

——Technical document No.CG-CE-CG935G-005

Service Manual of CG935G Wheel Loader

——Manufacturer

Name: Sichuan Chengdu Chengong Construction Machinery Co., Ltd.

Address: No.1 Middle Honghe Rd., Chengdu Economic & Technological
Development Zone, Sichuan, P. R. China

Tel: 086-028-

Fax: 086-028-

Postcode: 610110

Contact person:

——Machine

Model: CG935G

Name: Wheel loader

Serial Number:

Year of Manufacture:



CG935G WHEEL LOADER

SERVICE MANUAL

SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD.

Content

Preface	8
Safety	10
I Safety Symbols	11
1.1 Safety Symbols and Their Positions	11
1.2 Implication of Safety Symbols	11
II Safety Rules	17
2.1 EU Safety Requirements	17
2.2 Safety of Operator	17
2.3 Safety Protective Appliances	18
III Operation of Machine	19
3.1 Get Familiar with the Machine	19
3.2 Get in and off the Machine	19
3.3 Fire And Explosion Prevention.....	20
3.4 Fire Extinguisher	21
3.5 Ether (When Coldstart Device Is Equipped on the Machine)	21
3.6 Precautions for Burnings and Other Injuries.....	22
3.7 Precautions for Crush or Cutting	24
3.8 Precautions in Using FOPS&ROPS.....	27
3.9 Proper Handling of Waste.....	28
3.10 Prevention of Lightning Injuries.....	28
IV Start of Machine	29
4.1 Investigate Surroundings before Working on the Machine	29
4.2 Investigate Surroundings before Working on the Machine	29
4.3 Before Starting of Engine	30
4.4 Starting of Engine.....	30
4.5 After Starting of Engine.....	30
4.6 Check after Starting Machine	31
4.7 Machine Operation	31
4.8 Stop Engine	32

4.9 Parking of Machine	32
V Safe Drive	33
5.1 Sound Alarm (In Compliance with ISO6746-1 Standard)	33
5.2 Pay Attention to Drive Safety	33
5.3 Full-Load Transportation	33
5.4 Overspeeding Is Prohibited	34
5.5 Keep Good Visibility	34
5.6 Notices for Driving in Adverse Conditions	34
5.7 Safe Drive on Slopes	35
5.8 Traction and Trailer	36
VI Safe Operation	39
6.1 Keep Good Operation Practice	39
6.2 Pay Attention to Surroundings of Work Area	39
6.3 Ensure Ventilation When Working in Enclosed Space	40
6.4 Do Not Approach High Voltage Cable	40
VII Safe Parking	41
7.1 Pay Attention to Safety of Yourself and Others	41
7.2 Notices for Cold Regions	41
VIII Safety Inspection and Maintenance	43
8.1 General Knowledge	43
8.2 Working in Enclosed Places	44
8.3 Working underneath the Machine	44
8.4 Working at Top of The Machine	44
8.5 Maintenance When Engine Is Running	45
8.6 Do Not Drop Foreign Matters into the Machine	45
8.7 Cleaning	45
8.8 Welding Repair	46
8.9 Repair of Cooling System	46
8.10 Repair of Hydraulic System	47
8.11 Maintenance of Storage Battery	49

8.12 Charge of Storage Battery	50
8.13 Maintenance of Tires	50
8.14 Notices on Tire Storage	52
IX. Safe Transportation	52
9.1 Loading and Unloading of Loader	52
9.2 Road Transportation	53
9.3 Lifting	53
Product Information	55
I. General Information on Loader	55
1.1 Applicability	55
1.2 Profile and Major Parameters	55
1.3 Scope of Work and Configuration	56
II Cab Facilities	57
2.1 Instruments, Control Switch and Indicator Light	57
2.2 Fuse	58
2.3 Air conditioning System	59
2.4 Accumulator	60
2.5 Cab	62
Operation	66
I Operation and Control of Loader	66
1.1 Start Key Switch	66
1.2 Transmission Control, Steering Gear and Horn Switch	66
1.3 Control of Parking Brake	67
1.4 Control Pedal	67
1.5 Flameout Switch	68
1.6 Control of Working Device	68
II Operation Technology	70
2.1 Common Technology	70
2.2 Loading of Stockpile	71
2.3 Loading with A Truck	72

2.4 Loading of Hard Soil	72
2.5 Excavation	73
2.6 Loading to Bucket	73
Repairing and Maintenance	74
I Knowledge on Tyre Inflation	74
1.1 Tyre Inflation with Nitrogen (N ₂)	74
1.2 Regulation of Inflation Pressure	74
1.3 Purchase of Tyres	75
II Standard for Screw Torque	76
III Daily Maintenance Guide	77
IV Maintenance of Engine's Cooling System	78
4.1 Coolant	78
4.2 Cooling Water	79
4.3 Anti-icing Fluid	79
V Use Rule of Fuel	82
5.1 Precautions on Use of Fuel	82
5.2 Category of Fuel	82
VI Use Rule of Operation Oil	83
6.1 Diesel Engine Oil	83
6.2 Hydraulic System Oil	83
6.3 Transmission Fluid	84
6.4 Differential Gear and Final Transmission Fluid	85
6.5 Grease	85
6.6 Braking Fluid	86
VII Viscosity and Full Capacity of Operation Oil	87
7.1 Viscosity and Temperature Range of Operation Oil	87
7.2 Full Capacity of System	87
VIII S.O.S	88
8.1 Acquisition of Sample Oil for S.O.S	88
8.2 S.O.S (Regular Sample Oil) Analysis	88

IX Maintenance Interval	89
9.1 Upon Request.....	89
9.2 Maintenance of Each 10 Working Hours or Every Day.....	92
9.3 Maintenance after 50-Hour Running-in of New Loaders.....	94
9.4 Maintenance of Each 50 Working Hours or Every Week.....	96
9.5 Maintenance of Each 100 Working Hours or Every Two Weeks.....	96
9.6 Maintenance of Each 250 Working Hours or Every Month.....	97
9.7 Maintenance of Each 500 Working Hours or Every Season.....	101
9.8 Maintenance of Each 1000 Working Hours or Every Half An Year.....	104
9.9 Maintenance of Each 2000 Working Hours or Every Year.....	105
9.10 Maintenance of Each 3000 Working Hours or Every Year.....	107
Machinery Management	109
I Management and Usage of New Machine	109
II Storage of the Machine	109
2.1 No Use for One Month.....	109
2.2 No Use for over One Month.....	109
2.3 Use after Long-term Storage.....	110

Preface

Thank you for purchasing our product!

Before you operate the product, please read this manual thoroughly to ensure your safety and better performance of the product.

This manual contains issues regarding safety protection, operation instruction, lubrication and maintenance.

This manual does not elaborate on the configuration, operation or maintenance issues of main purchased parts such as engine, torque converter, or transmission, etc. For the detailed information, please refer to the attached operation manual of the main purchased parts.

The details or attachments showed by pictures or diagrams in this manual may vary from the actual product. And, for convenience of elaboration, the cover plate or shield on the product may be removed.

This manual does not include the continuous betterment and improvement of the design of the product.

For questions regarding your machine or this manual, please contact Chengdu Chengong Construction Machinery Co., Ltd., Sichuan for the latest information.

You are welcome to bring forth advices on the errors or defects of this manual and we will revise accordingly in new editions.

This manual does not cover tool-carrier. Separate manual is attached when client purchases a tool-carrier.

Safety

The Safety section lists basic safety precaution measures and explains the contents of the warning labels on the machine. Please read and comprehend the basic safety precaution measures prior to operation, lubrication, maintenance or repair of this machine.

Operation

The Operation section is for the reference of new operators and for review of experienced operators; it shall be kept handy for reading and learning.

The pictures or explanations are intended for operators getting familiar with the appropriate procedures of check, start, operation and stop of the machine.

This manual explains the basic operation techniques. The operation skills and techniques of the

operators will improve as the knowledge of the operations on the machine and its performance accumulates.

Maintenance

The Maintenance section contains instructive contents on the maintenance of the machine. The maintenance issues whose periods are not specified are listed in the item of “in need”. For the issues included in the “maintenance period”, please refer to the following elaborations.

Maintenance period

The maintenance period shall be calculated according to timer meter. If more convenient maintenance plan can be provided by the calendar date intervals (days, weeks, or months, etc.) and the intervals of this plan is close to the reading of time meter, it can be used to replace the time meter to calculate maintenance period. The recommended maintenance shall be implemented by the interval whichever is due earlier.

Under the work condition which is extremely severe, dusty or humid, higher frequency of lubrication may be needed than that specified in the “maintenance period”.

All maintenance items shall be conducted repeatedly in the maintenance period. For example, when conducting a maintenance item of a interval of each 500 work hours or each quarter, the maintenance items listed in the intervals of each 250 hours or each month, each fifty hours or each week, and each 10 work hours or everyday shall be conducted simultaneously.

Safety

Most of the accidents result from ignorance of basic safety rules or maintenance measures. Pay attention to potential accident threats. The relevant staff shall pay attention to potential accident threats and possess certain skills by training to correct malfunctions.

Inappropriate operation, lubrication, maintenance or repair is hazard and may result in casualty of personnel.

Any operation, lubrication, maintenance or repair shall not be conducted until the contents regarding operation, lubrication, maintenance and repair are read and comprehended.

Safety precaution issues and warnings are listed in the manual. Ignorance of these warnings may result in casualty of relevant personnel.

It is impossible for Chengdu Chenggong Construction Machinery Co., Ltd., Sichuan to predict every kind of work environment where peril is present. Therefore, the warnings in this manual can by no means cover every aspect. If a certain tool, program, work method or operation technique is not recommended by Chengdu Chenggong Construction Machinery Co., Ltd., Sichuan, you shall take care as for the safety of yourself or of other people. You shall ensure that the operation, lubrication, maintenance or repair procedures you elect will not cause the damage or unsafe status of the machine.

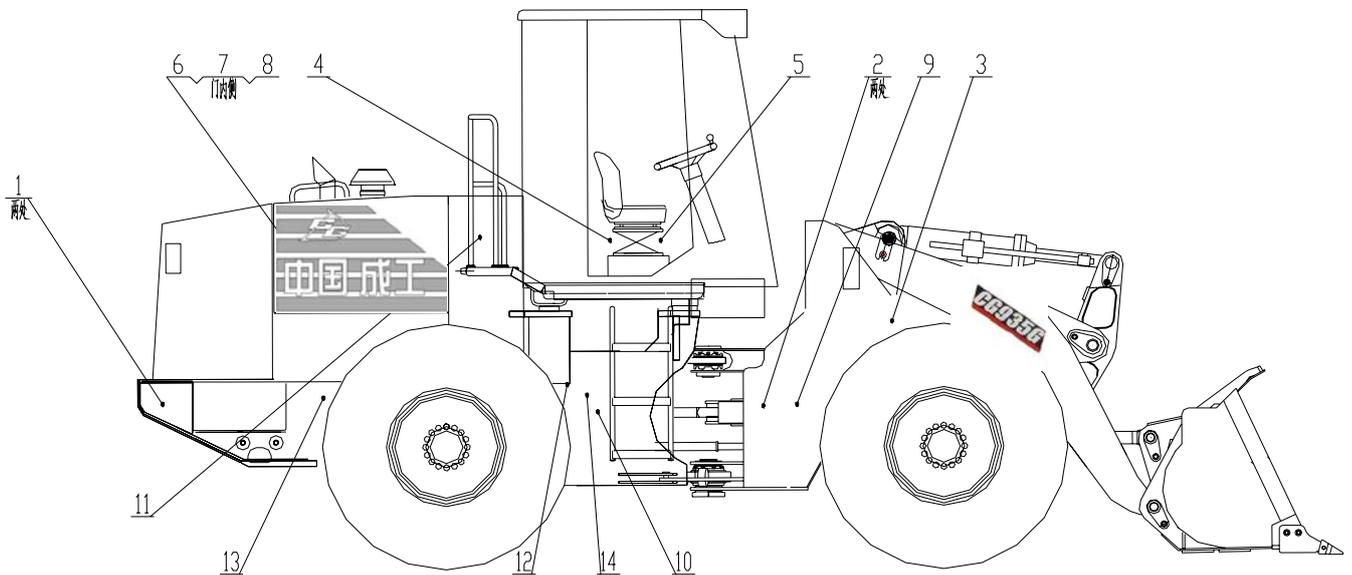
The contents, norms and diagrams in this manual are based on the data which are available at the time when this brochure is compiled. The norms, torque, measurement and modulation methods, diagram and other contents are subject to modification at any time and these modifications may affect the maintenance and repair of the machine. Complete and latest data shall be obtained prior to the start of work. Chengdu Chenggong Construction Machinery Co., Ltd. will provide the latest data.

I Safety Symbols

1.1 Safety Symbols and Their Positions

There are a number of safety symbols on this machine. In this section, their exact positions are identified and the hazard of accidents is described. Please get familiar with all these safety symbols.

Pay attention to all safety symbols and their positions and implications. The symbols and warnings that are obscure or damaged during use shall be replaced by new ones. Clean the safety symbols with cloth, water and soap. Do not use solutions, gasoline or stringent chemical agents that may result in loss of adhesiveness and peel-off of the symbols.



1.2 Implications of Safety Symbols

1. Keep distance from the machine

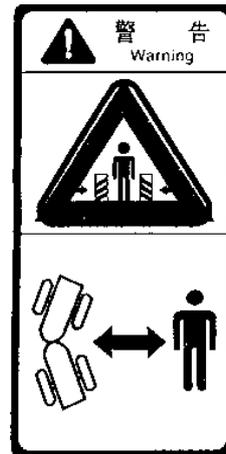
(at the counter weight of the loader)



During the operation of the machine, it is prohibited to approach the machine or enter into the work area to avoid accident or casualty!

2. Keep distance

(at the jointing of the chassis frames)



During the operation of the machine, it is prohibited to approach the jointing of the chassis to avoid accident or casualty!

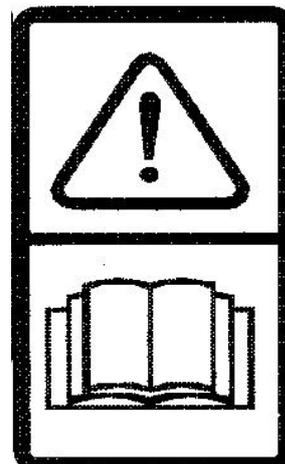
3. Do not approach

(underneath the boom arm)



4. Please read manual and operate appropriately

(at the side door of the operator's cabin)



During the operation of the machine, It is prohibited to get underneath the Machine!

When the machine is stopped and the movable arm is lifted, it is prohibited to get underneath the machine! To avoid accident or casualty!

5. FOPS and ROPS cautions

(at the side door of cab)



The cab has a rollover And falling object protective structure which shall not be modified.

7. Caution: Spray of pressured liquid

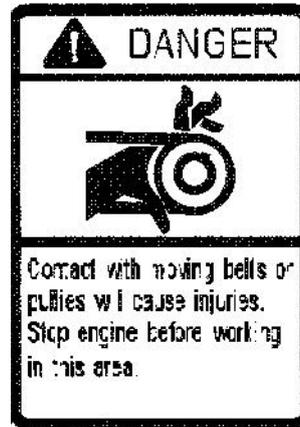
(on the machine body)



Prior to operation or maintenance, please read and comprehend operation and maintenance instruction and safety issues

6. Do not approach fan when engine is working

(at fan housing)



Contact with moving belts or pulleys will cause injuries. Stop engine before working in this area.

8. Keep away from moving belt

(on the machine body)



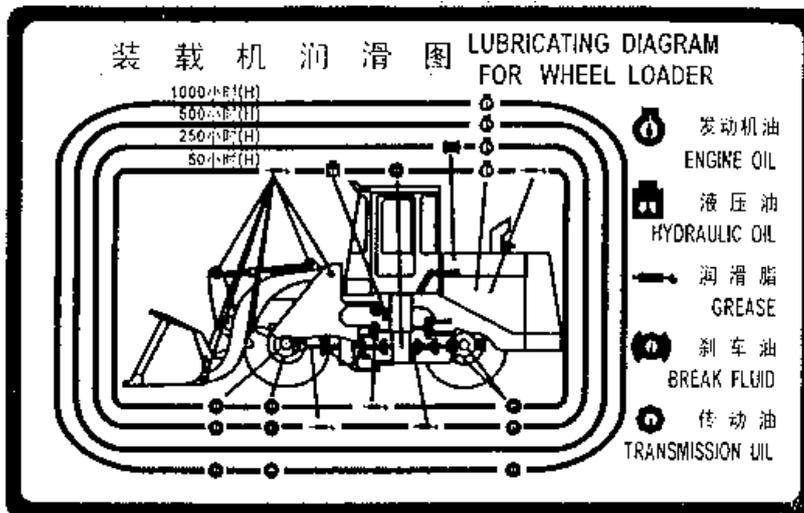
9. Plate on the bucket of the loader

装载机铲斗
Bucket of the loader

本铲斗用于铲装松散物料, 装载重量不能超过3.5吨。
The bucket is used for loose material, The load can not exceed 3.5 tons.

Pressured liquid (diesel, engine oil coolant) may cause injuries. Allow system to vent pressure slowly before servicing.

10. Lubrication diagram for wheel loader (on machine body)



Please conduct lubrication maintenance for the machine in compliance with the requirements.

11. Notice on oil-filling of torque tank (on the machine body)

变速器油箱
TORQUE CONVERTER OIL TANK

ZF箱证等级为SAE15W-40(例品)。出厂为美孚美孚(Mobil) Delvac Super 1300。

SAE15W-40 (The machine is originally filled with Mobil Delvac Super 1300)

注意
请在发动机运转, 变速器油温在40-50°C时, 油液在上下限之间(其中例品)。
NOTICE: 油液在上下限之间(其中例品)。

NOTICE
Please check the oil level at the idle speed of the engine transmission in Neutral position "N" and release the parking brake.
Oil level at 40°C on the lower mark "COLD"
Oil level at 50°C on the upper mark "HOT"

12. Notice on oil-filling of hydraulic oil tank (on the machine body)

液压油箱
HYDRAULIC OIL TANK

环境温度 Ambient Temperature

-4°	14°	57°	50°	68°	86°	104°
-20°	-10°	0°	10°	20°	30°	40°

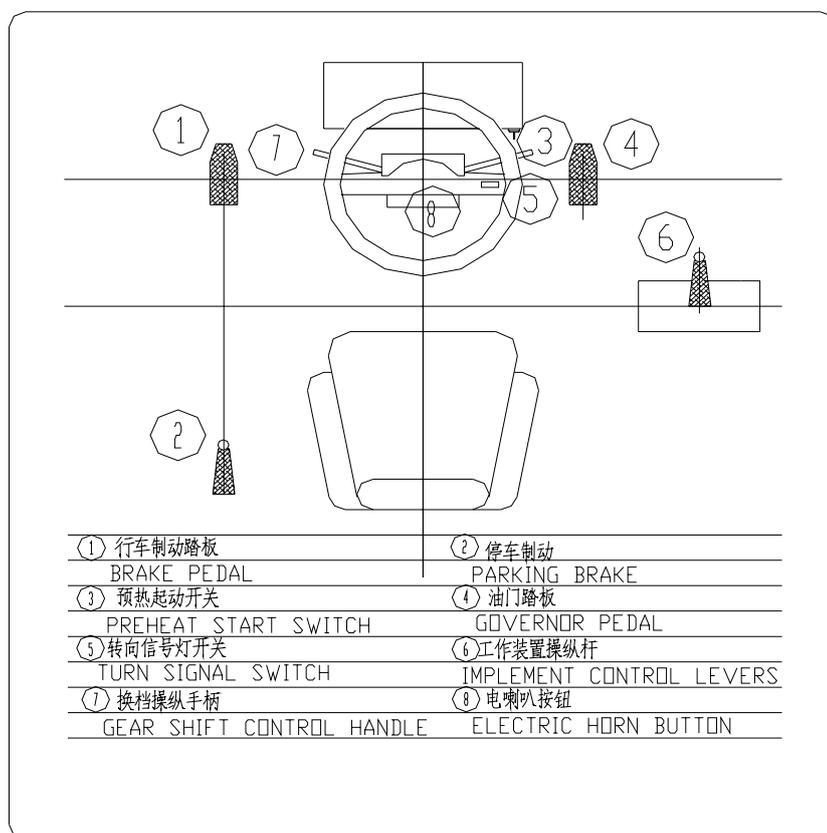
ISO VG46

ISO VG68

13. Plate on fuel tank

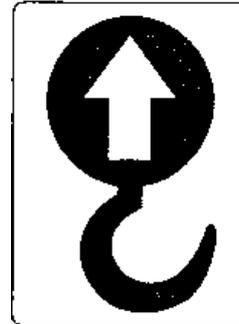


14. Operation plate of cab



**15. Instruction on safety stand for oil cylinder
(on the machine body)**

**16. Symbol of crane hook
(on the machine body)**



When the machine needs to be hoisted, please hang the hook or rope at the location where the hook symbol is affixed.

17. Symbol of lock rod (on the machine body)



The safety stand for oil cylinder is a safety device and is hanged at the rear frame. Before servicing, take it off and lock it in piston of oil cylinder.

Notice: when installing and using the device, please keep the bucket empty and the loader at non-operating state.

II Safety rules

2.1 EU Safety Requirements

1. Noise limit requirement

Complying with the 2000/14/EC directive, this machine meets the following requirements:

L_{PA} : ≤ 85 dB(A)

L_{WA} : ≤ 106 dB(A)

2. The vibration value of the seat of operator's cabin of this machine meets the requirements of ISO 7096-2000.

3. Electromagnetic compatibility

The electromagnetic compatibility of this machine complies with the relevant requirements of ISO13766 Standard. The machines can maintain its normal functions in certain electromagnetic environments and the electromagnetism generated during the operation does not cause damages to surrounding environment.

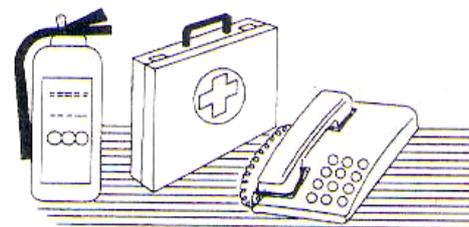
4. The operator's cabin of this machine has ROPS – rollover protective structure and FOPS – falling object protective structure.

