GÜNTER GROSSMANN

GG013 Wheel Loader

Operation and Maintenance Manual

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PREFACE

Thank you for selecting our GG013 wheel loader.

This manual is prepared for the operator, the serviceman and the technician in order to provide necessary information about safety performance, structure, operation, maintenance and control of GG013 wheel loader,

This manual provides the correct guide for operation and maintenance, Please read it carefully before operating.

Please keep this manual in the cabin to make it at hand at any time. lf it is lost please purchase a new one.

Correct operation, regular maintenance and sufficient lubrication are very important to ensuring safety and good condition of the machine. Failure to do so may cause serious problem to machine itself or human life.

Owing to the rapid development of technology and our continual improvement of products, the information contained in this manual may be changed without notice.

Chapter One Usage, Technical Performance and Parameters

1. Usage and Features

GG010 wheel loader is applicable for the road construction, urban construction, environment and sanitation, coal and gravel material yard, small and medium-size civil works, station, wharf. freight yard and warehouse and is mainly used to load or shift the loose soil, sand and stone, coal cinder, rubbish and other types of loose substances. lt can handle the materials for 3~5T tractors and heavy trucks and can also undertake such operations as pushing, spading and excavating, leveling, piling, lifting and pulling.

The Machine has the following features:

1)Hydro-mechanical drive, full deployment of the engine's power, auto infinite variable speed as per size of the external resistance, avoidance of the engine's stalling due to sudden Increase of external applied load, absorbing and eliminating the shock and impact of external applied load on the engine so as to protect the drive system and engine, raise the life-time of the vehicle, keep the operation simple and comfortable and have comparatively high economic and production efficiency.

2)Central radial frame and load-sensing full hydraulic steering device, concurrent rear track, small turning radius, convenient for operating in the arrow site. convenient and flexible operation, safe and reliable, light structure and convenient for maintenance.

3) Four-wheel drive, LP wide-base off-road tyre, oscillating back axle, with fine off-road performance, trafficability and bigger traction.

4)The braking system uses the single-pipe spread-shoed four-wheel braking.

5)Full-closed cab, adjustable and shock-proof seat, comfortable driving and wide vision,

Chapter Two Structural Principle and Service of Major Components

1.Engine system

Including mainly engine, radiator, air filter silencer, diesel tank and accelerator's operating system.

Engine

As for the diesel engine's structure, performance parameters operation and technical service, refer to the diesel engine manual attached the machine.

Air filter

After use for 50 hours, the air filter should be serviced upon halt take out the filter element and blow it with the compressed air from inside out or tap the end cap for service. Oil and water is prohibited for cleaning the filter element.

Radiator

Radiator assembly consists of water radiator and transmission Oil radiator, for air radiating of circulating water and transmission oil.

The radiator shall not have any leakage. The level radiator should be filled with soft water such as rain water and river water. When the ambient temperature is low, drain out the cooling water after operation every day to avoid the case and water box from any frost crack. Keep radiator dean outside and smooth inside for a fine radiating effect,

Diesel tank

The diesel tank is to cated at right side below the cap The filter at the fuel intake should be cleaned once after working about 50 hours

2.Drive System

The machine's drive system consists of con hydraulic torque converter, power-shifl gearbox, drive shaft, driving axle, etc.

From (Figure 2-1) it is observed that the power output by the engine has the torque boosted by the hydraulic torque converter and transmitted to gearbox.

The power of gearbox has the torque boosted by the hydraulic torque converter and transmitted to the gearbox. The power of gearbox moderates through multi-stage gear. Different gearing meshes produce different transmissions that output different speeds in different directions and the Advance I and II and Reverse I and II are made available.

Due to such reasons as uneven ground. Oscillation of the rear axel and steering, the position of the front and rear axles and gearbox changes relatively and thus the universal drive device is adopted the power output from the gearbox is transmitted to the front and rear axles through the drive shaft equipped with universal joint and expansion bend.

Via the main retarder, the power driving the front and rear axles moderates and changes the rotating direction(changing the driving left and right rotation into semi axis front and rear rotation). It drives the wheels to run,

1)Hydraulic torque converter-gearbox(Figure 2-2)

Hydraulic torque converter and gearbox are linked together with bolts the pump impeller (1) is linked with the pump impeller cover (2) with bolts to form a closure. One of its end is fastened to the engine flywheel (3) with bolts via the elastic junction panel. while the other end(the pump impeller) is based the wheel stand (6) via the bearing. The closure is installed with one turbine (4) and idler pulley (5).The turbine is linked with the axle. The idler pulley (5) is linked with the wheel stand via the Involute spline. The wheel stand (6) is fixed to the case of the torque converter with nut bolt. The gearbox's driving gear (31) is linked with the turbine axle (32) via the involute spline. The gearbox contains the advance

low-gear clutch axle assembly (27) and reverse high-gear clutch axle assembly (24);via the involute spline, the clutch's driven wearing discs are respectively sleeved on the internal splines of clutch hubs (30) and (13).Via the involute spline, the dutch's driving wearing discs are respectively installed on the gears(10),(28)and('l2).\/ia the involute spline, the gear (18) is installed on the output axle. while gears (16) and (18) meshed.

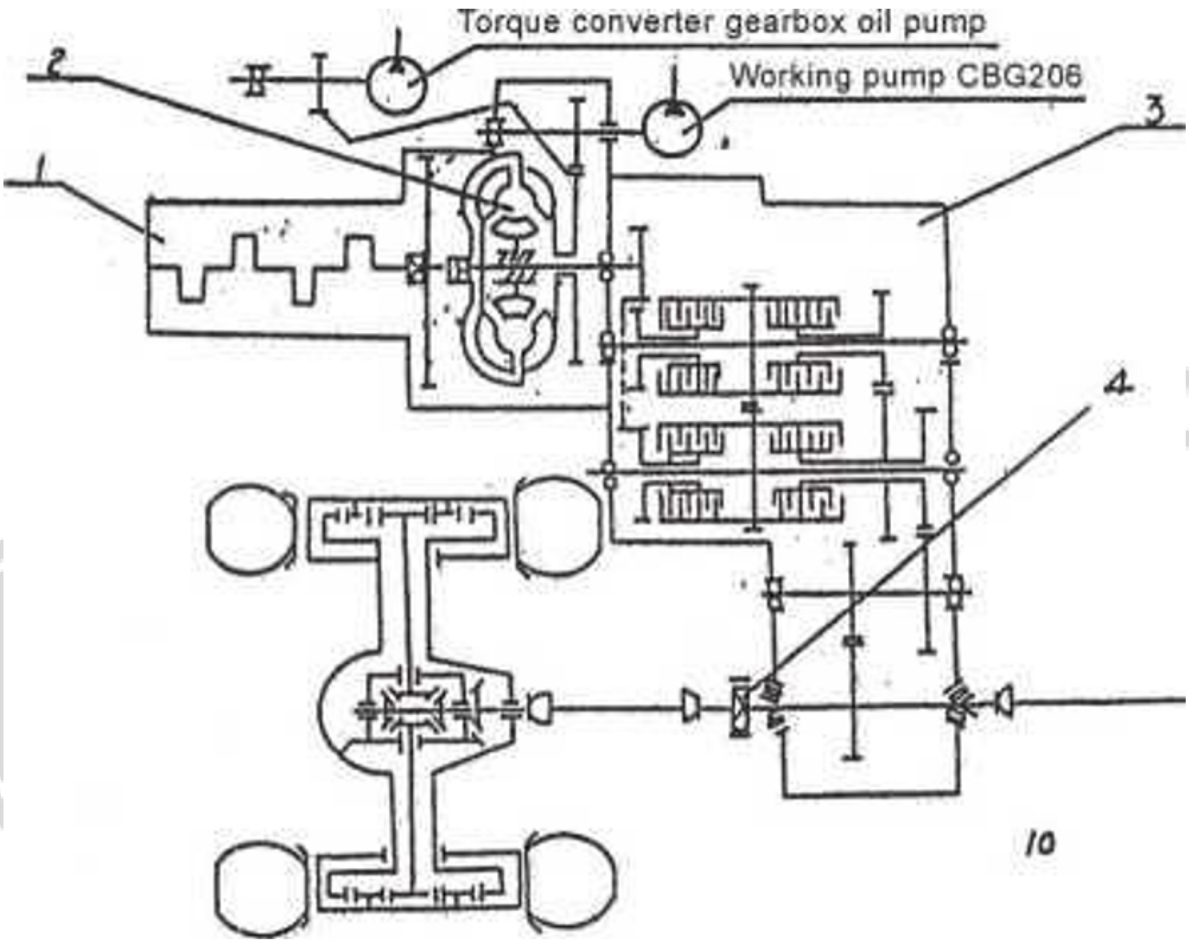


Figure 2-1: Illustration for Driving System

1. Diesel engine, 2. Hydraulic torque converter, 3. Gear box, 4. Hand brake, S. Wheel, 6. Hub reductor, 7. Diff, 8. Drive axle, 9. Main driver, 10. Drive shaft

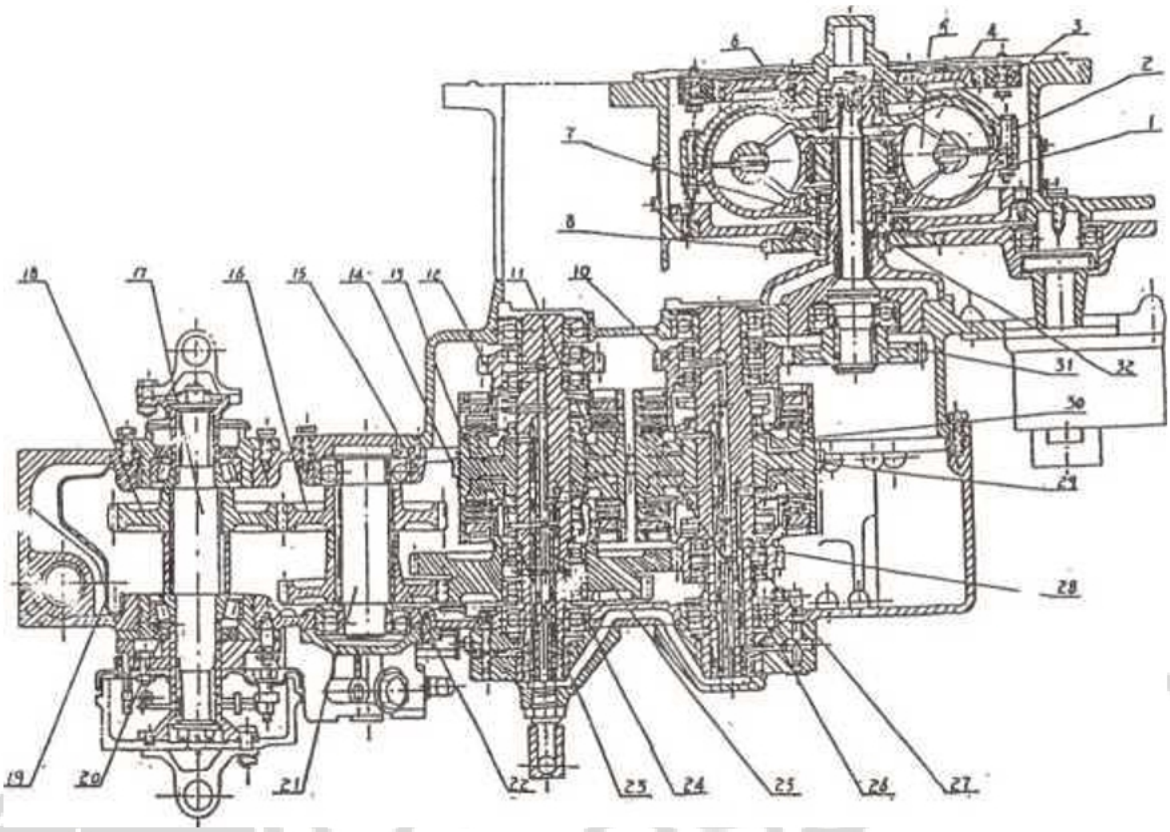
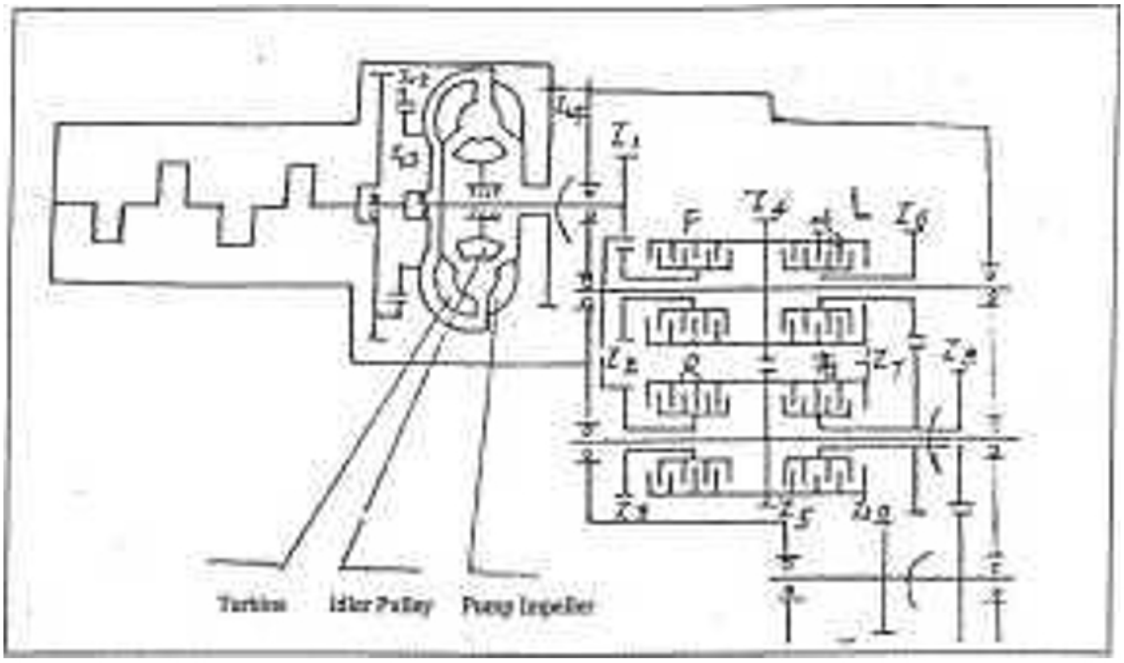


Figure 2-2: Ilustration for hydraulic torque converter

I. Pump impeller, 2. Pumpum impeller cover, 3.Elastic unction lanel, 4Turbine, 5. Idler pulley^ 6. Wheel stand, 7. Pump impella hub, 8 & 31 diving gear, 9. Advance Gear Piston 10.12,14, 18, 22, 28 & 29. Gear Reverse Piston 13

& 30. clutch hub； I5. Body. 17. Output shaft, 19. Oil baffle plate, 20. Oil seal, 21. Central axle 23. Gear II piston, 24 A 27 clutch axle assembly. 25. gear, 26, Gear II piston, 32. turbine axle



Via the nylon gear ring (Z12) and the drive gear (Z13) meshed with It, the power transmitted from the engine drives the hydraulic torque converter's pump impeller to rotate and converts the engine's mechanical energy into the kinetic energy of liquid in the pump Impeller So that the liquid shocks the turbine blades at a h^h speed and thus rotates the turbine. The kinetic energy of liquid is again converted Into mechanical energy that is transmitted out through the turbine axle. The liquid flows from the turbine into the idler pulley. When flowing out fit)lti the turbine, the running liquid follows the blade runner and changes the direction to shock the idler pulleys, while the working hydraulic pressure functions on the idler pulleys. Being fixed, the idler pulleys provide the running liquid with the counties force of the same power but in different direction. The reactionary torque received by the running liquid Functions in return on the turbine and thus the turbine receives the coaction of the pump impeller's torque and the idler pulley's counter force. In this way, the hydraulic torque converter plays a role of boosting the torque.

With the change joystick of the shift being in the central position (neutral), change joystick, Gear Z1 linked with the turbine is meshed with Z1 and Z3, but since the clutch has no hydraulic and Ihe gears (Z2, Z3) are idling, the power Transmitted from the turbine axle cannot be output and thus the vahine remains still.

When the change joystick is in the advance position and the shift joystick in the low-speed position, the drive pressure oil (12-14k/cm) enters the control valve of the gear box. Via the advance low-gear end cap of the pipeline, the pressure oil out from the contra valve enters the clutch piston through the

center-bore oil duct ot the clutch body axle. Under the oil pressure, the piston moves to joint the driving and driven friction plats of the advance and low-speed clutch. Via gears (Z2, Z6, Z7, Z8, Z9, Z10, Z11), the power input into the gear (Z1) is transmitted to the output axle and rotates the front and rear drive shafts and makes the wheels to rotate through and rear driving axles for Advance L

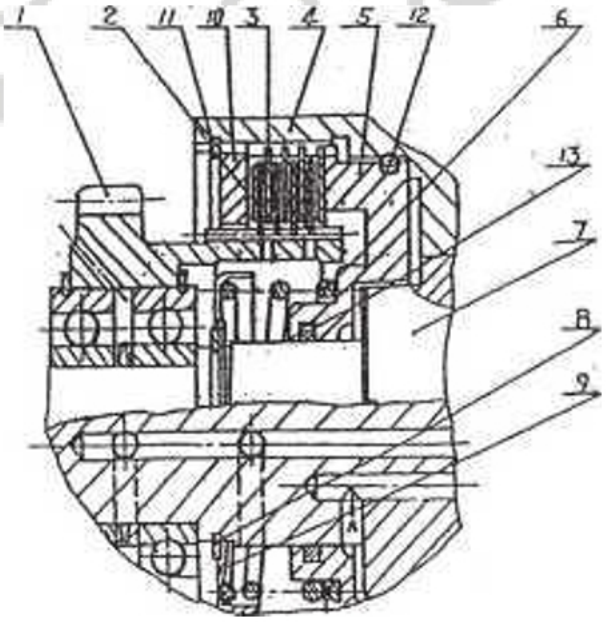
When the change joystick is in the advance position and the shift joystick in the high-gear position, Sir hit ar to the first gear, the pressure oil enters the clutch piston and joints the driving and driven friction discs of the advance and high-speed clutches. Via the gears (Z1v Z2, Z4, Z5, Z8, ZQ, ZtO, Z11), the power is transmitted to the output axle to rotate the front and rear drive shafts and then rotate the wheels through the front and rear driving axles for Advance II.

