

WHEEL LOADER
INSTRUCTION MANUAL
-----HW-928



SKU NO.	64464
Model No.	HW-928

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Chapter 1 purpose, product characteristics and main performance parameters

I. characteristics of uses and products

Hengwang loader is a new generation of loader developed by our company. It has advanced performance, reasonable structure and convenient operation and maintenance. It is suitable for shoveling and loading loose materials in hydraulic engineering, municipal construction, media, sand and stone yard, station, wharf, warehouse and other industrial and mining enterprises, and can carry out short distance transportation.

1, the local transmission system is mechanical transmission, one is hydraulic mechanical transmission. Hydraulic mechanical transmission device is adopted, which is composed of hydraulic torque converter and power shift gearbox. Rational matching of hydraulic torque converter and engine makes full use of engine power, enlarges engine input torque to make the whole engine have greater traction.

The transmission with hydraulic torque converter has the following advantages: (1) make the loader have automatic adaptability. When the external load suddenly increases, the traction force can be automatically increased to overcome the increased external load. At the same time, the vehicle automatically reduces the speed, avoids the external load continues to increase small also avoids the engine because of the sudden increase in external load surface flameout. On the contrary, when the external load is reduced, the vehicle automatically reduces traction and improves the speed of the vehicle. (2) Because the working medium of hydraulic transmission is wave body, it can absorb and eliminate vibration and impact from engine and load. Thus, the engine and the transmission device are protected, and the lifespan of the loader is improved. (3) The transmission system equipped with hydraulic torque converter can make the loader run at any small speed, thus improving the vehicle's trafficability. (4) Loader equipped with hydraulic torque converter, can start smoothly and realize CVT in a large speed range, can absorb vibration and shock, improve the comfort of the vehicle. (5) simplifying the operation of loaders and reducing the labor intensity of drivers. Power shift gearbox is fixed shaft type. The structure is simple and compact, small size, easy maintenance, and shift light, stable. After assembly with the hydraulic torque converter, the transmission system has a larger transmission range and a more ideal efficiency.

2. The whole machine is connected by articulated frame, and adopts a full hydraulic load sensing steering system composed of a full hydraulic load sensing steering gear and a priority valve. Its characteristics are light steering, flexible and reliable. No matter the size of the steering wheel or the speed of the steering wheel, the steering can be maintained smoothly. Moreover, the whole working process makes full use of the output flow of the oil pump, avoids power loss and improves the efficiency of the system.

3, the wide base low pressure tire 14 wheel drive, therefore, the traction force is big. In addition, the wide base low pressure tire improves the performance of the marsh and soft ground.

II. Main technical parameters of loaders (see loader nameplate)

We reserve the right to change the parameters and design without prior notice to the user as the product is constantly updated and improved.

The product configuration and technical parameters are different from the actual model. The product configuration and technical parameters are based on the physical object.

Chapter 2 Structural principle and installation adjustment of main components

I. engine system

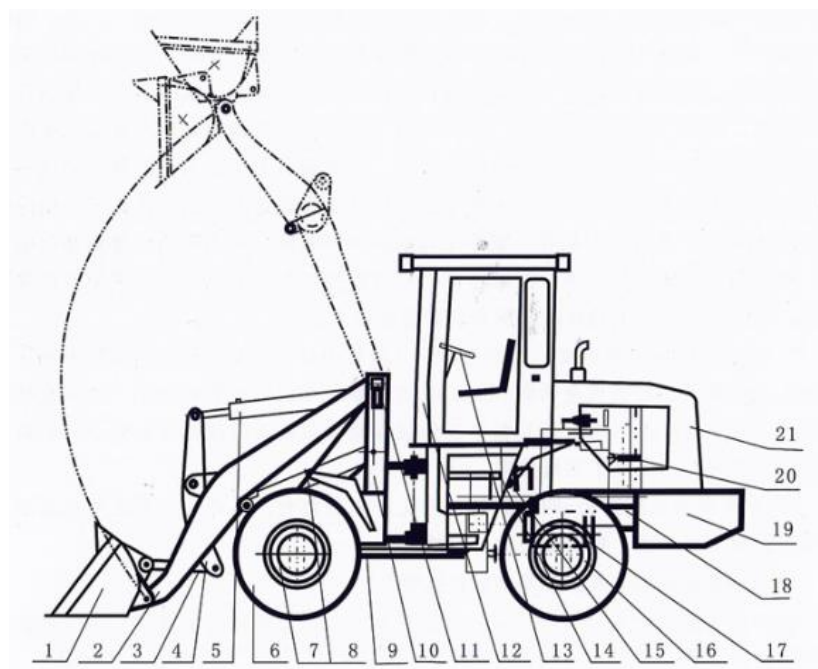
It mainly includes engine, air filter, radiator, muffler and throttle control system.

1、the engine Heng Wang loader adopts the first-class environmental protection power. For the structure, performance parameters, use and technical maintenance of the diesel engine, please refer to the instructions of the diesel engine.

2、air filter: filter air dust and other impurities, improve cylinder liner and piston life.

3、Radiator: Radiator assembly consists of water radiator, transmission oil radiator and diesel engine oil radiator, respectively, circulating water, transmission oil, oil forced cooling by blowing.

4、Muffler: reduce diesel exhaust noise and reduce environmental impact



1. Bucket 2, Arm 3, Rod 4, Rocker 5, Bucket 6, Tire 7, Drive Axle 8, Lifting Cylinder 9, Drive Shaft10, Front Frame 11, Electrical Appliances and Lamps 12, Cab 13, Steering System 14, Diesel Box 15, Torque Converter and Gearbox16, brake system 17, swing frame 18, rear frame 19, counterweight 20, diesel engine 21, rear hood.

II. Transmission system (mechanical transmission and hydraulic mechanical transmission)

(A) The mechanical transmission system is composed of gearbox, transmission shaft and front and rear axle. The power output from the engine is transmitted to the front and rear axles through the gearbox and transmission shaft to drive the wheels forward and backward. The driving sketch is shown below.

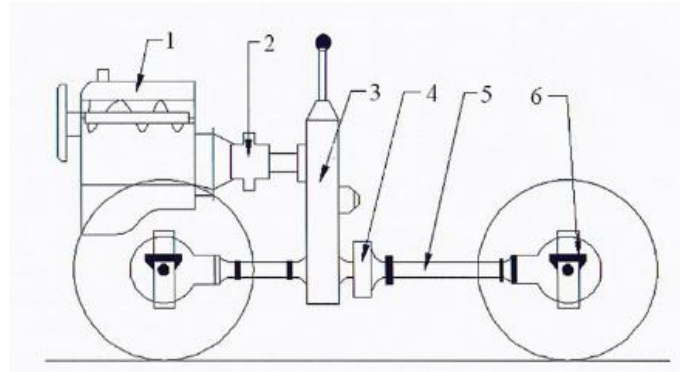


Fig. 2-2 simple layout of transmission system

1- diesel engine 2- power output shaft 3- transmission box 4- hand brake 5- drive shaft 6- drive axle

2- As shown in the above figure, the output power of the engine 1 is increased by the torque of the power output shaft 2, and transmitted to the gearbox 3. The power of transmission reduces through multi-stage gears, and different gears engage to produce different transmission, and output different rotational speeds in different directions, thus producing forward gears I, II and III, backward gears I and II.

Due to uneven ground, rear axle swing and steering and other reasons, the front and rear axles and gearbox position relative changes, so the use of universal transmission. The power output from the gearbox is transmitted to the front and rear axles 6 through the transmission shaft 5 with universal joint and expansion joint. The power transmitted to the front and rear axles is slowed down by the transmission and changed the direction of rotation through the differential to the half shaft, driving the wheel to rotate.

The clutch of loader is double, dry and often combined friction. The clutch is used to transmit or cut off the power of the engine and to protect the transmission system. Temporary separation of the clutch enables the loader to gear and shift gears smoothly.

Smooth clutch clutch ensures smooth start of loaders.

1、structure

The clutch is mainly composed of active part, driven part and control part.