2.2 Safety of Operator

Pay attention to location of all safety and warning symbols on the machine and comprehend their meanings. The symbols and warnings that are obscure or damaged during use shall be replaced by new ones.

When the operator is in one of the following status, he shall not operate the machine:

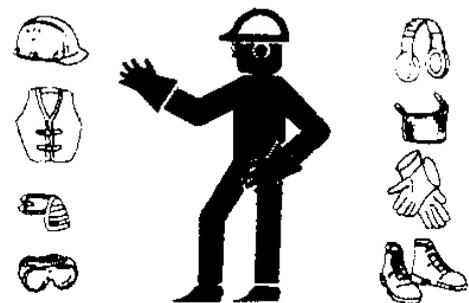
- When the operator is exhausted, he shall not operate the machine.
- When the operator has taken medicines that may cause sleepiness, he shall not operate the machine.
- The operator shall not operate the machine after drinking alcohol.
- The operator shall wear work clothes, work cap and work gloves for the servicing of the machine. The operator shall not wear clothes or ornamental articles that may either hook or entangle the machine, or cause combustion or sparkles in contact with electrical devices.



- Personnel who is not approved or certificated (operation qualification certificate) is not allowed to conduct operation, repair, or maintenance of the machine.
- Be familiar with the command signs and only follow the command signs of one person.
- Before starting the machine, be clear of:
 - Location of fire extinguisher
 - Location of toolkit
 - Fire alarm telephone number
 - Emergency telephone number
- Walk around the machine to ensure nobody is working around the machine and nobody is working lying underneath the machine.

2.3 Safety Protective Appliances

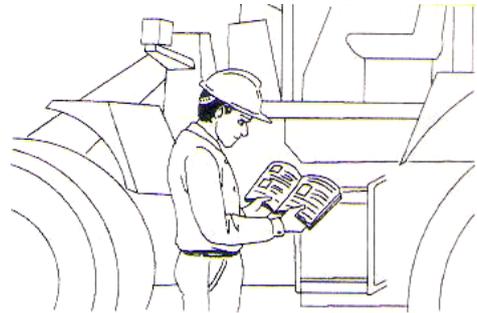
- When servicing the machine, determine the needed individual protective appliances according to the specific work environment.
- Do not wear clothes or ornamental articles that may either hook or entangle the machine.
- Do not wear clothes or ornamental articles that may cause combustion or sparkles in contact with electrical devices.
- All protective appliances shall be checked prior to use for their usability.



III Operation of the Machine

3.1 Get Familiar with the Machine

- Only those personnel who have received training and obtained qualification are allowed operate and maintain the machine.
- Read and comprehend operation and maintenance instructions and safety issues, otherwise do not work on the machine.
- Failure to follow the instructions or ignorance of warnings may cause injuries.
- When there is oil or grease at or near the operation position, please remove it. Otherwise there will be peril of slip.
- During the operation, repair, lubrication, maintenance and operation of this machine, only one person with operation certificate is allowed to operate machine or conduct servicing of repair, lubrication, maintenance, etc. Other people shall stay away from the machine. When operating the machine, it is prohibited to have more than one person in the operator's cabin.
- Various checks on the machine shall be conducted prior to operation. Check whether all the safety protective devices are in a safe status; whether the tires are worn and whether the tire pressure is proper. Check whether there is abnormal phenomenon of oil leakage, water leakage, gas leakage, deformation, looseness, abnormal sound, etc., which may cause malfunction or severe accident.



3.2 Get in and off the Machine

- When getting in or off the machine, do not wear loose clothes such as headscarf or jewels, otherwise they may be clamped and injuries may be caused.
- Check the handrails and steps before getting in and off the machine; remove oil stains, lubricants or mud if there is any. Besides, damages of parts shall be repaired and loose bolts shall be fastened.
- It is prohibited to jump onto or off the machine.
- It is prohibited to get in or off the machine when the machine is moving.
- When getting in or off the machine, face the machine, hold the handrail and step on the steps;

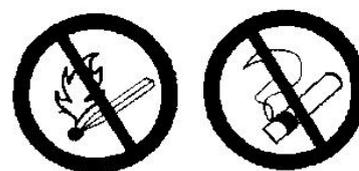
keep three-point contact (two feet and one hand or two hands and one foot) to ensure the stability of the body.

- It is prohibited to hold any control lever when getting in or off the machine.
- It is not allowed to climb into the operator's cabin from the rear ladder of the machine or get off the machine by the tires beside the operator's cabin.
- Do not climb up or down the machine when carrying tools or other articles; the needed tools shall be hoisted onto the operation platform by rope.

3.3 Fire and Explosion Prevention

The fuel used by the engine of the loader, most lubricant and some coolant are combustibles. It is very dangerous when flame is close by and special care shall be taken.

- Do not leak the fuel on hot surface or electric components.
- When fill fuel, the engine must be stopped. Do not smoke when filling fuel or at the fuel-filling area.
- Explosive gas will be generated around the storage battery; keep flames away. Maintain and use storage battery in strict compliance with the instructions in the product manual.
- Fasten the lids of containers in which the above stated combustible liquid is stored.
- Put the combustible liquid in protective containers and keep them at safe place. They shall be stored by categories and marked accordingly. Prevent them from being used by non-staff people.
- Remove combustibles accumulated on the machine, such as fuel, lubricant and other fragments.
- Do not conduct welding or flame cutting operation on tubes or boxes containing combustible liquid. Before welding or cutting, must clean with fire-resistant fluid when these operations have to be done.
- During the operation of the machine, when the exhaust outlet of the engine muffler is close to dry grass, waste paper or other combustibles, special care shall be taken.



- When parking the machine, take care to select parking place and avoid the high temperature parts like the engine muffler close to combustibles.
- Clean and fasten all electrode terminals. Check for loose or worn wires everyday. Before starting the machine, fasten loose wires and repair or replace worn wires.
- Check whether there is a leakage of fuel, engine oil or hydraulic oil. When there is, change the damaged hose; complete the repair and cleaning before operation.
- Do not use flames when checking dark areas.
- Shall prepare a fire extinguisher and know how to use it. Inspect and maintain it according to the instruction in the manual.

3.4 Fire Extinguisher

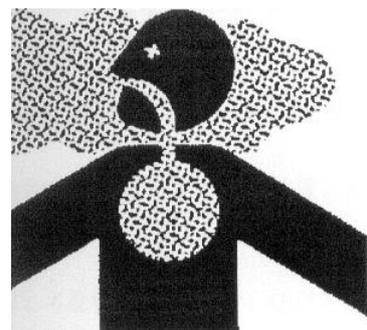
Take actions immediately should a fire arise:

- Must prepare a fire extinguisher for use; get familiar with operation of the fire extinguisher.
- Must prepare first-aid kit at the site. Check regularly and replenish medicines when necessary.
- Sort out some emergency telephone numbers (such as first-aid center, hospital, fire alarm) for contact in emergency. Post these numbers at specified places to ensure everyone is informed.

Location of the fire extinguisher:

3.5 Ether (when coldstart device is equipped on the machine)

- Ether is a toxic and combustible object.
- Injury will be resulted from inhalation of ether vapor or frequent skin contact with ether.
- The area shall be well-ventilated where ether is used.
- Do not smoke when changing ether container.
- Take care to prevent fire when using ether.
- Do not put replaced ether container at living area or in the operator's cabin.
- Do not put ether at places under direct sunshine or where the temperature is over 39°C (120°F) .



- Put discarded ether container at safe place. Do not perforate it or heat it.
- Keep ether container at place which is not accessible for non-staff.

3.6 Precautions for Burnings and Other Injuries

Coolant

- When the machine is working or has just finished working, the engine coolant is hot and is pressured. Severe burnings will be inflicted by contacting with them.
- When checking the coolant level, the engine shall be at the status of stopping and screw off slowly the filler cap of cooling system to check the fluid level (screw off slowly to vent the pressure).
- When it is needed to discharge the coolant, allow the coolant cool down completely before the discharge.

Oil

- Please take care not to touch hot oil or parts to avoid skin burning.
- When the machine is working, the hydraulic oil's temperature is high and the oil is pressured.
- When opening the filler cap of hydraulic oil tank, the engine shall be stopped and hydraulic oil should be cooled down to a degree that it is safe to open with bare hands.
- Before opening the hydraulic oil tank cover, any tube or joint or disassembling parts, please vent their pressure firstly.
- Please do not knock or bend high-pressure tubes.

Accumulator

- Must inspect accumulator before filling nitrogen. It is prohibited to fill gas in if the accumulator is not installed with plate, the contents on the plate is not complete or not able to be recognized, or defects on the body which may affect safe use of it.
- The accumulator is only allowed to fill in nitrogen. It is prohibited to fill in oxygen, compressed air or other combustible gas to avoid explosion.
- The accumulator is a high-pressure container and shall be maintained or changed by professional manufacturers. Before disassembling the accumulator, pressure must be vented and nitrogen inside the bladder be discharged with special tools. Then the parts can be

dissembled.

Storage battery

- Storage battery will release combustible smoke that may cause explosion.
- Do not smoke when checking the electrolyte of the storage battery.
- Electrolyte is an acid material that will cause injury when in contact with skin or eyes.
- Wear protective goggles when working on storage battery.

Pipeline, tubes and hoses

- Do not bend or hammer high-pressure pipelines; do not install damaged tubes or hoses on the machine.
- When repairing any loose or damaged fuel or lubricant tube or hose, any leakage may cause a fire. Please take care to ensure safety.
- Inspect the pipelines, tubes and hoses. Do not check for leakage with bare hand. Check for leakage with a piece of board or cardboard. Fasten all joints with specified torque. When any of the following troubles is discovered, shall make replacement.
 1. Damage or leakage of joints.
 2. Wear-out of or cut on out layer and bareness of reinforcing wire.
 3. Local bump of outer layer.
 4. Obvious twist or flatness of hoses.
 5. Wire in reinforcing layer is embedded into outer layer.
 6. Displacement of end joints.

Ensure correct installation of all pipe clamps and guard plates to avoid vibration and consequent overheat by friction with other parts when the machine is working.

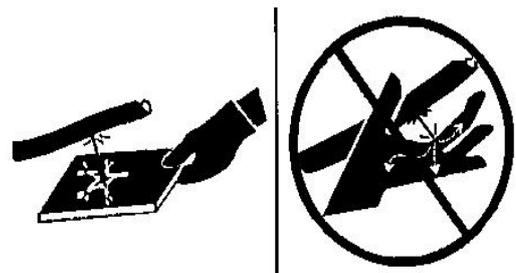
Compressed air

- Compressed air may cause injuries. When clean with compressed air, wear mask, protective clothing and shoes.
- The maximum pressure of compressed air used for cleaning shall be lower than 0.205Mpa.

Leakage of solution

Use board or cardboard to check for leakage.

Even the leakage of pressured fluid as minor as a



needle eye may penetrate muscles and cause injuries. If solution is jetted to skin, it shall be treated within a couple of hours by surgeons who are familiar with this kind of injury.

Asbestos

When handling parts that contain asbestos fiber, it shall be avoided to inhale in asbestos dust, which is harmful. The products of Chenggong that contain asbestos are brake pad, brake plate and some gaskets, the asbestos inside which are normally sealed with colophony or by other means. As long as no air containing asbestos is generated, normal handling is harmless.

When asbestos dust is generated, follow the precautions below:

- Never clean with compressed air.
- Do not brush or abrade materials containing asbestos.
- For better cleaning result, clean with wet cloth or vacuum equipment with high efficiency dust/air separation filter screen.
- Ventilate machining workstation of frequent use.
- Wear proper breathing mask when there is no way to control asbestos dust.
- Observe applicable laws and regulations in the work area.
- Store asbestos in compliance with relevant environment laws and regulations.

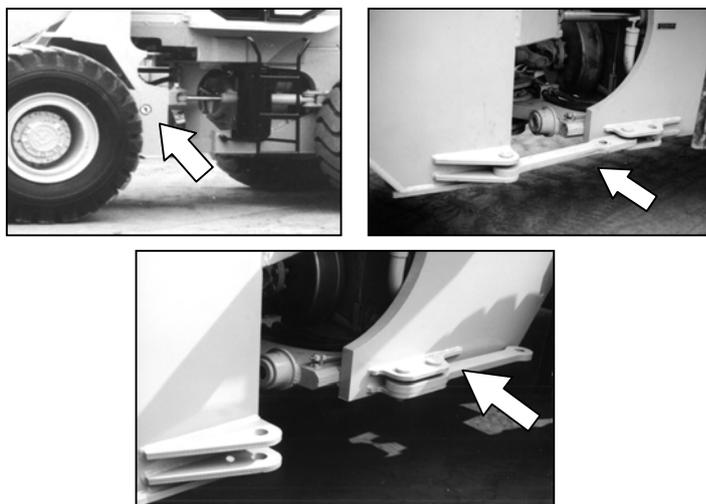
3.7 Precautions for Crush or Cutting

- During the operation of the machine, the space between the front and rear frames is not allowed to be entered.

When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position.

When the machine is hoisted and loaded on

other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position.



Lock rod

Lock rod is painted with red warning color. When it is in a lock status, it can prevent perilous

factors caused by relative movement of articulated front and rear frames in case of being under unpredictable foreign force. When the lock rod is in a lock status, the machine cannot run.

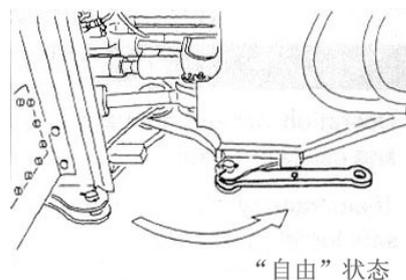
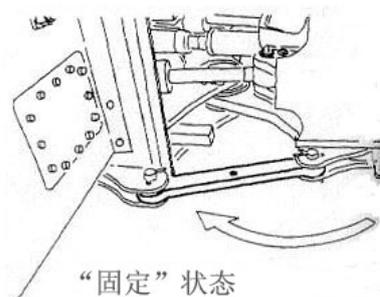
The lock rod must be in a lock status in following circumstances:

The lock rod must be in a lock status in following circumstances:

- During inspection, maintenance and repair of the machine;;
- When preparing to leave after finishing the work and stopping the engine each time;
- When the machine is being hoisted;
- During shipment of the machine;

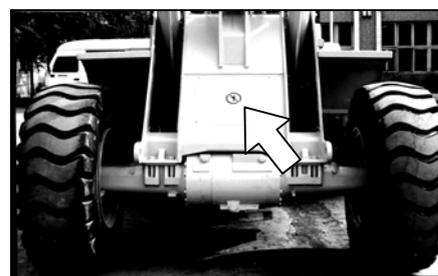
Fix

1. Keep the front and rear frames in a straight position.
2. Take off the rear split pin at the rear lug with a wrench, then take off the pin shaft from the bottom.
3. Rotate lock rod onward until the hole in the lock rod is concentric with the hole at front lug (see the picture).
4. Insert the newly pulled out locking pin shaft from the bottom and fix it with split pin. The front and rear frames are now in a lock status.



Release

1. Take off the split pin at the front lug, then take off the pin shaft from the bottom.
2. Rotate lock rod backward until the hole in the lock rod is concentric with the hole at rear lug (see the picture).
3. Insert the pin shaft which was taken off from the bottom and fix with the split pin. The front and rear frames are now in a free status.



- **When servicing haudralic parts inside the front frame or front axle and the movable arm is needed to be lifted, the bucket shall be located on a solid platform to prevent it from falling and cause severe injuries. It is prohibited to have anyone stand underneath the bucket or movable arm when the machine is working.**

When working underneath the machine, the machine and its attachments shall be properly supported. Do not rely on hydraulic device to keep the stability of the machine. If the control mechanism moves or hydraulic pipeline leaks, any attachment may fall off.

Instructions on use of protective safety stand for lift cylinder

Protective safety stand for lift cylinder is a safety protective device. It is fixed at the rear frame. Before servicing the wheel loader, it shall be removed from the fixing position and installed at the indicated places of the lift cylinder (as shown in the diagram). The orders of the removal and installation is as follows:

1. Remove the protective device;
2. Install it at the specified positions of the lift cylinder (two places at the left and right side of



the oil cylinder);

文本筐 Fix the safety stand for oil cylinder into the piston rod of oil cylinder when repairing.

3. Install and fasten tightly its fixing bolt.



文本筐: When not repairing, fix the protective device for the oil cylinder at the rear frame.

- Unless otherwise specified, no adjustment shall be made when the machine is working or

the engine is running.

- At the linkage mechanism of the work device, in accordance with the movement of the work device, the space at the linkage mechanism may increase or decrease.
- Keep away from all rotating and moving parts.
- Ensure that there is no any foreign matter between the fan blades. Fan blades will throw out or cut the tools or other foreign matters which fall inside or are pushed inside.
- Donot use twisted or worn wires or cables. Weare gloves when handling wires and cables.
- When removing bouncy objects, such as snap ring or closing ring, wear protective goggles to protect eyes. Take care to check whether anyone is nearby in case injury being inflicted to other people.
- When disassembling parts by hammering, fragments may fly over. Take care not to cause injuries.

3.8 Precautions in Using FOPS & ROPS (falling object protection structure or rollover protection structure)

The rollover protection structure (ROPS) and falling object protection structure (FOPS) of the wheel loaders of Chengdu Contruaction Machinery Co. Ltd are mounted outside the cab framework。 The FOPS & ROPS are for protection of operator in case of heavy objects falling down from above or rollover of the machine. The ROPS will not only bear the load when the machine is rolling over, but also absorb impact energy.

- If the device is damaged by falling or rollover, its strength will decrease and it will be unable to perform its protective functions. For this instance, please contact with Chengdu Contruaction Machinery Co. Ltd or its approved dealers to consult for repair method.
- Even if the POPS is installed, the operators must fasten safety belt for effective protection. Even if no defect is discovered of the safety belt, it shall be replaced evrey three years.
- It is prohibited to bore or weld inside or outside of ROPS, otherwise the strength of ROPS may be lowered.

3.9 Proper Handling of Waste

In order to prevent pollution, especially in the places where people or animal abide, the following requirements must be observed:

- Use leakage proof container when discharging liquid. It is not allowed to dump waste liquid on ground, sewage or water source site.
- When handling harmful materials, such as lubricant, fuel, coolant, solution, filter, storage battery and other materials, observe the relevant laws and regulations.
- The replaced waste tires shall be stored in specified safe place or be recycled. Do not dispose of randomly.

3.10 Prevention of Lightning Injuries

When lightning occurs near the machine, the operator is prohibited to carry out following procedures:

- Climb up the machine.
- Get off the machine.

If you are in the cab when lightning occurs, please remain in the cabin. If you stand on ground when it occurs, you should stand at a place far from the machine during the lightning period.

IV Start of machine

4.1 Investigate Surroundings before Working on the Machine

- Before starting operation, get familiar with the surroundings; check carefully and identify abnormal situations that may arise.
- Investigate the topography and ground status of the site and decide on the best and safest operation method.
- When working indoors or in other enclosed places, make sure the site is well ventilated to avoid poisoning by waste gas.
- In places where embedded facilities exist, such as water pipe, gas pipe, or high voltage cable, contact with relevant companies to identify the location of embedded facilities. Take care not to damage these facilities during construction. Ensure the safety of construction.
- Remove the obstacles on the drive path. Pay attention to perilous objects of wires, trenches, etc.

4.2 Inspection on the Machine before Starting it

- Check whether there is leakage of oil, leakage of water, looseness of bolt, abnormal sound, or damage or loss of parts.
- Confirm whether the lock rod of the front and rear frames has been released.
- Check whether the fluid level of coolant, fuel and the oil in the oil sump is at a normal status; check whether the air filter is blocked.
- Check whether all the lighting and signal lamps work properly.
- Check whether the meters and horn work properly; check to ensure the control lever is at parking position.
- Remove dirties on the glass of cab and all the lamps to ensure good visibility. The doors and windows shall be fixed in the status of open or close.
- Adjust the rearview mirror to proper position to ensure good visual field of the operator.
- Adjust the operator's seat to best operation position; check whether the seat safety belt and fixture device of it are damaged.
- Check whether the condition of fire extinguisher is normal.
- Ensure the safety belt is properly fastened.

4.3 Before Starting the Engine

- Take care to check if the lock rod of the front and rear frames is removed and fixed upon the rear frame. Do not start machine when the lock rod is not removed.
- Only starting the engine in the cab is allowed. It is prohibited to start engine by short-circuit terminals of motor or storage battery. Starting by bypass system will cause damage of electric system.
- Check to see if necessary light system is installed.
- Before starting the engine and the machine, check whether there is anyone working upon, underneath or near the machine. Check whether there is anyone in the work area.

4.4 Starting of Engine

- When the “please do not operate” or similar label is hanged on the starting switch of control lever, do not start engine or operate any control lever.
- Place the hydraulic control lever at “middle position” before starting engine.
- Place the transmission control lever at “neutral position”.
- Engage parking brake.
- Blow horn to attract attention of people nearby.
- Insert key and turn it clockwise, turn on power switch and the charging indicator light turns on. Then turn the key to start engine.
- **The starting of engine shall not be longer than 5 seconds. Allow the starting motor cool down for 2 minutes before starting again.**
- Start and work on engine in well ventilated condition. Discharge waste gas in enclosed places.

4.5 After Starting of Engine

- Keep low-speed run of engine until the engine oil pressure gauge indicates the pressure is normal. If there is no engine oil pressure within 10 seconds, turn off the engine. Make an investigation before turning on engine again; otherwise the engine may be damaged.
- Allow at least 5 minutes for low speed racing to let the engine warm up. Operate all control levers to accelerate preheating of hydraulic parts.
- Pay attention to check whether the meters are in the normal range during the operation.

- When the engine is racing for preheating, observe the following instructions:

When the ambient temperature is above zero, the preheating time is approximately 15 minutes.

When the ambient temperature is below zero, the preheating time is approximately 30 minutes.

