OPERATOR'S MANUAL

MOVING YOU FURTHER

WHEEL LOADER

HL630V
HL635V

HYUNDAI
CONSTRUCTION EQUIPMENT

Attention Please

Subject : Matters needing attention for maintenance and accessories

1. First welcome you to have used our product and thank you for great coordination in business.
2. In case the equipment is in faults, it should be maintained by our Company or the company appointed by our Company using standard parts.
3. At present, In some markets there have been some forged and fake imported parts and some unauthorized and untrained companies or persons to maintain the products of our company, causing many problems left and seriously affecting the equipment performance and operation life.
4. In view of the above, the customers are requested to pay attention to followings:
   1) The adopting of non-standard parts may not have obvious effects on the equipment in short time, however, it will certainly have a series of harmful effects later. In order to prevent the damage to the equipment or the performance deterioration causing severer loss, never use non-standard parts.
   2) When the customer is purchasing the parts, it is necessary to purchase products from our company or the company authorized by our company for selling the parts, and be careful for the discrimination. Welcome to contact our company if there is doubtful phenomenon.
   3) If the customer requires to maintain the equipment, it is requested to contact our company or the company authorized by our company.
   4) In case of the equipment faults arising from the maintenance with non-standard parts or by the unauthorized company or persons, our Company do not bear the responsibilities for the warranty service, even within the Warranty period.
   5) With the improvement of products, the contents of this manual may be lagging behind. Customers in order to obtain the latest product information, please contact our company or our authorized dealer.
5. Thank you once again for the business cooperation at normal times.

With best regards

Operation & Maintenance Manual

Our Company has the right to continuously improve the products so as to promote the best products to the market as possible as we can. These improvements can be implemented at any time; however, we will not change the materials for the products being sold at that time. The consumers should particularly be reminded of that they should regularly contact with the Agent to ask for the newest information of the equipment.

These information may include the auxiliary equipment or optional that are not available for your equipmnet. So please contact the Agent when you need other devices.

The pictures used in this Manual are only to visually depict the related sections of the equipment and they may be different from the actually installed equipment.

Contents

ADVICE FOR OPERATION OF LOADER

DANGER

The irregular operation of the loader can cause serious injure and death. When conducting equipment operation, maintenance, traveling or shipment, if the following safety rules are not obeyed, there may be serious and even fatal injury to the persons or heavy damages to the equipment and periphery.

For the sake of your safety and the safety of others whose safety is subject to your actions, please seriously check important factors causing hazards.

WARNING

The incorrect operation and maintenance may bring about hazards and even the personal death.

Before operation and maintenance, the driver and maintainer must fully understand the details in this manual.

If you perform the operation and maintenance without the correct method specified this manual, the accidents may occur.

Before using the equipment, it is necessary to read through the operation procedures and matters to be attended described in this manual.

The sold equipment follows all relative local laws and regulations. If you purchase the machine from other country, it may lack of the safety equipment specified in local laws and regulations. If so, please consult the Agent before operation.

Safety Alert Symbols

Preparation - understand the description of all operations and safety.

This is a Safety Alert Symbol. When working together with other persons, you must ensure that all persons shall be able to understand the sign language being used and warn the people of injury dangers. Please follow the recommended safety measures and safety operation regulations. Memorize the sign languages used in alert symbol.

Signal Words

The “CAUTION”, “WARNING”, “DANGER” used in this manual and on the machine. They indicate the hazardous level for harms and non-safety operations, and they also represent the three degree of safeties. Whenever you see the delta label for safety warning, you should seriously read the content of the warning no matter what warning text is followed.

CAUTION

CAUTION indicates a potential hazardous situation which, if not avoided, could result in minor or moderate injury. It is also used for reminding operator to prevent the unsafe operation factors during operating.

WARNING

Warning indicates a potential hazardous situation which, if not avoided, could result in serious injury or death. It is also used for warning operator to prevent the severer unsafe operations.

DANGER

Danger indicates a direct dangerous situation which, if not avoid, will cause death or extremely severe injury accidents. Meanwhile, it is also used to warn that the equipment will explode or be destroyed if not operated properly.

The safety warning starts from Page 1-4 of Safety Section in this manual.

It is impossible to pre-list all potential hazards in all working environments. Therefore, if you want to perform the operations un-recommended, you must ensure the safety of yourself and others and must ensure the equipment not to be damaged. If you cannot ensure the safety of some operations, please contact with the agent.

SAFETY DECALS

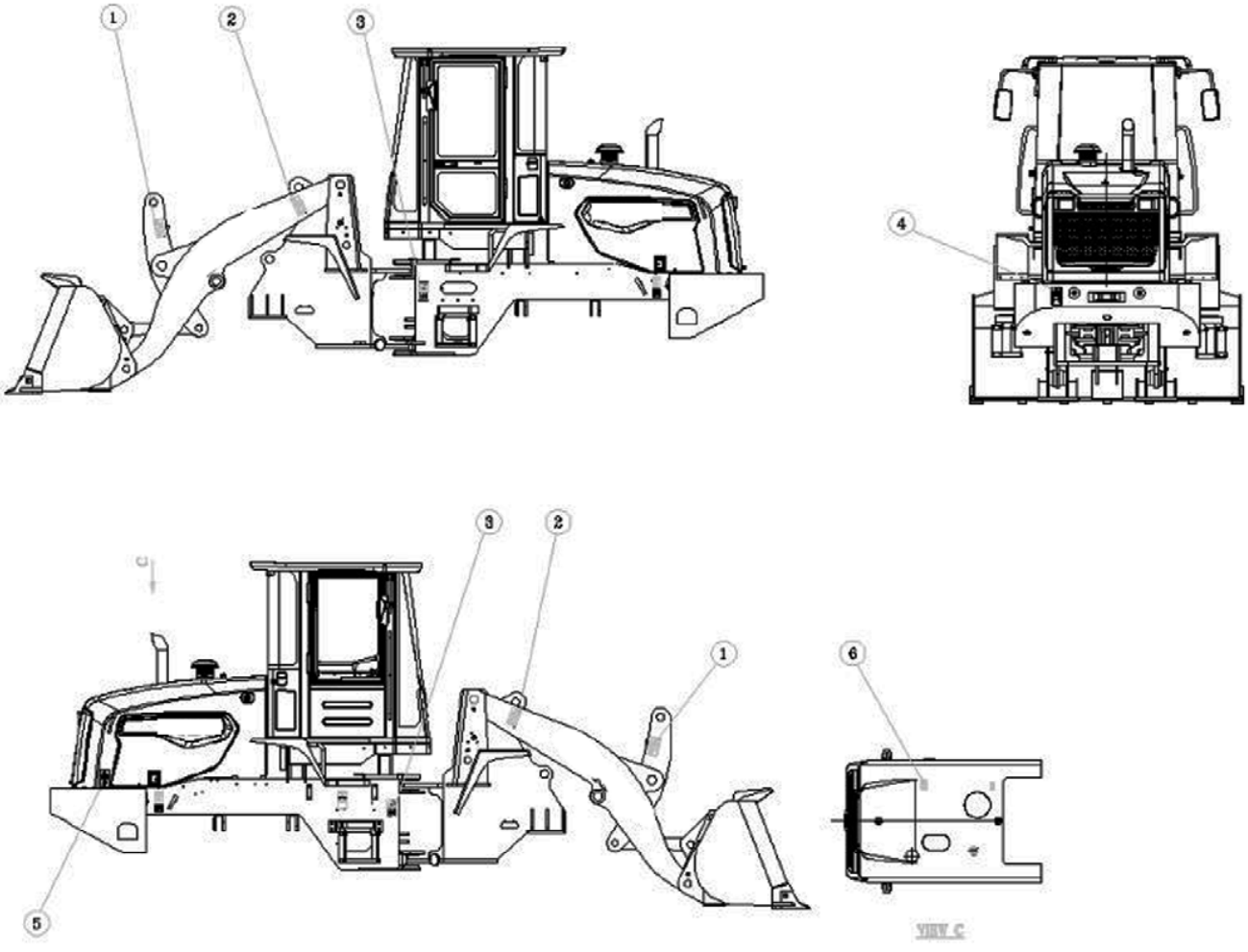


Figure 1

The safety decals are attached to the machine. In this Chapter, the locations and descriptions of these decals will be reviewed in the following section. Please become familiarized with all safety decals and their messages.

Make sure that all the decals are in correct locations and legible. Clean or replace the safety deals if the decals are missing or damaged, or the texts and pictorials are not legible. Use cloth, water and soap to clean the labels. Do not use solvent, gasoline or other harsh chemicals to clean the decals because they may lead the adhesive that secures the labels to the machine, thus causing the labels to come off.

Replace the damaged or lost labels. Remember, if a safety decal is attached to a part that is replaced, install a new safety deal on the replacement part.

1.Never stand under the bucket.

Figure 2

2.Never stand under the moving arm.

Sudden or accidental movement of boom may cause injury or death.

Securely brace boom before working or walking under raised boom.

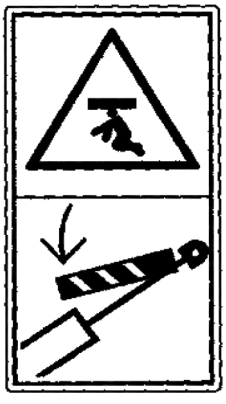


Figure 3

3. Severe injury and death from crushing could occur in articulation position when machine turns.

Make sure people are clear of machine before starting engine or moving steering wheel.

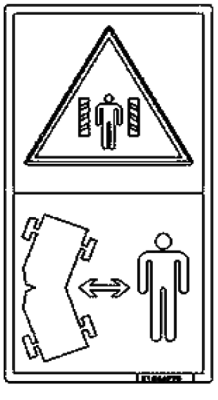


Figure 4

4.Standing here is strictly prohibited while the machine is moving. Otherwise, it will cause serious injury or death accidents.

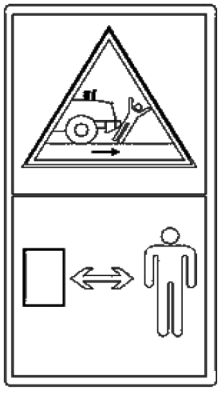


Figure 5

5.Keep your hands away from the fan during operation. Entanglement in the fan can cause serious injury.

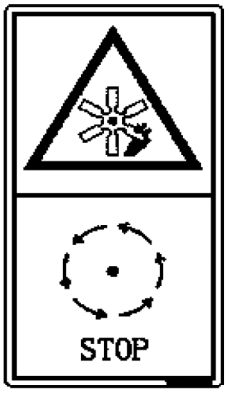


Figure 6

6.High temperature, NO touch.

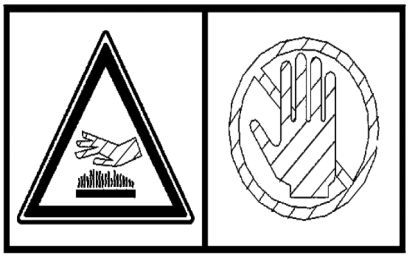


Figure 7

UNAUTHORIZED MODIFICATIONS

In case of the safety accidents arising from any modification without authorization by Hyundai, the Owner shall bear the responsibilities.

As a safety precaution, all OEM parts must be replaced with the correct authorized or genuine Parts. If the fasteners, bolts or nuts are not regularly replaced with correct spare parts, it may cause these parts to exceed the safety limit of operation.

GENERAL HAZARD INFORMATION

Safety Regulation

Operation and maintenance of the loader should only be carried out by authorized professionals with the requisite training.

Strictly follow all safety regulations, warnings and requirements when performing operation and maintenance.

When feeling ill or tired for taking medication or not adapt to the environment,you should not operate the machine. These problems will interfere with your sense of judgment in emergencies and may cause accidents.

When working together with another operator or with a person on work site traffic duty, it is necessary to ensure that all persons know the nature of the work and understand all hands signals that are to be use.

Always observe strictly any other rules related to safety.

Safety Features

Ensure all the guards and covers are installed in proper position. Repair immediately if damaged.

Be sure that you understand the methods of all safety features such as seat belt, and perform the correct operation.

Never remove the safety features, and keep them in good operating condition.

Incorrect operation of the safety features may also cause serious bodily injury.

Matters needing attention in cabin

When entering the cabin, remove the mud and oil from the soles of your shoes, otherwise, the accident will occur when you step on the accelerator pedal due to the slippage on the sole.

Do not stick suction pads on the window glass, because the suction pads could act as a lens which can cause the fire.

Do not leave lighters laying around the cabin. If the temperature inside the cabin becomes high, there is a danger that the lighter may explode.

Do not use mobile phone when you are operating the loader.

Never bring any dangerous objects such as explosives, inflammable goods into cabin.

To ensure the safety, do not wear earphone when you are operating the machine. Otherwise, the serious accident will occur.

Do not put your head and hands out of the window when you are operating.

Ensure the engine has already been shut off when you are leaving the seat. Otherwise, if you negligently touch the operation lever, the equipment will move and the accident will occur.

Lower the working device down to the Ground and shut off the engine when you leave the equipment. Use the key to lock all places and then pull out the key to carry it with you.

Clothing and personal protective items

Secure long hair, and avoid loose clothe and jewelry. These items have the tendency to catch on controls or into parts and cause serious injury or death.

Do not wear oily clothes, because they are Flammable.

Use the goggle, helmet, safety shoes, and gloves in the working area.

Do not use the tools without enough strength when performing the maintenance of the equipment. Otherwise it will cause the injury arising from breakage or slippage, or make the installation unqualified.

Figure 8

Breathing masks & Ear Protection

Do not neglect the factors which do not have direct hazardous impact on the health. The waste gas and noise pollutions are invisible, but they can cause disability or permanent injury.

Mounting and Dismounting

Before getting on or off machine, if there is any oil, grease, or mud on handrails or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.

Never jump on or off machine. In particular, never get on or off a moving machine. These actions can result in death or serious injury.

When getting on or off machine, always face machine. Maintain a three-point contact (both feet and one hand or one foot and both hands) with handrails and steps to ensure that you support yourself securely.

Never hold onto any control levers when getting on or off machine.

Securely latch door. If you grip handrail inside door when moving on platform outside of door, and door latch is not securely engaged, door may move and cause you to fall resulting in death or serious injury.

Use points marked by arrows in diagram when getting on or off machine.

Do not carry tools or supplies when you mount or dismount the machine.

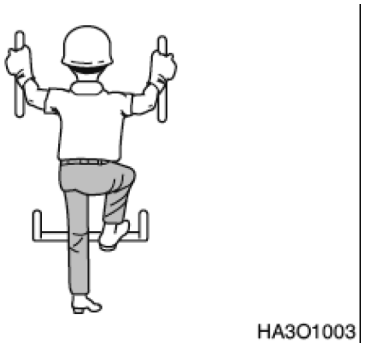


Figure 9

Fire Hazards for Fuel, Oil and Hydraulic Oil

If fuel, oil and anti-freeze fluid are put close to the fire source, it is easy to cause fire. In particular, the fuel may cause extreme danger.

Pay strictly attention to the following conditions:

Make sure the premises are well ventilated when the fuel, oil, anti-freeze-fluid and hydraulic oil are filled in. Switch off the lamp, control lever and the starter switch after the machine is shut off. Shut off the engine. The equipment should be far away from the flame and heating element. The auxiliary heating element or the equipment which may cause sparks must be quenched, switched off and move away from the loader.

Static can produce electric sparks at the oil filler. When it is cold or dry, or in other conditions which easily cause the static, it is necessary to make the oil filler always contact with the oil-filling pipe, so as to guarantee a good grounding.

The covers for fuel tank and other liquid tanks shall be tightened. Strictly prohibit from starting the equipment before tightening.

Figure 10

Precautions When Fluids at High Temperature

When the operation has just been stopped, the temperature of coolant, engine oil and hydraulic oil is very high, and there is still pressure in Radiator and hydraulic tank. In this case, opening the cover to drain the oil or the coolant, or replacing the filtration element will cause burns. It is necessary to wait for the temperature to go down and perform the operation according to the specified procedures.

In order to prevent the splashing of HT coolant and oil, it is necessary to shut off the engine, and wait for cooling of coolant oil, then slowly loosen the cover to release the pressure.

Figure 11

Figure 12

Coolant

- During operation, the temperature of the engine coolant is higher and there is pressure in the engine. All piping lines connected to radiator or to engine have hot water or steam in them. The contact with them will cause severe burns.
- When checking the coolant liquid level, the engine must be shut off, and the water filler cover must be cooled down to the extent that it can be opened by naked hand.
- Slowly loosen the water filler cover for the cooling system to release the pressure.
- The coolant of cooling system contains Alkali, so it is prohibit to make it contact with skin and eyes. It is not appropriate to be drunk. Moreover, cooling down the coolant before drain it out.

Asbestos Dust Hazard Prevention

Inhaling asbestos dust can be hazardous to your health. If the material you work with contain asbestos fiber, please obey the following regulations:

- Use dust-filtration mask.
- Prohibit using compressed air to purge.
- Use water to clean to prevent from kicking up dust.
- Whenever you operating the machine, make the air blow against your back.
- Obey the related laws and regulation on site.

Figure 13

Injury arising from working equipment

Do not put hands, arms, or other body parts between the moving components (e.g., between the working devices and cylinder or between equipment and working devices).

The gaps between equipment and working devices will change during operating the operation lever. In this case, the careless operation will cause serious faults or personal injury.

If it is necessary to enter the places between moving parts, fix securely the working equipment to make it not move.

Figure 14

Fire extinguisher and first-aid kit

In case of personal injury or fire happened, please operate as follows

- Find the Fire extinguisher and carefully read the operation description on it to ensure that you can use it. It is recommended to use the multi-functional “A/B/C” Fire extinguisher with a weigh of greater than 2.27 kg [5 lb]. Put the fire extinguisher in the cab. Regularly check and maintain the fire extinguisher and conduct the effective training for the field personnel.

Put one first-aid kit inside the reserved box, and put another on the site. Regularly check for the necessary of supplement of first-aid kit.

- Know what to do in case of injury from fire.
- Keep emergency numbers for doctors, ambulance service, hospitals and fire stations and put them by the side of the telephone set.

If the equipment catches fire, it may cause serious personal injury or even death. In case of fire during operation, escape from the machine as follows

- Shut off the starting switch, and stop the engine.
- If there is time, use the fire extinguisher to put out the fire as far as possible.
- Use handrail and steps to escape from the machine.

The above is the basic method to escape from the equipment. However, the method can be changed if necessary according to the actual conditions. Therefore, it is necessary to conduct the escape practice on site.

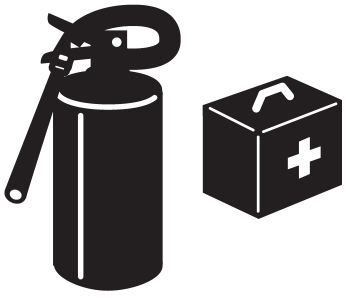


Figure 15

Prevent from falling objects or flying objects

The collision of falling objects or flying objects on site with the cab may cause dangers. Please select the protective devices under appropriate operation conditions to protect the drivers.

Working in mine, tunnel, deep pit or on soft and wet surface, it is possible to have the dangers from the falling stones or flying objects. The protective facility must be installed for the cab, and it should accord with the requirements from FOPS (protective devices for falling objects) or from protective devices for windows

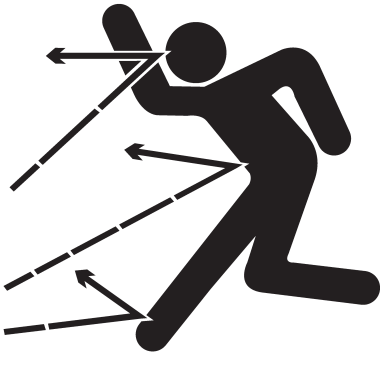


Figure 16

Prohibit reforming or changing any forms of protection structure by adding reinforcing devices (e.g., drilling hole, welding, re-installing or re-installing fasteners etc.). The re-identification of the whole protective system is needed for the protective system which has suffered severe impact or damage. Re-installation, re-authentication, or replacement of system is needed if necessary.

If there is the danger for the persons to be injured by the object impacting the cab, please contact with the Agent and ask for the effective safety protective devices and related recommendations. Ensure all other field personnel should be away from the loader and not threatened by potential dangers.

When you use crusher in operation, the protective devices should be installed on front windshield glass. Please contact with the branch organization for the recommendations

When performing the crushing operation,it is needed to install the thin plate on the front glass. We recommend you should contact with Agent.

When performing the cutting and destroying operation,it is needed to install the front and top protective plate, meanwhile, it is needed to install the thin plate on the front glass.

At the places where there is the danger of falling stones such as in mine quarry etc., please install FOPS (protective devices for falling objects), and install thin plate to protect the front glass.

If any glass of the machine is broken, please immediately replace it with a new one.

Figure 17

Protective measures for attachments

The optional attachments shall be provided by agent. If you need unidirectional action and bidirectional action hard pipe, flange and auxiliary control devices, please contact with our Company. Because we can not expect, prove or check all working devices the customers want to install, please contact with our Company to ask for the authentication certificate for the attachments and the compatibility authorization certificate for the equipment and working device.

Battery

- During operation, the battery can produce combustible gases which may cause explosion.
- Do not smoke while checking the level of electrolyte of the battery.
- The electrolyte is an acidic substance, and it will hurt the persons when it touches with skin or eyes.

Aether (if your machine is equipped with Aether cold starter)

- Aether is a toxic and combustible substance.
- Inhaling Aether vapor or frequent touching of skin with Aether will cause personal injury.
- There shall be adequate ventilation in the areas where Aether is used.
- Do not smoke while replacing the Aether tank.
- Pay attention to fire protection when using Aether.
- Do not put the replaced Aether tank in the living area or in the cab.
- Do not put the Aether tank in a place with direct sunlight or with an ambient temperature exceeding 39 ℃ (120 F).
- Put the discarded Aether tank at a safety place. Do not drill hole in it or heat it up.
- Put the Aether tank far away from the place where the non-working persons are living.

Tire

That the fully inflated Tire may be exploded is due to the heating inside of the Tire. Generally, heating is caused from the welding or heating of rim, the external flames or the too frequency of braking.

The explosion of Tire is much more powerful than air bleeding. It can make Tire, rim, and driving parts fly off over a distance of more than 500 meters. The explosion power and fragments may cause the personal death and property damage.

In order to prevent the excess air charging, the appropriate equipment and personnel are needed. The air leakage or rim damage are due to the incorrect use or misuse of the air charging device.

When charging the air, you should stand on the side of the Tire and use the cock with auto-clamping clamp.

The replacement and maintenance of the Tire may be dangerous. Therefore, the trained persons are needed to perform the maintenance and replacement of Tire, and shall perform the maintenance strictly according to the operation specifications provided by Tire or rim provider or by agent.

Indoor ventilation

The exhaust from the engine may cause fatal injury and death accidents, making people lose consciousness and lose alertness, judgment and control ability, thus inducing severe accidents.

Confirm a good ventilation before starting engine in an enclosed area.

Be careful for the opened doors and windows, because the waste gases may enter or may be blown in through them, thus inducing dangers.

Figure 18

BEFORE STARTING ENGINE

Matters needing attention on site

Completely check the working area for the abnormal conditions which may cause dangers before starting.

Check the terrain and ground surface on site, and identify the best and the safest operation method.

Before operation, please make the ground hard and smooth as possible as you can. Please sprinkle some water on the ground before operation if there is a lot of dust or sand on site.

If it is needed to work on the street, please arrange one specially-assigned person to direct the traffic, or erect a fence and stick the labels on site such as “NO ADMISSION” to protect the pedestrians and vehicles.

For the places where there are embedded with facilities such as water pipes, gas pipes, HV cable ducts, it is necessary to contact with the responsible company to identify the positions of the embedded facilities. Moreover, be careful not to damage these facilities during construction.

When performing operation or passing sandy dykes please first check the ground conditions, water depth and water flow speed. Never exceed the permitted water depth.

Check before starting engine

Perform the following checks before the starting of engine and before starting your work every day. Otherwise, it will cause serious injury or damage.

Check the surrounding of engine and battery for combustible materials Check fuel and lubrication oil and hydraulic oil for the leakage. Check rear-view mirror, handle and steps for the pollution by fuel.

Do not leave over parts or tools around the operator seat. The control lever or switch can be damaged by the falling objects caused from the vibration induced from the operating or walking, or the control lever will be caused to move to make the working device moving , thus causing the accident.

Clear thoroughly off the mud and fine sand on your shoes before you get on this machine, because these sand and mud will accumulate on the pivots of the accelerating pedal and brake pedal, interfering the reset of these pedals. Clear immediately and thoroughly the sand and mud accumulated at these places if any.

Check the level of coolant and hydraulic oil and the oil level in Oil sump of the engine. Check air filter for blocking or the cables for damaging.

Adjust the operator seat to the position at which the operation is easily performed. Check the seat belt and its fasteners for the damage or wear. The seat belt must be replaced after 3 years operation.

Check each instrument for normal operation. Check that the control lever shall be put at the “Parking” position. Clear off all dirt on the window glass and on the lamps in cab to ensure a good visibility.

Adjust the position of rear-view mirror to make the operator have a great rear view from the seat. Wipe up the surface of the rear-view mirror. Replace with a new one if the rear-view mirror glass is damaged.

Check front lamp and work lamp for normal operation. Please perform the maintenance if any abnormality is found from the inspection result. Be sure to have fire extinguisher, and familiar with its operation method. Do not put the machine close to open Flames.

Start the engine

Before you get on this machine, perform again the patrol inspection for your machine. And check places on the machine, below the machine and around the machine for the presence of persons or objects. Watch whether there are persons in the working area.

Never start the engine if the Warning Label “Do not start Engine” or “Do not operate” is stuck on the control lever.

When starting the engine,it is necessary for the horn to sound to issue the warning.

The engine cannot be started or controlled until you have sited on the operator seat.

Nobody shall be allowed in the cab except the operators. Nobody is allowed to sit on the machine body.

Start the machine only in the cab. Strictly prohibit starting the engine by short-circuiting the engine circuit; otherwise the machine’s electric system will be damaged by passing the starting system. Moreover, this operation is very dangerous.

The reverse warning alarm device shall be guaranteed to work normally if any.

Matters needing attention on starting

Fill engine oil, coolant and diesel oil up to the desired capacity;

At the instant of starting, it is not allowed to depress the throttle pedal down to the Max. position to prevent from damaging diesel engine components at the movement of starting;

If the engine cannot be started to work within 15s, it is necessary to return the electric lock back to the First Positioning position. Wait about 30s and you can re-start the engine again.

If it cannot be started for 3 times continuously, it is necessary to check the loader electrical system and diesel engine system. The engine cannot be re-started until the faults are removed. Otherwise it will cause severer fault.

Other operation of the diesel engine shall be performed as per the attached documents from the diesel engine factory.

Starting

The electrical system section in Operation Instructions shall be carefully read before you drive the vehicle.

Perform the inspection prior to driving and start the engine after confirming that each component is normal.

Put the shifting control lever at the Middle position and the control valve lever at the Middle position before starting, then rotate clockwise the electric lock for one increment (to switch on the power supply relay, i.e., the main switch of this machine). Slightly depress the throttle, and again rotate clockwise for one increment to start the engine.

The time for one start should not exceed should not exceed 5-8 s (the continuous working time for the starter motor should not exceed 15s). If the engine still cannot be started, it is necessary to immediately release the starter switch and wait for 30s, and then re start the engine again. If your vehicle cannot be started for 3 times continuously, perform the check according to the instructions in operation manual and start the engine after confirming that the faults are removed.

The engine, after starting up, shall be warming up at a speed of 600~750r/min. Watch the indications on the instrument (especially the engine oil pressure gauge); meanwhile, check the diesel engine system and other system for abnormalities). You can start to drive the vehicle when the at pressure reaches over 0.4MPa.

Parking the vehicle

Drive the vehicle to the warehouse or on a flat ground. Put the gearshift lever to Neutral position and place the bucket down to ground. Before the engine is switched-off, it shall run at a speed of 800-1000r/min for several minutes to make each component cooled down evenly. In winter, after parking the vehicle, it is necessary to timely open all drain valves of engine to fully drain all water accumulated in the cooling system to prevent the parts from being frost crack. When delivered from the factory, if the engine is filled with anti-freeze fluid, you should perform the operation with reference to the anti-freeze fluid sign attached on the rear of the vehicle.

OPERATION OF LOADER

Inspection after starting engine

If you do not correctly check after the engine is started up, then you may not timely find the abnormalities of the machine so that the personal injury or machine damage could occur.

Check the machine at a place without any obstacles, and do not let anybody to approach the machine while you are checking.

Check the operation of instrument and equipment. Check bucket, boom, brake system, transmission system and steering system for the normal working.

Check machine sound, vibration, heat, smell or instrument for any abnormalities: check for leakage of hydraulic oil, lubrication oil, gas or fuel.

Please immediately perform the maintenance if any abnormality is found. If the machine is working under the improper conditions, it will cause serious injury or damage.

Before traveling or starting operation, check the bumper for locking front/rear frame. The bumper shall securely lock onto the “Release” position.