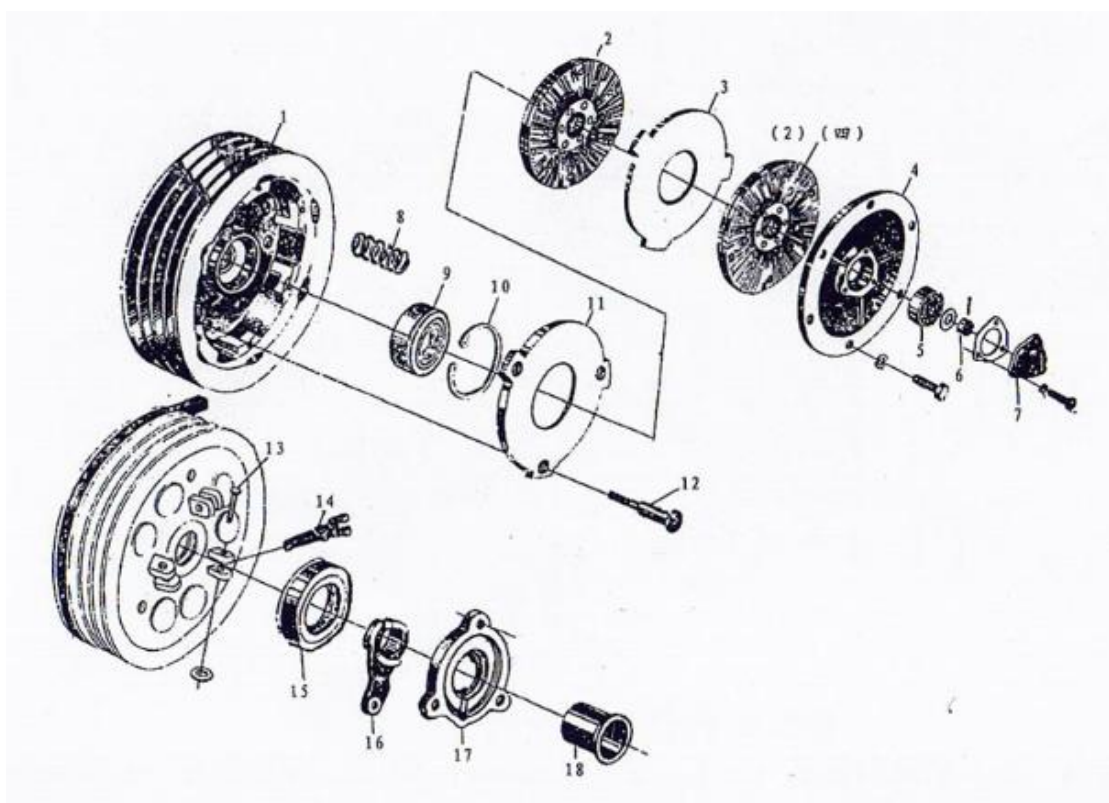
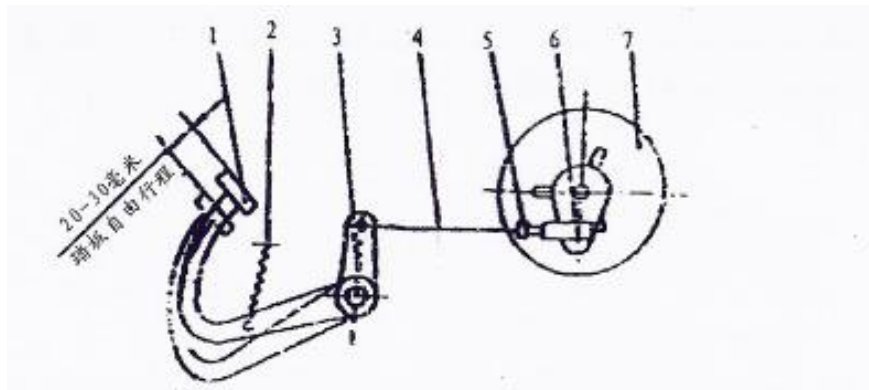


Fig. 2-3 clutch

1. Belt wheel 2, driven disk assembly 3, drive disk 4, belt wheel cover 5, bearing 602046, nut M167, bearing cover 8, spring 9, bearing 6020710, retaining ring 11, pressure plate 12, adjusting screw 13, pin 14, separation lever 15, separation bearing 68890916, separation claw 17, bearing cover 18, separation claw seat

Oil is not allowed on the friction surface of the clutch. If the clutch is washed with kerosene, it will be assembled and used after cooling and drying, otherwise the clutch will slip and accelerate wear and tear.



Pic 2-4 schematic diagram of clutch control mechanism

1.Clutch pedal 2.Return spring 3.Transmission shaft 4.Clutch pull rod 5.Fastening nut 6.Pull rod joint 7.Clutch belt wheel

2、Clutch adjustment

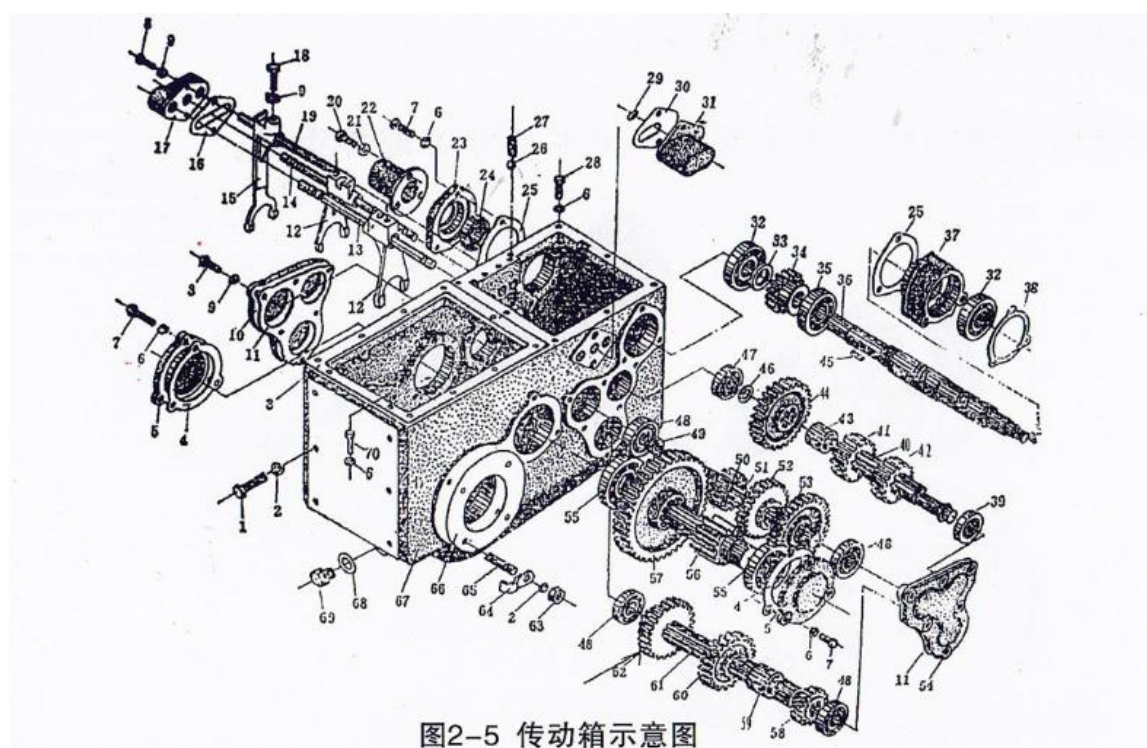
In the course of using the clutch, the parts are worn and deformed continuously, especially the wear of the driven disk, which reduces the clearance of the end face of the separating lever bearing, makes the three separating lever heads not on the same plane, and may even make the head of the separating lever contact with the end face of the separating bearing, resulting in incomplete or slippery separation of the clutch. Therefore, the clutch must be adjusted periodically.

In the case of pedal return, the clearance between the separation bearing 1 and the end of the separation lever 3 is 0.5 ± 2 mm. See (Fig. 2-4) the end of the three separation levers 3 (in contact with the separation bearing) must be guaranteed to be on the same rotary plane. If it does not meet the requirements, it can be adjusted by adjusting the nut 4 on the screw 5.

Due to the wear of the clutch disc, the free travel of the clutch pedal will also be reduced. If not adjusted in time, it will also make the clutch slip and accelerate the wear and tear of friction plate, so it should be adjusted regularly in use. By adjusting the working length of the tie rod 4, the free travel of the pedal can be changed. The free travel of the pedal is normally 20-30 mm. After adjusting, install the pin, the cotter pin and tighten the fastening nut.

3.gearbox

The transmission of the gearbox is composed of six forward gears and one backward gears by the main and auxiliary gears. The transmission line is shown in Figure 2-5.



5.Cover 10.II, III, V-axis left bearing cover 12.IV shaft gear fork 13.I, II, I gear slider 14.II, V gear slider 15. Sub-speed fork 17. Slide lever left cover 19.Variable speed slider 22. Power output shaft cover 23. Pressure cover 24. Oil seal SD30×50×10 26. Steel ball 1027. Spring 28. Bolt M10×30 29. Interlocking pin 31. Slide rod cover 32. Rolling bearings 30633. Gears 34. I. Axis 35. Rolling bearings 10836. I. Axis 37. Bearing sockets 39. Rolling bearings 20540. Reverse gears 41. Gears with variable speed and low speed 42. Sleeve 43. Sleeve 44. Gear 45. Key A8×35 46. Damper 47. Rolling bearing 10220548. Rolling bearing 30549. V. Sleeve 50. Reducing pinion 51.V-shaft 52. | II, V-gear 53.I, II I, IV, VI-gear 54.II, I II I, IV-shaft left bearing cover 55. Rolling bearing 30756. V-shaft 57. Reducing gear 58.I, II gear 59. Shaft sleeve 60.II, V-gear 61.II shaft 62. Gear 63. Nut M1265. Shaft tube fastening bolt 67. Gear box 69. Oil plugging

II)Transmission shaftThere is an oil filling nozzle on the crosshair of the universal joint. Grease should be lubricated for every 150 hours of work.

