



SHANDONG LINGONG  
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# Operation & Maintenance Manual

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# LG968/969

## WHEEL LOADER



## WARNING

Operators and maintenance persons should read this manual carefully and understand these instructions before use to avoid serious accident. For the convenience of relevant people using this manual, it should be kept properly.

SHANDONG LINGONG CONSTRUCTION MACHINERY CO., LTD



# **LG968/969 WHEEL LOADER**

## **Operation & Maintenance Manual**

880×1230 mm      16#      7.5pieces

3rd Edition in 2008. 3 and 1st Print in 2008.4

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# Operation & Maintenance Manual

## Concise Guide

All reasonable steps have been taken to ensure that this publication is correct and complete, but should any user be in doubt about any detail, clarification may be sought from Shandong Lingong construction machinery Co. Ltd. or their accredited representative. The information in this document is subject to change without notice and should not be construed as commitment by Shandong Lingong construction machinery Co. Ltd. Shandong Lingong construction machinery Co. Ltd accepts no responsibility for any errors that may appear in this document.

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Manual Feedback

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Please quote the title, part number and date of the manual. It is helpful to be quickly found in the previous version.

## Table of Contents

<b>PREFACE</b> .....	错误! 未定义书签。
<b>SAFETY INFORMATION</b> .....	错误! 未定义书签。
<b>CHAPTER I SAFETY</b> .....	<b>1</b>
<b>1 SAFETY LABELS POSITIONS AND THE CONTENTS</b> .....	错误! 未定义书签。
1.1 Safety Label and Its Position.....	错误! 未定义书签。
1.2 The Contents of Safety Label.....	错误! 未定义书签。
<b>2 SAFETY RULES</b> .....	错误! 未定义书签。
2.1 Safety Rules.....	错误! 未定义书签。
2.2 Safety Devices.....	错误! 未定义书签。
2.3 Protective Items.....	错误! 未定义书签。
2.4 Unauthorized Modification.....	错误! 未定义书签。
<b>3 SAFETY OPERATION</b> .....	错误! 未定义书签。
3.1 Be Familiar with Machine.....	错误! 未定义书签。
3.2 When Leaving Operator’s Seat.....	错误! 未定义书签。
3.3 Mounting and Dismounting.....	错误! 未定义书签。
3.4 Fire Prevention.....	错误! 未定义书签。
3.5 Precautions When Operating at High Temperature.....	错误! 未定义书签。
3.6 Running on the way.....	错误! 未定义书签。
3.7 Prevention for Crushing or Cutting.....	错误! 未定义书签。
3.8 Notice of Attachment.....	错误! 未定义书签。
<b>4 SAFETY STARTING</b> .....	错误! 未定义书签。
4.1 Before Starting Engine.....	错误! 未定义书签。
<b>5 SAFETY DRIVING</b> .....	错误! 未定义书签。
5.1 Warning.....	错误! 未定义书签。
5.2 Oneself Safety and Others’ Safety.....	错误! 未定义书签。
5.3 Full Load Transportation.....	错误! 未定义书签。
5.4 Never Drive Over-Speed.....	错误! 未定义书签。
5.5 Ensure Good Visibility.....	错误! 未定义书签。
5.6 Pay Attention to Blocks.....	错误! 未定义书签。
5.7 Drive at Bad Environment.....	错误! 未定义书签。
5.8 Safety Drive on the Ramp.....	错误! 未定义书签。
5.9 Towing.....	错误! 未定义书签。
<b>6 SAFETY OPERATION</b> .....	错误! 未定义书签。
6.1 Keep Good Operation Habit.....	错误! 未定义书签。
6.2 Pay attention to Surroundings.....	错误! 未定义书签。
6.3 Ensure Ventilation in Close Environment.....	错误! 未定义书签。
6.4 Don’t Get Close to Dangerous Environment.....	错误! 未定义书签。
6.5 Don’t Get Close to High Voltage Wire.....	错误! 未定义书签。
<b>7 SAFETY PARKING</b> .....	错误! 未定义书签。
7.1 Pay Attention to the Safety of Yourself and Others.....	错误! 未定义书签。
7.2 Notice for Cold Area.....	错误! 未定义书签。
<b>8 SAFETY EXAMINE AND REPAIR</b> .....	错误! 未定义书签。
8.1 General Knowledge.....	错误! 未定义书签。
8.2 Working in Close Area.....	错误! 未定义书签。
8.3 Maintenance of frames during driving up.....	错误! 未定义书签。

8.4 Working under the Machine .....	错误! 未定义书签。
8.5 Working on the Machine .....	错误! 未定义书签。
8.6 Maintenance during the Engine Working .....	错误! 未定义书签。
8.7 Do not let anything fall into the inner place of machine .....	错误! 未定义书签。
8.8 Cleaning .....	错误! 未定义书签。
8.9 Heavy Things .....	错误! 未定义书签。
8.10 Welding Repair .....	错误! 未定义书签。
8.11 Examine and Repair of Coolant System .....	错误! 未定义书签。
8.12 Examine and Repair of Hydraulic System .....	错误! 未定义书签。
8.13 Anti-fire .....	错误! 未定义书签。
8.14 Air Storage Tank .....	错误! 未定义书签。
8.15 Electric System .....	错误! 未定义书签。
8.16 Maintenance of Storage Battery .....	错误! 未定义书签。
8.17 Charging of Storage Battery .....	错误! 未定义书签。
8.18 Starting Using Voltage-Raising Method .....	错误! 未定义书签。
8.19 Maintenance and Storage of Tire .....	错误! 未定义书签。
8.20 Waste Materials .....	错误! 未定义书签。
9 SAFETY TRANSPORTATION .....	错误! 未定义书签。
9.1 Assemble and Disassemble the Machine .....	错误! 未定义书签。
9.2 Transportation on the Ground .....	错误! 未定义书签。
9.3 Lifting .....	错误! 未定义书签。
<b>CHAPTER II INTRODUCTION .....</b>	错误! 未定义书签。
1 GENERAL VIEW OF THE MACHINE & COMPONENTS' NAME .....	错误! 未定义书签。
2 GEOMETRICAL DIMENSIONS .....	错误! 未定义书签。
3 PRODUCT TYPE AND ITS MEANING .....	错误! 未定义书签。
4 NAMEPLATE .....	错误! 未定义书签。
5 USE CONDITIONS .....	错误! 未定义书签。
6 CIRCUMSTANCES REQUIREMENT .....	错误! 未定义书签。
7 FEATURES .....	错误! 未定义书签。
8 TECHNICAL PERFORMANCE & PARAMETER .....	错误! 未定义书签。
8.1 Performance .....	错误! 未定义书签。
8.2 Parameters of Dimension and Weight .....	错误! 未定义书签。
8.3 Product Standard and License .....	错误! 未定义书签。
<b>CHAPTER III OPERATION AND APPLICATION .....</b>	错误! 未定义书签。
1. BE FAMILIAR WITH MACHINE .....	错误! 未定义书签。
1.1 General Views of Controls and Gauges .....	错误! 未定义书签。
1.2 Introduction of Gauges & Controls .....	错误! 未定义书签。
2 ADJUST OF NEW MACHINE .....	错误! 未定义书签。
3 OPERATION AND USAGE OF LOADER .....	错误! 未定义书签。
3.1 Notices for Usage .....	错误! 未定义书签。
3.2 Starting .....	错误! 未定义书签。
3.3 Running .....	错误! 未定义书签。
3.4 Stopping .....	错误! 未定义书签。
3.5 Working .....	错误! 未定义书签。
3.6 Oil and Fuel Supplying .....	错误! 未定义书签。
3.7 Long-Time Storage .....	错误! 未定义书签。

3.8 General Problems and Eliminating.....	错误! 未定义书签。
<b>CHAPTER IV MAINTENANCE.....</b>	错误! 未定义书签。
1. GUIDES OF MAINTENANCE.....	错误! 未定义书签。
1.1 Precautions before Maintenance and Inspection.....	错误! 未定义书签。
1.2 Warning Tag.....	错误! 未定义书签。
1.3 Spare Parts.....	错误! 未定义书签。
1.4 Oil and Fuel.....	错误! 未定义书签。
1.5 Always Use Clean Oil and Fuel.....	错误! 未定义书签。
1.6 Keep the Machine Clean.....	错误! 未定义书签。
1.7 Be Careful of Refrigerant Water and Oil in High Temperature.....	错误! 未定义书签。
1.8 Check Oil and Filters.....	错误! 未定义书签。
1.9 Fuel Strainer.....	错误! 未定义书签。
1.10 Oil Change.....	错误! 未定义书签。
1.11 Welding Instructions.....	错误! 未定义书签。
1.12 Fire Prevention.....	错误! 未定义书签。
1.13 Sealing Part.....	错误! 未定义书签。
1.14 Checking Frame.....	错误! 未定义书签。
1.15 Precautions When Washing Machine.....	错误! 未定义书签。
1.16 Checking in Raining and Snowing Circumstances.....	错误! 未定义书签。
1.17 Dusty Worksite.....	错误! 未定义书签。
1.18 Avoid Using Mixed Oil.....	错误! 未定义书签。
2. CONTENT OF MAINTENANCE.....	错误! 未定义书签。
2.1 Outline of Oil, Fuel and Coolant.....	错误! 未定义书签。
2.2 Selection of Fuel, Coolant and Lubricant.....	错误! 未定义书签。
2.3 The Sketch of Lubricating Points.....	错误! 未定义书签。
2.4 Outline of Electric System Maintenance.....	错误! 未定义书签。
2.5 Maintenance Tools.....	错误! 未定义书签。
2.6 Tightening Torque of Threads.....	错误! 未定义书签。
3 RULES OF MAINTENANCE.....	错误! 未定义书签。
3.1 Every 10 Hours (Days) Service.....	错误! 未定义书签。
3.2 Every 50 Hours (Week) Service.....	错误! 未定义书签。
3.3 Every 250 Hours (Month) Service.....	错误! 未定义书签。
3.4 Every 500 Hours (Season) Service.....	错误! 未定义书签。
3.5 Every 1000 Hours (Half an Year) Service.....	错误! 未定义书签。
3.6 Every 2000 Hours (Year) Service.....	错误! 未定义书签。
3.7 Alteration.....	错误! 未定义书签。
3.8 Always replace air-storage tank when carrying out 3 years service.....	错误! 未定义书签。
<b>CHAPTER V THE STRUCTURE AND PRICIPLE OF MAIN COMPONENTS AND SYSTEM.....</b>	错误! 未定义书签。
1 Transmission System.....	错误! 未定义书签。
2 Hydraulic System.....	错误! 未定义书签。
3 Brake System.....	错误! 未定义书签。
3.1 Driving Brake System.....	错误! 未定义书签。
3.3 Emergency and Parking Brake System.....	错误! 未定义书签。
4 Electric System.....	错误! 未定义书签。

# PREFACE

Thank you for purchasing the LG968/969 wheel loader.

This manual is a guideline for users to use and maintain this machine properly. Keep this manual in cab and have all relevant people read it at any moment. If this manual has been lost or has become damaged and cannot be read, contact with our company or our dealers.

If you sell the machine, be sure to give this manual to the new owners.

Parameters, figures and information included in the manual are only apply to basic loaders. For those derivative products, please consult us or relative reference manuals.

When select working equipments please follow the working equipment user manual to assemble and disassemble, replace and use.

In addition, please read carefully the attached technical user manual of diesel engine and other function parts about the operation, usage and maintenance.

We are continually striving to improve the quality of our products, to produce more advanced and safer engineering machine. We reserve the right, at its sole discretion, to change, modify our design, but we do not promise to imply the changes to products that are sold. We also reserve the right to change the data and machine, and the right to maintain. The changes of design, operation and user manual of maintenance information in this document is subject to change without notice. Welcome customer feedback. If you would like to comment on any aspect of this manual or our products in general, please do not hesitate to contact us.

Please feed back the shortcomings during using our products in time, so that we can continue to improve our products to satisfy your requirement.

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 **WARNING**

- The wrong operation, maintenance and repair could result in hurt and death.
- Operator should read this manual carefully before operation or maintenance. **Never** involve in operation and maintenance and repair of the machine before reading and understanding this manual.
- The operation specifications and precautions given in the manual only apply to intended uses of the machine. If the machine is used for any unintended conditions that are not specifically prohibited, be sure that operation will not induce hurts to you and other persons.
- No operation and action is allowed that is conflict with the description in the manual.

# SAFETY INFORMATION

The operator should know and obey the safety criterion described in national and local laws. If there is no such criterion, please follow the rules described in this manual.

Most accidents are caused by the failure to follow fundamental safety regulations for the operation and maintenance of machines. To avoid accidents, please read, understand and follow all precautions and warning in this manual and on the machine before performing operation and maintenance.

Safety precautions are specified in SAFETY of Chapter I.

Because of potential danger that is impossible to be predicted. Safety information described in this manual cannot include all of the safety precautions, and we also cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, if procedures or actions which are not recommended in this manual are used, you must be sure safety of the operator and machine. Otherwise, consult us or the dealers.

The safety precautions for operation and maintenance in this manual only apply to those conditions specified by the machine. If the uses of the machine are not specified in the manual, users should take full responsibility by themselves. We will not bear any safe responsibility for the operators or machine.

In any case, you should not engage in prohibited operations as described in this manual.

The following signs are used for identifications of safety information in this manual:

** DANGER**— This word is used on safety messages and safety labels where there is a high possibility of serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.

** WARNING**— This word is used on safety messages and safety labels where there is a potentially dangerous situation. Failure to avoid this hazard may also result in serious injury or death. Failure to avoid this hazard may also result in serious damage to the machine.

** NOTICE**— This word is used on safety messages and safety labels for the hazards that could result in minor or moderate injury if the hazard is not avoided. This word is used for precautions that must be taken in order to avoid actions which could shorten the life of the machine.

# CHAPTER I SAFETY

## WARNING

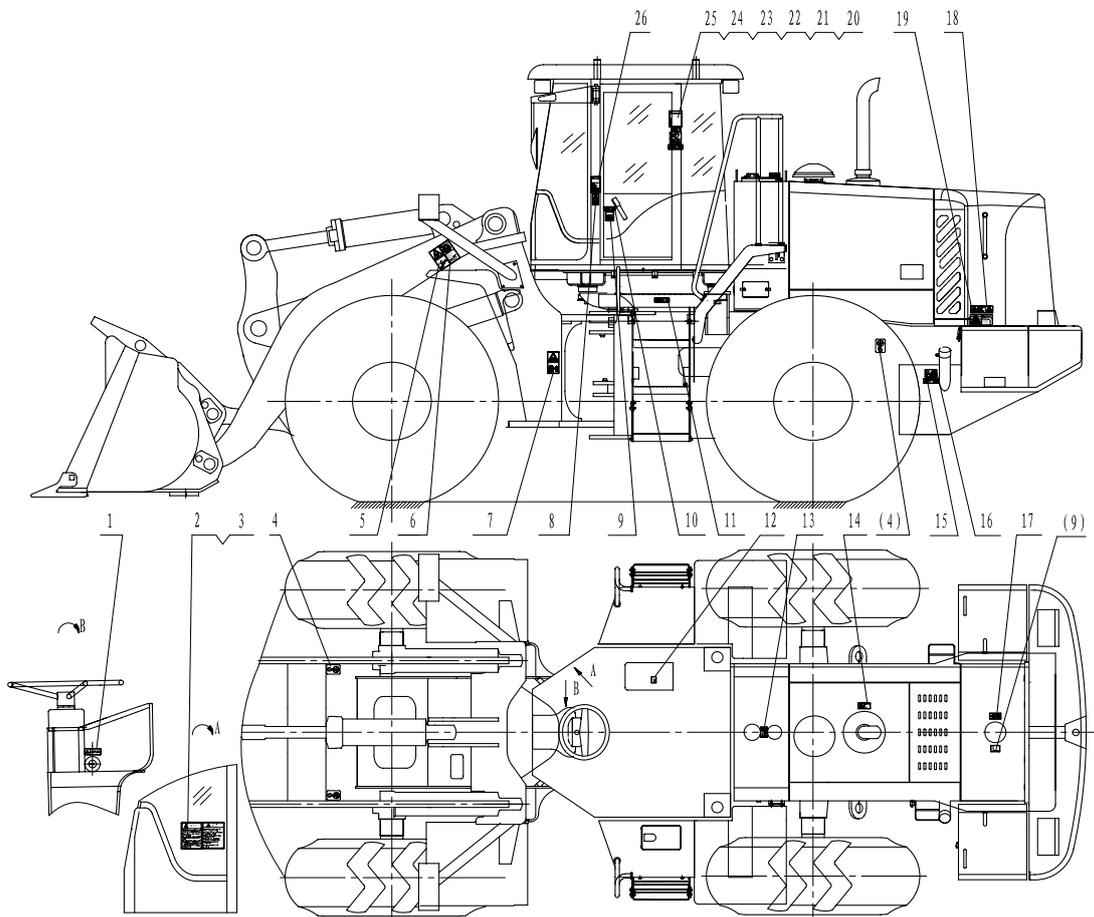
Read and follow all safety precautions. Failure to do may result in serious injury or death.

## 1 SAFETY LABELS POSITIONS AND THE CONTENTS

### 1.1 Safety Label and Its Position

The positions of safety label of this machine please see the following figure, Please read the contents of safety label carefully and follow the rules. Please keep the labels well, if there is any lost, broken or unclarity of label please add new one or repair in time. If there is any component attached with safety labels to be replaced, please make sure the new component has the same safety label.

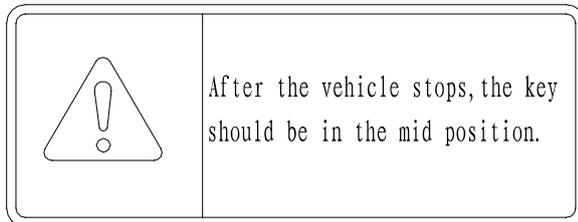
When clean the safety label, please use cloth, soap water and etc, but the cleanser and gas is forbidden to be used.



## 1.2 The Contents of Safety Label

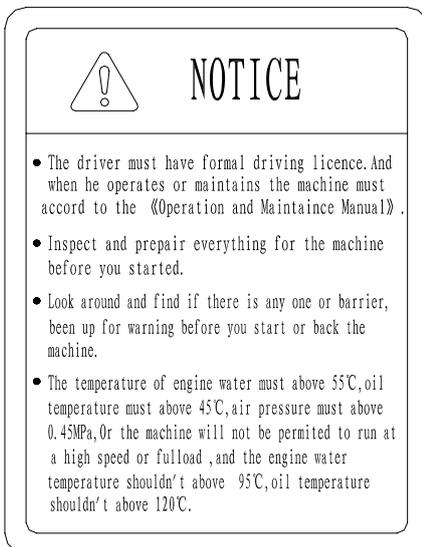
### 1 Warning for start

Located above the start button



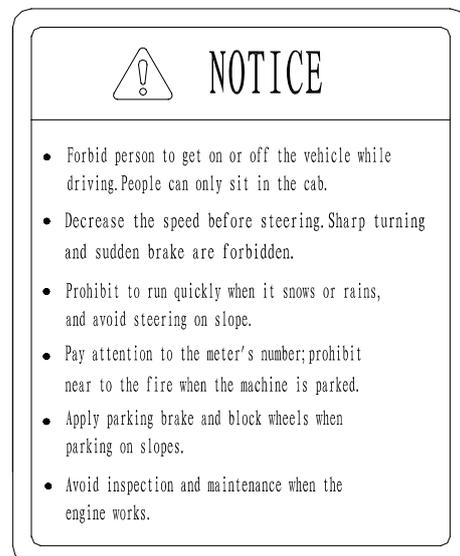
### 2 Notice for operation

Located on the right side of the window of operator cab



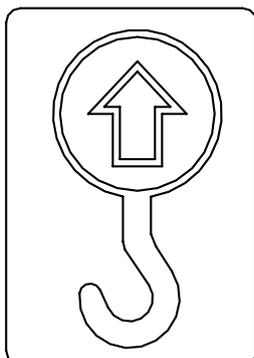
### 3 Notice for driving

Located on the right side of the window of operator cab



### 4 Start for lift

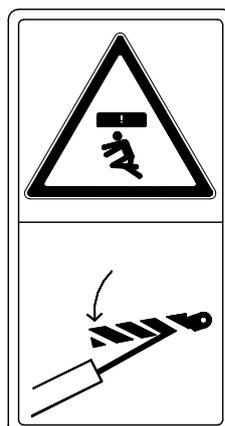
Located on the front of the front and rear frames



### 5 Limit position of lift arm

(Lock the lift arm cylinder before entering dangerous areas.)

Located on the two sides of actuating arm



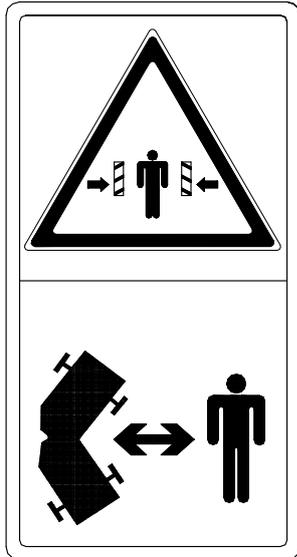
### 6 Danger of actuating arm

Located on the two sides of actuating arm



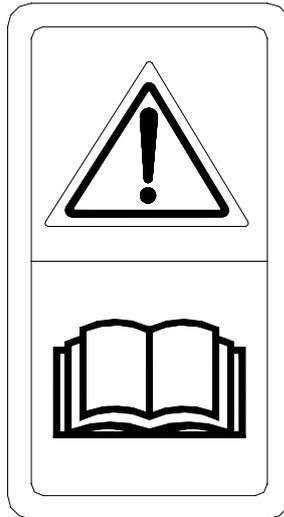
### 7 Danger or death during Steering

Located on the steering position of front and rear frames



### 8 Reference for manual

Located on the pole at right side of operator cab



### 9 Antifreeze fluid ( if stucked )

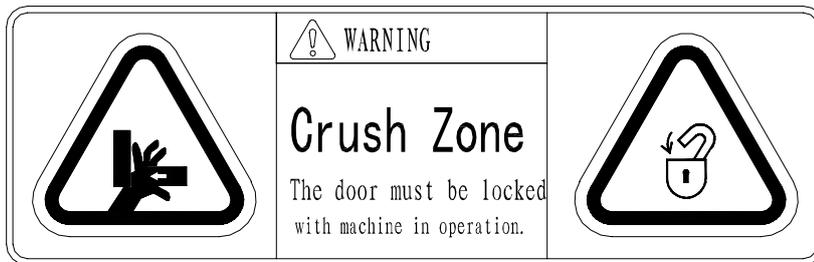
Located on the left operator cab door and mouse of radiator of engine hood

Coolant (-35#) has been added in the machine

- Notice :the coolant is glycol engine cooling liquor.
- Please do according to the circumstance and the illustration when reinfusing, otherwise the effect will be reduced.
- Selecting range is advised as below:
  - 25# is used in the temperature of  $\geq -15^{\circ}\text{C}$
  - 35# is used in the temperature of  $\geq -25^{\circ}\text{C}$
  - 45# is used in the temperature of  $\geq -35^{\circ}\text{C}$

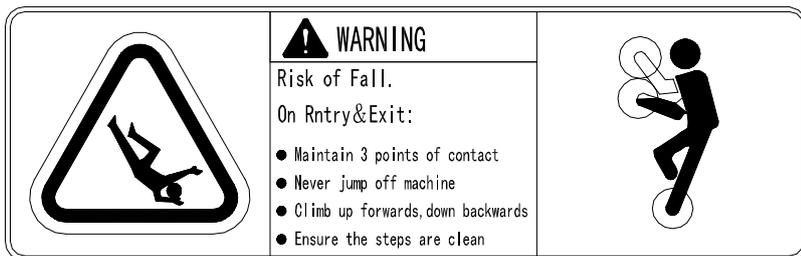
### 10 Notice for the door of operator cab

Located on right and left operator cab door



### 11 Notice for platform frame

Located on right and left platform frame



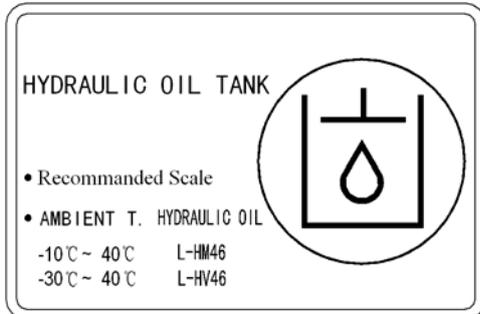
### 12 Parking Brake Handle

Located on right operation box

驻车制动手柄  
PARKING BRAKE HANDLE  
驻车或脚刹失效时,拉出手柄!  
pull handle when parking or brake failure!

### 13 Hydraulic oil tank

Located on the hydraulic oil tank



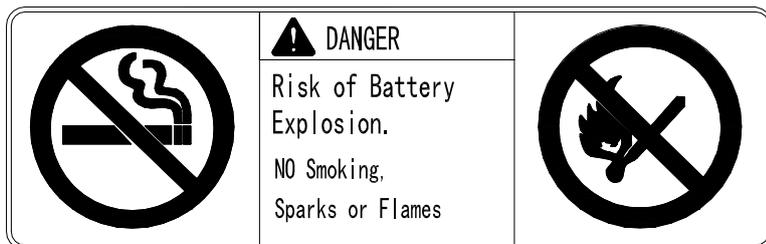
### 14 Warning of high temperature

Located on vent-pipe of engine hood



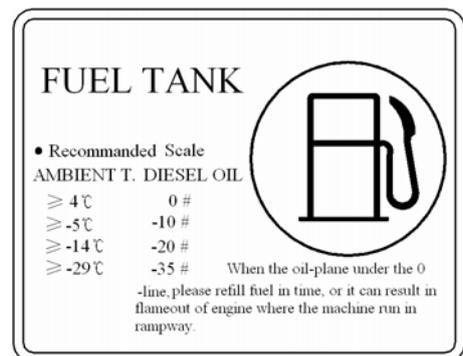
### 15 Forbidden of flame and fire

Located on fuel tank



### 16 Fuel tank

Located on fuel tank



### 17 Notice of hot water

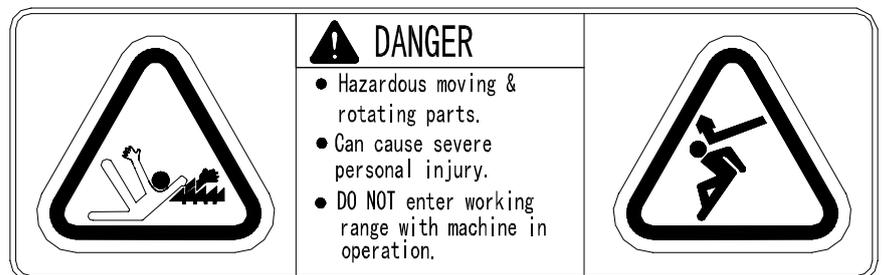
Be attention for steam or hot water ejection

Located on cover of water tank of engine hood



### 18 Warning of touching machine

Located on the two sides of engine hood



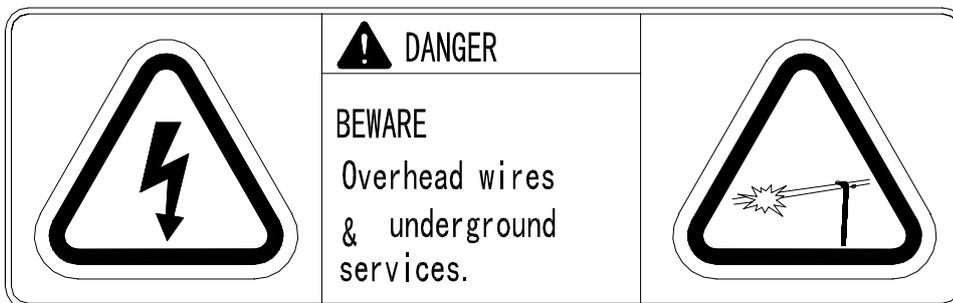
### 19 Warning of machine reversing

Located on the two sides of engine hood



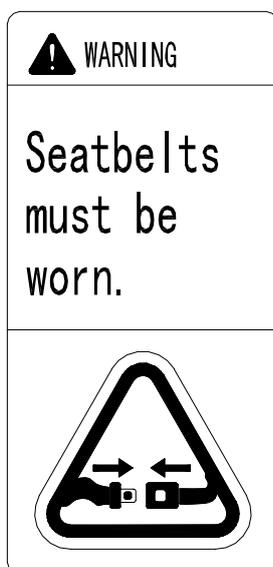
### 20 Warning of high voltage

Located on the right back pole inner operator cab



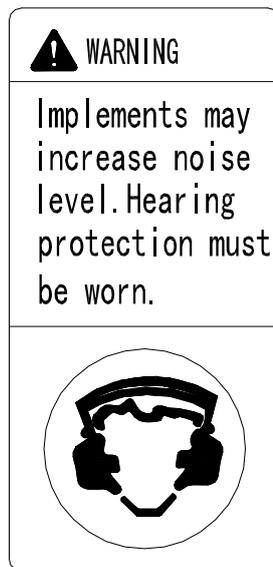
### 21 Warning of seatbelt

Located on the right back pole inner the operator cab



### 22 Warning of avoiding noise

Located on the right back pole inner the operator cab



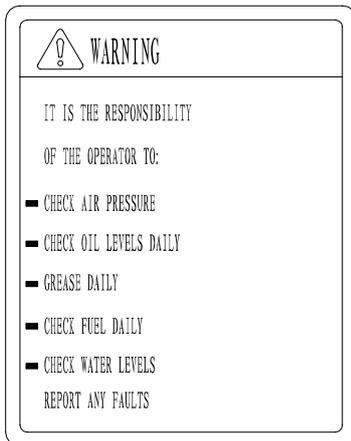
### 23 Warning of driver only

Located on the right back pole inner the operator cab



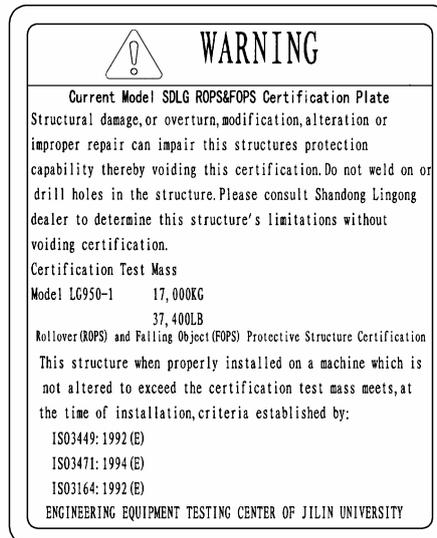
## 24 Check before starting

Located on the right back pole inner the operator cab



## 25 ROPS&FOPS (used in anti-roll cab)

Located on the left back pole inner the operator cab



## 26 Prevent rolling

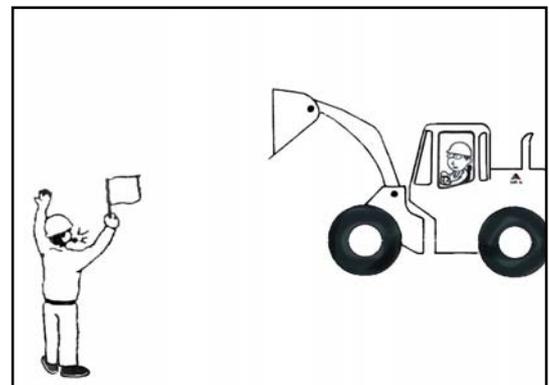
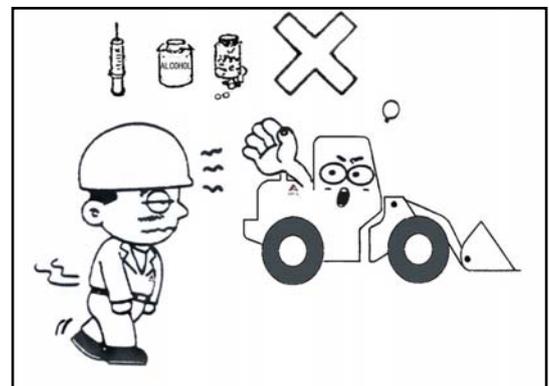
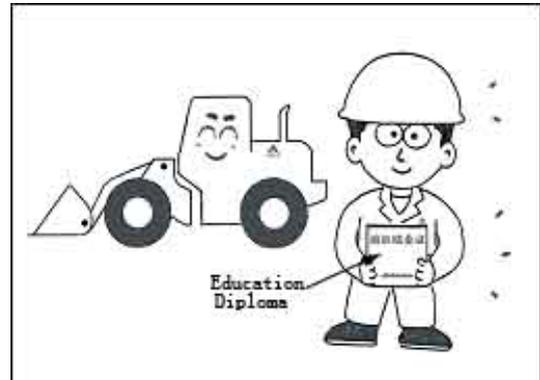
Located on the left front pole inner the operator cab



## 2 SAFETY RULES

### 2.1 Safety Rules

- Only trained and authorized people can be permitted to operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating and maintaining the machine.
- Adjust yourself, **never** operate machine when you feel bad. **Don't** operate machine if you feel bad, or feel sleepy after eating drugs or drinking. Those cases could cause your wrong judgments and induce accident.
- When working with another operator or with a person on worksite traffic duty, be sure that all people understand all hand signals that are to be used.
- Follow all the safety rules.

