one tenth of the rated capacity of the battery at a 20h rate until the battery terminal voltage reaches 14.4 V, and continue charging for 2-3h.

4.3.4.2 Constant voltage charger: Connect the under-voltage battery with the charger correctly (red: positive, black: negative), press the charging button, select the 14.4 V or 16 V button to charge, and the maximum charging current shall not exceed 25 A. Charging completed: Charging will be stopped automatically when the current box displays 0.00.

4.3.4.3 Use of DC charger + constant voltage charger: If the constant voltage charger cannot identify the charging status of the battery with severe power shortage (voltage below 10 V), following steps shall be adopted. Firstly, use the adjustable DC charger to charge for about 3-8h with the current which is one tenth of the rated capacity of the battery at a 20h rate, and then charge continually with another constant voltage charger till

charging is automatically terminated.

4.3.5 Precautions for charging

4.3.5.1 Fireworks are strictly prohibited during charging! The battery shall be charged in a well-ventilated environment away from open flames, and inflammable and explosive articles shall not be piled up around.

4.3.5.2 In case of battery overheating, peculiar (sour) smell, acid jetting, etc. during charging, charging shall be suspended.

4.3.5.3 Gas will be generated during battery charging. Before charging, please check whether vent holes on left and right sides of the battery top cover are unblocked. Please keep vent holes unblocked, to prevent the battery from bursting.

4.3.5.4 It is forbidden to charge any battery whose case has been deformed or whose electrolyte has dried up due to overcharge.

4.3.5.5 During battery charging, the charging staff member should take care of safety protection.

4.3.6 Discharge test to be conducted after charging is over

4.3.6.1 Use a high-rate discharge instrument to carry out the high-current discharge test for 5s. The battery with its load voltage higher than 9.6 V is an intact battery.

4.3.6.2 After confirming that the battery is in good condition, clean the battery to ensure that the battery appearance is clean and air vents are unblocked.

4.3.7 Necessary supporting tools

Battery test meter and charger.

4.3.8 Following quality problems are not within the scope of "Three Guarantees"

4.3.8.1 The battery fails due to misuse or an accident;

4.3.8.2 The battery is under voltage for a long time or subject to deep discharge due to belt slip, excessive starting, end post pollution and extra load;

4.3.8.3 The counter electrode vulcanizes for the charging voltage is too low and the battery is not charged enough for a long time;

4.3.8.4 The battery is subject to serious water loss and its weight becomes light, for the charging voltage and current are too high and the battery is overcharged;

4.3.8.5 The battery gets damaged due to overcharge and over-discharge;

4.3.8.6 During installation, positive and negative electrodes are connected reversely, or end posts are accidentally damaged, the case is damaged, and the battery is short-circuited, etc.

4.4 Lubrication

4.4.1 Proper lubrication can greatly reduce the friction resistance and parts wear of the machine, ensure the normal operation of the machine, and prolong the service life of the

machine.

4.4.1.1 Precautions for oil filling:

1. Clean the oil filling container and oil filling part, and be sure to replace the grease nipple if it is damaged.

2. The machine must be kept level during oil volume inspection.

4.4.1.2 Types and grades of lubricant (see Table 8)

Table 8

Type	Name & grade	Refueling quantity (L) (Reference value)	Applied to	Remarks
Diesel engine oil	CF15W/40	20	Diesel engine	For details, see the diesel engine manual (CF5W/40 is used in winter in north or exported to cold areas).
Lubricating grease	2# common lithium-based lubricating grease	4 kg	Bearing and hinge	The low temperature extreme pressure lithium-based grease is used in winter in north or exported to cold areas.

4.4.1.3 Oil filling and grease injection

1. Diesel engine oil

1) It is used for the diesel engine lubrication system.

2) The engraved line "Static full" on the oil dipstick indicates the required oil level before the diesel engine is started; "Dynamic full" indicates the oil level that should be maintained when the diesel engine is running; "Danger" indicates that oil should be added immediately. Change oil after operation for 100h for the first time (running-in period expires), and then change oil every 250 h.