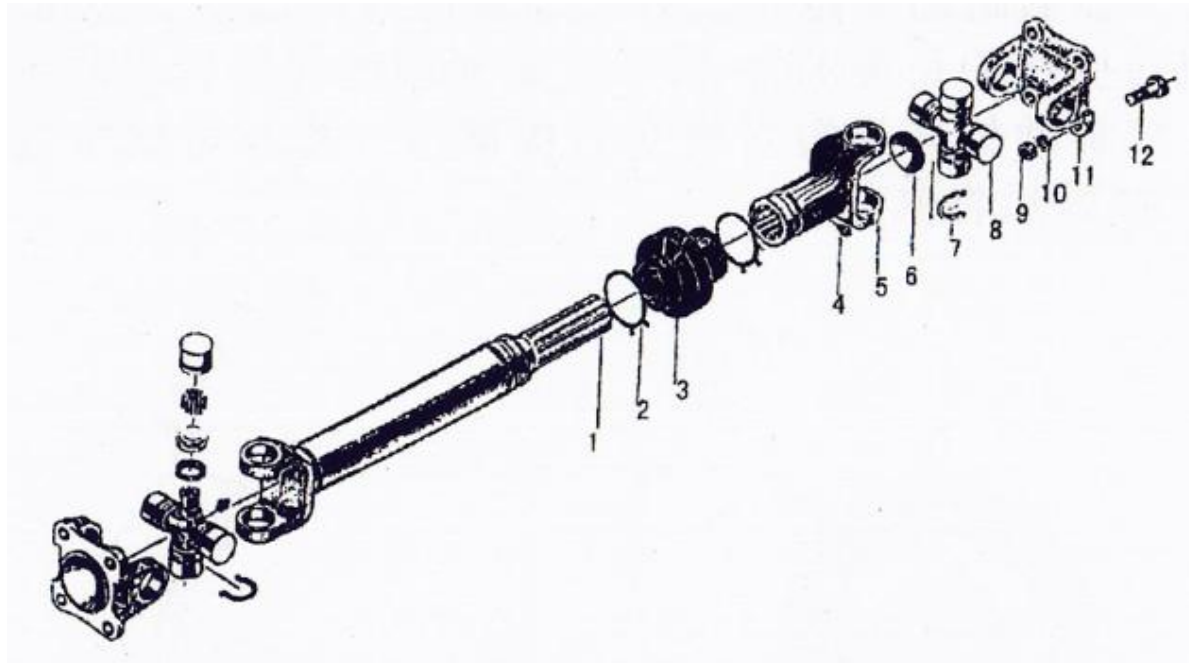


Fig. 2-6 transmission shaft

1. Shaft tube assembly 2, sheath fastening ring 3, spline sheath 4, oil cup M6 5, sleeve fork 6, sleeve fork cover 7, cross shaft clamp 8, cross shaft assembly 9, M10×1 10, spring pad 11, flange 12, bolt(III) **Drive axle**Active and passive gears in the drive axle have been selected according to the contact standard. Therefore, they can be used for a long time without adjustment. The original axle should be adjusted only when the damaged parts are replaced or when the parts are worn away. We should pay attention to the following items when adjusting.

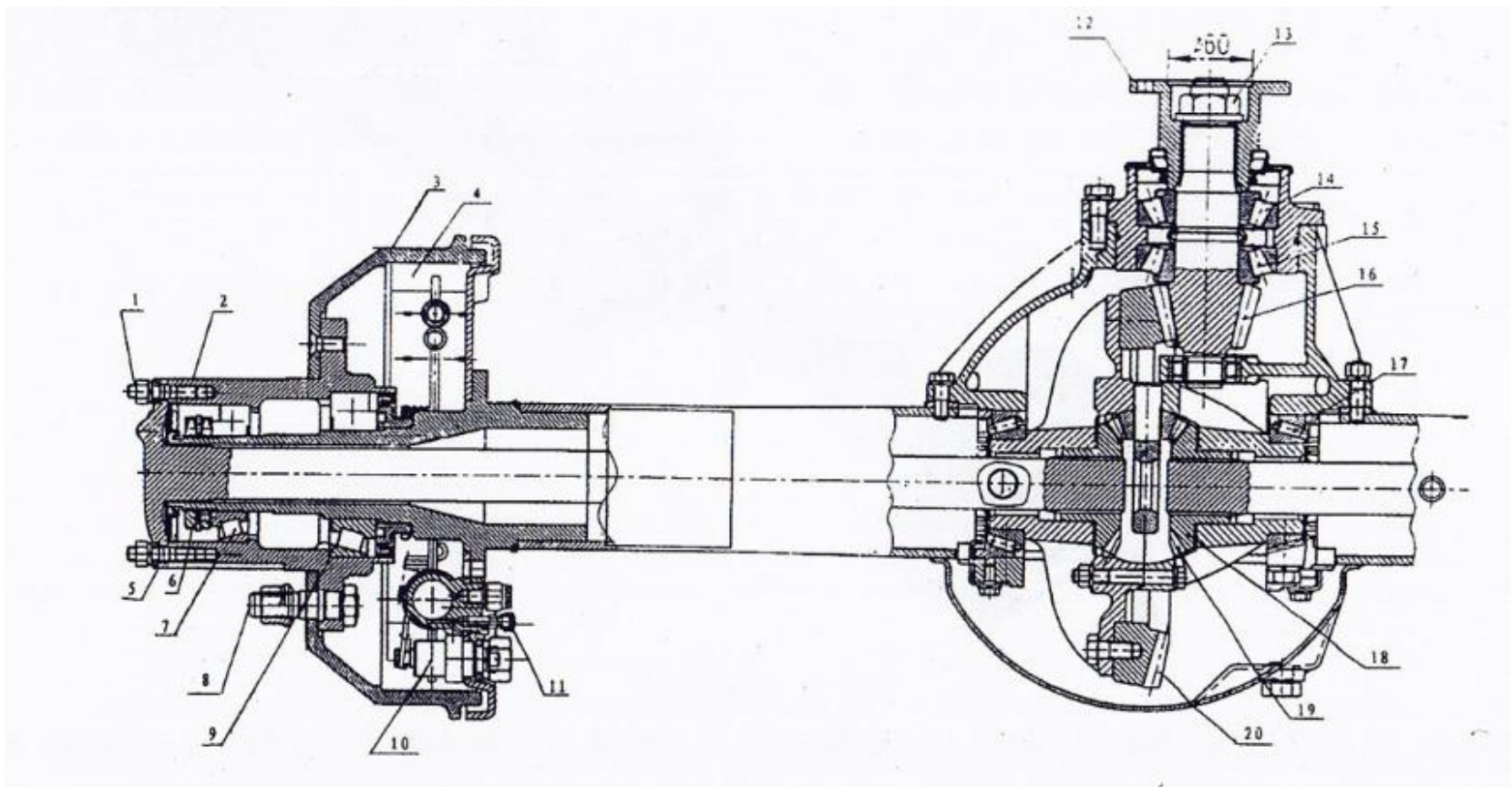


Fig. 2-7 driving axle

1. Half shaft bolt 2, wheel 3, brake 4, shoe iron (Beijing 130) 5, oil seal 49x (100, 102) 6, lock nut 7, bearing 75118, tire bolt 9, bearing 781310, brake sub-pump (Beijing 130) 11, bleed valve 12, drive shaft disc 13, nut 14, bearing 2730915, bearing 27522, 2959016, bevel gear 17, bearing 29590, bearing 2952218, half shaft gear 19, planet gear 20, passive bevel gear.

(1) The bearing clearance of the driving gear is adjusted by the cushion behind the inner ring of the bearing in the driving gear. After adjustment, there should be no clearance and the bearing can rotate freely.

(2) The displacement (arc length) of active and passive gears should be between 0.2 and 0.6 mm when measuring the backlash of active and passive gears around the radius of the flange plate 45mm.

(3) After every 100 hours of driving, check the driving axle oil surface, the correct berth surface is not lower than the bottom edge of the refueling port 10mm, if necessary, add, after each 300 hours of driving, gear oil should be replaced, the machine should be 18 hyperbolic gear oil.

(4) After every 100 hours of driving, the wheel housing bearing grease should be replaced once, and the bearing preload should be adjusted until it is suitable.

III. Brake system Mechanical brake loader in use due to friction and other parts of the wear and deformation, brake stroke will increase or produce bias brake, affect the braking performance, then the brake should be timely adjusted to ensure safe driving.

(1) Adjusting the lengths of the two brake rods (Fig. 2-8) can change the size of the empty stroke of the brake pedal and synchronize the left and right brakes. The brake rod can be screwed short so that the empty stroke is reduced. When adjusting, loosening the locking nut 3 should be loosed and locked.