For Reverse I and II, the process is the same as for Advance, while its driving route is given as follows:

Reverse I: via Z1, Z3, reverse clutch, Z5, Z4t low-speed clutch, Z6) 27, Z8, Z9, t10, 21t fe transmitted to the output. axle to drive the front and rear drive shafts and. rotate the wheels through+ the front and rear axles for Reverse I.:

Reverse II: via Z1, Z3, th^ reverse clutch, high-speed clutch, Z8, Z9, Z10, Z11 is transmitted to the out axle and rotate the front and rear drive shafts. Through the front and rear driving axles, it drives the wheels for Reverse II.

Structure and Operating Principle of Clutch:



(Figure 2-4) shift clutch) structure

A, active gear 2, active tablets 3.,. driven fifties 4(passive huly 5, piston 6,. spring 7, shaft 8,11, card ring 9, bearing plat 10. pressure plate 12,13 seal ring

The gear box is installed with four gear shift clutches: Advance, Revere, Gear-1 and Gear-H. the four clutches have the same structure and operating principle. Figure 2-4 is the structure diagram of the gear shift clutch, which is the wet multi-disc clutch. There are four pieces respectively of the driving disc (2) and driven disc (3). The external splines of the driving gear (1) the driving hub of the

clutch based on
the axle (7) with two bearings. The external splines of the driving wheel are linked with the internal splines of the driving disc (2) or can be the shift roll thereon. The external splines of the driven disc (3) are linked with the internal splines of the driven hub or can be the shift roll thereon. One end of the spring ⑹ supports the 丨 eft side face.切 the piston.⑹.white the other. based on the.' bearing axle {7) through the spring bearing disc (9) and snap ring (8). When the pressure oil enters the. right oil chamber of piston (5) via the oil duct A, th6 piston overcomes the spring force and shifts left and clamps ail the driving discs are driven discs. The clutch is jointed to transmit the power.

2) Drive hydraulic system (Figure 2-5)

The speed gear oil pump (12) located at the front end <5f the engine sucks the oil from the crankcase sump of the gear box via the filter screen (3). Via the oil filter (11), the pressure oil output from the gear pump enters the main pressure regulator valve (6). The oil entering the main pressure regulator valve is divided two paths: one goes to the gear box control valve(5) (oil pressure； 1.2r1.4Mpa); the other enters, via the main pressure regulator valve, the hydraulic torque converter (1) (oil pressure: 0.4~0,55Mpa). Out from the torque converter (oil pressure: 0.15H>.25Mpa), it passes through the oil cooler (4) into the clutch hub to lubricate the bearing and gears and cool the friction discs of the clutch. It will eventually return to the gear box. In operation, the transmission oil temperature is normally at 90'C~95,C, while the maximum instant temperature should not exceed120t); otherwise, the engine should be stopped for cooling.

Structure and operating principle of the system's major components are introduced as follows:

a. Gear box control valve (Figure 2-6)

the gear box. control valve consist of speed valve, reversing valve and isolating valve and valve body, The speed valve consists of speed valve handle (2), spring (9) and steel ball (10), Pull the speed valve handle (2) to keep the gear box respectively in the first gear* neutral and second gear. Th6 reversing valve -consists of reversing valve handle (3), spring (4) and steel ball. Pull the reversing valve handle (3) to Keep the gear box respectively in the advance gear, neutral and reverse gear.

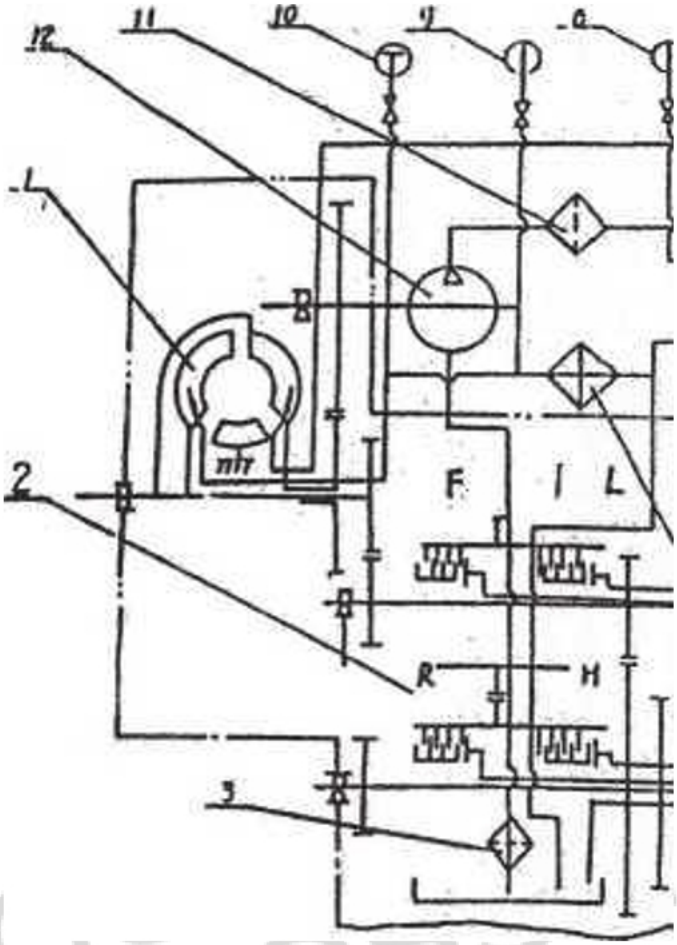


Figure 2-5: Torque Convertor-Gear Box Oil Duct

1. Hydraulic torque converter, 2, Got box; 3. filter screen, 4. Cooler, 5 Gear box control valve, 6. Main pressure regulator valve, 7.8.9. Pressure meter; 10 Thermometer; 11.Oil filler. 12. Oil pump

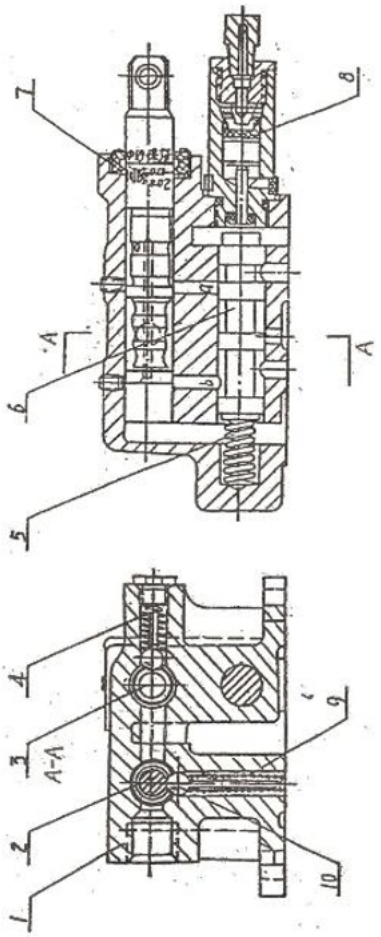


Figure 2-6:Gear Box Control Valve
1.Valve body;2.speed valve handle;3.reversing valve handle;4.5.&9spring.6.cut off valve.7.cut-off piston;11;steel ball

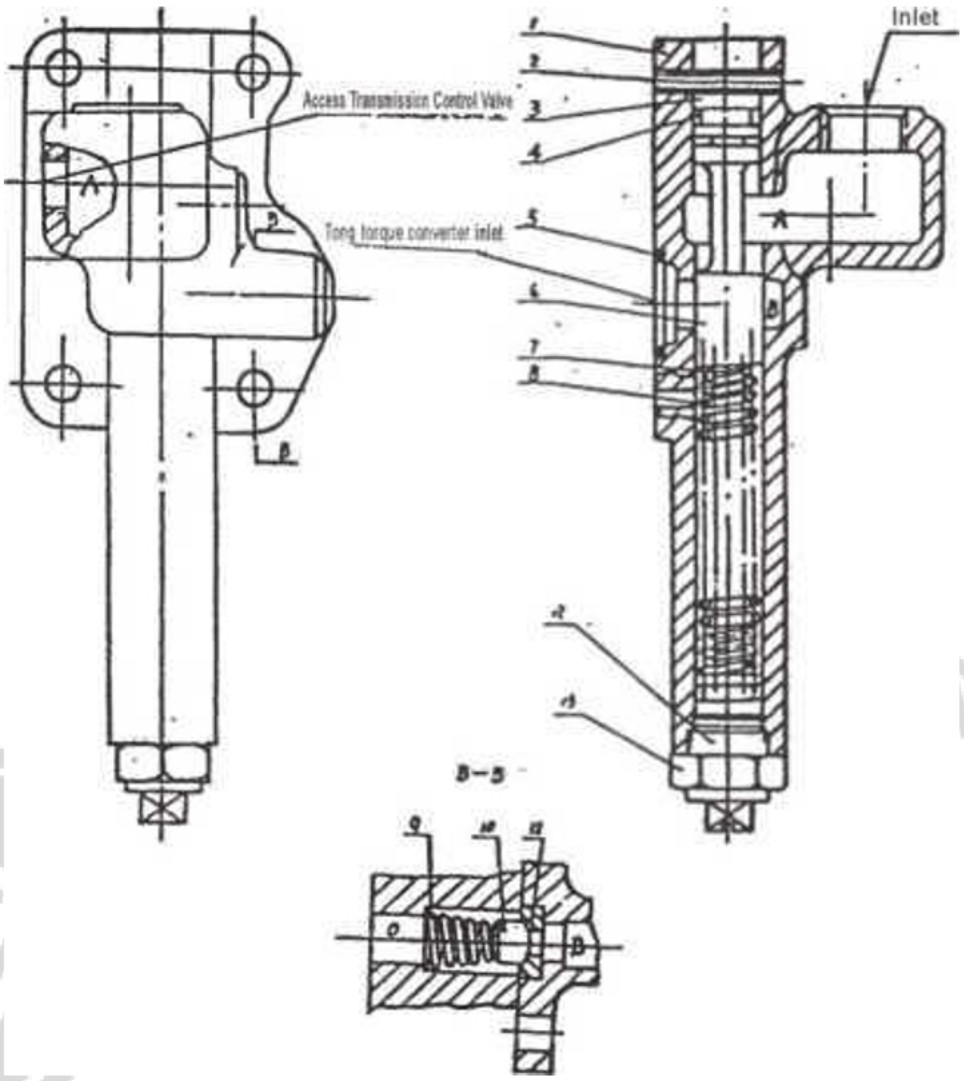
The reversing Valve and speed valve are integrated for Advance I and II, Reverse I and II. For instance, with the reversing valve handle (3) pulled out. the pressure oil from the main pressure regulator valve enters the reversing valve and passes through Hole-a into the advance dutch of the gear box. The pressure oil pushes the pistons so that the driving and driven friction discs of the clutch are jointed, while

the gear box is put into the advance gear. Keep the speed valve handle in the position of the first gear or second gear so that the speed will be Advance I and Advance II. Similarly, with the reversing valve pushed forward, the pressure oil flows through Hole-b into the reverse clutch of the gear box. The pressure oil pushes the pistons to joint the driving and driven discs of the clutch, while the gear box is the reverse gear. With the speed valve handle in the position of the first gear or second gear the speed will be Reverse I or Reverse II.

Isolating valve: isolating valve consists of control valve assembly, spool (6) and spring (5)*.With the loader traveling in a normal condition without applying the brake pedal, the isolating valve is in the central position. When the driver applies the brake pedal, the pressure oil from the braking system enters the oil chamber of the control valve to push the piston (8) which Will push the man drill to move the spool (6) and compress the spring (5).in this way, the isolating valve spool cut off the oil duct (Hole-a b) of the reversing valve to the gear box dutch so that the advance or reverse clutch is isolated, without transmitting the power. It is not only benefited for the loader's braking, but also applies all the power to the working devices when. the loader is in the mode of spading and loading.

b. Main pressure regulator valve (Figure 2-7)

The main pressure regulator valve consists mainly of the valve body (1), pool(6)， spring(7,8).and spillover valve's ball valve (10) and cone spring (9). Via Chamber A of the main pressure regulator valve, the pressure oil from the gear pump flows to the gear box control valve. When the pressure of Chamber A exceeds 1.1 Mpa, the oil liquid overcomes the effort of the spring (7,8) to push the spool (6) downward and open Chamber B. Via. Chamber B, the oil liquid enters the hydraulic torque converter. When the oil pressure of Chamber B Exceeds 0.4 Mpa, the ball valve (10) is open to return the surplus oil back to the oil tank.



(Figure 2-7} diagram the main relief valve

1,valve body 2, flexible pin 3, block 4,5, O-ring

6, spool 7,8 Spring 9,. conical springs 10.ball valve

11,valve seat 12,: adjustment, screw 13, nut

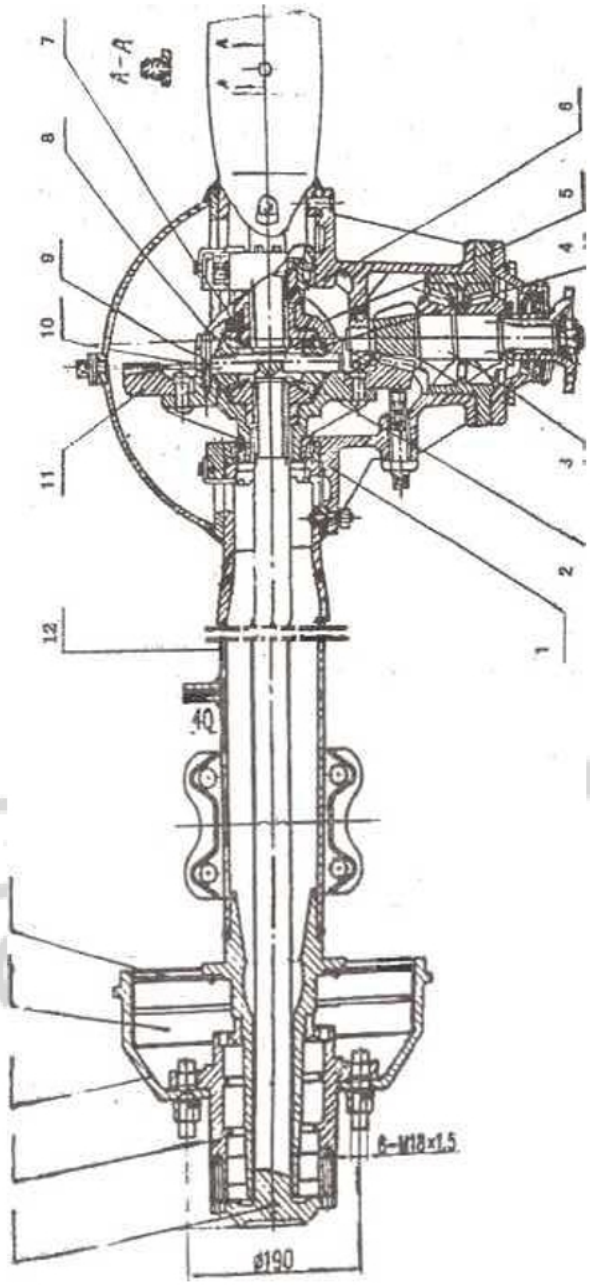


Figure 2-8: Structure of Driving Axle

1 Main retarder gear, 2. Diff, 3. Driving bevel gear, 4. Differential gear, 5. semi axis, 6, Diff right, 7. Earth axis gear washer, 8, Planet gear washer, 9. Bolt, 10. Differential gear shaft (cross axle), 11. Driven bevel gear, 12.Driving axle outer covering 13. Brake plate, 14. Brake disc, 15. Brake hub, 16. Rim 17, Semi axis

3) Driving axle

The loader is the full drive: the front axle and rear axle are both driving axles. The difference between the front axle and rear axle is the different spiral direction of the spiral bevel gear pair in the main drive. The spiral bevel gear rotates left-wise for the front axle and right-wise for the rear axle.

The structure of driving axle (as shown in Figure 2-8): composed mainly of axle hoeing, main retrace and diff assembly, series axis, etc. The axle housing is installed on the frame, bearing the load from the frame and transmitting the same to the wheels. The axle housing is also the main retarder. The semi axis is installed on the supporting mass. The main retarder is the 1-stage spiral bevel gear retarder, transmitting the torque and movement from the drive shaft. Diff consists of two cone-shaped straight teeth semi axis gears (5), cross axle (2) and four cone-shaped straight teeth differential gears (4)* left and right diff cases (2, 6) It plays a differential role for the different speeds of the left and right wheels and transmits the torque and movement of the main retarder to the semi axis that is linked to the hub (6) with the double-screw bolt.