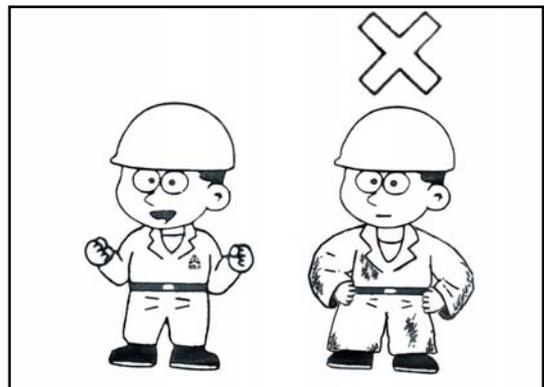
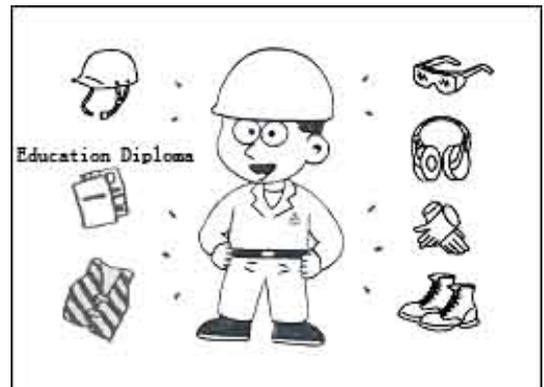
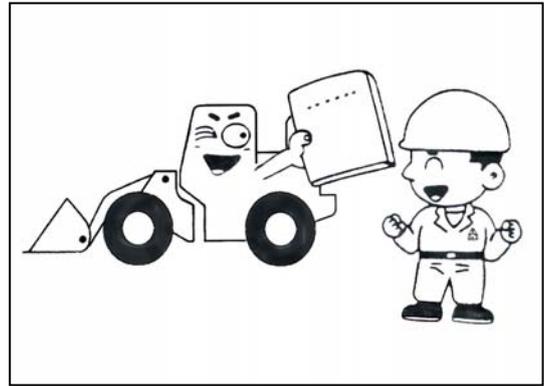


### 2.2 Safety Devices

- Be sure all guards and covers are in their proper position, and repair them when damaged.
- Use safety devices properly such as parking brake switch, safety belt and etc.
- **Never** remove any safety devices. **Always** keep them in good operating conditions.
- Improper use of safety devices could result in serious bodily injury or death.

## 2.3 Protective Items

- Wear protective items, such as hard helmet, safety glasses, shoes, mask reflector waistcoat or veil, earplug, heavy gloves when operating or maintaining the machine.
- Make sure to wear hard helmet, safety glasses and heavy gloves, if the operation involves scattering metal chips or other minute particles particularly when driving pins with a hammer or cleaning the filter elements of air cleaner with compressed air, be sure that there is no one near the machine. Check properly all protective equipments before using.
- Never wear loose clothing, jewelry and loose long hair. They can be caught on control levers (or control handle) or in moving parts and cause serious injury or death..
- Avoid wearing oily clothes, because they are flammable.
- Compressed air may hurt the body. When use compressed air, be sure to wear mask, safety cloth and shoes. The max pressure of cleaning compressed air should be lower than 0.3MPa.
- All the protective items should be examined before usage to make sure their function well.



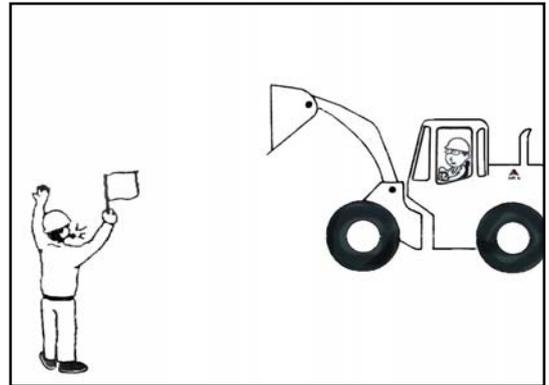
## 2.4 Unauthorized Modification

- Any modification without authorization from us can create problems with danger.
- Please consult Shandong Lingong construction machinery Co. Ltd or the sellers before modification, otherwise.
- we will not be responsible for any injury or damage caused by any the unauthorized modification.

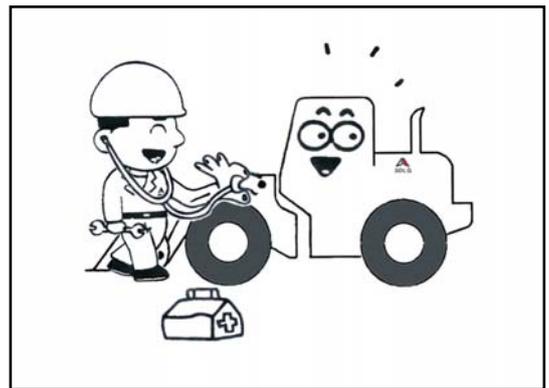
### 3 SAFETY OPERATION

#### 3.1 Be Familiar with Machine

- Learn the study manual supplied together with the machine. Learn the structure of the machine, operation and maintenance. Be familiar with the buttons, operation handles, meters, warning devices and their positions and functions.
- Know all the rules in operation; understand the gesture of the director.
- If there is any oil near the operation positions that can cause loosen, clean it immediately.

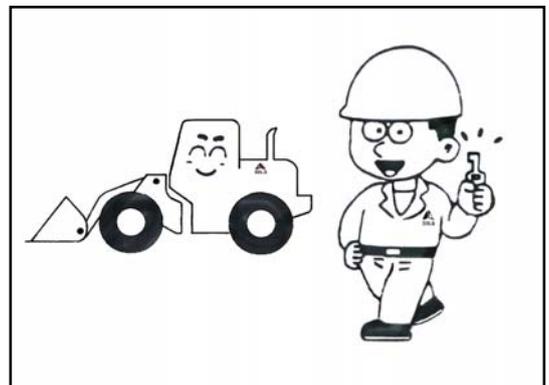


- Check all the safety items, such as the safety protective devices are at the safe status. Make sure the tires are not worn and the tire pressure is up to snuff. If you don't solve the oil leak, water leak, air leak, deformation, loosen, and abnormal sound, there may be dangerous accidents. Check the safety devices timely.



#### 3.2 When Leaving Operator's Seat

- **Always** keep the parking brake switch in lock position unfliningly.
- Level the working equipment completely to the ground and puts the Gear Control Lever and Working Equipment Control Handle to **Neutral** position, Stop the engine and turn off the electric lock.
- Make sure the loader is locked and keep the key carefully.

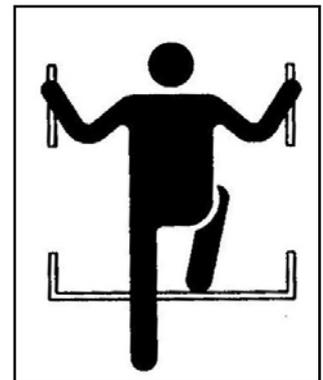


### 3.3 Mounting and Dismounting

- Check the handrails and pedals, if there is oil, lubricant or dirt; clean them first to prevent slip. Besides, repair the broken items, fasten the loosen nuts.
- **Never** jump on or off the machine. **Never** get on or off a moving machine.



- When getting on or off the machine, face the machine and use the handrails and pedals to ensure that you support yourself. Maintain three-point contact (two hands –one foot or two feet one hand) with the handrails and pedals to ensure body stable.

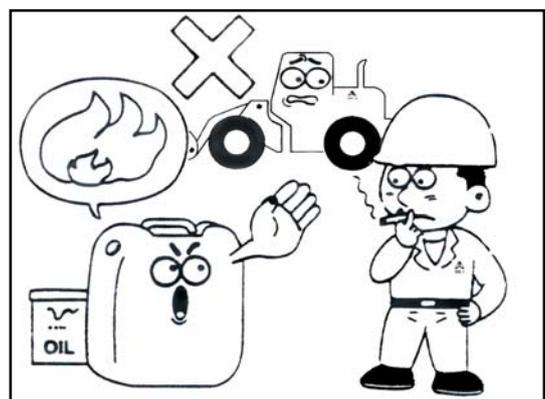


- **Never** hold any control levers when getting on or off the machine.
- **Never** get into the operator cab from the ladder at the back of machine or from the tire at the side of operator cab.
- **Never** hold any tools or other items when climbing up and down the loader, lift the tools needed using rope to the operation flat roof.

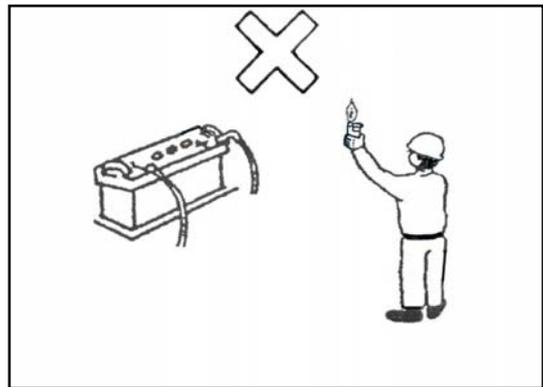
### 3.4 Fire Prevention

The fuel used for engine, lubricant for loader engine, hydraulic oil for hydraulic system, Hydraulic pressure shafting oil and gear oil for transmission system, brake fluid, antifreeze fluid for heat elimination system are flammable, so it is very dangerous when the fire is close, especially for the fuel. The following notice should be paid attention to.

- Keep fire away from flammable fluids.

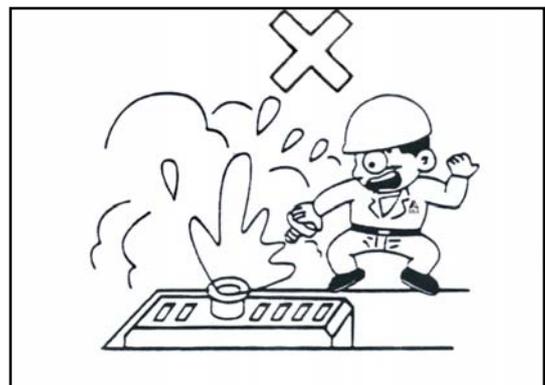


- Add refueling and lubricating oiling in well ventilated areas. Stop the engine and not smoke while refueling.
- Tighten all fuel and oil tank caps firmly.
- Put the above flammable liquid in certain container with relevant tag and put it in fixing place to storage separately. Do not allow unauthorized people to use.
- Electric welding and flame cutting is not allowed for the tubes containing flammable fluid. Clean the tubes with nonflammable fluid before electric welding and flame cutting.
- During working, pay more attention to the operation, when the outlet of muffler is close to flammable materials such as withered grass, old papers and etc.
- When parking the loader, carefully select the environment; especially select the places where there are no flammable materials near the outlet of muffler.
- Check whether there is leak of fuel, lubricating oil, or hydraulic oil. If so, repair or replace the broken items. Clean the repaired items before using.
- There is explosive air generated near storage battery, be sure there is no flame or fire nearby. Repair and maintain the storage battery as referenced in users manual.
- Flame or fire (match or lighter) is not allowed to be used to check dark place.
- Fire extinguisher should be prepared and know how to use. Check and maintain it as referenced in users manual.
- **Never** operate machine near flame or fire.
- Circuit short is not allowed.



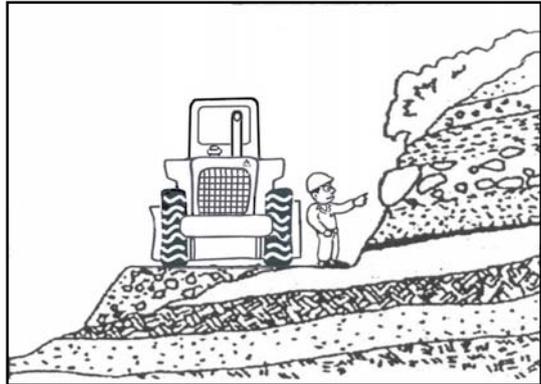
### 3.5 Precautions When Operating at High Temperature

- Immediately after operations are stopped, the coolant, engine oil, hydraulic oil are at high temperature and still under high pressure. Attempting to remove the cap, drain the oil or water, or replace filters may lead to serious burns. **Always** wait for the temperature to go down, and follow the specified procedures when carrying out these operations.
- Stop the engine, waiting for the water to cool, and then loose the cap slowly to relieve the pressure before removing the cap of radiator.



### 3.6 Running on the way

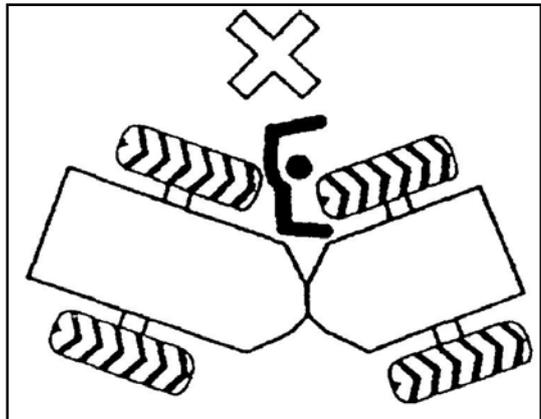
- Pay attention to the stability of the front and rear of the machine on the way, since there is work equipment that may block the eyesight at the front and meanwhile the load is concentrated on the back wheels.
- Be sure there is no big fog, soot or Sand-dust that may block the eye sight.
- Examine the working area, the status of road whether there is hole, block, sloss and ice.



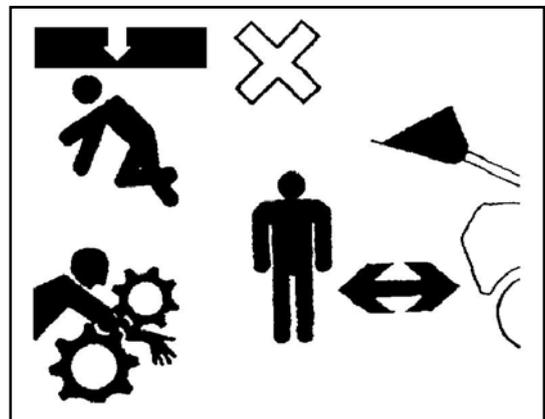
- Understand the request of the operation; be sure to understand meaning of the sign flag, signal, and label.

### 3.7 Prevention for Crushing or Cutting

- Do not enter, or put your hand or arm or other parts of your body among movable parts such as between working equipment and oil tank, machine and working equipment or joint points between front and rear frame. If the working equipment is operated, the clearance will change and this may lead to serious damage or personal injury when stand too close. The engine must be **OFF**, the working equipment is locked if people have to work between the motion components.



- Make sure the supporter and the accessories are right. Do not use hydraulic tank for support. The accessories may go down when there is leak of hydraulic oil of control system of motion or hydraulic tube.
- Don't adjust the machine when the engine is working unless there is notice.
- Be far away from any rotating and moving items.



- Make sure there is no sundry on the vane of engine. Vane could shoot off or cut off the sundry,

tools that fall into.

- Check and maintain the engine when it is one is dangerous, which is not allowed.

### **3.8 Notice of Attachment**

- Please read the user manual of the attachment and the contents in the manual that refers to attachment when assemble and use the attachments.
- It is not allowed to use the attachments that are not sold by Shandong Lingong construction machinery Co. Ltd or the sellers specified by Shandong Lingong construction machinery Co. Ltd.
- Shandong Lingong construction machinery Co. Ltd holds no responsibility for any hurt and lost, accident, and destruction of machine induced by using unauthorized attachments.

## **4 SAFETY STARTING**

### **4.1 Before Starting Engine**

#### **4.1.1 Safety Operation at Jobsite**

- Before starting operations, thoroughly inspect the area for any unusual conditions that could be dangerous.
- Examine the shape of the ground and quality of the soil of the jobsite, and determine the optimum method of operation. Before start working, the ground should be planed and pressed firmly. If there are big Sand-dust, sprinkle water first.
- When working on public roads, position flagmen and erect barricades and use the mark of **DON'T ENTER** to ensure safe passing traffic and pedestrians.
- In places when there are buried objects such as water pipes, gas pipes, or high-voltage cables, contact the responsible companies to confirm the position of buried objects and take care not to damage them during operations.
- When working in water, swampland or passing sand bank, check the ground conditions, speed and depth of the water. Be sure no to exceed the permitted water depth. After working, check and clean the positions that need lubricant. The depth of water allowed to pass please refer to **CHAPTER II – 6 CIRCUMSTANCES REQUIREMENT**.
- Be sure there is good ventilation condition when working in close environment.

#### **4.1.2 Check before Starting the Engine**

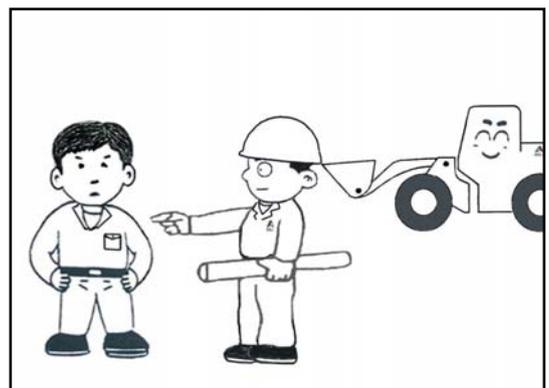
- Check the machine carefully before start work, report to the manager if there is any abnormal condition. Operation is only allowed after the abnormal condition is eliminated.
- Check whether there are any flammable materials such as wood chipping, leaf, paper and etc

which are accumulated on the engine to avoid fire.

- Check whether there is leak of oil, leak of water, loosen of nut, abnormal sound, broken of part or lost.
- Check the cab floor, rearview mirror, control handle, pedal and handrails whether there is oil, grease, snow or other dirt. Clean them if there are such things.
- Check the water level of coolant, fuel and the oil of engine oil Pan is at the normal level. Please refer to “**CHAPTER III – 3.6 Supply of Oils**”, check whether the air filter is blocked.
- Adjust the operator’s seat to the proper position for operation, please refer to “**CHAPTER III – 1.2.10 Seat Adjustment**”, Check whether the safety belt and the fixing equipment (if assembled) is broken. The safety belt must be replaced with new one in every three years..
- Check for the damage to gauges, the control handle to braking position.
- Clean the dirt on cab window or all the lamps to ensure better visibility.
- Adjust the rear-view mirror and keep the surface clean to ensure best view from operator’s seat. Replace with a new one if the mirror has been damaged.
- Don’t leave any tool or part on the operator’s seat. These things may fall induced by moving and shake during working and so this could break the control handle or switch, or move the control control handle to start the working equipment to cause accident.
- Check whether the floodlight and signal light is normal, repair if not.
- Check whether the front and rear frames is unlocked.
- Clean the oil of handrail and the pedal, the silt and small sand of shoes to avoid slip and affect operation.
- Check whether the tire is worn or broken, the bolt and nut is lose. Especially pay attention to loosen of nut of hub, repair or replace for any abnormal cases.

#### 4.1.3 When Start the Engine

- Before land on the machine, check the machine again to see whether there are people or block on or under or near the machine. Pay attention to the working area to make sure there are no people. Ask them to leave if there are people.



- Don’t start the machine if there is the tag of “**NO OPERATION**” on the control handle of working equipment..



- Sit with safety belt.
- Know the meanings of warning equipment, meters, and control equipments on the panel.
- Be sure the parking brake switch is at the Braking position; all the control equipments are in the middle position.
- Sound the horn for warning.
- Start the engine. Please refer to “**CHAPTER III – 3.2.2 Starting of Engine**”
- Only start the engine in the operator cab. It is now allowed to start the engine by short the engine circuit which may destroy the machine circuit by starting from side circuit. This is very dangerous.

#### 4.1.4 Check after Starting the Engine

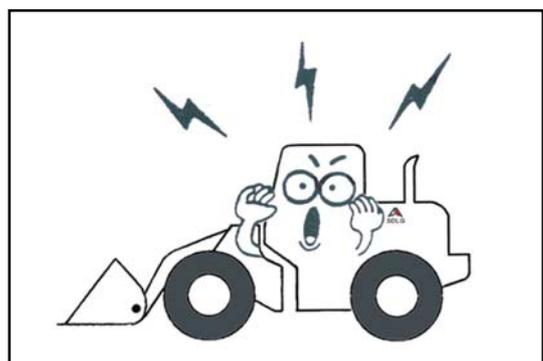
Check after the engine is started, to make sure there is no hidden danger.

- When examine the machine, park the machine at an extensive place, no other people is allowed to get close.
- Check whether the engine runs with abnormal sound or shaking. If so, it means there may be exceptions, report to the manager immediately. Operate the machine after the exceptions are eliminated.
- Test the engine running speed at empty shelf.
- Examine the gauges, meters and warning light, be sure they are at normal working range.
- Be sure to precisely operate the shelf controller at front, middle, rear shelf. Be sure all the control levers (or control handles) are smooth to be used.
- Examine the foot braking valve and oil operation valve as the user manual to be sure they are normal. Test the left turning and right turning is smooth at low speed.
- Be sure the control lever of control lever of manual brake valve is at braking state before moving forward.

## 5 SAFETY DRIVING

### 5.1 Warning

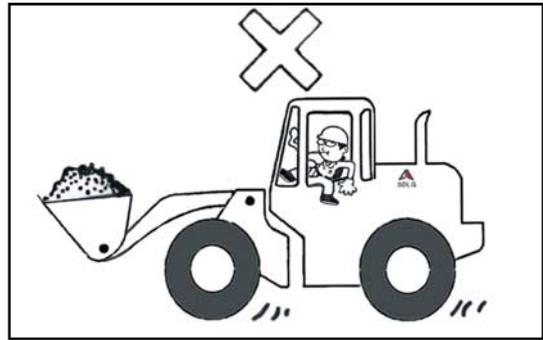
- The warning light should be on to make the other driver running inside or outside the road know the working can not be continued by some accident or at low speed state.



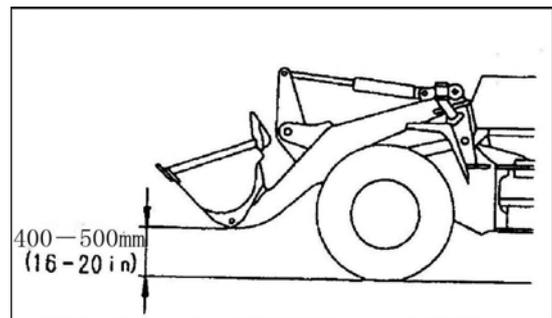
## 5.2 Oneself Safety and Others' Safety

- Form good driving habit to ensure everyone's safety.
- Sound the horn to ensure safety before driving to let others know.
- Be sure there is no people or block at left and right side.
- Check the braking effect on dry and firm plain ground.

- Do not put the arm or foot on the working equipment or extend outside the machine.



- Driving on the plain ground, the lower hinge of arm working equipment should be 400 ~ 500mm(16~20in) above the ground.

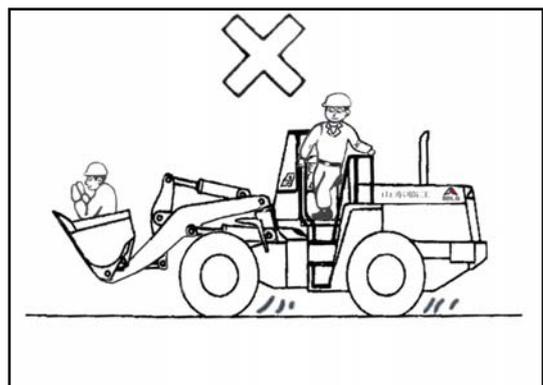


- Pay attention to the people around and in front, sound the horn to warning them when there is danger.

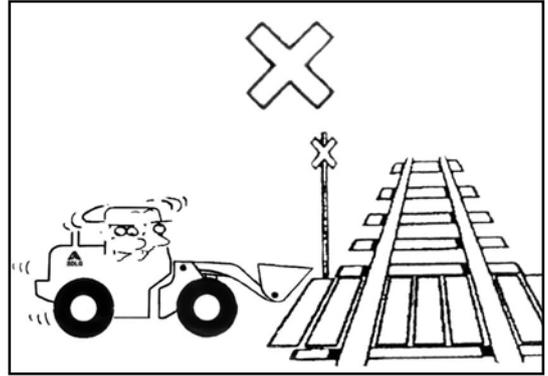
- The door of operation cab should be locked when driving. It is not allowed to open during driving.



- Except the driver, the other people are not allowed to stay in operator cab.
- **Never** use bucket as working template or take people.



- Follow the traffic rule on the normal road. Especially pass the crossing road quickly so as not block the road.



- Drive at side and let the other cars go first. Keep distance with others.
- Stop and brake when the engine stops.

 <span style="font-size: 24px; font-weight: bold; margin-left: 10px;">WARNING</span>
<ul style="list-style-type: none"> <li>● Steering unit will not work when engine stops.</li> <li>● Emergency brake could hurt people!</li> <li>● It is dangerous to change the running direction from forward to backward at high speed. <b>Never</b> do this!</li> </ul>

### 5.3 Full Load Transportation

- Do not hold full bucket at high position when transport. Select proper speed when full load transport. The bucket should be at tilt position near the block and relatively a lower position (400~500mm above the ground), so that the center of gravity could be low to insure driving smoothly.
- Make sure the limit lifting weight of the loader, **never** overload, which may hurt the machine or people. Shandong Lingong construction machinery Co. Ltd holds no responsibility for overload hurts.



- Do not drive, turn, brake suddenly, do not drive bypass.
- **Never** suddenly stop or low the working equipment that may throw out the materials in the bucket or cause the loader turn over.



## 5.4 Never Drive Over-Speed

- Know the characters of loader, follow the actual condition at working area, drive at proper speed. Select path of drive and method of machine to let the others know.
- Keep low speed so as to control easily at any time.
- **Never** drive fast, turn and brake suddenly at rugged, slippery or oblique ground.
- Drive at low speed when pass rough or rugged ground with blocks around, which may let the control of steering wheel difficult. Loader may turn over if operate wrong.
- Let the engine run smoothly, **never** drive at high speed.

## 5.5 Ensure Good Visibility

- Slow the speed and sound the horn when necessary to let others know or find a director when the visibility is bad or at the narrow crossing.
- Sand dust, big fog or storm may affect visibility. Slow the speed when visibility is bad. When visibility is not good, stop work until good weather.
- Drive carefully when take long part which may block the visibility. Carefully lift, go forward and backward, change speed. **Never** let the people get into the working space or find specific director.
- Keep the light on and drive at proper speed during night which may produce illusion for height of ground.
- Keep the front and rear head light and working light on when working at dark area.

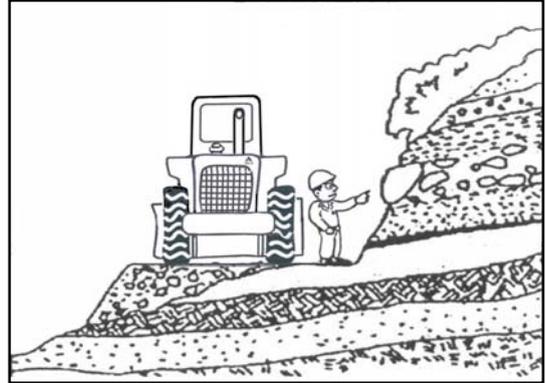


## 5.6 Pay Attention to Blocks

- If there are blocks (roof of buildings or the upper of door), **never** run into materials to be loaded when turn the direction or pass.
- Pay attention to the environment when pass or turn at narrow area. Slow the speed to make sure there is no block.
- Operate carefully when the ground is bad and load is not stable to prevent unstable load.

## 5.7 Drive at Bad Environment

- Do not operate by yourself at bad environment. Investigate the condition of road, the strength of bridge, landform of working area, geologic before working.



- Pay attention to sink of tire and the brake effect at sloppy or soft ground.
- When working in water or swampland, prevent the bottom of the axle housing from being soaked. Drive at low speed after pass water or being rained. Step on the brake pedal gently and alternately to let the skid device dry.

- The clay piled on the ground or near the canal is soft. **Never** turn over caused by the weight of loader.
- **Never** drive the machine near hanging things or deep ravine. These places may sink caused by the machine weight or vibration so that the machine may overturn and the people may be hurt or even dead.

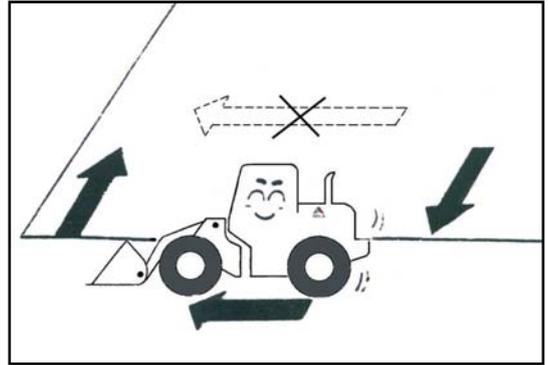


- Assemble anti-fall or anti-turn operator cab when there may stone falls or the machine may turn over at dangerous working place.
- Be careful when work continuously at rainy weather. Take care when the ground piled with materials after earthquake or explosion.
- Drive at low speed, prevent starting, braking or turning suddenly, use tyre chain on snowy road. Brake alternately. Low the bucket to the ground to brake if necessary.
- The load should be smaller when driving on snowy ground to prevent slip.
- Take care when shovel snow because the road shoulder or other things can not be seen under the snow.