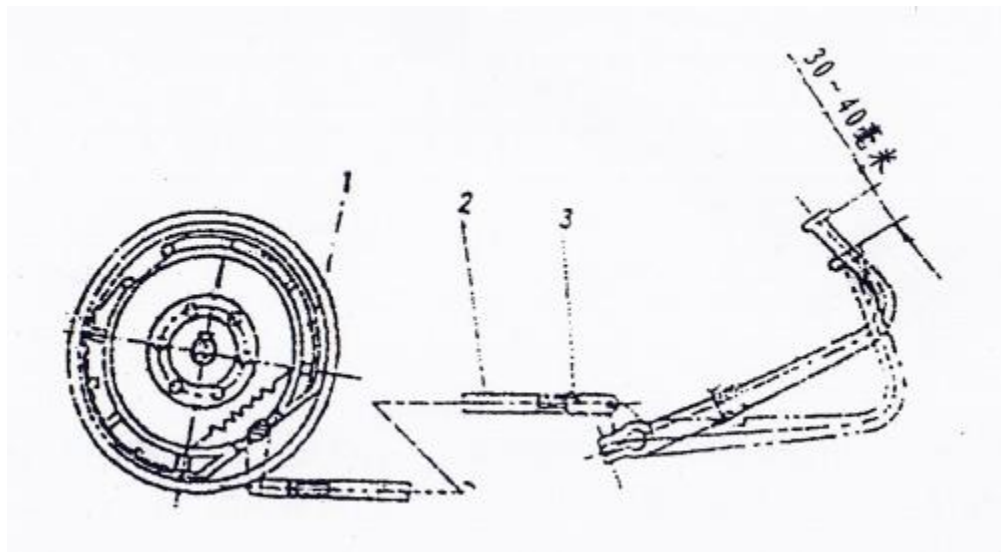


Fig. 2-8 adjustment of brake
1.Brake 2. brake lever 3. locking nut

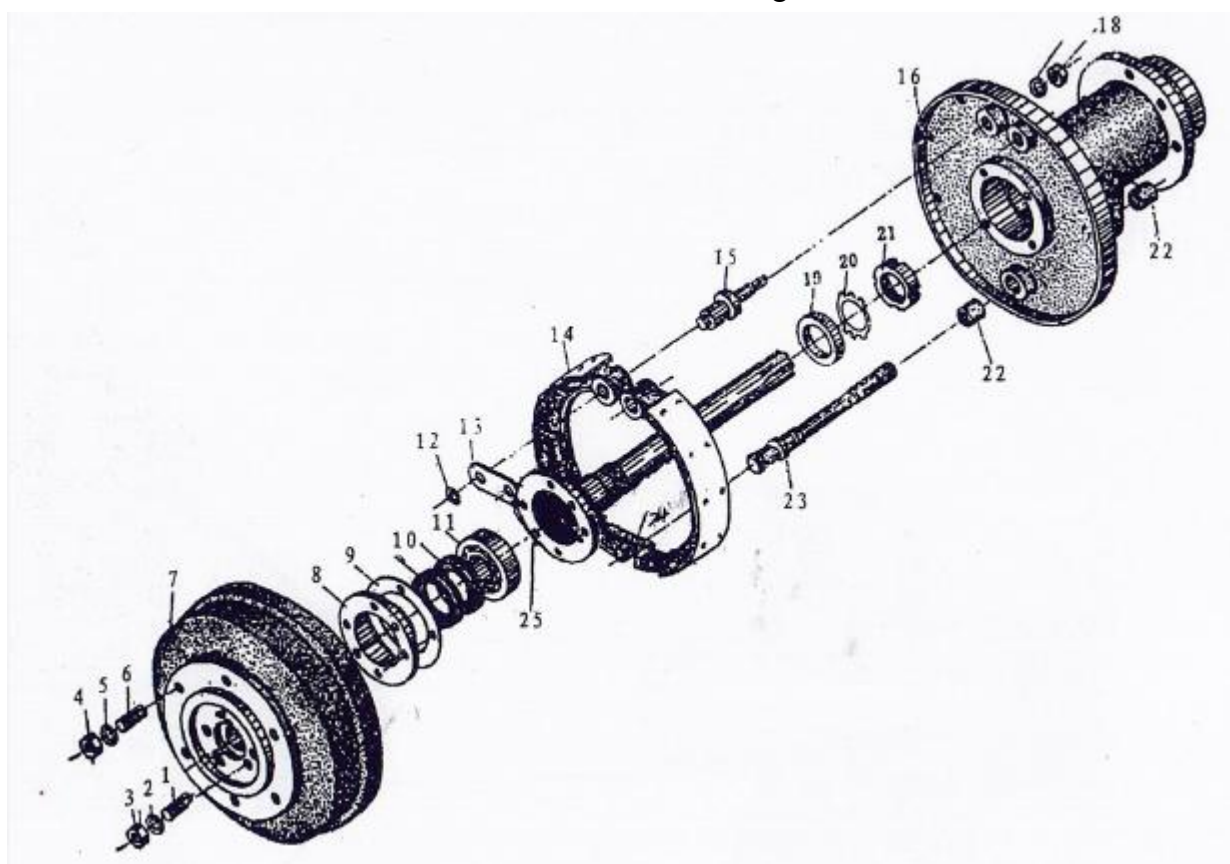


Fig. 2-9 half shaft assembly

1. Nut M142. Double head bolt M14? 03. Spring 4. Nut M165. Spring 6. Double head bolt M16o07. Brake hub 8. Bearing cover 9. Paper pad 10. Oil seal 52×75×12 11. Bearing 21012. Clamp spring 13. Press plate 14. Brake shoe 15. Eccentric shaft 16. Half shaft sleeve 17. Elastic pad 18. Nut M16 19. Lock nut 20. Lock nut 22. Sleeve 23. Brake convex shaft 24. Brake shoe return spring 25. Half shaft (2)By adjusting the orientation of the eccentric shaft 15 (Fig. 2-9), the contact mark between the friction pad of the brake shoe and the friction surface of the brake hub can be changed to make the friction pad wear evenly. The rear axle of the loader is padded up, the nut 18 is loosened (Fig. 2-9), the eccentric shaft is rotated with a wrench, and the driving wheel is rotated by hand. When the brake shoe is in contact with the brake hub, the resistance is sensed, and then the eccentric axis is slightly rotated in the opposite direction until the wheel rotation resistance disappears. Finally, the nut is locked to prevent rotation.

BJ130 hydraulic brake system is used for braking of four-wheel drive loader. The brake pedal has a full stroke of 160mm and a free stroke of 8-10mm. When the brake pedal is found to be too low, it should be checked.

- (1) Is the pipeline leaking oil?
- (2) Is the clearance between the hooves and drums too large?
- (3) Is there any air in the pipeline?

(B)hydraulic transmission system

The transmission between the power plant and the driving wheel is called the transmission system, whose function is to transmit the power output from the power plant to the driving wheel; the transmission system of the machine is mainly composed of diesel engine, hydraulic torque converter, fixed-shaft power shift gearbox, front and rear drive shaft, front and rear drive axle and other components. The transmission system is shown in Figure 2-10.

The front and rear drive shaft is made of NJ130 automobile drive shaft.

The functions of the main components in the transmission system are summarized as follows:

Hydraulic torque converter: can make the transmission system has a certain degree of automatic adaptability, that is, with the increase of external load, torque output shaft speed automatically decreased, and torque automatically increased: Conversely, when the external load decreases, torque output shaft speed automatically increased, torque automatically decreased. Therefore, it is equivalent to a certain range of automatic adjustment of the CVT, the number of gearboxes can be reduced accordingly.

Loader equipped with hydraulic torque converter, eliminating the main clutch, also eliminating the process of operating the main clutch, and hydraulic torque converter has the automatic adaptability, so that the number of shifting greatly reduced, the driver's fatigue greatly reduced, and because of the hydraulic torque converter has the automatic adaptability, improved the average driving of the loader. Speed and loader performance.