Matters needing attention on starting to travel

- Before traveling, re-check the surrounding of the machine to conform that there is nobody and no obstacles there.
- When traveling,it is necessary to sound horn to issue the warning.
- The machine can be operated only by the person sitting on the operator seat.
- Attach the seat belt.
- Nobody shall be allowed in the cab except the operators. Nobody is allowed to sit on the machine body.
- The reverse warning alarm device shall be check for normal work if any.

Matters needing attention on travelling

Never put the key in the starter switch to SWITCH OFF position when the vehicle is traveling. It is dangerous for the engine to be switched off when it is traveling, because the steering becomes very serious.

If the engine is switched off, it is necessary to immediately apply brake to stop the machine.

It is dangerous to glace to the left and to the right while operating .Full attention is required for operation.

It is dangerous to travel fast, or start abruptly, stop suddenly, turn sharply or travel in a zigzag mode.

If any abnormality is found in the machine (noise, vibration, smell, incorrect instrument indications, gas leakage, oil leakage etc), it is necessary to drive the machine to a save place and look up for the causes.

Adjust the working device height down to a place where the boom's lower hinge pin is 500 - 600mm (20 - 24in) over the ground. Then travel on the ground.

Do not operate the pilot control lever of the working device while the machine is traveling. If it is necessary to do so, first stop the machine, and then operate the pilot control lever.-

Do not abruptly operate the steering wheel. If so, the working device will touch the ground surface and the machine will lose its balance, or the machine itself or the structures around the machine will be damaged.

Drive slowly and avoid suddenly turn a direction while traveling on the rugged ground.

Try best to avoid crossing the obstacles while the vehicle is traveling. If the machine must cross an obstacle while traveling, it is necessary to let the working device travel close to the ground at a slow speed.

Keep the distance from this machine to other machines or to the structures while performing operation to prevent from the collision.

If the machine is transported on water, it is not allowed to exceed the permitted water depth.

Keep the permissible water level. The water level should not exceed the lowest part of the of the Axle oil seal and Transmission oil seal.

When the machine passes the bridge or the buildings on private territory, it is necessary to first check whether their strength can support the weight of the machine. When the machine travels on the public road,it is necessary to first accord with the regulations of the related authorities and comply the related regulations.

When the machine travels on the public road,it is necessary to comply with the traffic regulations. The traveling speed of this machine shall be lower than the normal speed of the vehicle. Travel on the side of the road, and pay attention to retain the central portion of the road to other vehicles.

If the machine is driven at a high speed for a long time, the tires will be overheated, and the internal pressure in the tires will change to be extremely high. This will cause explosion of the tires. If the tire is exploded, it will produce extremely powerful destructive force, thus able to cause serious injury or accidents.

If you are prepared to perform the continuous traveling, please consult the distributor specified by HYUNDAI.

Inspection when the direction changes

In order to prevent the injury or death, it is necessary to comply with following regulations before moving the machine or the working device even the machine is equipped with alarm device and rear-view mirror:

- Sound the horn to warn the personnel on the site.
- Check the vicinity of the machine for nobody being there. Especially watch the rear of the machine, because this is the area which could not be seen clearly by the person sitting on operator seat.
- When working in the conditions at risks or under conditions with bad visibility, please designate one specially-assigned person to direct the traffic.
- The unapproved persons can absolutely not enter the area in the steering direction or in the traveling direction.
- Do not change the travel direction at high traveling speed.

BCO0590S

Figure 23

Operation on slope

Be especially careful for that traveling on the slope will cause the machine to sideslip or tip-over.

The bucket must be 200-300mm over the ground while the machine is traveling on the slope. In an emergency, lower the bucket quickly down to the ground to assist the stop of the machine.

Do not make a turn on slope, nor traverse on slope. You should drive the machine down to the flat ground to perform these operations.

When driving down the slope, it is absolutely not to shift gear or put the gearbox onto Neutral Gear. Not using the braking force of the engine is dangerous. Put the gearbox onto low speed gear when the machine begins driving down the slope.

When driving down the slope, it is necessary to use the braking force of the engine, and travel at lower speed. Use also, if necessary, the braking pedal while using the braking force of the engine, so as to control the traveling speed.

Do not travel at a high speed on grasses, tree leaves or wet steel plate. If doing so, even a very small slope also make the machine slip towards one side. Therefore, it is necessary to travel at a low speed. The machine shall be right up or down the slope while the machine is traveling on the slope.

When the machine is traveling on slope, if the engine is switched off, it is necessary to immediately and completely depress the brake pedal and lower the bucket to the ground, then fix the machine by the parking system.

If the machine travels up or down the slope with load, you should let the bucket face the UP slope direction (i.e., face forward when traveling up, and face backward when traveling down). If the machine travels on the slope with load on the bucket, if you let the bucket face the DOWN slope direction, the machine will have the risk of tip over.

Be careful for HV cables

Do not let the machine touch with overhead cable. The electric shock could be caused even you are only near the HV cable. A safety distance shown in following table should be kept between the machine and the cable.

Accomplish the following items of work in order to prevent the accidents: when the machine is possibly in the danger of touching the cable on the site, you should consult with Electric Power Company before operation, and check whether the actions identified according to the existing laws and regulations are applicable.

Wear rubber shoes, and wear rubber gloves. Put a rubber pad on the operator seat, and pay attention not let any exposed portion of your body touch to the metal chassis.

Designate one signalman to send the warn signal if the machine is too close to the cable.

If the working device touches to cable, the operator shall not leave the cab.

When you work in the vicinity of HV cable, do not let anybody close to the machine.

You should consult with Electric Power Company for the voltage of the cable before operation.

	Voltage	Minimum safety distance	
LV	100~200V	2m	7tf
	6.600V	2m	7tf
HV	22.000V	3m	10tf
	66.000V	4m	14tf
	154.000V	5m	17tf
	187.000V	6m	20tf
	275.000V	7m	23tf
	500.000V	11m	36tf

The minimum distances listed this table are only for reference. The strong electric shock may still occur even the distance from the big arm or the bucket to the electric cable is 4- 6m (13-20ft) when the voltage and atmosphere condition changes. The safety range will be greatly reduced under HV or raining conditions.

Note: *Make contact with Electric Power Company and stipulate a safety plan together with the said company before approaching to the electric cables (cables above or underground) to perform any forms of operations.*

Matters needing attention on operating

Be careful not to be too close to the edge of the cliff. When constructing the dike or filling in earth, or dumping earth to the cliff, it is possible to unload the soil into one pile, and then use another pile of earth to push the first pile .

When the machine pushes the earth down the cliff or to the peak of the slope, the load will abruptly change to be light. In such case, because the traveling speed will increase suddenly, this is dangerous. Therefore, the traveling speed must be decreased.

When the bucket is full of load, the machine should never start, turn or stop abruptly.

When handling the unstable loads, e.g., the round or cylindrical objects, or cascade plates, if the working position is lifted, the load will be in the risk of falling onto the top of the cab, causing serious injury or destruction. When handling the unstable loads, pay attention not to lift the working device too high, or slant the bucket too backwards.

If the working device suddenly descends or suddenly stops, its reaction force may cause the machine to be tip over. Be sure to be careful for operating the working device, especially when the machine is loaded.

Do not use bucket or boom for hoisting.

This machine can only undertake the specified work, and the performing other operation not within its application scope will damage the machine.

Pay attention to follows to ensure a good visibility:

- When working in dark, it is necessary to switch on the work lamp and the front lamp, and shall install lighting equipment on site if necessary .
- Do not perform operation in fog, dim moonlight, snow, heavy rain or other conditions with bad visibility. Wait until the sky is bright. The work cannot be started until there is adequate visibility.

Pay attention to follows to prevent the working device from colliding other objects:

When performing operation in tunnels, under bridges, beneath cables or in other places where the height is restricted, especially pay attention not to let bucket touch anything.

When loading materials into a tipper, pay attention not to let bucket touch with tipper's cab.

In order to prevent the accidents induced from collision with other objects, the machine shall work at the safety speed, especially in a limited space, in the room or in a place where there are other vehicles.

Method of use of brake

Do not rest foot on brake pedal unless definitely necessary.

Do not repeat depress the pedal repeatedly.

When driving down the slope, use the engine as a brake, and it is absolutely not to shift gear or put the gearbox onto Neutral Gear.

Accidents can be avoided under correct and safe operation , please operate the braking system according to the following advises.

- Do not put your feet on the brake pedal except when it is necessary .Because the brake valve may be pressed by your foot when the loader is running on the rough road, which may put the loader into brake status ,and accidents result from failure of the braking system, which is caused by the improvement of the temperature of the brake system, may happen if the loader is in brake status for a long time.
- Please do not press the pedal time and again except when it is necessary. Repeated brake will improve the temperature of the brake caliper and it may bring bad effect. When repeat brake is needed under serious conditions, it is suggested to stop for 10mins after continuous working for 2 hours or take other measures to cool down the brake caliper and the braking Fluid.

- When the loader is travelling down a slope , please set the transmission on low speed gear, with which the engine can be used to brake. Never shift the gears or put set the transmission to neutral .
- When the loader is travelling up a slope ,keep the bucket above the ground at the height ranging from 200mm to 300mm and put the bucket to the ground immediately under emergency to stop the loader effectively

Operation in snowing

When you are working on the road with snow or ice,even the small slope could make the machine slip. Therefore, it is necessary to travel slowly to avoid the sudden starting, stopping or turning. Otherwise, the machine will slip, especially when it goes up or down the slope.

The frozen road will be soften when the temperature rises, so the traveling conditions become unstable. In this case, be particularly careful for driving.

After snowing, the road shoulder and the objects on the side of road could not be seen clearly. Therefore, be careful for sweeping the snow.

When traveling on the slope covered with snow, it is necessary to install the tire chain.

Then traveling on the slope covered with snow, never apply braking suddenly. To decelerate, you can use engine as the brake, and at the same time depress the brake pedal for several times continuously. You shall, if necessary, lower the bucket down to ground to stop the machine.

The ground adhesive force varies dramatically due to the impacting from the accumulated snow. Therefore, you shall make corresponding adjustment to avoid the slipping when traveling.

Matters needing attention in cold area

Remove thoroughly the water, snow or sludge covered on the parts such as wires, cable connectors, switches, or sensors. If not, the water contents in them will be iced, and the machine will be ineffective when it is used next time, causing unexpected faults.

Perform thoroughly preheating operation. If the machine is not preheated before operation of the control lever, the reaction of the machine becomes slowly, thus possibly causing the unexpected accidents. Operate each control lever to let hydraulic oil in the hydraulic oil system to perform circulation,raising the system pressure up to the ones set by system, releasing it, and returning the oil to hydraulic oil tank,for heating the hydraulic oil. This can guarantee good reaction from the machine and prevent from working improperly.

If the electrolytes of the battery is iced, do not charge the battery,nor use other power supply to start the engine. This is dangerous, because it will make the battery on fire. When you conduct the charging or use other power supply to start the engine, you should first melt the electrolytes in the battery before starting and check for the leakage.

Do not operate on the soft ground.

Do not operate the machine on the soft ground. Because if working on such ground, the machine will easily sink into the ground, and difficult to come out.

Do not let the machine to be too close to the edge of the cliff, to the suspended portion or to deep ditch. If these portions are collapsed due to the weight or the vibration of the machine, the machine will possibly fall down or tip over, thus causing serious injury or death. Be sure to keep in mind that the earth at these places will be softened after heavy rain, explosion or earthquake.

The earth piled up on the ground or by the side of the ditch is soft. It will collapse under the weight or the vibration of the machine to cause the tip over of the machine.

Parking the machine

After the operation, avoid sudden switching-off or shutting-off. Park the loader on a hard plane, far away from traffic lines and high walls, cliffs, and edges of pools and drainage ditch. If the machine must be parked on the slope, it is necessary to stop up the Tires to prevent from moving, and lower the bucket and other working devices down to ground or on the supporting bases. There should be no possibility of unexpected actions.

When parking on the highway, you should set the guard bars, marks, warning labels to ensure that the passing vehicles can see clearly the machine, and make the machine, flags and guard bars not hinder other vehicles.

All switches and operation levers must be switched off after the parking the vehicles during night.

Close the cab doors

Prohibit other persons sitting on the working device

Do not let anybody ride on the attachments such as bucket, crusher, otherwise it will cause the persons falling off or serious injury.

Others

The oils filled in must be clean, without containing impurities.

Frequently clean the filtration screen of the diesel fuel delivery pump (hand pump)

MAINTENANCE

Warning labels

Warn of that others persons are performing the maintenance, and hang the warning sign on cab control device and other necessary places.

Our company branch organizations provide control warning signs

ARO1320L

Figure 31

Requirements on personnel

Operation and maintenance of this machine may only be carried out by personnel equipped with corresponding resources. The persons irrelevant with current maintenance and repair work shall keep away from the work area. You can specially designate the persons to watch if necessary.

Be especially careful for performing cutting, welding or using hammers.

One person in charge shall be designated before starting of disassembling or mounting operation in the vicinity.

Do not let any non-working persons to approach the machine or accessories.

Perform the cleaning work before maintenance

Perform the cleaning work before inspection and maintenance to prevent the dust from entering the machine and ensure the maintenance can be securely performed.

If the machine is dirty when it is checked, it is difficult to locate the fault, and there is the risk of dust and mud entering the eyes or of the personal injury. Please obey the following items when you clean the machine:

- Wear the shoes with anti-slippage heels to prevent from slipping at the wet places.
- Wear goggles and work clothes when you clean the machine by using HP water gun.
- Adopt the protective measures to prevent HP water flow from cutting skin or prevent the mud from entering the eyes.
- Do not sprinkle water directly onto the electronic components (sensors, connectors) (1, Fig. 32). If the water enters the electrical system, it will cause the failure or faults

Pick up any tools in working area, rub up all lubrication oil, oil and other lubrication substances, and clean the working area to facilitate the safety operation. If the working area is not clean or tidy, it will cause tumbling or injury.

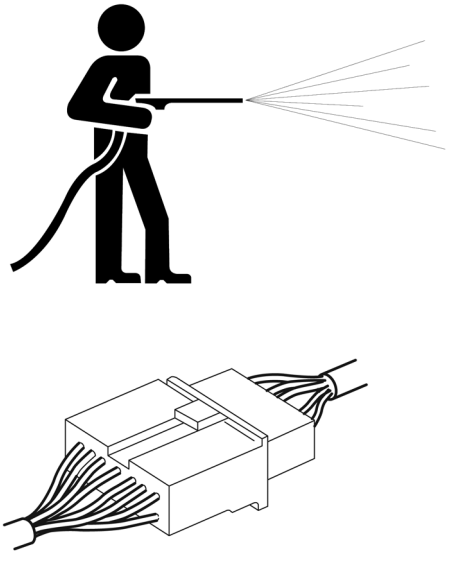


Figure 32

Maintenance and inspection of vehicles body

Working under the machine

Park the machine on the flat ground,and then lower all working devices down to the ground before performing maintenance or repairing under the machine.

Use wedges to fix the tires.

It is dangerous to work under the machine if the tires are above the ground and the machine is supported only by working devices. Never work under a machine which is poorly supported.

Maintenance with the frame jacked up

When working under the machine with working device or frame jacked up, it is necessary to lock the front/rear frames using bumper. Put the control lever to the “Middle” position. Use wedges to fix the working devices and frames.

Wedge the wheel on the opposite side before jacking. Put the wedges beneath the machine.

Working on the top of the machine

When performing the maintenance for the top of the machine, you should ensure that the foothold is clean and there is no obstacle. Moreover, you should comply with the following attentions.

- There should be no spilt lubrication oil or grease.
- No tools should be placed around.
- Pay attention to your pace when walking.

Do not jump off the machine. When you are getting on or off the machine, you must use staircase and handrail and always keep the touch at three points(two feet and one hand or two hands and one foot).

Use protective equipment if necessary.

The top of the engine hood is slippery and dangerous. Do not allow any parson to stand on it.

The top of the tire is slippery and dangerous. Do not allow any parson to stand on it.

When cleaning the glass in front of cab, stand on the mudguard of the front frame.

Do not hang the foreign objects inside the machine.

When performing maintenance with manhole or oil filler opened, be careful for not letting any foreign object (e.g., nut, bolt, cotton yarn or tools) fall down into the machine. The falling of such objects into machine will cause the machine to be damaged, the operation failed, or other faults. If any foreign object falls into the machine, it is necessary to take it out from the machine.

When performing the repair and maintenance, no unnecessary tools or parts should be left in the pockets in your clothes.

Maintenance with engine running

In order to prevent the injury, no maintenance should be performed when the engine is running. If the maintenance should be performed when the engine is running, you should comply with following items:

Arrange one person to sit on the operator seat, and be prepared to switch off the engine at any time. All workers must be in contact with others.

When the operation place is near the rotating parts and there is the risk to be drawn in, you should be extremely careful.

Absolutely do not let any tools or any portions of your body touch with fan blades or belts. This will cause serious injury.

When cleaning the interior of radiator, use the locking device to lock tightly the control lever to prevent the working device from moving. Moreover, pull up the parking brake switch to apply the braking.

Do not touch any control lever. If it is necessary to touch the control lever, you should signal other workers to warn them to walk to a safe place.

Proper tools

Use tools which are proper for the operation. The use of damaged, low quality, unqualified or temporary tools may cause the personal injury. The scraps from chisel or hammer are very dangerous, and they will cause the persons to be blind.

Figure 33

Operation of lighting devices

The explosion-proof lighting devices should be used for checking fuel, oil, battery electrolyte or detergent. Otherwise, there will be the risk of explosion.

Working in dark without using lighting devices may cause persons to be injured. Therefore, it is necessary to use appropriate lighting devices.

Do not use lighter or flames to replace the lighting devices even it is dark in working area, otherwise, it will cause fire. Tourmaline (gas) lamp also has the risks on fire and of explosion.

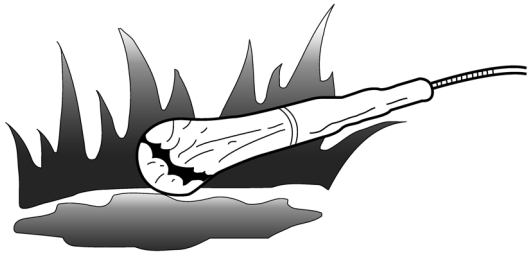


Figure 34

Fire protection and anti-explosion

All fuels, most lubrication oils and some coolant mixture are combustible. If the fuels are leaking or splashing onto the HT surface or on the electronic components, the fire will break out.

Put all fuels and lubrication oils at the specified places and make them far away from the unauthorized persons.

Put the oil foot and the combustible substances in the protective containers.

Prohibit smoking when the machine is oil-filled or is in the oil-filling area.

Prohibit smoking in the Battery Charging Area or in places where there are combustible substances.

Clean and tighten all cable connectors and check the cables for loose or wear every day. Tighten all loose cables and repair all worn cables before operating the machine.

Timely clear the combustible substances accumulated on the machine.

Do not weld the pipes containing the combustible liquids. Do not weld the pipes containing the combustible liquids. Please use anti-combustion solvent to thoroughly rub up the pipes before welding the pipes or cutting the pipes using flames.

Avoid burns

Stop the engine when checking the level of radiator to let the engine and radiator cool down.

Slowly open the cover to release the pressure before opening the cover of the radiator.

If the coolant in the recycling tank approaches the lower limit, add the coolant.

There is Alkali in coolant. First cool down the components of cooling system before draining out the coolant.

Hot components can cause personal injury. Do not let it contact the skin.

Slowly open the vent valve of hydraulic oil tank to release the pressure after engine stops operation, and ensure it is cooled down before screwing up the vent valve of hydraulic oil tank.

Release completely pressure in hydraulic oil system, fuel system or cooling system before disconnecting all pipes, connectors or connected components.

Battery can produce the combustible gases which may cause explosion.

Do not smoke while checking Battery electrolytes.

The electrolytes are acidic which may cause the personal injury. Therefore, do not let it contact the skin and eyes.

Be sure to wear goggles when performing he maintenance of battery.

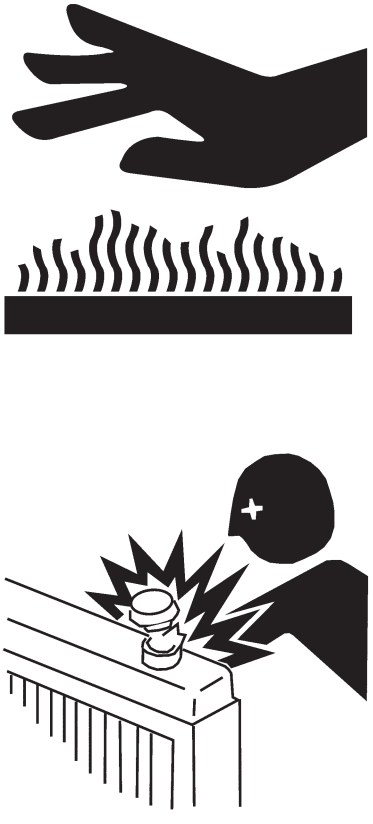


Figure 35

Welding maintenance

Welding maintenance

The welding work shall be performed in the place with appropriate devices and by the qualified welders. The electric welding can produce gases and cause electric shock and fire damage, therefore never allow the unqualified persons to operate. The qualified welders shall comply with following notes:

- Disconnect the battery terminals to prevent the explosion of battery.
- Remove the paint at the places where the welding shall carry on preventing the generation of harmful gases.
- If you perform welding on the hydraulic equipment or pipeline or in the area very close to them, it is possible to generate combustible vapor and sparks. This will cause the fire. Therefore, avoid welding in such places.
- If the splashing sparks from welding can directly fall down the rubber pipes, wires or pressure pipelines, they shall be covered with fireproofing baffles.
- Wear protection clothes when perform welding.
- Guarantee to provide a good ventilation on electric welding site.
- Clear off all combustible materials. The working site must be equipped with Fire extinguisher.

Comply with correct welding operation procedure to prevent the electrical parts and bearing from being damaged. Comply with following procedures when you perform welding on a loader equipped with electrical parts or on the engine:

- Park the machine on a flat surface.
- Switch off the electric lock to switch off the engine.
- Pull up the emergency brake hand brake.
- Switch off the negative switch of the battery, and cut off the connection between battery and frame.
- Clamp securely the welded grounding cable and the components to be welded. The closer the grounding position is away from the welding place, the better. Check and confirm that the electric circuit from the grounding cable to the welded part shall not pass any one of the following components.
  - Bearing
  - Hydraulic oil cylinder
  - Internal circuit of controller and other electronic parts and components

The purpose of doing so is minimizing the damage on following components:

- Bearing
- Hydraulic components
- Electronic parts and components
- Other possible components on the machine

The combustible materials shall be far away from the welding site. Protect each cable and do not let it splashed by the splashing sparks and welding slags produced from welding. Prevent any fire or any loss and injury thus caused. .

Use normal welding safety operation procedure to perform welding.

Matters needing attention for welding:

Prohibit using the grounding points for the electrical components on the machine as the Grounding Point for the welding machine!

If you want to perform welding near the electrical grounding points, you should disconnect the electrical Grounding point, and ensure the welding circuit of the welding machine does not pass this electrical component, then you can perform the welding operation. Otherwise, it will cause the damage of this electrical component, even the fire!

For the machine equipped with LCD, in order to avoid the possible loss, you should unplug all plug-ins at the connection between the instrument and the wire harness of the vehicle!

If other electronic components are also installed on your machine (e.g., audio device etc), in order to avoid the possible loss, you should unplug all plug-ins at the connection between the electronic device and the wire harness of the vehicle!

WARNING

Warning to customers: remove the counterweights from the machine. The front devices or other accessories may affect the balance of the machine, thus causing the accidental movement and serious injury or death. Our company bears no legal responsibilities for the faults induced from misusing the equipment.

Matters needing attention for attachment moving, installation and storage

Select the leader for the operation before starting removal and installation.

Do not let any unauthorized persons to approach the machine or attachments. Put the attachments removed from the machine at the safety places to prevent from falling. The guard bars are set around the attachments and corresponding measures should be adopted to prevent unauthorized persons from entering.

Figure 36

Maintenance and protection measures on the machine

When performing maintenance of the machine, please keep the area around your feet clean so as to prevent from slipping, and accomplish the following:

- Do not spill over the oil or lubrication oil.
- Do not leave your tools all over.
- Mind the Step when walking.

Do not jump on or off the machine. In order to ensure the safety, use the guard bars and step board when you get on/off the loader, and at least have three points contact (i.e., two foot and one hand, or one feet and two hands).

Please wear protective work clothes if necessary.

When you are working on the engine hood, you can only use the inspection passage with corollary anti-slipping pad. Do not use other components

Figure 37

Avoid being crushed or cut

When performing maintenance,if you must operating the engine, ensure at least two persons must work together. One person is sitting on the driver seat to operate the control device and shut off the engine.

Unless otherwise instructed by others, Do not adjust the machine when the machine or the engine is running.

Be far away from the running or moving parts.

Keep objects far away from the fan blades which may throw off or cut the objects.

Do not use bent or peeled cables. When handling the cables, please wear the gloves.

The dowels will fly off when you knock them. The flied dowel may cause the personal injury. Ensure that there is nobody around when you knock the dowels. Wear the protective goggles when you are knocking to prevent the eyes from being hurt.

Equipment supports and stops

Do not let any load and equipment hang in the air. Please lower all objects down to ground before you leave the cab. Do not use hollow, cracked, unstable or rocking objects to support. Never work under the equipment supported only by a jack.

Figure 38

Regulations you should comply when filling fuel or lubrication oil

Fuel, lubrication oil, hydraulic oil, anti-freeze fluid, braking fluid, windshield detergent can be on fire by flame. Please obey the following regulations:

Switch off the engine when you fill fuel or lubrication oil.

No smoking.

Immediately wipe up the overflowed fuel, lubrication oil, hydraulic oil, anti-freeze fluid, braking fluid, windshield detergent.

Tighten securely the top cover of all containers for fuel, lubrication oil, hydraulic oil, anti-freeze fluid, braking fluid, windshield detergent.

Keep a good ventilation on the place where you will fill fuel, lubrication oil, hydraulic oil, anti-freeze fluid, braking fluid, windshield detergent.

Precautions for maintenance under HT or HV conditions

When the operation has just been stopped, the temperature of coolant for various components and fuel of the engine are still under HT and HV conditions. At this moment, the opening of the engine hood, or draining of oil or water, or replacing filter will cause burn or other injury. Wait for the decrease of the temperature and perform the maintenance and repair according to the procedures specified in this Manual.

Measures which should be taken when you find the abnormalities during inspection

Measures which should be taken when you find the abnormalities during inspection

Perform the maintenance if any abnormality is found during inspection. Especially, if there is abnormality in brake or working device, it will cause the severe accidents.

Depending on the fault types, please consult the distributor specified by Hyundai.

Matters needing attention for HP pipes and hoses as well as LP hoses

Do not install the bent or damaged pipe or hose on the machine.

Repairing any loose or damaged fuel and lubrication oil way, pipes or hoses will possibly cause fire. Please consult the distributor specified by Hyundai for repair or maintenance.

Carefully check the pipeline, pipe and hose. Do not use naked hands to check the leakage. Check the leakage using one plate or paper plate. See “Penetration of solution” in Section “Safety” for more information. Tighten all connectors according to the specified torque. If the following problems are found, replace the items:

- The Joint is damaged or leaking.
- The external layer is worn or cut apart and exposure of reinforcing steel wires.
- Local upheaval in outer layer.
- Obvious torsion or squeezed.
- The reinforcing layer steel wires insert into external layer.
- The terminal end is wrong positioned.

Ensure all pipe clamps, protective plates and heat-insulations are correctly installed to prevent from vibrating, wearing other components or overheating.

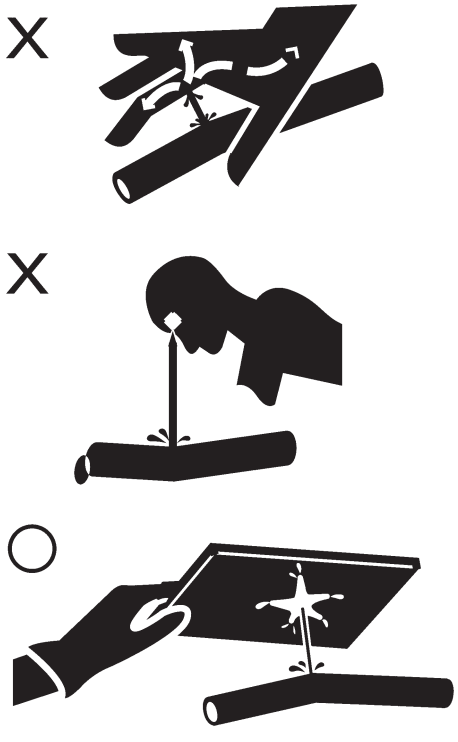


Figure 39

Compressed air

Compressed air may cause the persons to be injured. Wear protective mask, protective clothes and shoes when using compressed air. Use clean compressed air at pressure less than 0.3MPa, with a maximum pressure of 0.3 MPa.

Penetration of solution

Check the leakage using one plate or paper plate. Even the liquid leakage from a hole with a size of needle diameter can penetrate the human body, to cause the personal death. If the solution is splashing onto the skin, you must, within several hours, see a doctor for the treatment.