Operating principle (as shown in Figure 2-9): via the driving spiral gear (7), the drive shaft (8) drives the driven bevel gear (6) and thus the torque is transmitted to the driven bevel gear. Via the left and right diff cases (1) assembled with the driven bevel gear, the torque is transmitted to the cross axle(2) and then, via the four differential bevel gears (3) installed on the cross axle, to the left and right cone-shaped semi axis gears (4), If the left and right wheels have the same speed (i.e., the ground has the equal drag torque on the axis of the semi axis), the no relative movement will not occur between the semi axis gears of the differential gear, as if the left and right driving wheels are linked together with one single axle. But； when the vehicle makes a turn or travels on the uneven road and the different speeds are required for the left and right wheels (i.e., when the ground has different drag torques on the axis of the left and right semi axis, the difference is greater than the torque required for the differential gear), the differential gear rotates around its own axis so that the left and right wheels have different speeds for a differential role. Via the semi axis (5), the power is transmitted to the wheel (9) to keep the loader to travel.

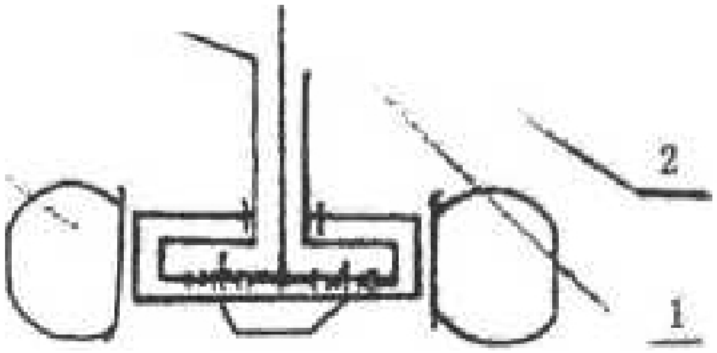


Figure 2-9: Illustration of Drive Axle

I. Difi 2. Differential gear axle (cross axle) 3. Differential bevel gear, 5. semi axis, 6. Driven Bevel Gear 7. Driving bevel gear, 8. Drive shaft 9 Wheel

Adjustment and service of driving axle should be carried out as per following requirements:

a. The tooth side clearance for the driving and driven spiral bevel gear is 0.20~0.34mm, with a variation not greater than 0.15mm. The tooth side clearance can be adjusted through the diff nut;

b. The clearance of the bearings on the two ends of driven bevel gear is adjusted with the driving diff nut to keep the axial clearance at 0.10-0.15mm.

C. The gear contact area of the driving and driven spiral bevels should be ensured at 60% along the tine length direction and 50% along the tine height direction, while the contact position should be in the center of tooth face and close to the tip end;

d. With the main driving mechanism running about 1200 hours, change the lubricant once and select the lubricant of relevant brands according to different regions and seasons,

4) Drive shaft

The drive shaft consists mainly of universal joint, expansion bend and drive shaft. The universal joint consists of universal joint folic (1), snap ring (2), roller ptn(3), cross axle(6) universal joint sleeve fork (8) (see Figure 2-10), with the main function to, when the angle changes, transmit the torque and rotate. The expansion bend is composed of one pair of internal and external- splines so as to allow the expansion of the total drive shaft length, but the length of the splines should ensure that in any operation conditions, the drive shaft will not drop off or dieback. The drive shaft pipe is the round tube made of rolled steel plates, which is used to transmit the torque for rotation.

For adjustment and service of drive shaft, attention should be given to:

a. The spline shaft and cross axle must be regularly injected with grease lubricant;

b. Check the tightness of the fixing bolts for the drive shaft when the vehicle is under service;

c. Keep the universal joint forks on the two ends of the drive shaft at the same level and mark the same with arrow symbols to avoid the malposition it dismantling and repairing.

3. Steering system

The loader's steering and working devices adopt the common-pump split system. The steering system consists mainly of the load-sensing full hydraulic steering device, priority valve, steering hydraulic cylinder, oil pipe and the operating oil tank and oil pump shared with the operating hydraulic system. Figure 2*11 illustrates its operating principle.

The pressure oil sourced from the oil pump first goes to the priority valve. Disregarding the load pressure and speed of the steering wheel, the priority valve first allocates the flow for the steering device and ensures the adequate oil for steering for a smooth and reliable steering, while the surplus oil can all be supplied to the working device's hydraulic system for use so as to eliminate the power loss due to the excess oil supply of the steering oil channel and to raise the system's efficiency.

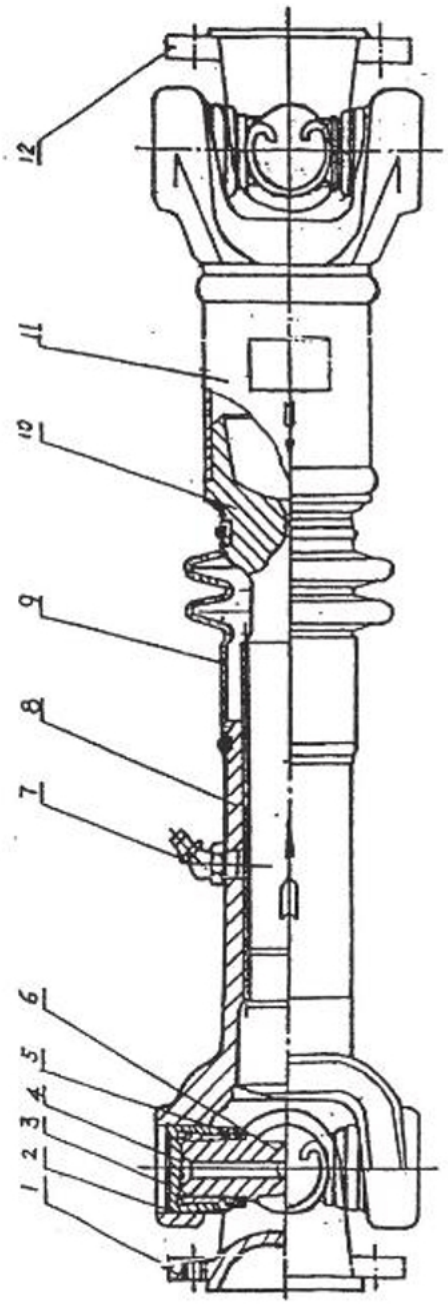


Figure 2-10: Universal Joint Drive Shaft
1. & 12. Universal joint fork, 2. Snap ring, 3. Roller pin, 4. Sleeve, S. Calicut oil seal, 6. Cross axle 7, Grease fitting, 8. Universal joint sleeve fork. 9. Anti-dust sleeve. 10. Drive shaft pipe. 11. Universal joint fork

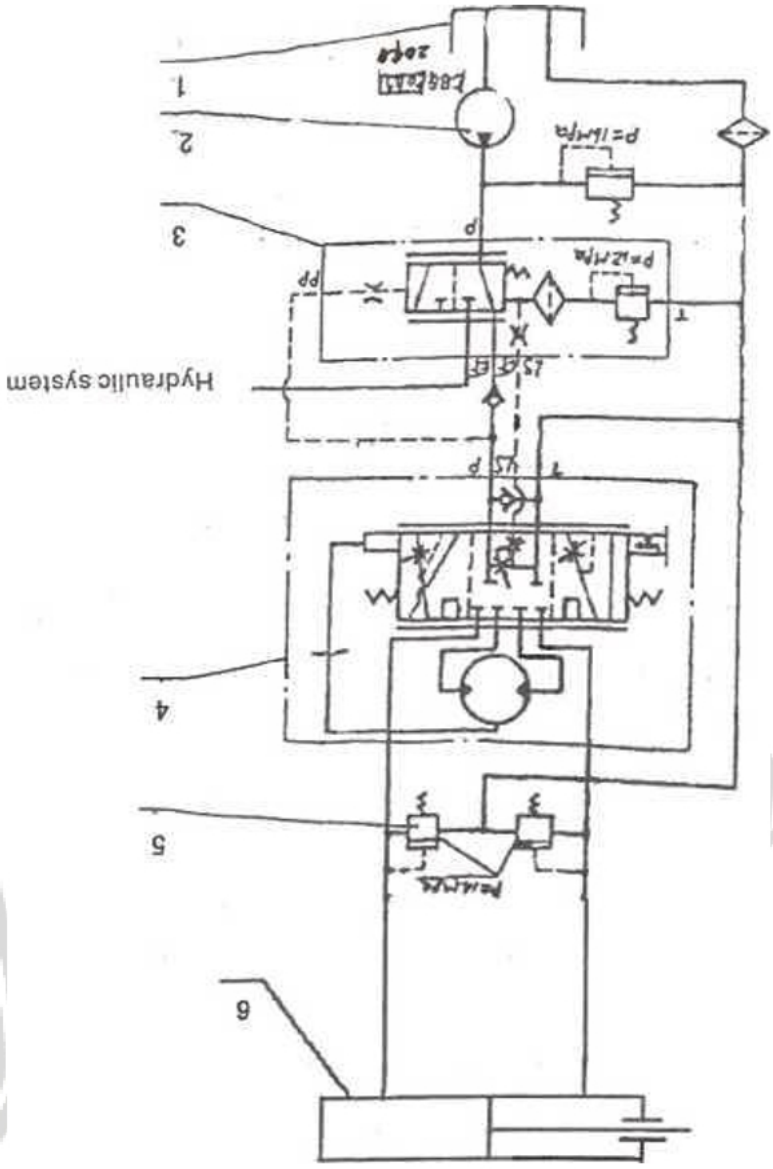


Figure 2-11:steering hydraulic system

1. oil tank 2.oil pump 3.priority valve 4.load-sensing steering device 5.spillover safety valve 6.steering hydraulic cylinder

On the in-line of the steering device installed is the one-way valve used to prevent the steering hydraulic cylinder oil from flowing backward into the steering device and causing the steering wheel to turn back. When the steering wheel turns left, via the load-sensing full hydraulic steering device, the oil enters the chamber of the steering hydraulic cylinder to turn the loader to the left; when the steering wheel turns to the right, via the load-sensing full hydraulic steering device, the oil enters the chamber of the steering hydraulic cylinder to turn the loader to the right If the wheels encounter any obstructer or when the steering hydraulic cylinder is in the extreme position and the system's oil pressure exceeds Imps, the spillover valve fixed or> the oil intake and outgo face of the steering device can ensue the out loading and the oil returns to the oil tank to avoid the overload of the system.

4.Hydraulic System of Working Device.

The loader's working device hydraulic system consists mainly of the gear pump, priority valve, multi-way reversing valve, boom hydraulic cylinder, tipper hopper hydraulic cylinder, operating oil tank and pipeline. (See Figure.2-12)

Via the priority valve from the gear pump, the pressure oil reaches the mufti-way reversing valve. By operating the relevant slide valve, the oil liquid is transmitted to the boom's hydraulic cylinder or tipper hopper's hydraulic cylinder. With the working device idling, via the oil duct in the multi-way reversing valve and filter, the oil liquid returns to the oil tank.

The major components of the system are introduced as follows:

1) Multi-way reversing valve (Figure 2-13): it is a separation multi-way reversing valve, composed mainly of the safety valve(i), filling valve body (2), tipper hopper's reversing valve (3), boom's reversing valve(4) and return valve body (5). Between the reversing valves of the tipper hopper and boom, the series-parallel connection is used to link the oil channel. Th? tipper hopper's reversing valve is the trio location valve with offsetting spring. It has Chambers Po, P, O and A, B. With the valve handle in the center, Po flows back to the oil tank via the oil duct between Chamber O (see Section A-A) and the valve handle. With the valve handle moved, the oil duct in the valve handle is cut off. When the oil pressure at the inlet of the multi-way valve rises, the high pressure oil of Chamber Po will open the one-way valve (16) to enter the two chambers P and then enters the operating chambers A or B, while the oil returning from the operating hydraulic cylinder will enter Chamber O and return to the oil tank.

When the Machine's working device lifts the bodri, it is necessary to extend automatically the tipper hopper's hydraulic cylinder; otherwise, it will be difficult for the four-bar linkage to move. Thus, the tipper hopper's reversing valve is installed with two overload slippage valves in the same structure with the safely valve: one is used to avoid overload and the other is used to supplement oil to the system to avoid any vacuum.

The boom's reversing valve is a four-position valve with the steel ball orientation. Its structure and operating principle is similar to that of the bucket's reversing valve. The only difference is the slide valve has one additional floating position fully connected with Chamber A, B and Chamber O,

The safety valve is a leading spillover valve, also named as variable damping safety valve. Under the very weak spring (9) and oil pressure, the main spool (8) is lightly pressed on the sleeve (7) that is in turn tightly pressed on the valve stand (10). They jointly separate the reversing valve's operating oil chamber A or return chamber o.

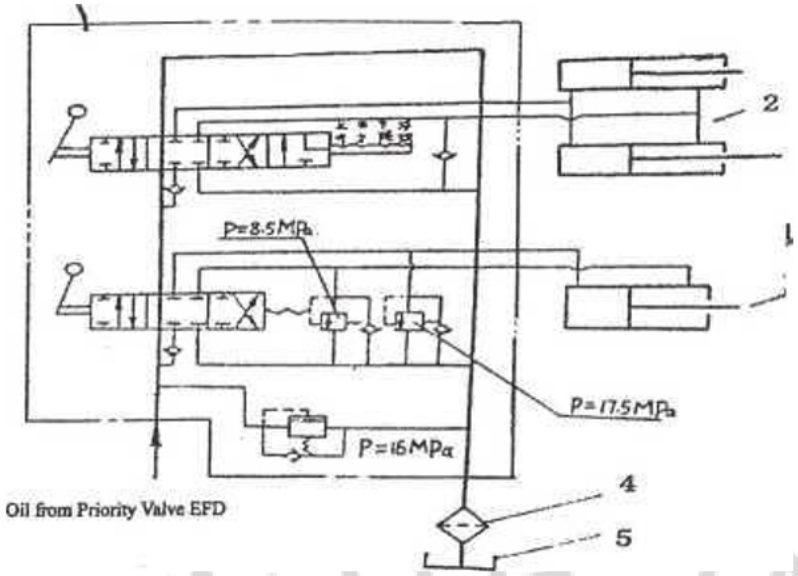


Figure 2-12: Operating Device Hydraulic System
1, Damping cylinder, 2. Lifting cylinder, 3. Distribution valve 4. Filter, 5.Oil tank

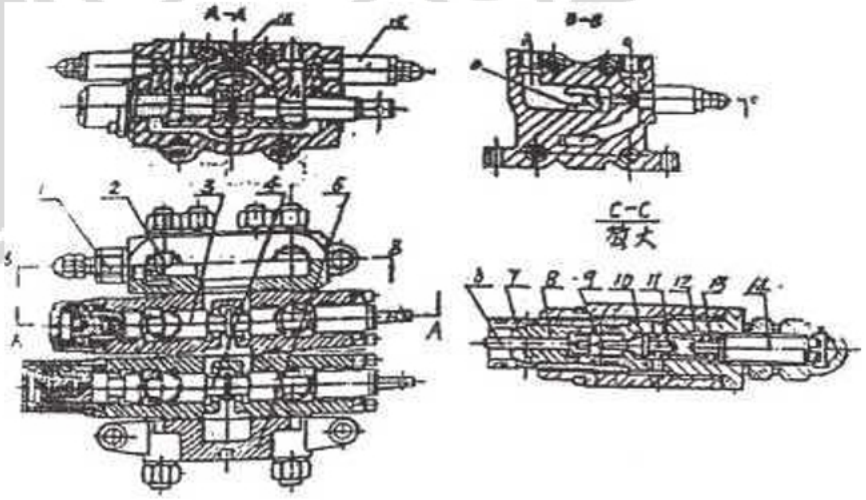


Figure 2-13; Multi-way Reversing Valve
1.Safety valve, 2. Filling valve body, 3. Tipper hopper reversing valve 4, Boom reversing valve, 5-Retun valve body, .6.side valve 7. Sleeve, 8. Main valve element 9 &13. Spring 10. Valve, stand 11. Leading valve element
12, Valve body, 14 Adjusting bolt, 15. Passing & Filling Valve, 16. One-way valve

When the. oil pressure Chamber A exceeds the valve's set pressure, the leading spool (11) is

open. The oil passes the center bore of the slide valve (6). With the small resistance, the oil pressure of Chamber a is slightly lower than that of Chamber A. Under this pressure differential, the slide valve overcomes the function of tie spring (9) and shifts to the right till being close will the pilot valve. The applied force of oil pressure in Chamber A on the slide valve is directly transmitted to the pilot valve so that it is further open. On the other hand, since the pilot valve chokes the center bore of the slide valve, the oil can only flow through the gap between the slide valve and main spool. The gap's antihunt action is far greater titian that of the slide valve's center bore. Therefore, the oil pressure of chamber a drops rapidly, while the sleeve is rapidly open under the pressure differential of Chambers A and a.