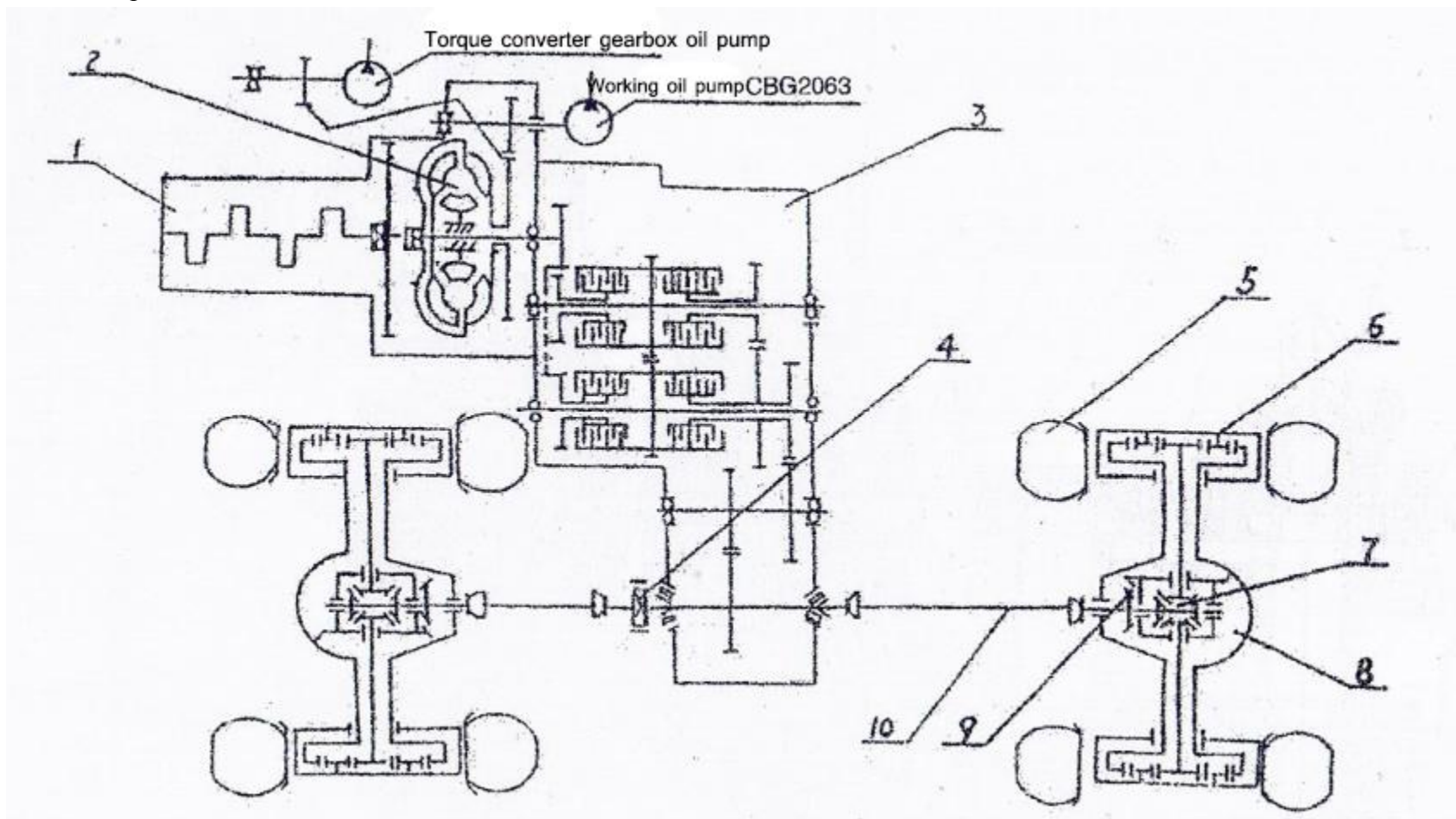


Fig. 2-1 0 schematic diagram of hydraulic transmission system1, diesel engine 2, torque converter 3, gearbox 4, hand brake 5, wheel 6, wheel reducer.2, 7, differential 8, drive axle 9, main driver 10, drive shaft.

In addition, the power of torque converter is transmitted by oil, which can absorb and eliminate the vibration and impact from diesel engine or external load when transmitting power, thus protecting the engine and improving the service life of the transmission system and driver's comfort.

The main function of the gearbox is to change the transmission ratio between the engine and the driving wheel with high efficiency, thus changing the speed and traction of the loader to meet the needs of operation and operating conditions. The gearbox allows the loader to move forward and backward, and can also cut off the power of the transmission system in high-grade positions.

The main function of the universal drive shaft is to transfer the power output from the gearbox to the farther front and rear axles, even though the axes of the active bevel gears in the main drive of the front and rear axles and the axes of the output axles of the gearbox can not be strictly guaranteed to have the same center line and there are installation errors, frame deformation or axis deflection, etc. It can ensure that the transmission of power is not affected.

The function of the drive axle is to change the direction of the transmission torque (the axis of the transmission torque is 900 directions each other) by means of the driving bevel gears installed vertically in the transmission and the driven bevel gears engaged with it, and to reduce the speed of the transmission output shaft through the main drive on the bridge. Torque increases, through differential, half shaft and wheel edge deceleration, further deceleration will be transmitted to each drive wheel power. Besides, the drive axle housing also acts as bearing and transmitting force.

It can be seen that the use of hydraulic mechanical transmission system to ensure that the operation can have enough automatic adaptability, thus greatly improving the productivity of the loader operation process, improving the operating conditions of the driver, reducing the driver's labor intensity, and improving the driver's comfort.

I. Hydraulic mechanical transmission (hydraulic torque converter-gearbox)

Hydraulic mechanical transmission is composed of hydraulic torque converter and forward and backward two-gear fixed-shaft power shift gearbox connected by bolts. They are an inseparable whole. It is stated below: 1、 Brief description of structure (see Fig. 2-11)

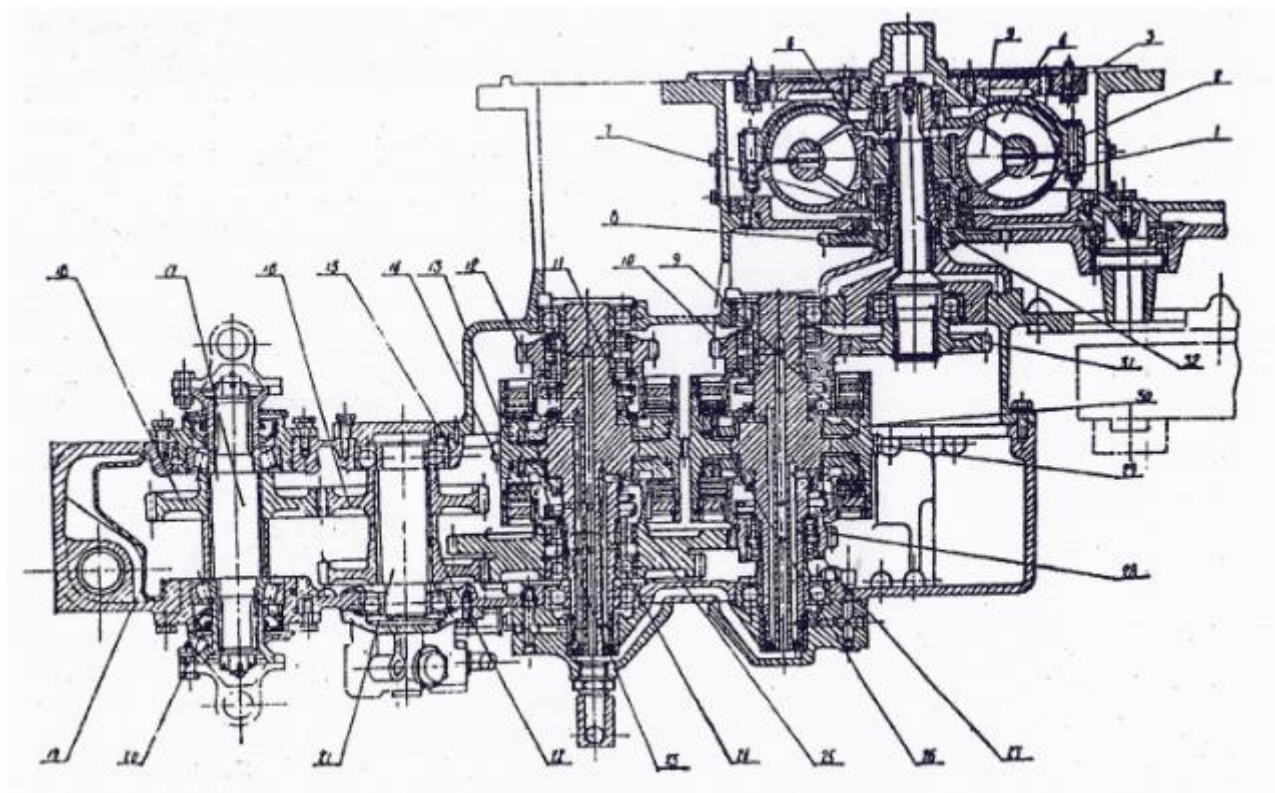


Fig. 2-11 torque converter - Gearbox 1. Pump wheel 2. Pump wheel cover 3. Tooth figure 4. Turbine 5. Guide wheel 6. Guide wheel seat 7. Pump wheel load 8. 31. Drive gear 9. Forward piston 10. 12. 14. 16. 18. 22. 28. 29. Gear 11. Backward piston 13. 30. Release case 15. shell 17. output shaft 19. oil plate 20. oil seal 21. middle shaft 23. 2 movable stockade 24. 27. Clutch shaft assembly 25. Double gear 26. First gear piston 32. Vortex Wheel axle

The pump wheel (1) is connected with the pump wheel cover (2) by bolts to form a closed body. One end of the pump is connected with the engine flywheel by an elastic plate (3), and the other end is supported on the guide wheel seat (6) by a ball bearing. In this closed body, there is a turbine (4) and a guide wheel (5). The turbine is connected with the turbine shaft (32) by an involute spline, and the guide wheel (5) is connected with the guide wheel seat (6) by an involute spline. The guide wheel seat (6) is bolted to the torque converter housing. The main gear (3) driving the variable speed pump and the working device pump is connected with the pump wheel shaft (7) through an involute spline, and the driving gear (8) driving the passive gear.