Scraps

Contacting with used engine oil may cause threats to the health.

Immediately rub off the engine oil from your hands, and wash away the remaining oil foot.

The used engine oil is a pollutant to the environment, and it can be only disposed by using the approved recycling equipment. Please accomplish the follows in order to prevent the environment pollution:

- Do not drain the waste oils into sewages or rivers.
- Collect the engine oil drained from the machine into the containers. Do not drain it directly onto the ground surface.
- Follow the corresponding laws and regulation when you dispose engine oil, fuel, solvent, filter or battery.

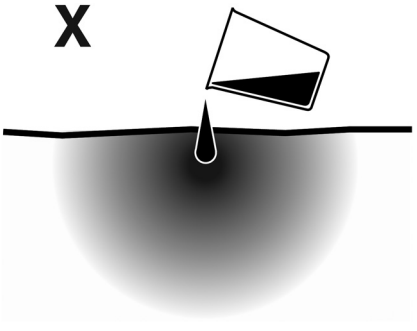


Figure 40

Check after maintenance

If you have not performed the complete maintenance or the check of the functions of each maintenance part, the unexpected problems will possibly occur, even causing serious personal injury or machine damage. Therefore, you must pay attention to following problems:

- When the engine is switched off, check:
  1. Have all repair and maintenance parts been inspected?
  2. Have all repair and maintenance items been correctly performed?
  3. Whether there are tools or parts left inside the machine? If something is stuck to the link mechanism, this is especially dangerous.
  4. Are all water leakage and oil leakage problems removed? Are all bolts tightened?
- When performing maintenance while the engine is running, pay attention to the follows:
  1. Are the repair and maintenance parts working normally?
  2. When the engine speed and the load increases, is there any oil leakage in hydraulic oil system?

BATTERY

Prevention of battery risks

The battery electrolytes contain sulphur acid, and battery can produce Hydrogen. Hydrogen is highly explosive. If disposing incorrectly, it will cause serious injury or fire. In order to prevent these problems, please accomplish following items:

- Prohibit smoking or flame approaching the battery.
- Please wear protective goggles and rubber gloves when you performing inspection, maintenance or charging of battery.
- Rinse immediately with water if the battery electrolytes spills over your body on your clothes.
- Rinse with plenty of water and see the doctor immediately if the battery electrolytes enters your eyes.
- Drink plenty of water or milk, and eat raw eggs or vegetable oils if you carelessly drink the battery electrolytes. And immediately go to a doctor or a poisoning prevention center.
- Please use clean wet cloth to scrub the upper surface of the battery. Do not use gasoline, diluent, other organic solution or detergent.
- Tighten the cover of battery box.
- If the battery electrolyte is frozen, do not charge the battery or use other power supply to start the motor, otherwise it will cause the risk of explosion.
- If you want to charge the battery or use other power supply to start the motor, you should let the battery electrolytes molten and check for the leakage before operation.
- Remove the battery from the machine before charging.

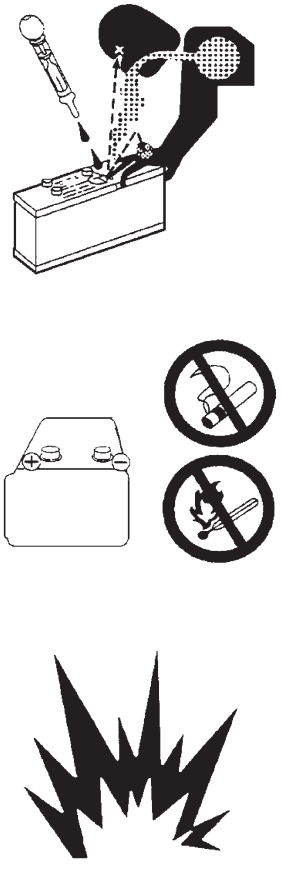


Figure 41

Auxiliary starting or charging the engine battery

The incorrect connection of battery cables may cause explosion or fire. Please obey the following items:

- Switch off all electrical equipments before connecting to battery, including the electric switch for battery charger and auxiliary starting device.
- When using other machine to perform the auxiliary starting, Do not let two machines contact each other. Wear protective goggles when connecting battery.
- 24 V battery combination consists of two 12 V batteries in serial. One wire connects to the Positive pole of one battery and the negative pole of the other battery. Connect the two positive poles of two batteries not in serial connection, and connect the negative pole of the booster battery and the metal support for the charged equipment.
- When connecting wires, first connect the positive pole wires; when disconnecting wires, first disconnect the negative pole wires. Finally connect the negative pole of the booster battery and the metal support for the charged equipment. The connection shall be as far away from the battery as possible.

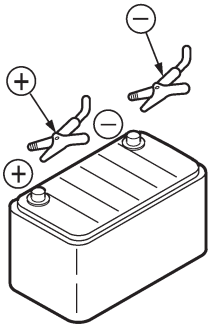


Figure 35

TRACTION

Matters needing attention on towing

If fault occurs during the selection or inspection of the traction string or during performance of traction, it will cause serious injury. Please obey the following items:

- Use the methods introduced in Operation and Maintenance Manual.
- Please wear the leather gloves for disposing string and ropes.
- When there are two or more persons to do the preparation, unify the signals and use them correctly.
- If there is fault in the machine or in the brake system, or the engine could not be started, please contact with the agent.
- When performing the traction operation, do not walk between the tractor and the towed machine.
- It is dangerous to perform the traction on slope, therefore, you should select a gentle slope. If there is no gentle slope, please reduce the slope angle before performing traction operation.
- Please use the string and ropes with enough traction force to tow the fault machine.
- Do not use the worn, kinked rope or the rope with too small cross-section.

SHIPPING AND TRANSPOTATION

Matters needing attention for loading/unloading machine

There is always danger in loading/unloading machine, so you should be very careful. When you perform loading/unloading of machine,the engine shall run at low speed, and the machine shall travel at low speed.

The loading/unloading of machine shall be performed on the solid flat ground. Keep a safety distance away from the road side.

When performing loading/unloading machine, you should always fix the transportation vehicle wheels by placing backing block under the ramp.

You should use a slant ramp with adequate length. It is necessary to guarantee the slant ramp has adequate width and length to provide a ramp for safe loading/unloading. The included angle between ramp and ground should not exceed 15 º. The distance between ramps shall be adapted to machine wheelbase.

Ensure the ramp is securely fixed, with heights on both side kept the same.

Ensure the ramp surface is clean, without lubrication oil, oil stain, ice and loose materials. Remove dirt on tires of the machine. Never make a turn on the ramp. If necessary, the machine shall be driven away from the ramp, and re-driven up onto the vehicle after the adjustment of the machine.

After loading onto the vehicle, fix the machine using wedges and wrap tightly the machine using ropes.

Matters needing attention for shipping machine

When using trailer to ship this machine, it is necessary to comply with regulations from the State and Local laws on weight, Height, width and length of the goods. It is also necessary to comply with all related traffic laws and regulation.

Consider the weight, height, width and length of the machine when you determine the transportation routes.

Check whether their strength can support the weight of the machine firstly when the machine passes the bridge or the buildings on private territory. When the machine travels on the public road,it is necessary to first accord with the regulations of the related authorities and comply these regulations.

When transportation, the machine may be divided into several parts if necessary. Therefore when you transport this machine, please consult the distributor specified by Hyundai for performing such operation.

TOWING

Matters needing attention for towing:

If you, in a incorrect way, or with a wrong steel wire, tow a machine which cannot travel, this will cause injury or death. Therefore, you should comply with following notes:

- Wear leather gloves when you handle the steel wires.
- When you make the preparation for the rowing together with other workers, you should discuss and determine the communication signals used in the operation before towing.
- If the engine on a fault machine could not start or the braking system is in fault, please consult the distributor specified by Hyundai for repairing.
- It is dangerous to tow a machine on the slope. You should select a place with flat slope. If not applicable, select a place with a slope as less as possible for towing.
- If the fault machine is towed by another machine, the rope used must have the capacity to withstand the weight of the fault machine.
- The steel wires used must not have brocket strands, kinkings or shrunk diameter.
- Do not stand astraddle on towing steel wire rope.
- When you are connecting the machine to be towed, nobody is allowed to access to a place between the towing machine and the towed machine.
- Let the car coupler of the towed machine be in line with the towed portion of the machine, and ensure it is in place.

Operation Controls

Description of each component position and each control switch, instrument and valve through drawings or photos.

The meters on the dashboard are attached with indicators through which the operator monitors the operation of the machine and with which the faults are displayed

WARNING

Warning lamp: If any warning lamp or several lamps on the console are lit up, immediately stop the operation and shut off the working unit. The operation could not continue until the troubleshooting is accomplished.

COMPONENT LOCATIONS

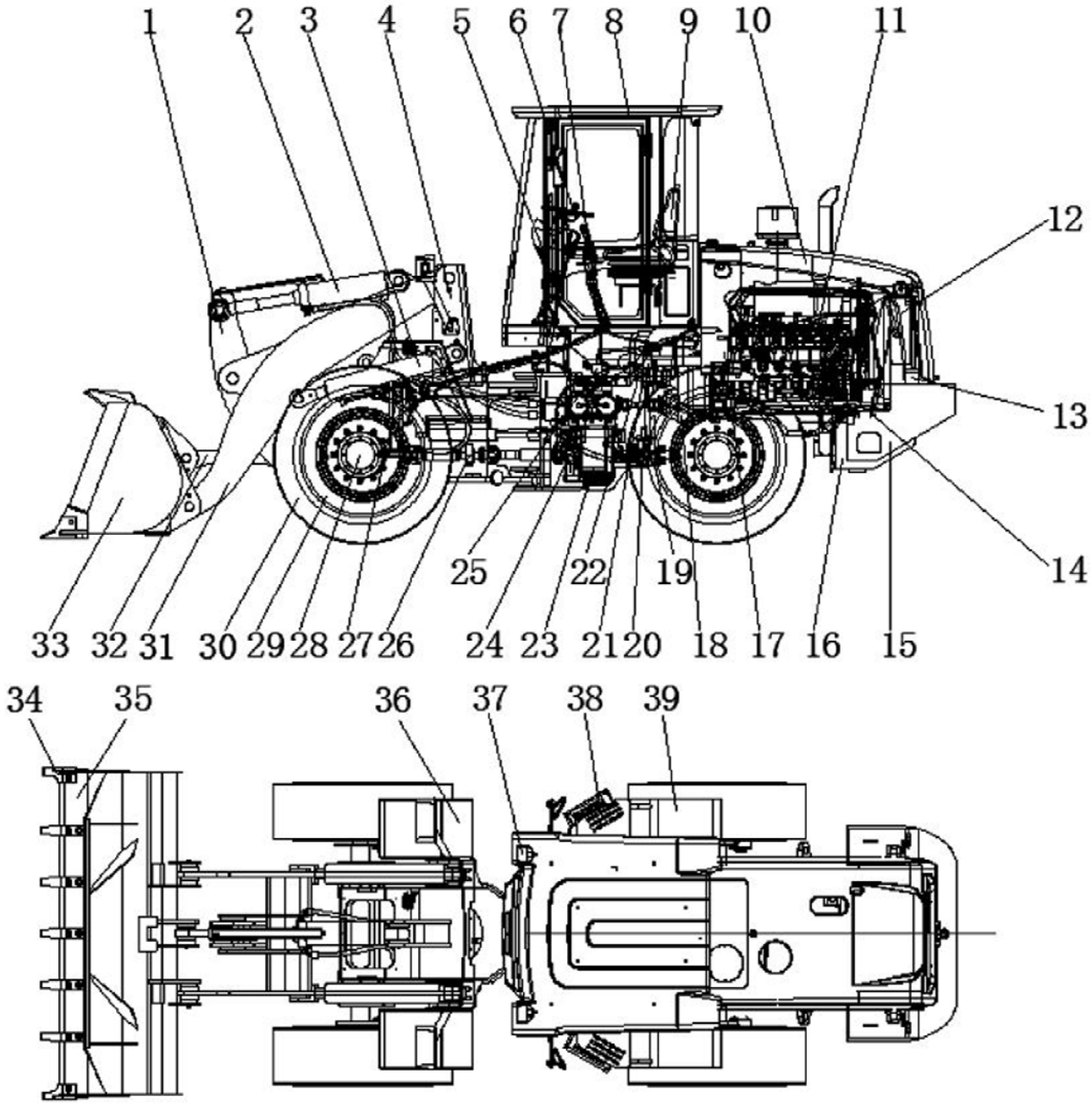


Figure 1

Reference Number	Description
1	Lever
2	Bucket Cylinder
3	Boom Cylinder
4	Frame
5	Electric Part-Fuse Box
6	Electric Part-cab
7	Joystick
8	Cabin
9	Seat
10	Engine Cover
11	Engine
12	Cooler Piping
13	Lighting Lamp-Rear frame
14	Electric Part-Engine
15	Counter Weight
16	Fuel Tank
17	Oil Tank
18	Torque Converter
19	Priority Valve
20	Pilot Filter

Reference Number	Description
21	Pilot Pump
22	Main Pump
23	Transmission
24	Break Piping
25	Sequence Valve
26	Shaft
27	Main Pump
28	Axle
29	Rim
30	Tire
31	Lift Arm
32	Link
33	Bucket
34	Bucket Tooth
35	Bucket Cutting Board
36	Fender
37	Lighting Lamp-Front frame
38	Ladder
39	Platform

OPERATOR`S AREA(STAND)

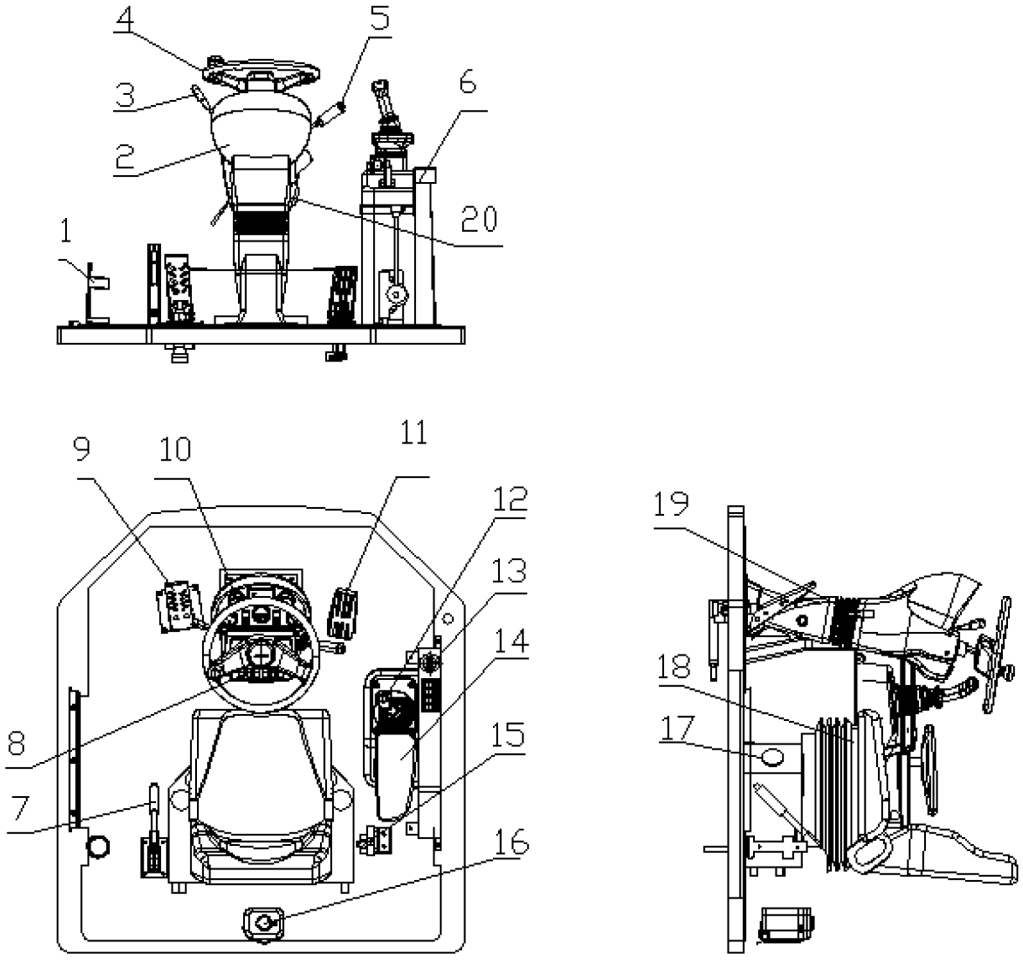


Figure 2a

Reference Number	Description
1	Fire Extinguisher Bracket
2	Console
3	Combo switch handle
4	Steering wheel
5	Gearshift Handle
6	Operation Box
7	Hand Brake Lever
8	Control switch such as OFF
9	Brake Piping
10	Dashboard Assembly

Reference Number	Description
11	Accelerator Pedal
12	Pilot Control Handle
13	Pilot Control Box
14	Engine Flameout Lever
15	High-Low Speed Control Lever
16	Washing Pot
17	A\C assembly
18	Seat
19	Steering Wheel Adjustment Handle
20	Fuse Box

OPERATOR`S AREA(OPTION)

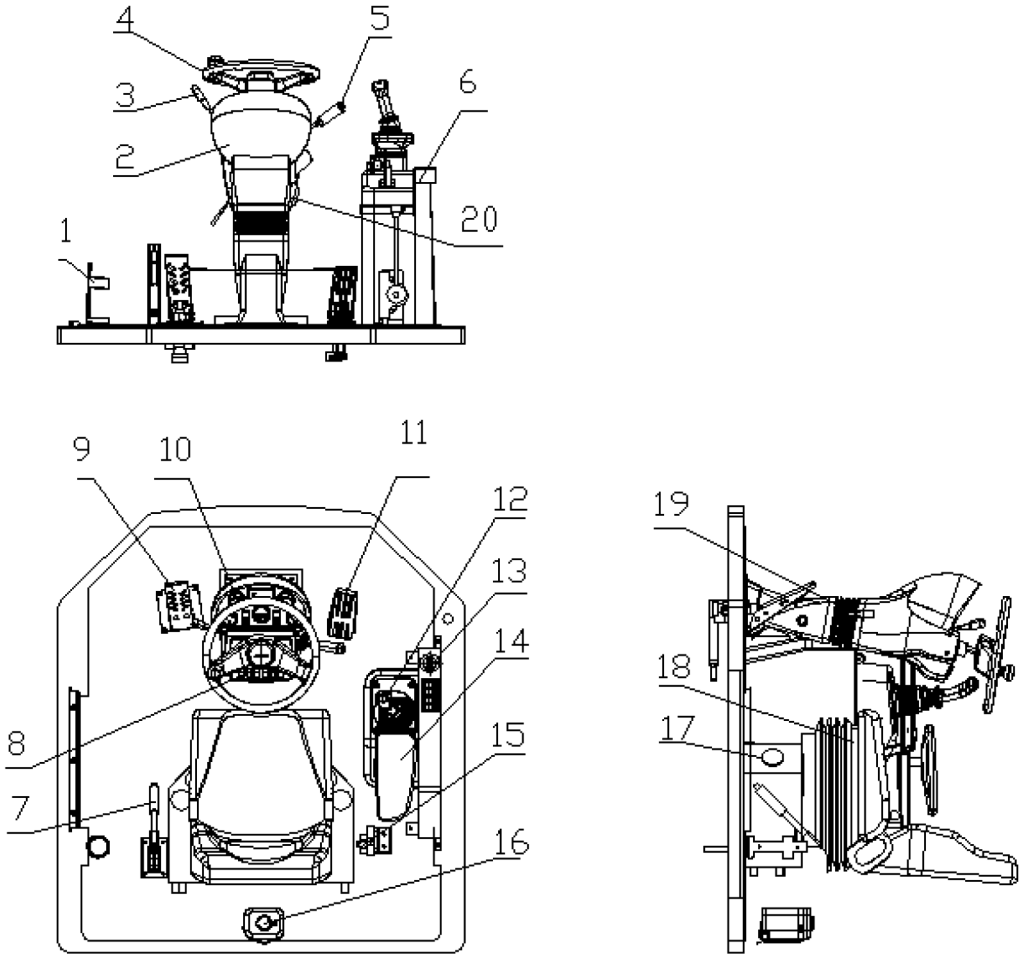


Figure 2b

Reference Number	Description
1	Fire Extinguisher Bracket
2	Console
3	Combo switch handle
4	Steering wheel
5	Gearshift Handle
6	Operation Box
7	Hand Brake Lever
8	Control switch such as OFF
9	Brake Piping
10	Dashboard Assembly

Reference Number	Description
11	Accelerator Pedal
12	Bucket control lever
13	Boom control lever
14	Engine Flameout Lever
15	High-Low Speed Control Lever
16	Washing Pot
17	Heater system assembly
18	Seat
19	Steering Wheel Adjustment Handle
20	Fuse Box

MANIPULATING FACILITY

Steering Wheel

1. The steering wheel rotation angle is not equal to the machine's rotation angle. Continuously rotate the steering wheel to increase the rotation angle until to the required position.
2. The quicker the steering wheel rotates, the quicker the machine rotates.
3. The steering wheel cannot restore to original position after rotation, and the machine rotation angle is kept unchanged. Therefore, after the machine finishes the steering, you should reversely rotate the steering wheel to make the machine drive along the straight direction.

Figure 3

WARNING

Do not switch off the negative pole switch of the battery while the engine is still running, otherwise it will damage the whole electrical system!

Starting switch

Starting switch (also called as electric lock) is located on the right side panel of the steering wheel.

1. Auxiliary – the first position you meet when you insert the starter key and rotate it counterclockwise, and this gear position can be auto reset (i.e., the button will return to "OFF" position when you release your hand). This gear position is not available at present.
2. OFF – at this gear position, the power supply control circuit for the whole machine is cut off, but at this time the machine is still powered by the generator. When you want to stop the machine, first use the switch off handle to stop the engine, and then rotate the starting switch to "OFF" position.

   Note: *Only at this position, is it possible to insert or pull out the starter key!*

Figure 4

3. ON – the first gear position you meet when you insert the starter key and rotate it clockwise. At this position, the electrical system of the whole vehicle can be powered to operate normally.
4. START – the second gear position you meet when you insert the starter key and rotate it clockwise. At this position, the starter motor can be powered to operate and start the engine. After the engine is successfully started, you should immediately release the starter button. This gear position can not be held by itself. As soon as you release the starter button, it will auto return to “ON” position of the starter switch.

Note: *Before starting the engine, please confirm the negative pole switch is in “ON” state and the shifting manipulating handle is at “Neutral” position.*

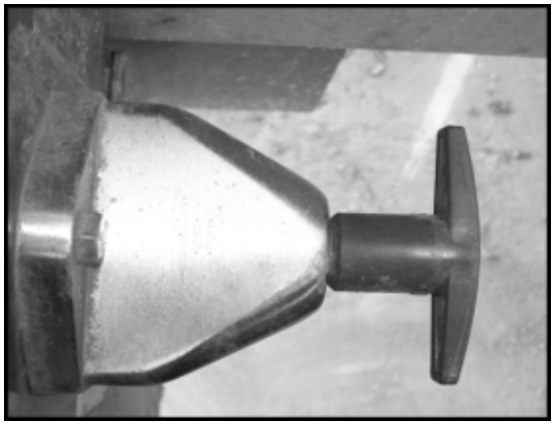


Figure 5

Figure 6

WARNING

If the engine starting operation fails, it is necessary to turn the switch to “OFF” position then you can restart. Otherwise it will damage the starter switch!

The time for each start should not exceed 15 s; the interval between two starts shall be at least 30s and the times to continuously start should not exceed 3 times; if it exceeds 3 times, you should wait for the starter motor to be fully cooled down, then you can start again. Otherwise, it will reduce the operation life of the battery; meanwhile it may damage the starter motor.

Operation of Pre-heating system

The pre-heater system can be used in some regions and states where the cold weather may affect the starting ability of the engine. Please read the following specification carefully before operation

1. Turn the starter switch to the position 'ON'.
   Starter Switch (ON)

Figure 7

   When When the resistivity of the engine coolant sensor is less than 2700±300Ω (which means that the engine coolant temperature is above 0 ℃), the controller won't go to pre-heat status and the pre-heat indicator will be on for 2s before goes out.

   Pre-heat indicato

Figure 8

2. When the resistivity of the engine coolant sensor is more then 2700±300Ω (which means that the engine coolant temperature is below 0℃) ,the controller will go to pre-heat status and the pre-heating time is associated with the voltage (please refer to the following table).

Voltage(V)	18	20	22	24
Times(S)	55±5	41±4	30±3	26±2

3. When the pre-heat time is up, the pre-heat indicator (DL) goes out (If the start switch is turned off during the pre-heat time, the controller will stop) and the pre-heat system then wait to start the engine for 30s

   • During the waiting time (the pre-heat plug is in ON position),if you switch on the start switch (K2),the fuel supply valve is open and the pre-heat indicator will be lighted on again with the pre-heat plug energized

   Starter switch ('start')

   • During the waiting time, if you don't switch on the start switch (K2), the voltage of 24V will not be input to 50 port which means that the engine is not started .The controller will stop working.

4. If the generator don't send D+ signal to the controller after the reset of the start switch, which means that the engine fail to be started, the control will stop working after 6s; if the generator send D+ signal to the control (which means that the engine is started), it begin to heat and the heat time is presented as a function of the resistance of the engine coolant sensor whose range is between 60s and 120s.
5. If the circuit of the engine coolant sensor is open, the pre-heat system works. The pre-heat indicator twinkle for 15s to give a warning after all start procedure is over, and it is the longest heating time.
6. When the voltage is less than 15V, the pre-heat system doesn't work and the pre-heat indicator(DL) twinkle for 15s to give a warning.
7. No matter the controller stop working at what stage, only turning off the pre-heat switch K1, which means cancel the voltage of 15V, firstly and then turning it on can regain the pre-heat function.

Figure 9

Schematic

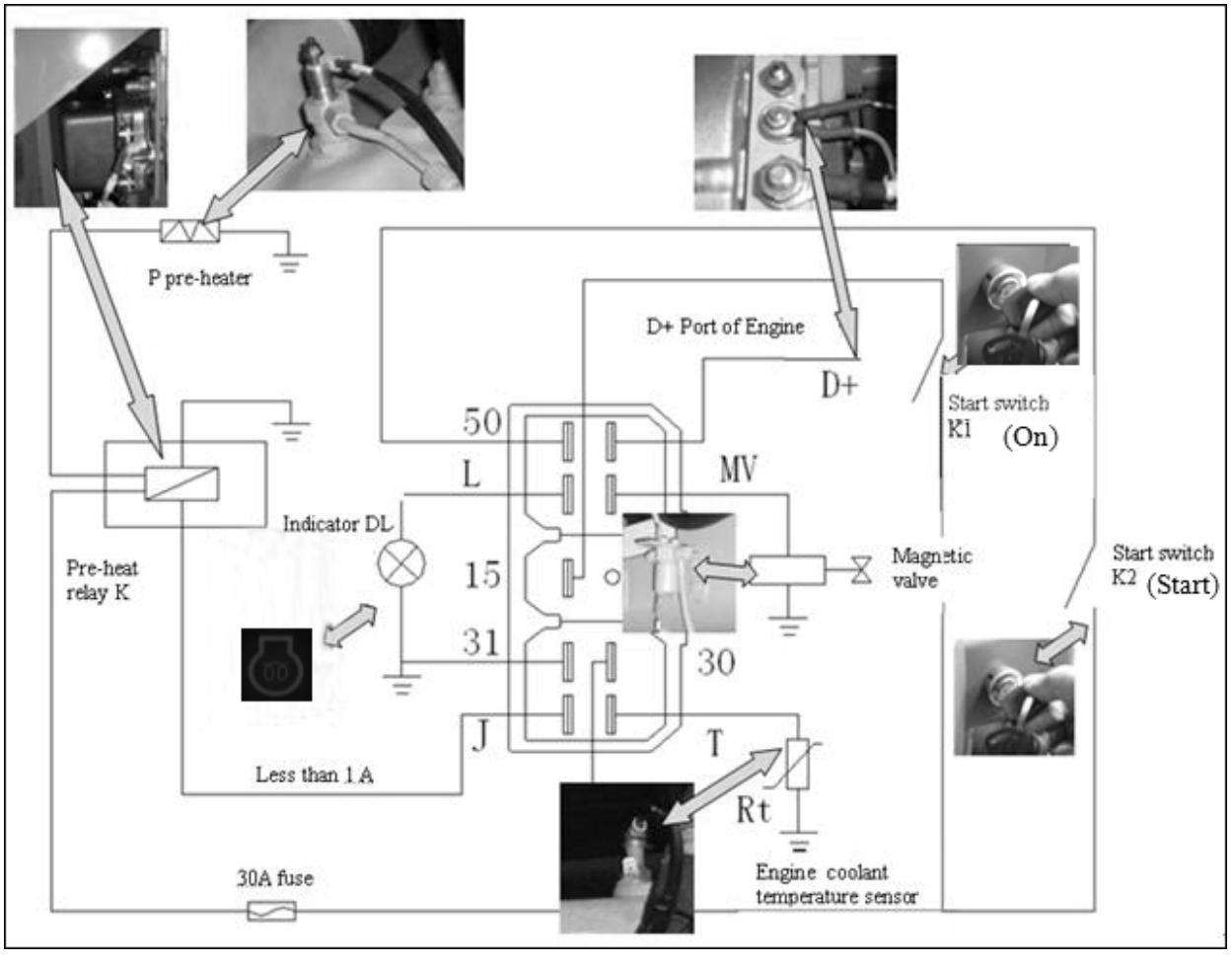


Figure 10

Parking brake Lever

The parking brake lever is on the left side of the seat (Fig.11.) Put upward the lever to lock the parking brake. Press down the lever to release the parking brake. When you press down the lever, you need to press and hold the button at the top of the lever.