2. Oil for hydraulic system

Add oil from the oil filler on the hydraulic oil tank to the middle position of the oil dipstick of the oil tank. The main principle is that, pressure oil is produced through the oil pump for the system. Replace the hydraulic oil every 1,000 hours

3. Injecting grease under pressure

The parts where lubricating grease is applied are at each sliding bearing or rolling bearing, including:

1) Bearings of diesel engine water pump and fan.

2) Bearing of operating lever.

3) Pins and bushings at both ends of all oil cylinders.

4) Pins and bushings in the working device.

Normally, inject the grease under pressure to parts above every 50 h. Timely inject grease according to the working conditions.

4.4.1.4 The maintenance period specified in this Manual is determined by using the working hour chronometer or calendar. The maintenance work shall be arranged according to the first-come-first-served time period. The maintenance period of a loader working in a harsh environment shall be shortened compared with the prescribed period.

4.4.1.5 Please perform maintenance in combination with check and maintenance before trip as well as after trip each day.

4.4.1.6 For maintenance of the diesel engine, please see the Operation Manual of Diesel Engine.

4.4.1.7 The regular maintenance periods include daily, 50, 100, 250, 500, 1000 and 2000h.

Table 9

Period	Inspection content
Routine	1. Check the level of cooling water or antifreezing fluid. 2. Check oil levels of the diesel engine oil sump and the governor (fuel injection pump). 3. Check whether the belt is loose or damaged. 4. Check the startability, smoke color and abnormal noise of the diesel engine. 5. Check the brake performance. 6. Check the flexibility of direction. 7. Check systems for oil and water leakage. 8. Check the working condition of monitoring instruments. 9. Check whether there is abnormal sound or overheating in each part. 10. Check the tire pressure, and check the tire for crack or abnormal wear. 11. Check whether switches, pedals, handles and buttons work normally. 12. Check whether bolts and nuts of parts are loose or fall off. 13. Mainly check whether tire nuts and wheel rim assembly bolts are loose. 14. Check the flexibility of each control linkage and add the grease. 15. Fill in hinge points and pin bushings with the lubricating grease. 16. Check the safety belt. 17. Check the water-sediment separator.
Every 50 hours	In addition to daily maintenance, following tasks shall be added: 1. Clean the diesel filter screen and replace the diesel paper filter element. 2. Clean the air filter element and replace it if necessary. 3. Check whether fastening bolts of engine bracket are loose. 4. Check whether the working device, frame and appearance parts are cracked. 5. Check the hydraulic oil level and add it if necessary 6. Remove pollutants on surfaces of water tank and radiator.
Every 100 hours	In addition to 50h maintenance, following tasks shall be added: 1. Replace the diesel engine oil and the oil filter (replace for the first time) 2. Clean battery terminals. 3. Check the oil cylinder piston rod.

Every 250 hours	In addition to 100h maintenance, following tasks shall be added: 1. Replace the antifreeze. 2. Replace the diesel oil and oil filter. 3. Check the tension of the chain and adjust the chain if necessary. 4. Check the oil level in the sprocket oil tank. 5. Clean the radiator. 6. Check whether the fan belt is normal. 7. Check the tightening torque of hydraulic motor and wheel rim assembly nut.
Every 500 hours	In addition to 250h maintenance, following tasks shall be added: 1. Replace the filter element and change oil with new oil. 2. Check whether mounting bolts of the pump are tightened.
Every 1000 hours	In addition to 500h maintenance, following tasks shall be added: 1. Replace the hydraulic return oil filter element, clean the hydraulic oil tank, and change oil with new hydraulic oil. 2. Clean the diesel tank. 3. Change the oil in the sprocket oil tank.
Every 2000 hours	In addition to 1000h maintenance, following tasks shall be added: 1. Check weld seams of parts of the working device and the frame for cracks, and check bolts and nuts for fixing conditions. 2. Maintain the diesel engine according to the diesel engine manual.