Then drive the variable speed pump and the working device pump through the spline sleeve. The input gear (31) of the gearbox is connected with the turbine shaft (32) through the involute spline. The gearbox has a forward and low shaft clutch assembly (27) and a backward top shaft clutch assembly (24). The driven plate of the clutch is respectively sleeved on the inner spline of the clutch housing (30) and (13) through the involute spline, and the clutch driving plate is sleeved on the outer spline of the gear (10), (23), (12) and the double gear (25) respectively through the involute spline. The gears (22) and (16) are installed on the intermediate shaft (21) by means of involute spline. The tooth (18) is mounted on the output shaft (17) by an involute spline, and the gear (16) engages with (18).

The front end of the output shaft of the gearbox is equipped with a hand brake device, and the upper part of the gearbox is equipped with a transmission oil pump and a working device oil pump. In the lower part of the gearbox case, a filter screen is installed at the suction pipe mouth of the gearbox oil pump, and a magnet and a discharge bolt are nearby.

2.the working process (see Figure 2-11)

The power from the engine drives the hydraulic torque converter pump wheel (1) to rotate through the elastic plate (3), and converts the mechanical energy into the kinetic energy of the liquid, so that the liquid flows into the turbine (4) at high speed, and the pressure difference is formed when the liquid moves around the turbine blade. It also drives the turbine to rotate, even if the kinetic energy of the liquid is converted into mechanical energy to be transported through the turbine shaft. After the liquid flows out of the turbine, it enters the guide wheel (5). When the working fluid changes its rotational motion after passing through the guide wheel, the working fluid gives the guide wheel the acting torque, and the guide wheel gives the working fluid the opposite reaction torque in the same direction. Torque converter plays a role in changing torque.

When the speed lever and the reversing lever are in neutral position (i.e. neutral gear), the gears (31), (10), (12) rotate idly, and the power from the turbine cannot be output, so the car stops.

When the reversing lever is in the forward position and the speed lever is in the low speed position, the pressure oil (1.2MPa~1.4MPa) from the main pressure regulating valve on the torque converter housing enters the gearbox control valve, the pressure oil from the control valve enters the clutch housing shaft through the pipeline and the forward low-grade oil-passing end cover, and enters the clutch housing shaft from the central orifice oil channel. The piston and the piston move under pressure to make the clutch main and driven friction plates engage. The power input by the input gear (31) is transmitted to the output shaft (17) through the gears (12), (14), (29), (28), (25), (22), (16), (18) to drive the front and rear drive shafts to rotate. Then drive the wheels through the front and rear drive axle. Make progress.

When the reversing lever is in the forward position and the speed lever is in the high-grade position, the pressure oil enters the piston of the clutch to engage the active and passive friction discs of the clutch. The power is transmitted to the output shaft through the gears (31), (12), (25), (22), (16), (18) so that the front and rear drive shaft rotates through the front and rear drive shaft. The rear drive axle drives the wheels to rotate. Achieve the two block of progress.

The process of going backward is the same as advancing gear. No more repetition. Its transmission route is:

Backward gear: The power input by the input gear (31) is transmitted to the output shaft (17) through the gear (10), (28), (25), (22), (16), (18) to drive the front and rear drive axles to rotate, and the wheel is driven to rotate through the front and rear drive axles. To achieve the first step backward.

Backward second gear: the power input by the input gear (31) is transmitted to the output shaft (17) by the gear (10), (29), (14), (25), (22), (16), (18) to drive the front and rear drive axles to rotate and drive the wheels through the front and rear drive axles. Achieve the second step backwards.

3.shift clutch

The gearbox is equipped with four shift clutches, i.e. forward gear clutch, backward gear clutch, I gear clutch and I I gear clutch. The basic structure and working principle of these four clutches are the same. The following diagram shows the structural diagram of the shift clutch.

The shift clutch is a wet multi disc clutch. The outer spline of the driving gear 1 is the driving hub of the clutch, supported on the shaft 7 by two bearings, and the outer spline of the driving gear and the driving plate 2 are respectively four pieces.

The inner spline is connected and can be moved axially on it. The outer spline of the follower 3 is connected with the inner spline of the passive hub 4, and can also be moved axially on it. One end of the spring is against the left end face of the piston 5, and the other end is supported on the shaft 7 by the spring supporting disc 9 and the clasp 8. When the pressure oil passes through the oil channel A into the left oil chamber of the piston 5, the piston overcomes the left shift of the spring force, and all the active plates and followers are compressed, and the clutch is combined to transmit power.

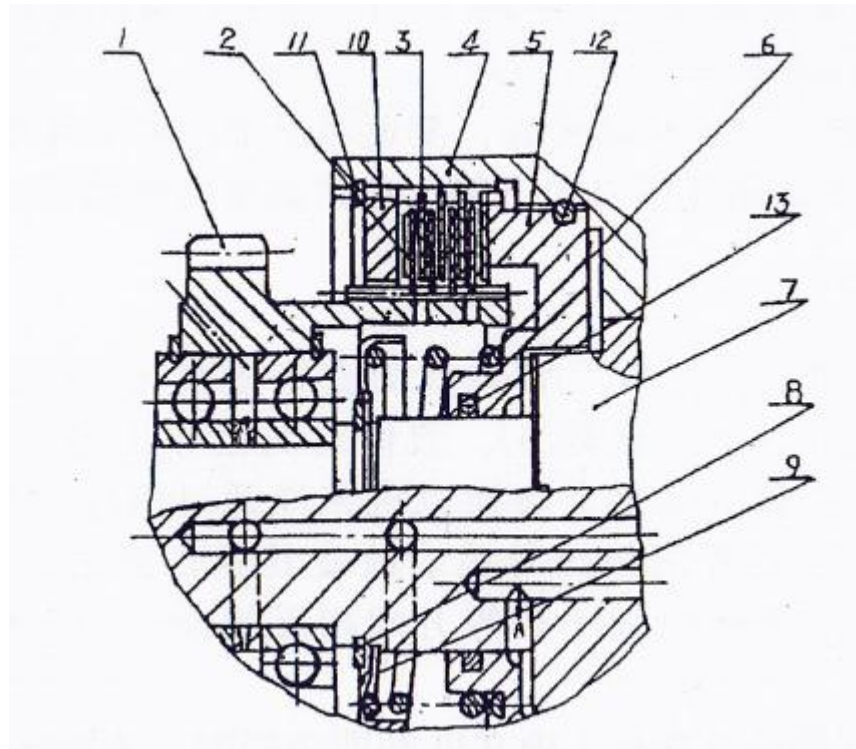


Fig. 2-12 shift clutch structure

1. driving gear 2, active tab 3, follower 4, passive 5, piston 6, spring.
7, shaft 8, 11, clasp 9, support tray 10, pressure plate 12, 13, sealing ring.

II. Hydraulic torque converter, oil transmission system of transmission (see Fig. 2-13)

A transmission gear pump (12) mounted on the torque converter housing at the upper left of the gearbox absorbs oil from the transmission oil pan through a filter (3). The output pressure oil from the gear pump passes through the oil filter (11) into the main pressure regulating valve (6) into the main pressure regulating valve in two ways, one way to the gearbox control valve (5) (1.2-1.4 MPa); the other way through the main valve into the hydraulic torque converter pump wheel (torque converter pressure valve control into the torque converter oil pressure of 0.4-0.6 MPa).

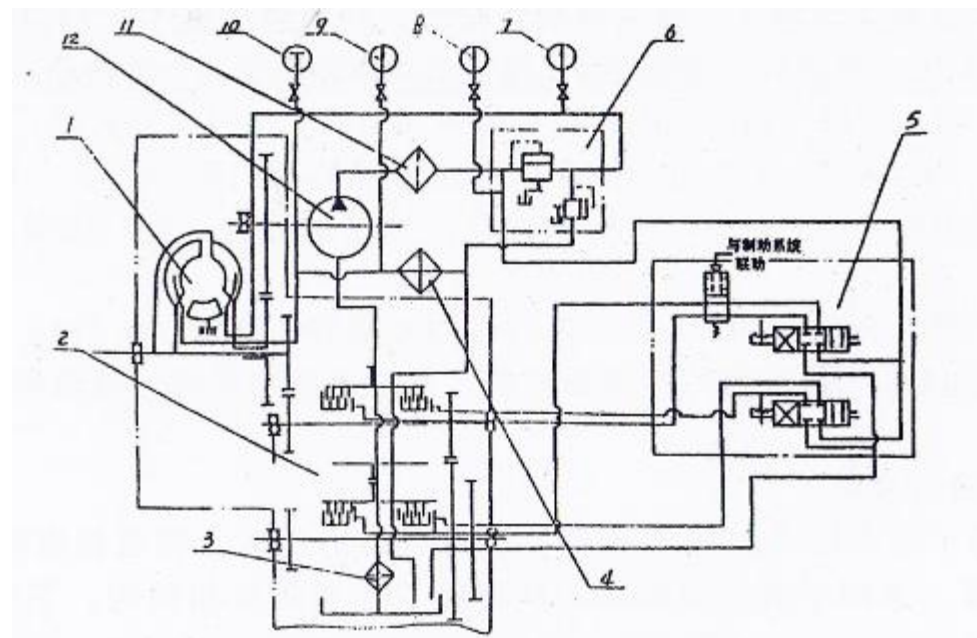


Fig. 2-13 schematic diagram of torque converter gearbox oil system

1. Torque converter 2. Transmission 3. Filter 4. Cooler 5. Transmission control valve 6. Main regulator 7.8.9. Pressure gauge 10. Temperature table 11. Oil filter 12. Oil pump

The oil at the torque converter outlet (the torque converter lubrication valve controls the torque converter outlet oil pressure of 0.25-0.3 MPa) passes through the oil cooler (4), enters the forward, low-grade and backward high-grade oil-passing end cover, and removes the lubrication bearing, gear and cooling clutch plate from the two clutch housing shaft lubrication holes. Finally flow back to the gearbox bottom.