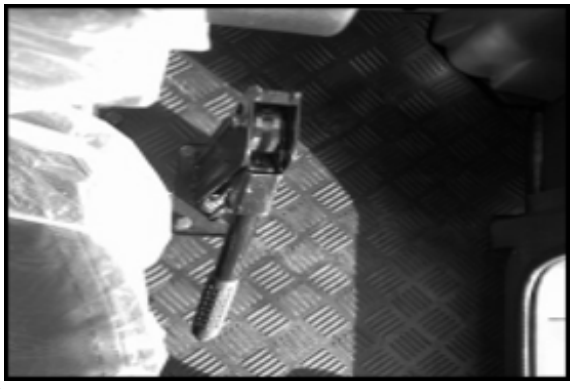


Figure 11

Service braking pedal

Service braking pedal (foot brake) is located in front left of the cab floor. (Fig. 12)

Depress the service braking pedal; the braking applies onto front and rear driving axles. Meanwhile, the braking lamp switch is energized, and the braking lamp is lit up. Release the Service braking pedal to release the service brake

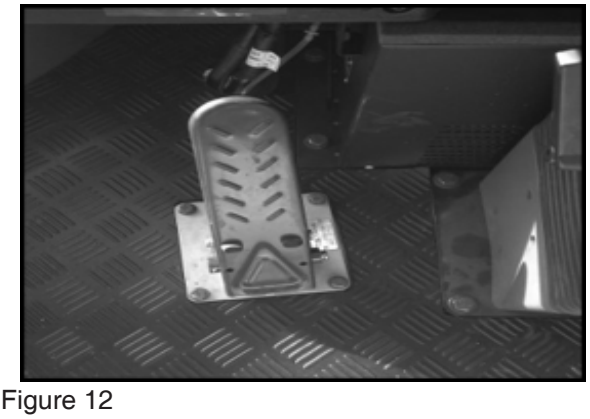


Figure 12

Throttle pedal

The throttle pedal is located in front right of the cab floor. When it is at the position shown in Fig.13, the engine is in the idle state. Depress the throttle pedal, the amount of fuel supply will be increased to increase the power output of the diesel engine.

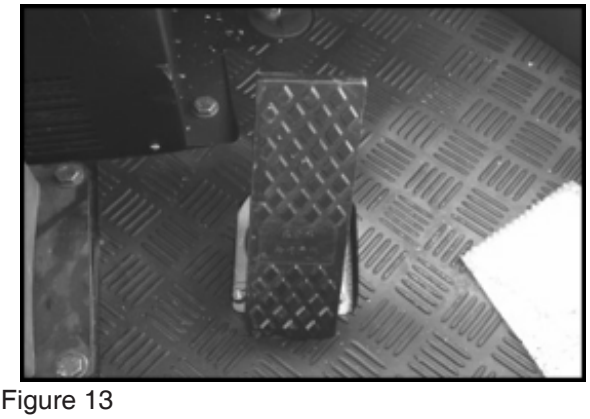


Figure 13

Engine cutoff switch

The engine cutoff of this machine is located on the right side of the control box(Fig.14). The engine cutoff of this machine is realized by pull-up the cut-off handle for a few seconds. Release your hand after the engine flame-out, then the handle will return automatically

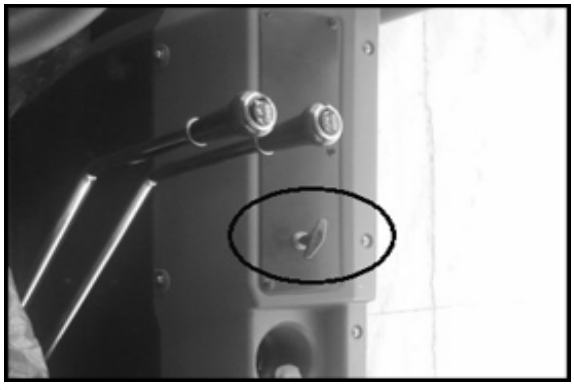


Figure 14

Gearbox manipulating handle

Gearbox manipulating handle is located under the steering wheel.

Toggling the handle back and fro, may operate gears “Forward I”, “Forward II”, “Reverse” and “Neutral” respectively

Figure 15

High-low speed switch handle

This handle is located on the right of the seat. Please refer to the right picture. When the handle is pushed to the middle position, the car is in neutral. Push forward into low speed gear; And pull back to high speed gear.

When parking switch for high or low speed: Put the shifting manipulating handle on “Neutral Gear” position, then feather the accelerator pedal meanwhile switch handle into the high or low speed position.

When moving switch for high or low speed: Should be the first to slam on

the brake pedal, in the moment of parking, switch the handle into the high or low speed position immediately

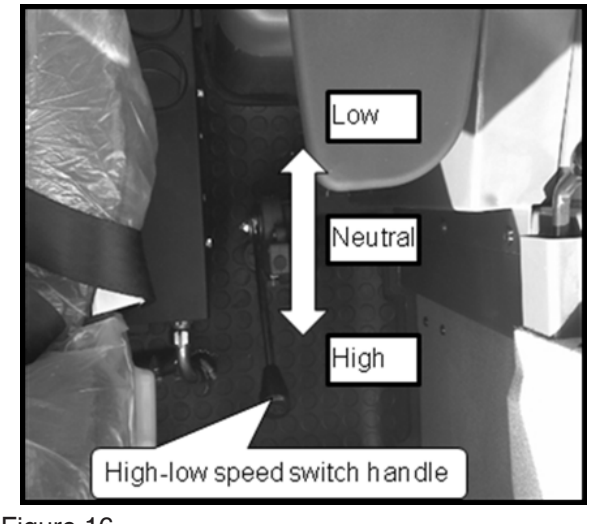


Figure 16

Pilot manipulating handle (stand)

Pilot manipulating handle is installed on the handle manipulating box on the right side of the driver seat. It is used for controlling the working device to perform the operation. The bucket manipulating handle with leftward and rightward manipulation is used to control the bucket's movement and the arm manipulating handle with forward and backward manipulation is used to control the arm's movement. This handle is at the "holding" position under natural state, i.e., at the middle position.

When the engine is running, if you push the manipulating handle rightward, the bucket will tilt forward; if you pull the manipulating handle leftward, the bucket will tilt backward.

If you push the arm manipulating handle forwards, the arm will lower; if you pull the arm manipulating handle backwards, the arm will rise.

If you slightly move the handle forwards or backwards, or leftwards or rightwards, you can control the openness of the main valve, which, together with the throttle openness, can control the movement position and speed of the working device in a comparatively accurate mode.
Besides, the pilot manipulating handle also has the following special functions:

Arm floating device

Push the manipulating handle forwards to the extreme forward position and holding the arm is in floating state once the pilot pressure going up to 30bar; If you want to remove the Floating state, you only need to pull the manipulating handle back to the middle position.

When you manipulate the arm to lower down, you can push the manipulating handle to the floating position, and the arm will then descend under the action of gravity.

When you perform scraping or shoveling & loading, push the manipulating handle to the floating position, and the bucket will fluctuate as the fluctuation of the ground surface, thus avoiding the damaging of the road surface.

Figure 17

Mechanical manipulating lever (option)

Working lever is installed on the right side of the seat. It is used for controlling the working device to perform the operation. The inner side is bucket control lever, used to control the movement of the bucket. The outer side is boom control lever, used to control the movement of the booms. Both handles are at the “HOLDING” position under natural state, i.e., at the middle position. When the engine is running, if you push the bucket control lever forwards, the bucket will tilt forward; if you pull the bucket control lever backwards, the bucket will tilt backward. If you push the boom control lever forwards, the boom will get down; if you pull the boom control lever backwards, the boom will rise. If you slightly move these two handles forwards or backwards, you can control the openness of the main valve, which, together with the throttle openness, can control the movement position and speed of the working device in a comparatively accurate mode.

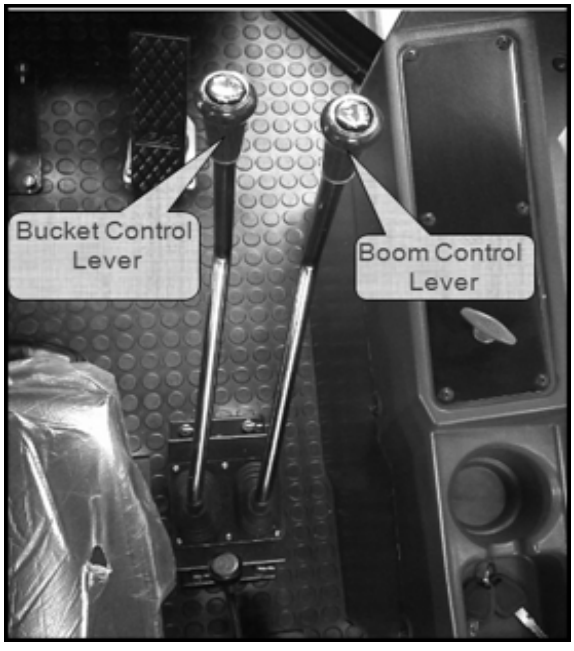


Figure 18

ROCKER SWITCH

Figure 19

Rocker switch located below the steering wheel, integration on the console （Fig.19）

1. Warning alarm switch (the first on the left)
   -- When the vehicle is in a state of need warning, Closing the switch can control the four turning lamps on or off at the same time.
2. Rotating beacon lamp switch(the second on the left)
   -- Control the rotating beacon lamp on or off;（OPT.）
3. Front working lamp switch(the third on the left)
   -- Working lamp switch control the two front working lamps on or off on the top of the cab .
4. Rear working lamp switch (the fourth on the left)
   -- Working lamp switch control the two rear working lamps on or off on the cover.
5. Windscreen washer switch(the fifth on the left)
   -- This switch control the washer,this switch can return by oneself.
6. Wiper switch(the sixth on the left)
   -- This is a switch to control the wiper.

MORNITORING INSTRUMENT

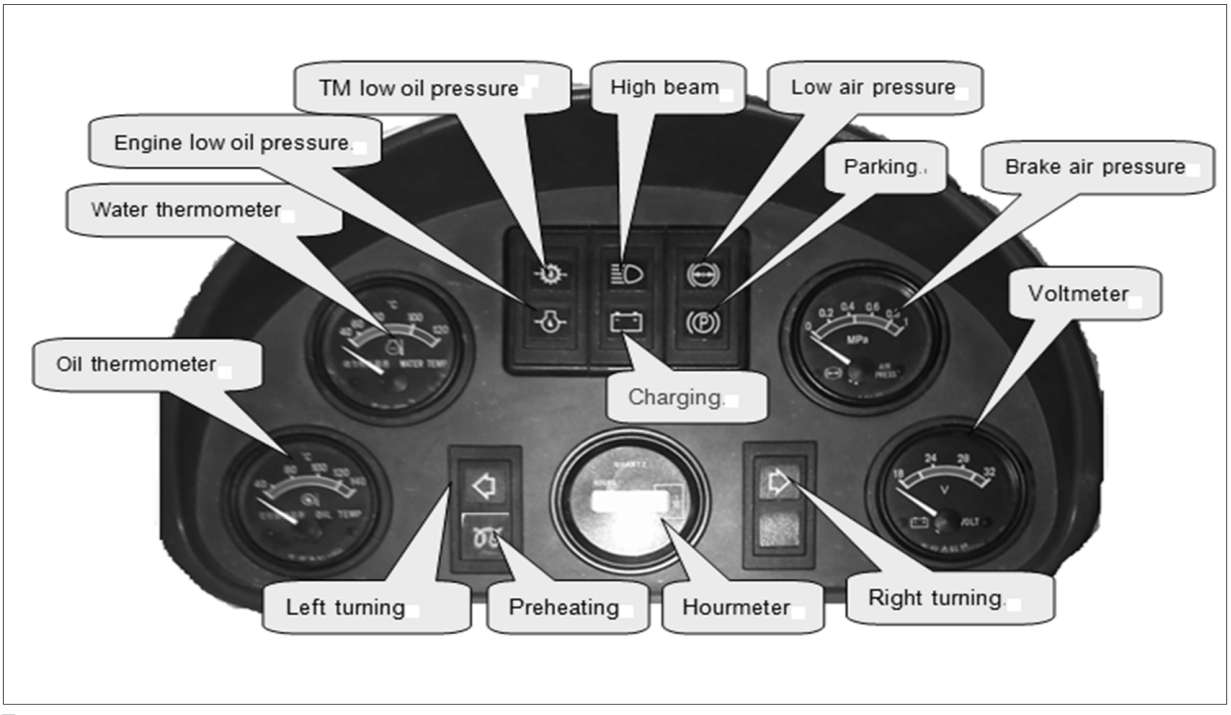


Figure 20

All monitoring instruments,alarm indicator lights , hour meter and so on are integrated instrument under the steering wheel assembly.

Instrument contains a list of the torque converter oil temperature, cooling water thermometer, brake air pressure meter, hour meter, voltmeter, a total of five kinds of indicator; Indicator light including emergency braking, braking pressure, low air pressure alarm and transmission low oil pressure alarm, engine oil low pressure alarm, high beam indicator light, charging indicator, left and right turn signal indicator, preheating, a total of 9 projects

1. Monitoring instrument
   When a variety of monitoring instrument (in addition to the hour meter) pointer instructions within the scope of the green zone, it shows that the project is in a normal range, and equipment can work normally; Otherwise, when the pointer is beyond the scope of the green zone, we should make a confirmation to the monitoring project status and take corresponding measures to make the monitoring instrument into the normal working state.

2. Indicator light

   When open the turning lamp, the corresponding turning indicator should be in light condition;

   When open the high beam , high beam indicator should be in light condition;

   When the loader is in a state of parking brake and parking brake indicator light should be in light condition;

   When turn the start switch to “ON” position, the charging indicator is in light condition before starting; When the engine starts, charging indicator should be in a state of out.

3. Hour meter

   Indicate the machine working time by the hour. Hour meter’s time range is 0 to 9999.99 hours. Timing starts when the engine starts

WARNING

When the parking brake lights light up, not allowed to put into gear, otherwise it will damage the brake system!
When charging system failure, cannot continue to work or drive before failure has not been ruled out.

Lamp and Switch

The lamps for the vehicle are divided into front/ rear combo lamp (one each for left and right), rear combo lamp (one each for left and right), indoor lamp, work lamp(one each for left and right),and rear lamp (one each for left and right)

Where, the front/rear combo lamp includes head lamp, front signal lamp, front steering lamp; and the rear combo lamp includes rear steering lamp, braking lamp, and rear signal lamp.

The steering lamp is control by the handle in steering gear assy.

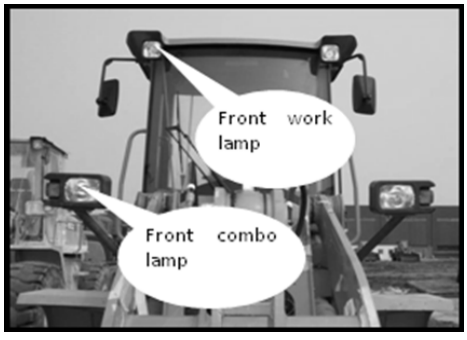


Figure 21

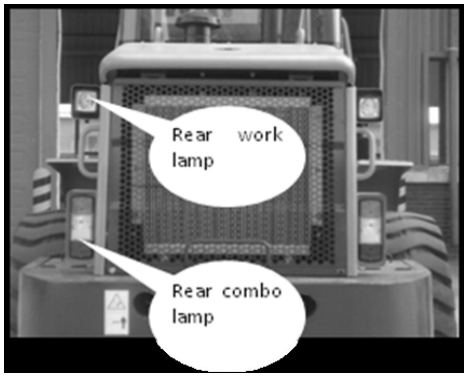


Figure 22

Figure 23

A/C system

1. Refrigeration
   A. Close the heater water valve;
   B. After the engine working normal, turn the blowing rate switch to the proper position;
   C. Rotate the temperature control switch to the proper position (Green indicator lit up), and the refrigeration system starts working and the cooled air begins to be sent out from the air outlet;
   D. You may adjust the temperature of the cooled air by adjusting temperature control switch
2. Heating
   A. After the engine working for a moment, turn the blowing rate switch to the proper position;
   B. Rotate the temperature control switch counterclockwise to the leftmost position, and the heating system starts working and the hot air begins to be sent out from the air outlet

Figure 24


Figure 25

3. Hot water valve
   The heating function of A\C system is realized by emitting heat through circulation of the coolant from engine to radiator. There are two hand hot water valves installed on water inlet and water return port connected to engine and radiator

   In normal operation, these two hand valves shall be at the OPEN position (i.e., the direction of handle of the valve is in line with the run of the pipeline). In case of repair due to the fault in A\C system, you should first close the two hot water valves (i.e., the direction of handle of the valve is perpendicular to the run of the pipeline) to prevent the engine coolant from being lost. When changing engine coolant, you should open the hot water valve and solenoid valve to change the coolant in the radiator also, and guarantee the correct liquid level of the engine coolant.

WARNING

When the ambient temperature is lower than 0 º and the engine is not working, If there is no anti-freeze fluid filled into the engine coolant, you should empty the engine water tank, and, at the same time, open the hot water valve and solenoid valve to drain out the coolant in the radiator, otherwise the radiator will be frost cracked due to too low temperature of the radiator pipeline!!!

Heater system (option)

Heater is mounted under the seat.
operation notes:

- In Warranty, it is strictly prohibited to disassemble the air conditioning system;
- In the winter, if you want to keep warm, you need to open the water valve; In the summer, don't need to keep warm, you must close the water valve(Fig.26a);
- Close the heater before stop the engine,and open the heater after start the engine;the engine runs later,turn the switch to the right position;heater start to work,warm wind blow out from air outlet continuously(Fig.26b).
- When Using the heater, can't put your clothes and other debris in front of the inlet and outlet, or it will cause poor air inlet and outlet, affect the heating effect;air inlet is on the side of the heater,air outlet is on the front of the heater(Fig.26c).
- When the temperature is below than 0℃, need add antifreeze to the engine. Then need to open the water valve and make the engine working for a moment, turn the blowing rate switch to the proper position; (this is important,Without antifreeze the radiator core may burst; this situation will cause large economic loss,and Is beyond the scope of the warranty!)

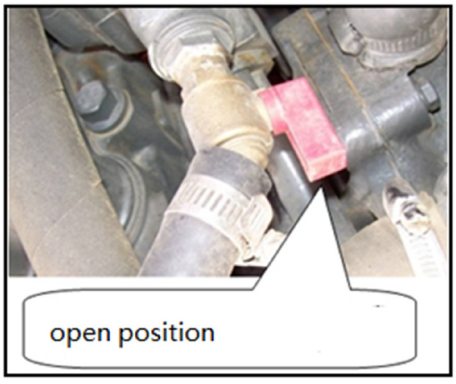


Figure 26a

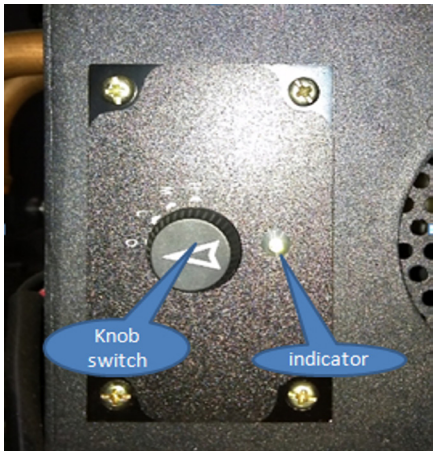


Figure 26b

Figure 26c

Fan (option)

The fan is mounted on the top of the cabin(Fig.27). switch is on the side of the base,contain neutral position, low gear and high gear.

Figure 27

Wiper and washer

This machine is equipped with a front window wiper, and the control switch is under the steering wheel.

1. Front wiper switch
   The front wiper switch has three gears with Stop, low speed and high speed. (Fig.28, left)

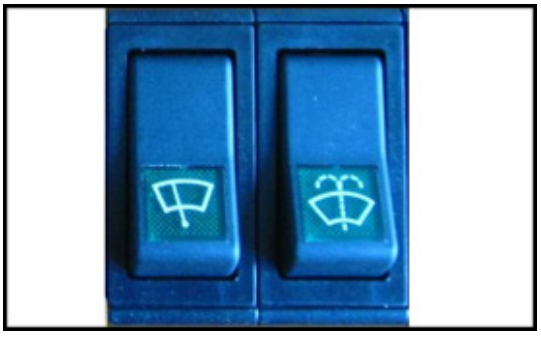


Figure 28

2. Washer switch
   Press washer switch, washer spray the water onto the window; Let go and the washer switch automatic reset, and the washer stop working. Washer is behind the driver seat(Fig.29)

Figure 29

⚠ WARNING

Often check whether the liquid detergent in the washer is run out, in order to avoid unable to clean front window and affect the line of sight. When temperature is lower than the 0 ℃,Should be let out the water in the washer and infuse antifreeze, Otherwise the washer will be unable to work due to freezing, even will be freezing.

Adjustment of steering gear

The inclination of steering gear of this machine may be adjusted within a certain range to adapt to driver's operation customs.

There is a spanner at the middle of steering gear (Fig.69). The method of adjusting the inclination angle of the steering gear is as follows.

Use angle adjustment handle to raise the spanner to adjust the steering gear to a proper position, and then release the spanner.

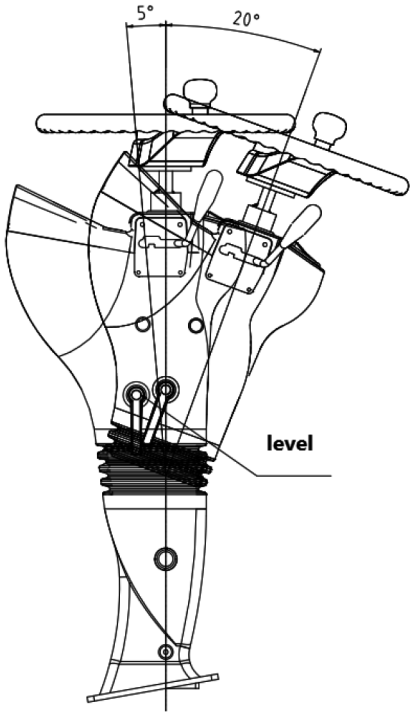


Figure 30

Adjustment of driver seat

The driver seat equipped for this machine can be adjusted in aspects of soft and hard extent (i.e., height, front and rear direction, backrest angle and headrest height) to adapt requirements from different drivers and different work situations.

1. Adjustment of front and rear positions
   There is a handle in front sections of low left side of the driver seat. If you toggle this handle towards the outside of the driver seat, the seat may move back and fro. During the movement, you will feel the obvious clamping positions at some places. Move the seat to the clamping position, release your hand and the seat will be fixed to the clamping position. This machine seat can be moved back and fro within the scope of 75mm, and the seat can only be fixed at the clamping position
2. Adjustment of height
   This machine seat has 3 positions able to be adjusted and you will obviously feel that there are 3 clamping positions. The driver seat is adjusted to the middle position when the machine was delivered from the factory. The driver can adjust the height as required. When adjusting, you should hold the base beneath the seat with your hands, and pull up smoothly. There are several clamping positions to be met during the moving up of the seat, where you can release your hands, and then the driver seat will be fixed at this position
3. Adjustment of backrest angle
   There is a handle in the middle on the right side of the driver. First you toggle the handle clockwise, then toggle the backrest forward or backward to a comfort position and release your hands. The backrest will be fixed at this position. The backrest of the driver seat for this machine can be folded forward, and adjusted backward within 110 º.

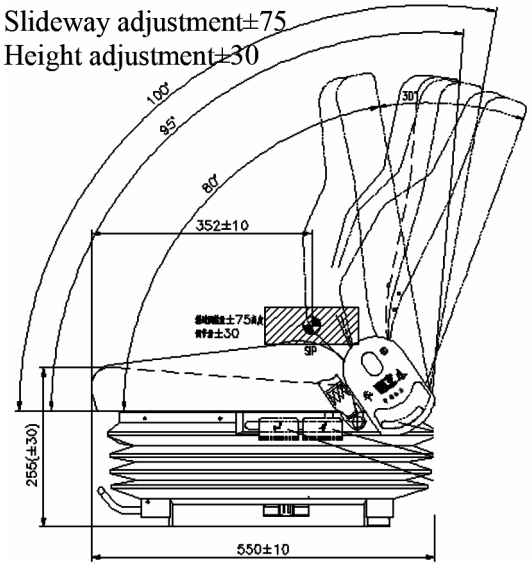


Figure 31

Usage of seat belt

The driver seat of this machine is equipped with seat belt. The driver shall tie the seat belt when operating the machine. Check the wear and security of the seat belt before using it. Replace it if necessary.

Adjust the length of the seat belt before using to ensure the seat belt can play the role of safety guarantee and have certain flexibility. You can adjust the length of the seat belt by changing the spring bolt position on the seat belt. The locking device of the seat belt is located at rear right side of the seat. Insert the spring bolt into the opening of the locking device, the locking device will clamp the spring bolt. There are two Red buttons by side of the opening of the locking device. Push this red button, and the spring bolt will spring out from the locking device. Before using seat belt, please check whether the locking device of the seat belt can normally be locked or opened.

Adjustment of rear-view mirror

There is one rear-view mirror each above, on the left and right side of the cab of this machine. Before operating this machine, you must adjust the field of view to ensure the driver has a good field of rear view.

Release the bolt connecting rear-view mirror support and cab and rotate the support to adjust the position of the rear-view mirror relative to the cab; Release the bolt connecting rear-view mirror and support and rotate the rear-view mirror to adjust the elevation angle of the rear-view mirror. After the above adjustment, it is necessary to tighten the bolt.

Figure 32

Audio system---multimedia

Audio system is located in the cab, including multimedia, speaker, and antenna.

Host panel(Fig.64)

Figure 33

Speaker(Fig.65)

Figure 34

The multimedia speaker has many functions such as digital radio, USB/SD/MMC, MP3/WMA, clock, adjustable volume.

1. The system configuration
   Digital tuning radio; USB/SD/MMC ; MP3 PLAYER.
2. Radio function
   Support FM FM/AM medium wave
   Support six FM1, six FM2, six FM3, six AM1, six AM2, six AM3, Channel storage, at the same time memory these radio station in case of outages.
3. MP3 Function
   Support USB/SD/MMC insert automatically play.
4. Auto save channels function.
   When the power is off, the channels can be saved automatically.
5. Other
   1) support the clock display type for 24-hours
   2) The mobile phone can be charged through USB port (cable is needed)

Key introduction

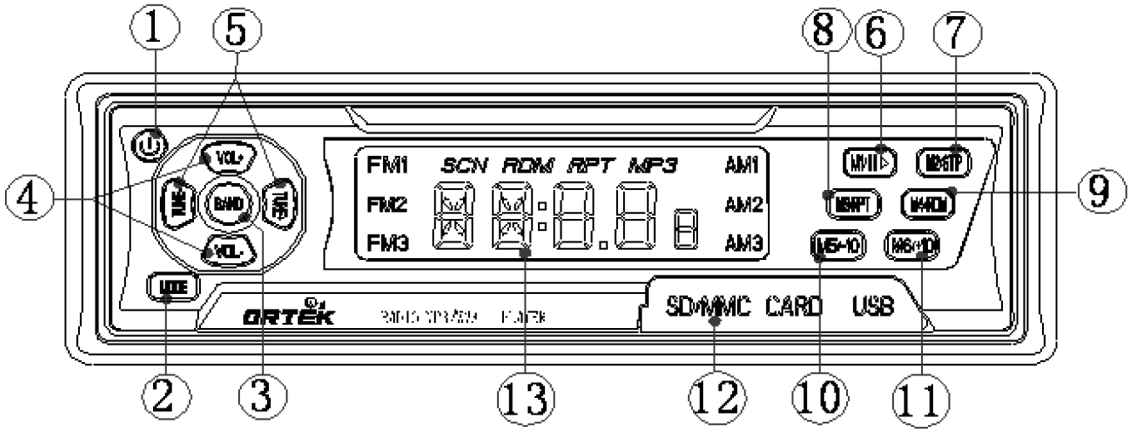


Figure 35

1. POWER Power supply switch control key
2. MODE Mode switch / Clock control key
3. BAND The radio band selection; Automatic search station storage key
4. VOL+/VOL- Volume control key
5. TUNE+/TUNE- Automatic sorting table; Last/ Next song ; Clock Settings key
6. M1/ II▶ Station storage; Suspension control key
7. M2/STP Station storage; Stop control key
8. M3/RPT Station storage; Repetitive control key
9. M4/RDM Station storage; Random control key
10. M5/-10 Station storage; Next 10 song control key
11. M6/+10 Station storage; Last 10 song control key
12. SD/MMC Card /USB Memory socket
13. LCD Liquid crystal display

Operating instructions

1. Radio mode button function declaration

1) M1,M2,M3,M4,M5,M6 are used to memorize the date of FM1,FM2,FM3,AM1,AM2,AM3 respectively.