When the ambient temperature is below -18°C , the preheating time shall be longer.

4.6 Check after Starting of Machine

After starting the machine and before operating it, the following checks shall be conducted to ensure there is no safety threat.

- Check whether there is an abnormal sound and successive vibration when the engine is running. If there is, it implies possible malfunction of the machine. Report to supervisors and repair before operating.
- Check the speed control of engine at neutral position.
- Check meters, apparatus and alarm lights to ensure that they work properly and within the specified range.
- Manipulate all control levers to ensure their smooth movement.
- Operate the shift control system to ensure the accuracy of front, middle and rear shifts of the machine.
- Check whether the brake pedal and governor pedal work properly according to the user manual. Check whether the left and right turning are smooth at low speed.
- Ensure back-up buzzer work properly.
- Ensure hand brake is released before driving the machine.

4.7 Machine Operation

- Drive the machine while sitting.
- Drive the machine slowly to open land and check whether all control levers work properly.
- Only operate control levers when the engine is working.
- It is not allowed to carry people when the machine is working.
- The bucket and other work devices shall approach ground as close as possible, about 40cm from the ground.
- Stop the machine in places far from cliffs, suspensions or slopes.

- If the machine side-slips down slope, unload the load immediately and drive the machine down the slope.
- Try to work in the up and down direction of slope and avoid working sideway to the slope.
- Keep the machine in a status under control. Do not overload.
- Keep the articulating and drafting devices are in a good condition.
- Trailer can only be connected to a drafting pin.
- It is prohibited to stride on traction rope or similar devices.
- When on hills, hardpan or slopes, or when crossing trenches, hillocks or other obstacles, pay attention to inclining of the machine.
- Report the items needed to be repaired that are discovered during operation.
- When linking trailer to the machine, it is prohibited to stand between the machine and the trailer. The traction frame or traction pin of traction equipment shall link to the traction pin of the machine.
- Get to know the maximum size of the machine.

4.8 Stop Engine

- After completing loaded operation of the machine, do not stop engine immediately. Otherwise may cause overheating of engine and accelerate wearing of its parts. After parking the machine and engaging the brake, allow the engine continue to run 5 minutes before stop it, which will cool down slowly the overheated areas of the engine.
- Turn the key back to 0 position to stop the engine.

4.9 Parking of Machine

- Park machine on horizontal ground. When it has to be parked on slopes, insert wedges under the machine.
- Step on parking pedal to stop the machine.
- Place the transmission control lever to neutral position.
- Pull up parking brake handle to apply parking brake.
- After placing all work devices on the ground, place the work device control lever to “middle position”.
- **It is prohibited to stop engine by hydraulic system.**
 - Turn down the engine and take away the key.

V Safe Drive

5.1 Sound Alarm (in compliance with ISO6746-1 Standard)

- Sound alarm that is controlled at the driver's position and reaches a minimum sound level of 93 dB (A) at 7m from the front end of machine.
- When the machine has troubles and is unable to continue to work or work at a low speed, turn on all turn lights (direction indicator lamp, brake lamp, alarm lamp) to give out warning to others.
- Pay attention to the meters and alarms.

5.2 Pay Attention to Drive Safety

- Please follow good operation practice in order to ensure the safety of yourself and others.
- Before starting vehicle, blow the horn to give out signal. Do not drive until it is confirmed that no people or obstacles around the vehicle.
- Do not stick body out of the vehicle.
- It is prohibited to use the bucket as a work platform or stand on it.
- Observe traffic codes when driving on ordinary roads. Go through crossings rapidly.
- Drive at the side of roads and take care to allow a passage for other vehicles to surpass. Keep distance.
- Try to avoid emergent brake operation.
- When driving at a high speed, it is highly risky to shift between forward and rear shifts. Try to avoid this operation.
- When driving or turning in narrow places, pay attention the surroundings and slow down to check whether there is any obstacle around.
- When the road condition is not good or the load is not stable, operate with care to prevent instability of the load.
- To ensure operation comfort of the driver and maximum life of transmission parts, slow down or brake before making gearshifts.
- When driving the machine, use parking brake to brake will cause severe wear of and damage to parking brake.

5.3 Full-load Transportation

- Do not transport with highly lifted bucket full of materials, which is hazard. When transporting with full-load, select proper speed to lower the center of gravity and ensure stability of the vehicle.
- The weight of loaded materials shall not heavier than rated load weight of the machine; avoid overload. Chengdu Construction Machinery Co., Ltd is not liable to any machine damages or people injuries caused by overload.
- Avoid abrupt starting, abrupt stop or abrupt turning in transportation.

5.4 Overspeeding Is Prohibited

- Get familiar with the performance characteristics of the vehicle and decide on appropriate speed, route and operation method according to the specific conditions of the site. Keep the relevant operators being informed.
- When driving in busy traffic of downtown or crossing lofty places, keep at a low speed to ensure the vehicle is under control at any time.
- When driving on rugged or slippery roads, or on hills, avoid high speed driving, abrupt turning or abrupt stop.
- The engine shall work smoothly. Abrupt turning in high speed driving is prohibited.

5.5 Keep Good Visibility

- When visibility is not good in front, or at narrow crossings, slow down and hold on for a moment. Blow the horn to warn other vehicles or ask for guide by others when necessary; avoid imprudent operations.
- Dust, heavy fog and storm will affect visibility. Try to drive slowly when visibility is not good.
- Misjudgment on distance and height of ground is prone to occur in nights. Please drive at a speed suitable for the lighting condition.
- Turn on the headlights and roof lights when operating.

5.6 Notices for Driving in Adverse Conditions

- When operating and driving in adverse conditions, special care shall be taken to ensure safety. Do not work alone in hazard places. Investigate beforehand on the condition of drive path, strength of bridge, topography and geography of work site.

- When moving in wet or floppy places, avoid falling of wheels and take care to effects of brake.
- When operating in water or swamp, do not let the bottom of drive axle contact with water.
- The earth piled up on ground or near trenches is floppy. It may collapse under the weight of machine or by vibration of machine, resulting in rollover of the machine.
- Avoid approaching suspensions or deep trenches. The weight or vibration of machine may cause collapse of these places and result in rollover of machine and people injuries.
- When there is a danger of falling rocks or rollover, use protective devices (FOPS & ROPS).
- When working in rainy days, the operation environment may vary from that when it begins to rain and special care shall be taken. There will be deposit on the ground after earthquake or explosion occurs and special care shall be taken.
- When working on snow ground, the loading operation may change significantly according to the types of the snow. The load shall be reduced and take care to avoid slipping of machine on the ground.

5.7 Safe Drive on Slopes

- When driving aside or changing directions on slopes, there is a danger of rollover of vehicle. Do not conduct this dangerous operation.
- Avoid turning directions on slopes. Do not turn until the vehicle reaches flat ground. When operating on hilltops, banks or slopes, slow down and turn by smaller angles.
- Whenever it is practical, prefer to drive up or down slopes than on lanes or sidewalks.
- Select appropriate shift before driving down slopes. Never shift gears on driving down slopes. When driving down slopes, it is a good practice to select the shift as same as when driving up.
- When driving on slopes, because the center of gravity of vehicle has shifted to the front wheels or rear wheels, operate with care and never brake abruptly.
- When driving on hills, banks or slopes, keep the bucket close to ground at a height of approximately 20~30cm (8—12inch). Lower the bucket down to ground in case of emergency to help stopping the vehicle or preventing rollover.
- When driving to slopes with full load:
 - Drive with the I shift.

Move forward when climbing up and backward when descending.

Do not turn.

- When driving down slopes and needing to stop, adopt the braking method of stopping without cutting off the power, i.e. step on the brake pedal. When using this method that does not cut off the power, do not operate shift control lever or place the transmission case at neutral position. If the speed is faster than the shift speed, step on brake peddle to slow down. The load will push the machine down the slope; place the shift lever at the first gear when starting to descend the slope.
- When driving the machine on slopes and the engine stops, step down the brake peddle to its full to brake, lower down the bucket to ground, and then use parking brake to fix the position of the machine.
- If the engine stops when the machine is on a slope (grade of slope < 15 degree =, step on the brake peddle immediately and lower down the bucket on ground, then use the parking brake. Place the direction and shift control levers at the middle position, then restart the engine.

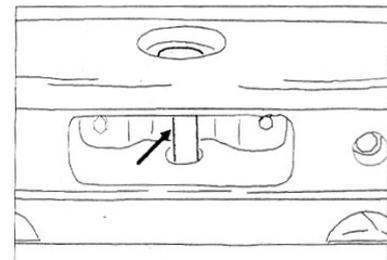
5.8 Traction and Trailer

When hauling a machine that is not able to move, if the method adopted is not correct or the cable wire chosen is defective, injuries or death may be caused.

- Operate in accordance with the related contents in the Servicing Manual and Product Instructions. Other incorrect traction methods may cause people injuries.
- Pad the machine properly to prevent its movement before releasing the brake. If the machine is not padded properly, it may slip and cause injuries and damages. The linkage of the trailer must be firm!
- Both the drawing machine and the machine being drawn shall install ROPS.
- Select proper cable wire. The cable wire to be used shall not have any cutoff strand, kink or shrunken diameter. Wear leather gloves while handling cable wire.
- When preparing traction work with other workers, agree on the signals to be used before starting the work.
- If the engine cannot be started or brake system is out of order, please contact the manufacturer and repair it.

- It is dangerous to haul a machine on slopes. Select a place where the slope is as flat as possible.
- If the machine that is out of order is to be hauled by another machine, the cable wire to be used must be strong enough to bear the load of the broken machine. When linking the machine to be hauled, nobody is allowed to walk to the space between the drawing machine and the machine to be drawn.
- The coupler of the machine to be drawn shall be in the same straight line of the traction part of the drawing machine and be in place properly.
- Do not stride over the drawing cable or cable wire.
- Note that the trailer is only applicable in emergency when moving distance is within several meters and the speed is not more than 2km/h to trail the machine to service area. For long-distance move a transporting van will be needed.

- A traction mechanism is equipped inside the counterweight of the frame of this machine. When needing to haul this machine, or use this machine as the tractor, the following instructions must be followed in operation:



1. Make sure the swing joint and traction pin are in good conditions.
2. The trailer should have a shield to protect operator in case towing line or towing lever breaks.
3. Make sure that the towing line or towing lever is in good order and has adequate strength to pull the machine. The towing line or towing lever should be capable of towing a weight that is 1.5 times of machine gross weight to pull the machine out of mud or over a slope.
4. The towing line is to be connected with counterweighted traction pin with firm connection.
5. Machine to be towed is not allowed to carry people unless an operator is necessary to control direction or brake.
6. Flashlight or other warning signals must be used when towing to warn others.
7. The towing line angle should be minimized: the angle between towing line and dead-ahead direction should not exceed 30°.
8. Too fast machine movement will break towing line or towing lever. Slow and smooth

machine movement will facilitate the operation.

9. The machine should be followed by a larger trailer or other equipment when going down a slope, so as to provide adequate control and braking capacity and prevent the machine from being out of control and rolling down.

10. The operator of machine being towed must steer in the direction indicated by towing line.

11. The following procedure must be followed before towing a power-off machine:

a. Connect piston chamber and dedicated hose in the same turning cylinder to allow free movement of turning cylinder.

b. In case a failure of gearbox or transmission system possibly occurs, dismount driving axle split shaft. Note that the machine will lose its parking brake when driving axle split shaft is dismounted, and the slippage of machine may cause personal injury or death.

c. Release parking brake.

VI Safe operation

6.1 Keep Good Operation Practice

- Always sit on the seat while operating and make sure to fasten safety belt and safety protective device. The vehicle shall be always at a status under control.
- Operate the control lever of work devices accurately. Manipulate the control levers accurately; avoid misoperation.
- Listen to the sound of the machine carefully. Report for repair immediately when there is an abnormal sound. Do not repair any part that is working.
- The load shall not be heavier than rated load weight. Confirm the weight of load materials beforehand to avoid overload. Chengdu Construction Machinery Co., Ltd is not liable to any machine damages or people injuries caused by overload.
- Do not rush into stockpiles at a high speed. Otherwise the vehicle may be damaged, the operator inclined to be injured and the goods damaged.
- The vehicle shall be kept at a vertical angle to the load material. If operating obliquely, the vehicle is inclined to lose its balance and become unsafe.
 - Before entering into narrow areas such as tunnels, overbridges or garages to work, inspect the conditions of the site.
 - In heavily windy days, load materials down the wind.
- When loading on a truck or a dumper, take care to prevent the bucket from bumping into the truck or dumper. Nobody is allowed to stand underneath the bucket; the bucket shall not be place above the cab of the truck.
- Stop operation when visibility is lowered by smoke, fog, or dust. Lighting equipments must be installed if the light at work site is insufficient.
 - Remember the following points when operating at nights:
 1. Make sure sufficient lighting equipments have been installed;
 2. Make sure the work lamps on the loader are at a normal status.
 3. Misjudgment of the height of and distance between objects are common when working at nights. Please operate with caution.

6.2 Pay attention to Surroundings of Work Area

- Irrelevant people are not allowed to enter into work area. Because the work device moves vertically, rotates sideways and moves forward and backward, the surrounding areas of the work device (underneath, in front, at rear, inside, at two sides) are dangerous and is not allowed to be entered into.
- When working near cliffs or at places where collapses may happen, must ensure safety and appoint people to command.
- When releasing earth or rocks from lofty places, take care of the safety at the falling places.

6.3 Ensure Ventilation When Working in Enclosed Space

- When it is not avoidable to operate or handle fuel, or clean parts or paint at an enclosed place or a place not well-ventilated, must open doors and windows to ensure sufficient ventilation in prevention of gas poisoning. If ventilation is still insufficient by opening doors and windows, install fans.
- When working at enclosed spaces, fire extinguishers shall be prepared. Remember their locations and operation method.

6.4 Do not Approach High Voltage Cable

- Do not allow the machine contact with suspended cables. Electric shock may be caused even if approaching to high voltage cables.
- Follow these instructions in prevention of accidents:
 1. When there is a danger of contacting electric cables by the machine at site, consult power company before operation starts to make sure whether the operation is safe. Consult power company for the voltage of cable before the operation starts.
 2. Wear rubber shoes and rubber gloves. Put a rubber pad on the operator's seat. Take care not to let any exposed part of body contact with the metal chassis.
 3. If the work device contacts cable, the operator shall not leave the cab.
 4. When working near high voltage cable, nobody is allowed to approach the machine.

VII Safe parking

7.1 Pay Attention to Safety of Yourself and Others

- Choose a lot as flat as possible to park the machine. Lower the work device down to ground.
- Do not park on slopes. When it is not avoidable to park on a slope, the degree of slope must be lower than 1/5 and wedges shall be put under the wheels to prevent the machine from moving.
- When the vehicle breaks or it is needed to park it at a place where the traffic is busy, set up an enclosure, signal, flag or alarm light, or set up other necessary signals to ensure the vehicles passing by are able to identify this machine clearly. And do not let the machine, enclosure, or flag obstruct traffic.
- When parking, unload the materials in the loader, lower down the bucket completely to the ground, turn off the engine, and engage the parking brake at the parking position. Lock all devices with the key and take off the key.
- It is prohibited to climb up the vehicle when it is transporting.

7.2 Notices for Cold Regions

- After completing work, remove water, snow or silt that clings to wires, plugs and sockets, swithes or sensors, or the cover parts of these parts, If not removing these stuff, the water contained in them will freeze and cause failure of machine when starting the machine next time. Unexpected malfunction may be inflicted.
- Preheat thoroughly. If the machine is not preheated thoroughly before operating, the reaction of machine be slow, which may cause unexpected accidents.
- Operate the control levers to cycle the hydraulic oil in the hydraulic system (raise system pressure to set pressure, then release the pressure to allow the oil flow back to hydraulic oil tank), which will raise the temperature of hydraulic oil. This will guarantee good response of the machine and prevent failures.
- If the electrolyte in storage battery has frozen, neither charge the storage battery nor start engine by other power supplies. This could be dangerous and cause the storage battery to

catch fire.

- When charging or start engine by other power supplies, melt the electrolyte in storage battery before starting and check whether there is any leakage.

VIII Safety inspection and maintenance

8.1 General Knowledge

- The operating and maintenance personnel shall receive trainings and obtain corresponsive qualifications; the people who are irrelevant to the maintenance and repair work being conducted are not allowed to enter into work area. Appoint people to watch over when necessary.
- The repair of vehicles shall be conducted in compliance to specified procedures. When not knowing how to conduct, seek assistance from Chengdu Construction Machinery Co., Ltd.
- Observe the cautions indicated by warnings label. Lables concerning especially important issues are attached on the vehicle; follow these instructions.
- Before starting maintenance work, adhere labels marked with “please do not operate” or other similar labels on starting swithes and console. Prevent others from starting engine or manipulate control levers. Injuries or death to operator may be caused otherwise.
- When operating or maintaining the machine, shall not wear loose clothes or jewels, or else they may get entangled on the control lever or other parts of the machine.
- Ensure all protective boards and covers are fixed on the machine.
- Fuel and engine oil are harzard items. Fuel, engine oil, lubricant and oil cloth shall not contact any fire or flame.
- The parts removed from the machine shall be stored in a safe place. Make sure that the parts will not fall off. Set up baluster surrouding the place and hang lables of “forbidden to enter” in prevention of approach by unapproved people.
- The work site shall be kept clean and tidy, without cast oil cloth, lubricant, etc., to prevent occurrence of fire or falling off of people.
- Before inspecting and repairing the machine, fix the front and rear frames with lock rod to avoil injured caused by their rotation.
- When it is necessary to conduct inspection and maitenance work with the movable arm bucket being lifted, must use necessary movable arm oil cylinder support device to prevent



falling of the work device and place all control levers at middle position. Lock the neutral shift lock switch to avoid mis-operation.

- Part the machine on horizontal ground and place the gearshift control lever at neutral position. Place the hydraulic control lever at maintaining position, turn off engine, and turn the key to “0” position, take away the key and engage parking brake.
- Unapproved people are not allowed to be on the machine.
- Put the accessories in order, such as lunch pail, tools or other accessories irrelevant to the machine.
- Understand the hand signals and who commands at sight. Only receive signal from one person.

8.2 Working in Enclosed Places

The waste gas exhausted from engine may inflict sickness and even death. When it is unavoidable to start engine at a enclosed place, use venting device to discharge the waste gas in the area. Open doors for ventilation when no venting device is available.

8.3 Working Underneath the Machine

- Park the machine on solid flat ground. Lower down the work device to ground before starting to maintain or repair underneath the machine.
- Keep the tyres in place by wedges.
- If letting the tyres off the ground and supporting only with the work device, it is very dangerous to work underneath the machine.
- Never work underneath the machine which is not properly supported.
- When inspection and repair can only be conducted with the work device being lifted, install oil cylinder safety stand on the piston rod of the moveable arm.

Method of using the protective frame:

Hang the safety stand for the lifting arm at rear frame when not using it.

When using it, take off the safety stand, lift the movable arm until the safety stand completely lock in the piston of movable arm cylinder, install bolts and nuts.

8.4 Working at top of the Machine

- When maintaining at top of the machine, ensure the standing point is clean and free of

obstacles.

- Use protective device when necessary.
- The top of engine cover is slippery and hazard and people are not allowed to stand on it.
- The top of tyre is slippery and hazard. Do not stand on it.
- When cleaning the front windows of the cab, stand on fender of the front frame.

8.5 Maintaining When Engine Is Running

Do not maintain when engine is running to avoid injuries. When it is unavoidable to maintain with engine running, comply with the following instructions.

- Appoint one worker to sit on the operator's seat to prepare to turn off the engine at any moment. All workers must keep contact with others.
- Do not touch tail pipe, muffler and other high temperature parts to avoid burnings.
- When the work position is close to rotating parts, there is a danger of being rolled in by the rotating parts. Special care must be taken.
- Do not touch any control lever. When it is unavoidable to manipulate control levers, give out signals to other workers, warning them to walk to safe places.
- Never let any tool or any part of body contact with the fan blades or fan belt. Severe injuries may be caused or else.

8.6 Do not Drop Foreign Matters into the Machine

- When opening the exam windows or oil filler to exam and repair, take care not to drop any foreign matter (such as nuts, bolts, cotton yarn or tools) into the machine. If these articles fall into the machine, must take them out of the machine.
- When repairing, do not carry any unnecessary tools or parts in the pockets.

8.7 Cleaning

- Clean the machine in time. This will avoid the dirt or silt on the machine to splash into eyes. The oil on the machine may cause slip and injuries.
- When cleaning the machine, use incombustible cleaning agent.
- When cleaning inside the machine, turn off engine and place all control levers at middle position. Pull up the parking brake switch and place it at brake position.
- Wear anti-skid shoes to avoid slipping on wet surface when cleaning the machine. When

washing machine with pressured water, wear protective clothes.

- Do not jet water directly on electrical units (such as sensors and plugs and sockets of wire). If water enters into electrical system, operation failure may be inflicted.
- When cleaning filter elements with compressed air, must wear protective clothes and goggles.

8.8 Welding Repair

Welding operation shall be conducted by competent welders and at places with proper equipments. Electric welding will generate gas, which may cause fire or electric shock in operation. The following instructions must be observed when welding:

- Disconnect the terminals of storage battery to prevent explosion of storage battery.
- Remove paints at places where are to be welded to prevent generation of toxic gas.
- If welding on hydraulic equipment or tubes, or at places very close to them, combustible steam and sparkle will be generated, which have a danger of causing fire or exploding. Avoid welding in such places.
- If the splashed sparkles of welding directly fall on rubber hoses, wires or pressured tubes, these pipelines may crack suddenly and the insulation husk of wires may be damaged. Use fire curtain to block the sparkles.
- When welding in places close to tyres, because tyre may explode, special care shall be taken.
- Wear protective clothes when welding.
- Keep the welding site well-ventilated.
- Clean up all combustible materials. Must prepare fire extinguisher at operation sites.