The oil temperature of the hydraulic mechanical transmission box is usually 80 -100 C. The maximum instantaneous temperature should not exceed 120 degrees. If the oil temperature is too high, stop cooling.

Transmission control valve (see Fig. 2-14)

The transmission control valve is composed of a speed valve, a reversing valve and a shut-off valve.

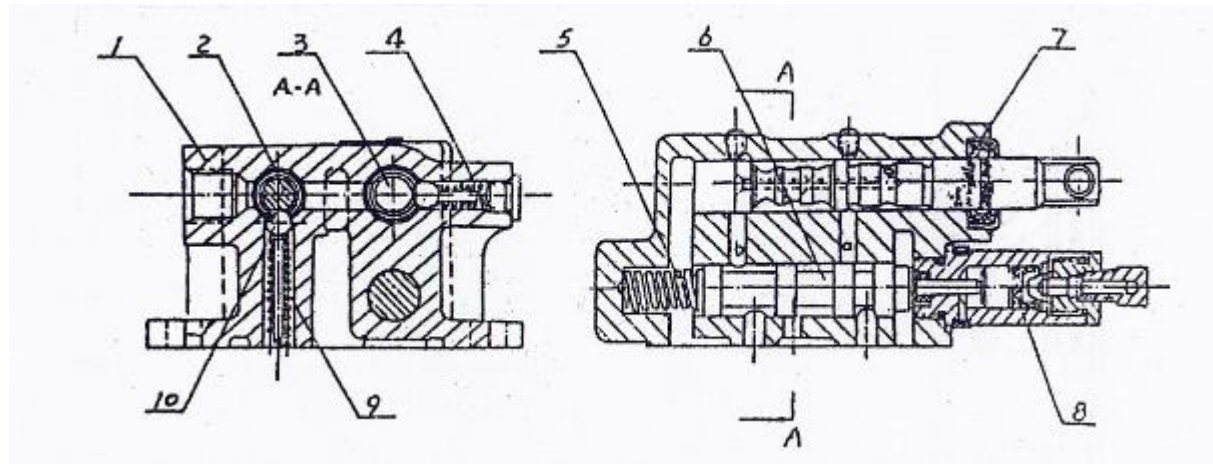


Fig. 2-14 transmission control valve

1 valve 2 variable speed slide valve 3 commutation slide valve 4 spring 5 cut off slide valve 6 oil seal 7 cut off piston 10 steel ball.

The speed valve-speed sliding stem (2) is positioned by a spring (9) and a steel ball (10), and pulling the sliding stem (2) enables the gearbox to be in neutral, first and second gear respectively.

The reversing valve reversing the sliding stem (3) is positioned by the spring (4) and the steel ball. Pulling the slide valve rod (3) enables the gearbox to be in neutral, forward gear and reverse gear respectively.

The combination of the reversing valve and the speed valve can reach the first gear, second gear, backward one gear and second gear. Its work takes the reversing valve as an example. When pulling out the sliding valve stem (3), the pressure oil from the main pressure regulating valve enters the reversing valve, flows into the forward clutch of the gearbox through hole a, the pressure oil pushes the piston, so that the clutch master and slave friction plates engage, the gearbox hangs up the forward gear, at this time, when the speed valve sliding valve stem is in the forward gear or two. At the same time, the vehicle speed can be moved forward or forward. Similarly, when the reversal valve stem is propelled, the pressure oil flows from hole B into the retrograde clutch of the gearbox, and the pressure oil pushes the piston to combine the clutch master and slave plates and hang up the retrograde gear. At this time, when the speed valve stem is in the first or second gear position, the speed can be retrograde one gear or retrograde two gears.

The function of the speed valve is the same as that of the reversing valve.

Cut-off valve

The shut-off valve is composed of a control valve assembly (8), a spool (6) and a spring (5). When the loader does not step on the brake pedal on the road, the shutoff valve is in the position (Fig. 2-14), the reversal valve is in the forward position, and the pressure oil passes through hole a to the clutch cylinder. When the driver steps down the brake pedal, the pressure oil from the brake system enters the piston of the control valve assembly (8), which moves under the action of the pressure oil, pushes the ejector rod to move the valve core (6) and compresses the spring (5). At this time, the oil from the a hole to the gearbox forward clutch is cut off. Therefore, the forward clutch's master and slave discs are separated and the torque is no longer transmitted, thus facilitating the braking of the loader.

III. Drive axle

The driving axle of the machine is divided into the front axle and the rear axle.

The gearbox of the machine has no front and rear axle detaching mechanism. The front and rear axle of the machine is the driving axle, that is, the four wheel drive.

1. brief description of structure:

The structure of the drive axle is shown in Fig. 2-15. It is mainly composed of axle housing, main transmission (including differential), half shaft, wheel side reducer and tire and vehicle assembly.

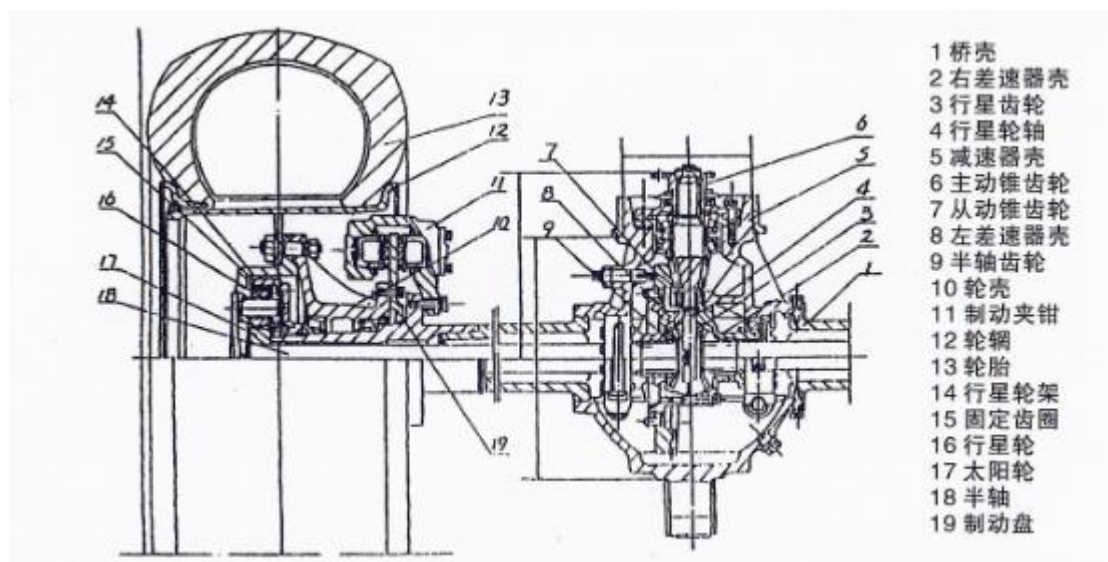


Fig. 2-15 driving axle general plan

The axle housing is mounted on the frame to bear the load coming from the frame and transfer it to the wheel. The axle housing is also the installation support for the main driver, the half shaft and the wheel reducer.

The main drive is a first-order spiral bevel gear reducer, which transmits the torque and motion transmitted by the drive shaft. The differential is a planetary gear drive composed of two conical straight-tooth half-shaft gears, a cross shaft and four conical straight-tooth planetary gear left and right differential housing. It plays a differential role in the different speeds of the left and right two wheels. The torque and motion of the main actuator are transmitted to the half shaft.

The left and right half axles are fully floated, and the two ends of the half axle are connected with the half axle gear and the sun gear of the wheel side reducer through the involute spline. Therefore, the half shaft will be transmitted from the main actuator to the wheel reducer by the torque and motion transmitted by the differential.

The wheel reducer is a planetary mechanism. The inner gear ring is fixed on the wheel edge support at both ends of the axle housing by splines. It is fixed and the planetary frame and the wheel bolt are fixed in one body. Therefore, the rim and the planetary frame rotate together. Its power passes through the half shaft and the sun wheel passes under the planetary frame.