   Push the button for shorter than 2s, you can pick up the corresponding pre-saved channels.

   Push the button until more than 2s, you can store the current channel in corresponding internal storage.

2) BAND is used to switch band between FM1, FM2, FM3, AM1, AM2, AM3.

   When you push the button for shorter than 2s, the radio band will circulate as FM1→FM2→FM3→AM1→AM2→AM3...; If you push the button until more than 2s and it was FM before you push it, it will search upward automatically from 87.5M of FM1 and store them automatically. When the search for FM1~FM3 is finished (18 channels totally) which means the search from 87.5M to 108M is finished, the first channel of FM1 is picked up automatically and the previous stored channels are replaced.

   When it was in AM before you push the button, it will search automatically upward from 522K of AM1. When the search for AM1~AM3 is finished (18 channels totally) which means that the search from 522K to 1620K is finished, the first channel of FM1 then is picked up automatically and the previous stored channels are replaced.

3) TUNE+/TUNE- is used to search automatic or step by step manually.

   If you push the button shorter than 2s, it will search forward or backward automatically and pick up one when it is found.

   If you push the button until more than 2s, and push it step by step again to search forward or backward automatically and it won't switch to automatical model until one channel is found.

2. USB/SD/MMC Mode button function declaration

1) M1/ MP3
   Suspension control key
2) M2/STP
   Stop play songs,At this time click this button will not restore play;
   pressM1/II▶key to play from the very beginning
3) M3/RPT
   Repeat function switch button
   Repeat play the current songs
4) M4/RDM
   Random function switch button
   Random broadcast songs of the current album
5) M5/-10
   Move 10 songs down
6) M6/+10
   Move 10 songs up
7) TUNE-/TUNE+
   Next song/last song,adjust time; clock adjustment key

3. Other mode button function declaration

MODE switching and clock control key

1) Push the button shorter than 2s,it will switch among FM→USB→SD.
2) Push the MODE button until more than 2s for the first time, time appears.
   Push the MODE button longer than 2s when time appears to reset the time. Push TUNE+ to adjust hour upward and TUNE- downward when it is twinkling. Push MODE again to switch to Minute adjust model after you have adjusted the hour and the operation is the same with that of the hour.

Note: *Time can be adjusted even the switch of the radio is off.*

Front and right side switch panel

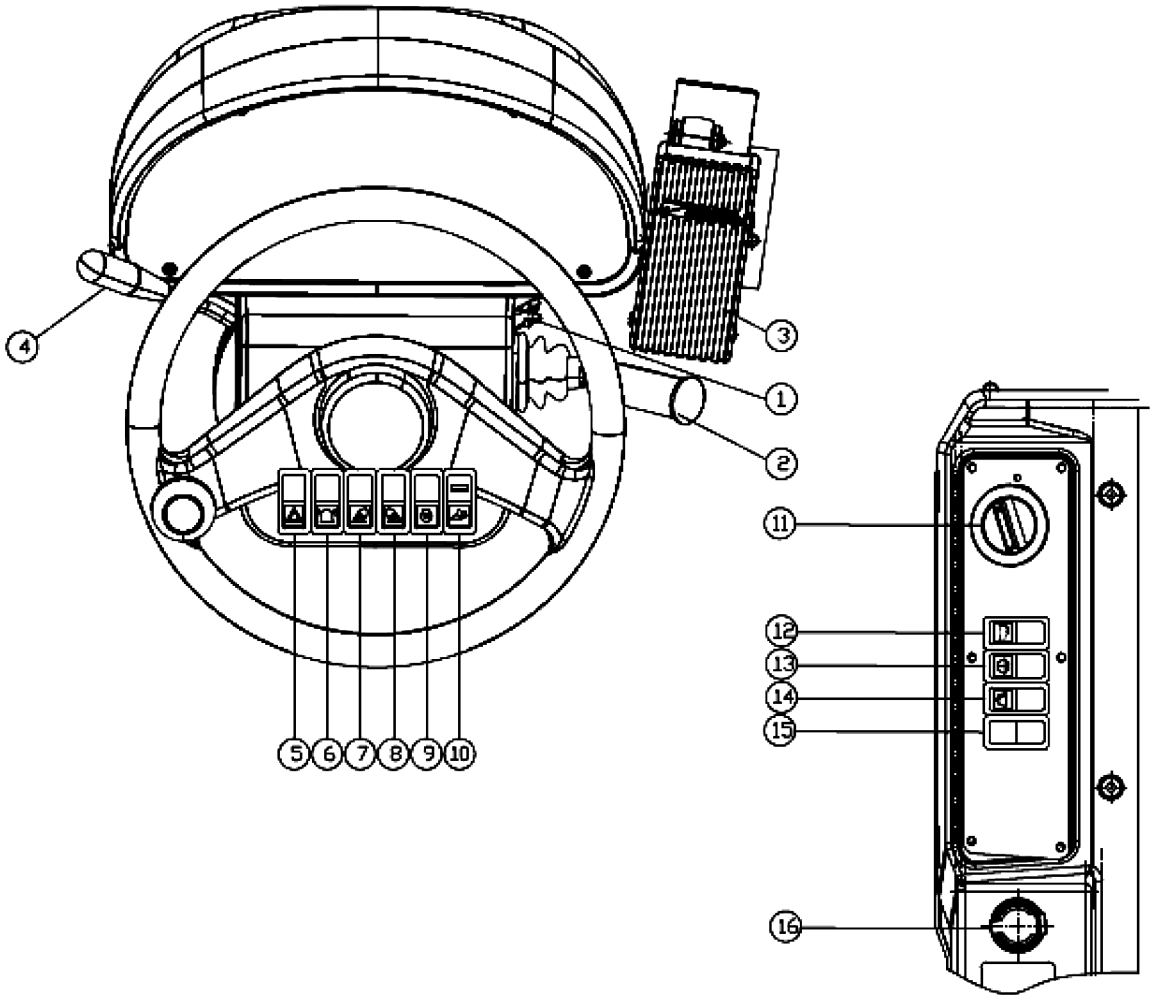


Figure 36

Reference Number	Description
01	Starter switch
02	Combine switch
03	Accelerate switch(Option)
04	Shift lever
05	Hazard Warning lamp switch
06	Rotating lamp switch
07	Front working lamp switch
08	Rear working lamp switch

Reference Number	Description
09	Fuel pumping switch
10	Pilot cutoff switch
11	Engine mode switch(Option)
12	Diagnostic switch
13	Wiper and washer switch
14	Wiper switch
15	spare
16	Power socket

1. Starting switch

A three-position starter switch is used to start or stop engine for equipment operation.

O. Turning switch to this position turns the engine “OFF” with its electrical system. In this position the engine is “OFF” but the interior cabin light is functional.

I. Turning switch to this position turns engine electrical system “ON”. When the switch is first turned “ON” all indicator/warning lights across top of the instrument panel, will light for approximately two seconds. The battery warning light and engine oil pressure warning light should remain “ON” after the others have turned “OFF”.

Moving switch to this position will crank engine. When engine starts, release key and allow it to return to “I” (ON) position. Do not operate the starter switch for more than fifteen seconds at a time. This will help prevent damage to starter.

Note: *Preheat Indicator Light -the operation of the preheat cycle depends on coolant temperature. When the engine coolant is cold enough, the preheat indicator light will remain “ON” until engine preheat cycle is completed. The preheat cycle takes about twenty seconds to complete, and the indicator light will turn “OFF”. When the light turns “OFF”, engage the starter.*

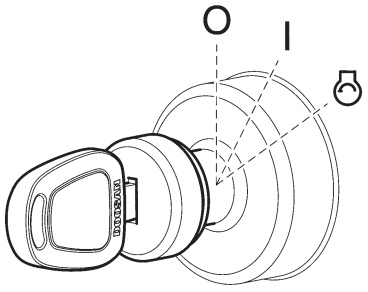


Figure 37

2. combination switch

A. Left Side Directional Switch - Pushing lever forward, activates left outside directional lights and directional indicator light on instrument panel.

B. Right Side Directional Switch - Pulling lever back, activates right outside directional lights and directional indicator light on instrument panel.

Note: *Turn signals will function with starter switch in "OFF" position.*

Figure 38

N.Neutral Position - Normal low beams.

C.Pull up 1st step - Momentarily turns "ON" both the low beams and high beams. (It returns to "NEUTRAL" position when released.)

D.Pull up 2nd step - The high beams turn "ON".

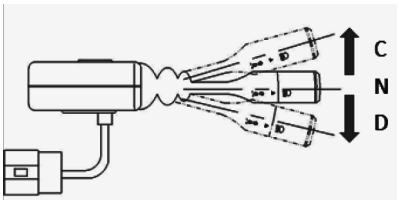


Figure 39

3. Accelerator pedal(Option For T-3engine)

Controls the travel speed of loader and working speed of load handling system.

Caution:

The further the pedal is pressed, the more engine speed increases. However, do not press the pedal more than necessary; otherwise it will increase fuel consumption, cause short life on the engine, and in the worst case lead to a serious accident.

Figure 40

4. Shift lever

Shift lever is located under the steering wheel.

Move the handle back and front, may operate gears "Forward I", "Forward II", "Reverse" and "Neutral" respectively.

Figure 41

5. Hazard Warning Light Switch

This warning light is used when the equipment is stopped because of a malfunction or when an emergency occurs. When this switch is pressed the directional indicator lights in front and back of the machine light up and flash, warning others in the area. At the same time the directional indicator lights on the instrument panel will turn “ON” to warn the operator. The hazard warning lights operate independent of the starter switch.

O. In this position, this switch turns “OFF” hazard warning lights.

I. In this position, this switch turns “ON” all turn signals and they flash simultaneously.

Note: *Hazard warning lights will function with starter switch in “OFF” position.*

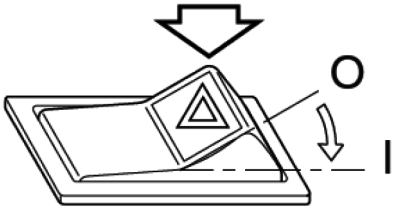


Figure 42

6.Rotating Beacon Light Switch

(Optional)

O. In this position, this switch turns “OFF” rotating beacon light.

I. In this position, this switch turns “ON” rotating beacon light.

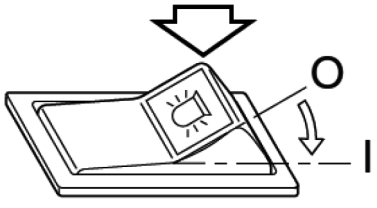


Figure 43

7. Front Work Light Switch

O. In this position, this switch turns “OFF” work lights mounted on the front top of cabin.

I. In this position, this switch turns “ON” work lights mounted on the front top of cabin.

CAUTION:

Do not turn “ON” the work light when traveling on public roads.

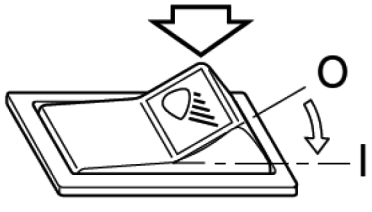


Figure 44

8.Rear Work Light Switch

O. In this position, this switch turns “OFF” work lights mounted on the sides of radiator.

I. In this position, this switch turns “ON” work lights mounted on the sides of radiator.

CAUTION:

Do not turn “ON” the work light when traveling on public roads.

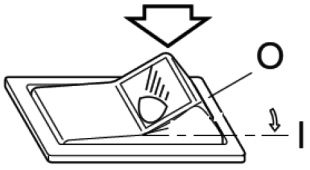


Figure 45

9.Fuel pumping switch(Option)

This switch is self return type;

When pressing the switch,the fuel pump will work and suck fuel from tank;

It can help the engine starting successfully more easily;

Figure 46

10.Pilot cutoff switch

O. In this position the operator cannot operate the pilot control valve lever (joystick).

I. In this position the operator can fully control the movement of the pilot control valve lever (joystick).

Caution:

When driving or parking, the pilot cutoff switch must be changed to “O” (OFF) position

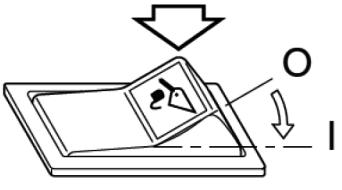


Figure 47

11.Engine mode switch(Option)

This economy mode switch allows the operator to select three type state to derated torque curve and droop. In the economy mode, fuel consumption is clearly reduced by utilising a reduced-power characteristic map for the engine. This is of benifit with gentle loading work.

Figure 48

12. Diagnostic switch(Option)

This switch is self return type;

It can clear the history of the fault error code of ECU when press one time;

Figure 49

13. Wiper and washer switch

O. In this position, this switch turns “OFF” windshield washer;

I. In this position, windshield washer fluid sprays onto the windshield .When released, the switch returns to “O” (OFF) position.

Caution:

The washer pump can be damaged if it is activated while there is no fluid in the tank.

The fluid level must be checked regularly and refilled as necessary.

Using soap or other solvents instead of the recommended washer can damage the wiper blades and the paint finish. Only use the recommended washer fluid or equivalent.

Figure 50

14. Wiper switch

O. In this position, this switch turns “OFF” windshield wiper mounted on windshield of operator’s cabin.

I. In this position, wiper work at slow-speed.

II. In this position, wiper work at high-speed.

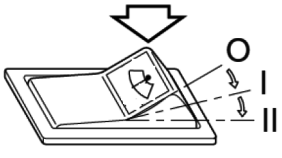


Figure 51

16. Power socket

This is a power socket for only 24V DC devices.

This socket can be used for charging a cellular phone or powering a small 24V DC electrical device.

Open the cap when using it.

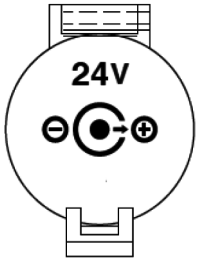


Figure 52

ADVICE FOR OPERATION OF NEW LOADER

All loaders were checked and adjusted before delivery from the factory. However, during the initial running-in process, you should still obey the following procedures, otherwise the equipment could be damaged or its performance degraded.

If perform the operation with full load before running-in period, it will produce adverse effect on the operation life and safety running, and cause accidents finally.

Note: *1) Check coolant, fuel, oil and hydraulic oil for leakage each day.*

2) Check lubrication oil every day and replace it if necessary.

3) Frequently watch the displays on dashboard and various instruments during operation.

4) Avoid the overload of engine.

5) Keep a load of 80% before engine and other components reaching their operating temperatures.

6) Pay attention during operation whether the working device is working normally

7) Check for the component loose or damage due to transportation.

8) Check the electric wires or terminals for not loose, the instrument for normal operation, and electrolytes for sufficiency.

9) Check Tire air pressure for normality.

Lubrication oil and filter element

1. Change engine oil and renew filter element after working for first 50 hours.
2. Change axle gear oil after working for first 100 hours.
3. Change the filter element in hydraulic oil line and renew filter element after working for first 250 hours.
4. Change transmission oil and renew filter element after working for first 100 hours.

Note: *Refer to "Inspection, Maintenance and Adjustment" on Page 4-1 of this manual for replacement of lubrication oil or grease.*

Running-in of the new vehicle

Running-in of the new vehicle plays an important role in extending the operation life, eliminating fault and hidden troubles, as well as avoiding major faults. After buying this machine, the user must perform the machine operation and maintenance according to the regulations on the running-in of new vehicles specified in this manual, and then you can normally use this machine.

Requirements on running-in of the new vehicle

1. The period for running-in of the new vehicle is 100 hours.
2. Start the engine and run at idle for 5 minutes.
3. During the running-in period, you should evenly arrange the running-in test for each gear of Forward Ⅰ and Ⅱ Reverse Gears.
4. Run the vehicle in a sequence at low speed (small power) first, and then at a high speed gradually. Except in emergency, you should avoid sudden start, acceleration, steering and abrupt braking.
5. It is appropriate to operate the vehicle with a load of loose materials during the running-in period, without too abrupt or too urgent actions. During the running-in period, the loaded weight should not exceed 70 % rated load,and the travel speed should not exceed 70% rated maximum speed.

6. Pay attention to the lubrication of the machine, change the lubrication oil and lubrication grease as per the specified interval.
7. You must pay attention to the temperatures of gearbox, torque converter, front/rear axles, hubs, parking brake, immediate supporting shaft, and hydraulic oil, cooling fluid, engine oil. Perform the troubleshooting if the overheat phenomenon is found.
8. Check bolt and nut of each component for the tightening.

Perform the following operations after 8 hours of running-in period:

1. Completely check bolt and nut of each component for the tightening. Especially you should check the following components one time: diesel engine cylinder head bolt, exhaust pipe bolt, and front/rear axle fixing bolts, rim nuts, propeller shaft connecting bolt, diesel engine fixing bolt, gearbox fixing bolt, front/rear frame hinged-type bolt.
2. Check fan belt, generator belt, A\C compressor belt for the degree of tightness.
3. Check gearbox oil level, driving axle and diesel engine oil levels.
4. Check the hydraulic system and braking system for the leakage tightness.
5. Check the connecting and fixing of each manipulating pull rod and throttle pull rod.
6. Check the temperature and connections of each component in electrical system, the status of generator power supplying and the working conditions of lamps and lighting as well as steering signal lamps.

Perform the following operations after expiry of running-in period:

1. Completely check bolt and nut of each component for the tightening. Especially you should check the following components one time: diesel engine cylinder head bolt, and front/rear axle fixing bolts, rim nuts, propeller shaft connecting bolt, diesel engine fixing bolt, gearbox fixing bolt, front/rear frame hinged-type bolt.
2. Check fan belt, generator belt, A\C compressor belt for the degree of tightness.
3. Check the hydraulic system and braking system for the leakage tightness.
4. Change the transmission oil in gearbox, and lubrication oil for driving axle.
5. Replace gearbox oil filter, diesel engine oil filter, filter element of diesel oil filter.
6. Wash return oil filter element in hydraulic oil tank .

Note: *Before changing gearbox transmission oil, driving axle lubrication oil and diesel engine oil, it is necessary to perform according to the related operation regulations.*

Operating machine

Before starting engine, check follows:

1. Check the engine coolant level.
2. Check the engine oil level.
3. Check hydraulic oil level.
4. Check the leakage tightness for each oil pipe, water pipe and each component.
5. Check battery connecting wires. If the connecting wires between battery and cables are found loosened, tighten them timely.
6. Check Tire air pressure for normality.

Start engine

1. Remove the obstacles along the driving direction; pay attention whether there is still repair man under the vehicle; except the driver can operate in the cab, nobody is allowed to stand at any position of the machine or sit in the cab.
2. Switch on the negative pole switch.
3. Get on or off the staircase according to the related regulations.
   The correct attitudes to get on/off the staircase (see Fig.1).
4. Adjust the rear-view mirror to have a good rear sight line, and approach the equipment as much as possible.
5. Close the cab left and right doors.
6. Check seat belt for abnormality, and tie the seat belt securely.
7. Check whether the shifting manipulating handle is at “Neutral” position; if not, please toggle it to “Neutral” position.
8. Check whether the manipulating handle is at the middle position. If not, please toggle it to the middle position.
9. Check whether the air flow switch for A/C system is at “O” position and the transfer switch at “O” position. If not, please toggle it to corresponding position.
10. Insert the key into electric lock and rotate clockwise one increment. Switch on power supply and hoot the horn to warn that this machine is to be started and that other persons are not allowed to approach this machine.

Figure 1

11. Check fuel quantity.
12. Slightly depress the throttle pedal, and rotate clockwise for another one increment to switch on diesel engine starter motor. The engine will be started to work within 10s. Now it is necessary to immediately release your hand to let the starting electric lock reset.

Note：*The time for one start should not exceed 15s (the continuous working time for the starter motor should not exceed 15s). If the engine cannot be started now, it is necessary to immediately release the starter switch and wait a little time (over 30s) and then re start the engine again. This is jointly determined by the characteristics of starter motor and the battery. If it cannot be started for 3 times continuously, it is necessary to search for the causes. The engine cannot be re-started until the faults are removed and three minutes later.*

13. The engine, after starting up, shall be warming up at the idle speed (600—750r/min). The full load operation cannot be started until the cooling water temperature of the engine is 55℃ and the hydraulic oil temperature is 45℃.
14. Listen to the engine at the low speed operation. Check the gearbox for abnormal sound and normal operation.
15. Check the instrument for normal operation and each lighting device, indicator, horn, wiper, braking lamp for normal operation.

Note : *Pay special attention to the indicated position for the engine oil pressure, which should not be less than 0.07MPa (at idle speed). If it is less than this value, it is necessary to stop the machine to check the engine for the faults.*

16. If it is in cold weather, you should heat the hydraulic oil. Toggle the bucket manipulating handle backwards and hold it for 4-5 minutes. Meanwhile, increase the throttle actuation to make the bucket limit stop against the arm and make the overflow of hydraulic oil, thus increasing the oil temperature in a quicker way.
17. Check service braking and Parking braking systems for the normality.

18. If there is no obstacle around the machine, it is necessary to slowly rotate the steering wheel and observe whether the machine has the actions for leftwards or rightwards rotation.

Operation of driving loader

1. Operate the manipulating handle and transfer the bucket backwards to the limit position; then raise the arm to the transportation position, i.e., the distance from the hinged point below the arm to the ground is about 500mm.
2. Depress service brake pedal and meanwhile press down the parking brake button to release the parking braking. Slowly release service brake pedal and observe whether the equipment is moving.

WARNING

If the machine moves on the flat ground, please immediately depress brake pedal and pull up the parking brake pedal handle to apply the braking. Check the shifting control system of this machine for the faults. If it is on the slope, please first use the wedge to stop the wheel to prevent the vehicle from moving, then check the machine again.

3 .Check whether the Neutral locking switch of the shifting manipulating handle is at “D”. If not, please toggle it to the position “D”;

4. Drive the machine to the flat ground. If the steering inspection is not performed due to narrow space during the operation in previous stage, now it is necessary to rotate the steering wheel. Check whether the machine can make a turning leftwards or rightwards.
5. Check service braking performance of the vehicle. Drive the machine at gear Forward I or II on the flat ground. First release the throttle pedal and smoothly depress the service brake pedal, then the machine can obviously slow down and stop.

Note : *If you depress the service brake pedal, but feel that the machine cannot obviously slow down, please immediately pull up parking brake handle to apply the braking. Meanwhile, operate the manipulating handle to lower down the arm to the lowest position, and tilt the bucket forward to make the bucket lip or knife edge insert in or go against the ground to force the machine to stop, thus ensure the security.*

6. Check the engagement states of each gear. Drive the machine to the flat ground. Check the gear shifting of the machine respectively with combination of each gear.
7. Steering operation of the machine:
   When the machine needs to turn due to the bend ahead in the driving direction, please perform the operation following the local traffic laws and regulation. At time when you are about to make a turn, you should first put the control handle of the steering lamp to the corresponding direction. When the combo switch handle is toggled forward, it is to turn leftwards, and when it is toggled backward, it is to turn rightwards. At this time, the steering lamps on corresponding side in front of or at the rear of the machine and the corresponding steering indicators on the panel will flash, indicating to the adjacent vehicles and pedestrians around that this machine will implement the steering operation. Then, rotate the steering wheel towards the side you want to make a turn, and the steering immediately begins.
   This machine adopts hinged-type full-hydraulic coaxial flow amplifying power steering. The steering wheel rotation angle is not equal to the machine's rotation angle. Continuously rotate the steering wheel to increase the rotation angle until to the required position. The quick the steering wheel rotates, the quick the machine rotates.
   The steering wheel cannot restore to original position after rotation, and the machine rotation angle is kept unchanged. Therefore, after the machine finishes the steering, you should reversely rotate the steering wheel to eliminate the relative angle between front and rear frames of the machine and make the machine drive along the straight direction. After completion of the steering operation, you should toggle the steering lamp to the middle position, and the steering lamp and the steering indicator will go off immediately.

When performing the steering at higher speed, you must release the throttle pedal and, if necessary, use service braking to decrease the machine speed and then conduct the steering operation so as to ensure the driving safety.

WARNING

Strictly prohibit conduct the steering operation on the slope. You should drive the machine down to the flat ground to perform these operations.

8. Braking operation of machine
   When the braking is needed for the machine, it is necessary to first release the throttle pedal and then smoothly depresses the service brake pedal. At this time, the braking can be applied.

WARNING

When the machine is driving at high speed, you cannot abruptly depress the throttle pedal to the bottom to prevent from the safety accidents or machine damage due to braking too suddenly unless in the emergency.

Parking of machine

1. Drive the machine to a flat field. Confirm that there is no risk of falling stones, landslip or flood.
2. Apply service braking to stop the machine.
3. Toggle the shifting manipulating handle to Neutral position.
4. Push parking brake handle to apply parking braking.
5. Operate the manipulating handle of working device to lower down the arm, and lay down bucket on the ground, then slightly press down the bucket.
6. Let the engine operate at idle speed for 5 minutes to dissipate the heat from each component.
7. After using ENGINE STOP button and making engine shut off, rotate electric lock key counterclockwise to “OFF” and cut off the power supply for the vehicle, then pull out the key.
8. Toggle each switch to middle position or “OFF”.
9. Close left and right doors, and get off the staircase according to the related regulations.
10. If you want to park the vehicle for a long time (e.g., for a night), it is necessary to open the battery box cover to toggle the power supply negative pole switch to SWITCH OFF.
11. If the machine is not added with anti-freeze solution when it is delivered from the factory, you should timely open all water valves after parking the vehicle in winter to drain out all cooling fluid in radiator of cooling system to prevent from frost crack. If the machine is added with anti-freeze solution when it is delivered from the factory, you should operate with reference to the description on the Anti-Freeze Fluid Label at the tail of the vehicle.
12. Lock up all equipments and take away the key with you.

Note: *Park the machine on the flat ground. If it is necessary to park the vehicle on the slope, please use the wedge to stop the wheel to prevent the vehicle from moving.*

If the machine needs to be stored for a long time, operate according to the following requirements:

A.Before storage

- Wash each part of the vehicle, dry and store in a dry warehouse. If the machine is only allowed to be stored in the open, it is necessary to park the machine on the concrete road surface where the drain is easy, and use the canvas to cover.
- Before storage, the fuel tank must be filled with fuel, and fill lubrication grease to each axis pin, drive shaft, and replace hydraulic oil.
- Put the shifting manipulating handle on “Neutral Gear” position.
- Pull up the handle of parking brake to apply parking braking.
- Put the bucket on a flat ground, and toggle the working device handle to the middle position.
- Toggle each switch to middle position or “OFF”, and lock all doors.
- Coat a thin layer of grease on the open part of the piston rod of the hydraulic cylinder.
- Remove battery from the vehicle, and store it separately.
- Air temperature decreases to below 0℃, add anti-freeze fluid into cooling water for engine, and make anti-freeze fluid able to access engine body and A\C system radiator. Or you can drain out the water in the cooling system. Pay attention that you should also drain out the water in the radiator of A\C system.
- After the machine is fixed, use frame-fixed bumper to fix the front and rear frames.

B. In the process of storage

- Start the vehicle once a month to operation each system, and fill lubrication grease to each movable axis pin, propeller shaft, thus lubricating each movable part. Meanwhile, charge the battery also.
- Wipe off the grease on the piston rod of hydraulic cylinder before starting vehicle.
- Coat the anti-rust agent on the easily corrosive part.

Note: *If the anti-rust agent is used in the room, it is necessary to open the door and window to remove toxic gases.*

C. After storage

When the machine is stored for long time, you must operate as follows:

- Replace the lubrication oil and hydraulic oil as well anti-freeze fluid in engine, gearbox, driving axle.
- Fill lubrication grease to each movable axis pin, propeller shaft.
- Wipe off the grease on the piston rod of hydraulic cylinder before starting vehicle.

OPERATION OF LOADER

Preparation before operation

Before operation, first use this machine to level the working site, remove the protrusions, fill and level up the pits, shovel the surface of wet ground, clear large and sharp stones on the site to prevent from scratching Tires.

If you want to use this machine to load the materials onto or unload them from the truck or hopper,you should adjust the limit height of the arm limiting device to make the bucket of the loader able to safely access the truck or hopper, and to prevent the truck or hopper from being damaged due to the impact by materials because the unloading height is too high.

General technologies

●Common shoveling and loading method

Common shoveling and loading method is suitable for shoveling and loading of loose materials.

The loader travels at a speed of Gear 2 to approach the materials, and align the bucket middle portion to the materials. The driver holds the steering wheel with left hand and operate, with right hand, arm control lever to lower down the arm to a height 500 mm above the ground.

When the machine is 1 meter away from the stock pile, then lower the arm to make it contact with the ground and change machine's Gear Forward II into Gear Forward I.