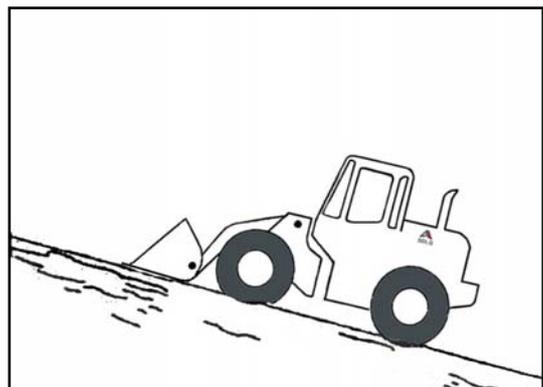
## 5.8 Safety Drive on the Ramp

- Pay attention to danger of turn over or slip when driving on the abrupt sidehill, dyke or ramp.
- The bucket should near the ground about 200~300mm higher than the ground when driving on the abrupt sidehill, dyke or ramp. Low the bucket to the ground to help brake or prevent turn over under emergency cases.

- Do not turn on ramp. Do not drive crossing the ramp or change direction which may induce turn over.



- **Never** turn on ramp until go to the plain ground. Slow the speed and use small turning angle when working on abrupt sidehill, dyke or ramp.
- Go up and down the ramp if possible, try not drive through alleyway or footway.
- Choose proper gearshift before go down slopes and **never** shift the speed during going down slopes.
- Do not brake on ramp because the center of gravity is on the front tire or rear tire.
- Use speed I when driving on ramp with full load. Go forward when drive upward the ramp, go backward when drive downward the ramp. Do not turn.
- Brake slowly when driving downward the ramp, do not use empty speed control for gear control lever.
- Go down the ramp slowly, **never** stop the engine.
- If engine stop on the ramp (slope is less than 15° ), step the brake padel immediately and low the bucket to the ground to help brake, put the gear control lever to the middle position, and then restart engine.
- Drive with load, the bucket should face the high direction of the ramp all the time, which means go up forward and go down backward.

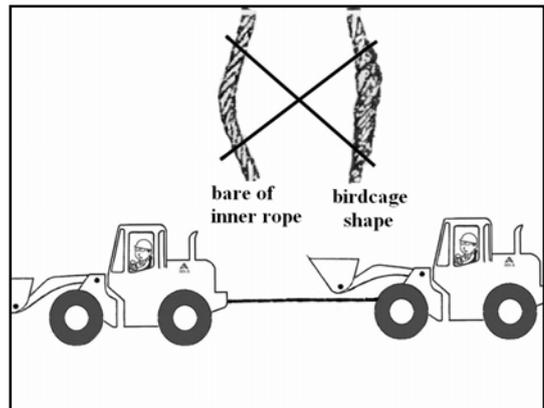


## 5.9 Towing

### **WARNING**

Injury, even death could result if a disable machine is towed incorrectly.

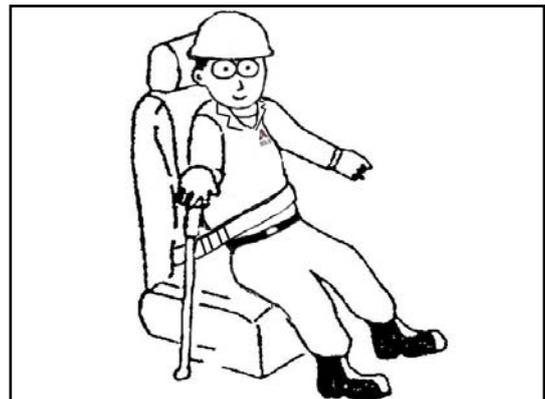
- Follow the direction in “**CHAPTER III – 3.5.2 (7) Towing**”, danger may be cause by wrong method.
- Wear gloves to dell with tightwire.
- Use the uniform signal before towing together with others.
- Please contact with Shandong Lingong construction machinery Co. Ltd. or their accredited representative if the engine can not start or the brake system has problem.
- Please tow the machine in plain ground, it is dangerous to tow on ramp.
- If one machine with problem is towed by another, the tightwire should be strong enough to suffer the weight of machine. There should not be broken wire, wring or radius reduction for tightwire .
- No people is allowed to go between two machine when connect them.
- Do not stand on the two steel wires or tightwires.
- Let the hook of one machine to be towed at the same line with the towing part of the other one.



## 6 SAFETY OPERATION

### 6.1 Keep Good Operation Habit

- Be seated with safety belt all the time during operation. The machine should be at the controllable state.
- Operate the control handle of working equipment properly, prevent misoperation.
- Examine and listen to the exceptions carefully, and report immediately. Do not repair at working state.
- Make sure, do not overload, otherwise it is dangerous. Shandong Lingong construction machinery Co. Ltd holds no responsibilities due to overload.



- It is dangerous and wrong method to run into the materials with high speed, under which condition the loader and the operator may be hurt and the product also.

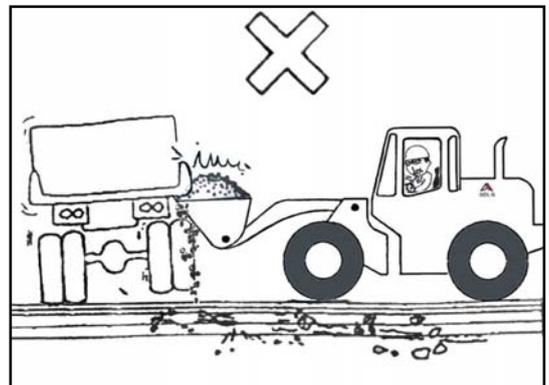


- Keep perpendicular angle during load and unload materials. If work from side direction, the Steering cylinder, differential carriers may be hurt, and the machine may be unbalanced. This is not allowed.
- Go to the load and unload materials first to make sure the conditions first, and then work.
- Do not break the working equipment when work in narrow area such as tunnel, overbridge, garage and etc..



Examine the ground and clean it first.

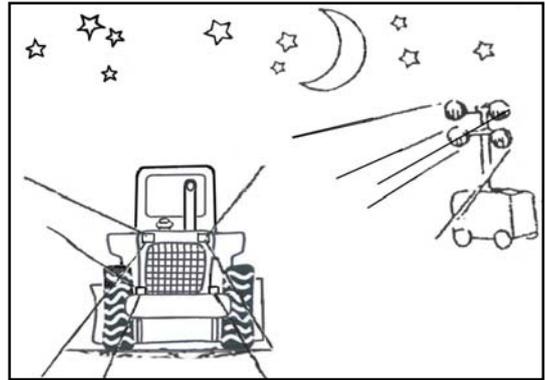
- Operate down the wind at strong wind weather.
- Be careful when the lift arm reach the upper limit. Load at the uper limit may cause the loader unstable. So the driving speed should be slow, the backel should forward slowly.
- When unload to the truck or tipper, make sure the bucket do not hit the truck or tipper. It is not allowed to stand under backel and let the backel go over the operator cab of truck.



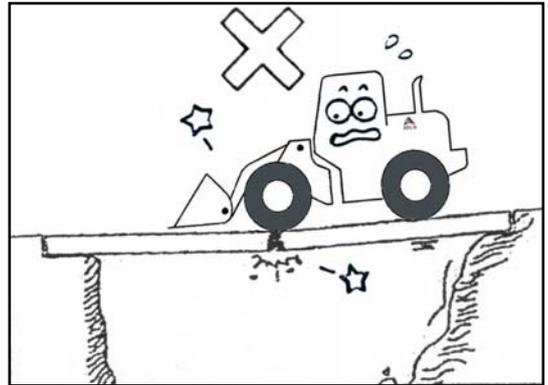
- Take care of the cars backside when drive backward.



- Assemble lighting systems during dark condition. And stop work when there is smoke, fog or sand dust to affect visibility.
- Work at night, please make sure:
  - ◆ Proper lighting system is assebled
  - ◆ Fuction light work normally
  - ◆ It is difficult to estimate the height and distance
  - ◆ Be alert, **always** examine the environment and the machine.



- Make sure the bridge or other builds are strong enough to let the machine to pass

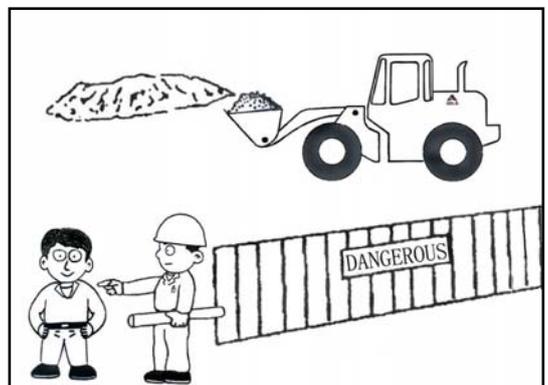


- Don't use the machine to do unprofessional works. Use the head of working equipment as other fuction, such as hook, grasp, draw, push, or tow may hurt the part or cause accident.

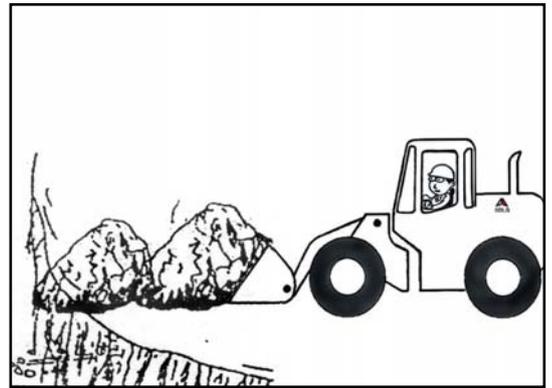


## 6.2 Pay attention to Surroundings

- No one is allowed to enter the working space because the working equipment will work up and down, turn left and right, move forward and backward all the time. It is not allowed to enter near(down, front, back, in, side) the working equipment.

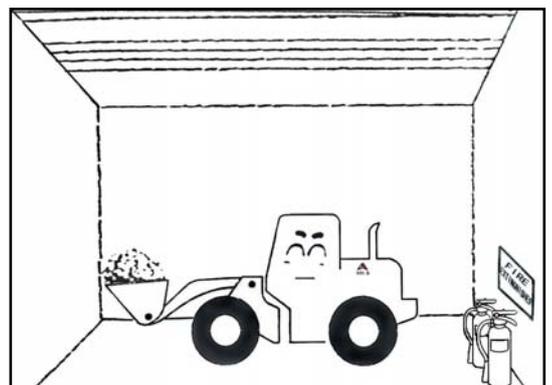
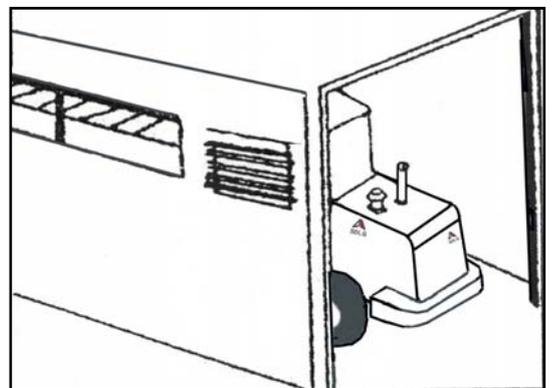


- Use safety method to work at the side of road or cliff where the landslip may happen. There should be people watching and directing all the time.
- Pay attention to the safety of fall point of materials when unload the sand or rocks from high position.
- Slow the speed in advance when push the material out of the cliff or reach the highest point, because the load may go down suddenly and the speed may increase then.
- When construct dam or unload soil from cliff, form one pile first and push the other to push the one before.



### 6.3 Ensure Ventilation in Close Environment

- Open the window to ensure enough air when work or burn oil, clean parts or painting in close or bad ventilate environment to prevent hurt our body. If this can not satisfy the need, please assemble aerator.
- Prepare fire extinguisher in close invironment and know where it is stored and how to use when work in this condition.



## 6.4 Don't Get Close to Dangerous Environment

- If the ejection of silencer toward flammable material, or the vent-pipe is close to the flammable material may cause fire. Pay attention to lipin, cotton, papers, fade grass, chemical materials, and etc. or flammable place.

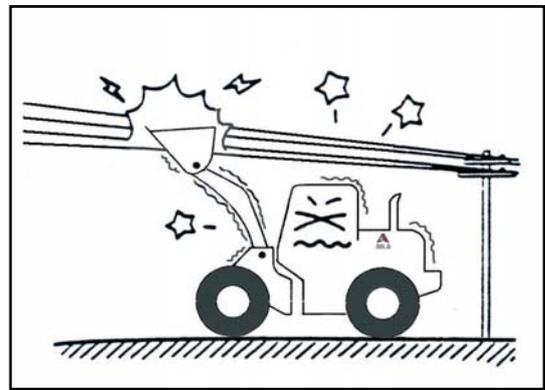


## 6.5 Don't Get Close to High Voltage Wire

Do not touch the aerial electric wire. Electroshock may happen even get close to high voltage wire.

The crossing distance between loader and the electric wire should be:

- At least 2m (6.5ft) at low voltage condition
- At least 4m (13ft) at 40KV high voltage condition (electric wire is generally supported by fixed insulator)
- At least 6m (20ft) at 40KV high voltage condition (electric wire is generally supported by fixed insulator)



To prevent accident, please do the following things:

- The height distance between loader and the electric wire should be
  - ◆ At least 2m(6.5ft) at low voltage cases
  - ◆ At least 4m (13ft) at high voltage cases
- Ask the electricity company first how to act according to the relevant rules when the machine may touch the electricity cables.
- Wear rubber shoes and rubber gloves. Lay a leather cushion on operator's shoes. Be sure no part of our body could touch the metal bottom.
- Assign a signal warner, who can give the warnings when the machine get too close to electric cables.
- **Never** leave the operator cab, **never** move, do not touch anything of machine until the people who is on the ground cut off the electric once the machine touch the wire,
- When operating near High-Voltage cables, make sure other persons are far from the machine.

## 7 SAFETY PARKING

### 7.1 Pay Attention to the Safety of Yourself and Others

- Park the machine at plain ground. The working equipment should be put on the ground.
- **Never** park at clamp. If it is necessary, the clamp angle should be less than 20%.
- If the machine broken-down or need to park at surrounded place, put bars, signal, flags and warning light. Make sure the other cars can see clearly. But do not block traffic.
- When parking the machine, unload all the material on the machine, low the bucket to the ground, shut down the engine, pull the parking brake switch and put it at the braking position. Lock the engine and keep the key well. Climb down the machine slowly according to “three point” method, **never** jump down to the ground.

 **WARNING**

**NEVER** get on or off the machine during driving.

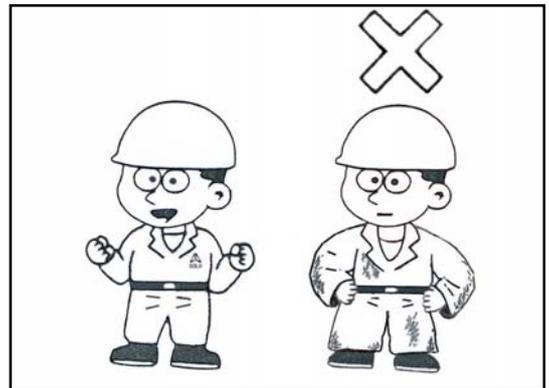
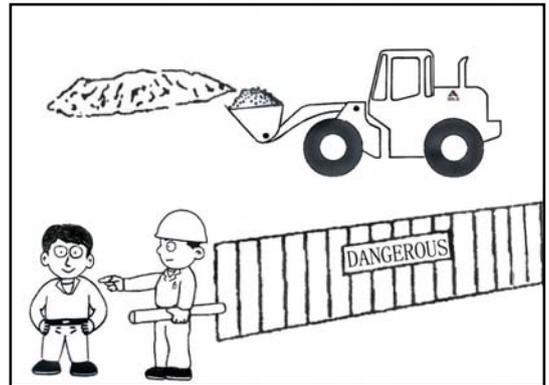
### 7.2 Notice for Cold Area

- Clear the water, snow or dust attached on wires, switches, power insert or sensor and the covers of these parts. Otherwise, the ice will form and the unpredictable accident may be caused.
- Preheat sufficiently. The machine may delay if do not preheat before operating the control handle of working equipment and the unpredictable accident may be caused.
- Operate the working equipment control handle to let the hydraulic oil cycle in the hydraulic system (let the pressure of system up to the system setting, and then release to let the oil flow back to the hydraulic oil tank ) to preheat the hydraulic oil, so as to guarantee better reaction and prevent malfunction.
- Do not charge if the storage battery freeze and do not use power to start the engine. It is dangerous and can cause the fire. Please refer to “**CHAPTER III 3.5.3 Operation in Cold Weather**”.

## 8 SAFETY EXAMINE AND REPAIR

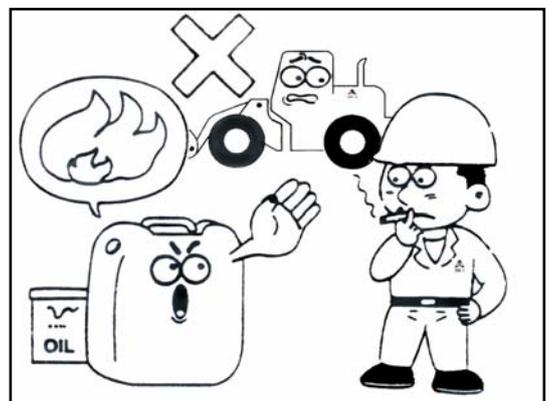
## 8.1 General Knowledge

- Operation and maintenance people should be trained to get the license. No one is allowed to enter the working area except the maintenance people. If necessary, please ask special people to accompany.
- Repair the machine according to the program. Ask the Shandong Lingong construction machinery Co. Ltd. for help if you don't know how to do.
- Please make sure the people who stand for the responsibility, decide the working sequence to repair the machine, assemble and disassemble the parts.
- Please wear uniform with tight wristband and trouser, wear safety glass.



- Please use the repair tools correctly, do not use broken or low quality tools.
- Low the working equipment completely to the ground, close the engine, push the parking brake switch, and wedge the tire during repair to prevent body hurt.
- Obey the rule of Warning billboard. Pay attention to the important notices in the lable of the machine and obey to the rule. Add new one or clean the lable if it is lost or dirty.
- Attache the lable of “**No Operation**” or other warning lable to the switches or control board during repairing the machine. **Never** let other people operate or start the engine to prevent body hurt or death.

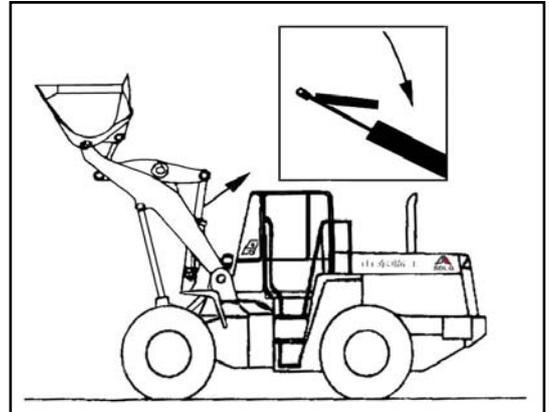
- Fuel, mobile oil, grease and oily cloth are dangerous material, which can not touch any fire or flame. Do not pile the oily cloth at the corner of wall which may cause self-ignite.



- **Never** smoke when add fuel or examine the storage battery.
- Put the accessories to a safe place to make sure do not lost. Put the handrail around and put the

“**No Enter**”warning lable to prevent the people from entering without permission.

- No people is allowed to get close to the machine or accessories with out permission.
- Keep the working area clean, tidy, without oily cloth, grease and etc., around to prevent fire or sliding.
- Lock the front and rear frames with safety bar to prevent rotation or hurt before examination and repair.
- Make sure the working equipment control handle in the middle position and use the necessary life-arms cylinder and tilting oil cylinder for supporting to prevent falling of working equipment if you have to examine and repair when the bucket is lifting.



## 8.2 Working in Close Area

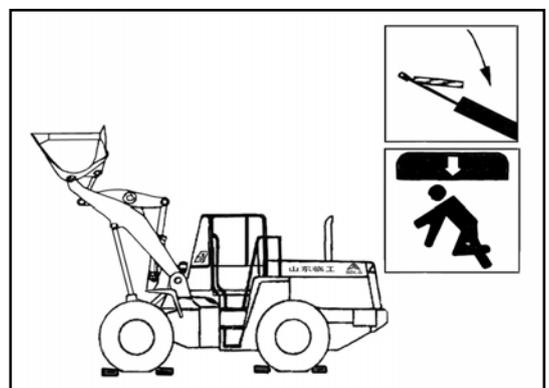
Exhaust gas from engine may cause disease or death. If it is necessary to work in close area, use releaser to relase the exhaust gas in the area. If there is no releaser, please open the door.

## 8.3 Maintenance of frames during driving up

- When drive up the frame, do not let anyone enter anyside of frame.
- Before driving up, lock the front and rear frames with **Safety Bar**, put the all the lever (or handle) in the middle, wedge the tire from the opposite side. Put the cushion blocks under the machine.

## 8.4 Working under the Machine

- Park the machine in firm ground. Level the working equipment to the ground before work under the machine.
- Wedge the tire firmly.
- It is dangerous to work under the machine only using the working equipment to support the machine.
- **Never** work under the machine without good support.



## 8.5 Working on the Machine

- Make sure the top of machine is no block and clean when work on the top of machine. Follow the disciplines below:

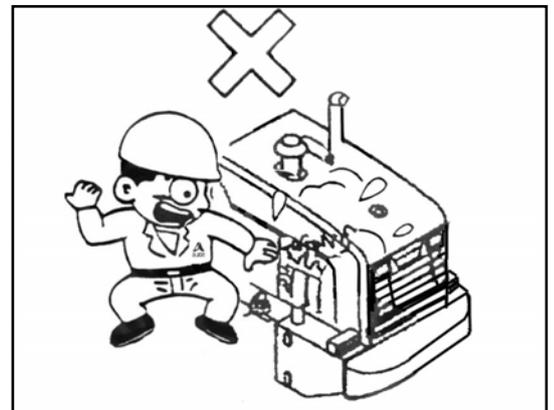
 <b>NOTICE</b>
<ul style="list-style-type: none"> <li>● Do not leak the lubricant or grease</li> <li>● Do not put the tools around.</li> <li>● Walk placidly.</li> </ul>

- **Never** jump down from the machine. When climb up and down the machine, face the machine and keep three point contact (two hands –one foot or two feet one hand) with the handrails and pedals to ensure safety
- Use protects equipment if necessary.
- **Never** stand on the top of engine hood because it is slick and dangerous.
- **Never** stand on the top of tire, because it is slick and dangerous.
- Stand on the mudguard of the front frame and seize the handrail to clean the front glass of operator cab.

## 8.6 Maintenance during the Engine Working

Do not maintain the machine during the working of engine to prevent hurt. If it is necessary, please follow the rules below:

- Assign a operator to sit down on the seat to ensure all the maintenance people can contact with him and prepare to shut the engine.
- **Never** touch the part with high temperature such as tail pipe, silencer and etc to prevent hurt.
- Be careful if the work place is near the rotation part. It is dangerous to be revolved in.
- Do not touch any lever (or handle). If it is necessary, warn the others to let them work to the safe place.
- **Never** let any tool or part of body touch the fan leaf or fan belt. Otherwise you hurt seriously.
- Do not adjust any place you do not know.



## 8.7 Do not let anything fall into the inner place of machine

- If open the examination window and oil filling port of oil tank, make sure do not let anything (such as nut, bolt, cotton yarn or tool) fall into the inner part. If such things happen, the machine may be broken; miss operation may be caused and other failures also.
- Do not carry any tool or part in your pocket during examination.

## 8.8 Cleaning

- Wear the anti-slide shoes to prevent sliding when clean the machine. Wear protect clothes when using high pressure water to clean the machine.
- Clean in time to prevent dirt or mud splash into the eyes or slide and hurt when there is oil on the machine.
- Do not use flammable scour when clean the machine.
- Shut the engine to clean the inner part of the machine, put all the levers (or handles) in the middle position, push the parking brake switch and keep it at brake position.
- Do not let the water inject to the electric part (such as sensor, wire connector) or operator cab. If so the operation may be disabled.
- Wear protect cloth and glass when use compress air to clean filter mesh.

## 8.9 Heavy Things

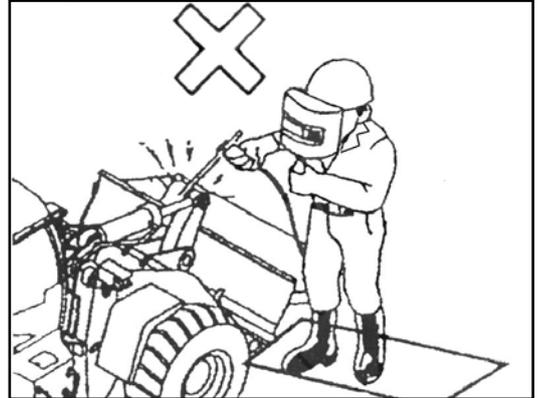
- Wear protect cloth, safety glass and safety helmet, put a copper bar between hammer and the part being hit.
- If hit the hard part using hammer, such as pin and bearing, eyes may be hurt by flying particles.
- Use the tools and heavy things carefully, **never** fall.

## 8.10 Welding Repair

Electric welding needs special technique and proper equipment and place. No person is allowed to weld without license, because gas may be generated during welding, fire and electric hit. Obey the following notices:

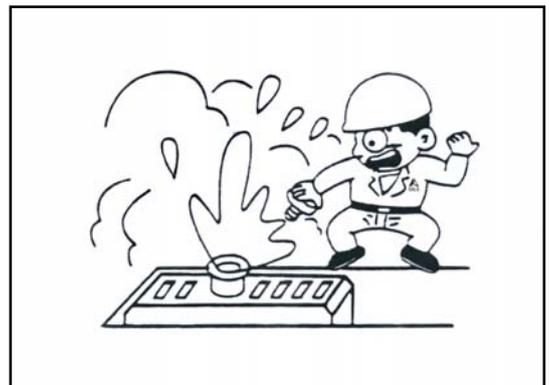
- Switch off the polar of storage to prevent explosion.
- Switch off the connecting polar between transmission box and control board to prevent the pulse current burn the control board for the machine with ZF control unit. Connect the polar of electric control board, otherwise the machine may not be started and move.

- Clean the oil paint at the place where welding is needed to prevent harmful gas.
- Please avoid welding on the hydraulic equipment or pipe, or the place that is near. Because flammable steam and spark may be generated and it is dangerous to catch fire.
- Cover the rubber pipe, wire or pressure pipe use anti-fire plate during welding, because the spark may fall onto them which may cause rupture suddenly, insulating tape shatter.
- Be careful when welding near tire which may cause thermal explosion of tire.
- Wear protective cloth to weld.
- Keep breezy in welding area.
- Clean up the flammable materials and equip fire extinguisher.
- **Never** affect the vehicle and the working equipment, safety and strength reconstruct.



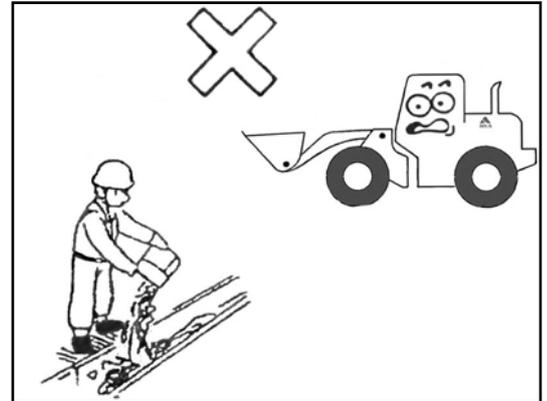
## 8.11 Examine and Repair of Coolant System

- Severe burn may be caused if open the cover of oil tank, radiator after welding, pour water or oil immediately after finishing welding, because the temperature of hydraulic oil, fuel and water in engine, oil and oil in radiator may still very high and the pressure may still be high at this time. Follow the program if do the operations above.
- Shut the engine, cool the hot water, open the cover slowly and gently to release the pressure. Use the arm to feel the temperature of air in front of water radiator to see whether the water temperature goes down. Be sure never touch the radiator.
- Shut the engine, cool the oil, open the cover slowly and gently to release the pressure to prevent hot oil jet. Use the arm to feel the temperature of air near the hydraulic oil radiator, torque converter oil radiator to check whether the temperature comes down.
- During machine warming, **do not** touch engine, silencer, tail pipe, relay to prevent burn.
- During machine warming, **do not** disassemble the water heat sensor of engine, oil heat sensor of



torque converter and water pipe of air condition to prevent burn.

- **Never** let the harmful alkaline materials in coolant system touch your skin and eyes.
- Choose proper container to hold liquid when replacing the coolant, mobile oil of engine, oil of transmission box and cleaning the parts. Dealing of waste liquid please refer to “**8.20 Waste Materials**” in this chapter
- Keep fire off when disassemble the connection pipe of air condition compressor.



## 8.12 Examine and Repair of Hydraulic System

- Lock the oil tank and other hydraulic equipment safely, release the pressure of all hydraulic systems before examine the hydraulic system.
- **Never** bend or beat the high pressure hydraulic pipe, **never** assemble the hard pipe and soft pipe bended abnormally or broken.
- Examine the pipe system carefully (hard pipe and soft pipe), screw down the connectors according to the proper torque. Do not examine the leak use hand but board, paper board. The hydraulic liquid leak from hole which may be as small as pinhole may penetrate your muscle, this may cause death. Please find the surgeon who is familiarity with hurt within several hours if liquid splash down onto your skin.

### ⚠ **NOTICE**

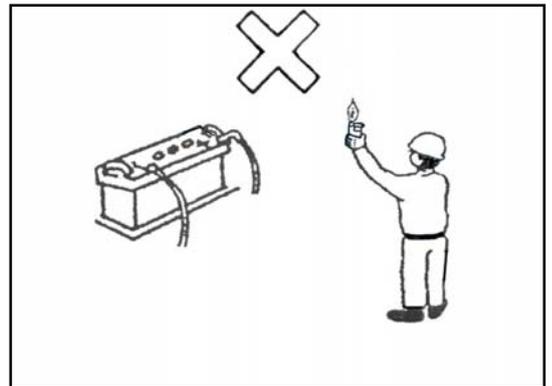
Please replace under the following conditions:

- Connector is broken or leak.
- Dissever of outside of soft pipe is abrasive, steel wire of strengthen layer is bare.
- Part of soft pip is upheaval.
- Soft pipe is obviously torque or staved
- Steel wire of strengthen layer penetrate the outside layer.
- The connector is misplaced.