In the normal operation, when the oil pressure of Chamber A is higher than Chamber O, the sleeve, main spool and slide valve are tightly pressed on the valve stand. When the oil pressure of Chamber A is lower than that of Chamber O, the sleeve, main spool and slide valve will be open under this pressure differential like a common one-way valve to supplement oil from Chamber 0 to Chamber A.

2) Hydraulic cylinder (Figure 2-14): for the loader, all the hydraulic cylinder structures have basically the same principle and are all the double-acting single-rod piston hydraulic cylinder, which is composed mainly of cylinder end (1), cylinder barrel (4), piston (2), cylinder rod (5) and sealants. When the pressure oil passes through the multi-way reversing valve into Oil Duct a, the oil liquid pushes the piston to right The oil liquid on the right of the piston flows back, via oil duct b, to the oil tank and the cylinder rod portends. Similarly, when oil duct b take in oil and Duct a returns oil, ttie piston shifts to the left and the cylinder rod draws back. Since the cylinder rod and piston are linked together, the oil pressure differs from the acting area on both sides of the piston. Under the same oil pressure, the left side of the piston receives bigger acting force.

3) Gear pump (Figure 2-15): the wooing device's hydraulic system and the steering hydraulic system share one common gear pump , with the operating pressure as 16 Mpa and flow as 40ml/r.

The pump is a axial clearance fixed external gearing pump, with a general structure of three-disc combination. Between the gear end face and side board, there is certain axial clearance. Between the gear's outer diameter and pump body's internal hole, there is certain diametral clearance. It consists mainly of the front pump cover (4), rear pump cover (9), pump body (7), driving gear(3), driven gear (14) etc.

With the oil pump in operation, the driving gear rotates to increase the pump's oil chamber volume. Vacuum is formed regionally between the two gears and, under the atmosphere pressure, the oil liquid enters the pump's suction chamber. The oil liquid between the two gears is closed by the side pump inner chamber. With the gear rotating, the oil liquid is brought to the oil chamber. On the outlet chamber of the pump, it is meshed mutually due to the continual rotation of the gear. The capacity of the oil chamber is gradually squeezed to small and the oil liquid is discharged through the oil outlets. Under the external load, the oil pressure is generated.

With the oil pump operating, through the axial gap, the hydraulic oil flows into the bearing for lubrication. Via the oil ducts of front and rear pump covers and the oil hole of the side boards, the oil liquid flowing into the tip end of the seal rings will flow back to the oil suction chamber. In order to reduce the internal leakage of the pump, maintain the required operating pressure and raise the pump's volume efficiency, a seal ring is installed at the two ends of the driving gear. With the hydraulic oil acting, the big

end face of the seal ring is closely adjacent to the ring face of the front and rear pump covers for the sealing purpose. Due to the gap control, the oil liquid from the seal ring's inner hole and driving gear's gap produces comparatively big pressure fall and thus reduces the leakage volume, eliminates the axial force and ensures the normal operation of the pump. At the junction of the pump body of cover installed is the large 0 gasket to avoid the external leakage, while the bearing is installed with the small gasket to avoid the internal leakage. The front pump cover is installed with the self-tightening oil seal to avoid air suction and external leakage. The check ring is used to control the axial movement of the oil seal.

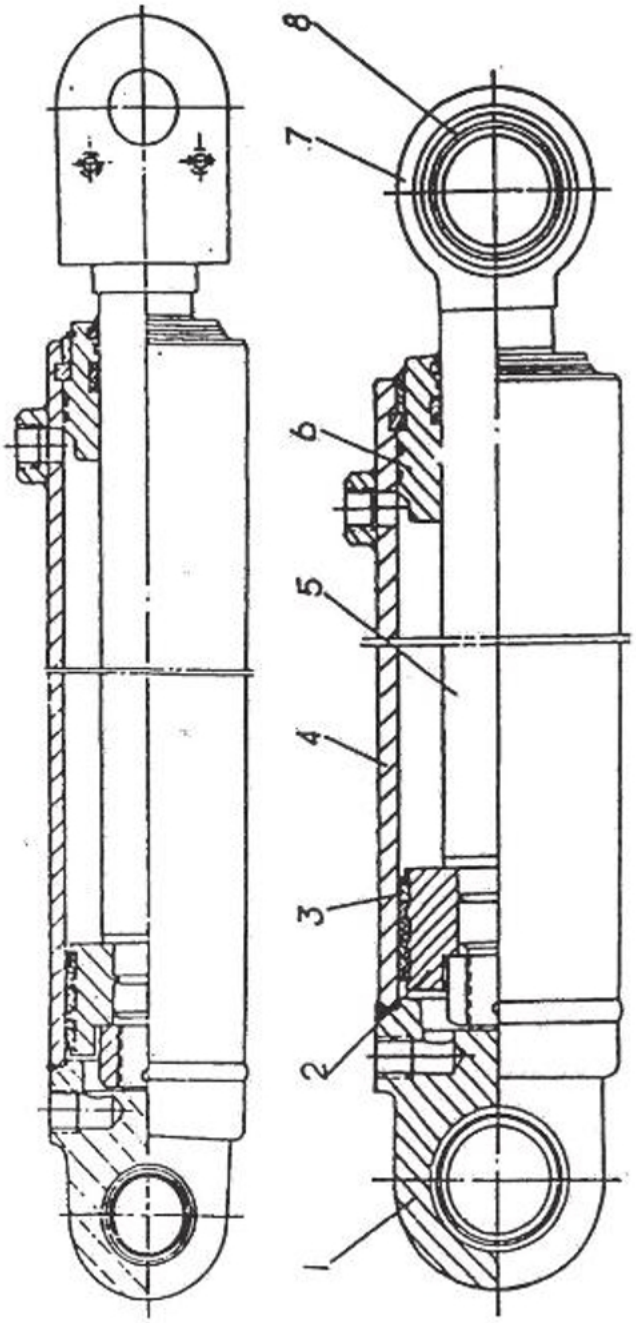


Figure 2-14: Illustration for Hydraulic Cylinder of Boom and Rotating Bucket
1. Cylinder end, 2, Piston, 3. Y-type Seal Ring, 4. Cylinder Barrel, 5.Cylinder Rod, 6. Guide sleeve, 7. Ear ring, S. Joint Bearing

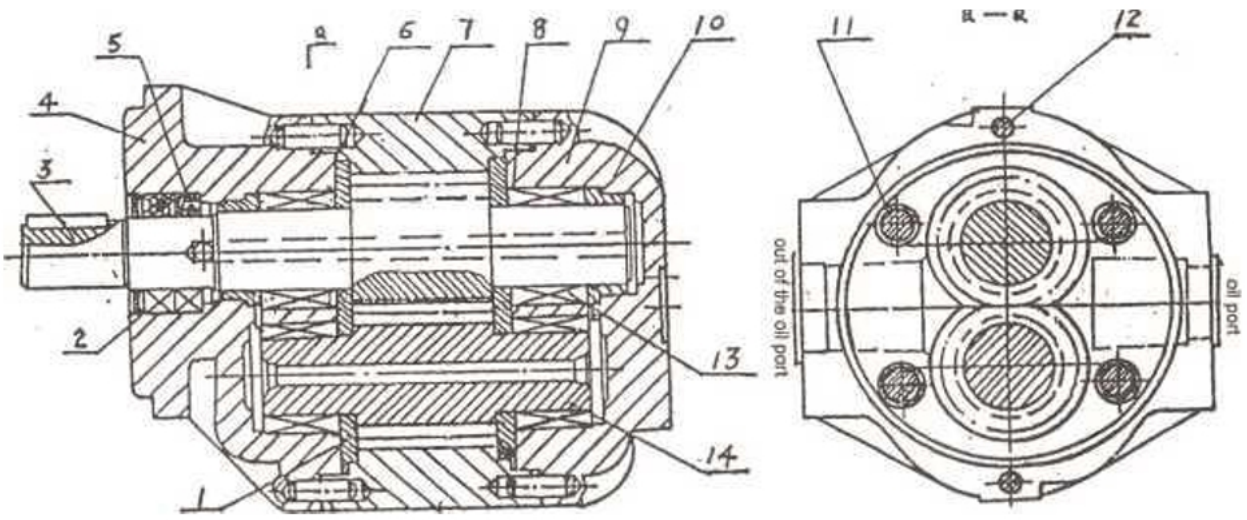


Figure 2-15: Illustration for Gear Pump Structure

1. Side panel, 2. Check ring, 3. Driving gear, 4. front pump cover, 5. Self-tight oil seal, 6.0-Ring Seal, 7. Pump body, 8. Seal ring, 9 Rear pump cover, 10.Seal ring ,11, Bolt, 12, Roller pin, 13. Roller bearing 14. driven gear

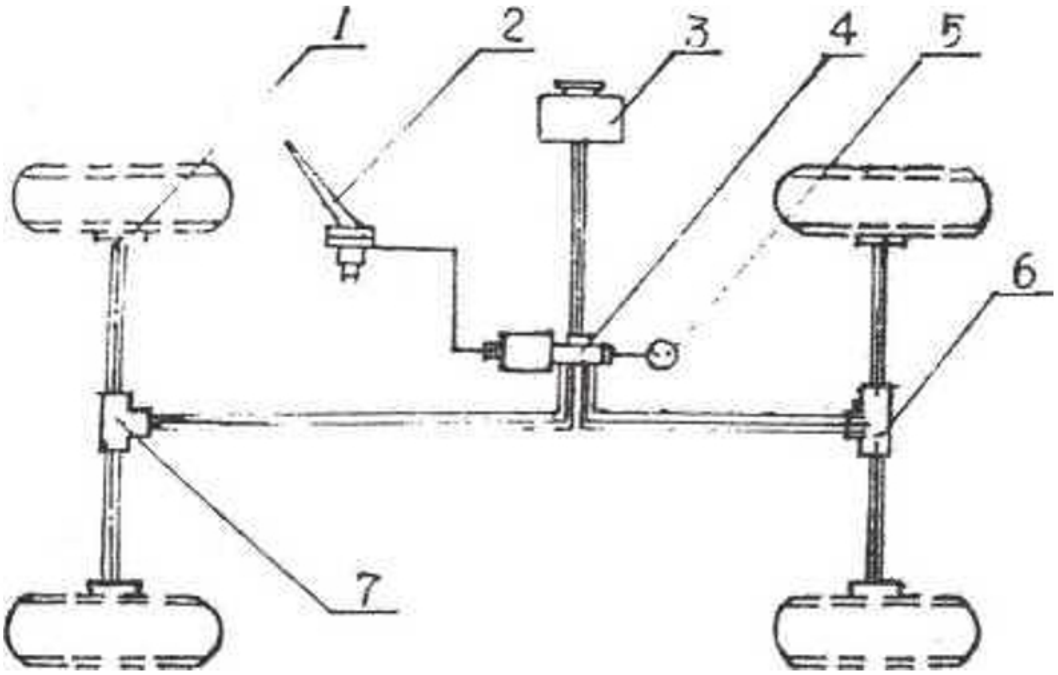


Figure 2-16: Illustrative Diagram for Braking System

1. Shoe brake 2. Brake pedal 3. Oil cup .4. Brake pump, 5. Brake switch 6\7 Tee coupling

The loader's braking system includes the foot braking system and hand braking system which the two independent braking systems. The foot brake system adopts the compressed-air oil-braking four-wheel shoe brake (see Figure 2-16) to push the braking liquid into the brake auxiliary cylinder of the shoe brake for the braking purpose. The hand brake system is used when the driver is off the vehicle or parked on the slope, while the parking brake adopts the external beam drum hand brake.

1) Hand brake

The extremal bream drum hand brake is adopted to brake the out shaft Of the gear box for parking file vehicle on the slope. The hand brake is linked with the hand brake joystick through the steel wire.

For braking, the hand brake joystick is used to pull the steel wire that the friction discs are end a sped to press tight on the brake hub for the purpose of braking. To cancel the braking, return the hand brake joystick to the original position to eliminate the tension. With the spring, the friction discs return to the original position so that with the spring, the friction discs resume the original position and are separated from the brake hub.

Instruction for operation of foot brake system:

1. Fill the brake master cylinder's oil cup with the mineral brake fluid. If the brake fluid is found insufficient, add timely. The oil cup top should a small hole for connection with the atmosphere.

2. The hydraulic system mixed with gas will influence the braking performance. The gas should be relieved upon changing the parts and cleaning the system, in the following way:

a. Clean the begrime from the hydraulic circuit, oil cup, oil intake and deflating valve;

b. Fill up the reservoir compartment with the brake fluid;

c. On the deflating valve: place the transparent pipe for deflating, one end of which is put into the oil tray to collect the discharged oil liquid;

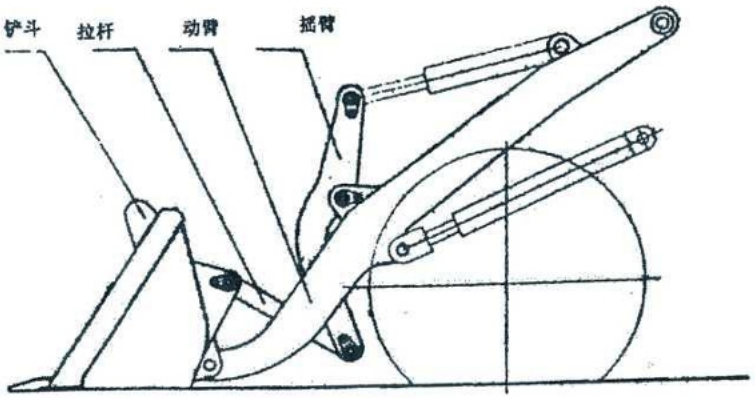
d. Release the deflating valve and push down the brake pedal continually till discharging to the fluid column without any foam. Screw tight the deflating valve and then release the brake pedal. For deflation, the oil level of the reservoir compartment is lower than the specified value, timely fill up to avoid gas from entering the system.

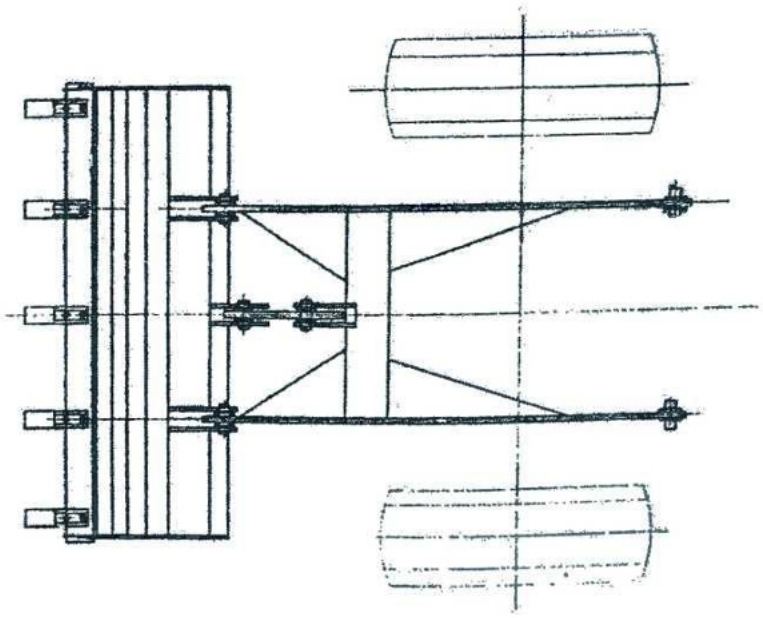
6.Working Device and Frame

1) Working device

The Machine's working device consists mainly of the bucket, tension rod, boom, beam, rocker, etc (see Figure 2-17). The rotating bucket mechanism uses the structure of BZ° shape reversal, single rocker and single tension rod. It is featured for the bigger unloading distance and up angle of the lifting bucket, fine translatability of the bucket, easy to fill up the bucket and no drop in lifting. Upon unloading at the highest position and then directly falling to the lowest position, the bucket will be automatically in the spading mode. The boom is of the single-plate structure.’ The rear end is based on the front frame, the. front end is linked with the bucket and central part is linked with the boom hydraulic cylinder. When the boom hydraulic cylinder stretches out and draws back, it keeps the rocker rotating around its central supporting point. Through the connection with tension rod, it keeps the bucket rotating up and down and cooperates with the boom in lifting and the vehicle in advancing and reversing to complete all the operations. The bucket is the level bucket with teeth. The bucket teeth are fixed to the main blade with double-screw bolts. The wom-out teeth can be changed. If the main blade is seriously worn out, cutting and replacement can be carried out.

The working device has the link joint of bucket and boom, bucket and tension rod, tension rod arid rocker, rocker .and boom, boom and frame, boom and hydraulic cylinder and rocker and hydraulic, cylinder, while the assembly gap is 0.18~0.34mm, In operation, wearing occurs between pin roll and bush. With the gap exceeding 0.6~0.7, the bushes or pin rolls should be changed.