Note: *When the bucket touches the ground, you should prevent the bucket from producing excessive force on the ground and inducing unnecessary resistance for the advance. Meanwhile, the front and rear frames of the loader should be laid straight, and there shall be no included angle between front and rear frames.*

Depress the throttle pedal to make the bucket fully insert into the stock pile. When the machine could not advance further, the driver toggle backwards the bucket manipulating handle to move the bucket backwards and then push the bucket manipulating handle back to the middle position. At this time, the machine will continuously insert into the stock pile and repeat such insertion and retraction of the bucket until the bucket is full with materials.

●United shoveling and loading method

United shoveling and loading method is suitable for shoveling and loading of hard or stickier materials. The operation before the bucket is inserted into the stock pile is the same with that of common shoveling and loading method. When the bucket is inserted into the stock pile and the machine could not advance further, the driver toggle backwards the bucket manipulating handle with right hand, and then toggle back to the middle position to move the bucket upwards and the bucket thus insert forward a distance. And then the driver toggle rightwards the bucket manipulating handle, and then toggle back to the middle position to rotate the bucket rightwards and the bucket thus could continuously insert forward. Repeat such insertion, lifting, re-insertion and retraction of the bucket until the bucket is full with materials.

●Exit from stock pile

After the bucket is full with materials, the driver should operate the bucket manipulating handle to rotate the bucket backwards until the bucket's stop dog touches backing plate, and then toggle the manipulating handle back to the middle position. You can thus get the maximum bucket retraction angle.

Lift the boom to a certain height so that when the machine retreats, the bucket can avoid the stock pile. The driver holds the steering wheel with right hand and toggle, with left hand, the manipulating handle back to the Gear Reverse position to operate the machine to retreat.

After the machine retreats from the stock pile, the driver operate the arm control lever to lower down the boom to a height of 500 mm above the ground.

●Transportation of materials

Transport materials with the loader in following conditions:

1) The heavy-duty truck cannot be used for transportation due to the road surface is too soft or the site is not leveled.
2) The heavy-duty truck is not economical for transportation over such a short distance (The handling distance is within 500 m).

During handling, the boom lower hinged point should be kept at the transportation position (500 mm above the ground), and the bucket should be rotated backwards to the limit position (the limit stop on the bucket touches the boom)othus ensuring a smooth and safe handling, not easily scattering the materials.

The vehicle speed for handling is determined according to the handling distances and road surface conditions. When the machine is crossing the pits or juts, you should release throttle pedal. You can use service braking to conduct “snub” if necessary, to reduce the machine speed to slowly go across the obstacles, thus reducing the impact on the machine and material scattering.

WARNING

Prohibit lifting the bucket to a higher position to conduct the transportation operation; otherwise it will cause the tip-over of the machine

●Unloading

1) Unloading the materials to truck or hopper

When the loader with full materials is 15m away from the truck or hopper, you should release throttle pedal. You can use service braking to conduct “snub” if necessary, to reduce the machine speed to slowly approach the truck or hopper. Meanwhile, the driver shall toggle the boom manipulating handle backwards to the limit position. At this time, the driver can release hand and the handle will not return back to the middle position under the force of magnet. During this process, the driver shall be careful for driving the machine and closely watching the approaching of the bucket to the truck or hopper, not causing the collision of the bucket and the truck or hopper.

When the bucket is located right above the truck or hopper, the driver shall depress the brake pedal to make the machine stop. Then, push the bucket manipulating handle forward to make the bucket tip-over forward to dump the materials into the truck or hopper. Here, the driver shall closely watch the movement of the bucket, not causing the collision of the bucket and the truck or hopper edge. If the material is stickier, it is necessary to repeatedly push the bucket manipulating handle back and fro, to make the bucket limit stop repeatedly impact the boom, making the materials attached onto the bucket fall off.

If the length of the vehicle body is two times as width of the bucket, the unloading operation shall begin from the front portion of the vehicle body.

During unloading, the impacting force of bucket limit stop and the arm shall not be too large, and the impacting times shall not be too many to avoid the damage to the machine.

After completion of unloading, the driver shall toggle the bucket manipulating handle backwards to the limit rear position. The driver release hand and the bucket will automatically return back to the middle position. Then, the driver shall toggle the shifting manipulating handle to the retreat position, and then release the brake pedal to make the machine leave the truck or hopper. When the machine is leaving the truck or hopper, the driver shall be careful for driving the machine and closely watching the approaching of the bucket to the truck or hopper, not causing the collision of the bucket and the truck or hopper. After the bucket fully leaves the truck or hopper, the driver can lower the bucket while driving to prepare the next operation cycle.

Figure 3

2) Unloading at lower position

When performing the materials handling between sites, the unloading at lower position is needed some time, i.e., the bucket unloads the materials at a place with lower height from the ground.

Here, after completion of unloading, it is necessary to rotate the bucket backwards to horizontal position, and then conduct the operation of lifting the arm. Otherwise, it is possible unable to lift the arm because of the interference from the link internal mechanism of the working device.

- **Handling by pushing**

  With bucket flatly close to the ground, put the shifting manipulating handle at Gear Forward I and depress the throttle pedal to push forward. During the pushing process, if some obstacles are found to hinder the advance of the vehicle, it is possible to slightly lift the arm to advance continuously. The operation of lifting or dropping of the arm shall be performed between the lifting and dropping the control lever (not to toggle to either lifting or dropping position) to ensure the pushing handling operation can be accomplished smoothly.

- **Scraping**

  Lift the arm and make bucket tip-over until the knife plate touches the ground. The included angle between the knife plate and the ground shall be kept to be about 60 º. For the hard road surface, the arm control lever shall be put at the Float position; while for the soft road surface, it should be put to the middle position. Toggle the shifting manipulating handle to the Retreat gear, depress the throttle pedal to make the machine retreat, and use knife plate to scrape the ground surface.

- **Traction**

  It is possible to equip 20 ton trailer to perform traction transportation. The method is as follows:

  1)Connect securely the trailer to the traction pin of this machine.

  2)Trailer should equipped with good braking system

  3)Put bucket at “Transportation” position.

  4)Smoothly execute the starting and stopping operation of the vehicle, and pay attention to apply the braking before going down the slope.

  Note: *When executing the braking, it is necessary to first apply braking for the trailer, and then for this machine.*

Operation method

● V-type operation method

Loader is dead against stock pile, and the included angle between truck and loader driving direction is 60 º, and it stops at a place 12-15m away from the stock pile. When the loader is fully loaded, it will retreat directly back to the place 12-15m away from the stock pile. It can make turn while driving, and lifting the bucket simultaneously. After unloading, it will retreat to the original place to perform the next shoveling and loading operation.

● Shuttling operation method

The Shuttling operation method is mainly used for the united operation between loader and fleet. When the loader is fully loaded, it will retreat back to the place with a distance of 2-3 times of the truck width. Then, one truck travels from one side of the loader to be in front of the loader and stops, and then the loader travels further forward and lifts the arm. After unloading, the loader retreats back to the original place. If the truck is not fully loaded, the truck will travel forward another truck space. After the loader accomplishes the next shoveling and loading operation, it will retreats to the original place, and the truck which has not been fully loaded then retreats to be in front of the loader, and the loader will perform the unloading. In this way, repeat the operations until the truck is fully loaded, then start the loading and unloading for the next truck. This operation method requires the loader driver and the truck driver to cooperate skillfully. They can use horns, lights or gesture to communicate if necessary.

Operation in cold weather

Matters needing attention in cold weather:

If the ambient temperature is too low, the engine will be started difficultly and the radiator may be frozen. Therefore, you should obey the following instructions:

1. When the environmental temperature is below 6 ℃, you should wait for about 8 or 10 minutes after you turn on the starting switch, and then start the engine

Figure 4

2. Use low-sticky fuel, hydraulic oil and lubrication oil, and add the anti-freeze fluid into the cooling water.
3. Matters needing attention for anti-freeze fluid
   - Do not use anti-freeze fluid containing methanol, ethanol, propanol.
   - Absolutely no use of any leakage proof water aqua, no matter whether it is used separately or together with anti-freeze fluid.
   - Do not mixedly use anti-freeze fluids with different brands.
   - When changing anti-freeze fluid, please refer to the description on the Anti-Freeze Fluid Label at the tail of the vehicle.

   Note: *Keep the anti-freeze fluid away from flame, and do not smoke when filling anti-freeze fluid.*
4. Matters needing attention for battery:
   - When the ambient temperature is decreased, the battery capacity will also decrease. If the charge rate of the battery is low, the electrolytes may be frozen. Therefore, it is necessary to keep the rate as close to 100% as possible and perform the heat preservation as possible so that the engine can easily be started up the next day.
   - Use chill-proof battery in severe cold district

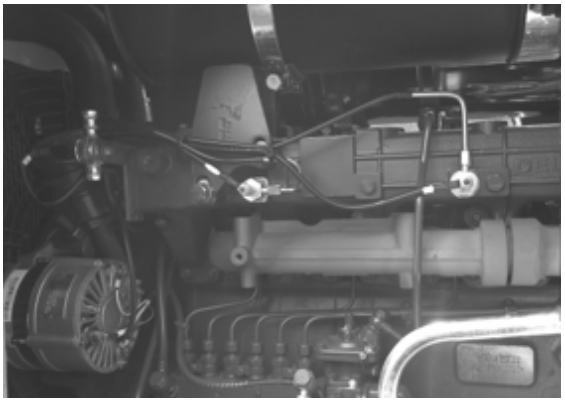


Figure 5

In order to prevent the vehicle from being not started next day due to the congelation of sludge, water or snow stuck on the machine, the following work must be done after completion of the operation each day:

1. Thoroughly remove sludge, water or snow stuck on the machine to prevent from them entering the seals to impair the seal performance.
2. Park the vehicle on the dry hard ground. If not possible, park it on the plank. Using plank may prevent the vehicle from being frozen onto the ground. This is convenient for the start of the vehicle next day.
3. In low temperature conditions, the battery capacity will decrease as the storage time of the vehicle increases. So it is necessary to cover the battery or remove it to a warm place and reinstall it before operation the next day.

After the cold weather and when it is warmer, you should perform as follows:

1. Replace with proper-sticky fuel, hydraulic oil and lubrication oil for all components.
2. If the permanent anti-freeze fluid was not used, it is necessary to fully drain out the water in the radiator, clean the radiator, and replace the cooling water.

OPERATION UNDER SPECIAL CONDITIONS

Operation under extreme cold conditions

If the machine is working in extremely cold weather, it is necessary to adopt protective measures to guarantee the normal operation. The following detailed inspection can ensure the machine to work normally in cold temperature.

1. Check whether the cooling system has used proper anti-freeze fluid under extreme low temperature. Carefully check cooling system and record the leakage situations.
2. Keep the battery fully charged to prevent from freezing. If you add water into the battery, run the engine for at least one hour to make it mixed with electrolytes.
3. Keep the engine in the optimal conditions to realize the easy start and operation in unfavorable weather.
4. Select proper engine oil according to the temperature. For more information see “Lubrication and specifications” in Engine Manual.
5. Ensure the fuel tank is fully filled with fuel at any time. Drain out the condensates in the fuel tank before operation. Check fuel tank the filter element, drain out the condensates in it (e.g., wax-like substance), and ensure the freezing point of the used oil is lower than the lowest ambient temperature.
6. Perform the full lubrication for the machine according to the instructions in Section 4 of “Maintenance Period Chart” and to the lubrication diagram attached on the machine.

7. Start the engine to make it reach the normal temperature before working with load.
   A. When the machine is in idle state, if the mud and ice are attached on the running components, please heat to melt the frozen substances.
   B. Be careful to operate the hydraulic components until they reach the temperature at which they can normally work.
   C. Check all machine control device and/or functions to ensure the normal operation.
8. Put a backup external air filter in the cab to replace the frozen components in case.
9. Perform auxiliary startup in cold weather, see Section “Start in Cold Weather” in this Manual.
10. In order to prevent from icing, remove all mud, snow and ice. If possible, use canvas to cover the machine, and prevent the canvas edges from being frozen onto the ground.

Operation under high temperature conditions

Operating the machine continuously under high temperature may cause overheat of the machine. Monitor the engine and gearbox temperature if necessary, and stop the machine to cool it down.

1. Frequently check and maintain the fans and radiator. Check the coolant level for the radiator. Check whether the radiator fins are accumulated with dust, sands or insects etc which blocks the cooling pipeline.
   A.Under high temperature, the dirt is generated more quickly in the cooling system. Change the anti-freeze fluid each year to keep the preservative function.

2. Regularly flush the cooling system, if necessary, to keep the cleanness of the pipeline. Avoid using the water containing high Alkali, otherwise, the dirt will be generated more easily. Check electrolytes level every day. Keep proper electrolytes level to prevent from damaging the battery. In high temperature environment, use weaker electrolytes. Dilute the electrolytes with a specific weight of 1.280 into one with a specific weight of 1.200-1.240, and fully charge it. Whenever the specific weight of 1.160 reaches, it is necessary to re-charge the battery. If stored under high temperature for a long time, the battery will self discharge quickly. If the machine stops for several days, please put it in a cool place.

WARNING

Do not store acidic batteries near tires, because the acidic gases will be harmful to rubber.

3. Check fluid level before oil filling. High temperature and cooling will cause the concentration varying of the fluid in the reservoir.
4. Perform the full lubrication for the machine according to the instructions in Section 4 of “Maintenance Period Chart” and to the lubrication diagram attached on this machine.
5. Do not store the machine in the sun for a long time. Put the machine under the covering to prevent sun, dirt or dust.
   A. If there is no appropriate covering, please use canvas to cover the machine. Prevent dust from entering engine, gearbox, and hydraulic system.
   B. Under the high temperature and wet weather, all parts of the machine will be corroded, and they will be more easily corroded in rainy season. The metal surface will be rusted and paint blistered, and other surfaces will have speckles.
   C. Coat the anti-corrosive lubrication oil onto unpainted or naked surface. Use insulation mixture to protective wires and terminals. Use paint or proper anti-rust materials on the damaged surfaces to prevent from being rusted or corroded.

Operation in the dusty or sandy area

Dust will be produced in most places during operating machines. However, you must adopt the preventive measures in severely dusty or sandy places.

1. Keep the cooling system and cooling area clean. You can use compressed air to purge them for cleaning, and shall adopt this measure as much as possible.

WARNING

Wear protective goggles when using compressed air.

2. When maintaining the fuel system, you must be careful to prevent dust and sand from entering the oil way.
3. Frequently maintain air filter, check air control indicator everyday, and keep dust cover and dust screen clean. Prevent dust and sand from entering engine parts and components as much as possible.
4. Perform lubrication and maintenance according to the lubrication diagram attached on the machine and to the instructions in Section 4 of “maintenance Period Chart”. Clean all lubrication oil connectors. The mixing of sand and lubrication oil will cause the wear and expedite the wear of parts.
5. Keep the equipment clean as much as possible. Put the loader under the shed to prevent the machine from being impaired by sand or dust.

Operation under rainy weather

Advice for operation under rainy weather is the similar to the under high temperature conditions.

1. Coat lubrication oil onto all naked surfaces. Be especially careful, as early as possible, for the damaged or unpainted surfaces. Coat lubrication oil on the damaged paint surfaces to prevent from being corroded.

Operation in brine

The brine and sea wave are highly corrosive. When the equipment is working in brine, pay attention to follow items:

1. When the equipment is corroded by brine, immediately use clean water to wash and dry it completely.
2. Spread lubrication oil on the surface which contacts to brine. Pay especially attention to the damaged paint surface.
3. Timely refit the damaged paint surface.
4. Perform lubrication according to the lubrication diagram attached on the current machine and to the instructions in Section 4 of “maintenance Period Chart”. The equipment working in brine environment should shorten lubrication interval.

Operation at high altitude area

Normally, the operation at high altitude area is the same with that under low temperature conditions. Before operating at high altitude area,you must perform the necessary adjustment on the engine according to the related engine manual.

1. Measure the working temperature of the engine and check the engine for overheat. The radiator must be strictly sealed to prevent the coolant pressure from being released.

On the last page of Operation Under Special Conditions,insert

Working in Water

After working in water, lubricate all lubrication points on front and rear frames which have been under water so water is removed.

The water depth is an important factor to take into consideration when the machine is working in swampy areas. Do not enter water whose depth exceeds the machine's minimum ground clearance height or is high enough to wet the bottom of the axle housing.

As a rule of thumb, the allowable water depth is about 400mm (16 inches).This means that the machine should not be used in a river.

Observe the following conditions:

1. Check the water depth in advance when crossing across a river.
2. Use the same precautions before crossing across a swampy area.
3. Do not enter rivers whose riverbed in steep or has a rapid flow.

WARNING

Avoid use of the loader in salt water .salt water will cause the development of rust which will shorten the life of loader.

Inspection, Maintenance and Adjustment

The maintenance and inspection of the equipment are necessary in order to keep the equipment working in normal conditions. The time interval, each system and components position and inspection method are listed as follows:

Note: *The following items list the content and time interval for the maintenance and inspection. The maintenance period may be shorten depending on actual conditions. The extreme heat or dirty environment is needed to be maintained more frequently. For maintenance period, refer to the engine working time shown on the cluster display of the console in cabin. (Fig.1)*

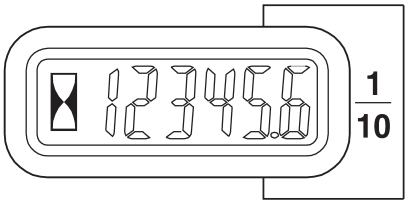


Figure 1

Series No.

There two Series NO plate attached on the body of the loader. The main Series NO. plate is positioned in the front of the front frame. (Fig.2) The engine Series No is stuck to the left of the engine body and above the oil sump. Other descriptions related the engines are positioned on a label on the cylinder head. (Fig.3)

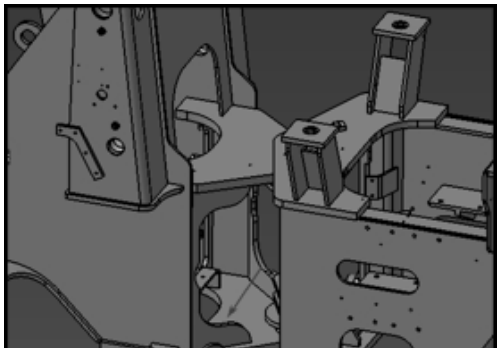


Figure 2a

Note: *These numbers and their positions are very important to the maintenance at any times during Warranty period.*

Figure 2b

Safety instructions

1. In order to prevent some accidental operation during maintenance, you must first identify the hydraulic system control level be positioned in the middle and hang the Warning mark (warning sign).
2. Confirm that the overflowed liquids are thoroughly cleared, especially those liquids around the engine.
3. Check all fuel pipeline for the tightening of joint, pipeline, fuel filter, and O-ring seal.
4. If it is needed to start engine for check or experiment, ensure that all irrelevant personnel have left and that the operation shall be performed according to the standard.

PREPARATION AND SETTING OF THE EQUIPMENT BEFORE MAINTENANCE

Park the vehicle as the following requirements before performance of maintenance according to the regulations in this manual.

Note: *Some special maintenance requires the machinery has different parking mode. However, after completion of maintenance, the machine must be reset to the following positions.*

1.Park on the hard plane.
2.Put the Bucket on the ground.
3.Switch off the engine and pull off the key
4.Put the control lever at middle position

WARNING

Especially be careful for running the engine during the maintenance. When the engine is running, let one person always stand in the cab without leaving.

5. Before starting work,hang a warning sign “Do Not Touch When Performing Inspection Or Maintenance” on the cab door or on the working pole.

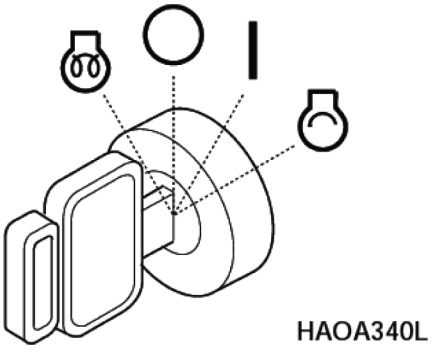


Figure 3

RECOMMENDED LUBRICATION TABLE

KEY POINT

Do not use un-recommended lubrication oil. Do not use unapproved products.

Note: *Refer to maintenance time interval table to make lubrication for the specified positions.*

Matters needing attention on lubrication

- The oil must be cleaned and the diesel oil must be sedimented for 72 hours; hydraulic system cleanness must meet the requirements from 18/15(GB/T14039-93) or NAS10 (American Standard), otherwise, the failure of the hydraulic system or pump excess wear will be caused.
- The oil filling device and oil position must be clean.
- The machine must be kept to be horizontal during inspection of oil flow.
- For oil filling of front and rear axles, you should fill the oil into the oil filler on the left hub and the right hub, the oil filling quantity is subject to the overflow at the oil level plug of the axle.
- Oil filling for the transmission: Fill oil into oil filling pipe of the transmission. After start the engine 5 minutes, keep engine at idle speed , check the oil level must be between the L and H level on the dipstick.
- Filling of hydraulic oil tank: Open the cover of hydraulic oil tank, and fill oil into the tank. When the oil level reaches 10-15 on the tank scale label, this indicates the oil in the tank is to be about full; if this is the first time to fill oil into hydraulic oil tank, you should start the engine to run for 5 minutes, then check the oil level again.
- Do not mix using, replacing of various kinds of oils, otherwise it will cause aging and ineffectiveness of rubber parts and the premature wear of the parts.

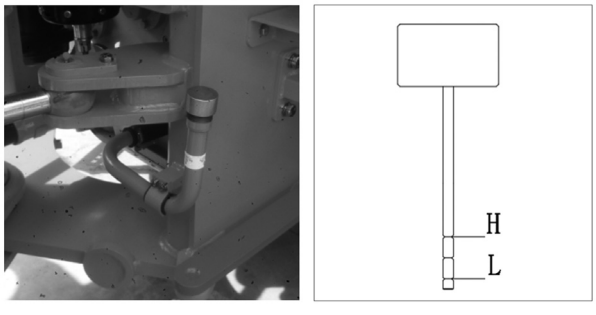


Figure 4

See following table for oil varieties and brands

Classification	Name		Application location
Lubrication grease	#3 molybdenum disulfide Lithium-based grease		Various rolling bearing, working device axis pin for rolling bearing, frame pin for steering cylinder axis pin, propeller shaft spline of sub-frame pin, and water pump
Torque converter oil	Engine Oil : SAE15W40 *Do not mix with other oils. *It is filled with engine oil when delivery.		Torque converter, power shift gearbox
Hydraulic oil	HM46(Summer)	HV46(Winter)	Working device hydraulic system and steering hydraulic system
Engine oil	CF 15W/40(Summer)	CF 5W/40 (Winter)	Diesel engine
Engine fuel	#35 light diesel oil		Diesel engine
Gear oil	GL-5 85W/90 heavy load vehicle gear oil		Main transmission and hub reduction inside the axle
Brake fluid	Mobil DOT3		Brake system

KEY POINT

Do not mix different brands of oil varieties from different companies. Our company disapproves to use other brands of oil varieties. If you must select other brands of oil varieties, the oil specification shall meet or exceed the standards we specified.

We use the oils from the specified excellent factories when the equipment is delivered.

But for the hydraulic oil temperature fluctuations every day and every week, or when it is operated below 0℃ air temperature, please select the lubrication oil with a lighter specific weight. The best recommendation is to select lubrication oil according to the air temperature conditions.

FLUID CAPACITY

Item		Size
Engine	Crankcase(Engine oil)	14L
	Cooler system	28L
Fuel tank		155L
Hydraulic oil Tank Capacity		123L
Gearbox system		42L
Front axle /Rear axle	Axle housing assembly	10L
	Hub wheel assembly	4.5L/ Edge

LUBRICATION OIL & MAINTENANCE CHART

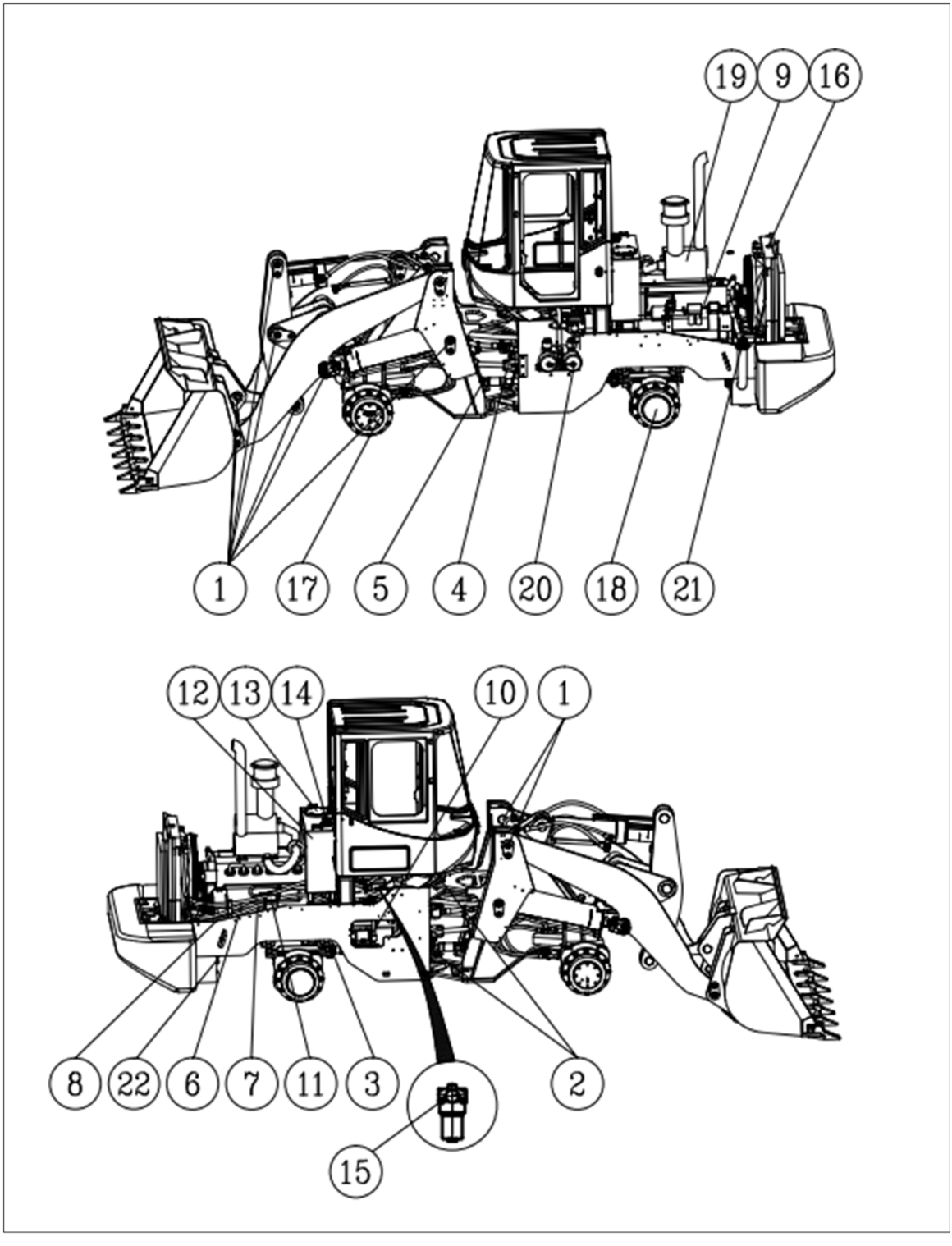


Figure 5

Maintenance period

No.	Items To Check	Service	Qty	Service Interval（h）						
				10	50	100	250	500	1000	2000
1	Front Joint Pin	Grease	13	V						
2	Articulation Pin	Grease	2	V						
3	Stabilizer pin	Grease	2	V						
4	Steer Cylinder	Grease	4	V						
5	Shaft Bearing	Grease	13	V						
6	Engine Oil	Engine Oil	14L	V	F			●		
7	Engine Oil Filter	Cartridge	1		F			●		
8	Fuel Pre-Filter	Cartridge	1					●		
9	Fuel Filter	Cartridge	2					●		
10	Transmission	Engine Oil	42L	V		F		●		
11	Transmission Filter	Element(Primary)	1					C		
		Element(fine)	1			F		●		
12	Hydraulic oil Tank Capacity	Hydraulic Oil ISO #46	123L	V						●
13	Oil Tank Return Filter	Element	1				F		●	
14	Oil Tank Breather Filter	Element	1						C	
15	Pilot Filter	Cartridge	1				F		●	
16	Radiator	Coolant	28L	V						●
17	Front Axle	Gear Oil	19L	V		F			●	
18	Rear Axle	Gear Oil	19L	V		F			●	
19	Air Filter	Element (Outer)	1		C			●		
		Element (Inner)	1					●		
20	Brake Pump	Brake Oil	2.8L	V				●		
21	Fuel Cap Filter	Element	1				C			
22	Fuel Suction Filter	Element	1				C			

V: Maintenance and Fill	Grease	NLGI-3 or NLGI-2
C: Cleaning	Engine Oil	API: CF-4, SAE: 15W40
F: First Time Exchange Only	Transmission Oil	#8 T/M OIL
●:Replacement On Every Interval	Gear Oil	API: GL-5, SAE: 85W/90
NOTE: For additional service items see list of“Maintenance Intervals” on page 4-9,4-10.	Hydraulic Oil	ISO: VG46, HV46
	Coolant	50% Water + 50% $(HOCH_2)_2$
	Brake Fluid	DOT 3

Maintenance items
10 hours/routine maintenance
●Visually check around the machine for informalities or oil leakage.
●Check the engine and transmission oil level.
●Check hydraulic oil level.
●Lighting and instrument
●Check tyre for damage and wear patterns.
●Gunning grease into drive shaft
● Gunning grease into front/rear frame articulated point, rear axle swinging rack, intermediate bearing and other bearings.
●Drain water from air reservoir each day.
●Check the brake pipe and make sure no air and fluid leak.
● Check oil level of the brake pump (from 1/2 to 2/3 of the full capacity of recommended) and the quality of the brake fluid (turbid or pollutional)
50 hours/weekly maintenance
●Tighten the connecting bolt for front/rear drive shaft.
●Clean the outer element of the air cleaner.
●On first 50th hours working day, change engine oil and the filter of the engine oil. From then on, repeat this operation every 500 hours.
●Check and adjust the parking brake system if necessary.
100hours/half-monthly maintenance
●Clean engine cylinder head and torque converter cooling device.
●Check battery liquid level, and coat a thin layer of vaseline.
● On first 100th hours working day, change transmission oil and the element of the fine filtration. From then on, repeat this operation every 1000 hours. Every time to replace the transmission oil, clean the primary filter element; If the element cannot be cleaned up, please replace it.
● On first 100th hours working day, change front/rear axle gear oil. From then on, repeat this operation every 1000 hours.
250 hours/monthly maintenance
●Check tightening torque of fixing bolt of rim.
●Check oil level of front/rear axle.
● Check load-carrying welds and fixing bolts of working device and front/rear frame for cracks and looses.
●Check compressor belt and generator belt for loose and damage.
●Check and adjust service brake and parking brake system.
●On first 250th hour working day.change pilot filter element and hydraulic return filter.From then on,repeat this operation every 1000 hours.