Chapter V Descriptions on Lifting, Transportation and Fixation of Skid Steer Loader

5.1 Lifting and Transportation of Skid Steer Loader

5.1.1 When the skid steer loader needs to be lifted, the lifting hooks can be used for hooking the lifting lugs reserved on the vehicle body. Before lifting, please adjust the lengths of the lifting ropes to keep the whole vehicle basically level. Please pay attention to keeping the hooks firmly hung when lifting. It is best to use special slings to prevent the wire ropes from contacting the hood and the cab. (See Fig. 27)

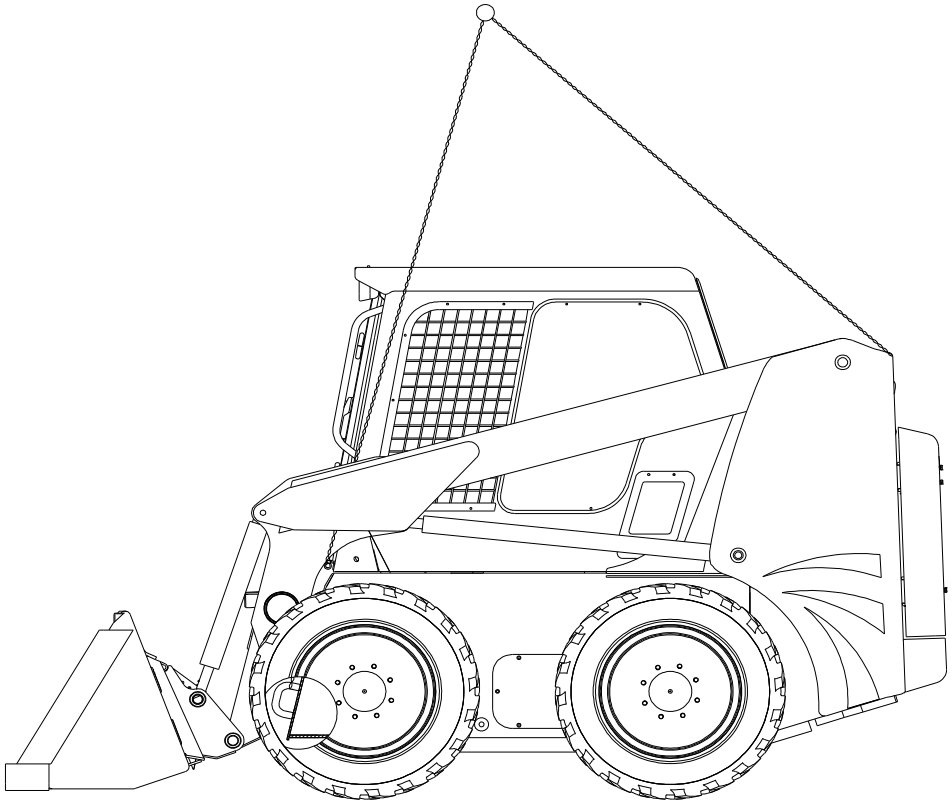


Fig. 27 Overall Lifting

5.1.2 When the skid steer loader is transported by flatbed truck or similar flatbed transportation tools for a long distance, it is necessary to fix the chassis of the loader with chains to prevent shaking and jumping; to prevent the machine from moving forward and backward on the flatbed truck, the front and rear wheels are fixed with triangle iron and then tied tight with steel wire.

5.1.3 The transportation of the whole machine shall comply with the relevant regulations of the transportation department. Without special circumstances, the parts of the loader shall not be disassembled during transportation.