- Make sure all the pipe clamps, protective board, and anti-heat cover is assembled properly to prevent vibration and overheat due to friction with other part
- Choose proper container to hold liquid when replacing the hydraulic oil of hydraulic system and cleaning the parts. Dealing of waste liquid please refer to “ **8.20 Waste Materials**” in this chapter

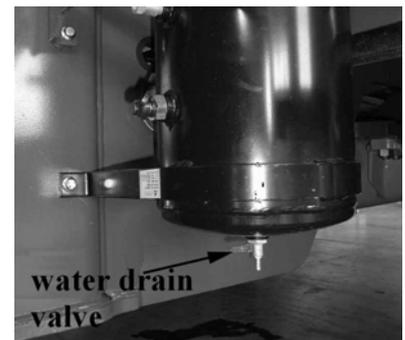
### 8.13 Anti-fire

- Shut the engine before adding fuel. No smoking and keep fire **OFF** during adding fuel.
- Keep fire **OFF** the storage place of fuel, grease or other flammable materials.
- Clean the flammable materials piles on the machine such as fuel, grease or other particles make sure there is no oil cloth or other flammable materials.
- Keep fire **OFF** storage battery, because explosive gas may be generated. Strictly follow the program in user manual to maintain the storage battery.
- Make sure there is no flammable materials such as blasted grass, old paper and etc near the high temperature parts such as silencer and etc when park the machine.
- Check whether there is leak of fuel, mobile oil or hydraulic oil. Replace the broken soft pipe. Clean before operate after repair.
- Check the wire to see whether there is broken and voltage leakage, if so replace it or repair it.
- Use inflammable liquid to clean the parts, do not use gasoline or other flammable materials.
- **Never** weld or flame cut the pipe or tank containing flammable liquid. Clean them use inflammable liquid before.
- Examine the fire extinguisher is well before repair. Make sure the place where the fire extinguisher is and know how to use.
- **Never** use fire (match or lighter) to check dark area.



### 8.14 Air Storage Tank

- Open the drain valve of air storage tank to drain every day, especially drain sufficiently once everyday in winter. Make sure



the drain valve is closed before start engine.

- Examine the outside of air storage tank frequently because there is high pressure air. Examine the anti-erosion layer and welding line to ensure safe.

## 8.15 Electric System

- Assign professional person with proper license to maintain the electric system.
- Connect the grounding cable at last to prevent explosion due to electric spark near battery when adjust outside power.
- Evulse the start up key before repair the electric system.

## 8.16 Maintenance of Storage Battery

Oxygen and hydrogen may be generated during charging because the electrolyte of storage battery contains vitriol. So miss-operation of storage battery may lead to severe hurt or fire. Please do as following notices:

- Keep kids **OFF** since the battery contains strong erosive vitriol. Wear safety glass and rubber gloves to deal with battery. Wash with lot of water to clean the vitriol in the eye or on the cloth, go to hospital if hurt severely.
- Keep fire **OFF** battery during charging, because the oxygen and hydrogen may be generated, explosion may be caused once the fire is close or the vent is blocked. Prevent circuit short.
- Keep fire **OFF** the crust of battery because it is flammable.
- Storage the battery under dry, clean and breezy circumstance with temperature between 5~25°C. Prevent sun light irradiation; be away from heat source at 2m. The battery will be affected much if the temperature is too high.
- **Never** reverse and put horizontal. Prevent hammer by machine or press heavily.
- Storage life is 6 months under room temperature without charge. If overtime, please charge before use.
- Pay attention to the labels before assemble to prevent accident.
- Spread Vaseline on the poles to prevent erosion. The wire connection should be firm and credible. **Never** hammer the wire pole to prevent loose which may cause the leak of vitriol.
- Connect the positive pole of storage battery with negative pole of machine first, and then connect

negative pole of storage battery with positive pole of machine.

- Put the battery on the shaft using upside fixing method or downside fixing method to prevent lose.
- There is indicator on the cover of battery. Green light means it can be used, black light means it is charging, white light means charging is finished. Please replace with another one after white light.
- Please recharge the battery in time if the battery lacks electric power during using to prevent the capability of battery sulfate going down.
- If the battery is assembled, disassemble it and put it at dry and ventilative place if it is not used for long time (generally more than 15 days). Recharge the battery every 3~6 months (based on whether the indicator is black or not).

### **8.17 Charging of Storage Battery**

It may explode if the storage battery charges in the wrong way. So deal with the battery as the dealing program and the program in user manual. Do as follows:

- Constant voltage charge:
  - Complementary charge: charge 16 hours at 16.0 Voltage (max current is less than 25A)
  - Normal charge: charge 24 hours at 16.0 Voltage (max current is less than 25A).
- Connect the positive pole of charging machine with negative pole of storage battery, and then connect negative pole of charging machine with positive pole of storage battery. Do not reverse.
- Examine the vent of battery to prevent block, otherwise it may explode.
- Low the charging voltage or current if the electrolyte overpass 45°C to prevent spurt out of electrolyte due to high temperature.
- **Never** overcharge during using or charging to prevent early invalidation due to water lost, grid increasing, diachylon dropping.

### **8.18 Starting Using Voltage-Raising Method**

The wrong connection of voltage-raising cable may lead to fire, so please do as follows:

- Two operators are needed for voltage-raising starting (one sits on the operator seat).
- The two machines are not allowed to touch when one is starting.
- Turn off all the starting switches of normal machine and iffy machine when connect the

voltage-raising cable.

- Connect the positive (+) cable first when assemble the voltage-raising cable. Cut off the negative or ground (-) cable first when disassemble the voltage-raising cable
- Connect the ground cable to the frame of iffy machine. Connection should be as far as possible away from storage battery.
- Do not let the voltage-raising cables touch with each other or let the clamp touch the machine when disassemble the voltage-raising cable.

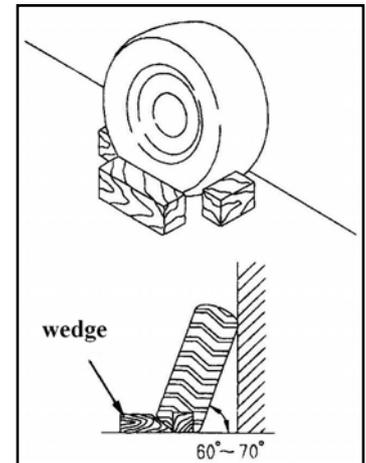
## 8.19 Maintenance and Storage of Tire

### 8.19.1 Maintenance of Tire

- The Explosion of tire can push the parts, such as tire, rim, driving axle and etc., as far as 500m or more. The explosion and the particles can lead to sever hurt and death, so please keep the pressure of tire at the normal level. Inflation pressure should not surpass the stand value. The inflation pressure please refer to “**CHAPTER II - 8 TECHNICAL PERFORMANCE & PARAMETER**”.
- The temperature raising caused by high speed driving may lead to increasing of the pressure of tire, which is the normal phenomenon. **Never** try to reduce the pressure, but reduce the speed to cool the tire. The tire may explode if continuously driving in high speed that can lead the tire over heat.
- Stand at the back of the tire and try to stand as far as possible away from the tire when adjust the pressure of tire.
- Check the tire, rim every day whether the tire is crack or bubble. **Never** operate at low pressure condition.
- Check the bolt and nut of rim whether there is lost. Check whether the torque of nut satisfy the suggest value of the factory.
- **Never** enter the front or rear place of the rolling direction of tire. Check the tire from side. Forelock the other tires if disassembles one tire.
- Pay attention when weld near the tire which can cause the tire explode.
- Only the person trained with professional license can repair the tire and rim using specific tool and following the proper steps. Otherwise it is very dangerous.
- Use the uniform tire with the same standard and same flower pattern to replace.

### 8.19.2 Storage of Tire

- It is the basic rule that the tire should be stored in warehouse. No one can enter without permission. Set fence around and hang the notice of “**No Enter**” if it is necessary to store the tire outside the warehouse.
- Store the tire at dry and clean place. Water can help oxide the tire, the dirt and oil can erode the tire. No light, heat insulation and ventilation are needed for storage. Cover the tires with canvas, plastic cloth or other anti-dust cloth. The wrong storage method can reduce the quality and life of tire seriously.



- Stand the tire on the plane ground and use the wedge to forelock it to prevent it fall down once there may be someone touch the tire without permission. The quality may reduce if the tire is put use the side because it can be staved. The tire should be rotated (90° ) once per month at least.
- Please stand aside if the tire will fall down. **Never** try to hold the tires since the tire of engineering mechanism are general very heavy, otherwise you may be hurt seriously.

### 8.20 Waste Materials

Do as the follows to prevent pollution:

- **Never** dump the waste oil to places such as cloacae, river and etc.
- Contain the oil vented from the machine in a container; **never** dump the oil directly onto the ground.
- Obey the relative rules and laws when deal with the harmful materials such as grease, fuel, coolant, solvent, filter, storage battery and etc.

## 9 SAFETY TRANSPORTATION

### 9.1 Assemble and Disassemble the Machine

- Pay attention to assembling and disassembling since it is dangerous. Keep the engine speed low during assembling and disassembling machine.
- Load and unload machine at plane ground and remain a certain safety distance to road side.
- Fix the tire well during assembling and disassembling machine to make sure it will not move. Put cushion under the gangway.
- Slope boards should be strong enough with sufficient length and width to form a safe slope. The angle with the ground should not larger than  $15^{\circ}$  . Remain some distance between slope board and board, board and machine.
- Make sure the height of two sides of board is the same to ensure firm orientation.
- Keep the board surface clean, and there are no lubricant, oil, ice and incompact materials. Clean the dirt of the tire.
- **Never** turn on the slope board. If it is necessary, turn outside the board and then drive back.
- Lock the direction mechanism after assembly, wedge the tire and pack the machine tightly with cord.

### 9.2 Transportation on the Ground

- Obey the rules about weight, height, width and length prescribed in national and local laws for transporting the machine using tow truck. Obey the traffic rules.
- Make sure the weight, height, width and length of machine before deciding the transport routine.
- Make sure the allowed limit of weight bearing when passing bridges or private buildings. Obey the relative rules when driving on the public roads.
- The machine may be disassembled when using other transportations. Please contact with Shandong Lingong construction machinery Co. Ltd. or their accredited representative

### 9.3 Lifting

Use the hook of front frame to transport the machine to ship or train.

Select proper lifting equipment according to the weight of loader, otherwise it is dangerous to surpass the weight limit.

● Notice for lifting:

- ◆ Make sure the loader is at the transporting state.

The front and rear frame should be at the middle position. Lock the machine using lock bar to prevent rotation of front and rear frame during lifting.

- ◆ All the levers (or handles) should be at middle position.

- ◆ Shut the engine, lock all the equipment using key and then remove.

- ◆ No one should be at the operator cab.

- ◆ **Never** lift the machine using steel wire connecting the two hook of front frame.

- ◆ It is allowed to lift the machine using 4 steel wires with the same length (no short than 7m).

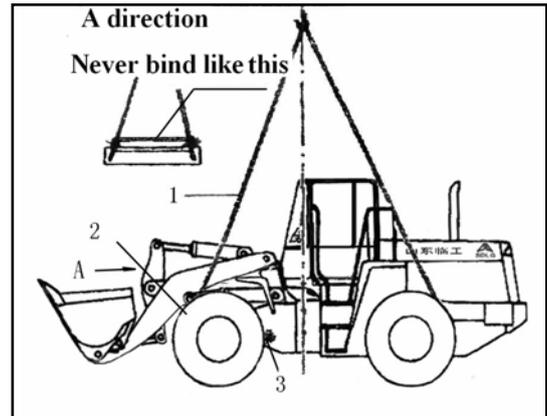
- ◆ Keep the machine horizontal during lifting.

- ◆ Prevent broken of hood, operator cab, hydraulic pipes.

- ◆ No person and car is allowed to pass under the machine during lifting.

- ◆ Draw back the lock bar to turn the machine after lifting.

- Connect the turning equipment using lock bar after lifting onto the ship (train), wedge the tire and bind the machine tightly to prevent movement during transportation.



# CHAPTER II INTRODUCTION

## 1 GENERAL VIEW OF THE MACHINE & COMPONENTS' NAME

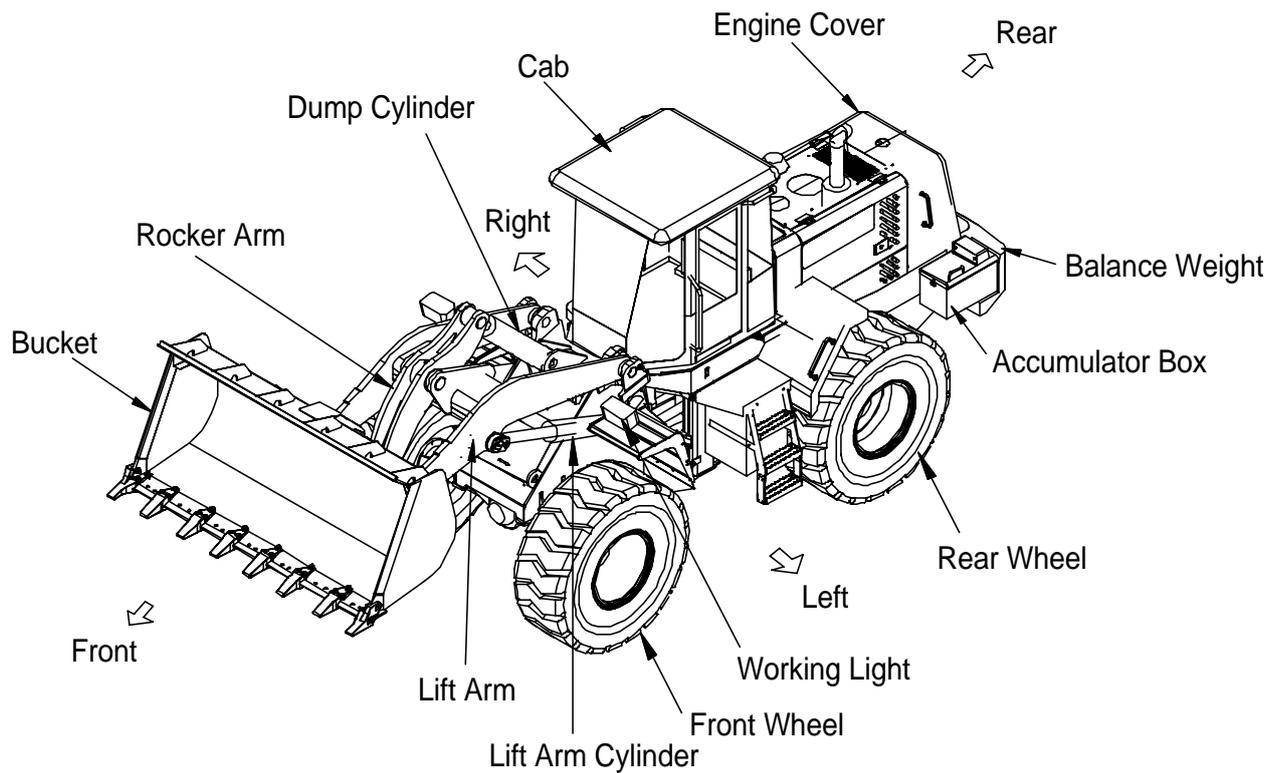


Figure 2-1 General view and components' name of LG968/969 wheel loader

## 2 GEOMETRICAL DIMENSIONS

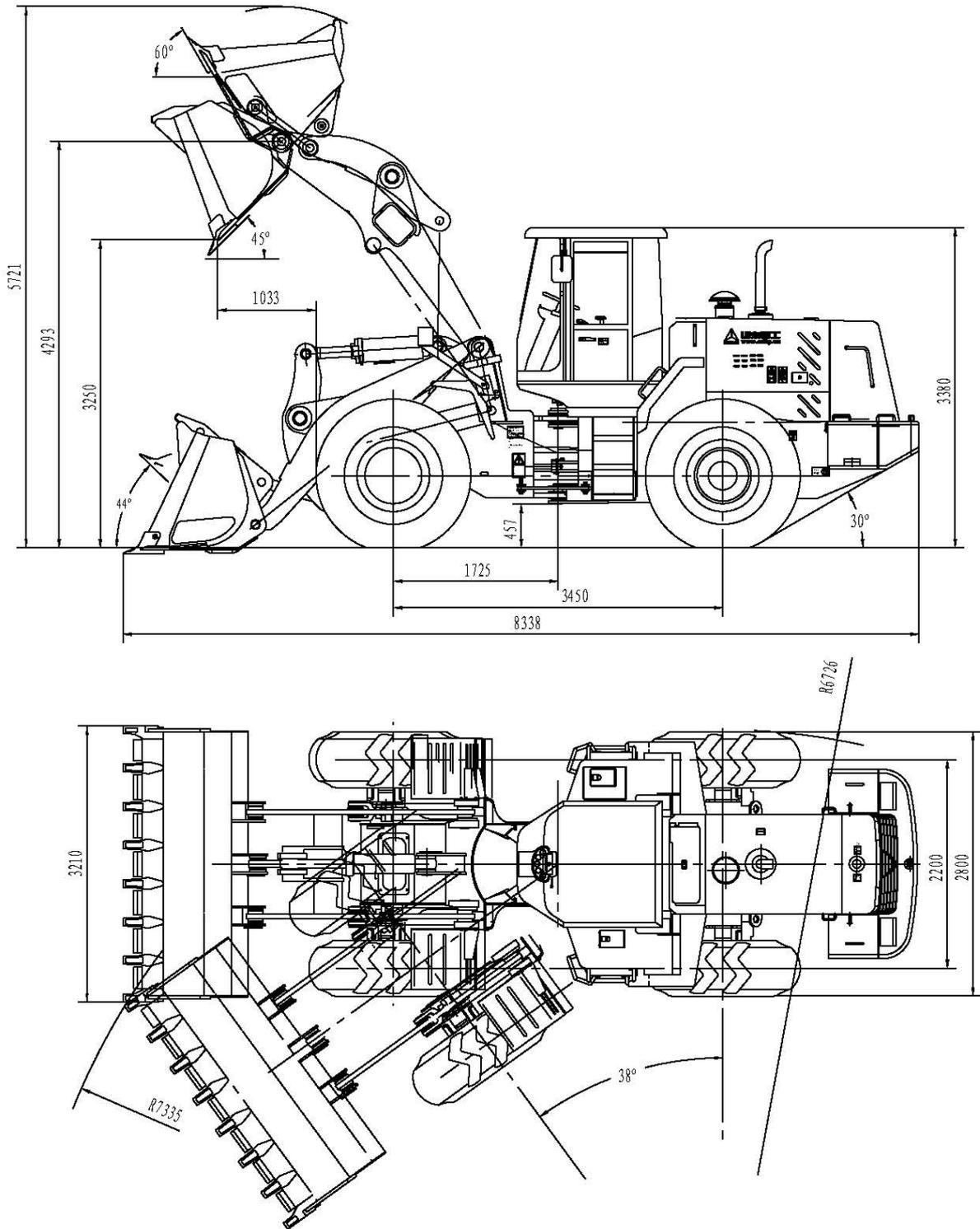
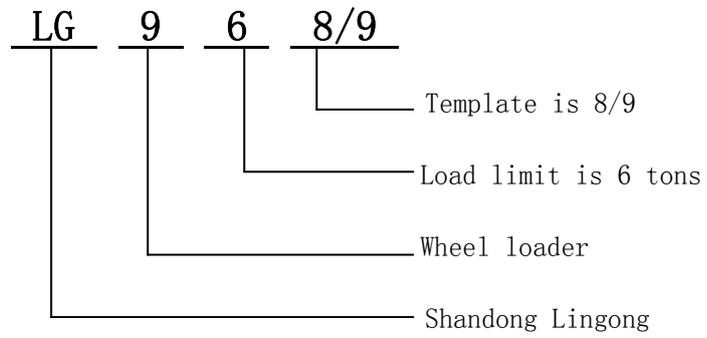


Figure 2-2 Geometrical dimensions of LG968/969 wheel loader mounted with standard lift arms

### 3 PRODUCT TYPE AND ITS MEANING



## 4 NAMEPLATE

The nameplate is fixed on the **left back side of front carriage**, describing the model, serial No., production date and manufacturer of the machine. The format of nameplate is shown as figure 2-3, figure 2-4. The other configurations please see “**8 TECHNICAL PERFORMANCE & PARAMETER**” in this chapter.



Figure 2-3 Nameplate of LG968 wheel loader mounted with standard lift arms



Figure 2-4 Nameplate of LG969 wheel loader mounted with standard lift arms

## 5 USE CONDITIONS

This loader is multi-purpose large engineering mechanism mainly used for bulk materials. It is widely used in mineral yards, constructions, roads, enterprises, freight yards and ports, etc. It can be used for dragging, flat the ground, piling and Stacking of bulk soil, sand, sand stone, coal, garbage.

It can chuck wood, fork grass, clean snow, chuck box-liked material and etc using proper work equipment.

Details please refer to “CHAPTER III – 3.5 Operations”.



### **WARNING**

The following operations are forbidden for the loader:

1. Over load
2. Bias load
3. Dig hard material
4. Lift heavy material using the rope hang directly on the bucket.
5. Dig at the place above the machine with the bucket lifting

## 6 CIRCUMSTANCES REQUIREMENT

The requires of this machine needs the circumstances listed as follows:

1. Altitude:  $\leq 3000\text{m}$ ;
2. Temperature:  $-15\sim 40^{\circ}\text{C}$  ;
3. Water depth:  $\leq 500\text{mm}$ .

The loader is general purpose engineering machine, and can be used under the cases listed in this manual. Please follow the rules and utilize relative specific purpose equipments if it is used under other cases or potential dangerous circumstances, such as areas with flammable materials, explosive air and asbestos dust and etc.

## 7 FEATURES

- Reasonable structure, attractive appearance and large traction force.
- New style steel structure cab, damping and seal, better visibility, good inside decoration, safe and comfortable operation environment with cool and hot temperature air condition.
- Optimal working equipment, large breakout force, the full-efficiency of bucket is high and high productivity.
- Dustproof design of pin is used to improve the machine life. Preserved integrated lubrication port can realize selectable assembly easily.
- Articulated Axle structure, large steering angle and small steering radius. Taper roller bearing is used in articulated Axle which can prolong the life of loader.
- The axle distance is long, tipping load is large and longitudinal stability is high.
- Full hydraulic fluxes amplify steering system, portable and quick steering, smooth operation, reliable and stable performance.
- Hydraulic operation system with patent is used, portable to be operated and the dependency is high.
- Unique close type cooling system, which can reduce the water temperature of engine and the oil temperature of hydraulic system, enhance the service life of whole machine.
- A double pump with interflow working hydraulic system is used. Unloading valve is used in steering system to realize high pressure small flow working style and low pressure large flow working style, which can improve the working efficiency, reduce the noise and fuel consumption, so that the traction ability of whole loader is improved.
- Optimized and advanced sealed hydraulic circuit structure, which improves the sealing reliability of hydraulic system.
- The improved multi-way valve is used in working equipment distribution valve, dependency is improved greatly.
- Single-pipeline air-over driving brake system and machinery air-drive parking brake eliminating system are safe and reliable. Gearshift can be selected for driving brake system, so that the working efficiency of working equipment is improved, the dependency of braking system is improved greatly.
- Optimal hydraulic tank, which effectively ensures the cleanliness of hydraulic system and greatly improves the reliability of hydraulic elements.
- Left and right plat Axle is simple and openhanded.
- Large door design of engine cover, traverse air filter, much easy to maintain and repair.
- All types of diesel engines with dependent capabilities are selectable according to users'

requirements.

- Many types of working equipments can be selected such as working equipment with enlarged bucket, working equipment with stone bucket and working equipment with auto weight measuring system

## 8 TECHNICAL PERFORMANCE & PARAMETER

### 8.1 Performance

	LG968	LG969
Bucket capacity	3.5 m <sup>3</sup>	3.5 m <sup>3</sup>
Rated loading capacity	60000N	60000N
Lifting time (full load)	≤7.0 s	≤7.0 s
Lowering time (empty bucket)	≤3.6 s	≤3.6 s
Dumping time (empty bucket)	≤1.4s	≤1.4s
Travel speed		
Forward:		
1 <sup>st</sup>	0~6.5 km/h	0~6.5 km/h
2 <sup>nd</sup>	0~11.5 km/h	0~11.5 km/h
3 <sup>rd</sup>	0~23 km/h	0~23 km/h
4 <sup>th</sup>	0~36 km/h	0~36 km/h
Reverse:		
1 <sup>st</sup>	0~6.5 km/h	0~6.5 km/h
2 <sup>nd</sup>	0~11.5 km/h	0~6.5 km/h
3 <sup>rd</sup>	0~23 km/h	0~6.5 km/h
Max. breakout force	≥198 kN	≥198 kN
Max. tractive force (supplied by engine)	≥165 kN	≥165 kN
Max. tipping load (fully turning)	≥115 kN	≥115 kN
Max. climbing angle	30°	30°
Min. turning radius(outside of the rear wheel)	6721 mm	6721 mm
Level passing radius (outside of bucket)	7335 mm	7335 mm
Max. turning angle	38°	38°
Tire charge pressure		
Front wheel	0.333~0.353MPa	0.333~0.353MPa
Rear wheel	0.275~0.294MPa	0.275~0.294MPa

## 8.2 Parameters of Dimension and Weight

Length (bucket on ground)	8362 mm	8362 mm
Width (outside of wheels)	3210 mm	2799 mm
Bucket width	3310 mm	3210 mm
Height	3380 mm	3380 mm
Wheel tread	2190 mm	2204 mm
Wheel base	3450 mm	3429 mm
Min. ground clearance	457 mm	457 mm
Max. dumping height(-45° dumping angle)	3250 mm	3250 mm
Dumping space (-45° dumping angle)	1033 mm	1033 mm
Dumping angle	≥45°	≥45°
Operating load	18400 kg	18400 kg

## 8.3 Product Standard and License

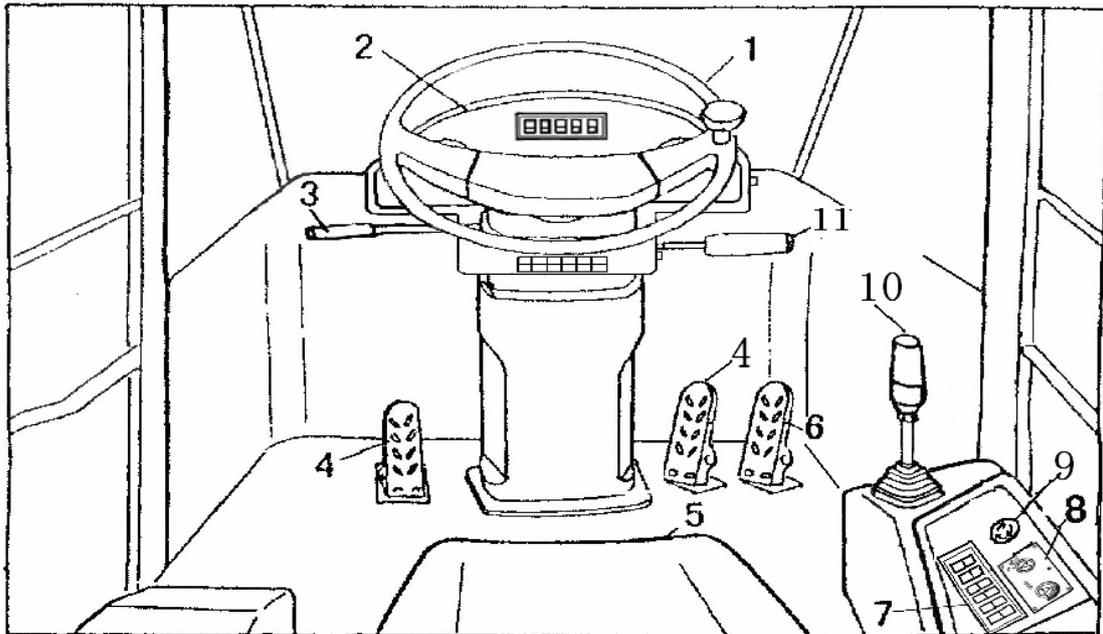
Product Standard    Q/LGJ 001    wheel loader

Product license serial number: TS2510013-2009

# CHAPTER III OPERATION AND APPLICATION

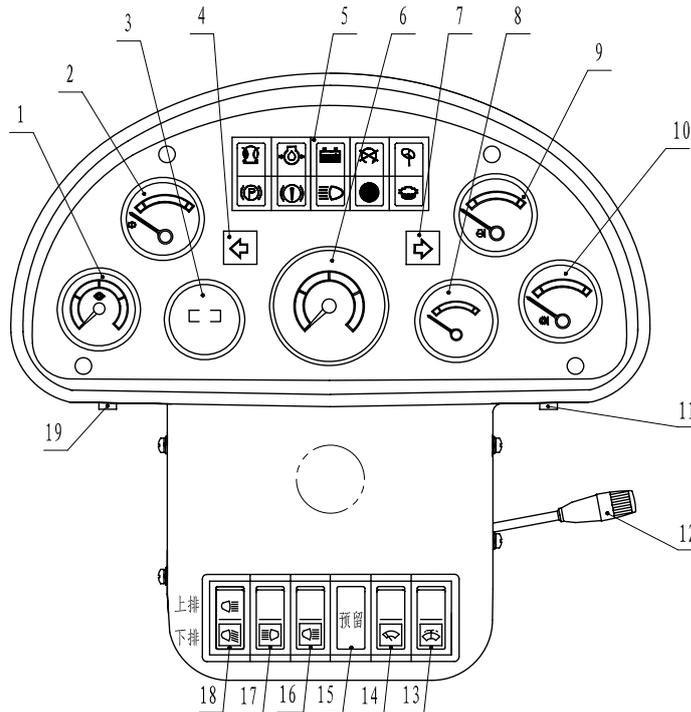
## 1. BE FAMILIAR WITH MACHINE

### 1.1 General Views of Controls and Gauges



1. Steering Wheel 2. Panel 3. Gear Control Lever 4. Brake Pedal 5. Seat 6. Accelerator Pedal  
7. Rocket Switch at Right Operation Box 8. Air Condition Control Panel 9. Parking Brake Switch  
10. Working Equipment Control Handle 11. Combined Switch

**Figure 3-1 General view of control System**



- |                                   |  |                           |
|-----------------------------------|--|---------------------------|
| 1. Gearbox Oil Pressure Gauge     | 2. Brake Air Pressure Gauge                | 3. Working Chronometer    |
| 4. Left Turn Indicator Lamp       | 5. Indicator Lamp                          | 6. Speed Gauge            |
| 7. Right Turn Indicator Lamp      | 8. Fuel level Gauge                        |                           |
| 9. Engine Water Temperature Gauge | 10. Torque Converter Oil Temperature Gauge |                           |
| 11. Ignition Switch               | 12. Combined Switch                        | 13. Water Jet Switch      |
| 14. Rain Brush Switch             | 15. Cover Board                            | 16. Rear lamp             |
| 17. Front lamp                    | 18. Rear head-lamp                         | 19. Warning Button Switch |

**Figure 3-2 General view of gauge**

## 1.2 Introduction of Gauges & Controls

Following are the introduction of gauges & controls needed for operating the machine. Be sure to understand their functions and methods.

### 1.2.1 Vehicle Gauges and Lights

- **Engine Water Temperature Gauge**

This gauge indicates the temperature of engine water.

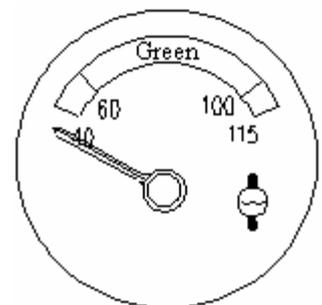
When the temperature index lies in the green ranges (60°C~100°C), the water temperature is normal.