8.9 Repair of Cooling System

- When just completing operation, the temperature of hydraulic oil, oil and water in the engine and radiator is very high and is pressured. At this instance, any attempt to open the oil tank cap, radiator cap, fill oil or water, or replace filter may cause severe burnings.
- In order to prevent hot water from jetting out, turn off engine and allow the water cool down, screw off the caps slowly to release pressure. When checking whether the water temperature has dropped, put hand in front of the water radiator to feel the air temperature. Take care not to contact the radiator.

- In order to avoid burnings, do not touch engine or muffler, tail pipe, relay when the machine is hot.
- In order to avoid burnings, do not disassemble engine oil temperature sensor, water temperature sensor, torque converter sensor or air conditioner water pipe when the machine is hot. The cooling system contains alkline material; avoid contacting with skin or eyes.
- When replacing coolant, engine oil, transmission case oil, filter and other parts, select appropriate containers.
- Store of liquid and treatment of waste fluid shall comply with local environment protection laws and regulations.
- When disassembling linking pipelines of air conditioner compressor, forbid approach of open flame, or else toxic gas will be generated and poisoning will be inflicted.

8.10 Repair of Hydraulic System

- Before repairing hydraulic system, lock oil cylinder and other hydraulic devices, cool down hydraulic oil, release all system pressure of hydraulic system.
- Do not bend or hammer pressured pipelines. Do not install bended or damaged tubes or hoses on the machine.
- Repair in time any loose or damaged tubes or hoses of fuel or lubricant pipelines, or of hydraulic system.
- Leakage may cause fire, please repair or make replacement in time.
- Please check all pipelines (tubes and hoses) carefully and fasten all joints with specified torque. Do not check for leakage with bare hands; use boards or cardborads. Even the leakage of pressured fluid as minor as a needle eye may penetrate muscles and cause injuries. If solution is jetted to skin, it shall be treated within a couple of hours by surgeons who are familiar with this kind of injury.

Note: when the following troubles are discovered, make replacement.

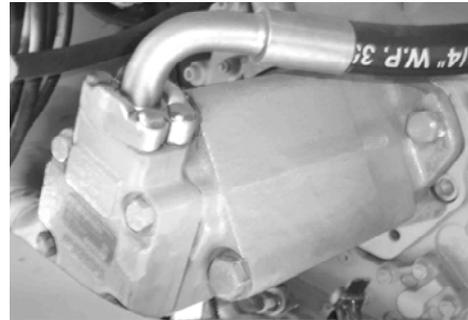
1. Damage or leakage of joints.
2. Wear-out of or cut on out layer and bareness of reinforcing wire.
3. Local bump of outer layer.
4. Obvious twist or flatness of hoses.
5. Wire in reinforcing layer is embedded into outer layer.

6. Displacement of end joints.

Turning and work hydraulic systems use vane pumps.

Instructions for use of vane pump:

- Starting of vane pump: All control parts shall be placed at middle position to enable the pump start without load. Start engine and run it at idle speed.



For its lower temperature, winter is the season when more troubles of vane pump occur.

- Filter all hydraulic oil at least every 2-3 months to maintain clean of the oil. Replace new hydraulic oil for the old (after having been used for a long time, the hydraulic oil will deteriorate, which is perceivable by observing the color of oil) when necessary to safeguard life of hydraulic parts.
- When starting, while making sure of a good condition of oil suction, it would be better to run it without load for a period of time of over 10 minutes. Run with load after the oil temperature has risen, which would avoid damages to pump core inflicted by bad suction of oil due to thickness of oil.

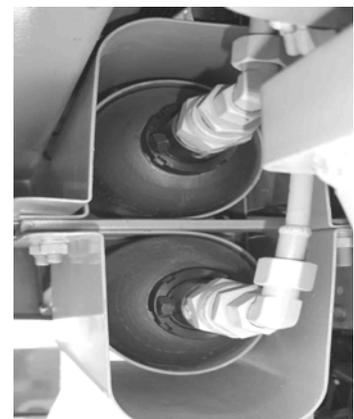
Periodical maintenance of hydraulic steering system:

1. Check all fastening positions and replace working oil after the initial driving of 50 hours;
2. Check oil quantity in oil tank and check all fastening positions after driving for every 10 hours;
3. Replenish grease at the front and rear supports of steering oil cylinder;
4. Check system pressure (system pressure: 16MPa) after driving for every 500 hours;
5. Replace working oil after driving for every 500 hours.

- The pair vane pump is used for the machine, with the model of 3520VQ21A12-297AA20, from American Eaton. It can be bought at local or through the manufacturer.

Accumulator

- Do not weld or make any mechanical machining on the shell of accumulator. When completing connection of hydraulic pipes,



the pressure inside pipes must be completely released by bleed screw on the accumulator. Works on accumulator such as repair and pressured connection are only allowed when the oil pressure is released.

8.11 Maintenance of Storage Battery

Battery electrolyte contains sulphur, and batteries may produce hydrogen. As a result, misoperation on batteries may cause grievous bodily injury or fire. Therefore, the following cautions must be strictly observed:

- Never approach lighting cigarettes or open flame to storage battery.
- When needing to contact storage battery in work, wear protective goggles and rubber gloves.
- Immediately use large amount of water to wash in case on splash of electrolyte of storage battery on clothes or skin.
- The splash of electrolyte inside storage batter into eyes may cause blindness. If electrolyte splashes into eyes, wash with large amount of water immediately and go to see doctor without delay.
- If having drunk electrolyte by mistake, drink large amount of water, or milk, or raw eggs, or rapeseed oil, and call for emergency aid of doctor or firstaid center.
- Before conducting works relevant with storage battery, turn off engine.
- Avoid contact with metallic items (such as tools) to cause shortcircuit between the positive and negative poles of the storage battery.
- When installing storage battery, connect the positive terminal first. When disassembling storage battery, disconnect the negative terminal (at the side of ground line) first.
- When disassembling or installing storage battery, firstly check which one is the positive terminal and which one is the negative and fasten firmly the nuts. If battery electrolyte level is close to “lower level limit”, add distilled water but be careful not to exceed “upper level limit”.
- When cleaning the top surface of storage battery, clean with cloth. Never use gasoline, solution, or any other organic solution or detergent.
- Fasten firmly the top cover of storage battery.
- If the electrolyte of storage battery has frozen, neither charge the storage battery nor start

engine by other power supplies. This is dangerous and may cause the storage battery catch fire. When charging the storage battery or starting engine by other power supplies, melt the electrolyte of storage battery before starting and check for leakages.

- Remove the storage battery from machine before charging.
- When repairing electric system or conducting electric welding on the machine, remove the negative pole of storage battery to prevent flow of electric current.

8.12 Charge of Storage Battery

If do not handle storage battery properly when charging it, the storage battery has a danger to explode. Therefore, please follow the charge procedures in handling rules and manual of storage battery, and abide by the following cautions:

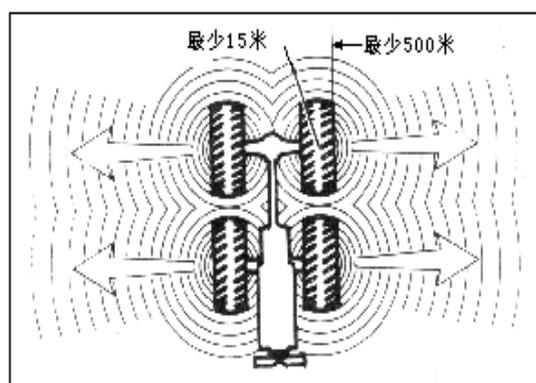
- Charge in a place of good ventilation. Take off the top cover of storage battery. This will enable hydrogen diffuse and prevent explosion.
- Set the voltage of charge to the same as the voltage of storage battery to be charged. If the set of voltage is not correct, the charger may get overheated and catch fire, which may cause explosion.
- Connect the positive (+) charge clip of charger to positive (+) terminal of storage battery, then connect the negative (-) charge clip to negative (-) terminal of storage battery. The two terminals must be fastened.
- If the charge rate of storage battery is lower than 1/10, adopt rapid charge mode and set the value below the rated capacity of storage battery. If the charge current is too big, leakage or evaporation of electrolyte may be caused, which may in turn cause fire or explosion.

8.13 Maintenance of Tires

- Since an explosion of tire will push the components and parts such as tire, rim and driving axle to the a place about 500 meters or farther away from the machine, and the explosion and fragments will cause serious damages or a human casualty accidents, a normal pressure of the tire must be ensured without any overpressure.
- When the vehicle is running, the heat produced by high speed running will increase tire's pressure, which is normal and do not try to lower it. Speed down or stop to cool the tire down. Please note: if the vehicle continues to run at a high speed, overheat of tires will likely to result in their explosion.

- When adjusting the pressure, keep away from the tire as far as possible and must stand at back of the tread.
- Combustible gas is forbidden to inflate. Dry nitrogen is recommended. Nitrogen can decrease potential explosion hazard, because it does not support combustion and can prevent rubber from oxidation or deterioration and tire rim from erosion.
- In order to avoid over-inflation, proper tools for nitrogen inflation and related training on use of such tools are necessary.
- Check of tires and rims shall be done every day. It is prohibited to operation under low pressure. Check for presence on the tires such phenomenon as cracks or blisters.
- Checking whether any connecting bolt or nut of tire rim is missing and whether the twisting moment of connecting nut of the rim complies with the value recommended by manufacturer.
- When checking tire, do not enter into places in front of or at back of the roll of tire and shall stand at the side of the tire. If a tire needs to be removed or disassembled, other tires must be fixed in place by wedges.
- When welding operation is conducted near a tire, must be careful because an explosion of the tire is possible to occur.
- Since repair of a tire or a rim is very dangerous, only trained professionals can undertake the repair, using specialized tools and following correct procedures.
- When replacing a tire, the specification of new tire shall be that as specified so as to ensure the sizes and tread patterns of all tires are uniform.

Whenever it is avoidable, do not enter into the range showed in the drawing below.



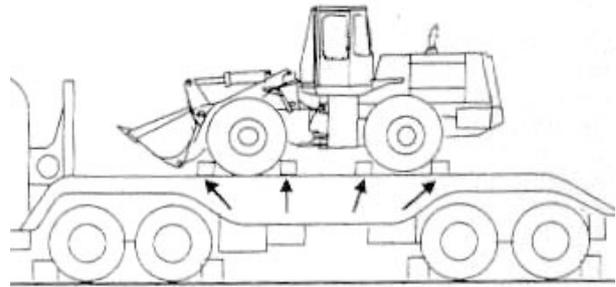
8.14 Notices on Tire Storage

- As a basic rule, tires shall be stored in a warehouse where any one can not enter into without permission. If storing tires outdoors, set up fences around the tires and hang a label of “No entrance”.
- Since moisture can quicken oxidation of rubber and dirt or oil can corrode tires, the storage place of tires shall be dry and clean. When storing tires, light, heat and air circulation shall be avoided and the tires shall be covered by canvas, plastic clothing or other duster. Incorrect storage practice will adversely affect quality and service lives of tires.
- The tires shall be placed on level ground vertically and be chocked firmly by wedge blocks so that unapproved touch will not make them fall down. If they are placed horizontally, the tires will be pressed flattened and their quality deteriorated. At least once of rotation (of 90°) shall be made for each tire.
- When tires are falling down, get away quickly. Tires of construction machinery are very heavy, severe injuries may be caused if attempting to hold it.

IX. Safe Transportation

9.1 Loading and Unloading of Loader

- Danger always exists in loading and unloading of loader, which should be conducted very carefully. When loading and unloading, loader engine should be running at a low rpm, and loader should be traveling at a low speed.



- Loading and unloading must be conducted on firm and level ground with safe distance from roadsides being properly kept.
- Tires of carrying vehicle must be fixed during loading and unloading of loader to ensure that carrying vehicle will not move. Cushion blocks should be placed under gangboards.
- Gangboards used must have adequate strength with sufficient width and length to provide a safe slope for loading and unloading. The angle between gangboards and the ground should not exceed 15°, while spacing between gangboards should be adapted to wheel track of loader.
- Make sure that gangboards are firmly positioned with the same height on both sides.
- Make sure that gangboard surfaces are clean and free of lubricant, oil stain, ice and loose materials. Clean loader tires to remove dirt if any.
- Never steer a loader on gangboards. If necessary, reverse the loader to get off gangboards, and then adjust direction before driving onto gangboards.
- After the loader gets onboard, lock its steering mechanism and wedge the tires, then tie down the loader with ropes.

9.2 Road Transportation

- In case the loader is towed by a trailer, provisions in national and local laws on weight, height, width and length must be observed. All related traffic regulations should be observed as well.
- Weight, height, width and length of loader should be taken into consideration when deciding transportation route.
- When passing bridges or constructions on a private premise, first check to see if whether such bridge or construction has an adequate strength to carry the weight of loader. When running on public roads, all related provisions must be understood and observed.

- When other means of transportation are to be used, the loader may need to be disassembled. Please contact Shandong Foton Heavy-Duty Machinery Co., Ltd. or authorized dealers.

9.3 Lifting

Lifting instruction is only applicable to short-time lifting of loader in short distance during the shipment of loader. Do not lift the loader for a long time when maintaining or servicing the loader, otherwise accident may occur to cause personal injury and death.

Correct lifting:

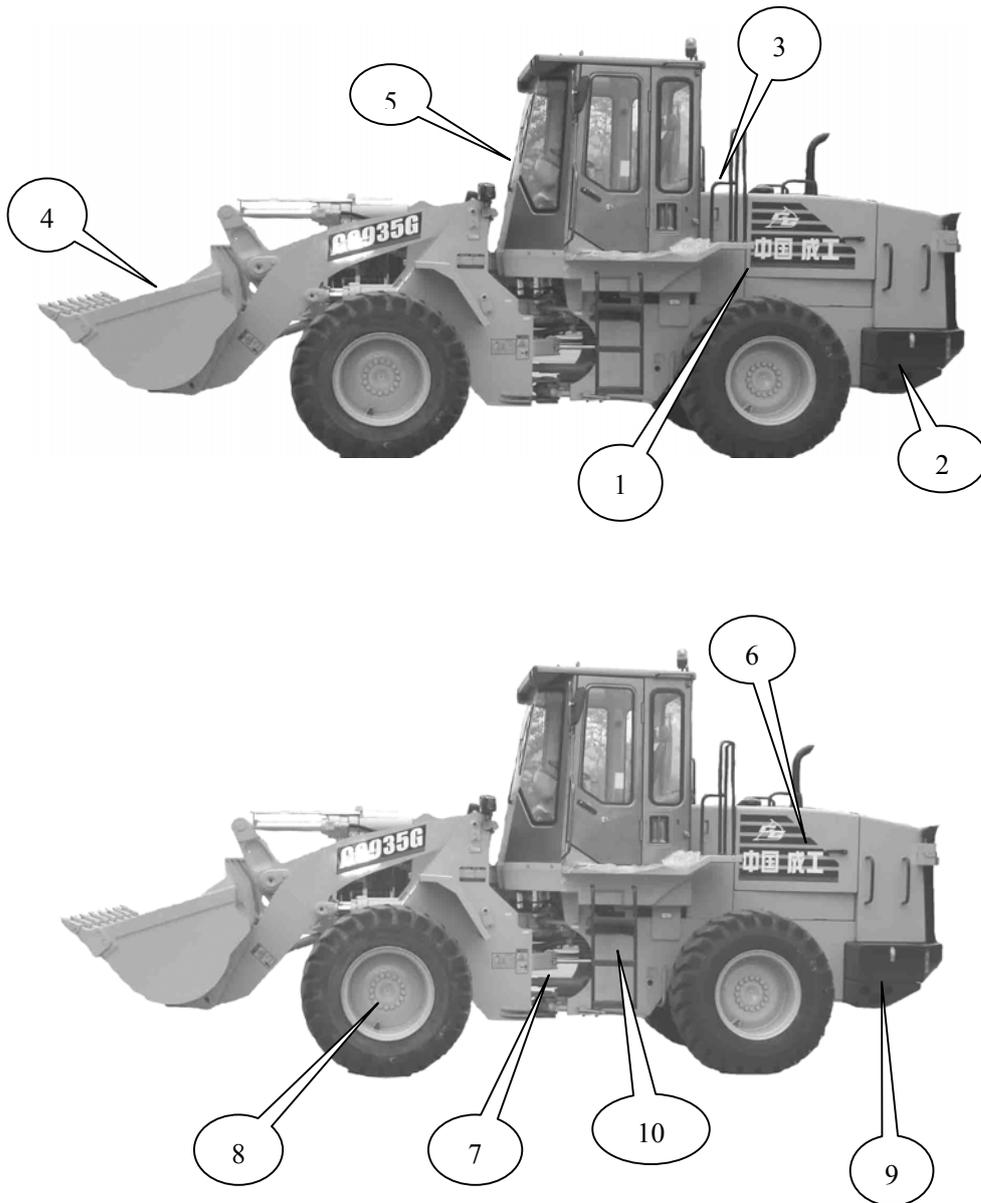
- Make sure that fixing rods on both front and rear frames are set to “Fixed” position to avoid relative turning of frames when lifting.
- All control levers should be placed in neutral position. No person is allowed to stay in the cab.
- Shut down engine and lock all equipment with keys before taking off keys.
- Make sure that there is no obstacles or persons in the range of lifting operation.
- Make sure that wire ropes and hooks have adequate strength. A crane must be used for horizontal lifting of the loader.
- Firmly connect wire ropes or hooks with ears marked for lifting on front and rear frames.
- Personal entry into areas under the loader or within the range of lifting operation is strictly prohibited.
- When lifting a loader onto a transportation vehicle or vessel, the loader must be properly fixed with wire ropes with all tires firmly wedged by wood blocks to avoid unexpected movement of loader during transportation.
- After the lifting is complete, always remember to retract fixing rods before steering the loader.

Product Information

I. General Information on Loader

1.1 Applicability

Loader is applicable to bucketing, stacking and towing operations in mines, roads, water conservancies and constructions, as well as conveying earth, sands, gravels and other loose materials in stock yard in factories, railway stations and ports.



1.2 Profile and Major Parameters

Engine (1), Fuel tank (2), Hydraulic oil tank (3), Working unit (4), Cab (5), Heat radiator (6), Gearbox (7), Driving axle (8), Batteries (9), Gas tank (10)

Major Parameters and Dimensions

Rated engine power:	116kW
Rated engine speed:	2200r/min
Rated bucket capacity:	2.0m ³
Rated loading capacity:	3.5t
Dump height:	2770mm
Unloading distance at maximum dump height from (bucket blade):	1014mm
Lift time of movable arms:	<6.5s
Total of “three time” of working unit:	<12s
Steering angle:	±35°
Turning radius:	5500mm
Maximum traveling speed:	>33km/h
Length	7250mm
Width	2395mm
Height	3225mm
Weight	11.6t
Oil pressure in working hydraulic system:	17MPa
Oil pressure in steering hydraulic system:	14MPa

All the above parameters are measured on a loader horizontally parked on hard supporting ground. The operator should pay attention in operation to limits of various operating conditions, such as soft ground, slope or unbalanced carrying, and correspondingly adopt proper operating mode.

1.3 Scope of Work and Configuration

As one of major construction machines, loader is widely used in bucketing, conveying, unloading and leveling operation of loose materials in addition to light-duty cutting.

The working unit of the loader is independently designed and developed by Chenggong with a self-made standard bucket. Loading weight of the loader should not exceed 3.5 tons.

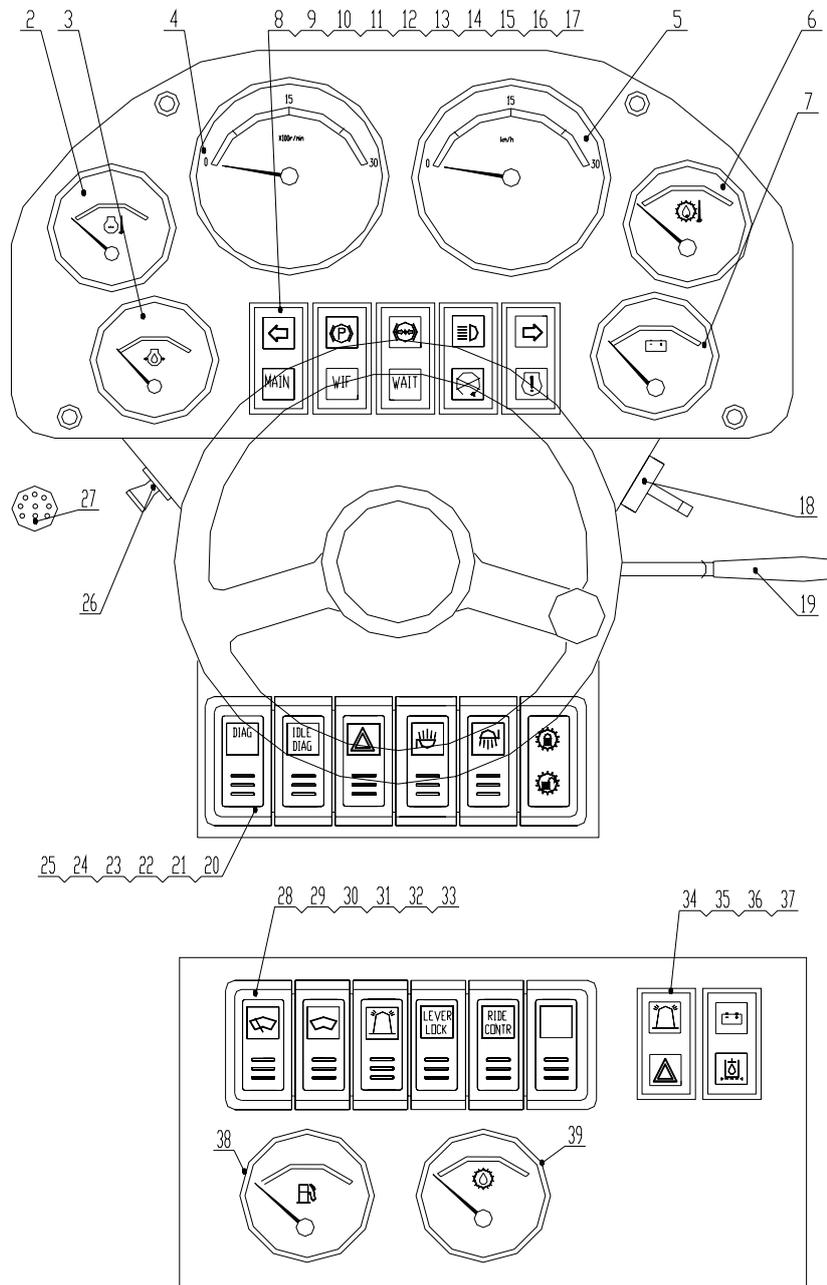
The loader is equipped with QSB series engine manufactured by Cummins Engine Company, Ltd.