Bucket Pull rod Boom Rocker

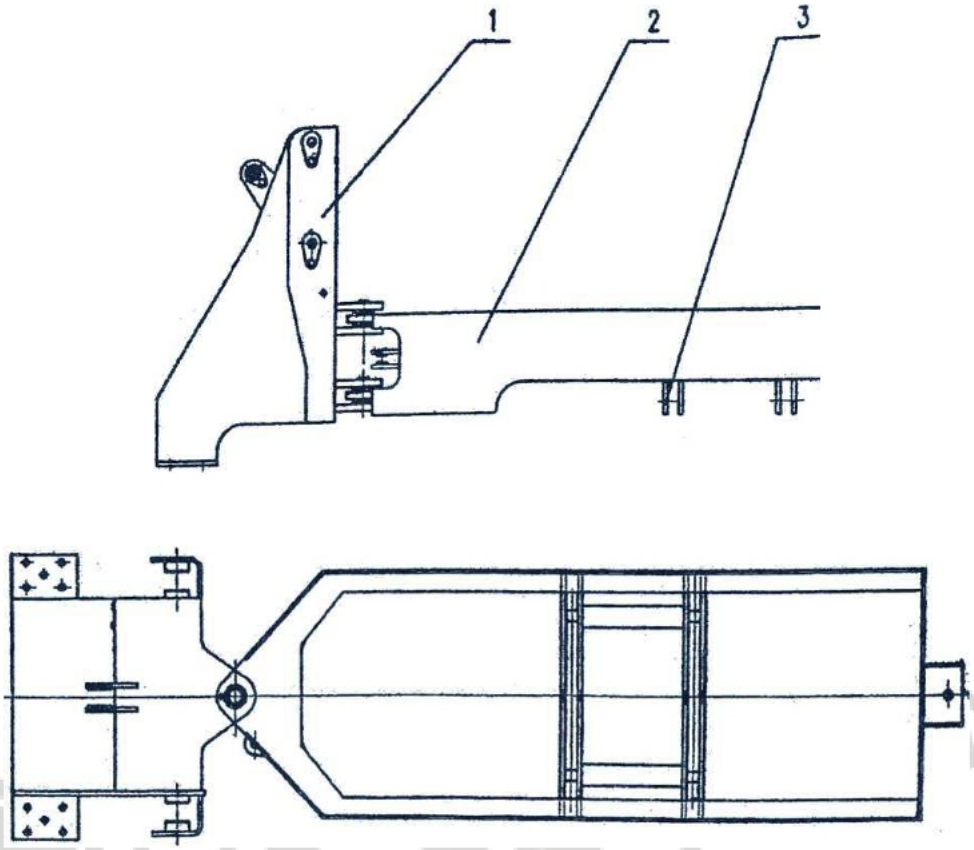


Figure 2-18: Frame Structure
1. Front frame 2. Rear frame 3, Rocker

1) Frame

The frame is the base for connection and installation of alt the machine's parts, consisting mainly of front frame and rear frame. Additionally, the rear frame is equipped with the rockers (see Figure 2-1S). The front and rear frames are hinged with pin rolls. The front frame is positioned on the front axle and is allocated with the working devices. The rear frame is linked with rear axle through the rockers, where installed are the engine, torque converter, gear box, cab, control mechanism. The steering mechanism is used to keep the front and rear frames rotating around the jointed shaft. The rear frame and rockers are linked with pin rolls. The rocker can move up and down at 12° in line with the center of the jointed shaft so that the can travel on the uneven roads but still with fine stability.

7. Electric System

The Machine's electric system has a rated voltage of 24V DC, single-wire system and negative ground

The electric system includes the power supply, start-off system, lighting and signaling system, etc. (Figure 2-19 shows the principle of electric system).

1) Power suppler

Including battery, generator, voltage regulator, ammeter, etc. The tottery is 6-Q-75 Model; rated capacity: 75Ah; voltage: 12V. The tow batteries are in parallel for use, with negative ground. The rated output power 24V!

The silicon rectifier generator is of JF 2314Y Model: rated voltage: 28V, rated power 350W, and FT211 Model voltage regulator. The generator and battery are in parallel to supply electricity to the load. When the engine runs at a high speed, in addition to power supply to the load, the generator also rediarges the battery, while the recharge voltage is controlled by the voltage regulator.

Ammeter is used to detect the recharge and discharge position of the battery. The indicator sways to "+• to indicate the recharge and to indicate the discharge.

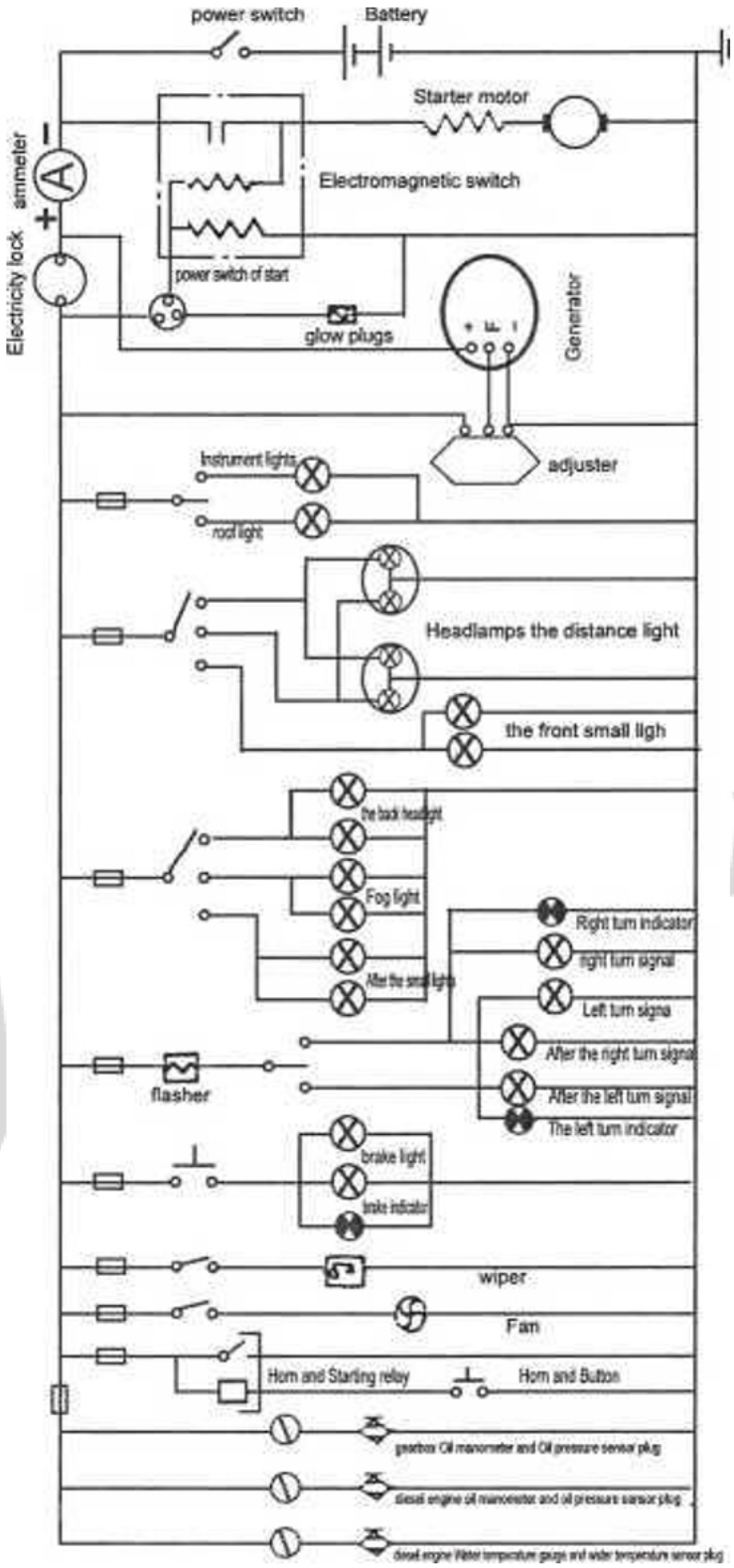


Figure 2-19:IIIustrative Diagram For Loader Electric System

2) start-up system

QD251a model start-up motor is a DC series moto.voltage:24v and power:3.7kw.it is

equipped with the electromagnetic gearing device and unidirectional buff clutch to prevent any damage due to the high-speed running of the armature after the diesel engine is started

After the power supply is connected with the magnetic coil through the start-up switch, due to the electromagnetic function, the wire iron element is sucked in so that the driving gear is meshed with the flywheel through the lever and the circuit for the start-up motor is connected to run the start-up motor to drive the flywheel to rotate. With the start-up switch off, the power supply is cut off for the electromagnetic coil and magnet is eliminated and the core returns to the original position so that the driving gear is sepa rated from the flywheel and the circuit 1$ cut off for the starter motor.

3) Lighting and signaling system

Lighting system includes the front and rear headlights, lamplit, i○p lamp, meter indicator, steering signal light, etc. Signaling system includes the horn, front and rear steering lights, stoplight, flash apparatus, sensor and meter.

instructions for electric system:

1.Check once weekly the battery's fluid feel and specific gravity; The fluid level should be about10~15mm higher than the polar plate. If the fluid level is low, add some quantity of stylized water. In summer, electrolyte fluid ratio should not be lower. In winter, it should not be lower than1.245, normal value: 1.25~1.26, winter. 1.28~1.29.

2.Normally, regularly check if the wire joints are loose and keep the same clean, timely change the damaged joint and broken cable. To ensure the recharge of the generator, it is also necessary to check and adjust the tension of the engine's fen belt

3.After operation every day or when parking for inspection, turn over the use the heater plug to heat the air in the cylinder for 10^-20 seconds.

5.the battery should be installed as close as possible, to the start-up. motor to reduce the connection cable length and avoid any excessive voltage drop. The voltage drop should not exceed 1 v normally, while the connecting conductor should use 35 mm2 low-voltage power cable.

6.to maintain the silicon rectifier generator, no grounded start-up mode shall be allowed to check if it generates to avoid burning the silicon rectifier elements.

7.The voltage regulator is a precision appliance aid should not be dismantled for adjustment If required, check and adjust on the special equipment With the engine off, immediately turn over the circuit key switch, to avoid the battery from discharging to the magnetic coil causing the electric loss of the battery and affecting the next start-up.

8.Since the start-up motor has a high current in running, the start-up time should end 10 seconds each time. In case of continual start-up, the lime gap should be a! leas 2 minutes, while the frequency should not exceed 10 times to avoid any damage to the start-up motor and battery.

9.If the engineers flywheel and start-up motor has not fully stopped, the next start-up is not allowed; otherwise it may damage the gear and gear ring of the start-up motor.

10.With the engine in operation, it is not allowed to turn off the power, for the circuit between the generator and battery will damage the generator

Chapter Three

Driving and Operating

1, Meters and Control Devices

All the Machine's control .devices .and meters are installed inside the cab as shown in Figure 3-1. As for the operation and functions of the control switch, meter, lights and control handles, see Table 3-1. Provision of front, rear* left and right directions shown in figures and tables are subject to the travel directive of the machine.

In operation, it is better to form a habit of checking frequently the meter panel and observe timely any abnormal conditions.

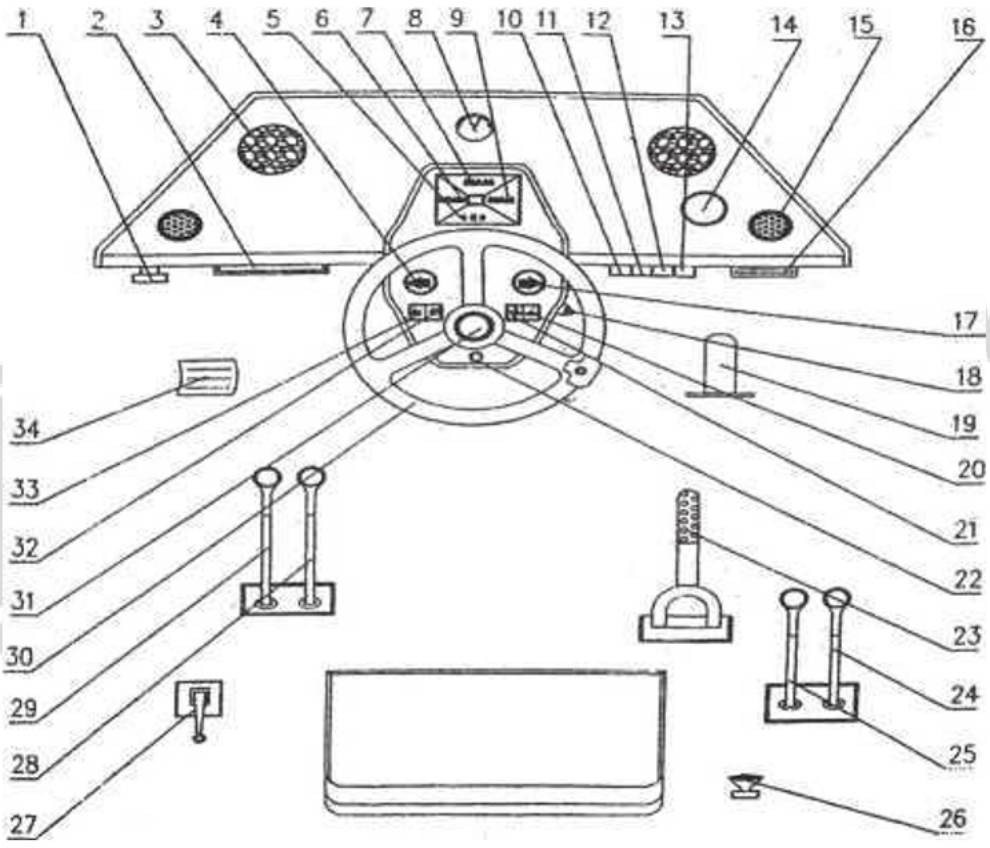


Figure 3-1:Loader's Operating Mechanism and Meters

Sr.No.	Name	Action and function
1	Lighter	Being pressed down. it will automatically eject and contact the power source for lighting a cigarette
2	Radio	Entertainment device in the cab
3	Speaker	Speaker for the radio
4	Left steering indicator	Lit to indicate the lest steering
5	Ammeter	Indicate the recharge and discharge of the battery with"+"meaning recharge and "+"discharge
6	Engine water thermometer	Indicate the firing temperature of the engine
7	Diesel meter	Note :additional function
8	Pressure gauge	Torque converters return oil pressure
9	Pressure gauge for engine oil	Display the engine oil pressure with the engine started
10	High beam and dipped headlights	Used to change the high-beam and dipped headlight
11	Travel light	On and off the travel light
12	Steering indicator	Used for conversion of left and right steering lights.
13	Standby	For additional functions
14	Cup stand	For holding water cup
15	A/C outlet	For ventilation when A.C is on
16	Ash tray	For keep the cigarette ash
17	Right steering indicator	Lit to indicate the right steering
18	Electric lock	Insert the key and turn clock wide to start and connect other power sours
19	Accelerator pedal	Control engine speed
20	Screen wiper	On and off the screen wiper
21	Fan	Pull the fan wire to turn on and off
22	Brake indicator	Lit to indicate the lighting of the rear brake light.
23	Hand brake handle	Lift up to brake and release down to release the brake
24	Bucket joystick	Push forward to decline the bucket and pull backward to return the bucket .keep in central position to resume the spring.
25	Boom joystick	Pull backward to lift the boom. push forward to low down the boom keep in the central position to resume the spring.
26	Power cutoff switch	Pull up to stop the engine.
27	Main power switch	Press down the handle to connect the power and lift up the handle to turn off the power
28	Change joystick	Push forward for advance pull backward for reverse and keep in central position for neutral
29	Shift joystick	Push forward for first gear pull backward for second gear and keep in the central position for neutral
30	Steering wheel	Turn the steering wheel antilock-wise to turn the vehicle left and clockwise to vehicle right

31	Horn button	Push down to horn
32	Antifreeze switch	On and off the fog lights at the four comers fo the cab
33	Rear light switch	On and off the read headlight
34	Accelerator pedal	Control engine speed

2.Running-in

To extend the lifespan 6f the loader, before operation, the new vehicle should be applied with running-in test so that all the friction part will have a running-in. This provision is also applicable the loader after the overhaul.

1)Idling operation should be kept for 8 hours in the following steps:

As per specifications, start the diesel engine, keep the engine running for 5 minutes at a low speed and then accelerate it to the top speed to run for 10 minutes;

Operate the working device's boom joystick and bucket joystick, to lift and drop th6 boom and dump and collect the bucket for about 10 minutes;

Travel without load, from low speed to high speed and keep the ruining-in for the advance gear and reverse gear.

2)Check the following items upon completion of trial operation without load:

(1) Check fully all the bolt and nuts, especially the bolts for the cylinder cover, exhaust pipe and front and rear driving axles, nuts for rims and connection bolts of the drive shaft;

(2) If the fan belt is properly tight;

(3)If any abnormal sound from the engine, torque (xinverter, gear box,, driving axle and components;

(4)Check Oil or water leakage of the working device's hydraulic system, drive hydraulic system, engine's lubricating and cooling system, braking system, engine's water cooling system;

(5)If the steering is flexible and the brake is sensitive and reliable;

(6)If the reading of ail meters is normal;

(7)If all the joysticks and accelerator's tension rods are property connected or loose;

(8)If any clamp in the action of the working device;

(9)If- the electric system's connections, meters, lights, signals and generator's recharge are normal;

3)Start the trial operation after completing the above checking and service. In operation, gradually increase the load, but the operation should be sharp. Make sure to observe the spading and loading capacity oil the loader for different materials- During the trial operation, also check the items specified for the test run.

4)(1)Change the engine lubricant and clean the engine filter with diesel；

(2)Change the oil of the torque converter, gear box and their oil-channel system and clean the filters;

(3)Change the oil in the working hydraulic system an clean the filter；

(4)Clean the front and real axles* main retarder and hub redactor and change the new oil;

(5)Eliminate the faults observed in the running-in period.