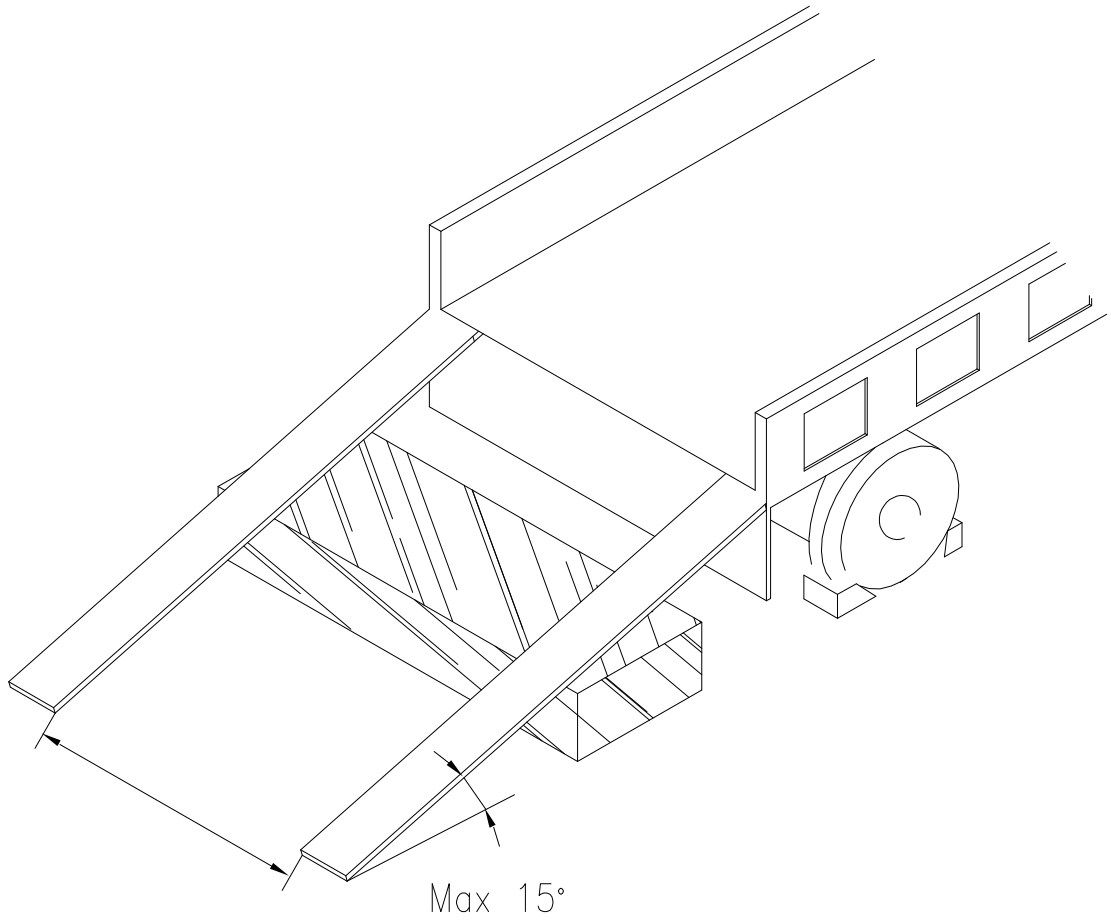
5.1.4 Note: Before loading, it is necessary to check whether the truck or trailer meets the safety requirements. Park the trailer or truck on the horizontal ground to ensure that the trailer, truck and loading/unloading platform have enough bearing capacity to support the machine. Check whether the trailer, truck and loading/unloading platform have impurities such as oil stains and ice pieces that can easily lead to wheel slippage, and clean them up in time. When the machine drives on or off, the speed shall be slow. Do not deviate from the truck to prevent the machine from overturning.

5.1.5 Load the machine onto the transport vehicle according to the following steps. It is as shown in the following figure.

1. Place several wedge-shaped wooden blocks under the wheels of the truck or trailer to prevent the transport wheels from sliding.