Torque-converting gearbox is ZF4WG-158 manufactured by ZF Liuzhou Company.

Front and rear driving axles are manufactured by Chenggong.

II Cab Facilities

2.1 Instruments, Control Switch and Indicator Light



Engine oil pressure meter (2) – indicating pressure of engine oil; the standard value is 0.1 – 1.0 Mpa.

Engine water temperature meter (3) – indicating the temperature of engine coolant; the standard value is 80°C~92°C.

Engine speed meter (4) – indicating the work speed of engine; the standard value is 0~2000rpm.

Also indicates the voltage value of circuit; the standard value is 8~32V.

Speedometer (5) – indicates traveling speed of the loader, normal value 0- 40km/h. It also displays combustion time of engine.

Torque converter oil temperature meter (6) – indicating working oil temperature of torque converter; the standard value is $\leq 120^{\circ}\text{C}$.

Voltage meter (7) – indicating power voltage of circuit; the rated value is 24V;

Left turn signal (8), service indicator light (9), parking brake light (10), water content in fuel indicator light (11), low brake pressure indicator light (12), warming-up indicator light (13), high beam indicator (14), engine halt indicator light (15), right turn signal (16), engine failure indicator light (17), preheat starting switch (18), left/right turn signal switch (19), power interruption selector switch (20) - select whether to shut power when applying brake.

Rear working light switch (21), front working light switch (22), caution light switch (23)

Idle adjustment switch (24), diagnose switch (25), cigarette lighter (26), diagnostic connector (27) Front window wiper switch (28), rear window wiper switch (29), hazard warning light switch (30) Vehicle shock absorber switch overtop (31) - to be activated when the loader is traveling at a speed higher than or equal to 8km/h to reduce the impact on machine by over-speed. Control lever lock switch (32) – hydraulic oil loop for movable arm hoisting and bucket lifting is allowed to work only when this switch is set to lock.

Reserved switch (33), caution light indicator (34), hazard warning light indicator (35)

Hydraulic oil loop jam indicator light (36), charging indicator light (37)

Fuel gauge (38) – indicates fuel level in fuel tank

Gearbox oil gauge (39) – indicates working oil pressure in gearbox, normal value 1.6-1.8Mpa.

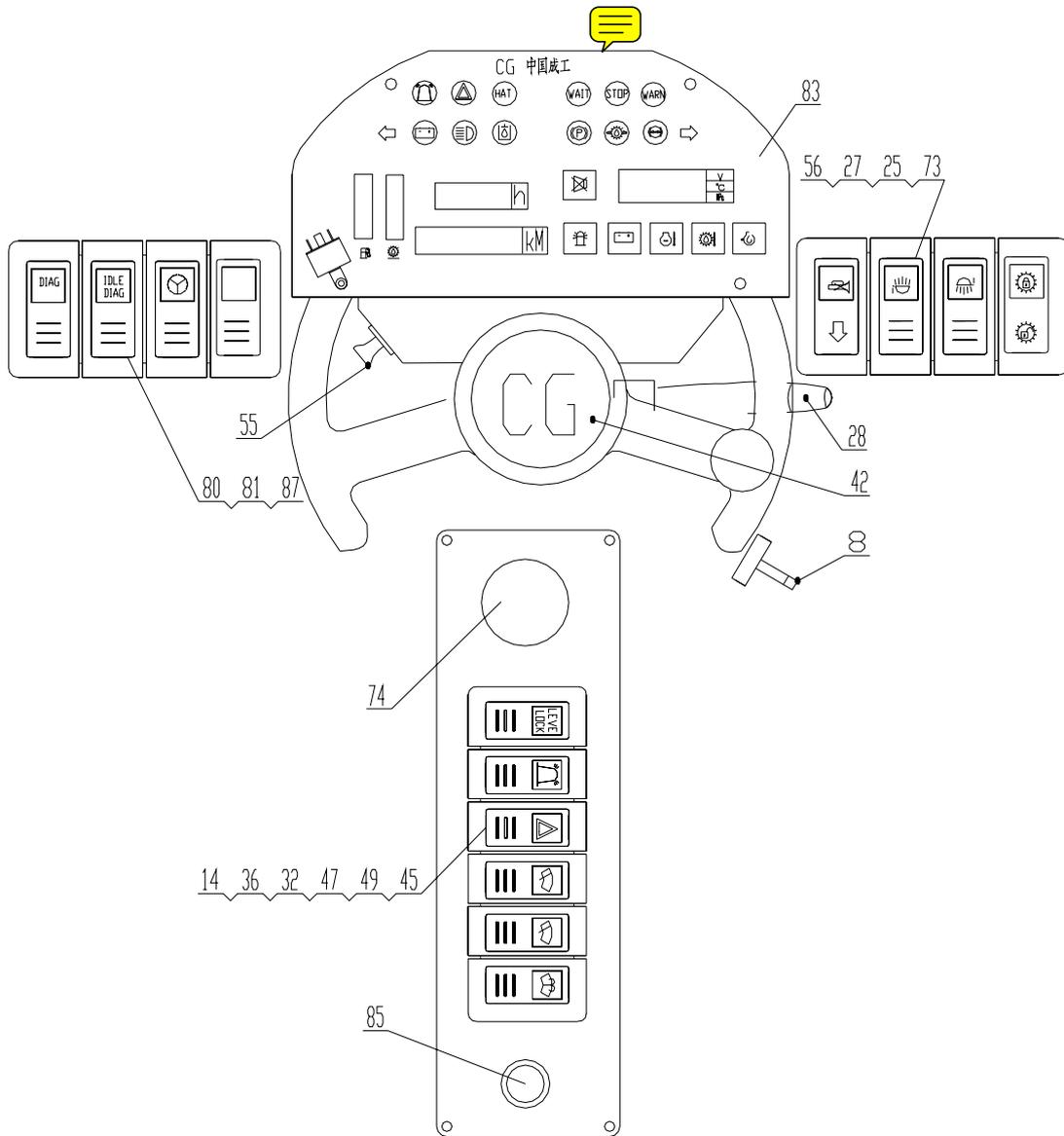
The electrical control system of this wheel loader is comprised of two parts: one is electronic fuel ejection control system, controlled by CAN bus; another one is control system for accessories, including components for lighting, signal and alarm indication, air conditioning, hoist control, leveling control, etc.

2.2 Fuse

- Fuse is installed under the left side of dashboard in cab.
- Fuse – protects electrical system against damages caused by loop overload. If fuse is damaged, replace it. In case the new fuse is blown out again, check and repair the circuit.

II Cab Facilities

2.1 Instrument Desk and Accessories



Start key switch and accessories (8)

Rotary switch (28)--including foglight switch (far near light) and turn signal switch

Cigarette lighter (55)--Facilitating lighting cigarette;

Horn button (42)

Stop button (74);

2.2 Instruments, Control Switch and Indicator Light

1) Electronic monitoring:

Engine oil pressure gauge-- indicating engine oil. The normal value is 0.1~1.0Mpa.

Engine water thermometer -- indicating the temperature of the engine's coolant. The normal value is 80°C~92°C.

Engine tachometer-- indicating the working rotation speed of the engine. The normal value is 0~2000rpm. In addition, it indicates the magnitude of voltage of the circuit. The normal value is 8~32V.

Oil-temperature gauge of torque converter-- indicating the working oil temperature of the torque converter. The normal value is $\leq 120^{\circ}\text{C}$.

Voltmeter -- indicating the voltage of the circuit and power supply. The rated value is 24V;

Signal lamp (Top row left to right):

Work rotation; emergency alarm; emergency turning; wait indicator; stop indicator and failure indicator.

Signal lamp (Bottom row left to right):

Left turn indicator; charging indicator; far light indicator; hydraulic block; parking brake; Transmission fluid pressure; brake pressure; right turn indicator; and engine failure indicator.

2) Panel switch:

Power shutoff selector switch (73)--Choice of power shutoff or not in service brake;

Rear working light switch (25). The rear working light can be turned on as the front/rear position lamp is turned on;

Front working light switch (27). The front working light can be turned on as the front/rear position lamp is turned on;

Instrument pageup/down button (56). The intelligent instrument may indicate by pageup and pagedown;

Working rotary switch (36);

Emergency warning switch (24);
Front wiper switch (47);
Rear wiper switch (49);
Failure diagnosis switch (80);
Failure pageup/down switch (81);
Joystick lock switch (14)--Only as the switch closes, the lifting of hydraulic oil circuit by the moving arm and of bucket is allowed;
Cigarette lighter (26);
Standby socket (85);
Fuel gauge (38)--Indicating the oil level of the fuel box;
Transmission fluid pressure gauge (39)--indicating the working oil pressure of the transmission case. The normal value is 1.6~1.8Mpa.
Emergency turning switch (87)--Press this button to start the emergency turning system.

Caution

It is suggested to use the emergency turning system under the circumstance that urgent turning to avoid obstruction is required as the paroxysmal normal turning system fails or engine shuts down.

Warning

If the emergency turning system is started frequently, the emergency turning unit will be damaged possibly.

The electrical control system of this loader mainly is composed of two parts including electronic spray engine control system by CAN bus control and control system for accessories including lighting, signal and alarm indicators, air conditioning, lifting control and leveling control etc.

Warning

Improper external power connection will result in personal injuries and death due to explosion. Accumulators connected in series shall be installed in a separate accumulator box. As the external power source is used, the cable joint (+) shall be connected with the accumulator's joint (+) connected with the starter coil. The cable cathode (-) of the external power source shall be connected with the one of the starter. In case the cathode of the starter

- Fuse with the same model number and specification must be used for replacement, otherwise the circuit may be damaged. If the fuse needs frequent replacement, there may be a failure in circuit which should be checked.

2.3 Air Conditioning System

- **Basic operating method**

Refrigeration (1) For the first time the cooling system is used, blowing rate switch shall be rotated to the high speed after the engine is started (at this time, the indicator lights), and run for five minutes.



1 Blowing rate switch 2 Temperature control switch

- (2) Rotate the temperature control switch clockwise to “COLD”. At this time, the cooling system starts work.
- (3) When the temperature is decreased to the required one, rotate the temperature control switch anticlockwise slowly until the indicator off. (At this time, the temperature is the one set. The air conditioning system will regulate the temperature automatically).
- (4) As the cold air is used in high temperature seasons, windows and doors shall be closed, or not the refrigeration effect will be weakened.

- **Note: In refrigeration, please shut off the heat water valve**

Heat supply (1) Turn off the temperature control switch to OFF, turn on the heat water valve and start the blowing rate switch.

(2) Appropriate temperature may be attained by regulating the heat water valve.

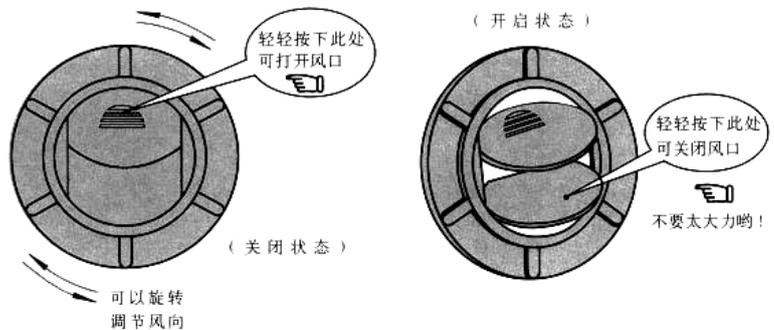
- As the engine fails to work for ambient temperature less than 0°C, the engine radiator shall be emptied or filled with anti-icing fluid so as to avoid the breakage of the pipe of the radiator of the heat supply system.
- The whole air conditioning system shall not be dismantled without authorization. The repairing shall be conducted a professional person.
- The belt shall be examined daily for proper tightness.
- The dirt on the surface of condensator shall be cleaned in time so as to avoid weakening the refrigeration effect.
- After discharging secondary refrigerant or repairing, the proper refrigeration oil shall be

added depending on the amount of the one discharged. The secondary refrigerant discharged shall be recovered with the special equipment.

- The air conditioning shall be started for refrigeration one time biweekly during the season of winter so as to ensure the smooth operation of the system.

Use of air vent and defrosting function

Air vent--If necessary, the air direction may be changed by regulating the air guide sheet of the air vent.



- As the air conditioning is not used, the air vent shall be closed to avoid the access of the foreign substances.
- As the cold air is used in high temperature seasons, the window and door shall be closed, or not the refrigeration effect will be weakened.
- As the engine is turned off, the air conditioning device shall not be used, or not the energy of the accumulator shall be wasted and difficult starting of the loader will be occurred.
- Please examine and maintain the air conditioning regularly for a long service life.

2.4 Accumulator

Two accumulators connected in series are located at the same accumulator box. As the cross strapping is adopted, the anode cable (+) shall be connected with the accumulator's joint (+) connected with the starter coil. The cable cathode (-) of the external power source shall be connected with the one of the starter. In case the cathode of the starter is not available, the cable cathode (-) of the external power source shall be connected with the body of the engine.

The accumulator of this loader is free from maintenance, which is located at the left side of the rear end of the rear frame. For maintenance-free accumulator, the electrolyte may not be examined and water may not be added. It is safe in use and propitious to environmental protection.

Examination over charging state

The charging-state indication densimeter is attached on the cap. It may indicate the charging state:

Green--Power over 65%, indicating that the accumulator is normal.

White – charge rate lower than 65%, recharging required.

Black – battery out of use, replacement required.

In order to ensure enough power of this loader for starting, please examine the charging state of the accumulator.

Use of external power source

Make a primary diagnosis for the loader that fails to start.

- Turn the joy stick of the transmission box of the choke to neutral position. Put all working devices down. All joy sticks are placed at the holding position.
- Turn the starting pre-heating switch of the choke to the central position and turn off all instruments and air conditioning etc.
- Help the started loader close the choke so as to facilitate wire connection. But two loaders shall not contact each other.
- Help to turn off the engine of the started loader. If the auxiliary power source is used, the charging system shall be turned off.
- Give attention to whether the wire connection of the accumulator is correct and tightened.
- Connect the anode (+) of the external power source to the anode (+) terminal of the discharged accumulator or the accumulator of choke.
- Connect another anode of the external power source (+) to the anode helping the starting of the accumulator. Identify the correct connector lug with the method of Step 6.
- Connect cathode of the external power source (-) to the cathode helping the starting of the accumulator.
- Lastly, connect another cathode of the cable to the frame (not the cathode column of the accumulator). The connection position shall be kept away from the accumulator, fuel, hydraulic pipe or moving elements.
- Start the engine that helps starting of the loader or close the charging system assisting in starting. Two minutes at least are required to shut down partial charging of the loader.
- After starting the flameout engine, the external power source shall be shut down immediately in the reverse order.
- Summarize the causes for starting or charging failure of the choke. Now, the engine works

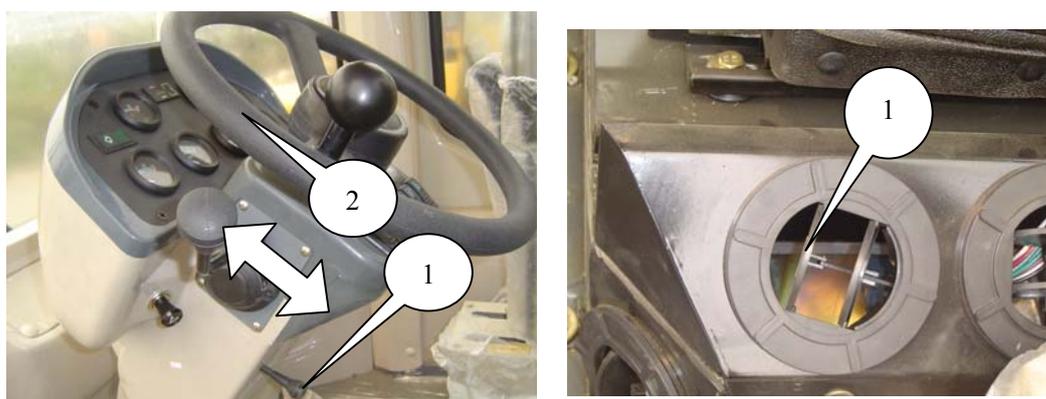
and the charging system works normally.

- Incorrect external power connection may trigger an explosion and cause personal injury or death. Serial battery should be installed in a separate battery case. When an external power supply is used, (+) wire terminal should be connected to (+) battery terminal that is connected to starter loop, and (-) wire terminal should be connected to starter cathode. In case there is no starter cathode, connect it to engine body.
- The accumulators connected in series are installed in the same accumulator box. Use the terminal connected with the starting motor. The accumulator and starting motor are situated at the same side of the loader. Any metal shall not contact the anode wire clip.

2.5 Cab

The cab is full closed, in which anti-roll and anti-falling structures are available. It is spacious and comfortable, and easy to be operated.

Inclination adjustment of steering gear



The steering gear may be regulated upwards and downwards depending on the different drivers.

To regulate the steering gear, the steering gear (2) shall be pulled upwards or downwards to the appropriate position according to needs as the adjusting locking rod (1) of the steering gear is pulled upwards, and loosen the adjusting locking rod (1) to lock the position of the steering gear.

The model of the steering gear is BZZ5-630(FK/20), provided by the Jining Eaton Hydraulics Co., Ltd.

Chair

DS85H/90 is the mechanical suspending driver chair with a hydraulic damper designed especially for large industrial vehicles, engineering loader and large and medium agricultural tractor. The suspending unit on the chair chassis is protected by rubber sleeve so as to avoid external sewage and dirt.

Cushion and backrest are made with vacuum foam one-step molding technology, and may be dismantled and replaced easily according to needs.

Adjusting range:

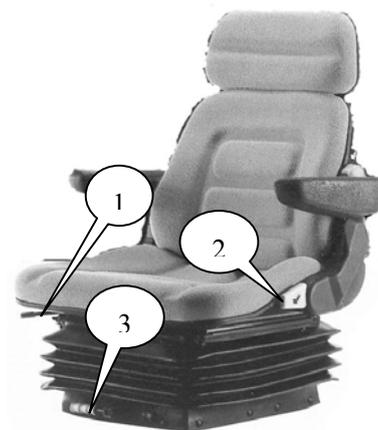
- The backrest may be adjusted for 150mm forwards and backwards.
- The adjusting distance of the backrest's elevation is 60mm.
- The adjusting of the backrest forwards is 12.5°, backwards 15°. The chair may be leveled to the cushion.
- The journey of the suspending device is 100mm.
- The adjustment between 50-130kg may be conducted according to the driver's weight.

Optional accessories:

- Backing block
- Armrest
- Safety belt

As the fore and rear control locking rod (1) of the chair is pulled upwards, the chair may be moved to the wanted position forwards or backwards, and then release the locking rod to lock the chair.

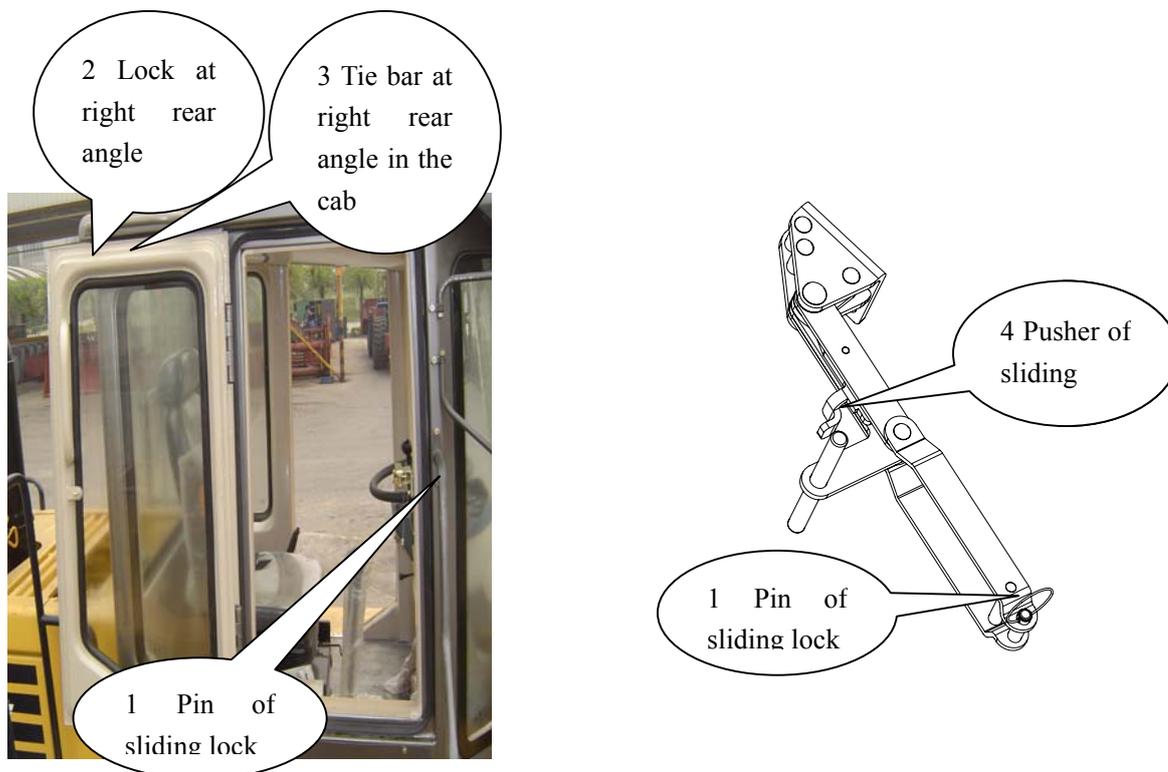
While pull upwards the backrest angle control rod of the chair (2), adjust the backrest to the required angle, and lay down the control rod to lock the backrest. Pull out (3) and adjust the elevation by means of rotation.