3. Driving and Operating

Before driving the machine, make sure to read the Manual and the engine's operating instructions so as to understand definitely about the machine's performance and structure, operating method, technical service and maintenance and get familiar with the location and function of all the joysticks and meters for safe driving and operation.

1)Check and prepare before dispatching:

(1)Add adequate cooling water into the water tank;

(2)Check if the engine lubricant is adequate;

(3)Check if oil for driving and operating hydraulic system is adequate;

(4)Fill up the engine;

(5)Cheek if the tires air pressure is sufficient and rim nuts are loose;

(6)Add adequate lubricant c» grease lubricant to all the lubrication parts.

2)Instructions for Operation:

(1)The filled diesel must be clean, while the diesel brand and number should comply with the quality requirement specified;

(2)The hydraulic transmission oil used for gear box and hydraulic torque converter and hydraulic oil used for wording device's hydraulic system must be clean and comply with the brand requirement;

(3)Carry out regular service and lubrication as per specification;

(4)With the engine started, keep it running without load till the water temperature reaches 55 before starting to travel;

(5)To operate the boom and bucket to the required position, keep the joystick in the central position;

(6)Only when the diesel ignite’s outlet water temperature reaches 55 "C and the engine oil temperature reaches can the full-load operation be allowed. In operation, die engine's water temperature should not exceed 90"C, the engine oil temperature should not exceed 95*0, and the torque converter's oil temperature should not exceed 120 "C,

(7)It is not allowed to lift the bucket t〇 the maximum height for shifting the materials. To shift the materials, it is necessary ‘to keep the' boot and the. link point in a ground clearance of 3'10mm for a steady travel.

3)Startup

(1)T\mi on the main power switch;

(2)The shift joystick and working device's joystick is kept in the central position and the hand brake joystick in the brake position;

(3) Insert the key into the electric switch and turn clockwise to the connection position;

(4)Push the accelerator pedal halfway, tum the startup switch to ^Start'* position for a startup. Each startup should not last more 15 seconds. If the engine foils to start within 15 seconds, wait for 2 minutes for trying again. If such start-up foils for four or five times, it is necessary to check and find out the fault reasons and eliminate the same before continuing with the startup;

(5)Upon starting, accelerate gradually to keep the engine at the speed of 1200-1400R/M and wan up tile it and make surfer if the indication of the engine meter is within the normal range;

(6)Where it is hard to start in winter, drain the cold water and add instead hot or boiled water before starting again. If necessary, fill the engine lubrication system with 70~80"C winter lubricant before starting. To start, make sure to observe the engine*s oil pressure and control properly the acceleration to avoid any block.

4)Travel and operation

Upon starting, run the engine without load to warm up for minutes. When the water temperature and oil temperature reaches 45 X； and above and all the meters indicate the normal

order and the engine's operating sound and exhausting becomes normal, release the brake ,

(1) Shovel and 1oad

The loader aches the pile yard at the speed of Ge^ II and shovels in the material pile at the s f Gear I. At this time, all the joysticks of the working device should be kept in the central position. On the hard and even cement floor, the boom joystick can be pushed to the most front float position and keep the bucket to the ground and approach the piled materials. The accelerator should be properly controlled ensure the adequate power without excessive slippery of the wheels to avoid shortening the lifetime of tires.

The loader shovels and excavates materials normally in the following modes:

a. One go shoveling (see Figure 3-2 a): the loader advances in a straight line keeping th6 front blade of the bucket penetrated into the bottom of the piled materials> When the penetration depth reaches the length of the bucket bottom, stop the loader and then use the rotating bucket's hydraulic cylinder t〇 turn up the bucket for filling up the bucket;

b. Shovel and excavate in sections (see Figure 3-2 b): it is to penetrate and lift in sections, as is mainly used for materials different for shoveling;

c. Excavation (see Figure 3-2 c). With the bucket inserted in to the material pile ^>out 1⁄3 of bottom length, stop advancing the loader and lift the boom. If is used for excavation of soil pile.

d. Combined shoveling and excavation (see Figure 3-2 d), advance the loader and place the bucket into the material pile not so deep (about 0.2-0.5 of hopper bottom length) and continue to advance the loader forward and rotate up the bucket or and (see Figure J-2e).

Note: High speed is not allowed to travel to the material pile. To shovel materials, the travel speed should be lower than 4 km/hour.

(2)Shifting .

With the bucket filled, up, reduce .the ace 丨 elation* Pull the operating joystick back to the “neutral” position and clutch in Reverse I to retreat from the material pile. If the haulage is comparatively, it is necessary to lift the bucket to the shifting position before traveling for a fine stability of the machine. If the dump truck is nearby, keep on lifting upon retreating till a proper height.

(3)Unloading

a. The boom lifts the bucket above the wagon and the loader approaches simultaneous the wagon at first gear;

b. When tile bucket is higher than the wagon and enters the unloading area, push slowly the dumping joystick to the position of ^Downward

c. Step down the brake pedal to stop the vehicle and continue to rotate the bucket till all the materials are unloaded. If the bucket is sticking with any material, pull forward and backward the dumping joystick. The bucket shakes several times to drop the materials;

d. Pull the dumping joystick to the position of Upward" to draw in the bucket. Keep the shift handle in the “Reverse” position and release the brake. The loader retreats backward. Upon retreating away from the wagon, put down the boom for an loading action.

(4)Unloading mode:

For the loader to cooperate with the dump truck in operation, the most common operating modes are as follows (see Figure 3-3):

a, ur-shape operating (see Figure 3-3 a). The dump truck moves forward and backward in

parallel with the operating area and the loader advances and reverses vertically with the operating area.

With the bucket filled up, the loader reverses in a straight line for a certain，distance. In reversing，the loader, lifts the bucket up to the unloading position and the dump truck reverses to a proper place vertically with the loader. After the bucket unloads, the dump truck advances for a certain distance and the loader travels forward to the material pile for loading the bucket to start the next job.

b, shape operating (see Figure 3~3 b): the dump truck is in a 60° angle with the operating area. Wide the bucket filled up, the loader reverses and turns 600,so that the loader is vertical with the dump truck. Then, lifting the boom, it travels towards the dump truck for unloaded^. Upon unloading, the loader moves away from the dump truck and turns around to travel

c, KL" shape operating (see Figure 3~3 c): with the dump truck being vertical with the operating area, the loader shovels and loads the materials and reverses and turns 90° before approaching the dump truck. The unloaded loader reverse and turns 90° and travels to the material pile for the next operation.

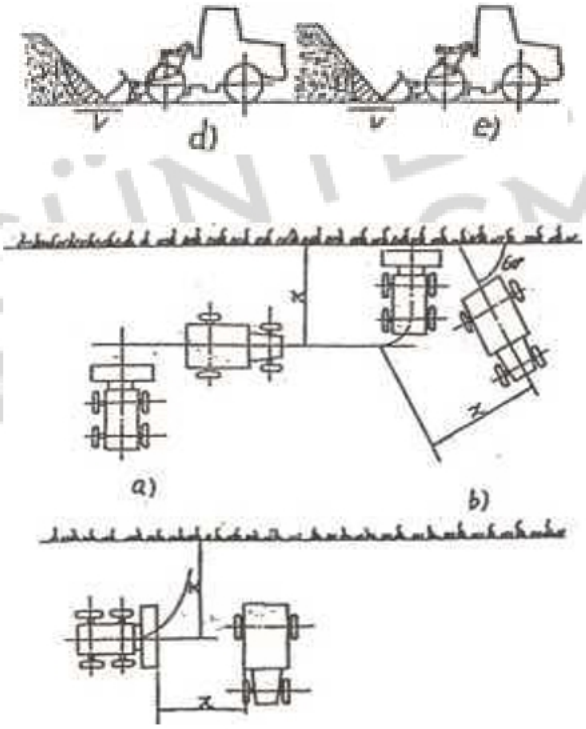


Figure 3-3:operating model of loader

5) Park and turn off the engine

(1)Reduce the engine speed and step down the brake pedal to stop the vehicle;

(2)Keep the gear shift lever in the neutral position;

(3)Release the brake pedal and pull tight the hand brake joystick;

⑷ Keep th6 6rt.gine. idling for.3.~5 tributes to cool all parts evenly.

(5)Keep the working device adjacent to the ground horizontally and the handles in the central position;

(6)Lift the cut-off hose to stop the engine before returning the cut-off hose to the original position;

(7)PUII out the electric key, pull down the main power switch and lock the door;

(8)Upon stopping in winter, it is necessary to rive all the drain valves to drain out all the water of

the cooling system, but the antifreeze fluid may not be necessary to drain out

⑼ Wither temperature being-20° - -30° it _is necessary to take off the battery and keep the. same in a warm room to avoid any frost crack

4. Instructions for Safety:

1)The driver must possess the official driving license, be familiar with the Machine's Manual and the engine's intinction and use, maintain and service as per provisions thereof;

2)Standing under the boom bucket is prohibited;

3)Slow down when making a turn, it Is prohibited to take a sudden turn and slam the brakes on. Traveling at a high speed is not allowed in rainy and snowy days. Steering on the slope should be avoided;

4)Going down the slope and steering is prohibited with the engine to avoid any accident due to the ineffective hydraulic steering;

5)With the bucket loaded, high-speed travel is not allowed beyond the transportation position;

6)Upon loading, the polarization of cargo focus is hot allowed;

7)Overloaded travel is not;

8)To park on the slope, the wheels should be stopped with trigs in addition to pulling up the brake;

9)The loader shall not be parked by the fire-

10)Check from time to time if the meter reads normally.

Chapter Four Technical Service

Since loaders operate in comparatively adverse conditions, the parts may become loose or damaged easily d to the strong vibration and knocking on the components. In order to ensure the normal operation of the load prolong the lifetime, prevent potential problems and reduce losses, the users should carry out regular Techni services on the machine so as to keep it a good technical. This Chapter mainly introduces about t technical service for all the parts except the engine. For the engine's technical service, please refer to the use manual for the engine provided along with the machine.

1.Water, Oil Brand and Oil Change Schedule of Loader

Parts for oil and water filling	Types of oil and water		Standard code	Oil filling and changing period		
	winter	summer		Per shift	weekly	Quartanly chan
Engine cooling system	Soft water such as rain water and river water	Soft water such as rain water and river water		yes		
Engine fuel tank	NO.-10#,-35 light diesel	0# light diesel	GB252-77	yes		
Engine lubricant	(HC-11,HC-8)11#,8# diesel engine oil	(HC-4)14# diesel engine oil	SY1152-77		yes	yes
Oil for gearbox and torque converter	YB-N46(30#) antiwarming hydraulic oil				yes	yes
Operating hydraulic oil tank	30# antiwarming hydraulic oil				yes	yes
Baker master oil tank	Mineral 719 brake fluid				yes	
Main retarder and hub redactor	(HL-20)20# gear oil	(HL-30)30# gear oi	GB4011-64			yes
All drive shaft's cross axle	2# calcium base grease lubricant	1# calcium base grease lubricant	GB491-65		yes	
All drive shaft's splines						
Drive shaft stands						
Pin roll for frame joint						
Front and rear pin rolls for the steering hydraulic cylinder						
Seats for dumping cylinder and lifting cylinder.						
Boom seat						
Pin rolls under bucket						
Pin rolls for lifting cylinder rod						
Pin rolls on two ends of the tension rod						
Pin rolls dor dumping cylinder rod						

2.Service of tires:

1)For installation, the inner and outer tubes, rim and liner and lock ring must be complete and clean. Steel elements such as rim and lock ring should be first treated with painted, without any scrap, burr, scratch and other defects to avoid damaging the inner and outer tubes.

2)Keep the tires with .normal pressure: tire pressure is excessively high, expanding the tube canvas and rubber and causing crack; otherwise, the tire pressure is excessively low, expanding the tire side bend and causing the slide between the inner and outer tubes and the rim to increase the friction.

3)Correct operation is the important factor to extend the lifetime of the tires. Normally, it is prohibited to apply sudden brake, sudden start and high-speed turning. To operate, try to avoid any slippery.

4)Avoid the tires from being in contact with oil, chemical articles (acid and alkali) and paint,

5)With the machine being used for a certain period of time, change the position of tires from back to front and vice versa.

6)If to park for a long period of tittle, lift up the machine to keep the tires off the ground and avoid direct sunlight.

3.Regular Service

1) Routine Service

(Daily) routine service before dispatching and upon returning

(1)Check the water in the water tank and oil the fuel tank and operating oil tank, oil in the gear box and braking fluid in the brake's master cylinder, if the oil level is up to the specified level and if all the lubrication points are filled with adequate grease lubricant;

(2)Check tires' air pressure and outflux;

(3)Check If the control mechanism is flexible and reliable, If the brake is reliable and if the signaling devices are complete;

(4)If the started engine produces any abnormal sound and if ail meters are normal;

(5)If any part leaks and where the leakage Is;

(6)If any over heat in gear box, torque converter, oil pump, front and rear axles;

(7)Upon returning from operation in winter, make sure the discharge the water front the engine and water tank (except where the antifreeze is applied).

2)Weekly technical service (After running for about 50 hours)

In addition to the routine services, the following services shall also be applied:

(1)Inject the vehicle's grease fittings with grease lubricant,

(2)Tighten the connecting bolts of drive shaft, connecting bolts for driving axle and tyre nuts;

(3)Clean the air filter, diesel filter, engine oil filter and gear box, operating oil tank and oil-channel system filters;

(4)Check if the hand brake's tension rod, foot brake pedal, shift joystick, clearance and stroke of accelerator pedal comply with the requirement. If not, adjust the same;

(5)Check the fluid level and electrolyte fluid ratio of the battery. If not adequate, adjust the ratio and recharge;

(6)Check if the bucket, boom and rocker have any damaged or loose parts.

3)Monthly technical service (After running for about 200 hours)

In addition to the daily and weekly technical service, the following should also be done:

(1)Check the oil level of the driving axle and hub redactor and supplement to the specified oil level;

(2)Check the bearing of hand brake and foot brake and adjust the gap;

(3)Check and adjust the gap of the steering mechanism.
4)Quarterly technical service
(After running for about 600 hours)
In addition to the daily, weekly and monthly technical service, the following should also be done:
(1)Replace with fuel, engine oil, gear oil, grease lubricant of the suitable brand as per seasonal change;
(2)Check the leakage and damage of the multitoned valves and all the cylinders. If the working device sinks seriously, it should be resolved by repair;
(3)Check if the cup of brake master cylinder is damaged.
5)Semi-yearly technical service (After running for about 1200 hours)
In addition to the daily, weekly, monthly and quarterly technical service items, the following should also be done:
Change all the fuel, engine oil, transmission oil, hydraulic oil, gear oil and brake oil and clean the pipe, tubing and oil filters before adding in the new oil being purified;
(2)Dismantle and clean the brake master cylinder and brake auxiliary cylinder and check the braking effect and If it returns sensitively;
(3)Check and adjust the mesh mark and gap of the positive-drive spiral bevel gear pair and adjust the same 1o the specified range;
(4)Check the performance of torque converter, gear box and steering device and open the same for checking if necessary.
6)Annual technical service
(After running for about 2400 hours)
(1)Dismantle the driving axle's driving transmitter for check and change the wearable items;
(2)Dismantle the gear box and torque converter for checking and change the wearable items;
(3)Dismantle the steering device and priority valve for checking;
(4)Dismantle hydraulic cylinder for checking and change the oil seals;
(5)Check the deformation and damage of the front and rear frames, working device*s parts; rectify the deformation and repair the damaged;.
(6)Dismantle all the drive shafts for checking and clean and change oil;
(7)The engine is as per User's Manual.

Chapter Five Common Faults and Troubleshooting

For the convenience of users to understand and eliminate the general faults of the loader, some commo possible reasons and Troubleshooting are introduced as follows. As for the relevant diesel engine's fai troubleshooting, see Manual for Diesel Engine.