**Notice:**

If the temperature index is over green to reach red ranges, be sure to stop the machine for inspection.

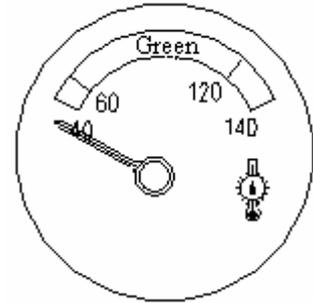
See “**3.4.2 STEPS TO STOP ENGINE**” in this chapter to stop engine.

- **Torque Converter Oil Temperature Gauge**



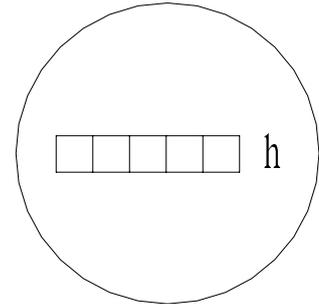
This gauge shows the torque converter oil temperature

When the temperature index lies in the green ranges (60°C~120°C), the water temperature is normal. If the temperature index is over green to reach red ranges, be sure to stop the machine for inspection.



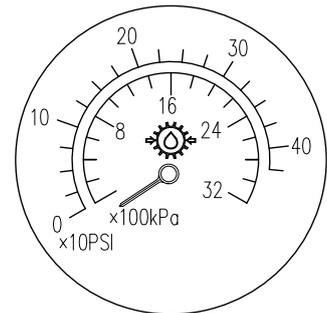
- **Working Chronometer**

This indicator shows the total operation hours of the machine; its value can be used as references of inspection and maintenance.



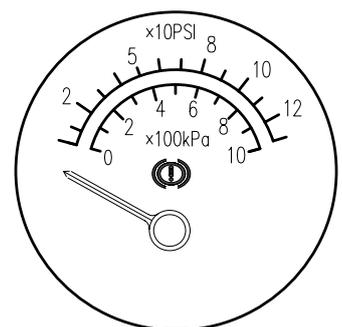
- **Gearbox Oil Pressure Gauge**

This gauge indicates the pressure of gear-shifting system. If the pressure index lies in range (15~17) X100kPa or (21.75~24.65)X10PSI, the oil pressure is normal. Be sure to stop the machine for inspection if the index lies in other areas.



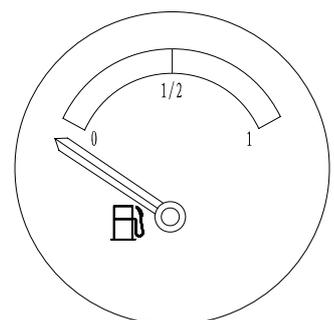
- **Brake Air Pressure Gauge**

This gauge indicates the air pressure of brake system. If the pressure index lies in range (4~8) X100kPa or (5.8~11.6)X10PSI, the oil pressure is normal. Be sure to stop the machine for inspection if the index lies in other areas.



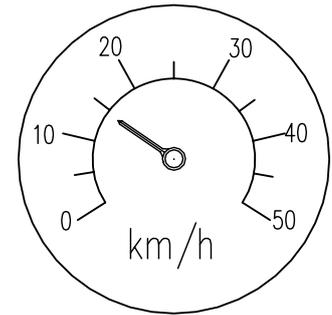
- **Fuel level Gauge**

This gauge shows the fuel capacity in fuel tank.



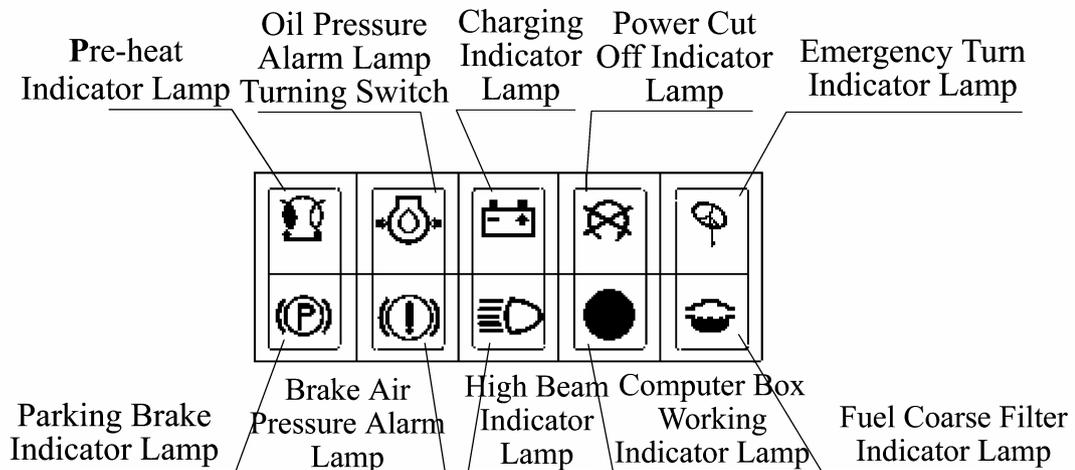
- **Speed Gauge**

This gauge shows the speed during machine driving.



- **Indicator Lamp**

See “1.1 General View of Controls and Gauges Figure3-3 Figure3-2” in this chapter.



**Pre-heat Indicator Lamp:** The lamp will be on if start switch is turned to preheat position when machine equipped with cold boot equipment; the lamp will be off if start switch is turned to other position.

**Oil Pressure Alarm Lamp Turning Switch:** The lamp will be on if the oil pressure is below 0.1MPa.

**Charging Indicator Lamp:** The lamp will be on if start switch is turned on. It will be off immediately after the engine is started. Otherwise it means there is some problem with storage battery, please examine and repair.

**Power Cut Off Indicator Lamp:** Power is cut off if the lamp is on; power is not cut off if the lamp is off.

Step on the left brake pedal, the power is cut off, lamp is on; step on right brake pedal, power is not cut off, lamp is off.

**Emergency Turn Indicator Lamp:** if the emergency turn indicator lamp is assembled, if the emergency pump works, the lam will be on if the machine turn in emergency.

**Parking Brake Indicator Lamp:** If the brake air pressure is normal, the lamp will be on when push down the parking brake switch, the lamp will be off when the parking brake switch spring back; the lamp will also be on if the brake air pressure is low.

**Brake Air Pressure Alarm Lamp:** The lamp will be on for warning if the brake air pressure is below 0.4MPa.

**High Beam Indicator Lamp:** The lamp will be on if the high beam is used in front head lamp. The lamp will be off if the low beam is used in front head lamp or the front head lamp is off.

**Computer Box Working Indicator Lamp:** If the ZF gearshift box or 4WG180 gearshift box is assembled, this lamp will be on if the starting switch is at **ON** position. If the lamp is not on, please check to eliminate exceptions.

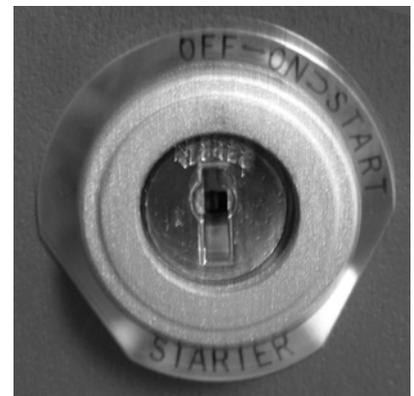
**Fuel Coarse Filter Indicator Lamp:** If this lamp is on means the coarse fuel filter is jammed seriously, please clean or replace.

**Turn Indicator Lamp:** The lamp will be on and shine if turn on the turn switch, which means the turn signal has been send. The left turn indicator lamp will be on if turn left, and the right turn indicator lamp will be on if turning right.

## 1.2.2 Switch

### ● Starting Switch

This switch is on the gauge panel and used for start or shut down the electric system and engine of whole machine. See “1.1 General View of Controls and Gauges Figure3-1 Figure3-2” in this chapter.



#### **HEAT Position**

This position is reserved for pre-heating system, which is an optional system for customers because there is no preheating system in basic diesel engine.

#### **OFF Position**

Insert or remove the key at this position. Turn the key to this position to cut off the electric power.

#### **ON Position**

This position is used to turn on the electric system. Keep the key at this position when the engine running.

#### **START Position**

This is the engine-start position. Keep the key at this position during starting. Immediately

after engine starting, pull out the key, or it will return to **ON** position automatically. If the start button is assembled, this position is not used; start button is only used for electric power control.

- **Rocket Switches**

This panel includes those switches of rear headlight, front light lamp, back light lamp, rain brush, water jet pot and etc. Be sure the dome light is off when traveling on the road. Please see “**1.1 General View of Controls and Gauges Figure3-1**” in this chapter.

- **Rain Brush Switch:**

Press bottom side, rain brush will work; press top side of the rain brush will stop.

- **Water Jet Switch:**

Push bottom side of button, eject water to the front glass of cab; release the button, water stops.

- **Back Light Lamp Switch:**

Press bottom side, the back light, front and rear outline-showing lamp will be on; press top side, the lamp will be off.

- **Heater Switch (if assembled):**

Press bottom side, heater works; press top side, heater stops.

When the heater or air condition work, adjust the air outlet in the front of gauge panel to adjust wind speed so that the frost can be cleaned or warm (cool) wind will be blown.

- **Front Headlight Switch:**

Press bottom side, the low beam of the front headlight of front frame will be on;

Press top side, the high beam of the front headlight of front frame will be on.

No side is pressed, the front headlight will be off.

- **Rear Headlight Switch:**

Press bottom side, the low beam of the rear headlight of engine cover will be on;

Press top side, the high beam of the rear headlight of engine cover will be on.

No side is pressed, no lamp will be on.

- **Front (Rear) Light Lamp Switch:**

Press bottom side, the front (rear) light lamp will be on; Press top side, the lamp will be off.

- **Warning Lamp Switch:**

Push this button down, all the turning lamps will blink used for emergency circumstance, sending warning light to absorb the attention of other vehicles and passersby. When the button springs back, all the turning light will blink.

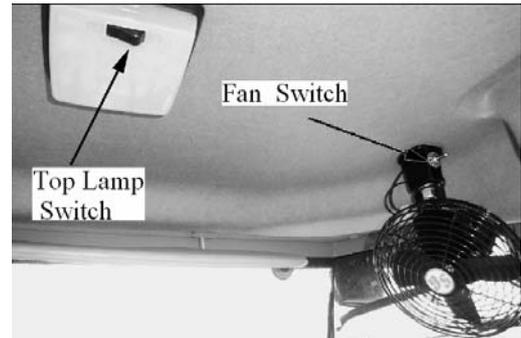
- **Top Lamp Switch:**

It is at the back of the top lamp in operator cab;

Press **ON** position to turn it on;

Press **OFF** position to turn it off.

Turn it **OFF** during driving.



- **Fan Switch:**

Press bottom side, low wind speed;

Press top side, high wind speed;

Press middle, fan stops.

- **Horn Switch:**

Press the button at the middle of the steering wheel, the horn will sound.

- **Parking Brake Switch:**

Push this switch, to carry out parking brake, turn this switch gently until it rebounds to eliminate parking brake.

### 1.2.3 Steering Wheel

The steering wheel is at the operator cab, see “**1.1 General View of Controls and Gauges Figure 3-1**” in this chapter. Steering wheel and Steering unit are connected. When the machine work fine, turn the steering wheel clockwise, the machine turn right; turn the steering wheel counter-clockwise, the machine turn left.

The features are listed below:

- The rotation angle of steering wheel and that of machine is not equal. Continuously turn the steering wheel; the machine rotation angle will increase until to the needed position.
- The faster the steering wheel turns, the faster the machine turns.
- Steering wheel will not come back after turning, and the turning angle of machine will be kept. After finishing turning of machine, turn the steering wheel reversely to keep the machine move in straight direction.

### 1.2.4 Control Levers and Pedals

- **Combined Switch**

See “**1.1 General View of Controls and Gauges Figure3-1 Figure3-2**” in this chapter.

This combined switch controls Lighting, High/Low Beam Headlight and Turning Light.



◆ **Lighting**

If the starting switch is at **ON** position, combined switch is turned to “**OFF**” position, lift the switch, high beam of front headlight will be on, if the combined switch is turned to “” or “” position, auxiliary light, rear position light, back light will be on, lift the switch, headlight will be on.

◆ **High/Low Beam Headlight**

Start switch is at **ON** position, when the combined switch is turned to “” position, Low Beam Headlight will be on; push down the switch, High Beam Headlight will be on.

◆ **Turning Light**

Push this switch forward, left turning light will be on; push this switch backward, right turning light will be on.

**NOTICE:**

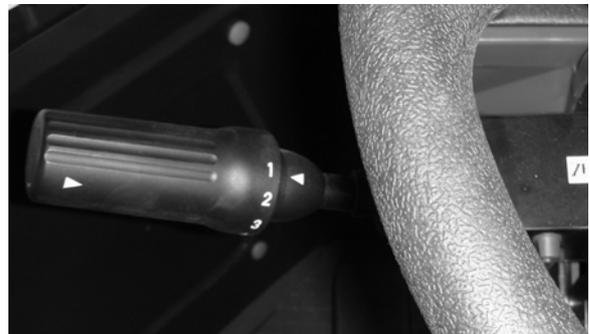
All the turning lights will be on at the same time during operating this switch. Please put the switch back manually.

● **Speed Control Lever**

This lever controls the direction and travel speed of the machine.

This machine employs four-front and three-rear gearshift box. Put the lever at the proper position, the desired speed can be derived.

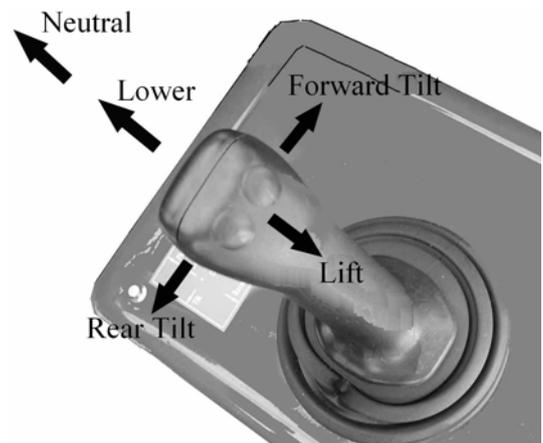
- Forward I , II are used for operating
- Forward III, IV are used for traveling
- Hold are used for parking
- Reverse I , II , III are used for reversing.



● **Working Equipment Control Handle**

This lever can control bucket and lift arm, there are four positions forward and backward, which are used to operate the lift arm to lift, neutral, lower and float; there are 3 positions left and right that are used to control the bucket Forward Tilt, Neutral, and Rear Tilt.

**(1) Bucket**



- ✧ Rear Tilt is used for drawn in bucket
- ✧ Neutral is used for remaining at a certain position.
- ✧ Forward Tilt is used for dumping.

## (2) Lift Arm

- ✧ Lift is used for lifting.
- ✧ Neutral is used for maintaining at a certain position.
- ✧ Lower is used for lowering.
- ✧ Float is used for moving freely under applied force.

There are other functions for Working Equipment Control Lever:

- ✧ **Auto Level Function:** After loader unload materials at the upper most position; put the control lever at rear tilt position, the control lever will be locked by electromagnetism. During drawing the bucket, when the bucket is at the auto-level position, the control lever will return to **Neutral** position automatically, and then put the control lever at **Lower** position to put the working equipment on the ground, the bucket will automatically stay at level state for digging. With this automatic level function, the working efficient of whole machine can be improved greatly.
- ✧ **Lift Limit Function:** When the control lever is at lift position, lever will be locked by electromagnetism; when the lift arm moves to the upper most point, lever will return to **Neutral** position, to realize lift limit avoid hydraulic impulsion breaking the machine.
- ✧ **Auto Lock Function:** When the loader plough ground or strickle the ground, put the lever at **Float** position, the control lever will be locked by electromagnetism to realize automatic lock; put the lever at **Float** position, the lever will automatically return to **Neutral** position, which will improve the working efficiency.

**NOTICE:** Never put down the lift arm at Float position.

### ● Brake Pedal

The Brake Pedal controls the brake of the wheels. See “**1.1 General View of Controls and Gauges Figure3-1**” in this chapter.

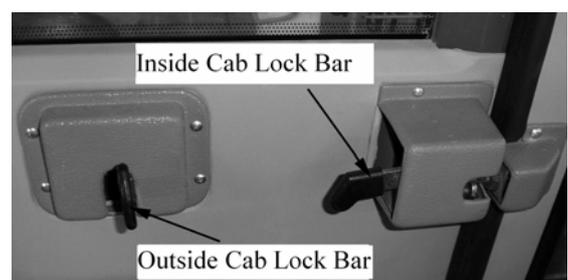
### ● Accelerator Pedal

This pedal controls the accelerograph of the engine. See “**1.1 General View of Controls and Gauges Figure3-1**” in this chapter.

The engine speed can be freely regulated between low idling and full speed.

## 1.2.5 Operator Cab Door Lock Bar

**Outside Cab Lock Bar:** Open the left and right door to



180° , the orientation lock on the door will touch the outside lock of cab and the door will be locked outside the cab. The control bar is at the middle of the lock bar, turn the control bar to downside and it will unlock.

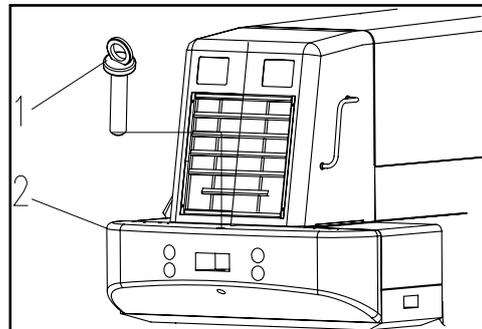
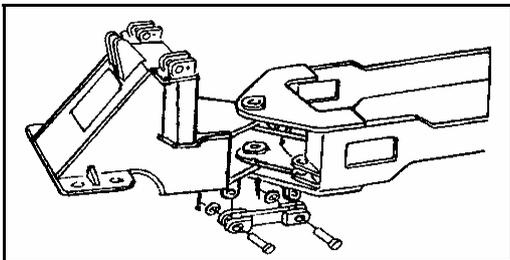
**Inside Cab Lock Bar:** The door will be locked automatically after close the door. Insert key outside the cab, turn 180° clockwise and pull out key, pull the handle outside the cab, the cab door will be opened. Turn the lock bar upward, the door will open.

## 1.2.6 Safety Bar

### ⚠ WARNING

- Be sure to use the front and rear safety bar during maintaining time or transporting.
- Be sure to release the safety bar during traveling in gear.

- The safety bar is used to lock the front and rear frames during maintaining or transporting vehicles, in order to prevent the frames from gyration.

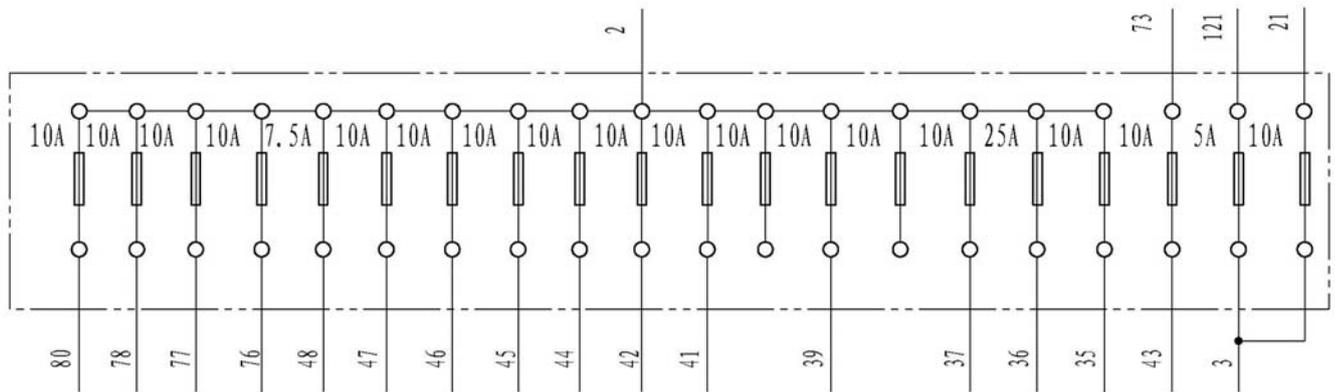


## 1.2.7 Towing Pin

- During towing, insert the towing pin ① into the counterweight ②.

## 1.2.8 Fuse

Fuse box



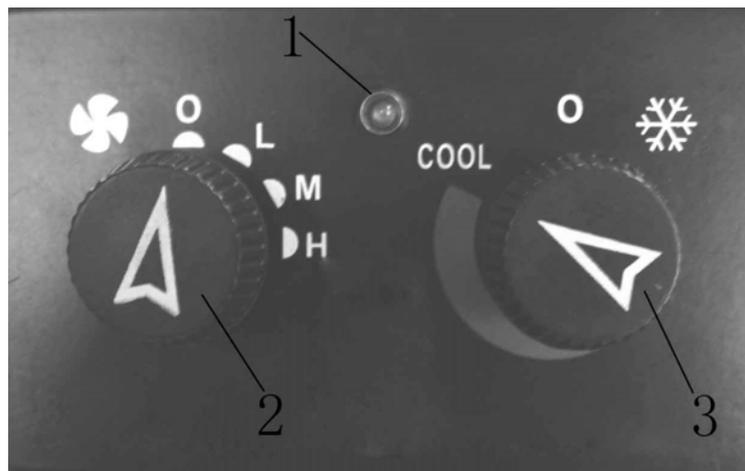
**⚠ NOTICE**

- **Always** be sure to close the startup switch before replacing a fuse .The fuse is used to protect wiring and cable from burning out. If the fuse has become corroded, or the white powder can be seen, or the fuse is loose in the fuse holder, please replace the fuse.
- When replacing the fuse, please maintain the same capacity.

**1.2.9 Air Condition (Selectable)**

- Appearance of Control Panel

The control panel of air condition is at the right side of operator cab.



1. Work Indication Lamp; 2.Wind and Power Switch; 3. Temperature Adjust Switch

- Operation Method
  - a) Cooling
    - ◇ Start the engine.

- ✧ Turn on the wind and power switch 2. This switch has three wind speed (low speed wind, middle speed wind and high speed wind) and four positions (O, L, M, H) from left to right which can adjust the rotation speed of radiator fan to change from low to high step by step.
- ✧ Turn on the temperature control switch 3 (work indication lamp is on) to the maximal position, the compressor will start to work, and the air condition will start to cool.
- ✧ Turn the wind and power switch2; select different positions and gain three different wind speed.
- ✧ When the temperature drops to the desired degree, turn the temperature switch counter-clockwise slowly until the indication lamp1 is off. The lamp1 will be on if the cab temperature is higher than this degree and compressor will work, the system start to cool; when the environment temperature is below this degree, the lamp1 will be off and the system will stop.

b) Warming

- ✧ Turn the temperature adjust switch to “O” position (shut status)
- ✧ Open the valves of water pipe of engine, start the engine.
- ✧ Turn on wind and power switch2, select wind speed to what you need.

● **Notice:**

- ✧ **Never** keep temperature control switch 3 at the coolest position all the time, and wind and power switch 2 at the low speed wind (L position) to prevent the radiator frost.
- ✧ Try to prevent the sun light shine upon the machine point-blank during summer.
- ✧ Close the door to use air condition; close the heat source valve during cooling; turn off cooling temperature control switch to warm during winter.
- ✧ Clean the condenser frequently, use compressive air or cool water to wash. NEVER use hot water or steam to clean.
- ✧ Use the condenser once per week during winter even the cool wind is not used for 1 minute to keep the air condition work fine.
- ✧ Add antifreeze into coolant to prevent cold crack of part if the temperature is below 0°C. Let the coolant water out after the machine stops if the antifreeze is not used (please see “**3.5.3 Operation in Cold Weather**” in this chapter), add new water the next time.

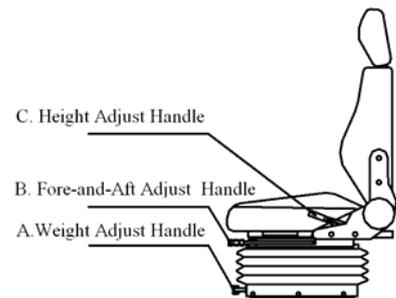
### 1.2.10 Adjustment of Cab’s Seat

## ⚠ WARNING

- When adjusting the cab's seat, park the machine in a safe place and stop the engine.
- Adjust the cab's seat before starting operation or replacing the operator.
- Make sure that you can depress the brake pedal completely when your back is against the seat backrest.

### ● Weight Adjustment

Weight adjust handle is at the middle bottom of the seat. Turn the handle A counter-clockwise, the rigid of shock absorption will go down; turn the handle A clockwise, the rigid of shock absorption will go up. The Operator can adjust handle A according to his weight until feel comfortable.



### ● Fore-and-Aft Adjustment

The handle is at the left bottom of the seat. Pull the handle B to adjust the seat forward or backward until ideal position; it will be locked automatically after push it down.

### ● Backrest Adjustment

Pull the backrest adjust handle C to push the backrest until to the proper angle, and then release handle to lock the angle.

### ● Height Adjustment

There are three weight positions, divided by three block position; the operator can adjust by himself. Hold the basement under the cushion, pull it steadily upward hard, the seat will be locked during moving up if it hits the block position and you will hear the sound like “Ka Ta”, and then release your hand, the seat will be locked at this position. If the seat is at the upper most position, pull the seat hard upward once and then push it down, the seat will go down to the lower most position.

### ● Head Pillow Height Adjustment

Pull the pillow hard upward or downward with your two hands holding it, and the height of pillow will be adjusted.

## 1.2.11 Safety Belt

Wear the safety belt if the safety belt is assembled during operation. Check the abrasion level and the fastness. Replace it if possible.

Adjust the length of safety belt before using to ensure the effect and comfort. Move the lock-tongue

position to adjust the length. The locker of the safety belt is at the left back of the seat. Insert the lock-tongue into the locker, the locker will block the lock-tongue. Press the red button at the side of locker placket to release the lock-tongue from locker. Check whether the locker can block and release the lock-tongue normally.

### **1.2.12 Rearview Mirror**

Rearview mirrors are at the left and right positions outside the cab and top left position inside the cab. Before operation, rotate the rearview to adjust elevation so that you can have good rearview.

### **1.2.13 Key**

There are 2 keys for every type.

- Key for engine starting switch.
- Key for cab left and right door.
- Key for left and right door of engine cover.
- Key for fuel inlet of fuel tank

## **2 ADJUST OF NEW MACHINE**

New machine must be trained first to increase load step by step so that the parts of machine can be fully adjusted to increase life. It needs 60 hours to train the new machine, please follow the notices below:

- Run the machine at low speed level to preheat the engine.
- **Never** accelerate the engine suddenly in preheating period.
- **Never** start, turn or brake suddenly except emergency.
- Idle running of the machine without Loading: the gearshift should be used from low speed to high speed accordingly. Turn left, right or brake during steadily during running.
- Running-in of the new machine: all speeds include forward and reverse should be adjusted.
- It is better to load bulk materials in new machine training. Do not drive too hard. The load is better less than 70% of the standard load, and speed is better less than 70% of the maximum speed limit.
- Pay attention to lubricant; add lubricant in time according to rules.
- Pay attention to gearbox, torque converter, front and rear frame, rim and brake drum temperature, once they are overheat, please find the reason.
- Check the bolt, nut to make sure its fastening.

Do the following works after 10 hours new machine training:

1. Check the fastening status of bolts and nuts of all parts. Especially the bolts of diesel engine cylinder cover, vent-pipe bolts, front and rear frame bolts, rim bolts, transmission axle bolts and connection bolts one time entirely.
2. Clean the coarse and extract oil filter and fuel filter.
3. Check the loosen status of belt of fan, electrical machine and air condition compressor
4. Check the specific gravity of storage battery electrolyte and its reserves, fasten the connect poles.
5. Check the oil level of gearbox. Please see “**3.6.3 Adding Oil to Gearbox**”.
6. Check the seal of hydraulic system and s system.
7. Check the connection and sensitivity of levers (handles).
8. Check the temperature and connection of circuit system, power supply of electrical machine, gauge, light and lamps and turning signals.
9. Open the air storage tank to drain water.

The following works should be done after training of new machine:

1. Clean the filter net at gearbox bottom and the filter cartridge of oil suction.
2. Clean the filter cartridge of hydraulic oil tank.
3. Replace the mobile oil of engine Please see “**3.6.1 Fuel Supplying of Engine**”.

## **3 OPERATION AND USAGE OF LOADER**

### **3.1 Notices for Usage**

1. The diesel must be deposit more than 72 hours before using, the trademark should fit for the rules.
2. Transmission oil for gearbox, torque converter and the hydraulic oil for hydraulic system must be clean.
3. The loader must be maintained and lubricated periodically.
4. Drive until the brake pressure reach 0.4MPa after the engine starting.
5. Preheat the engine until 30~40°C before starting if the environment temperature is lower than 5°C.
6. Do not stop the machine and brake to change the transmission. when changing the speed from low to high, release the accelerograph a little and operate the Gear Control Lever at the

same time, then press accelerator; when changing the speed from high to low, release the accelerator first and then change the transmission slowly.

7. Operate the lift-ram and bucket to the required position, pull (push) the working equipment control lever back to the middle position.
8. Stop to change the forward or backward driving direction.
9. Full load working is allowed until the water temperature of engine is above 60°C and the mobile temperature of engine is above 50°C. But the water temperature of engine should not over 95°C and the mobile temperature of engine is not over than 120°C, otherwise stop to cool.
10. **Never** lift the bucket to the up most position to transport material. The lower hinge of lift arm should be 400~500mm above the ground to ensure stable driving.
11. Diesel engine is used in the machine. The power will go down as the altitude goes up, environment temperature and relative temperature go down. So please pay attention to the environment conditions and calculate the real power under the current environment condition according to the power correct table in “**Diesel Engine Usage and Maintenance User Manual**”.

## 3.2 Starting

### 3.2.1 Check before Starting

- Check the bottom and surrounding of machine to see whether there is lose of bolt, dirt, oil leak, leak of coolant and broken of parts. Check the status of accessories and hydraulic parts.
- Check before Starting:
  - 1) Check the fuel of fuel tank, see “**3.6.2 Adding Fuel to Fuel Tank**” in this chapter.
  - 2) Check the hydraulic oil in hydraulic oil tank, see “**3.6.5 Adding Oil to Hydraulic Oil Box**” in this chapter.
  - 3) Check the mobile oil at engine oil pan, see “**3.6.1 Fuel Supplying of Engine**” in this chapter.
  - 4) Open the water tank cover to check the water level of water tank.
  - 5) Check the brake oil of oil bowl of brake booster pump.
  - 6) Check the seal ability of oil pipe, water pipe, air pipe and other parts.
  - 7) Check the seal ability of hydraulic pipes and the pipes round.
  - 8) Check the wire connection of storage battery.

- 9) Check the pressure of tire to see whether it is normal. Please see “**CHAPTER II 8.1 Performance**”.
- 10) Check the control levers ( or handles) to see whether they are sensitive and in the middle.
- 11) Adjust the seat position to sit comfortably. Please see “**1.2.10 Adjustment of Cab’s Seat**”
- 12) Check the safety belt (there be sometimes) and other safety equipments to work fine.
- 13) Start after all the parts are normal.