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

3. Drive the skid steer loader carefully and drive back onto the truck.



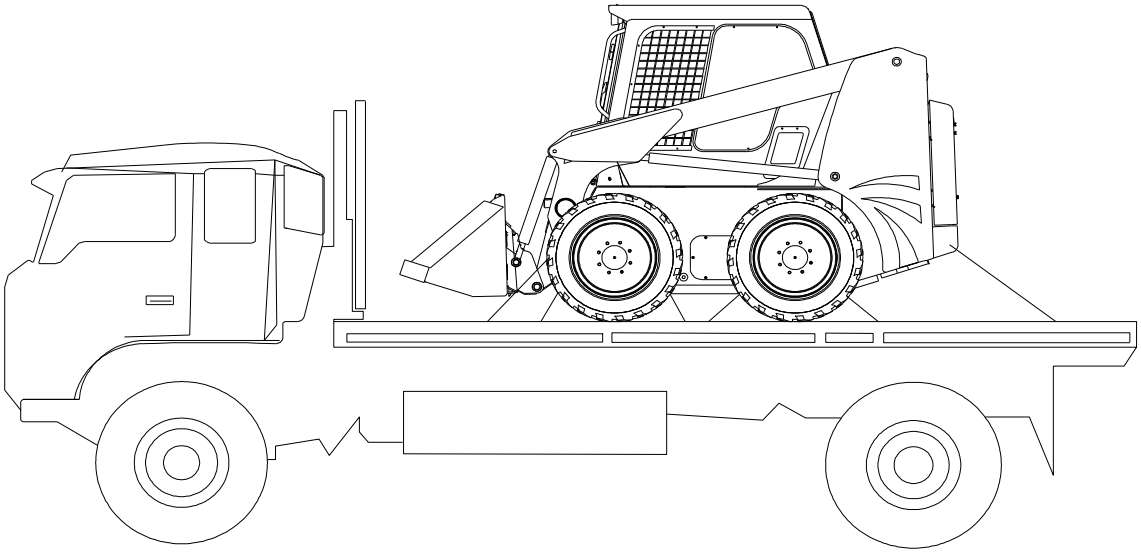
5.1.6 After driving the machine onto the transport vehicle, in order to ensure the safety during transport, the following steps must be taken to protect the machine. It is as shown in the following figure.

1. Lower the skid steer loader accessories onto the truck board, turn off the engine and remove the key.

2. Place wedge-shaped wooden blocks under the front and rear wheels of the skid steer loader.

3. Respectively tie the front and rear lifting lugs of skid steer loader with ropes.

4. Write down the height of the skid steer loader and the truck or trailer, and stick it onto the truck cab, so as to accurately judge the negotiating ability of the truck when passing through the tunnel or in case of high-altitude cables.



Chapter VI Common Faults and Troubleshooting

6.1 Common Faults Troubleshooting

6.1.1 During the use of the machine, some troubleshooting methods are shown in the following table (Table 10).

Table 10

Fault	Causes	Troubleshooting
Electrical system		
When the engine is running, the voltage value flashes even at high speed.	Alternator fault Circuit fault	Replace Check and repair it.
Abnormal motor sound	Alternator fault	Replace
Failure to start when the key is placed in the start position	Circuit fault Battery low Main fuse fault	Check and repair it. Charge battery Replace
When starting the engine, the starter gear sometimes works and sometimes does not work.	Insufficient battery charge	Charge battery
The oil pressure warning light is not on when the engine stops.	Bulb fault Pressure sensor fault	Replace Replace
Hydraulic system		
The pump makes abnormal noise.	There is no oil in the oil tank. Pump fault Hydraulic oil is not suitable for ambient temperature.	Fill oil Check and then repair or replace. Replace oil.
The equipment only operates at low speed.	Pump fault The maximum pressure of the valve is not set correctly, or the valve is closed due to impurities. Air filter blocked	Check and then repair or replace. Restart or replace. Remove dust or replace.
Powertrain		