Maintenance items
500 hours / quarterly maintenance
●Tighten the connecting bolt between front/ rear axle and frame.
●Replace engine diesel oil filters.
●Clean the oil filling and oil sucking filtration screen of fuel tank replace fuel filter.
●Replace the outer and inner element of the air filer.
● Check and wash the seal components of the booster pump and replace the brake fluid of the whole loader.(When replace the brake oil, the air must be exhausted from the brake system)
● Check the wear conditions of the friction plate of the service brake and that of the brake drum and brake shoe of the parking brake.
Every 1000 hours/half-yearly maintenance
●Inspect various temperature gauges and pressure gauges.
●Check the tightening of engine exhaust pipe.
●Check engine operation
●Replace the oil return filter element, breather and pilot the filter element of the hydraulic oil tank.
Every 2000 hours/yearly maintenance
●Replace hydraulic oil, clean oil tank and oil sucking filter screen, and check oil sucking pipe.
● Check service braking and parking braking operations. Disassemble and check the wear of friction lining if necessary.
●Check the tightness of distribution valve and working cylinder by measuring the natural sediment.
●Check flexibility of the steering system.
●Replace the Coolant of the radiator and cooler piping

WORKING HYDRAULIC SYTEM (pilot control) : HL635V

Working hydraulic system is used to control the actions of working devices such as arm and bucket in loader. The whole working hydraulic system is mainly composed of: hydraulic oil tank (with oil return filter), gear pump, main control valve, boom cylinder, bucket cylinder, control lever and leveling system.

Operation principle of working hydraulic system

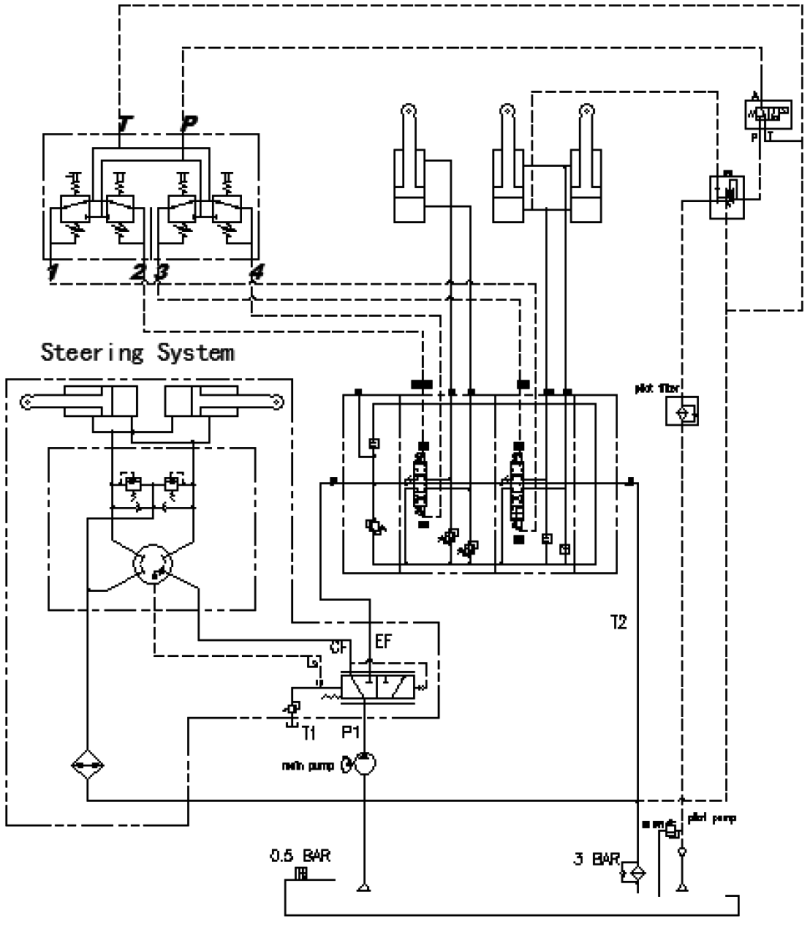


Figure 6a HYDRAULIC CIRCUIT (pilot Control system)

- When working device does not work, the oil from priority valve will pass through middle portion of the main control valve and return from the return port of main control valve to the oil tank.
- When the working device needs to actuate, Operate the control lever of the bucket, and the oil from priority valve will pass through the working oil port of the main control valve and, depending on the position of the bucket spool, enter the big chamber or small chamber of the bucket cylinder, able to realize the tilting of bucket. Operate the control lever of the arm, and the oil from priority valve will enter the working oil port of the main control valve and, after passing through bucket spool, and depending on the position of the boom spool, enter the big chamber or small chamber of the arm cylinder, able to realize the lifting or dropping of arm.
- When the external load exceeds the working capacity of the system, or when the working device moves to each limiting positions and the system pressure rises up to the set pressure of the system, the relief valve of the main control valve will open and the high pressure oil will return to tank through relief valve. At this time, the hydraulic system will heat and energy consumption is greater.

Introduction to main elements of working hydraulic system:

- Main control valve:
- Model DVS20
- Pressure setting of relief valve…..……...16.5MPa
- Overload valve pressure of bucket small chamber…….... 18.5MPa
- Overload valve pressure of bucket big chamber… …….....18.5MPa

The main control valve is a pilot operated, integrated, serial-parallel, duplicated valve, and is mainly consisted of valve body, boom slide valve, bucket slide valve, main relief valve, bucket small chamber overload valve, and all kinds of check valves. The oil inlet passage for boom slide valve and bucket slide valve is a serial structure, with the bucket slide valve having the priority. When the bucket slide valve is working, the boom slide valve cannot work at the same time. However, the oil return passage for boom slide valve and bucket slide valve is a parallel structure, i.e., both slide valves can realize the oil return at the same time. The bucket slide valve is a 3-p-6-w slide valve, including bucket unloading, neutral and bucket retracting positions (totaling to 3 positions). The boom slide valve is a 4-p-6-w slide valve, including boom lifting, neutral dropping, and float dropping positions (totaling to 4 positions). Moreover, the bucket slide valve also has bucket big chamber overload valve and bucket small chamber overload valve.

When bucket slide valve of the main control valve is at Middle position, the overload valve connected to the bucket oil cylinder big/small chamber will limit the maximum pressure inside the bucket oil cylinder. When external force exerts on the bucket oil cylinder, and if the pressure inside the cylinder is higher than the pressure setting of the overload valve, the overload valve will open to connect the pressured chamber to oil tank to realize the oil return, and the piston of bucket oil cylinder will move immediately to prevent the system elements from being damaged from high oil pressure.

The interior of bucket valve and boom valve is installed with check valve to prevent the “Nodding” phenomenon during operation. The bucket slide valve can automatically reset, but the boom slide valve needs manual reset due to the internal steel ball locating.

WARNING

Hydraulic system may be under high oil pressure even if the engine is switched off or the pump has stopped. If you make any operation on this system without releasing these pressures, it is possible to cause serious injury or damage. In order to avoid the occurrence of injury or damage, you should carefully read this Section and release the pressure in hydraulic system before performing any operation on the hydraulic system.

When commissioning or adjusting the system, you should put the machine on the flat ground, and keep it far away from the working crowd and machinery. The machine can only be separately operated by one person, and other persons must be away from the machine by certain distance to prevent the accidents.

You must understand the correct flow and pressure in this hydraulic system during the inspection and operation of this hydraulic system. The output flow of the pump is related to the engine speed. The higher the speed of the engine is, the more the pump output will be, and vise versa. The pressure value of the hydraulic system is related with the load of hydraulic system.

The maximum pressure of each subsystem is calibrated through each relief valve. The too low calibrated value may cause boom to powerlessly lift or dig. However, the too high calibrated value may cause the damage to elements or seals.

The leakage in boom and bucket operation system is related with oil cylinder oil glands, the gap and seals inside of each valve, and the fit between cone valve and taper seat.

WORKING HYDRAULIC SYTEM (Mechanical Control) : HL630V

Working hydraulic system is used to control the actions of working devices such as arm and bucket in loader. The whole working hydraulic system is mainly composed of: hydraulic oil tank (with oil return filter), gear pump, main control valve, boom cylinder, bucket cylinder, control lever and leveling system.

Operation principle of working hydraulic system

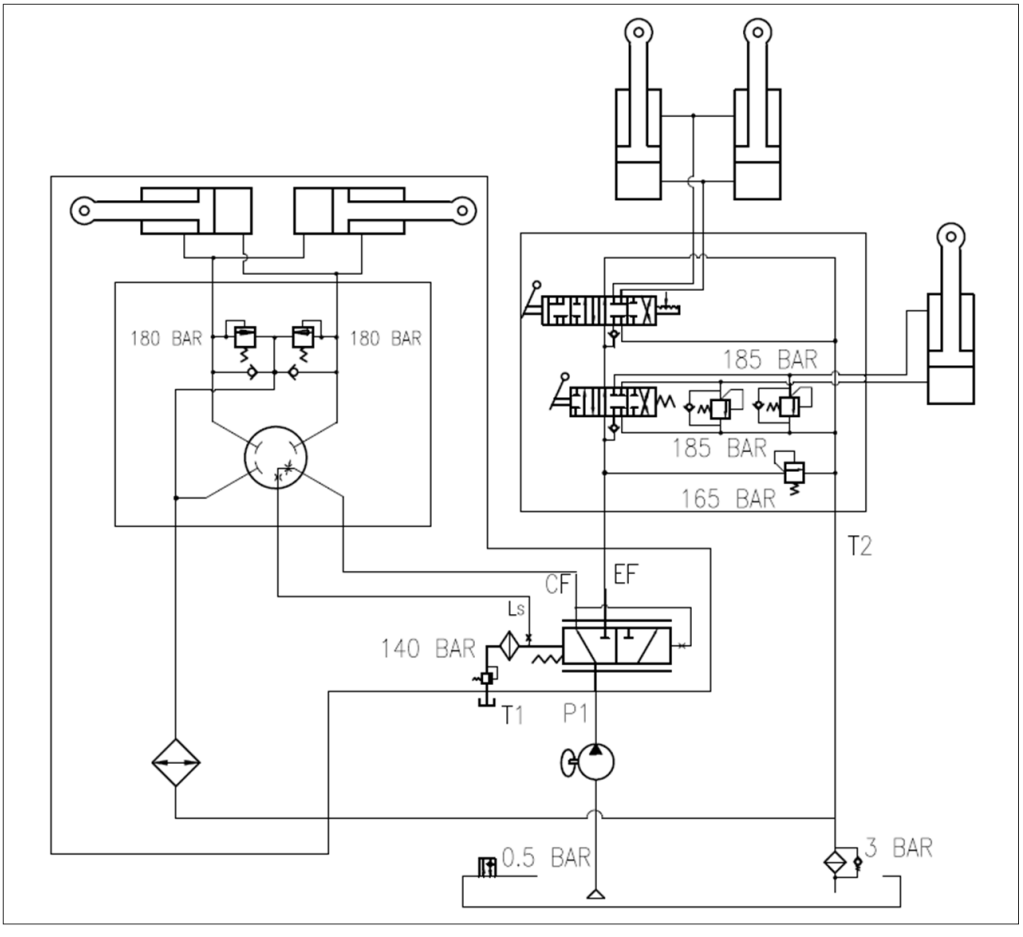


Figure 6b HYDRAULIC CIRCUIT (Mechanical Control system)

- When working device does not work, the oil from priority valve will pass through middle portion of the main control valve and return from the return port of main control valve to the oil tank.
- When the working device needs to actuate, Operate the control lever of the bucket, and the oil from priority valve will pass through the working oil port of the main control valve and, depending on the position of the bucket spool, enter the big chamber or small chamber of the bucket cylinder, able to realize the tilting of bucket. Operate the control lever of the arm, and the oil from priority valve will enter the working oil port of the main control valve and, after passing through bucket spool, and depending on the position of the boom spool, enter the big chamber or small chamber of the arm cylinder, able to realize the lifting or dropping of arm.
- When the external load exceeds the working capacity of the system, or when the working device moves to each limiting positions and the system pressure rises up to the set pressure of the system, the relief valve of the main control valve will open and the high pressure oil will return to tank through relief valve. At this time, the hydraulic system will heat and energy consumption is greater.

Introduction to main elements of working hydraulic system:

- Main control valve:
- Model GDF-25-00B
- Pressure setting of relief valve…..……...16.5MPa
- Overload valve pressure of bucket small chamber……..... 18.5MPa
- Overload valve pressure of bucket big chamber……..18.5MPa

The main control valve is a mechanical operated, integrated, serial-parallel, duplicated valve, and is mainly consisted of valve body, boom slide valve, bucket slide valve, main relief valve, bucket small chamber overload valve, and all kinds of check valves. The oil inlet passage for boom slide valve and bucket slide valve is a serial structure, with the bucket slide valve having the priority. When the bucket slide valve is working, the boom slide valve cannot work at the same time. However, the oil return passage for boom slide valve and bucket slide valve is a parallel structure, i.e., both slide valves can realize the oil return at the same time. The bucket slide valve is a 3-p-6-w slide valve, including bucket unloading, neutral and bucket retracting positions (totaling to 3 positions). The boom slide valve is a 4-p-6-w slide valve, including boom lifting, neutral dropping, and float dropping positions (totaling to 4 positions). Moreover, the bucket slide valve also has bucket big chamber overload valve and bucket small chamber overload valve.

When bucket slide valve of the main control valve is at Middle position, the overload valve connected to the bucket oil cylinder big/small chamber will limit the maximum pressure inside the bucket oil cylinder. When external force exerts on the bucket oil cylinder, and if the pressure inside the cylinder is higher than the pressure setting of the overload valve, the overload valve will open to connect the pressured chamber to oil tank to realize the oil return, and the piston of bucket oil cylinder will move immediately to prevent the system elements from being damaged from high oil pressure.

The interior of bucket valve and boom valve is installed with check valve to prevent the “Nodding” phenomenon during operation. The bucket slide valve can automatically reset, but the boom slide valve needs manual reset due to the internal steel ball locating.

Observation and inspection

After the fault occurs, the first step for troubleshooting is to perform the observation of the steering system and its elements. Switch off the engine before performing observation, lay boom and bucket down to the ground.

- Check the hydraulic tank oil level is normal.
- Observe the oil bubbles in the hydraulic oil tank: take a sample from the oil tank using a clean bottle after the machine is just stopped, and observe the bubbles in the oil sample.
- Remove the oil filter and observe the precipitation of oil. The magnet can be used to separate the irony grains from non-irony grains.
- Check all pipelines and joints for the leakage and damage.

Release of hydraulic system pressure

- Put the machine on the flat ground, and keep it far away from the working crowd and machinery. The machine can only be separately operated by one person, and other persons must be away from the machine by certain distance to prevent the accidents.
- Push the parking braking button, and the engine should be switched off.

WORKING DEVICE

The working device is consisted of four main parts: bucket, lift arm, lever and link, as shown in Fig. 7. The lift arm is a single plate structure, whose rear end is supported on the front frame, and the front end is connected to the bucket, and the middle portion is connected to lift arm oil cylinder. When the lift arm oil cylinder stretches or retracts, the lift arm will rotate around its rear end pin to realize the lifting and dropping of bucket.

The lever is a single rocker arm structure. When the bucket oil cylinder stretches or retracts, the lever will rotate around its central bearing point and the bucket will tilt up or tip down trough the link connection.

The bucket is flat bucket with teeth, as shown in Fig. 7. The tooth sleeve is welded to the main cutting plate. The tooth body is fixed using flat pin. After worn, the tooth body can be replaced by tapping out the flat pin. The wearable plate is welded onto the bottom of bucket to extend the service life of bucket.

The type of connection between tooth body and the tooth sleeve is shown in Fig. A-A.

The structure of pins for each movable parts of the working device is shown in Fig. B-B. The bush adopts composite materials with self-lubricating capacity to extend the service life of pin and bush; each pin shall be filled with lubrication oil every 50 hours during operation to ensure its normal operation.

After the whole machine works for 2000h, it is necessary to check the gap between each axis pin and bush. If the actual gap exceeds the permissible maximum value in the following table, you should replace the pin and bush.

Pin position	Check item	Nominal dimension (mm)	Fit clearance(mm)	Permissible gap after being worn(mm)	Measures to be adopted after the permissible value is exceeded(replace pin or bush)
Link and lever hinge pin	Gap	ϕ60	0.220~0.394	0.90	(as above)
Link and bucket hinge pin	Gap	ϕ60	0.220~0.394	0.90	(as above)
Lift arm and bucket hinge pin	Gap	ϕ60	0.190~0.338	0.80	(as above)
Lift arm and lever hinge pin	Gap	ϕ85	0.240~0.414	1.00	(as above)
Bucket oil cylinder and lever hinge pin	Gap	ϕ60	0.220~0.394	0.90	(as above)
Lift arm oil cylinder and lift arm hinge pin	Gap	ϕ50	0.220~0.348	0.85	(as above)
Lift arm and frame hinge pin	Gap	ϕ60	0.220~0.394	0.90	(as above)

Check working device regularly for crack, bend and deformation of each component weld,and repair them timely if necessary.

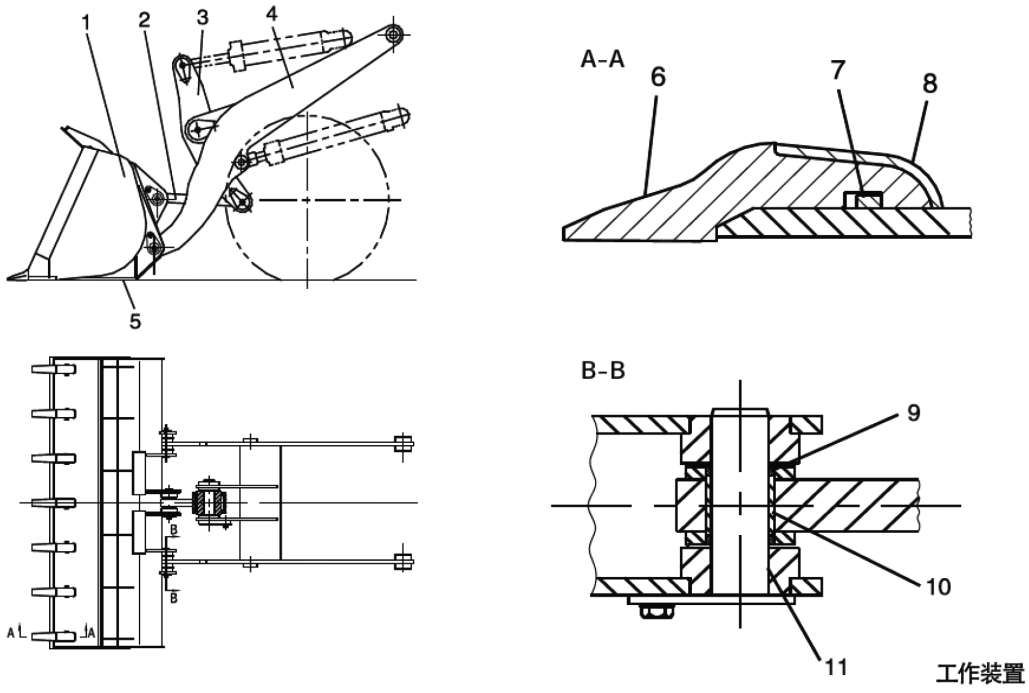


Figure 7

Reference Number	Description
1	Bucket
2	Link
3	Lever
4	Lift Arm
5	Wearable Plate
6	Tooth Body

Reference Number	Description
7	Flat Pin
8	Tooth Sleeve
9	O-Ring Seal
10	Bush
11	Pin

ELECTRICAL SYSTEM

Electrical system includes: battery, alternator, starter motor, gauge panel, switch, lamp system, control elements, A\C circuit and other electric equipment etc..

The machine's voltage is DC 24V, with negative pole grounded, and single wire system (See "Electrical System" of Parts Catalogue for more information)

Battery bank

This machine uses two batteries in series. The negative pole of the first battery is grounded, and the positive pole of the secondary battery is connected to relay contact of the power supply. When the power supply relay is closed, this battery bank can supply power to electric equipment. The battery models 100AH free-maintenance battery.

Pay attention to the follows during operation of battery:

1. Keep battery clean.
2. Tighten the battery after the battery is installed in battery case to prevent the machine from being damaged due to bumping and collision during traveling. The wire terminal and battery terminal must kept close contact. If loosen, you should tighten the nut at the joint, and coat lubrication oil at the joint to prevent the corrosion from acid fog.
3. The plastic plug on filling hole must be tightened to prevent the electrolytes from overflowing due to the vibration during traveling of vehicle. Meanwhile, keep the vent hole in the plug unblocked.
4. Do not put any conductive parts on the battery to avoid short-circuit. Strictly prohibit using short-circuit sparking method to check the battery for the capacity to prevent the over current in moment, thus causing battery capacity to be dramatically lost, and battery terminal to be burnt.

5. When handling battery, do not tow it on the ground.
6. If the specific weight of electrolytes level of the battery drops to be less than 1.18kg/L, you should immediately charge the battery to prevent the acidulation of the pole plate. After first charging of the newly used battery, it is better to discharge the battery at a rate of 10 hours discharge rate, then continue the charge to make the battery fully play its role and output adequate capacity. So far as 2506-1104 battery used in this machine, you should judge the status of the battery regularly according to the gravimeter color, as shown in Fig.8.

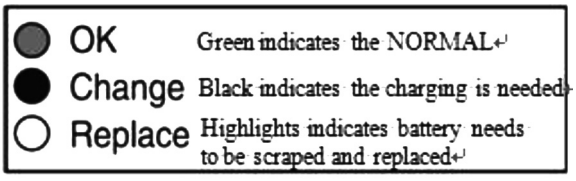


Figure 8

Power supply relay

Power supply relay is used to control the ON and OFF between power supply and the machine circuit system. When the coil of power supply relay controlled by Main switch is energized and closed, its main contact is closed to make battery bank supply power to vehicle circuit system.

Power supply relay model is DK238D,with a coil current of 0.55A,contact of 600A(allowing 1000A current to be passed in a moment.)

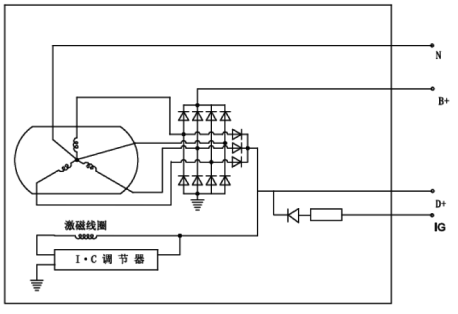


Figure 9

Silicon rectification alternator

The silicon rectification alternator used in this machine is
a corollary product for diesel engine.

Silicon rectification alternator is an integrated AC alternator, with a voltage of 28V,an output current of 55A.

Its principle is shown in Fig.19.

This alternator has four output terminals, they are respectively:

B+: Power supply output terminal of the alternator.

D+: Charge indication terminal.

N: Midpoint output,with an output voltage equal to half that at alternator “+”, in DC voltage.

IG:Not available for this machine

Under normal conditions, the alternator can either supply power to electric equipment or to the battery. This can be obviously observed on Voltmeter installed on dashboard. After running of engine, if the voltage indicated on voltmeter is greater than that before operation, this indicates the alternator is charging the battery and supplying power to electric equipment. After running of engine, if the voltage indicated on voltmeter is equal to or less than that before operation, the alternator does not generate electricity, and the battery supplies power to electric equipment.

Reasonably operate and frequently maintain the alternator because it has a severe application environment. Please pay attention to the following items during operation and maintenance.

WARNING

This machine strictly prohibits the alternator to separately supply power to electric equipment without battery.

1. This alternator requires negative pole to be grounded. Never connect reversely; otherwise the silicon rectifying diode will be burnt.
2. Do not short circuit the alternator “+” output terminal to magnetic field terminal “-” during running of alternator to check the situation of the alternator to prevent from burning silicon diode and impacting electronic regulator.
3. Do not use Megohmmeter or 220V AC power supply to check the insulation of alternator. It is only possible to use high resistance position of Millimeter to check.
4. Perform maintenance for the alternator every 1200 hours or so of operation:
5. Use air compressor to purge dust on each part of the alternator, and use gasoline to wipe up slide ring and each part of dirt.
6. Clean bearing and replace with new lubrication oil. Check for any loose. Replace if any, and fill lubrication oil. It is advisable to fill lubrication oil until the oil occupies 2/3 space of the bearing.

7. Check the welding heads on coils, rotor, and silicon diode for disordering.
8. Use multimeter high-resistance position to check silicon diode one-by-one. If the great difference between Positive direction and Negative direction resistances, this indicates the silicon diode is damaged, and must be replaced. The new silicon diode shall be installed on end cover or element plate with good contact condition. If too loose, use copper strip with a thickness of 0.1mm to tightly stuff. If too tight, it is possible to slightly enlarge the hole. The power of electric soldering iron shall not exceed 75W, and the welding shall be quickly performed.
9. Check electric brush for the wear. Replace it if it is worn too much.
10. Check the insulation between electric brush bracket / outgoing wire screw and the shall for the normality.

The above battery and silicon rectification power form the power supply in the electrical system. When the main switch is ON, the power supply relay is energized to be closed and its contact is ON. At this time, both battery bank and alternator can supply power to electric equipment.

WARNING

This machine strictly prohibits starting the vehicle with silicon rectification power supply instead of iocon rectification power.

Starter motor

The Starter motor used in this machine is a corollary product for diesel engine. The starter circuit is shown in Fig.10

When the electric lock is rotated clockwise to start, its contact is ON, and +24V voltage reaches the electric lock through Line 15□ Line 16A□ starter motor electromagnetic coil energized and closed □ battery "+" connected to starter armature, then starter motor carries diesel engine flywheel to rotate to start the diesel engine

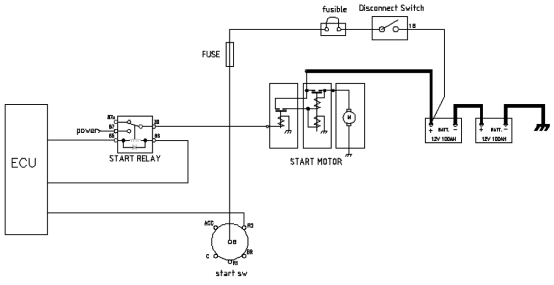


Figure 10

Note: *There is also one fork device inside the starter motor which is used to engage the starter rotor and the outer gear ring of diesel engine flywheel (not shown in this diagram).*

Please pay attention to the following items during operation of the starter.

- Frequently check the wiring bolt of the starter for loose (tighten it if any), and the wires for good conditions.
- Keep the starter clean during operation. Do not let water or oil leaking into the starter to prevent the faults induced from the degradation of insulation level.
- Keep lubrication of gear fork device to prevent it from being blocked, causing the contact of EM coil of starter motor unable to be closed or to damage the starter motor.
- Disassemble the starter motor during maintenance to check its collector ring and use gasoline to wipe up. If tiny spot or indentions are found on the surface, use #0 sand paper to polish, and use gasoline wipe up. The pressure of brush shall be adjusted to be within 800~ - 1000g or so.