### 3.2.2 Starting of Engine

#### Notices for starting of engine:

- Make sure the working equipment control handle are at the middle position before starting; gear control lever is at **neutral** position, put switch to its original position.
- It is now allowed to use the largest accelerograph at the beginning of starting to prevent broken of parts at the beginning.
- Follow the right starting steps to start the engine.
- Other operations to diesel engine please follow “**Diesel Engine Usage and Maintenance User Manual**”

#### Steps to start diesel engine:

- Put the gear control lever at the left bottom of steering wheel to **neutral** position
- Turn the start key clockwise to the **ON** position, connect the power switch, sound the horn.
- Turn the starting key to **ON** position, connect the power switch, press the accelerograph a little, and then turn to the **START** position. Then release the starting key, it will go back to **ON** position automatically. The starting time is not more than 5~10 second, (the starting engine should not work continuously for 15 seconds).
- Start again if the machine does not start at the first time. But the alternation time should be longer than 1 minute. If it can not start for three times, please check the reason and remove the block.

### 3.2.3 After Starting of Engine

- Low the speed of engine, and examine the reason if engine oil pressure gauge does not direct in the normal scope. After that, start again, otherwise there may be troubles.
- If the mobile oil pressure does not reach the stated value, over speed of engine will induce high temperature and the turbo charger may be broken.
- Operate the working equipment control handle to let the hydraulic oil fluid in hydraulic tank and pipes to fast warm the hydraulic parts.

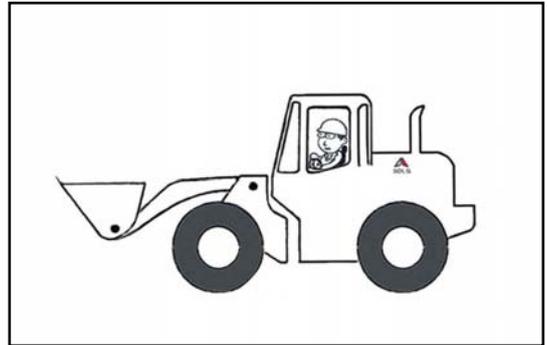
- Keep the engine idle for several minutes after starting, increase the speed to 1000~1200r/min gradually, and then enter partial load running status. Pay attention to the value of gauge.
- Do not let the engine run at high speed or low speed longer than 20 minutes at idle status.
- If it is necessary to run the engine at idle status, apply load from time to time or let the engine run at middle speed.

### 3.3 Running

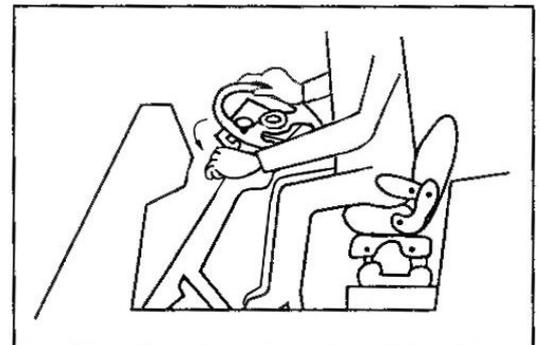
#### 3.3.1 Driving

Make sure there is no other person on the machine or around to prevent accident and the machine is under control.

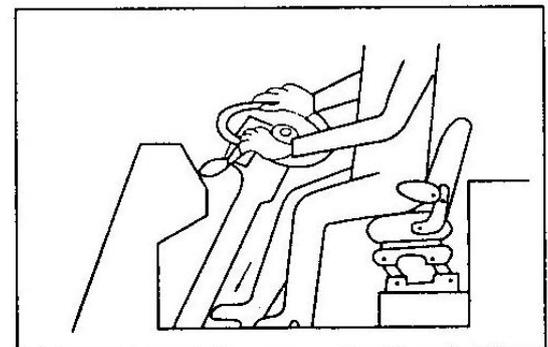
- Raise the lift-arm, keep the bucket backwards, and keep running status.



- Put the gear control lever at forward I or backward I position.



- Press the brake pedal; rotate the parking brake switch gently to release the brake status.



- Release brake pedal, push the accelerograph pedal slowly to drive forward or backward.
- It is safe to drive only when the brake pressure is over specific value (0.45MPa)
- **Never** lift the bucket to the up most position to transport material. The lower hinge of arm working equipment should be 400~500mm above the ground to ensure stable driving.

 **NOTICE**

- **Never** run at high speed if the machine runs at slope or uneven ground.
- Select proper transmission when go down the slope and **never** change the transmission at that time.
- **Never** run over speed going down the slope, and use the brake pedal to slow the speed.

### 3.3.2 Gearshift, Changing between Forward and Backward

- Press the accelerator a little bit during change transmission to prevent too much impulsion.
- It is best to change the running direction (change from forward to backward or from backward to forward) after stop the machine to get the best comfort and prolong the life utmost.
- No need to stop and brake during running. Release the accelerator and operate the transmission lever at the same time when change the speed from low to high; when change the speed from high to low, release the accelerator first and then change the transmission slowly.

### 3.3.3 Turning

- Turn the steering wheel the same as the wished turning direction of the machine to turn.
- The machine is centered at swivel pin, the front and rear frame will bend to turn.

 **WARNING**

- **Never** turn suddenly or turn on the slope at high speed.
- The machine can not turn if the engine stops

### 3.3.4 Braking

- **Never** put your foot on the brake pedal unless necessary.
- **Never** press the brake pedal again and again unless necessary.
- **Never** try stopping the engine and put the gear control lever at **neutral** position during going down the slope.
- **Never** use left brake pedal (if left and right brake pedals are assembled) during driving on ramp to prevent the power being cut off to induce danger.

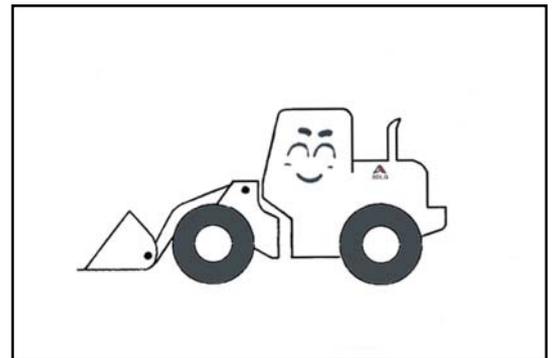
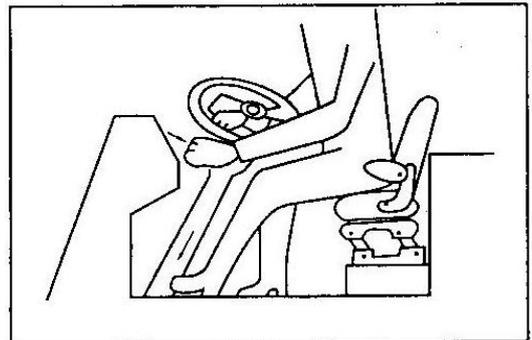
 **WARNING**

Never use control lever of manual brake valve to brake or slow the speed of machine during running unless emergency.

### 3.4 Stopping

#### 3.4.1 Steps to Stop

- Release the accelerator, press brake pedal to stop the machine, put the gear control lever at the **neutral** position.
- After safety stopping, push the parking brake switch to lock the machine at brake status.
- Level the bucket and other work equipment on the ground.
- Stop the machine at plane ground where there should not be danger of stone falls, coast or flood. If it is necessary to stop the machine on slope, wedge the tire to prevent movement.
- Let the cooling water out at winter after stopping ( if antifreeze is not added), if the temperature is below 0°C. Please see “**3.5.3 Operation in Cold Weather**” in this chapter.



#### 3.4.2 Steps to Stop Engine

- Let the engine run freely for 5 minutes to cool all the part equably.
- Turn the key to **OFF** position, the diesel engine will flameout and then draw-out the key to keep it well.

 **WARNING**

Never Stretch the flameout control soft shaft before the engine is cooled.

### 3.4.3 Leaving Machine

- Use ladder and handle to climb down facing the machine. **Never** jump down.
- Check whether there are particle-liked materials piled on engine, if so, clean immediately to prevent fire.
- Clean all the possible flammable materials around the machine to prevent fire.
- Lock the door and window and draw the key.

### 3.4.4 Do the Followings after Work Everyday

- Check the fuel reserves.
- Check the oil level of engine oil pan and its cleanness, if the oil level is too high or diluted, find the reason to eliminate.
- Check the oil pipes, water pipe, gas pipe and other parts whether there is leaking.
- Check the gearbox, torque converter, steering unit, fixing of front and rear frame, saling and check whether there is overheat.
- Check rim bolts, transmission axis bolt and other pins to see whether they are loose.
- Add antifreeze if temperature is below 0°C, and drain the water ( if no antifreeze), see “**3.5.3 Operation in Cold Weather**” in this chapter.
- Check whether the work equipment work well.
- Check whether the tire pressure and outlook is normal.
- Add butter to the adding points of work equipment.
- Check the brake oil of oil bowl of brake booster pump.
- Drain the water in air tank from water outlet valve.
- Clean the outlook of machine and the clay and sundries in bucket.

## 3.5 Working

### 3.5.1 Prepare to Work

Clean the work area, fill hollowly up, and eradicate the sharp stones that may break the tire and roadblocks.

### 3.5.2 Modes of Work

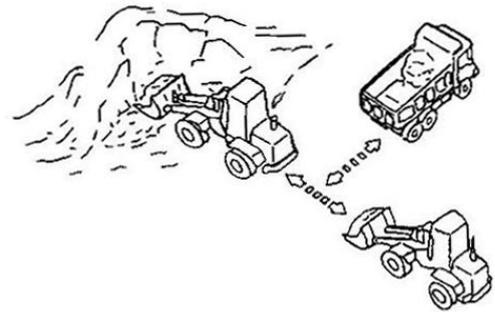
#### (1) Loading Operation

- Work together with camion can help improve efficient especially for long distance transportation.
- When work together, there are two ways to cooperate if loader dig the material and the camion

transport and unload the material:

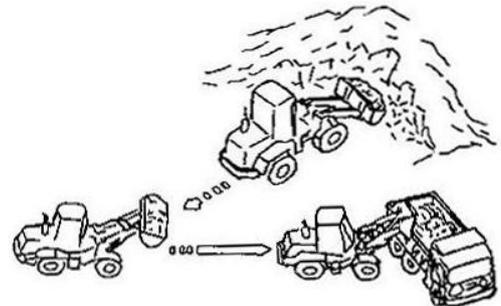
◇ **Cross Load:**

Loader face material, move backward after dig full and let the auto-unload truck move into the position between material and loader. This method cost the minimum time and can reduce the cycle time most effectively.



◇ **“V” Shape Load:**

Auto-unload truck is fixed and form almost 60° angle with the backward direction of loader. After digging, loader move backward and turn some degree and move forward toward the truck.



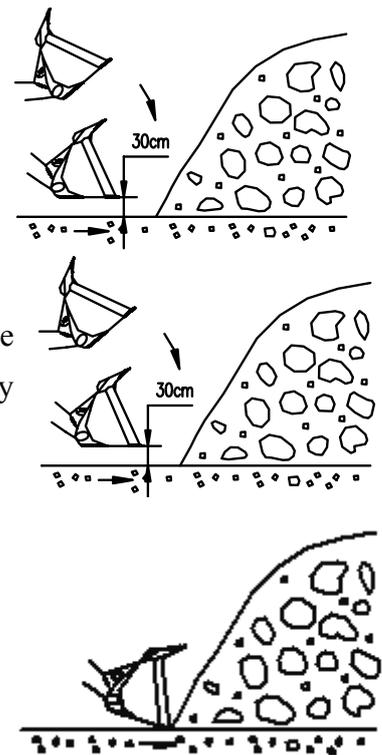
The smaller the loader work angle is, the more work efficient is.

**(2) Digging Operation**

■ **Digging Piled Soil or Blasted Rock**

When digging piled soil or blasted rock, the loader should face the material and do as follows:

- If it is needed to lower the bucket while driving the machine forward, stop the machine when the bucket is about 30cm away from the ground, and then lower it slowly.
- If the bucket hits the ground, the front tires will come off the ground and the tires will slip.
- The machine must slow the speed immediately when it reaches the material pile. Step the accelerator pedal, and enter the material pile with the bucket simultaneously.
- Keep the bucket horizontal when loading the stockpile, while



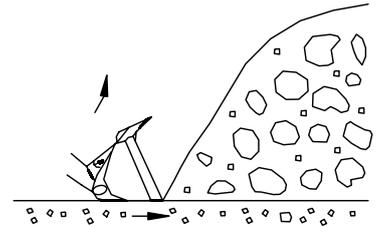
Blasted Rock

make it a dumping angle down when loading the blasted rock.

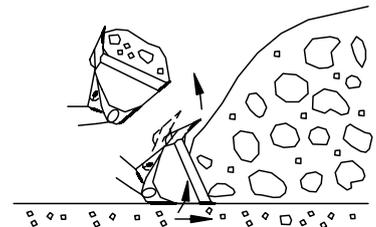
**Notice:**

Forbid getting the blasted rock under the bucket which will make the front tires deviate from the ground and skid. Try to hold the load in the center of the bucket; otherwise, if the load is on one side of the bucket, it will be unbalanced.

- Raise the lift arm to prevent the bucket from going in too deep while thrusting the bucket into the material. The tires will bring ample traction by raising the lift arm.



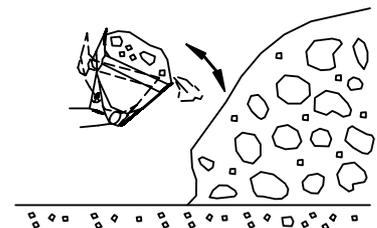
- If enough material is loaded into the bucket, operate the working equipment control lever to take back the bucket in order to load it fully.



**Remark:**

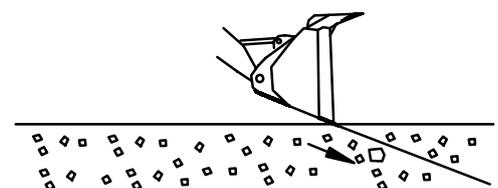
If the shovel edge moves up and down when thrusting material into the bucket or when digging, the front tires will deviate from the ground and skip.

- If there is too much material loaded into the bucket, it's needed to dump and title the bucket quickly to remove the excessive load so as to prevent the material from dispersing during the transportation.

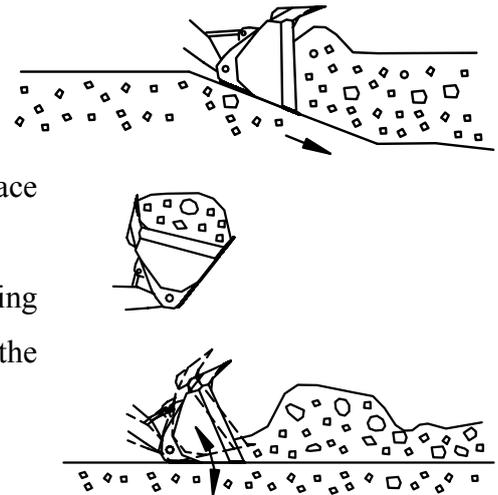


■ **Digging and Shoveling Material on Flat**

Set the bucket edge leaning to the ground slightly as the following picture when digging and shoveling material on flat, and be careful not to fasten the load to one side which will bring on unbalance. This operation should be carried out carefully with 1st gear.



- Set the bucket edge facing down slightly.
- When driving the machine forward, operate the working equipment control lever to let the lift arm lower down to proper position so that it can the thin layer of the surface each time when excavating the soil.
- when driving the machine forward, Shift the working equipment control lever back and forth slightly to reduce the resistance



**⚠ NOTICE**

Keep the two sides of the bucket cut into material equably to prevent single side work. Face the loader straight forward, **never** let the angle exist between front and rear frame

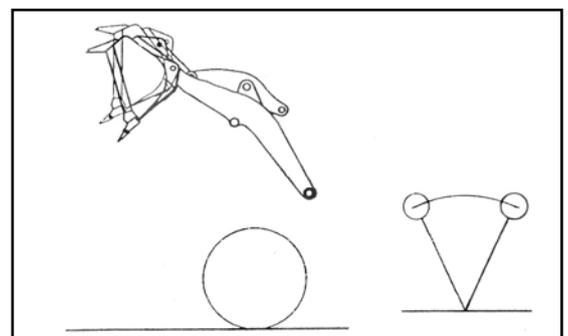
**(3) Conveying Operation**

Conveys by itself under the following conditions:

- The ground is too soft and **never** been planed, the camion can not be used.
- The conveying distance is within 500 meter, it is not economical to use camion.
- The conveying driving speed is determined according to the road condition.
- In order to get good visibility and stability, the bucket should turn to its limit (bucket lift-ram touch the upper limited block) and keep the pin connection point of lift-arm at transportation position (400~500mm above the ground).

**(4) Dumping Operation**

- When dumping to camion or freight yards, raise the lift-ram to the position (forward tilt to the maximum position) where the bucket does not touch carriage or material pole, operate working equipment control handle to forward tilt the bucket to dump, part or all of the material can be dumped by lever control. Act slowly and gently during dumping to prevent striking.
- If the material sticks onto bucket, move the working equipment control handle cyclically to let

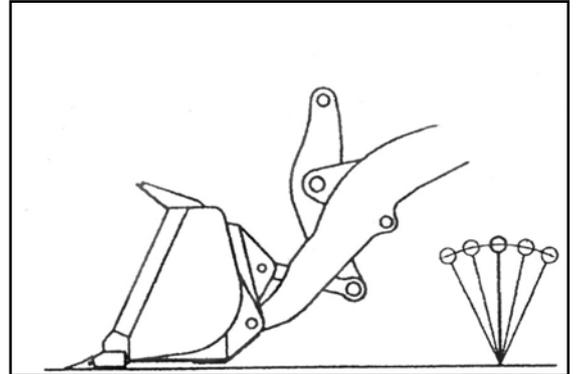


the bucket tilt forward or backward to shake down the material.

- After dumping, use the bucket to level equipment. Rear tilt bucket to level position, operate the working equipment control handle to let the lift arm lower down to prepare for next operation.

### (5) Pushing Operation

Level the bucket to the ground, push accelerator to move forward, if there is block during moving, raise the lift arm a little and move forward continuously. When operate the lift arm to lift the or lower, operate the control lever between lifting and lowering operating. **Never** let the lever at the raising or lowering position to ensure pushing smoothly.



### NOTICE

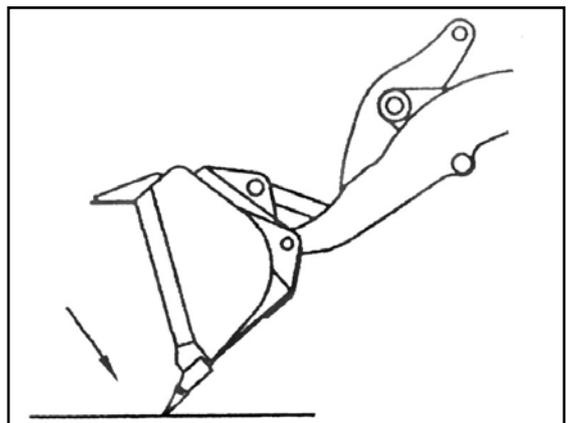
Watch the Torque Converter Oil Temperature Gauge all the time during pushing. If the temperature is too high, stop to let machine to cool down and then continue to work.

### (6) Strickling Operation

Tilt the bucket to the bottom to let the blade touch the ground. For hard ground, let the working equipment control handle at the float position; for soft ground, let the lift arm control lever at the **neutral** position.

Use **Reverse** transmission to strickle the ground.

### (7) Towing Operation



 **WARNING**

Before towing, must use braker block the tire to prevent the machine rolling.

During towing, be careful to prevent severe and fatal hurt.

- If possible, the machine towed should keep the engine running to ensure braking and turning.
- If the machine towed can not start the engine, disassemble the front and rear transmission axle. If the machine can not turn, disassemble steering cylinder.
- The connection hole of the rear frame at inner side of rear wheel can only be used for lifting and binding, but not for towing.
- If there is no braking system for machine towed, **never** use soft towing but use fixing towing or use towing bar. Connect the towing bar to the towing pin at the back of loader.
- If there is no braking system for machine towed, no one is allowed to stay on it.
- Check the towing rope or towing pin to see whether they are strong enough to surfer the weight of the machine towed. If machine will pass clay ground or go up slope, the towing rope or towing pin should surfer at least 1.5 times the weight of machine.
- Try to use small towing angle of towing rope to ensure the angle between towing rope and the machine towed is within 30° . The height of the towing points of the two machines should be close.
- Connection of the towing equipment and the machine should be strong.
- The weight of the towing machine should be heavier than the loader towed, and has enough traction power and braking power to be able to pull or brake go up and down slope.
- When towing the machine down the slope, use one machine with enough traction power and braking power and use another one to pull at the back side to prevent the machine towed losing control or turning over.
- Start to tow and brake gently, at low speed, turn on the warning flash lamp.
- The speed for towing of loader should within 2 km/h. Try to towing the machine to the nearest repairing garage. If the distance is longer than 10 km or the towing speed faster than 10 km/h, must disassemble front and rear transmission axle or put loader on tow truck.

### 3.5.3 Operation in Cold Weather

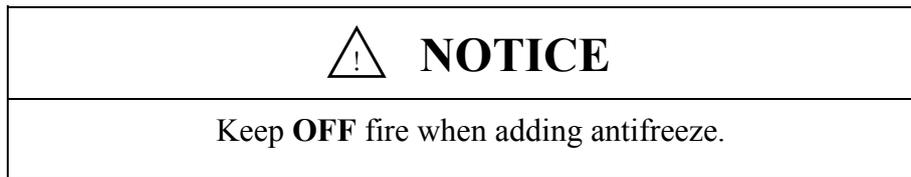
#### Attentions for cold weather

If the temperature is too low, the engine will be difficult to start; radiator may be frozen, so please do the as the followings:

- Use fuel with low viscosity, add antifreeze into hydraulic oil and lubricant and coolant. Details of

trademark of oil please see “**CHAPTER IV 2.2.1 Selection Table of Fuel, Coolant and Lubricant**”.

- Attentions for using antifreeze:
  1. Do not use antifreeze containing formaldehyde, ethanol or propanol.
  2. **Never** use any waterproof, whatever use independently or together with antifreeze.
  3. **Never** use antifreezes with different trademarks together.
  4. Replace antifreeze with proper ratio according to the requirement, please see “**CHAPTER IV 2.1.2 Coolant**”



- Attentions for using storage battery:
  1. If the temperature goes down, the capacity of storage battery will go down. If the charging ratio of storage battery is low, the electrolyte may be frozen, so please ensure the charging ratio near 100% and try to preserve heat, so that it is easy to start next day.
  2. If the storage battery is frozen, **never** charge or start the engine, please do as the method in “**CHAPTER I 8.16 Maintenance of Storage Battery**” to disassemble the battery and put it into hothouse or warm water (be attention **NEVER** let water enter the battery), warm it to 15°C slowly, otherwise explosion may happen.
  3. Please use anti-high and cold storage battery in high and cold place.

- Attentions after work everyday:

In order to prevent the materials frozen on the machine which may affect working the next day, please do as the followings:

1. Completely clean the silt and water on the machine to prevent silt, water or snow from entering sealed parts which may freeze or break the sealed parts.
2. Park the machine on dry and hard ground. If it is impossible, park the machine on wooden board, which can prevent the tire being frozen on the ground. So that it is convenient to drive the next day.
3. The capacity of storage battery will go down obviously under cold weather, so cover or move the storage battery to warm place, assemble it the next day.
4. when the temperature is below 0°C and there is no antifreeze in coolant, please open the water drain valves located at the bottom of water tank and all the drain valves of engine, to drain all the coolant water in cooling system and evaporator of air-condition system to

prevent cold crack. If antifreeze is added, please follow the descriptions on the nameplate of antifreeze.

**After cold weather:**

After the weather is warm, the relative parts should reuse the proper mobile oil, fuel and hydraulic oil that are compliant with the temperature.

### 3.6 Oil and Fuel Supplying

#### 3.6.1 Fuel Supplying of Engine

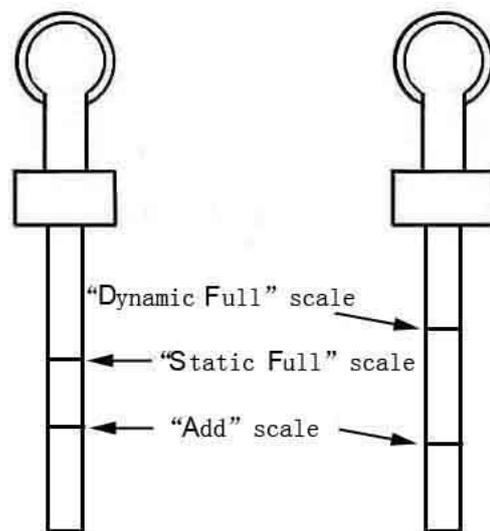
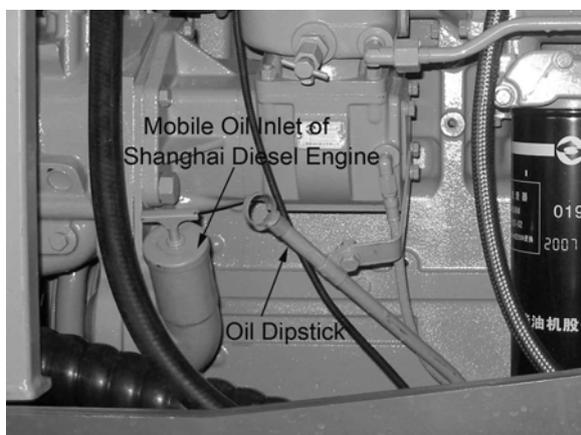
##### ① Fuel Level Checking

 **NOTICE**

Oil level checking must be executed **15** minutes before working or after engine stopping.

- Park the machine on plane ground, put transmission lever at **neutral** (“N”) position, push the parking brake switch, put blocks at front and back of tire.
- Open the side door at right side of engine cover.
- Pull the dipstick out, and wipe it clean with cloth. Insert the dipstick back, and pull it out again to check the oil level (repeat twice at least).
- The oil is proper, if the oil level is between scale “Static Full” and “Add” of dipstick. If the oil level is below scale “Add”, it needs to add some mobile oil from oil inlet.

**NOTICE:** If the machine is running at idle state, check the scale of the other side of dipstick, it is proper if the oil level is between scale “Static Full” and “Add” of dipstick. If the oil level is below scale “Add”, it needs to add some mobile oil from oil inlet.



- Put the dipstick back, and close side door at right side of engine cover. Mobile oil select please see “**CHAPTER IV 2.2 Oil Selection**”, the followings are the same.

## ② Mobile Oil Replacing

- Park the machine on plane ground, put transmission lever at **neutral** (“N”) position, push the parking brake switch, put blocks at front and back of tire. Start the engine and run at idle status until the oil temperature reaches 20°C ~40°C, then stop the engine.
- Rotate the oil drain plug, let the oil flow out and hold it in a container, change the oil filter.
- After the oil is released completely, rotate the oil drain plug back. Open the right side door of engine cover; add prescribed mobile oil (about 27.5L) from oil inlet of engine. Run the engine at idle status, check whether the oil filter and oil releasing plug are leaky.
- 15 minutes after the engine is stopped, let the mobile oil flow back to oil pan, and check the mobile oil level of engine again.



## ③ Mobile Oil Filter Replacing

### Disassembly

- Clean the area near the mobile oil filter seat, use filter elements spanner to disassemble the filter.

### Assembly

- Add diesel full into filter coarse, spread machinery oil onto rubber sealing ring.
- Rotate tightly 3/4~1 cycle after the rubber sealing ring reaches basement.
- Start the engine and check to ensure the gasket is sealed, if not so, disassemble filter elements and check the sealing surface.

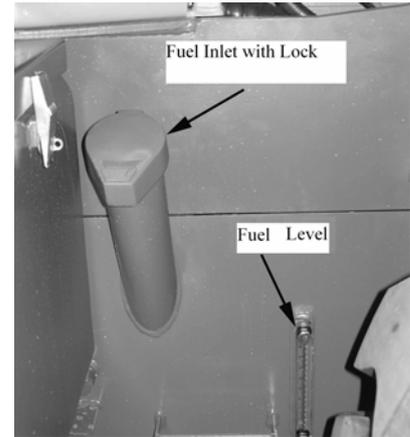
### NOTICE

- After changing the filter elements, run the engine at least 1 minute at idle status to ensure the engine is lubricated sufficiently before working.
- Over tight mechanical rotation could hurt screw thread or filter element sealing.

### 3.6.2 Adding Fuel to Fuel Tank

#### Fuel Level Checking

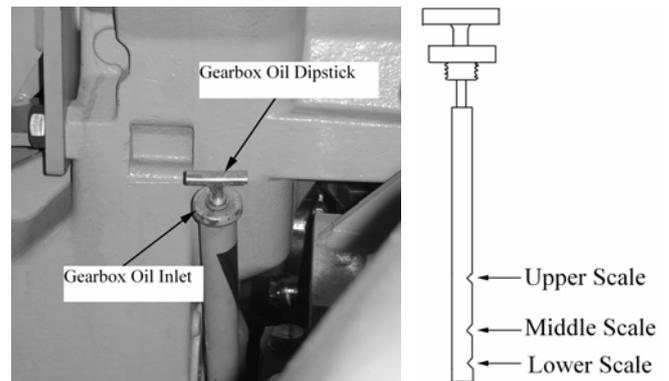
- Park the machine on plane ground, check the fuel level from outside of fuel tank. If the fuel level is under 0, please add fuel from inlet of fuel tank. Fuel selection please see “**CHAPTER IV 2.2 Selection of Oil, Fuel and Coolant**”.



### 3.6.3 Adding Oil to Gearbox

#### ① Oil Level Checking

- Park the machine on plane ground, put the transmission lever at **neutral** (“N”) position, push the parking brake switch, and wedge the front tire.
- Start engine, run the engine at idle status (at about 1000r/min), rotate to loose the oil dipstick of oil inlet at the left side of gearbox, stretch it out and clean.



- Dip the oil dipstick into oil pipe and rotate tightly, and then take out (at least twice).
- Oil temperature is about 40°C, oil level should between lower scale and middle scale.
- Oil temperature is about 80°C, oil level should between upper scale and middle scale.
- If the oil level is not at the prescriptive scale, please add prescriptive hydraulic transmission oil. Selection of hydraulic transmission oil please see “**CHAPTER IV 2.2 Selection of Oil, Fuel and Coolant**”.

#### ② Oil Replacing

- Park the machine on plane ground, put the transmission lever at **neutral** (“N”) position, push the parking brake switch, and wedge the front tire.
- Make sure the gearbox at the working temperature, **rotate** to



open the oil drain plug at the front of gearbox to drain the oil, and contain it in container.

**NOICE:** During draining, not only drain all the oil of gearbox out, but also drain the oil of torque converter radiator.

 **WARNING**

If the temperature of gearbox oil is relatively high please wear protective clothes, and operate carefully to prevent self hurt.

- Release all the oil, clean the scrap iron on oil drain plug and the oil dirt on gearbox. Assemble the plug together with new seal ring.
- Rotate to open the cover of oil inlet of gearbox, add prescriptive hydraulic transmission oil. **Rotate the cover back.**
- Start the engine and run at idle status, add oil until the oil level is between lower scale and middle scale.
- Select all the gearshifts one time.
- Check the oil level again, add more if necessary.