The oil pressure warning light is still on when the engine is running at high speed.	Low oil level Blocked oil filter The oil is not suitable for the surrounding environment.	Fill oil Replace the filter Replace
The vent hole of the radiator emits steam. Engine coolant temperature warning light is normally on.	Low coolant level Radiator leakage Fan belt being slack There is accumulation of sludge or lime in the cooling system. Damaged or blocked radiator blades Temperature adjusting device fault Loose or damaged radiator cap Working at high altitude Thermostat fault Instrument fault	Fill in coolant Repair Check belt tension and adjust. Replace coolant and clean the cooling system. Repair or Clean. Replace Cover the cap tight or replace the components. Replace Replace
It is hard for engine to start	No fuel Air in the fuel system Leakage at air inlet/outlet	Fill oil Pipeline exhaust Adjust the gap between the inlet and outlet ports.
The exhaust gas is white or bright blue.	Too much oil Inappropriate fuel	Discharge some oil. Replace fuel with the correct fuel.
The exhausted gas sometimes tends to be black.	Air filter fault Injector fault Compression fault	Clean or replace it. Maintain or replace Adjust the valve clearance.
Sometimes the sound of combustion is similar to panting or abnormal sound (during combustion or in mechanical parts).	Injector fault The cetane content in fuel is too low. Internal damage of exhaust muffler Valve clearance is too large.	Replace Replace fuel with the correct fuel. Replace Adjust the valve clearance.
Traveling system		
The machine can neither move forward nor backward.	Low oil level Suction filter blockage Coupling fault The maximum pressure of the valve is incorrect or the valve is dirty. Hydraulic lines are blocked. Travel motor fault	Fill oil Replace Replace the coupling Clean or replace the valve. Reinstall Repair or replace Check the seat switch and the safety bar switch.

	The parking brake light is normally on.	
The machine moves slowly (accompanied by abnormal sound).	Low oil level Existence of foam Oil suction pipe is too small. Suction filter blockage Travel motor fault	Fill oil Use propulsion oil. Check and eliminate leakage. Replace Repair or replace
Insufficient traction in both directions	The engine does not reach its maximum speed. Auxiliary fuel pump fault (gear pump) The maximum pressure of the valve is not set properly. Improper setting of pressure reducing valve Oil overheating Travel motor fault	Replace the diesel filter and check the injection pump. Repair or replace Restart Restart Check oil level and clean the radiator. Repair or replace
There is insufficient traction in only one direction.	Overload of engine The pressure of the valve in this direction is not set properly.	Reduce the load Regulating valve
Oil overheating	Low oil level Blocked or unclean radiator Improper oil Oil suction pipe is too small. Maximum pressure of regulating valve Travel motor fault Pressure reducing valve set too large Travel motor fault	Fill oil Check and replace if necessary. Replace oil with the correct oil. Check and eliminate leakage. Check installation, repair or replace. Repair or replace Regulating valve Repair or replace
The machine cannot reach the maximum speed.	Suction filter blockage The engine does not reach its maximum speed. Travel pump fault Improper setting of overflow valve	Replace Replace the diesel filter and check the injection pump. Check, repair or replace. Adjust
The machine accelerates slowly.	Engine power reduction Improper pressure reduction setting	Check the fuel filter, injection pump and valves for blockage. Adjust to the rating value.

Oil leaks from the engine drive shaft or pump.	Sealing washer damaged High pump casing pressure Diverter valve pressure set too high	Replace Discharge blocked or damaged pipelines Check and repair
Miscellaneous		
Fuel being run out	Fuel being run out	Add fuel and exhaust before starting the engine again.
The battery is completely used up.	Generator fault The battery is used up when the engine stops.	Repair or replace Charge battery
The machine is stuck in mud.	The machine cannot get out.	Pass a suitable metal cable through the towing hook to pull the machine.

6.1.2 In case of the above faults, please contact our customer service staff in time to solve them effectively, and do not dismantle or connect using jumper wires without authorization.

6.2 Reasons for Battery Being Undervoltage

6.2.1 The machine stops running for a long time, the leakage current of the machine is large, or additional electrical equipment is installed, which causes the electric energy of battery to be used up.

6.2.2 Under the condition that the machine is not started, the electrical equipment used has been started for too long or has been used in other abnormal ways.

6.2.3 The machine starts frequently.

6.2.4 Machine charging system fault, such as:

6.2.4.1 Fault in alternator and its control circuit.

6.2.4.2 The alternator fuse is burned out.

6.2.4.3 The drive belt of engine is slack, which causes failure of the battery to be charged normally and causes the battery to be undervoltage.