Right door

The right door is used as the exit, which may be opened only from the internal cab.

Loosen the pin (1) to open window. The opened window is fixed by the lock (2) on the right cab.



If the window is required to be opened, the slide rod at the right rear top angle in the cab shall be pulled to release the window, and then the window may be closed.

As the right door is fixed on the pin (1), the door is opened at certain degree and fixed.

Note: While using pull lock to open or close the door, the lock (4) shall be pulled so as to ensure smooth rotation. As the loader is working, the window shall be fixed (opened or closed)

Left door

The left door of the cab may be closed or opened. While being opened, the opened window is fixed by the slide rod (2) on the left rear top angle in the cab. If the door is required to be closed, the slide rod (2) at the left rear top angle in the cab shall be pulled to release the window, and then the window may be closed. As the loader is working, the window shall be fixed (opened or closed)

As the loader is working, the window shall be fixed (opened or closed)

As the air conditioning is used, please close the right window and left door of the cab.

Fire extinguisher

MFJL-400 fire extinguisher adopts ammonium phosphate dry powder. In use, hold the fire

extinguisher tightly, pull out safety pin, press compression bar, and spray on the flame.

- Once it is opened, the fire extinguisher shall not be used again. Placing it upside down is now allowed.

Operation

I Operation and Control of Loader

1.1 Start Key Switch

Turn on the power switch firstly, and then turn the key switch to start the engine.

1. The key switch has four positions:



Flameout: The key switch may be inserted or pulled out only at this position. As the switch is situated at this position, the power source of most circuits of the cab will be shut off.



Pre-heating: Turn the key switch anticlockwise to this position to put through preheating device.



Rotation: Turn the key switch clockwise to this position to put through the power of electronic control and cab meter,, charging indicator's relav etc.



Starting: Turn the key switch clockwise to this position to start the engine. After starting, release the key switch, the key switch will automatically return to the power-up position.

- The running time for starting the engine each time shall not exceed 15 seconds. For the second starting, the interval time of two times shall be over 2 minutes.
- After starting and preheating of the engine, if the alarm lamp lights (including low brake pressure alarm lamp, or engine failure, and fuel-water alarm lamp), the engine shall be stopped immediately for examination. After the alarm lamp lights off, the engine may be operated, or not, your driving safety would be endangered.

1.2 Transmission Control, Steering Gear and Horn Switch

Transmission control

Option of driving directions-- Pull forwards the operating rod (1) for advance, and backwards

for retrogression

Speed option--Turn the speed operating rod (1). As the arrowhead aims at I, II, III and IV, the corresponding driving speed may be attained.

- This loader has four forward gears and three backward gears. As the speed operating rod is at the position of IV gear, the loader is under the state of retrogression, and only three-gear speed may be attained.

(2)--KD key.

Turning operation

The driving direction of this loader is controlled by steering wheel (2). The turning of the steering wheel means the turning of the loader.

Turn left--Turn the steering wheel (2) anticlockwise, the loader turns left. Faster turning of the steering wheel anticlockwise, quicker turning left.

Turn right-- Turn the steering wheel anticlockwise, the loader turns right. Faster turning of the steering wheel anticlockwise, quicker turning right.

Horn switch (3)--Press the horn switch (3), the horn will alarm.

1.3 Control of Parking Brake

Parking brake handle is on the left side of operator's seat.

Applying parking brake – pull up parking brake handle (1) to apply parking brake.

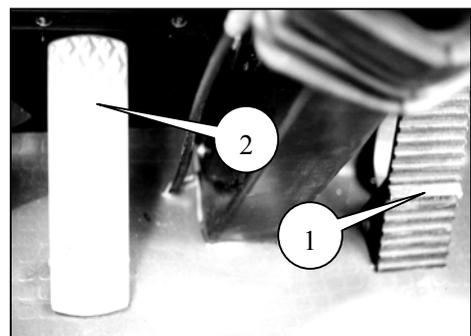
Releasing parking brake – push the button (2) on the top of parking brake handle (1) and push down the handle to release parking brake.

- The system uses hydraulic oil as working fluid - same as other hydraulic systems, therefore no other brake fluid is needed.
- Do not apply parking brake when the machine is traveling unless in emergencies, otherwise severe damage to parking brake will be caused.

1.4 Control Pedal

Accelerator pedal (1)--The journey under the pedal decides the oil supply amount of the diesel engine.

Service braking pedal (2)--In service, step on the pedal (2) to reduce speed or stop the loader.



1.5 Flameout Switch

This loader adopts electric control.

- If low brake pressure warning light keeps on after engine start and warming-up, stop the machine immediately to check. The machine should not be operated until low brake pressure warning light goes off, otherwise the operator or the machine will be in danger. In case brake pressure warning light goes on in traveling, stop the machine immediately to check.

1.6 Control of Working Device

Lifting Control of Bucket

Descend and fluctuation--Push forwards joy stick (1) to lay down the bucket. If push it forwards further, the bucket fluctuation may be realized.

Keeping--Move back the joy stick (1) to the central position from the lifting or decreasing, fluctuation position, and the bucket may stay at its original position.



Lifting--Pull backwards joy stick (1) to lift the bucket.

- **This loader is equipped with a lifting limit system. When the bucket is pulled backwards to lift the operating rod, the operating rod will be absorbed under the action of electromagnet to make the moving arm finish the lifting automatically until going up to the limit position. Meanwhile, the electromagnet will release the operating rod back the central position and stop the lifting of the moving arm. The different lifting elevations of the moving arm may be attained by adjusting the position of the electromagnet installed on the moving arm.**

Bucket Reversion Control

Reversion--Pull outwards the joy stick (1) for bucket's reversion forwards.

Keeping--loosen the reversed joy stick (1) to make it back to the central position. The bucket will stay at its original position.

Take back--Pull the joy stick (1) inwards to take back the bucket.

- **This loader is equipped with a bucket auto-leveling device. After the bucket unloads,**

you may pull the bucket backwards to reverse the operating rod. The operating rod will be absorbed under the action of the electromagnet and finish bucket reversion automatically (the descent of the moving arm may be operated at the same time). As it reverses automatically to the bottom of the bucket and stays at the level position, it will automatically stop reversion. This process is named as the auto leveling. Its purpose is to improve the operation efficiency. The bucket bottom level or inclination the lifting elevations of the moving arm correspond to may be attained by adjusting the position of the electromagnet installed on the cylinder of turn trolley to meet various working requirements.

- Check whether the control handle is smooth and at middle position.
- Check whether the handle-locking electromagnetic valve works properly.

Loading:

Advance to stockpile by II gear. When the loader reaches the near area of the stockpile, shift to I gear. Descend the moving arm to make the distance of the interface point under the moving arm away from the ground about 500mm. The bucket shall be parallel to the ground.

As the bucket has a distance of about 1 meter away from the stockpile, the moving arm may be descended to make the bucket near the ground level and into the stockpile.

As the bucket cuts into the stockpile again, if the resistance is strong, the turn the bucket upwards and lift the moving arm discontinuously for full load.

After the bucket is filled, lift the moving arm to certain elevation, and turn the handle back to the central position.

Unloading:

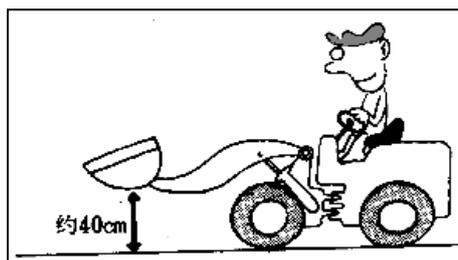
Load all or partial materials slowly by controlling reversion handle so as to weaken the impact force of the materials against the camion. If the materials are stuck on the bucket, the materials may be unloaded by means of reversing and shivering the bucket repeatedly.

In order to prevent improper operation of the handle after parking and act of moving arm, the loader is equipped with a handle lock-up solenoid valve. The pilot-operated oilway shall be shut down firstly prior shutting off the power of the solenoid valve. At this time, if you operate the handle, the working device will not work. In working, power the solenoid valve.

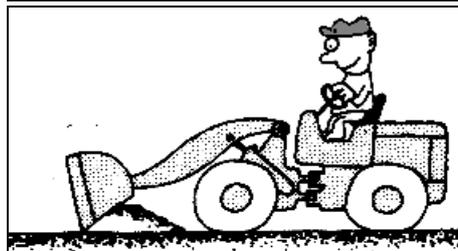
II Operation Technology

2.1 Common Technology

In operation, in order to widen the drivers' vision and stabilize loading, the bucket shall be lowered and kept about 40cm above the ground.

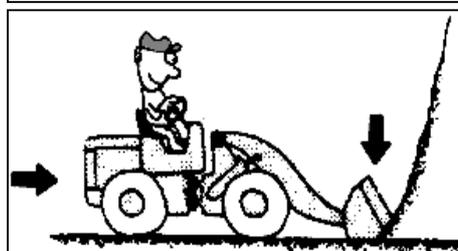


Use the wait time to level the working area.

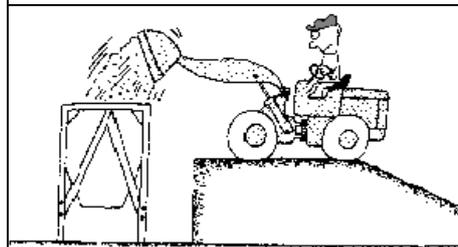


Avoid more stress of the bucket to make the loader have enough tractive force.

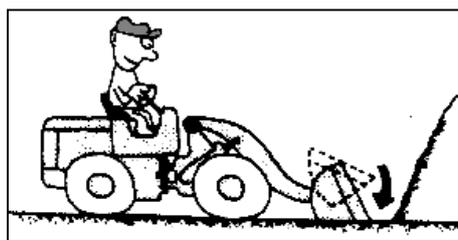
Use cutting teeth to load the relatively hard materials.



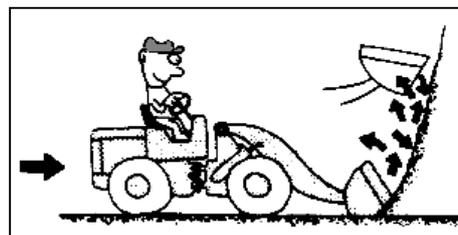
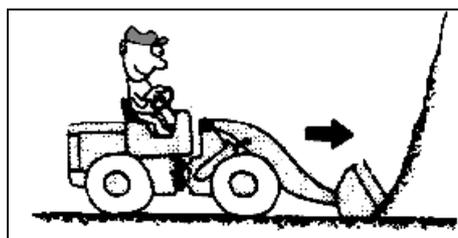
In bucket reversion, the joy stick (1) shall be placed at the position of bucket reversion. And then turn back it to the original position. Repeat the operation until materials are unloaded.



In order avoid dust into the engine and keep visibility, the bucket shall be reversed leeward.



Ensure the bucket is consistent with working requirements. Overload will shorten the service life of the loader.



Scraping

Note: Scraping is not allowed as the bucket is at the forerake position so as to prevent the bucket from damage.

In scraping, the bottom of the bucket shall be parallel to the ground.

Bucket Reversion

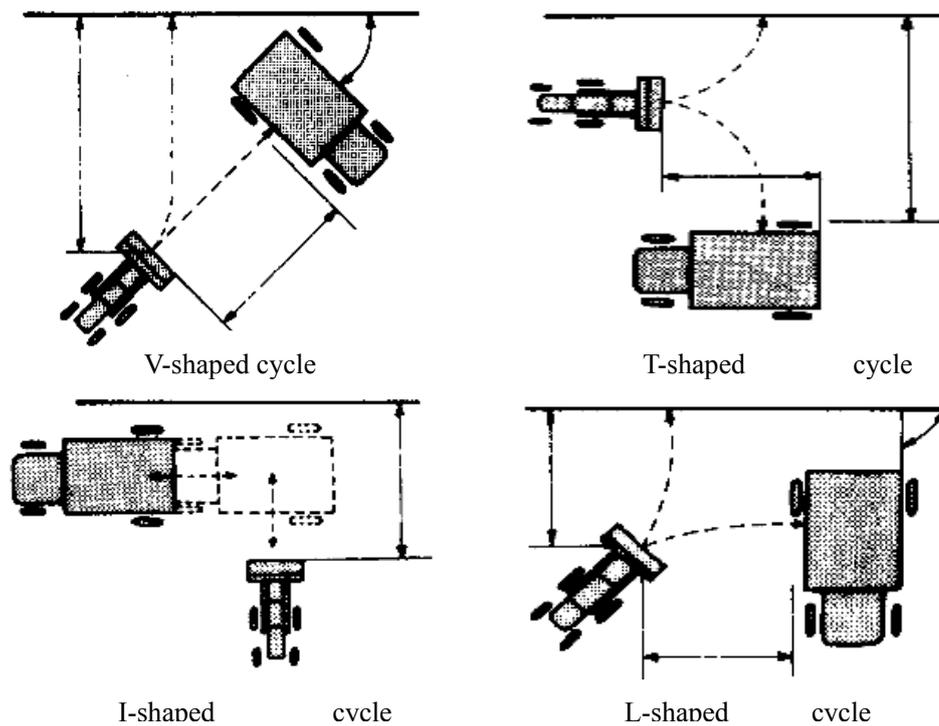
Use the bucket stopper for maximum reversion angle.

- Unnecessary repeated collision with the stopper will accelerate its wear. The charge of repairing linkage gear of the working device is very high.

2.2 Loading of Stockpile

1. Level the bucket and scrape the ground slightly. Hold advance I gear to make the bucket directly insert into the stockpile.
2. Make the joy stick of the moving arm at the position of lifting, and operate the joy stick of the bucket to make the bucket incline backward slowly for 2-3 times for full loading.
3. After the bucket is filled, the bucket stays at the backrake position, and the joy stick of the bucket stays the central position.
4. Lift the bucket enough high to avoid the stockpile. Make the transmission control rod at the reverse gear to drive the loader backwards.
5. As the loader reverses to the certain position, lay down the bucket to the transport position about 40cm away from the ground. Push the transmission control rod to the required gear to transport the materials.
6. As the loader reaches the reversion unloading area, make the joy stick of moving arm at the position of lifting until the bucket unloads all materials.

2.3 Loading with a Truck



For the four loading methods above, the operation method with a short cycle time (for one time of loading) may be chosen depending on the situation on site.

1. Enough distance shall be available to make the bucket reach the lifting height prior to the loader reduce the speed.
 2. Place the bucket at the middle of the truck to unload materials. In case the length of the truck body is two times of the bucket, the materials shall be unloaded to the back from the front of the body.
 3. Advance the joy stick of the bucket to reverse the bucket.
 4. Shake off the materials stuck on the bucket. Rapidly push and pull the joy stick of the bucket to make rocking arm touch the stopper.
 5. Make the joy stick of the bucket at the position of taking-back bucket.
 6. Prior to laying down the bucket, please note whether the truck is outside the bucket.
 7. Lay down the bucket as another bucket will be installed on the loader.
- **Unnecessary repeated collision with the stopper will accelerate its wear. The charge of repairing linkage gear of the working device is very high.**

2.4 Loading of Hard Soil

- The collapse of materials will cause personal injuries and death.

- Remove suspender and note the materials slid.
- 1. Load hard soil from the bottom to the upper surface
- 2. Lift the bucket slightly and leave the soil stack.

2.5 Excavation

1. Lay the bucket on the ground and make it have a small excavation angle.
2. Prior to the loader advances, press the bucket downwards, and make the lifting joy stick of the moving arm at the position of holding when the bucket reaches the enough depth.
- 3 Keep the bucket leveled scraping and excavation by lifting and laying down the bucket.
- 4 As the bucket is filled, take back the bucket to make it run against the stopper. Drive the loader to the material unloading position when the bucket is away from the ground for 40cm.

2.6 Loading to Bucket

1. Fill the bucket (See “Loading of Stockpile”).

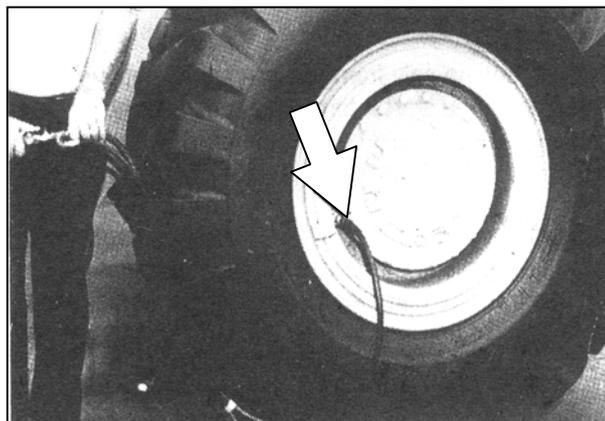
When the bucket reaches the lifting limit position, materials may be loaded to the chopper leeward if possible.

Repairing and Maintenance

I Knowledge on Tyre Inflation

1.1 Tyre Inflation with Nitrogen (N₂)

- SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. suggests that all rubber tyres and tyres' pressure would be inflated and regulated with nitrogen respectively. Nitrogen is a kind of inert gas and does not support combustion.
- **In order to avoid redundant nitrogen in the tyre, proper nitrogen inflation equipment shall be used and necessary training on application of the equipment is required. Improperly using the equipment may result in blowout of tyre possibly, even serious personal injuries and death.**
- **Because the pressure of the cylinder filled with nitrogen is about 15000kPa, improperly using the inflation equipment will possibly result in blowout of tyre or damage of wheel rim.**
- Besides the function of weakening the dangerousness of the explosion, the inflation with nitrogen may also delay rubber's aging and gradually wear of tyres (it is especially important that the tyre has expected service life (four years above). In addition, it may reduce the dismantling problem due to the corrosion of the wheel rim parts.



- **In tyre inflation, an inflation chuck that clips tightly automatically shall be used. The operator shall stand outside the tyre.**
- The set pressure of the modulating valve of the inflation equipment shall not exceed the recommended pressure 300~350 kPa. The pressure of the tyre inflated with nitrogen shall be same as the one with air.

1.2 Regulation of Inflation Pressure

- If the loader works under a cold condition, the pressure for tyre inflation at a warm place of 18°C~21°C is too low. The low pressure will shorten the service life of the tyre.
- Please see working and maintenance manual for the regulation of inflation pressure under a cold condition.

1.3 Purchase of Tyres

Specification of tire is 17.5-25-16PR, with inner tube. As the tyre requires to be replaced, the user may purchase the tyre of same specifications at the local store.

II Standard for Screw Torque

Usually, fasteners will be dismantled in repairing. For reinstallation, the following items shall be noted:

- The bolts and nuts dismantled from the loader shall be kept well for reinstallation. In case a new fastener is required, the size and grade of the new fastener shall be same as the old one.
- The strength of the material is marked with number (8.8, 10.9 etc.) on the head of the bolt usually. The standard torque for the 8.8-grade bolt and nut is given in the following table.

Size of Thread	Standard Torque (N.m)
M6	12 ± 4
M8	25 ± 7
M10	55 ± 10
M12	95 ± 15
M14	150 ± 20
M16	220 ± 30
M20	450 ± 70
M24	775 ± 100
M30	1600 ± 200
M36	2700 ± 400

III Daily Maintenance Guide

“Healthy examination” for the loader shall be conducted regularly or irregularly (examination and repairing).

Causes of failure or lower performance of the loader shall be found out early and removed in time. In this way, a higher production rate and long service life may be attained.

- Grease or oil accumulated on the loader will cause a fire. Therefore when the loader works for some time (about 1000 hours), the grease or oil on the loader shall be cleaned with steam or high-pressure water.
- Prior to maintenance, all joints, caps and blocks shall be wiped away.
- In case the leakage is suspected or found out, the liquid level shall be examined regularly.
- The hinging part of the frame is the central unit connecting with the front and rear frames. Good lubrication of the hinging part can ensure the normal and safety operation of the machine.
- Regularly lubricate the pin of the rotating and hinging parts to extend the service life.
- Regularly examine whether all parts have any deformation, crack or abnormal factor.
- In hoisting, the lifting lug on the frame shall be used. Hoisting weak part and pin hole is not allowed so as to prevent them from damage.
- As the external power source is used to start the engine, please follow the explanation of “Starting of Engine” in the chapter of “Operation”.
- The machine has one 24kv starting system. Starting the engine with the external power source only can use the voltage of 24kv. High-pressure voltage will damage the electrical system.
- Examine the dust and foreign substances on the coarse filtering net. If necessary, the dust and foreign substances shall be eliminated. Prior to discarding the coarse filtering net, clean it for six times. In cleaning the filter element, examine completely whether the filtered material has any crack. The filter shall be replaced once per year, even if the time of cleaning does not reach 6 times. As the coarse filter is repaired for three times, the thin filter shall be replaced.

IV Maintenance of Engine's Cooling System

4.1 Coolant

Keeping normal working temperature of diesel engine will improve the efficiency of the engine. Therefore it is necessary to maintain the cooling system properly. Overheat, overcooling, pitting corrosion, gaseous cavitation, crack of cylinder end, piston sticking and blockage of radiator are common failures of the cooling system.

- It is suggested to add 30% anti-icing fluid into the cooling mixture. Under the working temperature of the engine, all kinds of water have causticity, regardless of the high concentration of the anti-icing fluid. 3%~ 6% coolant additives shall be added to protect the cooling system.
- Do not add coolant into the overheated engine, or not the engine will be damaged. Prior to adding the coolant upon request, the engine shall be cooled firstly.
- As the concentration of the additive exceeds 6%, and the sum of the additive's concentration and the one of the anti-icing fluid exceeds 65%, sedimentation will be formed, and results in blockage of radiator's pipe, engine's overheat and inefficient sealing of water pump.
- If the machine is stored or transported to the area 0°C below, the cooling system shall be protected as per the possible minimal temperature.
- Under lower temperature, the specific gravity of the coolant shall be examined frequently so as to facilitate taking enough protective measures.
- If the coolant is polluted, the engineer is involved in overheat or radiator has foam, the cooling system shall be cleaned.
- Per 1500 hours or one year, the coolant shall be discharged, and the system shall be cleaned. And new coolant shall be added.
- In case the speed of adding coolant exceeds 20L/min, air bubbles of cooling system will be caused possibly.
- After adding the new coolant, start the engine and uncover the radiator until the coolant is up to the normal working temperature and the liquid level is stable. If necessary, more coolant shall be added in the system until reaching the proper liquid level.