 **NOTICE**

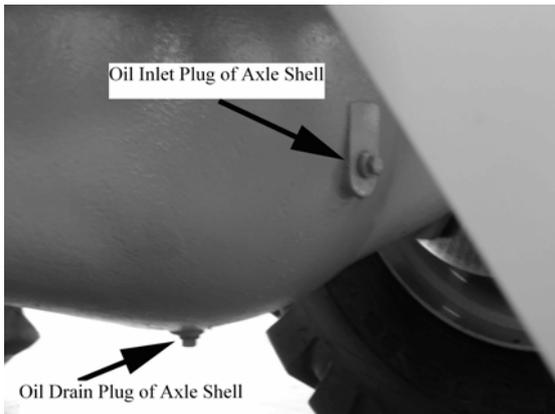
- If the old oil is dirty, do not add new oil directly, but disassemble the coarse filter, clean all the parts. If there is any metal power or particles please contact with maintenance man.
- Assemble the parts orderly, add new hydraulic transmission oil a little, start engine at idle status for 3~5 minutes, and then release the oil in oil pan and add new prescriptive oil.

### 3.6.4 Adding Oil to Axle

#### 3.6.4.1 Adding Oil to LG Axle

##### ① Oil Level Checking

- Park the machine on plane ground, put the transmission lever at **neutral** (“N”) position, push the parking brake switch, and wedge the front tire. Rotate to open the oil inlet plug on the shells of front and rear axle. It is proper if the oil level is at the bottom side of oil inlet, otherwise please add axle oil. Please watch 5 minutes after adding oil, if the oil level keeps stable; please rotate to assemble the oil plug. Selections of axle oil please see “**CHAPTER IV 2.2 Selection of Oil, Fuel and Coolant**”.



## ② Oil Replacing

- Park the machine on plane ground, run the engine 10 minutes, use small accelerograph to move the machine slowly to let the oil drain plug of front axle at wheel side at the lowest position
- Shut engine, put transmission lever at **neutral** (“N”) position, push the parking brake switch, wedge the front and rear wheels.
- Rotate to disassemble the oil drain plugs of two wheels near front axle and the oil drain plugs at the bottom of axle shell bottom to release oil to container.

### ⚠ **WARNING**

The temperature of axle oil may be high please wear protective clothes, and operate carefully to prevent self hurt.

- Release all the old oil and rotate to assemble the oil drain plugs at the bottom of axle shell bottom.
- Start engine, rotate the parking brake switch gently until it rebounds, use small accelerograph to move the machine slowly to let the oil drain plug of front axle at horizontal position, and then shut the engine, put the transmission lever at **neutral** position, push down the braking control switch.
- Add new axle oil (about 32 L) from the oil drain port of two wheels near front axle and the oil inlet port at the middle of axle shell. And then check the oil level again.

- Rotate to tight the oil drain plugs of two wheels near front axle and the oil inlet plug at the middle of axle shell.
- Replace the rear axle oil according to the procedures above. Selections of hydraulic oil please see “**CHAPTER IV 2.2 Selection of Oil, Fuel and Coolant**”. The followings are the same.

#### 3.6.4.2 Adding Oil to ZF Axle

##### ① Oil Level Checking

- Park the machine on level position! Examine all the places that oil needs to be added. Oil draining should be done some time after the machine is driven.

**NOTICE: Be careful for the splash of hot oil when drain oil, add oil and rotate to open oil plug.**

##### ② Types of Oil

- Oil level of Tire side: rotate the hub until the word “Olstand” is at horizontal position. Oil level standard is justified as oil flowing out the oil drain plug hole.
- Oil level of Axle: Oil level standard is justified as oil flowing out middle oil adding hole or the oil draining plug hole.

##### ③ Examination

- If the oil level drops after several minutes, add some more until the oil level reach the prescribed position can keep stable.

**NOTICE: Check the oil level every month! Examine the oil level especially after new drive Axle is substituted or the drive Axle is repaired before loader is used.**

##### ④ Oil Replacing

- Replace the oil first time after the new loader is driven 500 hours, and replace oil every 1000 hours after then, and replace at least once every year.

##### ⑤ Oil for brake

- Mobile oil Delvac super 1310 (registered as SAE10W) is recommended for inner brake of drive Axle.

**NOTICE: It is not allowed to use other brake liquid that is not authorized by ZF. Drain the air in axle after replacing the new axle or repairing the oil routs of axle.**

##### ⑥ Working temperature

- The continuous working temperature of axle should not be higher than 90 degree. If the temperature is higher than 130 degree, please stop to examine the brake system and axle.

##### ⑦ Lubricate grease

- Please use lubricate greases with the following features:  
Lithium-based saponification grease, dripping point should be 170 degree NLG2 degree, lubricate grease should be anticorrosive, water-resistant and press stable. Add grease every week

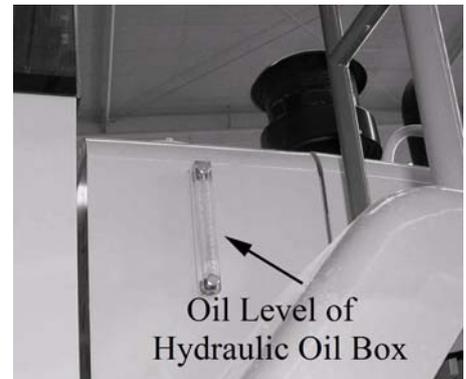
to butter port.

The rotation torque of all the bolt connections between axles and frames\transmission axis\ rims should be examined periodically. (first examination should be after working. 50 hours)

### 3.6.5 Adding Oil to Hydraulic Oil Box

#### ① Oil Level Checking

- Park the machine on plane ground, level the bucket on the ground, and then check whether there is angle between front and rear frame.
- Check the oil level indicator of hydraulic oil box at the left side of machine. The level indicator scale is at the middle with the error within  $\pm 2$ . If the oil level indicator is lower than -2 scale, please add hydraulic oil.



Selection of oil please see “**CHAPTER IV 2.2 Selection of Oil, Fuel and Coolant**”.

The followings are the same.

#### ② Oil Replacing

#### **WARNING**

If it needs any operation during replacing oil, please do as the relative rules, and pay attention to safety.

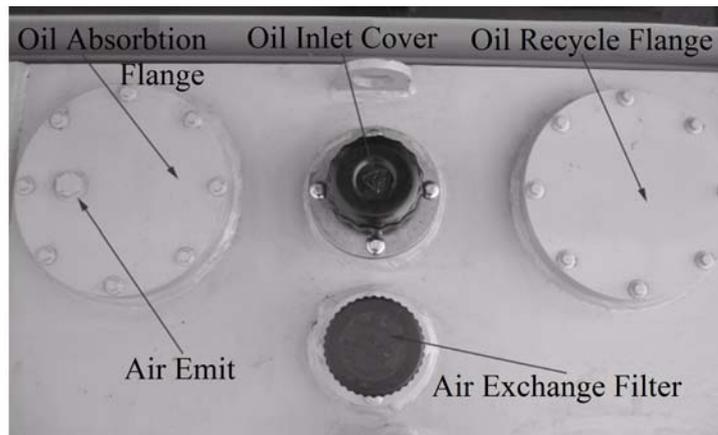
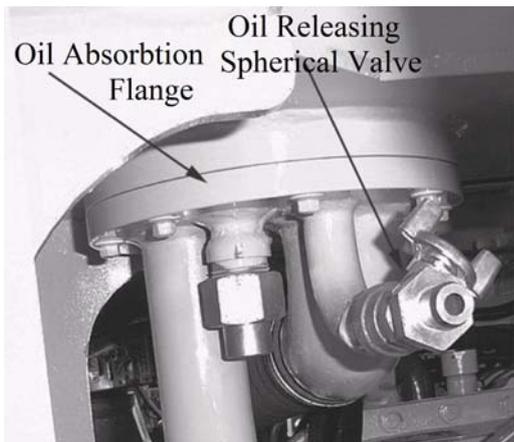
#### **NOTICE**

Pay attention to the clarity of oil during replacing oil; **never** let other materials enter the hydraulic system directly.

- Clean the sundries in bucket, part the machine on plane ground and put the transmission lever at **neutral** position, push down the parking brake switch, start the engine at idle status for 10 minutes, raise and lower the lift arm several times, tilt forward and backward the bucket several times.
- Raise the lift arm to the upper most position; tilt backward the bucket to the most position and

shut the engine.

- Operate the working equipment control handle to let the bucket tilt forward freely by its weight, release the oil in bucket cylinder. After the bucket tilt to the position, push the working equipment control handle forward to let the lift arm fall down by freely by its weight, release the oil in lift arm cylinder.
- Clean the oil drain port at the bottom of hydraulic oil box, rotate to open the **oil releasing spherical valve** to release the oil to container. Open the oil inlet cover at the same time to quicken draining.



**⚠ WARNING**

The temperature of hydraulic oil may be high please wear protective clothes, and operate carefully to prevent self hurt.

- Disassemble the flange **cover** of oil box, clean the inner part and the oil inlet port and oil recycle elements, if the elements are broken please replace with new one.
- Assemble the flange cover and **oil releasing spherical valve** again tightly.
- Add prescriptive oil from oil inlet port at the left top side of bench frame, until the oil lever reach the middle of oil lever indicator. Rotate the oil inlet port cover. **Never** add oil directly to oil tank without oil filter elements.
- Start engine, raise and lower lift arm, tilt forward and backward the bucket to the most position 2~3 times to let the hydraulic oil fill the cylinders and pipes sufficiently. And run the engine at idle status for 5 minutes to release the air of system.
- Shut the **engine**, **check the oil level**, if there is not enough oil, add some more.

## 3.7 Long-Time Storage

### 3.7.1 Before Storage

When putting the machine in storage for a long time, be sure do as follows:

- After every part is washed and dried, house the machine in a dry building. **Never** leave it outdoors.

If the machine must be outdoors, park it on well-drained concrete and cover it with canvas.

- Add lubricant grease and change hydraulic oil before storage.
- Apply a thin coat of grease to hydraulic piston rods.
- Disconnect the negative electrode of the battery and cover it, or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop down below 0°C, drain the coolant out (except the one added with antifreeze). Please see “**3.5.3 Operation in Cold Weather**” in this chapter.
- Lower the bucket to the ground, set all control levers ( or handles) to **Neutral** position. Push down the parking brake switch and lock the cab door.

### 3.7.2 During Storage



#### **WARNING**

Open doors and windows to keep ventilation and exhaust poisonous gas if the antirust is used in the house.

Start the machine once a month so that lubricant can be coated over the surface of movable parts and other components surfaces, storage battery can be charged at the same time.

Wipe off the grease coated the hydraulic cylinder rods before work and operation.

### 3.7.3 After Storage

Do as follows after long-term storage of machine.

- Wipe off the grease coated the hydraulic cylinder rods.
- Add oil and grease to all the requisite positions.

## 3.8 General Problems and Eliminating

### 3.8.1 Electrical System

No.	Problems	Possible Causes	Remedy
1	Lamp is not bright when the engine runs at high speed.	1 Faulty cable ( contact problem or open circuit)	1. Check, repair loose terminals and disconnection
2	Lamp flickers when the engine is running.	2 Improper adjustment of fan belt tension	2. Refer to “Operation and Maintenance manual” of diesel engine for adjusting the tension of fan belt.
3	Ammeter does not work when engine is running.	1 Faulty alternator 2 Faulty cable 3 Improper adjustment of belt tension	1. Replace 2. Check and repair 3. Refer to “Operation and Maintenance manual” of diesel engine for adjusting the tension of fan belt.
4	Abnormal noise from alternator.	Faulty alternator	Replace
5	Starting motor does not work when starting switch is on.	1 Faulty cable 2 Insufficient battery charge	1. Check and repair 2. Charge
6	Pinion of starting motor does not mesh or keep meshing without rotation.	Faulty battery charge	Charge
7	Starting motor turns feebly	1 Insufficient battery charge 2 Faulty alternator	1. Charge 2. Replace
8	Starting motor disengages before engine starts	1 Faulty cable 2 Insufficient battery charge	1. Check and repair 2. Charge

### 3.8.2 Transmission System

No.	Problems	Possible Causes	Remedy
1	Shifting pressure of every gear is low	<ol style="list-style-type: none"> <li>1 Over low oil level in gearbox oil sump</li> <li>2 Oil leakage in the main oil lines</li> <li>3 clogged oil filter of gearbox</li> <li>4 Faulty of converter charging pump</li> <li>5 Improper adjustment of the pressure-regulator valve in transmission control valve</li> <li>6 Invalid spring of pressure-regulator valve in transmission control valve</li> <li>7 Pressure-regulator valve of transmission control valve or accumulator piston is locked</li> </ol>	<ol style="list-style-type: none"> <li>1 Add oil to the specified level</li> <li>2 Check the main oil lines</li> <li>3 Clean or replace the filter</li> <li>4 Disassemble and check the converter charging pump or replace it</li> <li>5 Readjust to the specified value</li> <li>6 Change the spring of pressure regulator valve</li> <li>7 Disassemble and check to remove the lock</li> </ol>
2	Shifting pressure of certain gear is low	<ol style="list-style-type: none"> <li>1 Damaged piston seal ring of this gear</li> <li>2 Damaged gasket in the oil lines of this gear</li> <li>3 Oil leakage in the oil lines of this gear</li> </ol>	<ol style="list-style-type: none"> <li>1 Change the seal ring</li> <li>2 Change the gasket</li> <li>3 Check and remove the leakage</li> </ol>
3	The oil of torque converter overheats	<ol style="list-style-type: none"> <li>1 Over low oil level in gearbox oil tank</li> <li>2 Over high oil level in gearbox oil tank</li> <li>3 Over low shifting pressure and clutch slips</li> <li>4 T/Q radiator is clogged</li> <li>5 T/Q operates with high load for a continuous long time</li> <li>6 Radiator is not good</li> </ol>	<ol style="list-style-type: none"> <li>1 Add oil to the specified level</li> <li>2 Drain oil to the specified level</li> <li>3 Refer the problems 1 and 2</li> <li>4 Clean or replace the radiator</li> <li>5 Shut down for cooling</li> </ol>
4	Machine can not move when engine runs in high speed	<ol style="list-style-type: none"> <li>1 Cut-off valve spool of transmission control valve can't reset</li> <li>2 Shift no gear</li> <li>3 Spring of pressure-regulator valve in transmission valve is broken</li> <li>4 Same as 1, 2, 3 and 4 of problem 1</li> </ol>	<ol style="list-style-type: none"> <li>1 Disassemble the cut-off valve, find out the reasons that spool can't reset and remedy</li> <li>2 Shift gear again or readjust the gearshift control levers and linkages</li> <li>3 Change the spring of pressure-regulator valve</li> <li>4 Refer to 1, 2, 3 and 4 of problem 1</li> </ol>
5	Insufficient driving force	<ol style="list-style-type: none"> <li>1 Over low shifting pressure</li> <li>2 Over high oil temperature of T/Q</li> <li>3 Damaged T/Q blades</li> <li>4 Damaged overrunning clutch</li> <li>5 Insufficient driving force of engine</li> </ol>	<ol style="list-style-type: none"> <li>1 Refer to problems 1 and 2</li> <li>2 Refer to problems 3</li> <li>3 Disassemble and check the torque converter, change blades</li> <li>4 Disassemble and check free-wheel clutch, change damage parts</li> <li>5 Check and maintain the engine</li> </ol>

### 3.8.3 Brake System

No.	Problems	Possible Causes	Remedy
1	Insufficient brake force	<ol style="list-style-type: none"> <li>1 Oil leakage of pliers pump</li> <li>2 Air in brake hydraulic lines</li> <li>3 Low brake air pressure</li> <li>4 Over worn leather cup of booster pump</li> <li>5 Oil leakage from hub to brake plates</li> <li>6 Worn brake plates</li> </ol>	<ol style="list-style-type: none"> <li>1 Change rectangular sealing ring of pump</li> <li>2 Bleed the air out</li> <li>3 Check the sealing performance of air compressor, control valve, storage tank and lines.</li> <li>4 Change the leather cup</li> <li>5 Check or replace the seal of hub</li> <li>6 Change brake plates</li> </ol>
2	Failure to release the brake normally	<ol style="list-style-type: none"> <li>1 Wrong position of brake valve spool, locked piston rod, damaged or faulty reset spring</li> <li>2 Improper operation of booster</li> <li>3 Pliers piston can't reset</li> </ol>	<ol style="list-style-type: none"> <li>1 Refer to problem 2</li> <li>2 Check the booster pump</li> <li>3 Check or replace the rectangular seal ring</li> </ol>
3	Pressure in air storage tank drops quickly after shutting down (pressure drop is over 0.1 MPa in 30 min)	<ol style="list-style-type: none"> <li>1 Inlet valve of foot brake valve is clogged by dirt even damage</li> <li>2 Loose pipe fitting or broken pipes</li> <li>3 Poor sealing performance of check valve in combination valve of oil-water separator</li> </ol>	<ol style="list-style-type: none"> <li>1 Brake for continuous several times to blow the dirt off or change valve</li> <li>2 Tighten the pipe fitting or change brake pipes</li> <li>3 Find out the reasons for sealing failure and change parts if necessary</li> </ol>
4	Slow rise of pressure reading in the brake gauge	<ol style="list-style-type: none"> <li>1 Loose pipe fitting</li> <li>2 Abnormal work of air compressor</li> <li>3 Inlet valve or diaphragm of brake valve is not sealed</li> <li>4 The bleed hole of pressure controlled valve is clogged or the diaphragm of check valve leaks air.</li> </ol>	<ol style="list-style-type: none"> <li>1 Tighten the fitting</li> <li>2 Check air compressor</li> <li>3 Check and clean the inner parts of brake valve, find out the unsealed parts then repair</li> <li>4 Clean air bleed hole, find out the unsealed reasons of retaining valve and diaphragm then repair.</li> </ol>

### 3.8.4 Hydraulic System of Work Equipment

No.	Problems	Possible Causes	Remedy
1	1 Insufficient raising force of life-arms	<ol style="list-style-type: none"> <li>1 Over worn or damaged cylinders</li> <li>2 Over worn multi passage valve, excessive clearance between valve spool and valve block</li> <li>3 Oil leakage of oil lines</li> <li>4 Severe internal leakage of working pump</li> <li>5 Idle suction of working pump</li> <li>6 Low set pressure value of safety valves</li> <li>7 Clogged suction tube and filter</li> </ol>	<ol style="list-style-type: none"> <li>1 Change the oil seals of cylinder</li> <li>2 Change the distribution valve</li> <li>3 Find out the leaking points and repair</li> <li>4 Change the oil pump</li> <li>5 Check oil lines and remedy</li> <li>6 Regulate the system pressure to set value</li> <li>7 Clean the filter, strainer, and change oil</li> </ol>
2	Insufficient force of the bucket, the bucket tend to lower down or float up	<ol style="list-style-type: none"> <li>1 Damaged seal ring of steering cylinder piston</li> <li>2 Over worn of multi passage valve, excessive clearance between valve spool and valve block</li> <li>3 Low set pressure value of safety valves</li> <li>4 Overload valve and oil complementary valve is blocked by dirt</li> </ol>	<ol style="list-style-type: none"> <li>1 Change the oil seals</li> <li>2 Change multi passage valve</li> <li>3 Change the system pressure to its prescriptive value</li> <li>4 Disassemble and clean</li> </ol>
3	Hydraulic oil mixing into gearbox	Aged or broken oil seals of working pump or steering pump lead to the hydraulic oil leaking into the gearbox	Change oil seals or change oil pump
4	Foam in hydraulic oil tank and harsh noise	<ol style="list-style-type: none"> <li>1 Suction oil line is damaged and air is sucked into oil lines</li> <li>2 Over low oil level and large amount of air is sucked into oil lines</li> </ol>	<ol style="list-style-type: none"> <li>1 Check the oil lines, remedy the leakage parts. Replace if necessary.</li> <li>2 Add hydraulic oil to specified level</li> </ol>

### 3.8.5 Steering System

No.	Problems	Possible Causes	Remedy
1	Heavy steering	<ol style="list-style-type: none"> <li>1 Insufficient oil supply for working pump and steering pump</li> <li>2 Air in steering system</li> <li>3 Faulty of steel-ball in check valve body of steering unit causes heavy steering and little pressure during either slow or quick turning of steering wheel.</li> <li>4 Faulty of piloted valve</li> <li>5 Too low pressure of safety valve</li> </ol>	<ol style="list-style-type: none"> <li>1 Check oil pump</li> <li>2 Discharge air from system and check the suction lines</li> <li>3 Check the valve. Clean if it is blocked by dirt</li> <li>4 Replace piloted valve</li> <li>5 Readjust the pressure to specified value</li> </ol>
2	Increased steering turns	<ol style="list-style-type: none"> <li>1 Over low oil level in hydraulic reservoir</li> <li>2 Leakage of oil lines, damaged oil seals</li> <li>3 Internal leakage of steering cylinder</li> <li>4 Worn steering unit</li> <li>5 High viscosity of oil or wrong brand of oil</li> </ol>	<ol style="list-style-type: none"> <li>1 Fill oil to specified level</li> <li>2 Change seals of oil circuits</li> <li>3 Change seals of hydraulic tanks</li> <li>4 Replace steering unit</li> <li>5 Change by the specified oil</li> </ol>
3	Inflexible or failure of steering system	<ol style="list-style-type: none"> <li>1 Damaged spring plate of steering unit</li> <li>2 Cracked, broken or deformed centre pin and drive shaft</li> <li>3 Faulty dual overload valve</li> <li>4 Scuffed rotor and stator, scuffed valve spool, valve body and sleeve</li> <li>5 Faulty in steering pump or piloted valve</li> </ol>	<ol style="list-style-type: none"> <li>1 Change the damaged spring plate</li> <li>2 Change the center pin or drive shaft</li> <li>3 Check and repair the bi-directional overload valve</li> <li>4 Disassemble, check, clean and assemble strictly or change parts</li> <li>5 Change the damaged parts</li> </ol>
4	Steering wheel can not reset	<ol style="list-style-type: none"> <li>1 No concentric steering column and valve spool</li> <li>2 Steering shaft axially locks the valve plug</li> <li>3 Large axial resistance of steering column</li> <li>4 Broken spring plate</li> </ol> <p>Phenomena: medium pressure drop increases or the relief of steering unit fails when steering wheel stops (wheel loader deflects from straight traveling line)</p>	Remove the problems according to the respective reasons.

### 3.8.6 Engine

Refer to “**Operation and Maintenance Manual**” of diesel engine for troubleshooting.

# CHAPTER IV MAINTENANCE

## 1. GUIDES OF MAINTENANCE

Read following information before carrying out maintenance and inspection.

### 1.1 Precautions before Maintenance and Inspection

- Perform maintenance on the hard and level ground.
- Lower the work equipment near the ground and level the bucket.
- Set all control levers (or handles) to **Neutral** position.
- Push down the parking brake switch.
- Put blocks in the front and behind of wheel.
- Lock the front and rear frames with safety bar.

### 1.2 Warning Tag

- Attach the warning tag near starting switch before maintenance to prevent someone from starting the engine during maintenance.

### 1.3 Spare Parts

- Use only parts specified by the manufacturer of the wheel loaders.

### 1.4 Oil and Fuel

- Use oil and fuel specified in this manual according to ambient temperature.

### 1.5 Always Use Clean Oil and Fuel

- Keep containers of oil and fuel clean and use clean oil and fuel.

### 1.6 Keep the Machine Clean

- **Always** keep the machine clean. Especially keep grease fittings, pipe joints and oil level gauges clean and prevent foreign materials from getting in them.

### 1.7 Be Careful of Refrigerant Water and Oil in High Temperature

- Draining hot oil and refrigerant water or removing the filters immediately after the engine stops are hazardous. Make sure the engine is cool. The temperature of the oil drained is appropriately about 20°C to 40°C. If it is lower than this temperature, be sure to warm it up to this temperature.

before draining it.

## **1.8 Check Oil and Filters**

- After the oil is changed or filters are replaced, check the oil and filters. If large amounts of metallic particles or foreign materials are found, consult the maintenance people.

## **1.9 Fuel Strainer**

- Do not remove the fuel strainer while fueling.

## **1.10 Oil Change**

- Change oil in the places where dust is lesser to keep foreign materials away from oil.

## **1.11 Welding Instructions**

- Turn off the starting switch of engine and remove the battery cables.
- Keep the distance between grounding cable line and weld area within 1m.
- Avoid welding near seal rings and bearings.
- **Never** weld any pipe or tube containing fuel or oil.

## **1.12 Fire Prevention**

- Use inflammable cleaner or light oil to clean parts. Keep spark or cigarette light away from it.

## **1.13 Sealing Part**

- When replacing O-ring or gaskets, clean the clamp faces firstly and make sure the O-ring and gaskets are in the correct assembly position.

## **1.14 Checking Frame**

- After a long time operating in the rocky condition, check for damage of the undercarriage and loosen or damage between bolts and nuts.

## **1.15 Precautions When Washing Machine**

- Wash machine after complete cooling of the engine.
- Do not allow water to spray on any electric components.

## **1.16 Checking in Raining and Snowing Circumstances**

- Clean the machine immediately after working in rain and snow, lubricate and coat anti-rust oil to more parts.

## 1.17 Dusty Worksite

Do as follow when working at dusty worksite:

- Inspect and clean air filter frequently to avoid blocking up.
- Clean the radiator frequently to avoid blocking up.
- Clean and replace fuel filter at short intervals.
- Clean the electric components, especially the starting motor and alternator, to avoid accumulation of dust.

Refer to “**Operation and Maintenance Manual**” of diesel engine for replacing and maintaining air filter.

## 1.18 Avoid Using Mixed Oil

- **Never** use oil mixed with different brands. If there has only one brand oil to be available which is different from the one in used. Drain the oil from the machine, and fill with the new brand oil.

## 2. CONTENT OF MAINTENANCE

### 2.1 Outline of Oil, Fuel and Coolant

 <b>WARNING</b>
<ul style="list-style-type: none"> <li>● Because of the bad operation conditions and dusty ambient circumstance, the oil is easy to deteriorate. Change in time as soon as the oil deteriorates or mixes with much foreign materials.</li> <li>● Add the specified volume of oil. Either too much or too little oil may cause problems.</li> <li>● Replace the related filters when changing oil.</li> </ul>

#### 2.1.1 Fuel

- The fuel pump is a precision instrument. If fuel containing water or dirt is used, it can not work properly.
- **Never** let impurities get in when changing and adding fuel.
- Strictly use the fuel specified in this manual.
- Fuel may be froze at low temperature (particularly at low temperature lower than -15°C), so it is necessary to change the style of fuel according to the ambient temperature.

- **Always** fill the fuel tank after finishing operation to prevent the moisture in the air from condensing and forming water inside the fuel tank.
- If engine fails to suck fuel or the filters have been replaced just, bleed the air in the circuit.

### 2.1.2 Coolant

- Use the clean and soft water, rain or tap water as coolant. Well water and spring water can be used as coolant after soft processing and precipitation to avoid bringing scale which can influence the performance of heat exchange.
- If the engine overheats, wait for the engine to cool before adding coolant.
- Add coolant to specified level. If the level is too low, it will cause overheating of engine system and corrosion of cooling system.
- Add antifreeze to coolant if ambient temperature is lower than 0°C. Drain the coolant out after working (please see “**CHAPTER III 3.5.3 Operation in Cold Weather**”) and refill before next working if there is no antifreeze in the coolant.
- Antifreeze is flammable. Keep fire off when the antifreeze is added.
- **Never** use 100% antifreeze as coolant. Refer to the following table to select the mixing proportion.

Name	Proportion%					Freezing point≤°C
	Glycol	Alcohol	Glycerin	Water	Proportion	
Glycol	60			40	Proportion in volume	-55
	55			45		-40
	50			50		-32
	40			60		-22
Alcohol		30	10	60	Proportion in weight	-18
Glycerin		40	15	45		-26
Antifreeze		42	15	43		-32

### 2.1.3 Grease

- Grease is used to prevent wear and noise on the joint surfaces.
- Joints not included in the manual (connectors, jointing sleeves) are treated during overhaul, so they do not need grease. When some parts become inflexible because of long-time operation, it is necessary to grease them.
- Remember to wipe off the overflow grease when adding grease.

### 2.1.4 The Storage of Oil and Fuel

- Prevent water, dirt or other impurities from getting in.
- Follow the rule that the oldest oil or fuel is used first to prevent any change in quality during

long-term storage.

## 2.1.5 Filters

- Filters are extremely important safety components. They can prevent impurities in the fuel from entering important equipment causing problems. Replace all filters periodically. Replace filters at shorter intervals when working in the severely bad conditions.
- **Never** try to clean paper filter elements and use them again. **Always** replace them with a new one.
- When replacing oil filters, check if there are some metallic particles adhering to the old filter. If some metal particles are found, consult the maintenance people.
- **Never** open the packs of spare filters until they are used.
- **Always** use authorized filter parts.

## 2.2 Selection of Fuel, Coolant and Lubricant

### 2.2.1 Selection Table of Fuel, Coolant and Lubricant

Please use special oils of Shandong Lingong priorly and may choose specified oils in the following table.