6.2.4 A battery not installed on the vehicle is stored for more than 6 months.

6.2.5 Prompt: If the battery is undervoltage due to the above reasons, the battery can be restored to the normal working state through correct auxiliary charge operation.

6.3 Precautions for Battery Charging

6.3.1 The battery with broken battery case or acid leakage cannot be recharged. Replace

the storage battery after finding out the cause.

6.3.2 The battery with broken terminal posts cannot be recharged. Replace the storage battery after finding out the cause.

6.3.3 If the electric eye shows a white battery, first rule out whether the fault is caused by the green ball stuck in the electric eye, and this fault can be removed by shaking the battery gently; as to other reasons lead to electric eye whitening, for example, if the electrolyte level of the battery is too low or the electrolyte dries up, the battery cannot be used any longer.

6.3.4 If oxide scale is deposited on the surface of the terminal post, please clean the terminal post before charging to remove the oxide scale on the surface.

6.4 Battery Charging

6.4.1 If the charging battery is operated incorrectly, there is a danger of explosion; please follow the battery handling regulations and charging regulations in the Manual, and observe the following precautions:

6.4.2 During the charging and testing of the battery, the mixture of oxygen and hydrogen will be discharged from the air holes. When the concentration of hydrogen in the environment exceeds 4%, it will explode in case of open flame, spark or high heat; therefore, when charging, keep ventilation, prohibit smoking and prevent sparks and open flames.

6.4.3 The battery should be charged at normal temperature, and safety goggles must be worn during the charging operation.

6.4.4 When installing the battery, it shall be kept in a horizontal state and shall not be tilted more than 40 degrees.

6.4.5 When charging a battery, the positive pole of the charger shall be connected with the positive pole of the battery, and the negative pole of the charger shall be connected with the negative pole of the battery. Reverse charging is strictly prohibited.

6.4.6 In the process of charging, when the electrolyte temperature of the battery exceeds 45°C, the charging voltage or current shall be reduced as appropriate to prevent the electrolyte splashing caused by extremely high temperature.

Hydrogen and oxygen are produced by electrolysis of water in the later stage of battery charging, resulting in water loss. The higher the charging voltage is, the more water loss will be. There is no need to add water to the maintenance-free battery during use. It is recommended to use the constant voltage charging method with constant voltage and gradually reduced current, and avoid the constant current charging method whenever possible.

Reference Table of Densities of Common Materials

S/N	Material name	Specific Classification	Reference Unit Weight, Kg/m^3	Remarks
1	Common soil	Fine sticky dry soil	1250	
		Caking dry soil	1520	
		Powdery dry soil	1550	
		Wet soil	1725	
		Muddy soil	1730	
		Compact soil	1840	
2	Clay	Wet soil	1750	
		Dry soil	1485	
3	Sand	Loose dry sand	1440	
		Wet sand	1680	
		Damp sand	1850	
4	Sandstone	Broken sandstone	1500	
		Solid sandstone	2300	
5	Gravel	Dry gravel	1485~1650	
		Wet gravel	2015	
		Mine gravel	1900	
		Dry clay mixture	1185	
		Wet clay mixture	1650	
		Dry sand mixture	1730	
		Wet sand mixture	2000	
6	Alumina		1425	
7	Crushed stone		1600	
8	Slag	Dry type	650	
9	Coal	Smokeless raw coal	1190	
		Bituminous coal	950	
		Dry peat	415	
		Wet peat	1125	
10	Weathered rock and soil	75% rock and soil	1955	
		50% rock and soil	1725	
		25% rock and soil	1585	
11	Gypsum	Crushed lump	1600	
		Broken lump	1810	
		Solid lump	2780	
12	Limestone	Broken block	1550	
		Solid block	2600	
13	Slag		1760~2100	
14	Granite	Fragments	1650	
		Integral	2800	
15	Hematite		2460	
16	Magnetite		2780	