1.Vehicle

Features of fault	Possible reasons	Troubleshooting
Diesel engine fails to run after start-up	1.Failure in clutch or inaccurate adjustment of ditching operation mechanism 2.The cut-off valve hand of the gear shift distributing valve fails to return 3.Conventional system mechanical , with clamps or separation A. Shift pressure oil has no pressure or low pressure 5.Hand brake or spot-type disc brake is not released Torque converter fails	1.lutch in or check and adjust 2.Dismantle and check the cut-off valve and eliminate the fault 3.Check and eliminate 4.See the following section 5.Check and release Overhaul
Insufficient driving force	1.Diesel engine has inadequate power 2.Torque converter's intake oil pressure fe in adequate or over high • 3.Torque converter's oil temperature is excessively high 4.Gearing pressure is insufficient and the clutch slips 5.Hand brake or sh〇Q brake is not complete released Leakage or choking of the oil duct in the torque converter or gear box	1.ee User's Manual for diesel engine 2.Overhaul 3.See the following section 4.Check oil pressure and piston seal 5.Release or overhaul Dredge or change the sealing elements

2.drive system

Features of fault	Possible reasons	Troubleshooting
Shift pressure of gears is low or has no pressure	1.Gear pump sucks inadequate oil, leaks internally or high-pressure pipe leaks 2.The main pressure regulator's valve is not property adjusted or spring is broken 3.Cut-off valve seized 4.The gear shift sleeve piston or oil duct leaks oil and the oil duct is choked 5.Gear oil pressure meter fails or oil duct is choked	1.clean filter screen or change the oil pump and fill up oil to the correct position 2.Re-adjust or change the spring 3.Overhaul 4.Change the sealing elements or dear Change oil pressure meter and clear the pipe
The shift oil pressure is low for a certain gear	1.The piston's O-ring is damaged 2.Seal ring of the oil duct is damaged The gear's oil duct is choked or leaks	1.replace 2.replace 3.replace
torque converter has an excessively high oil temperature	1.The gear box's oil level is excessively low or high 2.Choking in the engine oil radiator and oil duct 3.Clutch slips Continual and high-toad operation for a long time	1.ll up to the specified oil level 2.Clean or change 3.Overhaul and correct gear oil pressure 4.Stop for cooling or keep idling for cooling
Mixed gears	leakage at the seal ring at the axle end	replace
System leaks oil	1.The sealing elements are wom out, aging or deteriorate 2.Joint is loose	1.replace 2.tighten

3.steering system

Features of fault	Possible reasons	Troubleshooting
Steering wheel steers upon returning	1. returning spring in the steering device is damaged 2. Seized between oil sleeve and oil axle or seized oil sleeve at the valve body.	1. change 2. dismantle
Steering wheel is light with slow turn and heavy with fast turn	Inadequate oil supply	Adjust priority valve
Weak steering	Operating pressure oil has a low pressure	Adjust spillover valve on the priority valve
Hydraulic cylinder driving the steering wheel does not move	The system has air inside or the oil is insufficient	Eliminate air or supplement oil
Oil leakage of the system	Joint is loose or the sealant it damaged	Tighten or change

4.brake system

Features of fault	Possible reasons	Trouble shooting
Travel brake is poor	1. 2. Brakes master cylinder has inadequate brake fluid. 3. Oil between the brake disc and friction discs. 4. The brake friction discs wear to the extreme 5. Push stroke is not the properly regulated	1. Change the oil seal 2. Add the brake fluid 3. Check the reason and eliminate 4. Replace 5. Adjust the stroke
Off tracking when brake is applied	1. brake of he left and right wheels have different power 2. Air pressure differs to much for left and right wheels.	1. Check the tension of the auxiliary pump piston 2. Charge air at specified pressure
Brake fails to loose normally	1. brake master cylinder piston fails to return flexibly 2. Bake auxiliary cylinder piston fauls to return flexibly	1. check .clean and eliminate 2. Clean or change rectangular ring
Friction discs wear abnormally	1. Brake fails to loose normally 2. Brake disc surface has scars	1. Overhaul 2. Overhaul and change
Hand brake has inadequate power	1. Gap is too big between the hand brake hub and brake disc 2. The brake disc has oil	1. Adjust 2. Clean

5.wokring devices hydraulic system

Features of fault	Possible reasons	troubleshooting
Lifting and dumping is slow or does not move	1. hydraulic cylinders oil seal is damaged 2. Piping system leaks oil 3. Operating oil pump leaks seriously 4. Safety valve is improperly adjusted and the system pressure is on the low side. 5. Operating oil pumps oil sucking pipe and oil filter is choked 6. Priority valves spool is seized 7. Multi-way valve is excessively worn out and fit clearance is too big	1. Change oil seal 2. Check and rectify 3. Repair or change 4. Adjust to the specified value 5. Clean or change 6. Overhaul 7. overhaul

The lifted boom drops automatically	1.Boom’s hydraulic cylinder teaks 2. Muiti-way valve's central part leaks	1. Change the seal ring 2,Overhaul
Oil pump sucks air or oil liquid foams	1.Oil level is excessively low 2.Oil filter is choked 3.Oil suction tube leaks air or oil pump's oil seal is damaged 4.Improper oil or bad oil liquid	1.Fill to specified oil level 2.Clean oil filter 3.Overhaul Change as per specification
Excessively high oil temperature	1.FulMoad operation is over long 2.System pressure is adjusted excessively high 3.Oil tank is inadequate 4.Internal friction of the operating oil pump	1.Stop for cooling 2.Adjust the pressure as per specification 3.Fill up oil to the specified oil level Overhaul

6.Electric system

Features of feat	Possible reasons	Troubleshooting
Engine does not generate or voltage is low	1.The drive belt slips 2.Fault witty the generator's regulator 3.Excitation winding or armature coil is short-cut or open 4.Silicon diode is stove or loose Electric brush and collector is not contacted	1.Adjust 2.Overfiaul or change 3.Overhaul 4.Overhaul 5.Overhaul
Battery is not recharged or recharge current is low	1.Voltage regulator is damaged 2.Conductor is not well contacted or short-cut 3.Inadequate electrolyte fluid or improper proportion Generator fails to generate or voltage is low	1.Overhaul or change 2.Overhaul 3.Add the stilled water 4.See the Table
		1.Adjust the regulator 2.Change or fill oil Check and repair
Difficult to start the engine	1.Engine fails 2.Battery has insufficient power or wires are not property connected 3.Start-up motor' electromagnetic switch contact is burnt or fails to stop 4.Start-up motor is internally short-cut or carbon brush is well contacted 5.Armature shaft is bent or sleeve and armature is too tight or loose 6.UnidirecBonal clutch slips Excitation winding or armature coil is short-cut or open	1.See User Manual for diesel engine 2.Change or overhaul 3.Overhaul 4.Overhaul 5.Overhaul 6.Overhaul Overhaul
Lamp bulb or equipment’s are often b	1.Voltage regulator has excessively high voltage Lamps' rated voltage is not 24V	1.Re-adjust '2. Replace
No lights have no power or some have no power	1.Power cable is open Cable for the lamp is open or the lamp is damaged	1.Overhaul 2. Chet* the circuit or change bulb
Starter is burnt out	1.Excessive long starting time and starting time exceeds 15 seconds each time or continual startup 2.Electromagnetic snitch contact is burnt or sticking 3.Electromagnetic switch’s return spring is out of order The starter's driving gear and flywheel is meshed tc» tightly	1.As per specification 2.Overhaul 3.Check or change Adjust gear clearance

Chapter Six Transportation and Storage

1. Transportation of Loaders

1)Self Travel: suitable for a short distance. For a self travel, the provisions for the Running-in' should be followed. Make sure the traveling speed shall not exceed 20km/h and the torque oil temperature shall not exceed 110C, Water temperature and oil temperature of the engine shall not exceed 95C. The engine's oil pressure should be normal. In case of a high temperature during the travel stop for lowering the temperature or overhauling

2)Travel with tows: slow and not safe. It is used only when the engine or hydraulic drive system is out of order. To tow, disconnect the drive shaft from the gear box to the front and rear axle to avoid damaging the gear box and the gear shift sleeve. The operator should be seated in the loader to control the direction. it is better to keep the towing speed at about 5km/h.

3)Line-haul: for the line-haul, railway, truck and ship can be used. In addition to the relevant provisions of the transportation department, the following preparatory work should be also carried

a. All the wheels should be stabilized with trigs at front and rear and the body should fastened better with roles or thick iron wires to avoid any rolling

b. Pull tight the parking brake joystick and keep the bucket flat on the wagon box,

c. Tum off the main switch, keep all the joy sticks in the neural position and lock the door,

d. Drain the cooling water from the engine in winter or being transported to the cold area.

2. Storage of Loaders

To store the loader for a long period after operation, the regulations should be followed.

1)Check the oil at all the oil points and add adequate dean lubricant

2)Take of the battery for indoor storage in a dry place and recharge it every month;

3)Lift up the machine so that, the wheels are off the ground;

4)Start and run idle once every other month

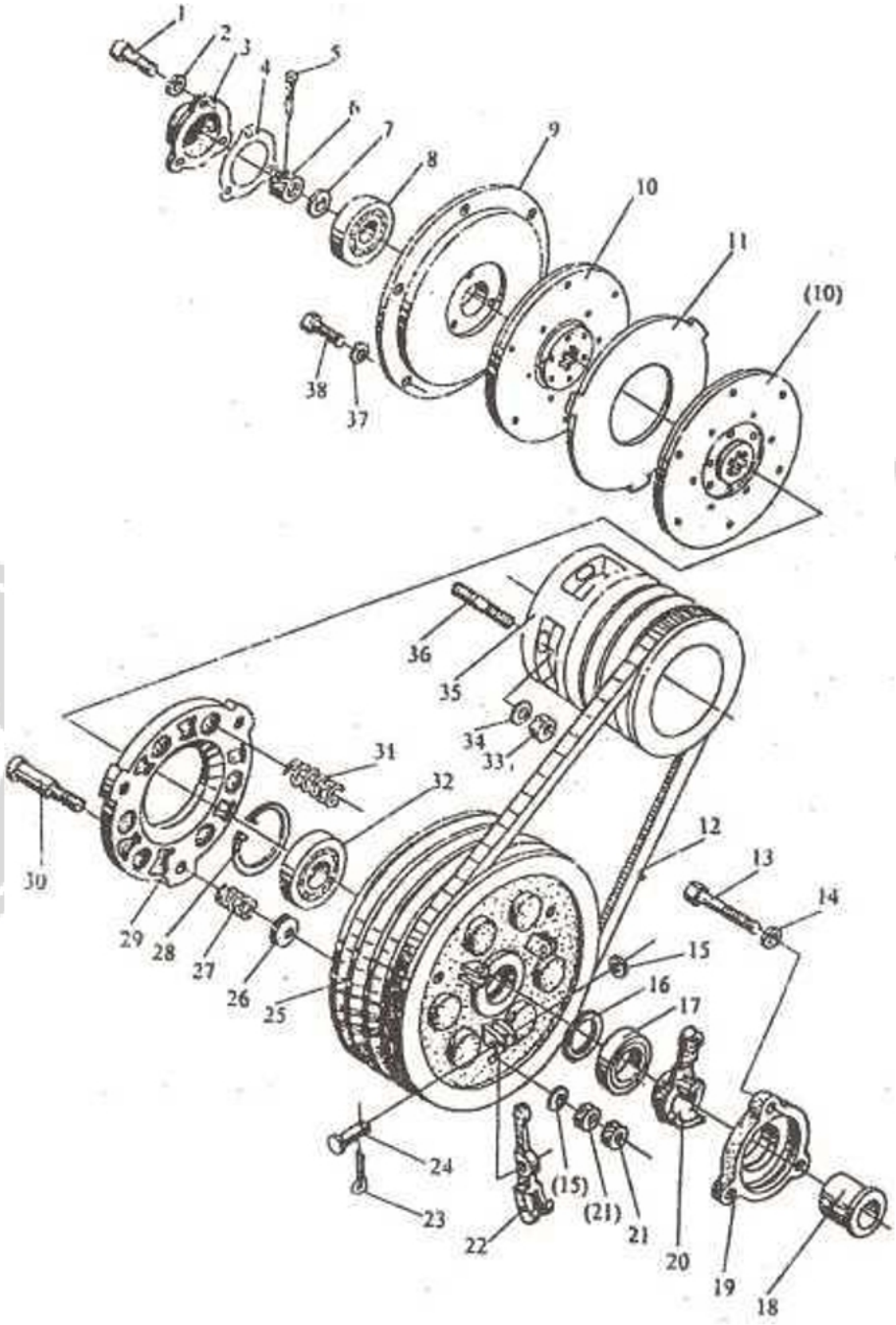
5)Keep the loader in a storehouse or under a shelter and cover it with the waterproof cloth if being kept in the open area;

6)Drain out the cooling water;

7) Pull the handbrake to the braking position

8)Operate the working device controls several times and eliminate the residual pressure from the cylinders and tubing before being placed in the neutral position and keep the gear lever in the neutral

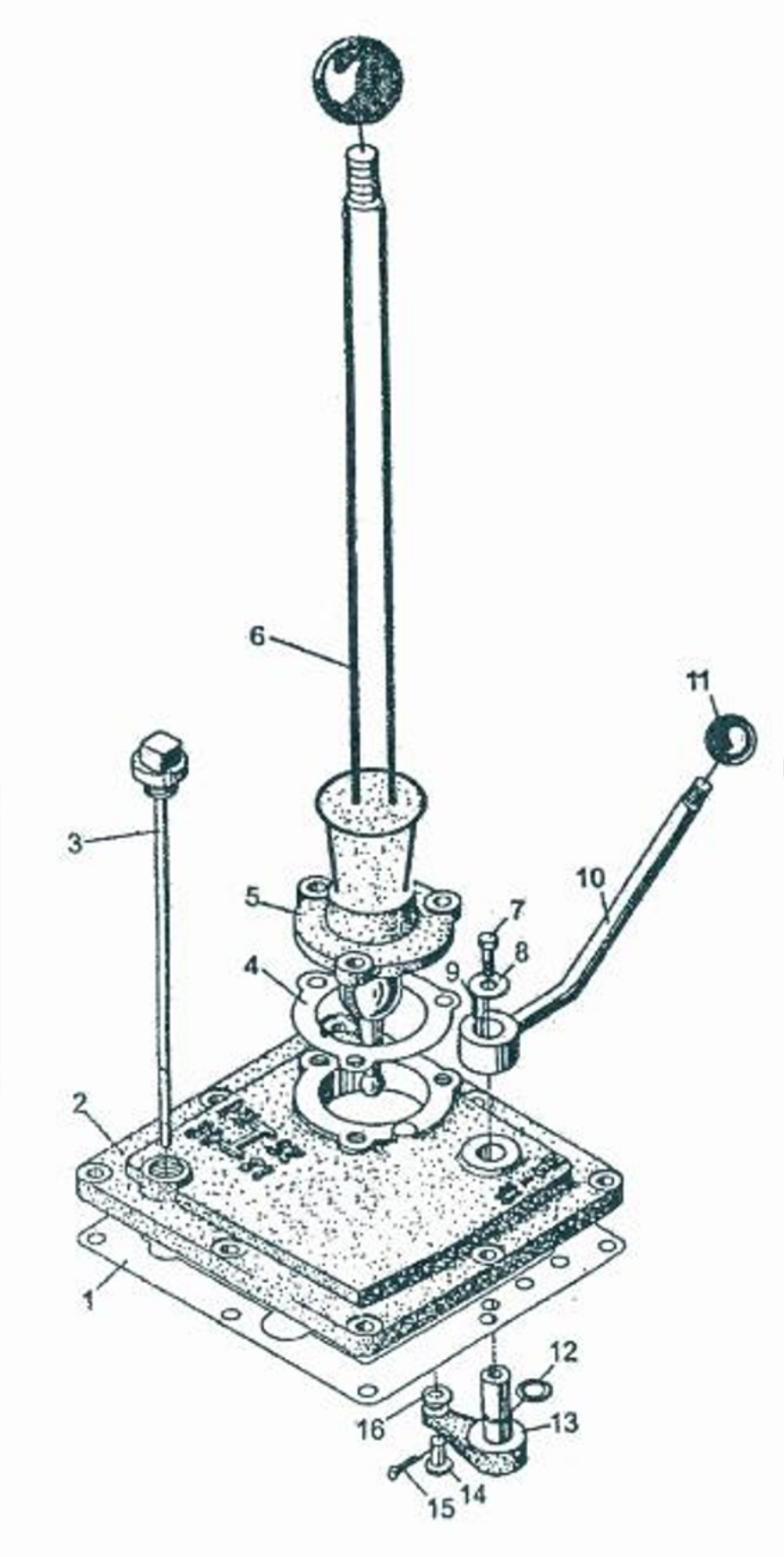
Clutch Assembly



Clutch assembly

ser NO.	part NO.	part name	QTY (piece)	assemble NO.	remark
	12.21.001	Clutch Assembly	1	12.21.001	
1	GB/T67-2000	Screw M6x12	3	12.21.001	
2	GB/T93-1987	Gasket 6	3	12.21.001	
3	12.21.104A	Bearing Cover	1	12.21.001	
4	12.21.103	Paper Gasket	1	12.21.001	
5	GB/T91-2000	Pin 4X36	1	12.21.001	
6	GB/T6181-2000	Skrew M16	1	12.21.001	
7	GB/T97.1-1985	Gasket 16	1	12.21.001	
8	GB/T276-1994	Rolling Bearing 6204-Z	1	12.21.001	
9	12.21.102	Belt Wheel Cover	1	12.21.001	
10	12.21.011	Clutch Drive Gear Assembly	2	12.21.001	
11	12.21.109	Clutch Driving Disc	1	12.21.001	
12	GB/T1171-1994	Triangle Tape B2000	4	12.21.001	
13	GB/T5780-2000	Bolt M10x70	3	12.21.001	
	GB/T5780-2000	Bolt M10x55	3	12.21.001	For Installing Widening Gearbox
14	GB/T93-1987	Gasket 10	3	12.21.001	
15	GB/T97.1-1985	Gasket 8	6	12.21.001	
16	12.40.124	Felt Ring	1	12.21.001	
17	not stardard	Clutch Release Bearing 588908	1	12.21.001	
18	12.21.114	Clutch Release Seat	1	12.21.001	
19	12.21.115-1	Clutch Bearing Cover	1	12.21.001	
20	12.21.113	Clutch Release Seat	1	12.21.001	
21	GB/T6170-2000	Screw Nut M8	6	12.21.001	
22	12.21.118	Screw Ralease Lever	3	12.21.001	
23	GB/T91-2000	Pin 3.2X20	3	12.21.001	
24	GB/T882-1986	Pin B8x35	3	12.21.001	
25	12.21.108	Clutch Belt Wheel	1	12.21.001	
26	12.21.121	O Ring	3	12.21.001	
27	12.21.116	Cltch Spring	3	12.21.001	
28	GB/T893.1-1986	Ring 62	1	12.21.001	
29	12.21.110	Clutch Pressure Plate	1	12.21.001	
30	12.21.117	Clutch Adjusted Screw	3	12.21.001	
31	12.21.111	Clutch Spring	6	12.21.001	
32	GB/T276-1994	Rolling Bearing 6206-Z	1	12.21.001	
33	GB/T6170-2000	Screw Nut M12	3	12.21.001	
34	GB/T93-1987	Gasket 12	3	12.21.001	
35	12.21.101	V-Belt Pulley	1	12.21.001	Engine Belt
36	GB/T898-1988	Bolt M12x30	3	12.21.001	
37	GB/T93-1987	Gasket 8	6	12.21.001	
38	GB/T96-1987-2000	Bolt M8x20	6	12.21.001	