Kinds of Fluids	Recommended Types And Standards	Capacity	Using places
Engine oil	Ambient temperature $\geq$ -15° CD 15W-40 GB11122 Ambient temperature $<$ -15° CD 5W-30 GB11122	27.5L	Shanghai diesel engine
Transsmitt oil	CALTEX Delo Gold Multigrade 15W-40 or Mobile HEIBAWANG 1300 (SAE15W-40)	35L	Torque converter and gearbox
Gear oil	Heavy duty gear oil for automobile (GL-5) 85W-90 GB13895	32X2L	LG Main reducer and final drive
	CALTEX Thuban GL5 EP90 或者 FUCHS Titan Gear LS90	32X2L	ZF Main reducer and final drive
Hydraulic oil	CALTEX RANDO HDZ46 or Mobile DTE25	200L	Hydraulic oil tank
Fuel	Lowest temperature $\geq$ 4°C 0#light diesel Oil GB252 Lowest temperature $\geq$ -5°C -10#light diesel Oil GB252 Lowest temperature $\geq$ -14°C -20#light diesel Oil GB252 Lowest temperature $\geq$ -29°C -35#light diesel Oil GB252	295L	Fuel tank
Brake fluid	Motor vehicle brake fluids HZY3 (DOT3) GB12981	4L	Brake oil cup
Grease	2# or 3# lithium based grease GB7324	2.8kg	Pins in every joint points of the work equipment
Antifreeze	Engine coolant of glycol type SH0521		Radiator

## 2.2.2 Reference Table of Foreign and Domestic Oils

### ● Engine oil

Oil Brands	Similar Oil Brands (classified by SAE standard)			
	MOBIL	SHELL	CALTEX	ESSO
Diesel Machine Oil Excelled CD and CD 15W-40 GB11122	HEIBAWANG1300 (SAE15W-40) (-15°C~50°C)	RotellaSX 40; Rotella TX 40, 20w/40; Rotella DX 40	<b>Caltex Delo Gold Multigrade 15W-40</b>	Essolube XT-3; Essolube XT-2
Diesel Machine Oil Excelled CD and CD 5W-30 GB11122	HEIBAWANG1300 (SAE10W-30) (-20°C~40°C) Delvac super 1 (over -40°C)	Rotella SX30, 10w/30; Rotella TX30; Rotella DX30		Essolube XT-5

### ● Hydraulic oil

Chinese Brands	Similar Oil Brands				
	CALTEX	SHELL	MOBIL	CASTROL	ESSO
Hydraulic oil L-HM46 (-5°C~40°C) GB11118.1	Caltex RANDO HDZ46 (-25°C~40°C)	Tellus 27; Tellus 29	DTE25 (-10°C~40°C)	Hyspin AWS 32; Hyspin AWS 46	Nuto H46
Hydraulic Oil L-HV46 (-30°C~40°C) GB11118.1-1994		Hydro-kinetic Tellus T27 46	DTE15M (-26°C~40°C)	Hyspin AWH46; Nuto	Vnivis N46

### ● Hydraulic transmission oil (torque converter-transmission oil)

Chinese Brands	Similar Oil Brands				
	CALTEX	MOBIL	FUCHS	ESSO	SHELL
8 # Hydrostatic transmission oil Q/SH303 064	Caltex Delo Gold Multigrade15W-40	Mobile HEIBAWANG1300 (SAE 15W-40)	Titan universal HD15W-40	Standard Torque Fluid G7	Rotella 10W

● **Gear oil (Axle oil)**

Chinese Brands	Similar Oil Brands (classified by SAE standard, GL-5)				
	CALTEX	FUCHS	MOBIL	ESSO	SHELL
Heavy duty gear oil for automobile (GL-5) 85W-90 GB13895	Caltex Thuban GL5 EP 90	Titan Gear LS90	Mobil Gear oil HD80W-90 (-20°C~40°C); Automobile Gear oil HD85W-90 (-10°C~50°C)	Gear oil GX 85W-90	Spirax EP Heavyduty HD90 HD80w-90

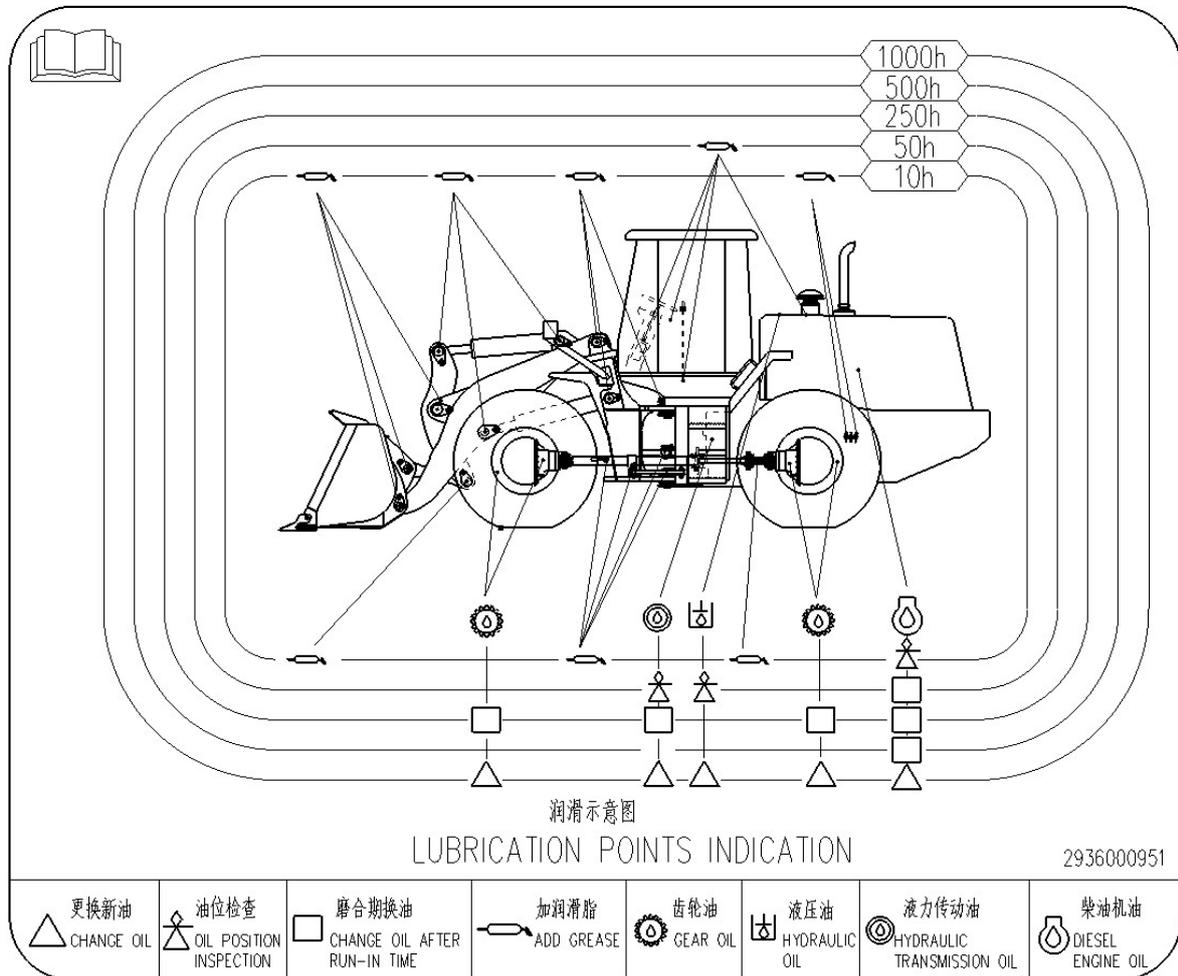
● **Brake fluid**

Chinese Brands	Grade	Similar Oil Brands			
		MOBIL	ESSO	British BP	SHELL
Motor vehicle brake fluids HZY3 GB12981	SAE 1703C	Super performance brake fluid DOT3	Brake fluid	Brake fluid Disc-brake fluid	Donax B

● **Grease**

Chinese Brands	Similar Oil Brands					
	MOBIL	CALTEX	CASTROL	ESSO	British BP	SHELL
ZG-2 or ZG-3 Lithium based lubricant grease GB7324	Mobile grease XHP222	Marfak multi Purpose	LM grease	Ronex MP; Beacon EP 2	Energrease L	Retinax A; Alvania

## 2.3 The Sketch of Lubricating Points



## 2.4 Outline of Electric System Maintenance

- If the wire gets wet or the insulation is damaged, electric leakage may occur and result in hazardous accident.
- Maintenance of components related to the electric system.
  - Check the tension and distress of fan belt.
  - Check the fluid level of storage battery.
- **Never** remove or disassemble any electric components installed in the machine.
- **Never** install any electric components other than those specified by us.
- Be sure to keep the electric system free of water when washing the machine or working in rain and snow.
- Avoid the electric system the corrosion by seawater when working on the seashore.

## 2.5 Maintenance Tools

Refer to the production containerization list for details of maintenance tools.

## 2.6 Tightening Torque of Threads

Be sure to carry out the maintenance following the table lists which is the standard tightening torque of threads in the main components, except for specified conditions.

No.	Position	Thread size	Material or character calss	Torque(N.m)
1	Assembling bolts of transmission base	M18×40	8.8	240~280
2	Middle cover bolts of transmission base	M14×35	10.9	125~165
3	Assembling bolts of hub and brake disc	M20×1.5×50	8.8	280~380
4	Assembling bolts of left and right differential carriers in the main transmission	M16×1.5×150	40Cr	280~330
5	Assembling bolts of driven spiral gear and right differential carrier in the main transmission	M16×1.5×55	40Cr	280~330
6	Assembling bolts of bearing bracket and carrier in the main transmission	M22×100	40Cr	500~600
7	Lock nuts of input flange in the main transmission	M33×1.5	8	320~400
8	Assembling nuts of planetary gear carrier and hub	M20×1.5	40Cr	500~600
9	Assembling nuts between main transmission carrier and axle housing	M16×1.5×45	8.8	193~257
10	Rim nuts	M20×1.5	35	480~580
11	Assembling bolts between brake pliers and carrier	M20×1.5×56	40Cr	376~502
12	Assembling bolts between driving axle and frame	M30×2×175	45	530~670
13	Assembling bolts at the middle of driving shaft	M14×1.5×55	8.8	125~165
14	Assembling of mobile oil box and frame	M16×35	8.8	185~265
15	Assembling bolts between fuel tank and frame	M24×2×130 M24×2×80	8.8	320~480
16	Assembling bolts between teeth and bucket	M20×85 M20×62	45	376~502

## 3 RULES OF MAINTENANCE

Maintenance content includes running in of the new machine and periodic maintenance of every 10, 50, 250, 500, 1000 and 2000 hours.

### 3.1 Every 10 Hours (Days) Service

- Check the sealing performance of work equipment systems such as hydraulic, steering and brake system.
- Check the flexibility and reliability of brake.
- Check whether the electric circuit is correct and electric components are normal.
- Check the oil level in the oil tank and the water level in the water tank.
- Add greases to fan shaft, jointed point between front and rear frames, driving axles, jointed points of oscillating frame and joint points of work equipment.
- Check if there are other abnormalities.
- Refer to “Operation and Maintenance Manual” of diesel engine for maintenance.

### 3.2 Every 50 Hours (Week) Service

Carry out the periodic maintenance of every 10 hours with this maintenance operation at the same time.

- Check oil level of the gearbox, hydraulic oil tank and brake booster pump.
- Tighten all assembling bolts of transmission axles.
- Check whether all assembling bolts of hubs and brake caliper are loosened.
- Check all assembling bolts of teeth for tightening.
- Check and lubricate the accelerator control, parking brake and gearshift control system.

In addition, do the extra maintenance in the first 50 hours as follow:

- Check and clean the air vent of gearbox. Check and clean the filter cartridge of oil line system of torque converter-gearbox.
- Check if there is leakage in the hydraulic system. Check and clean the air vent of hydraulic reservoir. Check and clean the oil-return filter cartridge of hydraulic reservoir.
- Check if there is leakage in the brake system. Clean the filter mesh of oil bowl in the booster pump. Clean the air vent and check the brake fluid. Add if deficient.

### 3.3 Every 250 Hours (Month) Service

Carry out the periodic maintenance of every 10 and 50 hours with this maintenance operation at the same time.

- Check the storage battery. Clean surface and terminals of the battery then coat Vaseline lamina.
- Check whether assembling bolts of frames are loose and welding seams are cracking.
- Check whether the front and rear axles, engine and gearbox and frame are loosening.
- Check the tires pressure. Inflation pressure of front tires should be 0.333~0.353MPa while that of rear tires is 0.275~0.294MPa.
- Open the water drain valve in the air tank to drain the water.

In addition, do the extra maintenance in the first 250 hours as follow:

- Check and clean the air vent of gearbox. Clean the oil pan of gearbox. Replace the suction filter cartridge in the oil pan of gearbox. Replace the filter cartridge in the oil lines of torque converter-gearbox. Replace the gearbox oil.
- Replace the gear oil of front and rear axle.
- Check if there is leakage in the brake system. Clean the filter mesh of oil bowl in the booster pump. Clean the air vent and check the brake fluid. Add if deficient and replace if necessary.

### 3.4 Every 500 Hours (Season) Service

Carry out the periodic maintenance of every 10, 50 and 250 hours with this maintenance operation at the same time.

- Check and adjust the clearance of hand brake system.
- Check the wearing condition of brake discs and friction discs. Replace if necessary.
- Clean the silencer of braking electromagnetic valve.

In addition, do the extra maintenance in the first 500 hours as follow:

- Check if there is leakage in the hydraulic system. Check and clean the air vent of hydraulic reservoir. Replace the oil-return filter cartridge of hydraulic reservoir. Check the quantity and cleanness of hydraulic oil. Filter if possible, add if deficient and replace if necessary.
- Check if there is leakage in the brake system. Clean the filter mesh of oil bowl in the booster pump. Clean the air vent and replace the brake fluid.

### 3.5 Every 1000 Hours (Half an Year) Service

Carry out the periodic maintenance of every 10, 50, 250 and 500 hours with this maintenance operation at the same time.

- Clean the oil pan of gearbox. Clean the air vent of gearbox. Replace the suction filter cartridge in

the oil pan of gearbox. Replace the filter cartridge in the oil lines of torque converter-gearbox. Replace the gearbox oil.

- Change the gear oil of front and rear axles.
- Check and clean the filter mesh of oil bowl in the booster pump. Clean the air vent and replace the brake fluid.
- Check if there is leakage in the hydraulic system. Check and clean the air vent of hydraulic reservoir. Clean the hydraulic reservoir. Replace the filter cartridge of oil suction and return filter. Replace the hydraulic oil.
- Check the clearance and wear condition between pins and bushes in every articulated point.

### **3.6 Every 2000 Hours (Year) Service**

Carry out the periodic maintenance of every 10, 50, 250, 500 and 1000 hours with this maintenance operation at the same time.

- Check performances of the torque converter and gearbox, and disassemble them for checking if necessary.
- Check the sealing performance of multi passage valve and hydraulic tank by measuring the natural sedimentation volume of the cylinders fuel oil, and then check the system pressure. If the natural sedimentation volume is over than its specified value, replace the multi passage valve or hydraulic tank. Contact us for details.
- Check the weld seams of rim and other stress parts and adjust the deformation.

### **3.7 Alteration**

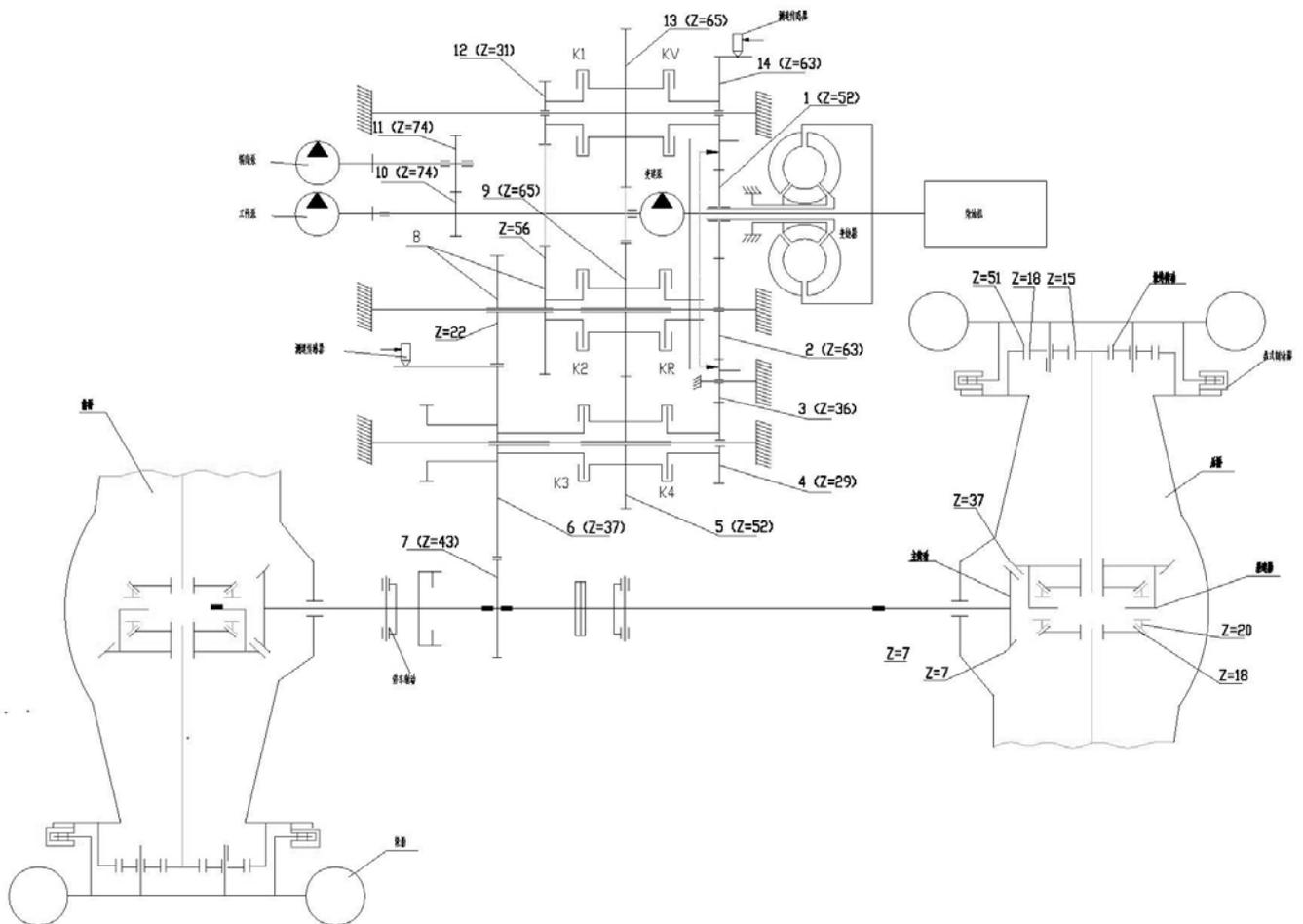
The maintenance principles listed above are the normal requirements. The maintenance time should be determined by the closer one between two of the maintenance schedules. If the working condition is very severe, please short the maintenance time cycle according to the real conditions to increase maintenance time.

### **3.8 Always replace air-storage tank when carrying out 3 years service.**

# CHAPTER V THE STRUCTURE AND PRICIPLE OF MAIN COMPONENTS AND SYSTEM

## 1 Transmission System

The transmission system includes hydraulic torque converter, transmission box, the oil line system of hydraulic torque converter of transmission box, transmission axle, front and rear driving axle, wheel and so on. The transmission system theory is shown in the Figure 5-1.



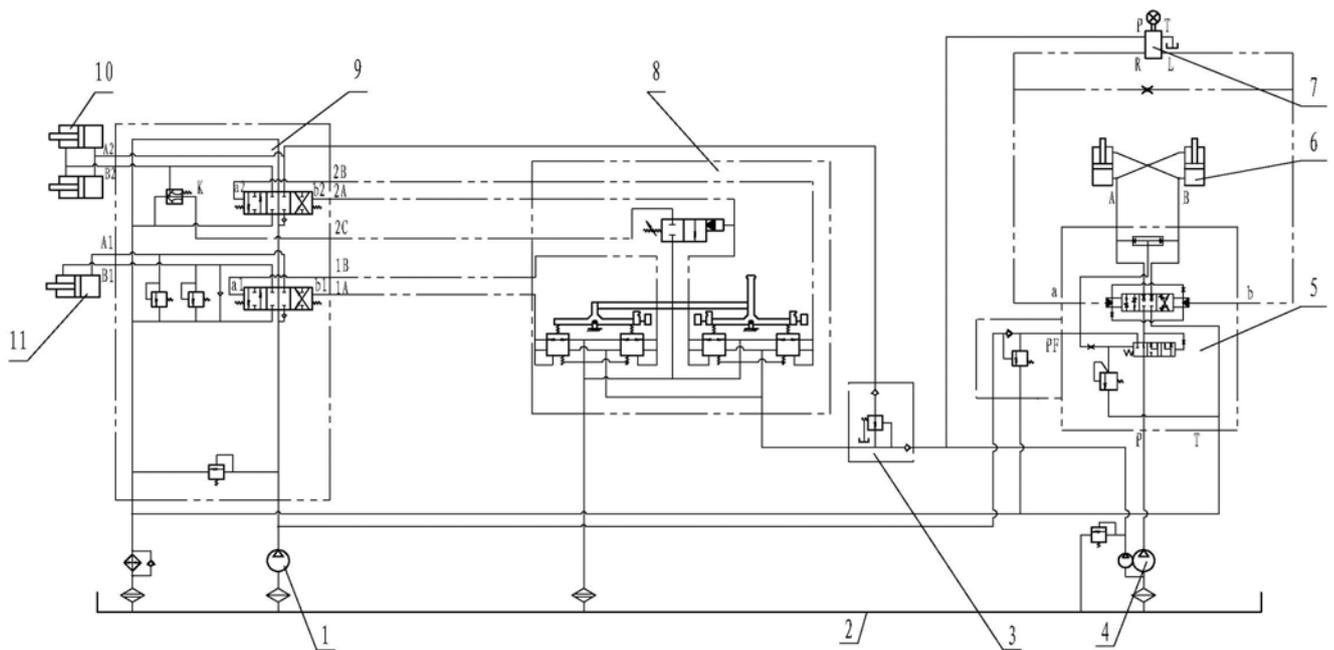
1. Input gear 2. KR steering gear 3. Intermediate gear 4. 4th speed gear 5. K34 gear ring  
 6. 3rd speed gear 7. Output gear 8. Gear assy 2nd speed large-small gear 9. KR2 gear  
 10. Working pump gear 11. Steering pump driving gear 12. 1st gear 13. KV1 Gear  
 14. KV steering gear

Figure 5-1 LG968/969 Transmission System Theory

## 2 Hydraulic System

The hydraulic system includes the working equipment hydraulic system and steering hydraulic system. The working equipment hydraulic system is composed of work pump, priority valve, multiway valve, pressure selection valve, lift arm cylinder, bucket cylinder, hydraulic oil tank and pipe attachments, as is shown in Figure 5-2.

The multi-way valve is changed from machinery control to hydraulic control multi-way valve. The multiway valve of rocket cylinder controls three actions including dumping, median and taking bucket back while the multiway valve of lift-arms cylinder controls four actions including floating, lowering, median and lifting to achieve the control of loader's working equipment. The hydraulic control system employs hydraulic priority control technique, which is handy and flexible to control. The pre-set pressure of safety valve is 18~18.5MPa. The overload pressure of rocket cylinder's large cavity is 20.5MPa while that of small cavity is 12MPa.



- 1-Working pump    2-Hydraulic reservoir    3-Pressure selection valve    4-Twin pump  
 5- Flow amplification valve    6-Steering cylinder    7-Steering unit    8-Pilot valve  
 9-Multiway valve rocket cylinder    11-Life-arms cylinder    12-Bucket cylinder

Figure 5-2 Hydraulic System Theory

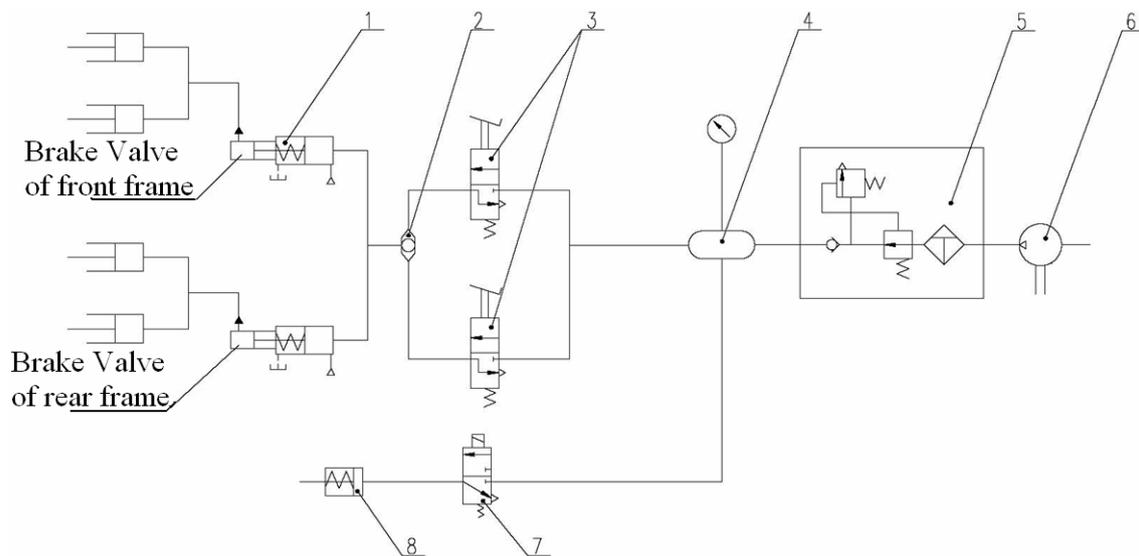
This system employs flow amplification full hydraulic pin steering system. Flow amplification steering system mainly includes steering pump, unload valve, flow amplification valve, steering unit, steering cylinder, hydraulic oil reservoir and the pipe attachments.

Oil line mainly includes pilot oil line and main oil line. The flow of pilot oil line controls the flow of the main oil line to make sure the variation of oil flow from main line to steering cylinder in some ratio, so that the small flow with low pressure can control large flow with high pressure, as a result, the steering operation is handy and flexible. Safety valve is on the flow amplification valve, the system pre-set pressure is 14MPa.

When the system working pressure of working equipment is below 16MPa, the hydraulic oil of steering system will flow through PF port of flow amplification valve, unload valve and will converge with the oil of working equipment hydraulic system to let working equipment hydraulic system achieve large flow with low pressure working. When the system working pressure of working equipment is above 16MPa, unload valve will unload. The working equipment can get oil supply only from working pump, so that to achieve small flow working with high pressure.

### 3 Brake System

Brake system is used when the machine decelerates even stops or the long-term parks on the level ground or incline. The brake system of this machine is composed of driving brake system, emergency and parking brake system.



- 1-Air booster pump 2-Shuttle valve 3-Air brake valve 4-Air tank  
 5-Combination valve of oil water Separator 6-Air compressor  
 7-Braking electromagnetic valve 8- Parking brake air room

Figure 5-3 LG968/969 Braking Sytem Theory

### 3.1 Driving Brake System

This system is double brake pedal, air pushing oil and four wheels caliper disk brake system. 8 brake clamps with 2 rear clamps and 2 front clamps are used to improve the safety of the whole machine.

When the left brake pedal is stepped on during driving, the compressed air of air tank 4 flows through air brake valve 3 and shuttle valve 2 into the air chamber of air booster valve 1 and pushes the piston of booster pump to change oil pressure (oil pressure is about 14MPa). Brake fluid pushes the piston of caliper disk brake and makes the friction disk contact the brake plate and brake the wheels to achieve the purpose of decelerating or parking. And the air pressure signal is send out to cut off the power of gearbox.

When the right brake pedal is stepped on during driving, the braking theory is the same as left pedal is stepped, but the power of gearbox is not cut off.

Release the brake pedal, the compressed air of booster pump bleeds from brake valve to atmosphere and the brake state relieves.

### 3.3 Emergency and Parking Brake System

This system employs the electronic control air driving inner expand hoof type brake system. During running, gently rotate the operation button of the brake electromagnetic valve 7, the button will rebound later automatically, the compressed air of air tank 4 flows through brake electromagnetic valve 7 into the parking brake air room 8, pushing the spring to open the piston, release the disk brake to release braking status; when stopping, **push** the operation button of brake electromagnetic valve 7, the compressed air in brake air room 8 will be drained to the environment through the air drain outlet of brake electromagnetic valve, the brake unit will be pulled up due to the spring force to brake the machine, and at the meanwhile, air pressure signal will be send and the break indicator lamp will be **ON** and the power of gearbox is cut off.

When the system pressure is lower than 0.4MPa, the brake electromagnetic valve will power off automatically, so that to achieve emergency brake, so that the compressed air in parking brake air room 8 will be drained to the environment through manual control brake valve to achieve emergency brake, to ensure the safety of machine and the people.

## 4 Electric System

Electric system is composed of storage battery, starting motor, charge generator, priority control system, buckle auto-level system, appliance, switch, lamps, air condition circuit and other electric instruments.

The system of this machine employs D.C. 24V voltage, negative electrode and single wire lines. The relation of each electric instrument and their working theories refer to the theory sketch of electric system, as is shown in figure 5-4.



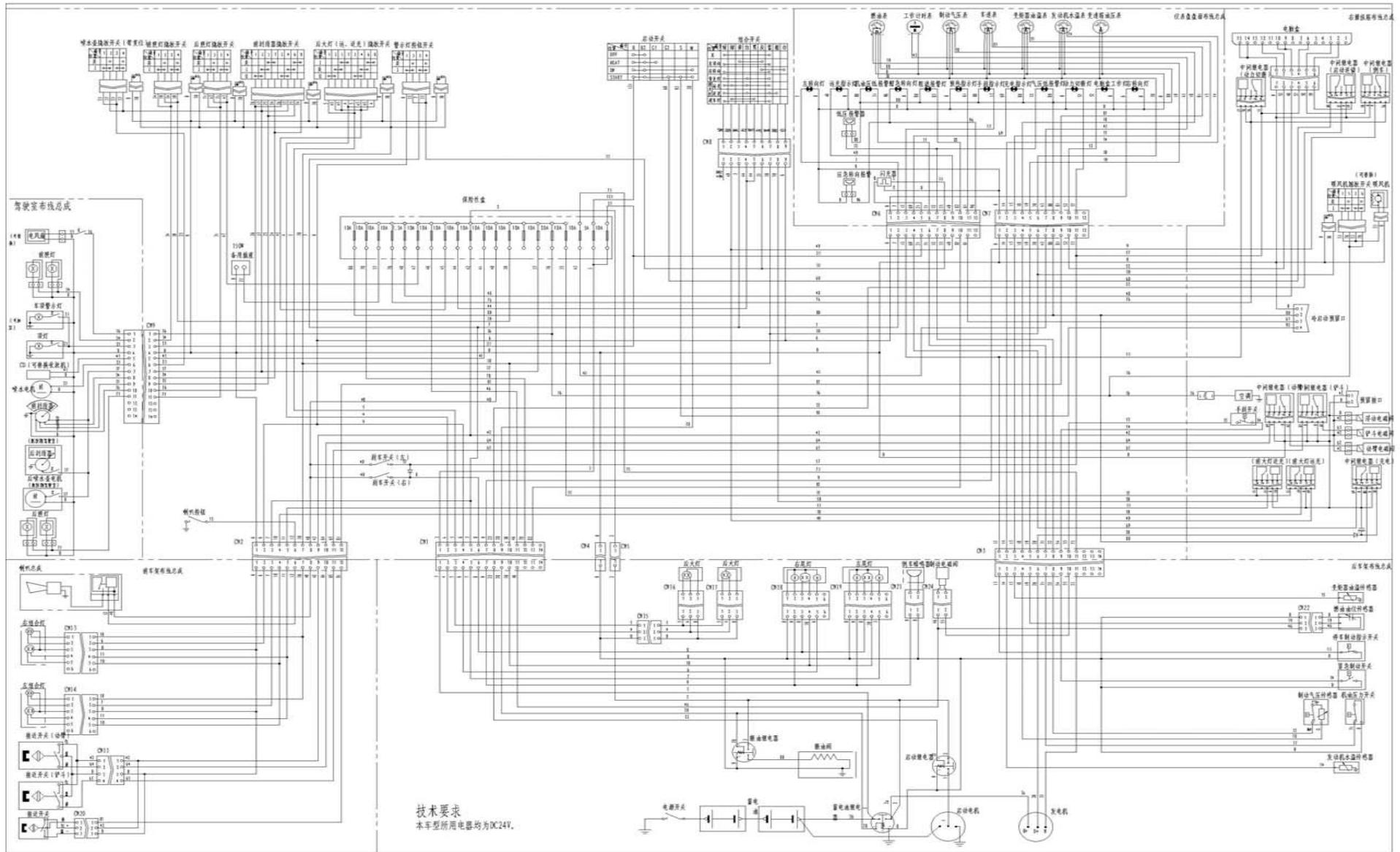


Figure5-4 LG968/969 Electric System Theory