Lamp system

The electrical system is equipped with head lamp, rear lamp, signal lamp, steering lamp, instrument lamp, brake lamp etc.. Where, the head lamp has low/high beam, thus ensuring to meet the requirements for operation and traveling.

Except brake lamp, in-cab lamp, head lamp low/high beam switching, steering lamp, the aforementioned lamps are controlled trough lower-left combined rocker switch, as shown in Fig.11.

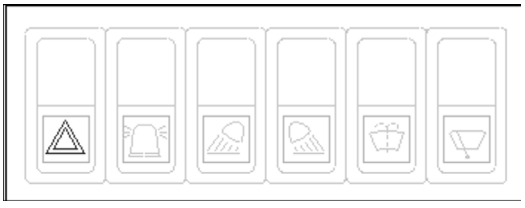


Figure 11

- Rotating Beacon
- Rear lamp
- Hazard Alarm
- Instrument small lamp
- Work lamp
- Front lamp

When at “0” position, the above 6 switches are all in the status with lower end raised, as shown in Fig.10

The principle of the brake lamp

It is an air pressure switch is installed in the air line of the machine (Fig.12). When the pneumatic brake pedal is depressed, the air enters the air line to make air pressure switch closed, thus making brake lamp energized, as shown in Fig.12:

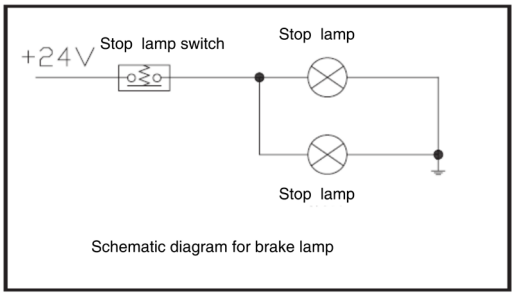


Figure 12

In order to facilitate to replace the damaged bulb, the specifications for the bulbs in this machine are listed in following tableclosed, thus making brake lamp energized, as shown in Fig.12:

No.	Name	Qty.	Specification of bulb	
1	Head lamp	2	24V	75/70W
2	Rear lamp	2	24V	70W
3	Work lamp	2	24V	70W
4	Front signal lamp and front steering lamp	4	24V	10/21W
5	Rear signal lamp, steering lamp, brake lamp	6	24V	10/21/21W
6	Rotating Beacon	1	24V	21W

Instrument

The pressure gauge for this machine adopts mechanical-type instrument, including engine oil pressure gauge, barometer, and gearbox oil pressure gauge. The pressure gauge is a mechanical structure consisting of elastic element, spring pipe, and connecting joint. When the gauge is working, the working pressure of measured system enters the gauge through connecting pipe; the free end of the spring produces the displacement to carry the pointer in the transmission chemical structure to rotate to indicate the corresponding working pressure. Thermometer is consisted of moving-magnetic type thermometer indicator and heat-sensitive resistance type sensor, including diesel engine water temperature thermometer, and torque converter oil temperature thermometer. Working principle is shown in following diagram. Thermometer's indicator works together with its sensor; the variation of temperature may influence the heat- sensitive resistance value. Because the resistance is different, the pressure applied on the heat-sensitive resistance will also be different, and the produced magnetic force, through the variation of the coil voltage inside the instrument, will also correspondingly vary, thus carrying the Instrument Pointer to be deflected to point different temperature values.

All thermometers mentioned above have corresponding sensors to work together, and they cannot be exchanged mutually. If abnormal indication is found, first check the instrument power supply and ground conditions, then check the sensors. A simple judgment of magnetic-electric thermometers: use multimeter to measure the inner resistance of the instrument and sensor. If their resistances are different from those with same models by a resistance value >100Ω,they can be judged as ineffective, and shall be replaced with specified sensor and instrument.

Working hour meter: it is used for recording the working time of machine, in hours, with a counting range of 0 - 9999h. When the engine begins running, the counter will automatically work.

Note: *You must the instrument and sensor in a corollary mode, otherwise it will cause the abnormalities of instrument and sensor operations.*

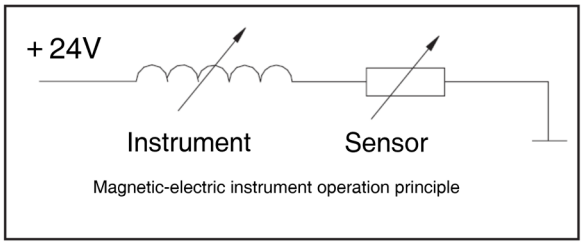


Figure 13

A\C system circuit

See Fig.14 for the principle of the circuit of A\C system.

Main technical parameters of A\C system:

Voltage	24VDC
Heat-release capacity	5KW
Refrigerating capacity	4KW

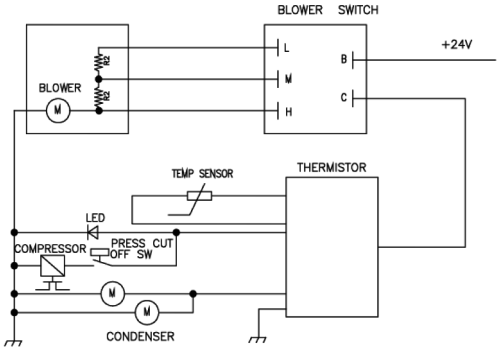


Figure 14

Introduction to A\C circuit operation

The air-conditioner system for this machine has three function of: refrigerating, he ating and dehumidifying. See “A\C system switch” for details of operation.

OTHERS

There are also other elements in this system, mainly including:

Fuse

It is installed beneath the seat. When the power supply system is short circuited, it may be burnt, thus protecting the main circuit.

Wiper switch

The switch of the wiper is on the combo rocker switch as shown Fig.15, and it has 3 gears with stop, low, high speed

Washer switch

Press washer switch, washer is working, and spray the water in the kettle into the window, let go after the washer switch automatic reset, and washer stop working. The washer is behind the driver seat.

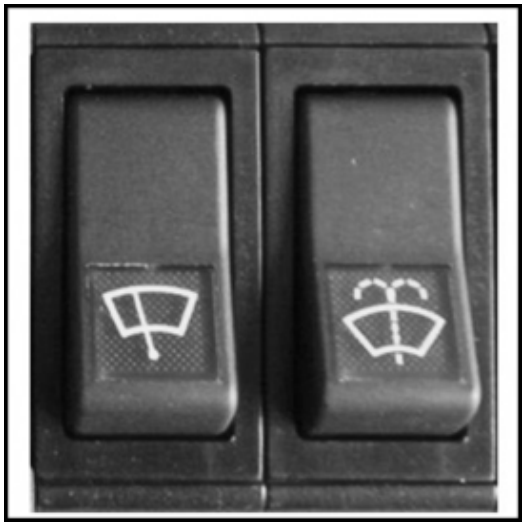


Figure 15

Note: *Each start time cannot exceed 15s, and it better to have 30s interval between two continuous starts. And the times to continuously start should not exceed 3. Or else, you should wait for the starter motor and ICO(ignition cut off) electromagnet to be fully cooled down, and then you can start again, thus preventing the accumulated high temperature from burning starter motor and ICO electromagnet, and severely damaging the capacity and service life of battery.*

Transportation

Investigate the height, width and the allowed carrying capacity in the passage of transportation line. The total height, total width and total weight should not exceed the related regulations. Please consult Hyundai or other agents for the solutions.
In order to prevent the safety accidents from being occurred during the shipment of the machine, clear the ice and snow as well as other slippery materials on the dock and wagon.

Transporting machine

CAUTION

During shipping, please follow the laws and regulations about the shipment height, width, length and weight issued by State and local authorities.

- Use wedges to stop the wheels of trailer or truck before shipping.
- Do not allow the steering operation on the way for the machine being driven on to the trailer or the truck. You should back the vehicle to the flat ground, and then perform the steering operation
- After the machine is fixed, use frame-fixed bumper to fix the front and rear frames.
- Lay the bucket down to the transportation vehicle, put the shifting manipulating handle on “Neutral Gear” position.
- Pull up the handle of parking brake to apply parking braking.
- The engine is switched off, and all switches are put to Middle position or “OFF position. Pull out the electric lock key.
- Close and lock all doors, then take away the buttons.
- Toggle the power supply Negative switch to “OFF” position.
- When you use truck or trailer to transport the machine, you must use wedges to stop the wheels and use steel cables to fix the machine, so as to prevent the machine from moving during transportation.

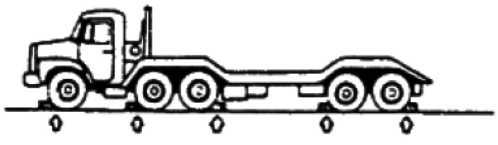


Figure 1

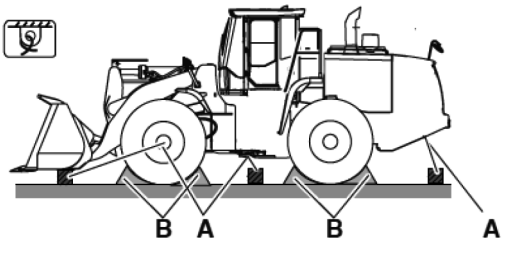


Figure 2

Lifting of loader

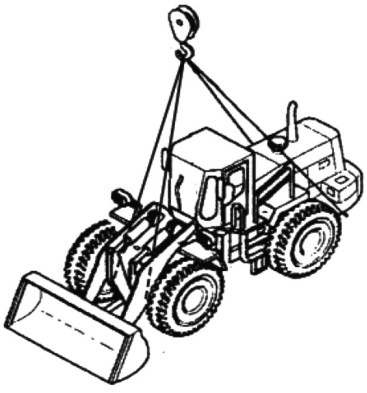
It is necessary to let the professionals with lifting knowledge be responsible for the command and operation.

You should calculate the crane's maximum lifting weight and the sling's bearing capacity to ensure the lifting safety. Meanwhile, the 4 hooks on the sling shall bear load evenly.

Accomplish the following preparation before lifting:

- Put the shifting manipulating handle on "Neutral Gear" position.
- Put the boom and bucket to the lowest position.
- Pull up the handle of parking brake to apply parking braking.
- Switch off the engine and pull out the electric button
- Close and lock all doors.
- Toggle the power supply Negative switch to "OFF" position.
- Use frame to fix the bumper and fasten the front and rear frames, making the machine unable to rotate.

The sling should be securely fixed to the lifting eyes of the machine on which the lifting marks are indicated.



Lifting marks

Figure 3

WARNING

Incorrect lifting may cause the offset of the machine, thus inducing personal injury or death as well as property loss.

Towing of the fault machine

This machine cannot be towed unless in the emergency. Towing is only used for towing this machine to a place where the overhaul can be performed, instead of transporting over a long distance. The towing distance for this machine should not exceed 10km, and the towing speed should not exceed 10km/h, otherwise the gearbox will be damaged for short supply of oil. If you must move this machine, you should use special trailer.

WARNING

Incorrect towing of inoperable machine may cause the personal injury or death. Towing the fault vehicle on bad road surface may cause the fault vehicle to be further damaged severely.

If the brake system is in fault, the brake shall not be applied. In this case, you should be quite careful during towing.

Matters needing attention for towing: Be sure to release parking braking

Note:

1. *You should use wedges to stop the wheels of the machine to prevent the machine from moving. If the machine wheel is not properly stopped by wedges, the machine will move. The wedges shall be removed after towing begins.*
2. *Nobody shall be allowed to sit on the towed machine unless the driver can control the direction and brakes.*
3. *Ensure, before towing, the towing rope and the tow bar are in good working conditions and have adequate strength to pull the machine. The strength of the available towing rope and tow bar shall be at least 1.5 times of the gross weight of the towed machine, so as to pull up the machine from the mud or beneath the slope.*

4. *Keep the minimum angle of the supporting rope, and the angle between the tow rope and the right ahead should not exceed 30 º*
5. *The too quick movement of the machine may cause the breakage of tow rope or tow bar. It is better to slowly and stably move the machine.*
6. *When towing the machine, all persons shall be far away from both sides off the rope to prevent the tow rope from injuring persons due to the breakage.*
7. *Under normal conditions, the trailer shall be of a size as the machine. It is necessary to ensure the trailer shall have adequate braking capacity, weight and power to control the slope ascending of two machines and the travel distance etc..*
8. *When the towed machine is descending the slope, in order to have adequate controlling and braking capacity, it is necessary to connect a bigger trailer or other machine to the back of the machine so as to prevent from out-of-control and rolling.*
9. *If the travel direction of the towed machine is controlled by the driver, the driver shall make the turn along the direction of tow rope. Check the regulations on the width, height, and load-restriction and traffic restriction for the roads you want to go through. It is possible to need special application or permit.*

Transportation dimension

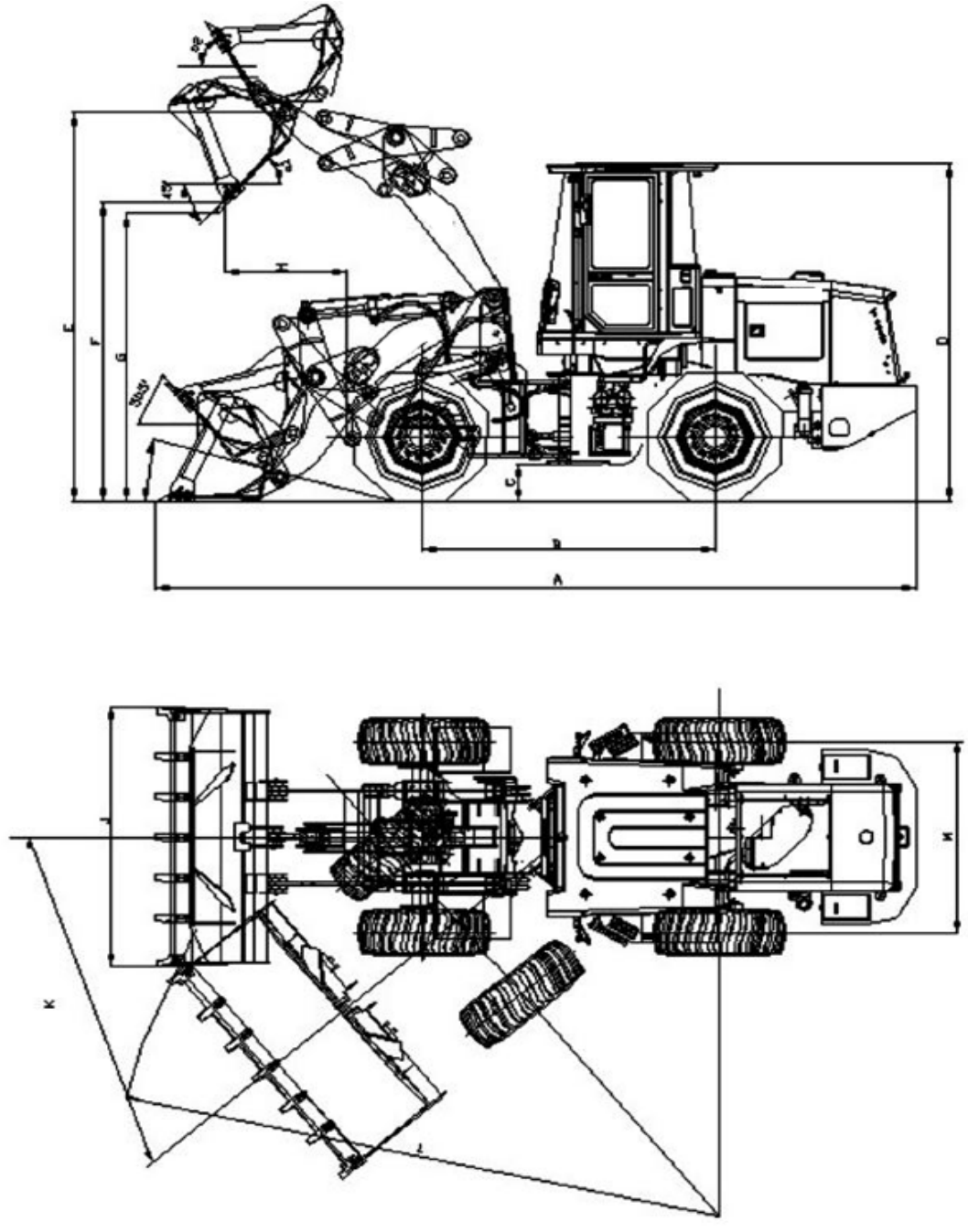


Figure 3

Basic dimension		
Sign	Description	Dimensions
A	Transportation length	6990mm
J	Transportation width	2510mm
D	Cab height	3250mm
C	Ground clearance	330mm
B	Space between front and rear Tires	2670mm

Troubles Shooting

Transmission system

Characteristics of faults	Cause	Remedy
Shifting pressure low for each position	1. Oil level too low in gearbox oil pool	1. Add oil to the specified oil level
	2. Leakage in main oil way	2. Check main oil way
	3. Gearbox oil filter blocked	3. Clean or replace variant pump
	4. Variant pump ineffective	4. Replace working pump
	5. Pressure regulation spring of shifting manipulation valve improper	5. Re-adjust according to the regulations
	1. Pressure regulation spring of shifting manipulation valve ineffective	1. Replace spring of regulation valve
	2. Shifting manipulation valve, Pressure regulation valve or accumulator piston blocked.	2. Dismantle and eliminate the blocking phenomenon
Shifting pressure at some position is low	1. Seal ring for piston of this position damaged	1. Replace seal ring
	2. Seal ring in oil way of this position damaged	2. Replace seal ring
	3. Leakage in oil way of this position	3. Locate the leakage point and repair
Torque converter oil temperature Over high	1. Oil level too low in gearbox oil pool	1. Add oil to the specified oil level
	2. Oil level too high in gearbox oil pool	2. Add oil to the specified oil level
	3. Shifting pressure low, and clutch slippage	3. See I, II
	4. Torque converter radiator blocked	4. Clean or replace torque converter
	5. Torque converter works with high load for too long time	5. Stop working for cooling properly
Engine speed high, Engine is running, but the vehicle could not be driven	1. The valve stem of shutoff valve for shifting manipulating valve not return	1. Remove shutoff valve, find the cause of unable returning, and perform trouble shooting
	2. Gear not engaged	2. Re-push to the proper position, or re-adjust the control lever system
	3. Pressure regulation spring of shifting manipulation valve broken	3. Replace spring of regulation valve
	4. See items 1,2,3,4 in (I)	4. See items 1,2,3,4 in (I)

Characteristics of faults	Cause:	Remedy
Driving force not adequate	1. Shifting pressure low	1. See I, II
	2. Torque converter oil temperature too high	2. See III
	3. Impeller of torque converter damaged	3. Disassemble torque converter and replace impeller
	4. Big overrunning clutch damaged	4. Disassemble big overrunning clutch and replace damaged parts.
	5. Poor engine output power	5. Repair the engine
Gearbox oil level increase	1. Steering pump shaft end mixing oil	1. Replace oil gland at steering pump shaft end
	2.Working pump of working hydraulic system mixing oil	2. Replace oil gland at working pump shaft end

Braking system

Characteristics of faults	Cause	Remedy
Foot braking force not adequate	Air in braking hydraulic pipeline	Bleed the pipeline
	Oil leakage in brake pad ass'y	Replace seals on the brake pad ass'y
	Brake air pressure low	Check tightness of air compressor, combo valve, accumulator and pipeline
	Seals for bake pump worn	Replace seals
	The hub is leaking, and the oil is leaked onto the brake pad	Check or replace hub oil seal
	Brake pad worn to the limit	Replace brake pad
Gear not engaged	Brake valve fault	Check brake valve
Brake can`t opened normally	Brake valve fault	Check brake valve
	Brake pump not act normally	Check brake pump
	Slave pump piston can not return	Check or replace rectangular coil
Pressure in air reservoir quickly decreases (drops more than 0.1MPa in 3 minutes)	Intake valve of the brake valve blocked by dirt or damaged	Perform several times of braking to blow off the dirt or replace brake valve
	Pipe joint loose or pipeline ruptured	Tighten joint or replace pipe
Pressure indicated by barometer rises slowly	pipe joint loose	Tighten joint
	Air compressor works abnormally	Check working conditions of air compressor
	Intake valve of the brake valve or drum membrane not sealed	Check or replace brake valve
Emergency or parking braking force inadequate	Clearance between brake drum and brake pad too large	RE-adjust according to the operation requirements or replace brake pad
	Oil on the brake pad	Clean brake pad

Hydraulic system for working device

Characteristics of faults	Cause	Remedy
Arm lifting force or bucket digging up force inadequate	Wear or damage of cylinder oil seal	Replace oil seal
	Distribution valve excessively worn. Fit clearance between valve stem and valve body exceeds the specified value	Disassemble, check and repair to make the clearance meet requirements on specified value , or replace distribution valve
	Oil leakage in pipeline system	Locate the leakage point and repair
	Severe internal leaking of working pump	Replace working pump
	Improper adjustment of safety valve, and system pressure too low	Adjust the system pressure to the specified value
	Oil suction pipe and oil filter blocked	Clean oil filter and change oil
Bucket or arm rises slowly even at high speed of engine	See above	See above
	Dual action safety valve blocked	Disassemble the dual action safety valve to check

Steering hydraulic system

Characteristics of faults	Cause	Remedy
Hard to make steering	Oil temperature too low	Increase the oil temperature , then start working
	Load sensing oil way blocked	Clean it
	Pressure of steering pump low	Adjust overflow valve block pressure according to the regulations
	Partial bolts for metering motor of full hydraulic steering gear tightened too tightly	Loosen the bolts
Vehicle steering not stable	Priority valve acts not sensitively	Maintain or replace priority valve
Both leftward and rightward steering slowly	Regulation valve leaking	Repair or replace priority valve
	Steering pump flow inadequate	Repair or replace steering pump
Steering normally when steering resistance is small; Steering slowly when steering resistance is large	Steering overflow valve seat leaking severely	Repair vale seat or replace seal ring
	Steering cylinder leaking severely	Repair or replace steering cylinder seal ring
Vehicle not steering while steering wheel is rotated	Steering gear fault	Repair or replace steering gear
	Steering overflow valve fault	Repair steering overflow valve
	Steering column fault	Repair steering column
Steering wheel auto rotates while driver nor operating	Full hydraulic steering gear valve housing blocked	Remove impurities in valve
	Full hydraulic steering gear spring plate broken	Replace spring plate
Steering pump noisy and steering cylinder acts slowly	Air in steering oil way	Start vehicle, make several times of leftward/rightward steering
	Steering pump worn, and flow inadequate	Replace steering pump
	Oil viscosity inadequate	Change oil as per correct brands
	Hydraulic oil inadequate	Fill enough hydraulic oil
	Internal leaking in steering cylinder	Repair cylinder or replace seal

Electical system

Characteristics of faults	Cause:	Remedy
Generator not working, or output low voltage	Commutator oil stained or worn	Wipe using clean cloth dipping with gasoline, or grind using #00 emery cloth
	Remanence coil open circuit	Check external magnetic field , and check exciting circuit using light bulb
	Remanence disappeared	Perform magnetizing or replace with new generator
Generator overheat	Bearing worn or lubrication oil inadequate	Replace and add lubrication oil
	Commutator or armature coil short-circuited internally	Disassemble generator and check commutator and armature coil , and eliminate the short-circuit faults
Battery not charged or charged at low flow	Generator magnetic field coil short-circuited or open circuited	Generator magnetic field connected well, and resistance of magnetic field coil is about 20Ω
	The positive pole connecting wire dropped off	Turn on the electric lock but do not start, there should be 24V on the generator “+” pole
	Battery connecting wire too loose or dropped off	Visual check and tighten the wire
	Generator transmission belt too loose	Visual check and tighten the wire
Battery charge time too long	1. Battery feed supply severely. 2. One or two cells in the battery short-circuited or damaged. 3. Generator negative pole connecting wire dropped off	Start the generator and use multimeter to check charge current or battery voltage. If the charge current is too large and battery voltage is below 25V, the battery is in fault. If the generator “+” pole voltage is greater than 30V, check generator “-” pole grounding for the normality. Connect voltmeter “-” pole to ground and “+” pole to generator “-” pole. If there is voltage indication on voltmeter, the Grounding wire is open circuited.. Otherwise, the problem is in the generator.

Characteristics of faults	Cause:	Remedy
No indication on electric sensing instrument instrument	Instrument damaged	Replace instrument
	Sensor damaged	Replace sensor
	Generator or battery is in fault	Check whether the terminal voltage of generator or battery is normal
	Sensor drops off	Re-tighten it
Engine could not start or start difficultly	Battery damaged or its capacity inadequate	Replace with new battery or charge the old battery
	Electric lock damaged	Replace electric lock
	Electric circuit contact badly or short-circuited	Check and repair
	Starter motor electromagnetic switch or fork damaged	Check the coil for perfection , the contact for smooth, the fork for moving freely, the spring for broken and for tooth picking. Repair if necessary
	Rotor of starter motor burnt	Replace starter motor
	Main power supply relay, starter relay or gear position/start interlocking relay damaged	Replace relay
Lamps not lit up	Lines fault	Check switch, fuse, light bulb, and lines. Replace or repair if necessary
Maximum range indicated by instrument	Instrument connecting wires loose	Re-tighten or connect the grounding wire

Specification

Stnadard specification

Item	Size
Bucket capacity	1.7m^3
Rated load	3000kg
Boom lifting time(full load)	≤5.4s
Cycle time	9.3s
Highest speed at each gear	
Gear Forward I	8km/h
Gear Forward II	13km/h
Gear Forward Ⅲ	24km/h
Gear Forward IV	36km/h
Gear Reverse I	9km/h
Gear Reverse II	27km/h
Maximum traction force	98±5kN
Maximum digging up force	107±5kN
Maximum gradability	30°
Min. bend radius	
Outside of bucket	5540±100mm
Geometry dimension	
Total length (with bucket laid down the ground)	6990±100mm
Total width(outside of wheel)	2300±10mm
Bucket width	2510±10mm
Total height(top of cabin)	3250±100mm
Axle base	2830±10mm
Wheel Base	1850±10mm
Min. Distance above Ground (at articulated point)	330±10mm
Maximum unloading height	2840±50mm
Maximum unloading distance	1240±50mm
Machine weight(with cab)	10200±200kg
Driver seat	Over the articulation position

Engine

Item	Specification
Model	WEICHAI WP6G125E22
Rated power	92kW
Displacement	6750cc
Rated rotation speed	2200r/min
Maximum torque	540N.m/1300-1500r/min
Fuel consumption at rated working conditions(rig-test)	≤215g/kw.h
Fuel	#0 light diesel oil in winter ,-10 # in summer
Fan diameter (exhaust)	600mm

Transmission system

Item	Size
Hydraulic torque converter	
Type	Single turbine
Torque ratio	3.25
Cooling mode	Air cooling
Gear box	
Type	Fixed shaft type hydraulic gear shifting
Shifting gear	4 gears for Forward, 2 gears for reverse
Variable -speed oil pump(gear pump)	
Operating pressure	1.1~1.5MPa
Main transmission and hub reduction	
Main transmission type	1st stage reduction spiral bevel gear
Hub reduction type	Planetary reduction straight spur gear
Driving axle and wheel	
Type	4- wheel driven
Tire	17.5-25
Tire air pressure	0.28~0.32MPa

Braking system

Item	Size
Service braking (foot braking)：	Single pipeline, air-poppet oil 4-wheel caliper disc brake
Brake disc diameter	ϕ 460mm
Parking braking	Flexible shaft control
System air pressure	0.71~0.784 MPa

Steering system

Item	Specification
Type	Articulation frame, full hydraulic system
Steering cylinders — I.D. × stroke	2- ϕ 80× ϕ 45×393mm
Steering pump (shared with working system)	JHP2100 (shared with working system)
System pressure	14MPa
Discharge	100ml/r
Steering angle	36º each on left and right

Hydraulic system for working device

Item	Specification
Boom cylinders -I.D.	2- ϕ 125× ϕ 70×710mm
Bucket cylinders -I.D.	1- ϕ 140× ϕ 80×540mm
MCV	Duplicate, section type
Work pump	
Model	JHP2100
Discharge	100ml/r
System pressure	17.5MPa
Working device	Single rocker, reversal, 6-connecting rod mechanism

Electrical system

Item	Size
System voltage	24V
Battery	Two 12V120AH in series
Light bulb voltage	24V
Diesel engine starting	24V, electric startup

Oil filling capacity

Item	Size
Fuel tank	155L
Hydraulic oil Tank Capacity	127L
Crankcase	14L
Gearbox system	42L
Axle (Housing and hub wheel)	
Front axle	19L
Rear axle	19L

A/C System (optional)

Item	Size
Hot air	
Working medium	Diesel engine cooling water
Heating capacity	5000W
Refrigeration	
Working medium	R134a
Refrigerating capacity	4000W
System voltage	24V

Environment protection

Environment protection

When you perform the maintenance of the equipment and the disassembling of any pipeline, connector or other associated parts, you should use the special containers to collect coolants, oil liquids, fuel, electrolytes or other materials which may cause environment pollution. Meanwhile, you should dispose the related pollution materials at the specified authorized places or containers, and should comply with the requirements from local laws and regulation when you perform the disposals.