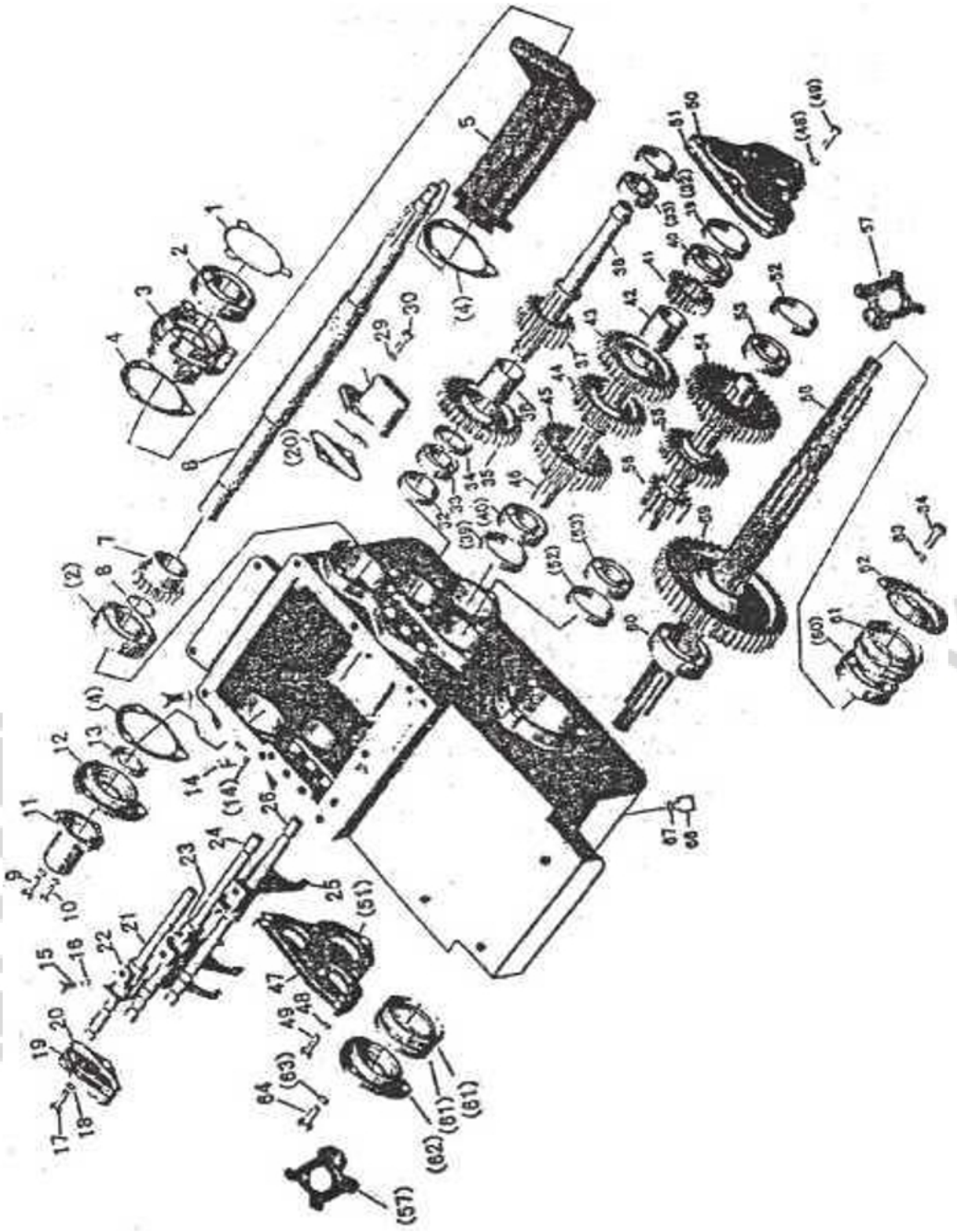
Cover Assembly



Cover Assembly

ser NO.	part NO.	part name	QTY (piece)	ser NO.	part NO.	part name	QTY (piece)
1	12.54.111	Front Cover Paper Washer	1				
2	12.54.101	Front Cover	1				
3	12.54.013A	Inlet Oil Plug	1				
4	12.54.108	Speed Control Lever Seat gasket	1				
5	12.54.107	Speed Control Lever Seat	1				
6	12.54.102	Central Speed Control Lever	1				
7	GB5781-86	Bolt M8x16	1				
8	GB96-85	Gasket 8	1				
9	GB1096-79	Bolt C5x6	1				
10	12.54.012	Assistant Speed Control Lever	1				
11	12.54.110	Handle	1				
12	GB3452.1-82	O Ring	1				
13	12.54.109	Rocker	1				
14	12.54.113	Shifting Block	1				
15	GB91-86	Pin 2.6X16	1				
16	GB848-85	Gasket 10	1				

Gearbox Assembly

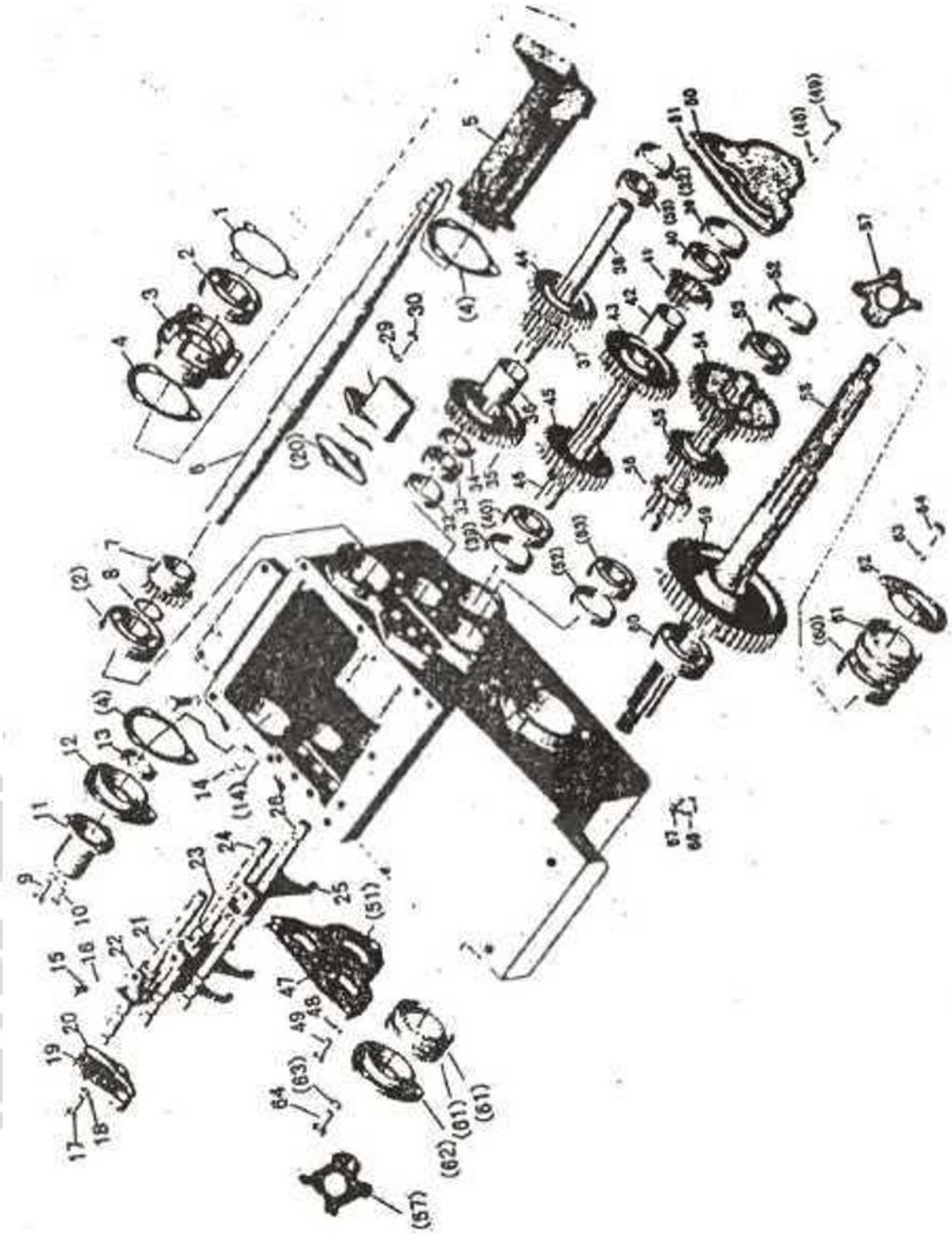


Notice :NO. 4、5、6、8 gearbox shafts shall be enlarged and added weight, changes of dimension PLS refer to the gearbox adopt bearing, sealing to maintain or replace.
As the parts changes caused by the improvement of gearbox, PLS purchase according to the real Object.

Gearbox Assembly

ser NO.	part NO.	part name	QTY (piece)	ser NO.	part NO.	part name	QTY (piece)
1	12.37.131	paper washer	1	41	12.37.136	Ⅰ、Ⅱ gear	1
2	GB/T276-94	rolling bearing 6306	2	42	12.37.137	shaft sleeve	
3	12.37.103-1	bearing seat	1	43	12.37.134	Ⅳ、Ⅵ gear	1
4	12.37.104	paper washer	2	44	12.37.123	Ⅱ、Ⅴ gear	1
5	12.37.113	half shaft drivepipe	2	45	12.37.125	assistant speed pulley	1
6	12.37.105A	I shaft	1	46	12.37.124	Ⅲ shaft	1
7	12.37.102	I shaft gear	1	47	12.37.132	Ⅱ、Ⅲ、Ⅳ right shaft bearing	1
8	12.37.129	ring	1	48	GB5781-86	bolt	12
9	GB93-87	I shaft edge screw gasket 10	27	49	GB93-87	gasket	12
10	GB97.1-85	I shaft sealing cover screw gasket 6	3	50	12.37.121	Ⅱ、Ⅲ、Ⅳ left shaft bearing	1
11	12.37.130A	I shaft sealing cover	1	51	12.37.119	paper washer	1
12	12.37.128A	I shaft left pressure cover	1	52	HG1-692-67	spacer sleeve	2
13	HG4-692-67	I shaft oil seal SD30x50x10	1	53	GB/T276-94	needle bearing 305	2
14	12.37.108	spring	3	54	12.37.13B	Ⅱ、Ⅲ、Ⅳ、Ⅵ slip gear	1
15	GB5781-86	bolt M8x30	8	55	12.37.140	Ⅱ、Ⅴ slip gear	1
16	GB93-87	gasket 8	19	56	12.37.122	reduction gear	1
17	GB5781-86	bolt M8x25	16	57		flange disc	2
18	GB93-87	gasket	19	58	12.37.141	Ⅴ shaft	1
19	12.37.159	slider cover	1	59	12.37.118	reduction gear	1
20	12.37.135	paper washer	1	60	GB/T276-94	Ⅴ shaft bearing 12207(needle)	
21	12.37.156	assistant gear slider	1	61	HG4-692-67	seal 35x58x10	4
22	12.37.107	assistant gear shifting fork	1	62		Ⅴ shaft pressure cover	2
23	12.37.109	Ⅰ、Ⅳ shifting fork	1	63	GB93-87	gasket	6
24	12.37.157	Ⅱ、Ⅴ shifting fork	1	64	GB5781-86	bolt M10x25	6
25		Ⅰ、Ⅳ shifting fork	1	65	12.37.101B-1	gearbox body	1
26	12.37.158	Ⅰ、Ⅱ hifting fork	1	66	12.37.115	oil plug	1
27	12.37.160	Inter locking round pin	1	67	13.37.112	gasket	1
28	12.37.161	slide right cover	1				
29	GB93-87	gasket	2				
30	GB5781-86	bolt	2				
31	GB5781-86	bolt M10x30	10				
32	HG4-692-67	space sleeve	2				
33	GB/T283-94	bearing (305)	1				
34	12.37.126	ring	1				
35	12.37.127	asistant gear high speed gear	1				
36	12.37.137	shaft sleeve	2				
37	12.37.111	asistant gear low speed gear	1				
38	12.37.133	Ⅱ shaft	1				
39	HG4-692-67	space sleeve					
40	GB/T276-94	shaft sleeve(305)	4				

Gearbox Assembly(Reverse Gear, Acceleration)



notice: NO. 4、5、6、8 gearbox shafts shall be enlarged and added weight, changes of dimension PLS refer to the gearbox adopt bearing, sealing to maintain or replace.
As the parts changes caused by the improvement of gearbox, PLS purchase according to the real Object.

GÜNTER GROSSMANN

Gearbox Assembly(Reverse Gear, Acceleration)

ser NO.	part NO.	part name	QTY (piece)	ser NO.	part NO.	part name	QTY (piece)
1	12.37.131	Paper Washer	1	41	12.37.136	Ⅰ、Ⅱ Fixed Gear 18 Big Gear Block	1
2	GB/T276-94	Rolling Bearing 6207	2	42	12.37.137	Shaft Sleeve	
3	12.37.103-1	Seperate Seat	1	43	12.37.134	Ⅳ、Ⅵ Fixed Gear 33 Gear	1
4	12.37.104	Paper Washer	2	44		Reversed Fixed Gear 22 Gear	1
5	12.37.113	Half Shaft Drivepipe	2	45	12.37.125	Assistant Gear Pulley 17X27 Gear	1
6	12.37.105A	I Shaft	1	46	12.37.124	Ⅲ Shaft	1
7	12.37.102	I Shaft Gear 20 Teech	1	47	12.37.132	Ⅱ、Ⅲ、Ⅳ Right Shaft Bearing	1
8	12.37.129	Ring	1	48	GB5781-86	Bolt	12
9	GB93-87	I Shaft Edge Screw Gasket 10	27	49	GB93-87	Gasket	12
10	GB97.1-85	I Shaft Sealing Cover Screw Gasket 6	3	50	12.37.121	Ⅱ、Ⅲ、Ⅳ Left Shaft Bearing	1
12	12.37.128A	I Shaft left pressure Cover	1	51	12.37.119	Paper Washer	1
14	12.37.108	Spring	3	52	HG1-692-67	Spacer Sleeve	2
15	GB5781-86	Bolt M8x30	3	53	GB/T276-94	Bearing(6206)	2
16	GB93-87	Gasket 8	19	54	12.37.13B	Ⅱ、Ⅲ、Ⅳ、Ⅵ Slip Gear 20X25gear	1
17	GB5781-86	Bolt M8x25	16	55	12.37.140	Ⅱ、Ⅴ slip Gear 17 Gear	1
18	GB93-87	Gasket	19	56	12.37.122	Ⅳ Shaft	1
19	12.37.159	Slider Cover	1	57		Flange Disc	2
20	12.37.135	Paper Washer	1	58	12.37.141	Ⅴ shaft	1
21	12.37.156	Assistant Gear Slider	1	59	12.37.118	Reduction Gear 49 Gear	1
22	12.37.107	Assistant Gear Shifting Fork	1	60	GB/T276-94	Ⅴ Shaft Bearing 6207	
23	12.37.109	Ⅰ、Ⅳ shifting Fork	1	61	HG4-692-67	Seal 35X58x10	4
24	12.37.157	Ⅲ、Ⅴ shifting Fork	1	62		Ⅴ Shaft Pressure Cover	2
25		Ⅰ、Ⅳ shifting Fork	1	63	GB93-87	Gasket	6
26	12.37.158	Ⅰ、Ⅲ、Ⅳ、Ⅴ hifting Fork	1	64	GB5781-86	Bolt M10x25	6
27	12.37.160	Inter Locking Round Pin	1	65	12.37.101B-1	Gearbox Body	1
28	12.37.161	Slide Right Cover	1	66	12.37.115	Oil Plug	1
29	GB93-87	Gasket	2	67	13.37.112	Gasket	1
30	GB5781-86	Bolt	2				
31	GB5781-86	Bolt M10x30	10				
32	HG4-692-67	Space Sleeve	2				
33	GB/T283-94	Bearing (6206)	1				
34	12.37.126	Ring	1				
35	12.37.127	Asistant Gear High Speed Gear 28 Gear	1				
36	12.37.137	Shaft Sleeve	2				
37	12.37.111	Asistant Gear Low Speed Fixed Gear 18 Small Gear	1				
38	12.37.133	Ⅱ Shaft	1				
39	HG4-692-67	Space Sleeve					
40	GB/T276-94	Shaft Sleeve(6206)	4				