4.2 Cooling Water

- If hard water or water with many calcium or manganese ions mixes with the silicon and phosphorus of the additive in the cooling system, indissoluble compound will be formed easily.
- The tendency that silicon and phosphorus form indissoluble compound will increase with the increase of the water's hardness. After a series of heating and cooling circulation, the hard water or water with many calcium or manganese ions will form indissoluble compound easily.

Usable Water Minimally	
Ingredient of Water	Ingredient of Water
Chlorine (CL)	Chlorine (CL)
Sulfate (SO ₄)	Sulfate (SO ₄)
Total hardness	Total hardness
Total granularity	Total granularity
PH value	PH value

- We suggest using distilled water or plasma water to weaken the possibility and severity of the formation of indissoluble compound. ppm= number of particles per one million.
- Using the water that meets this requirement not always prevent the formation of the indissoluble compound, but reducing the rate of deposition for eligible level.

4.3 Anti-icing Fluid

- The coolant shall adopt the eligible water and shall contain about 30% anti-icing fluid so as to maintain the operation temperature of water pump's cavity for a higher efficiency of the water pump.
- To protect the possible minimal ambient temperature, antifreezing agent may be added in the coolant in advance. The amount of the antifreezing agent depends on the antifreezing agent purchased and possible minimal ambient temperature at the machine position. Nevertheless, the concentration of the antifreezing agent in the coolant shall not exceed 60%. Over 60%, the antifreezing protection action on the engine will be weakened and the possibility of precipitation formation in the cooling system will be increased.
- Try best to buy anti-icing fluid with less silicate and proper coolant additive for heavy diesel engine.
- Add properly anti-icing fluid additive

Adding the anti-icing fluid as make-up liquid into the cooling system's liquid is a kind of unacceptable method. In this way, the concentration of the anti-icing fluid in the coolant will be

increased. The mixture of water and antifreezing agent shall be added into the cooling system.

Refer to the following table to determine the concentration of the anti-icing fluid (only as reference, please see the user's manual of anti-icing fluid for details)

Concentration of Anti-icing Fluid	
Protection Temperature	Concentration
-15°C above	30% anti-icing fluid, 70% water
-23°C above	40% anti-icing fluid, 60% water
-37°C above	50% anti-icing fluid, 50% water
-51°C above	60% anti-icing fluid, 40% water

- Ancillary coolant additive

The coolant additive is used to prevent rust, dust, pitting corrosion and corrosion of the engine's parts due to contact with the coolant. Most anti-icing fluid has no enough ancillary coolant additive.

In the coolant, the additive or corresponding liquid of proper amount shall be added. The coolant cannot be used separately, except the anti-icing fluid with the additive above. Under this circumstance, the additive may not be added. Nevertheless, in the process of maintenance, the additive shall be added.

As the coolant additive is used, the concentration in the cooling system may increase by 3%~6% to prevent corrosion.

In order to excessive antirust in the cooling system of the engine, the concentration of the coolant additive shall not exceed the maximum 6% we recommend.

For a higher concentration of the additive, precipitation may be formed possibly at the high-temperature surface of the cooling system, and an adiabatic layer may be formed to weaken the heat exchange performance of the engine. The decrease of the heat exchange rate will possibly cause the crack of the cylinder end and other high-temperature parts. The higher

concentration of the additive will also increase wear of the water pump's seal.

As the premixed coolant of the anti-icing liquid is not used, the coolant additive shall be added.

As the coolant is added into the new or reworked engine for the first time, if the antifreezing agent above is not used, 1L ancillary coolant additive or corresponding matter shall be added in each 30L coolant, so the concentration of the ancillary additive in the cooling system occupies up 3%~6%.

In order to maintain the concentration of 3%~6%, every 250 hours or in oil replacement (later or first), the ancillary additive shall be added.

V Use Rule of Fuel

5.1 Precautions on Use of Fuel

- Upon completion of work every day, as the fuel is added, the wet air shall be discharged so as to avoid condensation.
- Do not top off the fuel tank because the fuel possibly expands and overflows as the temperature increases.
- Prior to installing the fuel filter, the fuel shall not be added into the fuel box. The fuel with foreign substances will accelerate the wear of the fuel system's parts.
- The fuel to be added shall be settled for 72 hours to ensure its cleanness.
- After beginning to add or filling the fuel into the fuel box, retention time of 5-10 minutes is allowed to discharge the water and precipitate from the fuel box.

Upon the replacement of the fuel filter, the air shall be discharged from the system.

- Prior to filling up the fuel box, the water and precipitate in the fuel box shall be discharged weekly to prevent that the water and precipitate access into the fuel system.
- Only the fuel recommended in this section can be used.

5.2 Category of Fuel

In order to offer optimal performance and service life of the engine, the fuel engine for the CCG935G loader allows the use of distilled fuel, i.e. diesel fuel, fuel oil and gas oil.

Selection of diesel:

Solidifying point of fuel °C	10	0	-10	-20	-30	-40
Ambient temperature °C	> 18	8~18	-2~8	-12~-2	-27-12	-37~-27

See the operating specification of engine for details.

VI Use Rule of Operation Oil

6.1 Diesel Engine Oil

Please use the following recommended diesel engine oil: API CD/SD, CD/SE, CD/SF, CD/SG or CD.

- The percentage of sulfur in fuel will affect the use of the diesel. For the effect of the sulfur content in fuel, the remaining and ingredients of the engine oil may be evaluated with infrared analysis method and ASTM D2896 procedures. The production of sulfide depends on the sulfur content in fuel, recipe of lubricant, working conditions of engine and ambient temperature etc.
- It is a common rule that the TBN of the diesel oil is 20 times of sulfur content in fuel. It may be modified by analyzing the oil employed. The effect of recipe of the lubricant depends on the ingredient of the additive. The balanced additive mixture of low TBN has the effects same as the additive mixture of high TBN. Based on the analysis on the oil employed, these results may be attained.

Going against the suggestions above may shorten the service life of engine due to carbon precipitate or excessive wear.

Selection of engine oil: The engine oil CF above shall be adopted.

Viscosity	10W	5W/30	10W/30	15W/30	15W/40
Ambient temperature °C	-20~-5	-25~25	-20~20	-10~25	-10~35
Viscosity	20W/40	30	40		
Ambient temperature °C	-10~30	5~30	>25		

This machine adopts SAE 15W-40 Mobil Delvac Super 1300.

6.2 Hydraulic System Oil



- The hydraulic oil employed may enable the components and hydraulic transmission parts of the hydraulic system to attain a longer service life and optimal working performance. In most hydraulic systems, the following recommended hydraulic oil shall be used: API CC, CC/SF, CD/SF, CD/SG, CD, CE/SF, CE/SG or CE.
- In case the oil of different viscosity is required due to extremely bad ambient temperature, the engine oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. may be used.
- The industrial hydraulic oil that is applied to large load and has anticorrosion, anti-bubble, antirust and anti-oxidation additives may be used.
- This machine adopts Mobil DTE25-antiwear hydraulic oil.

6.3 Transmission Fluid

- Using the oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. may enable the transmission box to attain a longer service life and optimal performance. The oil for transmission box/transmission system oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. is the one in conformity with the API CD/TO-2 code.
- Going against the suggestions above will possibly shorten the service life of the transmission box due to insufficient performance of materials and inconformity of friction materials with the friction requirements.
- Mixture of oil of various levels shall not be used for the transmission box. The oil mixture of various levels uses high molecular polymer as improver of viscosity index. Because of permanent and temporary shear, the improver of viscosity index loses its viscosity efficiency.

- The oil for transmission box and transmission system cannot be used for the engine, or not the service life of engine shall be shortened.
- This machine adopts Mobil Delvac Super1300 (the level is SAE15W-40).

6.4 Differential Gear and Final Transmission Fluid

- In order to attain optimal service life and performance of the parts of the front and rear axles, the oil of proper viscosity shall be chosen. The differential gear and final transmission fluid recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. is the one in conformity with the API GL-5 code.
- This machine adopts Mobilube GX HD80W-90.

6.5 Grease

There are many kinds of grease recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. They are applicable different conditions:

- MPGM

MPGM is applied to heavy-duty roller bearing and joints. The high-pressure grease enables the machine to have its longest service life. Under NLGI NO.2 is applicable to the conditions of most kinds of temperature.

If MPGM grease is not available, the multi-purpose grease containing 3%~5% molybdenum may be used.

- It is recommended to use MPGL (for non-high pressure area).

The NLGI NO.2 grease is used for automatic light-load high-temperature lubrication (175°C). The grease serves good mechanical stability, anti-oxidation and antirust functions, and good separation torque. If this kind of grease is not available, the similar multi-purpose grease may be used.

- This machine adopts molybdenum disulfide lithium-based grease or 3# and 4# calcium-based grease.

6.6 Braking Fluid

This machine adopts hydraulic braking system and does not require the braking fluid

separately. The liquid for the braking system is same as the one for the hydraulic system.

All kinds of operation oil shall be cleanly. The oil for hydraulic system shall meet the requirements of 18/15 (GB/T14039-93) 或 NAS9 18/15 (GB/T14039-93) or NAS9 level.

VII Viscosity and Full Capacity of Operation Oil

7.1 Viscosity and Temperature Range of Operation Oil

Type		Specification and No.	
		The brand number added as the product that has an export destination to a non-low temperature area	The brand number added as the product that has an export destination to a low temperature area
Oil for torque converter and transmission box		SAE 15W-40 Mobil Delvac Super 1300	Mobil Delvac MX 15W-40
Axle lubricant		HD80W-90(Mobilube HD 80W-90)	Same as left column
Hydraulic oil		Hydraulic oil(Mobil DTE 25)	Hydraulic oil(Mobil DTE 15M)
Brake oil	Common axle	DOT 3 Mobil Super Heavy Brake Fluid	Same as left column
	Wet axle	Air-pushing oil brake	Hydraulic oil (Mobil Delvac Hydraulic 10W)
		Hydraulic brake	/
Engine oil		0# light diesel fuel	-20# light diesel fuel
Grease		NLGI 2 lithium-based (Mobilgrease HP 222)	Same as left column
Engine oil		SAE 15W-40 Mobil Delvac Super 1300	Mobil Delvac MX 15W-40
Anti-icing fluid		Mobil Antifreeze(Clear water 40%+antifreeze 60%)	Mobil Antifreeze(Clear water 20%+antifreeze 80%)

7.2 Full Capacity of System

Full Capacity (approximation)	
Oil box or system	Liter
Cooling system	40
Fuel box	160
Engine oil	27
Transmission fluid	35
Differential gear and final transmission fluid (single unit)	26
Hydraulic oil box	125

VIII S.O.S

S.O.S method is adopted to examine the conditions of the machine and whether the machine requires to be maintained. As each kind of oil is sampled, the lubricant shall be heated and mixed evenly so as to ensure that the sample oil has representativeness.

8.1 Acquisition of Sample Oil for S.O.S

In order to realize the good preventive maintenance scheme, we suggest adopting the S.O.S method to examine the conditions of the machine and whether the machine requires to be maintained. As each kind of oil is sampled, the lubricant shall be heated and mixed evenly so as to ensure that the sample oil has representativeness.

For acquisition of sample oil for S.O.S, several methods are available.

- Insert sample oil doper into the oil groove.
- Use sample oil valve.
- Use discharged oil as the oil is replaced.

Note: We suggest adopting the first or second method. If two methods do not work, the discharge oil may be used.

As the discharged oil is adopted as the sample oil, the oil cannot be sampled from the oil discharged firstly or lastly because it is not mixed evenly and has no representativeness.

8.2 S.O.S (Regular Sample Oil) Analysis

The regular sample oil analysis is composed of three basic tests:

- Wear element analysis.
- Chemical and physical tests.
- Oil status analysis.

The wear element analysis adopts spectrophotometric method to examine the wear degree of components by measuring the concentration of the wear mental elements in the sample oil (unit: number of particles per one million). If the test results deviate from the concentration range of normal wear, we may confirm that the part will be disabled soon.

By the chemical and physical tests, the proportion of water, fuel, and antifreezing agent in the lubricant may be examined.

The oil status analysis adopts infrared analysis method to determine whether the lubricant

has smoke and dust, sulfide, oxide and nitride and measure their amount. The infrared analysis may help us work out the replacement cycle of the lubricant under special working conditions.

The infrared analysis method shall be conducted simultaneously with the wear element analysis method and chemical and physical tests so as to ensure the correct evaluation.

S.O.S Cyclogram				
Oil box	Engine oil	Hydraulic oil	Differential /Final drive oil	Transmiss ion fluid
Time interval	250h	500h	500h	500h

IX Maintenance Interval

9.1 Upon Request

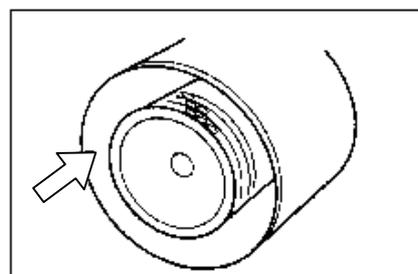
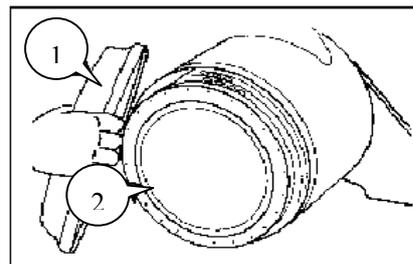
Prior to carrying out any operation and maintenance, the warnings and annotations in this manual's safety chapter shall be read and understood.

Please refer to the instructions for use and maintenance of the engine for cleaning of air intake system.

Repairing of filtering element

Replace/clean coarse filtering element

1. Dismantle the cover of air filter (1);
2. Dismantle coarse filtering element (2) from the shell of the air filter;
3. Clean the shell of the air filter;
4. Clean and examine the coarse filtering element. Please see "Cleaning of Coarse Filtering Element";
5. Installed the cleaned coarse filtering element in the shell of the air filter;
6. Clean and install the cover, and fasten the bolts on the cover with hands not a tool.



After installing a cleanly coarse filter, if the engine discharges black smoke, new fine filter shall be installed.

After being cleaned for 6 times, the coarse filtering element shall be replaced. Even if it is not cleaned for 6 times, it shall be replaced one time every year.

Replace fine coarse filtering element

1. Open the maintenance door;
2. Dismantle the cover and coarse filtering element;
3. Dismantle the bolt fixing the fine coarse filtering element and then dismantle the fine filtering element;
4. Cover the air inlet and clean the interior of the air filter;
5. Examine the gasket between air inlet pipe and shell. Any damaged gasket shall be replaced;
6. Open air inlet to install a new fine filtering element;
7. Install the nut and gasket on the screw. The torsional moment of the nut shall be $27 \pm 7 \text{ N.m}$;

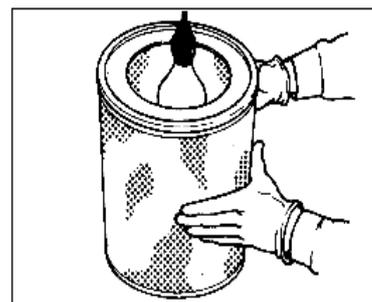
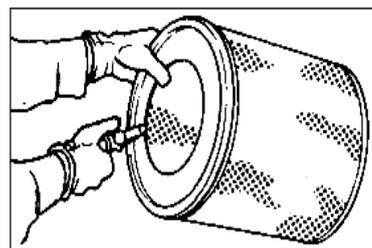
8. Install the coarse filtering element and cover, and fasten the bolts on the cover with hands not a tool;
9. Close the maintenance door.

Clean coarse filtering element

While cleaning the coarse filtering element, do not strike it, or not, the engine will be damaged.

The filtering element may be cleaned with pressure air, pressure water or cleaning.

1. Induct the air or water along with internal and external wrinkles of the filtering element;
2. After cleaning, examine the coarse filtering element. Do not use the filtering element with a damaged wrinkle, gasket or seal;
3. Pack the cleaned filtering element and store it at a cleanly and dry place.



Accumulator

Checking Electrolyte

Batteries used for the machine are conventional lead-acid batteries, installed on both sides of rear end of back frame. Check electrolyte every 100 hours.

All fixed bolts of the accumulator shall be fastened per 1000 hours.

Check the following items at least every 1,000 hours, or at a higher frequency if required by the environment.

- Clean the battery top with a clean piece of cloth.
- Keep terminals clean and apply Vaseline.

Water consumption by each battery should not exceed 30CC under normal charging frequency and weather conditions.

Check the batteries once a week under anomalous temperature. In this case the water consumption may increase.

0. Remove battery cover.
1. Clean battery surface with a clean piece of cloth. Keep terminals clean and apply Vaseline.
2. Check electrolyte level in each battery, and add distilled water to keep the level not lower

than the shield plate 20mm. In case there is no distilled water available, cooled drinking water may be used as a substitute.

3. Reinstall battery cover.

Radiator

Clean or replace the pressure cover

The maintenance door of the radiator cover is designed at the rear topside of the machine.

1. Open the maintenance gate of the radiator.
2. Slowly loosen the radiator cap and release the pressure.
3. Examine the damage, precipitation or foreign substance of the cover, and wipe off the cover with a clean cloth or if necessary replace it with a new one;
4. Fit on the cover;

Close the maintenance door.

Clean the exterior of radiator core

Open the radiator cowling at the back of the machine.

The dust, leaves and other foreign substance on the radiator may be removed with compressed air, high-pressure water or steam (compressed air is better).



Fuse

Location: Fuse box is installed at the left lower side of the instrument desk in the cab.

Fuse--It protects the electrical system from damage due to short circuit. If the fuse is burnt out, replace it with a new one. If the new fuse is burnt out again, check and repair the circuit. Do not reel too much coils of fuse.

- **Only the fuse of fusing current can be used, or not, the circuit will be damaged possibly. If the fuse requires to be replaced frequently, it is possible the circuit is involved in failure. Please examine the circuit.**

Windscreen wiper

Examination/replacement

Examine the brush of the wiper. If it is worn too mush or damaged, or cracked, the wiper

shall be replaced.

Dipper tooth

The damaged dipper tooth shall be replaced. and properly connect it with bolts and nuts.

Prior to replacing the dipper tooth, the dipper shall be padded well, or not, it will result in personal injuries and death possibly.

9.2 Maintenance of Each 10 Working Hours or Every Day

Engine oil

Examine oil level. The oil shall not be excessive so as to avoid the engine from damage.

1. Open the maintenance door at the side of the machine;
2. Keep the oil level between the normal mark on the oil scale;
3. If the oil requires to be added, open the oil filling cap to add oil;
4. Clean the oil filling cap and install it.
5. Close the maintenance door.

Transmission fluid

Examine the oil level. The transmission fluid scale is located at the left side of the machine.

1. In low-speed idling, the oil level shall be kept between two scales of the oil scale;
2. The oil shall be added depending on demand;
3. Clean the oil filling cap and install it.

Hydraulic oil

Examine the oil level. The hydraulic oil box is situated behind the cab and hydraulic oil's level is at left side.

1. Keep the oil level at the middle of the oil level gauge;
2. If the oil requires to be added, open the oil filling cap to add oil with an oil tube;
3. Clean the oil filling cap and install it.

In oil filling, the dipper shall be leveled on the ground.

Cooling system

Examine the level of the coolant. The radiator cap is located in the engine hood behind the machine.

1. Open the maintenance door on the engine hood;

2. Unfasten the radiator cap slowly to release the pressure;
3. Keep the level of the coolant within 1cm under the water filter. If the water requires to be filled every day, please examine the leakage.
4. Examine the sealing of the cap. Any damaged cap shall be replaced;
5. Mount the cap and close up the maintenance door.

Fuel box

Discharged water and precipitate

The fuel box is located at back of the machine, and the discharging screw plug is located at the right bottom of the fuel box.

1. Release the discharging screw plug slowly to discharge the water and precipitate.
2. Fasten the discharging screw plug.

Round examination over machine

Examine machine

1. Examine whether the working device and linkage gear are worn. Any damaged one shall be replaced;
2. Examine whether bulbs and glass are damaged. Any damaged one shall be replaced;
3. Examine and remove the dust and foreign substance on the engine hood;
4. Examine leakage of cooling system, hose failure and dust accumulation status. The leakage shall be removed and foreign substance on the radiator shall be got rid of;
5. Examine the leakage status of the hydraulic system; examine the oil box, soft and hard tubs, screw plug, and joints. Any leakage shall be removed;
6. Examine the leakage status of front and rear differential gears, final transmission, and wet brake;
7. Examine the leakage status of the transmission box;
8. Examine damage and pressure of tyres;
9. Examine whether the covers and hoods are closed and whether they are damaged;
10. Examine ladder, aisle and railing and their cleanness;
11. Examine the cleanness of the cab;
12. Examine whether the instruments and switches are damaged. Any damaged one shall be replaced;

13. Examine the rear bumper for optimal vision.

Cleaning of glass window

Clean windows with ordinary cleaning fluid for windshields. Open the window.

Instruments and Lights

Start engine and check instruments, glasses and switches for damages; check all lights; whistle electric horn and then shut down engine.

9.3 Maintenance after 50-Hour Running-in of New Loaders

Gearbox Oil

- Replacing gearbox oil: gearbox oil should be replaced after 50-hour running-in of new loader.

Start engine to heat up oil. The loader should be parked in a level position with the bucket laid down and a slight down-ward pressure being applied.

Apply parking brake and shut down engine.

1. Remove the oil drain plug in gearbox drain pan to discharge oil remained.
2. Replace filtering element of fine filter. Refer to "Replacing filtering element" in Maintenance per 500 Working Hours or per Season.
3. Dismount oil suction pipe and drain pan assembly from box body, and dismount support plate assembly from the drain pan assembly.
4. Take off magnet on the support plate assembly and clean it with a clean stiff brush or compressed air.
5. Clean oil suction pipe, support plate assembly and drain pan. Replace the support plate assembly if filter screen is damaged.
6. Reinstall the magnet onto support plate assembly.
7. Reinstall the support plate assembly onto drain pan. Check the gasket and replace it if damaged.
8. Reinstall drain pan assembly, tighten screws and then install oil suction pipe.
9. Clean and install oil drain plug into gearbox.
10. Remove the oil drain plug under the torque converter oil cooler at the rearmost end of machine to change oil remained in torque converter oil cooler. Clean and reinstall oil drain plug.
11. Fill specified torque converter oil to the high level of oil gauge with the engine being shut

down.

12. Start engine and apply brake.

13. Slowly operate gearbox control lever with the engine idling to circulate oil and fill torque converter, its oil cooler and pipes with oil. Check oil level in torque converter, which should fall between lower and higher levels of oil gauge.

14. Place gearbox control lever on neutral position and then shut down engine to park the machine.

- Never hammer the magnet on any hard objects. Damaged magnet must be replaced.
- After running-in, maintain the new loader at normal frequency.

Replace the oil of differential gear and final transmission of the front and rear axles

Maintain according to the following requirements (except otherwise herein provided);

1. Disassemble the oil drain plug of front axle and rear axle, and discharge the oil.
2. Clean the oil drain plug and reinstall it.
3. Disassemble the oil drain plug of front axle and rear axle, and refuel the axle through the oil filling port till bleeding. See figures and tables in “the viscosity and full capacity of oil”.
4. Install the oil drain plug. Start the engine and let it work for a few minutes. Re-check the oil level and refuel to the specified position if necessary.
5. Install the oil drain plug.

Working device and hydraulic steering system

Replacement of hydraulic oil box

The machine shall be on level ground, set all working devices in the ground and exert downward pressure on them. Close the parking brake and shutdown the engine.

1. Disassemble the oil filling cap of the hydraulic tank.
2. Open the vent valve at the bottom of the hydraulic tank and discharge the oil.
3. Close the vent valve.
4. Replace the filter of hydraulic system. See “Hydraulic System” in “Maintenance of Each 500 Working Hours or Every Season”.
5. Disassemble the fuel strainer, clean it and install it.
6. Refuel to the hydraulic tank. See “Viscosity and Full Capacity of Oil”.
7. Check the gasket of the oil filling cap and replace the damaged gasket.

8. Fit on the oil filling cap.
9. Start the engine and run it for a few minutes.
10. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
11. Shut down the engine.

9.4 Maintenance of Each 50 Working

Hours or Every Week

- Firstly carry on the aforementioned examination items

Lower hinge pin of dipper

Lubricate the hinge pin

Lubricate two hinge pins under the dipper.



9.5 Maintenance of Each 100 Working Hours or Every Two Weeks

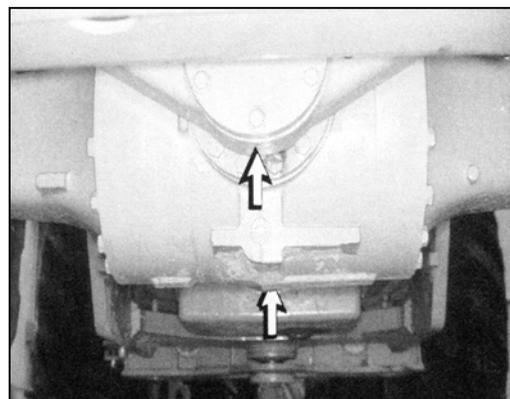
- Firstly carry on the aforementioned examination items

Oscillating frame of rear axle

Lubricate the two lubricating joints of the oscillating frame of the rear axle.

Hinge pin of hydraulic oil cylinder and tie bar

Lubricate 11 hinging joints of the working device (excluding two hinge pins of the dipper).



Steering cylinder's hinge pin

Lubricate 4 bearings of the left and right steering cylinders.

Articulated bearing of front and rear frames

Lubricate the upper and lower articulated bearings of the front and rear frames.

Air conditioning System

1. For the integral air conditioning system, do not dismantle it randomly so as to prevent the condensator from leakage. Examine it regularly; especially examine whether the pipe joints are loosened and whether the collecting screws are loosened. For any problem, the corresponding measures shall be taken.

2. Regularly examine the belt for proper tightness. Usually, after working for 100 hours, it shall be examined one time.
3. Regularly clean the dust on the surface of condenser. It may be cleaned with water or high-pressure air blower to prevent weakening the condensation effect. Usually, after working for 100 hours, it shall be cleaned one time. Spray rinsing with steam is not allowed.
4. While removing the system refrigerant, discharge it slowly to avoid randomly discharging of the antifreezing oil. Keep it away from skin.
5. While replacing the parts, add the antifreezing oil according to the requirements.
6. The expansion valve has been adjusted well according to the relevant regulations. Do not adjust it without authorization.

9.6 Maintenance of Each 250 Working Hours or Every Month

- **Firstly carry on the aforementioned examination items**

Engine oil and filter

Replace engine oil and filter

1. Disassemble the oil drain plug of crankcase, discharge oil, clean the plug and install it.
2. Open the machine's left maintenance door, disassemble the filter with a zony wrench.
3. Clean the filter's shell base, remove all old filter gaskets.
4. Smear new filter gasket with a thin layer of engine lubricant.
5. Install new filter by hand, tighten it for semi-circle when the gasket touch the base.
6. Disassemble the oil filling cap, and add fresh oil into the crankcase. See also "Viscosity and Full Capacity of Operation Oil". Clean the oil filling cap and install it.
7. Start the engine to heat oil, detect leakage, and shutdown the engine.
8. Maintain the engine oil in the normal position of oil gauge.
9. Install the maintenance door.

Braking system

Test the braking capacity of the service brake.

There shall not have any people and obstacles around the machine.

Fixed link of the front and rear frames shall be packed up.

Test the brake on dry road.

The following tests are used to determine whether the service brake functions are normal or not, not to measure the maximum braking force. The vehicle braking force needed by the engine running at a certain speed is adapted with the setting value of the engine and the efficiency of the driving system, as well as the braking capacity of the brake.

When the machine begins moving, the revolving speed of the engine when braking, the service brake shall be compared with that of the engine as braking stopper is under the original test, and shall be a system wear symbol.

1. Start the engine, slightly raise the bucket, brake the service brake, and release the parking brake.
2. When braking the service brake, put forward the gearshift at the second gear.
3. Gradually increase the revolving speed of the engine to high speed idle, and the machine shall not move.
4. Let the revolving speed of the engine drop to low speed idle, set the gearshift to stop short, close up the parking brake, put the bucket on the ground, and shutdown the engine.

● **If the loader starts moving, lower the rpm immediately and apply parking brake.**

If the machine still moves when tusting the service brake, please connect with related service station and allow serviceman to check the machine. If necessary, the service brake shall be repaired before reuse of the machine.

Test the braking capacity of the parking brake.

There shall not have any people and obstacles around the machine.

There shall not have any people and obstacles around the machine.

Fixed link of the front and rear frames shall be packed up.

Fixed link of the front and rear frames shall be packed up.

Carry on the test on dry cement road which slant angle is about 8 degree and the length of the slope is about 20 meters.

The following tests are used to determine whether the service brake functions are normal or not, not to measure the maximum braking force.

- Start the engine, and raise the bucket to the transport position (40 centimeters above the ground).
- Drive the machine to the center of the slope, tramp the service braking pedal to stop the

machine (do not loosen the pedal at this time).

- Set the gearshift to the stop short and close up the parking brake.
- Loosen the service braking pedal (shall not turn off the engine), observe whether the machine moves down or not. At this point in time, if the machine doesn't move in five minutes, the parking brake is normal.

If the machine moves, immediately tramp the service braking pedal to stop the machine and quickly drive it off the slope.

If the machine still moves when testing the parking brake, please connect with related service station and allow serviceman to check the machine. If necessary, the parking brake shall be repaired or adjusted before re-use the machine.

Cooling system

Add coolant additive.

Do not add additive randomly before reading and understanding the content of the chapter “Cooling System Specification”.

The maintenance door of the radiator cap is located on the top of the aft closure of the machine.

1. Open the maintenance gate.
2. Slowly unscrew the radiator cap and release pressure.
3. Add 0.25L coolant.
4. Fit on the radiator cap and close the maintenance gate.

Splines of propeller shaft

Lubricant splines

1. Disassemble the fixed link of the front and rear frames and start the engine.
2. Turn the machine right or left to the limit position.
3. Put the bucket on the ground, close up the parking brake, and shutdown the engine.
4. Lubricate the hinged splines of propeller shaft.

Cooling Fan and Generator Belt

Check – Adjust – Replace

Check belt conditions and tension. In case the belt is worn out or damaged, the whole belt component should be replaced.

Check AC generator belt and cooling fan belt conditions and tension. The belt sagging should be 14-20mm under an 110N force, otherwise adjustment is necessary.

Cooling Fan Bearing

Lubrication

Open service door in engine to lubricate cooling fan bearing.

Additional Maintenance Contents for the First 200 Hours after Usage of New

Loader Are Given below

Gearbox Oil

Check oil cleanness, and replace oil if polluted.

Refer to “Gearbox Oil” in Maintenance after 50-Hour Running-in of New Loaders.

Front Axle and Rear Axle

Check the cleanliness of the oil and replace it if it is dirty.

See the steps in “‘Front axle and rear axle’ in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Check the cleanliness of the oil and replace it if it is dirty.

To see the steps in “‘Working device and hydraulic steering system’ in the maintenance of the running-in 50 hours of new loader”.

9.7 Maintenance of Each 500 Working Hours or Every Season

- **Firstly carry on the aforementioned examination items**

Crankcase scavenging valve of engine

Clean scavenging valve

Carry on cleanup according to the service manual of diesel engine.

Gearbox

Replacing Filtering Element

1. Open service door.
2. Dismount filter casing.
3. Dismount and discard old filtering element.
4. Clean filter casing with clean nonflammable solvent.
5. Clean casing base.

6. Install a new filtering element in the casing.
7. Check filter casing seal and replace it if damaged.
8. Start engine and apply brake.
9. Slowly operate gearbox control lever to circulate gearbox oil.
10. Place gearbox control lever on neutral position to check for leakage.
11. Keep the oil at specified level, and add oil through filler pipe if necessary.
12. Shut down engine and close service door.

Hydraulic system

Replace filter.

1. Disassemble the oil filling cap, and release the pressure inside the gasoline tank.
2. Loosen the fixed bolts of the filters.
3. Disassemble the lid and filter element.
4. Discard the filter element.
5. Check the O-Ring and it shall be replaced if necessary.
6. Install new filter element and lid, and tighten the fixed bolts of the lid.
7. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
8. Check the seal of the lid of oil filling port, replace the gasket if it is damaged, and install the lid of oil filling port.

Fuel oil system

Clean and replace the filter.

Clean the coarse filter element.

Carry on working according to the service manual of diesel engine and the following steps are for reference only.

- Open the maintenance door by the side of the machine.
- Loosen the holding bolt on the shell of the filter.
- Discard the shell and filter.
- Disassemble the filter element from the lag.
- Clean the filter element and shell in clean, non-flammable solvent.
- Dry the filter element by compressed air.

- Clean the shell base of the filter.
- Check the seal ring and replace it if it is damaged.
- Install clean filter element.
- Encase the filtering element and lag.
- Re-tighten the bolts.

Before the installation of filter, do not refuel. Impure fuel oil will cause the accelerated wear of the fuel oil system.

Carry on working according to the service manual of diesel engine and the following steps are for reference only.

1. Disassemble the filter and discard it as useless.
2. Clean the filter fixing base, and make sure that all the old seal rings have removed.
3. Smear clean diesel on the new filter seal ring.
4. Install new filter by hand and twist another three-quarters circle when the seal touch the base.
5. Start the diesel engine system (see below).

Start the fuel system.

If the engine fails to start or run smoothly after refueling the filter and oil pump body, the injection pump and pressure duct shall be started with refueling.

Each injection pump has an overflow one-way valve, which can not be opened by manual pump pressure. Refuel the injection pump and pipeline according to the following steps.

- **If loosen or tighten fuel line nut by only a wrench, the fuel injector may be irremediable defect by distortion. So clamp the injector by a wrench and loosen the nut by another wrench.**

1. Loosen spray bar at the engine junk head.
2. Set the acceleration control leer to low speed idle position.
3. Start the engine and stop it till the diesel flow out from all pipelines and no air bubbles.
4. Tighten the nut of fuel oil pipe with a torsional moment of $40 \pm 7 \text{N.m}$, and chuck the injector with another wrench to prevent damage.
5. Start the diesel and check its leakage.
6. Close the maintenance door.

Start pump

Filter and pump body

1. Open air release valve for fuel system on pump body.
2. Loosen the priming pump plunger and press it up and down.
3. Close the pump and lock plunger when there is no bubble as the fuel oil flows out.
4. Close the vent valve.
5. Start the diesel and check its leakage.

Fuel tank lock and fuel strainer

Oil filling cap of the fuel tank locates in the back of the machine.

1. Disassemble the lid.
2. Replace the lid if the gasket is broken.
3. Take out primary strainer from the oil filling port.
4. Clean the primary strainer with clean, non-flammable solvent.
5. Fit on the primary strainer.
6. Fit on the oil filling cap of the fuel tank

Additional Maintenance Contents for the First 600 Hours after the Usage of New Loader Are Given Below

Differential gear and final transmission

Replace oil.

See oil replacement in “Front axle and rear axle’ in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Replace oil.

See the steps in ““Working device and hydraulic steering system’ in the maintenance of the running-in 50 hours of new loader”.

9.8 Maintenance of Each 1000 Working Hours or Every Half An Year

- **Firstly carry on the aforementioned examination items**

Gearbox oil

Replace the gearbox oil.

Start the engine to hear the oil and the machine shall be set at a level position. Set down

the bucket and exert downward pressure on it slightly. Close the parking brake and shutdown the engine.

1. Remove oil drain plug in gearbox to discharge oil remained.
2. Replace filtering element. Refer to “Gearbox Oil” in Maintenance after 50-Hour Running-in of New Loaders.
3. Dismount oil suction pipe and drain pan assembly from box body, and dismount support plate assembly from the drain pan assembly.
4. Take off magnet on the support plate assembly and clean it with a clean stiff brush or compressed air.
5. Clean oil suction pipe, support plate assembly and drain pan. Replace the support plate assembly if filter screen is damaged.
6. Reinstall the magnet onto support plate assembly.
7. Reinstall the support plate assembly onto drain pan. Check the gasket and replace it if damaged.
8. Reinstall drain pan assembly, tighten screws and then install oil suction pipe.
9. Clean and install oil drain plug into gearbox.
10. Add oil to gearbox through the filler. Refer to Viscosity and Filling Limit of Working Oils.
11. Replace the air release valve on the top of gearbox with a new one.
12. Start engine and apply brake.
13. Slowly operate gearbox control lever with the engine idling to circulate oil. Place gearbox control lever on neutral position.
14. Keep the oil at specified level, and add oil through filler if necessary.
15. Shut down engine.

Gimbal of driving shaft

1. Fill lithium-based lubricant into the grease fitting of the gimbal of middle shaft.
2. Fill lithium-based lubricant into the grease fitting of the gimbal of forward shaft.
3. Fill lithium-based lubricant into the grease fitting of the gimbal of fork of rear driving shaft.
4. Fill lithium-based lubricant into the grease fitting of the gimbal of rear driving shaft.

Additional Maintenance Contents for the First 1500 Hours after Usage of New Loader Are Given below.

Differential gear and final transmission

Replace oil.

See oil replacement in “Front axle and rear axle’ in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Replace oil.

See the steps in “Working device and hydraulic steering system’ in the maintenance of the running-in 50 hours of new loader”.

9.9 Maintenance of Each 2000 Working Hours or Every Year

● Firstly carry on the aforementioned examination items

Oil in hydraulic tank

Replace oil.

Let the machine work for longer hours to heat the oil.

The machine shall be on level ground, set all working devices in the ground and exert downward pressure on them. Close the parking brake and shutdown the engine.

1. Disassemble the oil filling cap of the hydraulic tank.
2. Open the vent valve at the bottom of the hydraulic tank and discharge the oil.
3. Close the vent valve.
4. Replace the filter of hydraulic system. See “Hydraulic System” in “Maintenance of Each 500 Working Hours or Every Season”.
5. Disassemble the fuel strainer, clean it and install it.
6. Refuel to the hydraulic tank. See “Viscosity and Full Capacity of Oil”.
7. Check the gasket of the oil filling cap and replace the damaged gasket.
8. Fit on the oil filling cap.
9. Start the engine and run it for a few minutes.
10. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
11. Shut down the engine.

Differential gear and final transmission

Replace oil.

1. Disassemble the oil drain plug of front axle and rear axle, and discharge the oil.
2. Clean the oil drain plug and reinstall it.
3. Disassemble the oil drain plug of front axle and rear axle, refuel the axle through the oil filling port till bleeding. See figures and tables in “Viscosity and Full Capacity of Oil”.
4. Install the oil drain plug. Start the engine and let it work for a few minutes. Re-check the oil level and refuel to the specified position if necessary.
5. Install the oil drain plug.

Engine Valve Clearance

Adjustment

Adjustment should be carried out in accordance with service manual of diesel engine. The following procedure is for reference only.

- **To avoid personal injury and death, rotating flywheel by starting engine is not allowed. Engine component with high temperature may cause scald, therefore the engine must be cooled down before measuring valve clearance.**
- **Shut down the engine to measure valve clearance. To obtain precise measurements, shut down the engine for 20 minutes to achieve same temperature at cylinder head and cylinder body.**

Adjust valve clearance to be within the scope specified in service manual of diesel engine.

Please contact service staff for complete adjustment procedure of valve clearance.

Engine Valve Rotors

Observe the rotation of the rotors with the engine idling after valve clearance is adjusted.

WARNING

Always wear goggles or face shield and protective clothing to avoid scald by hot oil.

1. Start engine and run it at a low rpm.
2. Observe the top surface of each valve rotor, which should rotate slightly each time the valve closes.

Contact service staff if any rotor fails to rotate.

9.10 Maintenance of Each 3000 Working Hours or Every Year

- **Firstly carry on the aforementioned examination items**

Coolant in the cooling system

Replace the coolant / clean the system.

Replace the coolant as soon as possible when observing the coolant has impurities or bubble.

The radiator cap locates at the top of the rear cover of the machine.

1. Open the maintenance gate of the radiator.
2. Slowly loosen the radiator cap and release the pressure.
3. Open the discharge valve and discharge the coolant. The discharge valve locates at the bottom of the radiator.
4. Close the discharge valve and add system clean water and cleaning liquid of the cooling system which concentration is 6%~10%.
5. Start the engine and run it for 1.5 hours, shutdown it and discharge cleaning liquid.
6. Shut down the engine and wash the cooling system with clean water till removes all water.
7. Close the discharge valve.
8. Add coolant. See also in “cooling system specification” and “Viscosity and Full Capacity of Oil”.
9. Start and run the engine, open the radiator cap, open the thermostat, stable the liquid level.
10. The coolant level shall keep within 1cm under the charging pipe.
11. Replace damaged lid gasket and fit on the lid.
12. Shut down the engine.

Machinery Management

I Management and Usage of New Machine

New machine leave factory after sophisticated inspection and test run. However, it shall have enough running-in before usage, which is the know-how of long-term maintaining machine in a well-state and economic usage.

Please take heed of the following items when using new machine:

- No matter what season, enough warming-up shall be done before working.
- Be sure to avoid the engine work in idling (non-load high-speed operation). It must not do like that especially not heating the engine.
- Be sure to avoid emergency brake, flashback and unnecessary spike stop.

II Storage of the Machine

2.1 No Use for One Month

In addition to the attention of stop at ordinary time, the following items shall be implemented for the machine of non-use of a month:

- Brake the machine for every week, and operate the working device to use at any time.

2.2 No Use for over One Month

In addition to the attention of stop at ordinary time, the following items shall be implemented for the machine of non-use of over a month:

- Check oil point of each part to see whether it has oil with specified volume.
- Park at hard-surface road at high position taking into account such as the rainy season.
- Take out the accumulator.

Even parking inside the house, the accumulator shall be kept in other dry place for the summer heat or humid area, and be charged for every month.

- Smear the anti-corrosive grease on the bare part of easily rusty hardware such as piston rod.
- Cover with clothes at the humidity area (venting device, air filter).
- Tyre pressure shall be adjusted to the standard pressure and check the abrasion and damage of tyre. (Prepare new tyre according to the check result).

In order to remove the burden of tyre load, float it by jacking up the machine.

If this approach can not be implemented, be sure to check the air pressure every two weeks to maintain proper air pressure.

- Carry on running the machine for every week, start the engine, move the machine forward after enough warming-up.

If the working device is moved, the antirust grease on the piston rod shall be wiped away firstly.

2.3 Use after Long-term Storage

- Remove the cover which prevents humidity.
- Wipe the anti-corrosive grease which covers the bare part.
- Discharge the oil in the engine crankcase, torque-converter gearbox, differential gear and final reducer, clean them, and replace new oil with specified volume.
- Discharge impurity and water from hydraulic reservoir and diesel box.
- Add cooling water with specified volume.
- Install the removed storage accumulator after it has been charged and connect it with cable.
- Adjust the tyre pressure according to the authorized pressure of the road.
- Carry on the inspection before operating.

Carry on the warm up operation.

Structure and specification are subject to any changes without notice

**ADDRESS: NO.1 MIDDLE HONGHE RD., CHENGDU ECONOMIC & TECHNOLOGICAL DEVELOPMENT
ZONE, CHENGDU, SICHUAN, P. R.CHINA
CONSULTING TEL.:86-28-82854808
SERVICE TEL.: 86-28-82854826
FAX: 86-28-82854811
EMAIL: CG169@MAIL.SC.CNINFO. NET
NET ADD: [HTTP://WWW.CG169.COM](http://WWW.CG169.COM)
[HTTP://WWW.CHINACHENGGONG.COM](http://WWW.CHINACHENGGONG.COM)**

P.C.: 610110

First Edition prepared in Sept. 2007, and printed in Nov. 2007