The principle of wheel side planetary transmission can be seen in Figure 2-15. It can be seen from the diagram that the sun wheel which is connected with the spline is driven by the half shaft and rotates in the same direction by N_{frames} too rotating speed, while the planetary gear which is combined with the sun wheel rotates in the opposite direction. Because the gear ring is fixed, the planetary frame is driven in the same direction as the sun wheel by N_{frames} rotating speed, and the N_{frames} are less than N_{too} .

The wheel rim assembly is the main walking part. The tire used by the machine is a low pressure wide base tire. Its section size is large, its elasticity is good, and the ground specific pressure is small. It has small subsidence on soft roadbed and good cushioning performance on concave and convex pavement. In short, on the harsh road surface, the tire has good cross-country performance and traction performance.

The brake is a caliper disc type. The brake disc (19) is fixed on the wheel hub (10) and rotates together with the wheel. The clamp (11) is fixed on the drive axle housing (1), and each drive axle is provided with a clamp on the left and right sides, and each clamp is provided with two pairs of pistons.

When braking, the pressure oil from the brake master pump enters the clamp, and enters each piston through the oil channel and the oil pipe in the clamp, pushes the piston and the friction pad to the brake disc (19), produces the braking torque, causes the wheel to stop turning.2.Working process (see Fig. 2-15)

The power output from the engine is transmitted to the active spiral bevel gear (6) via the hydraulic torque converter, the transmission shaft of the gearbox, and the driven bevel gear (7) is transmitted to the driven bevel gear. The torque is transmitted to the driven bevel gear through the left and right differential housing (2) and (8) integrated with the driven bevel gear to the cross shaft (planetary gear shaft) (4). If the ground resistance moment to the axis of the half shaft is equal, then there is no relative motion between the planetary gear and the half shaft gear, and the half shaft rotates with the differential housing and the driven large spiral gear at the same speed. Move. It seems that the left and right driving wheels are driven by a shaft.

If, for some reason, the resistance distance between the left and right wheels acting on the axis of the half shaft at the contact with the ground is not equal, and the difference in torque between them is greater than the torque needed to overcome the internal resistance when the planetary gear rotates, the planetary gear will rotate around its own axis, thus playing a differential role. When the planetary gear revolves around its own axis, the planetary gear makes the half-shaft gear and the right-half-shaft gear rotate in the opposite direction. So the car can make a turn.

IV.Transmission shaft

The drive shaft is mainly composed of universal joint, expansion joint and transmission shaft. The universal joint is composed of universal joint (1), clasp ring (2), roller needle (3), cross shaft (6) and universal joint sleeve fork (8) (see Figure 2-16). The main function is to transfer torque and rotation when the angle changes. The expansion joint is composed of a pair of internal and external spline shafts. In this way, the total length of the drive shaft can be allowed to stretch, but the spline length should ensure that the drive shaft in a variety of working conditions, that is, do not take off and do not die, the drive shaft tube is rolled from steel plate into a circular tube, used to transfer torque and rotation.

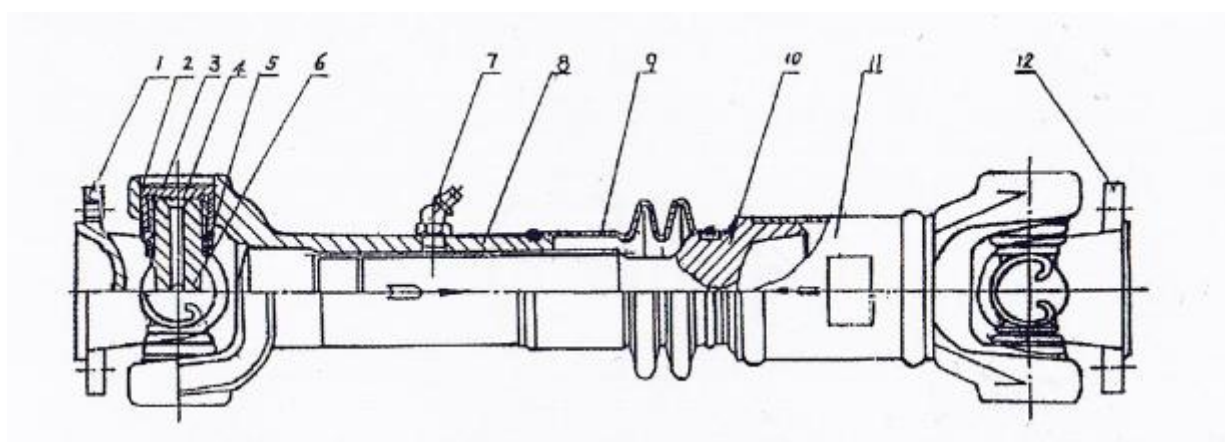


Fig. 2-16 transmission shaft diagram of universal joint

1, 12, universal joint fork 2, clasp 3, needle roller 4, sleeve 5, felt oil seal 6, cross shaft 7, butter nozzle 8, universal joint sleeve fork
9, dust jacket 10, transmission shaft tube 11, universal joint fork

Attention should be paid to the adjustment and maintenance of transmission shaft.

a, spline shaft and cross shaft must be regularly lubricated according to the regulations.

b, transmission shaft fixed bolts should be inspected and tightened while maintaining the vehicle.

c. The universal joint forks at both ends of the transmission shaft are located in the same plane, and are marked with arrows.

When disassembling or repairing, care should be taken not to dislocate

III.Braking system

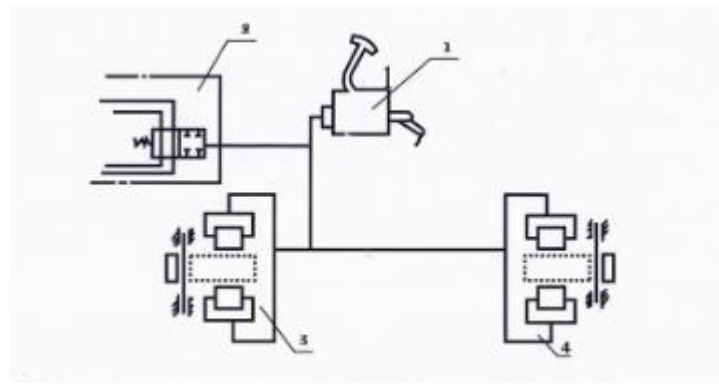


Fig. 2-17 schematic diagram of brake system

1. brake master cylinder 2, the shut-off valve 3 of the transmission control valve, the front axle sub pump 4 and the rear axle sub pump.

The brake system of the loader includes two independent braking systems: the foot brake system and the hand brake system. The foot brake system adopts single-pipe hydraulic clamp disc brake (see Fig. 2-17), mainly composed of brake master pump, oil storage cup, clamp disc brake. When braking, the foot pedal pushes the top rod of the brake master pump to produce high-pressure oil which is fed into the brake sub-pump of the front and rear axle clamp disc brake respectively, so that the piston extends out of the brake disc. At the same time, the high-pressure oil of the brake master pump enters the cut-off valve piston of the variable speed distribution valve, pushes the sliding valve down, cuts off the oil circuit of the forward or backward clutch of the reversing sliding valve, so that the main-driven friction disc of the clutch is rapidly separated, the power is cut off, and the front and rear axles are not driven, thus the brake is fast and reliable. The hand brake system is used for the driver to leave the vehicle or stop on the ramp. The parking brake adopts the external drum type hand brake. The following are the main components of the system: (I) brake master cylinder. The structure is shown in the figure:

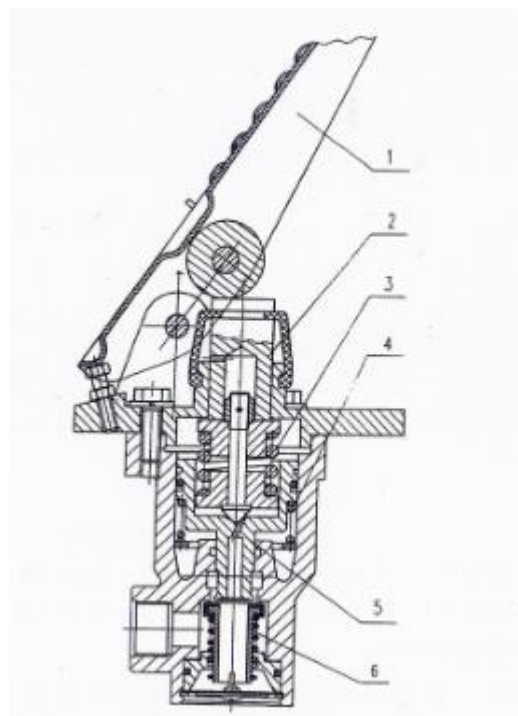


Fig. 2-18 brake master cylinder

- 1, pedal 2, ejector pin 3, balance spring 4, return spring 5, piston 6, intake valve.

(II) The hand brake uses the external drum type hand brake, brakes the transmission output shaft, achieves the vehicle stops on the slope road the goal. The hand brake is connected with the hand brake lever through a wire rope. When braking, the wire rope is pulled by the hand brake joystick, so that the friction disc is held tightly and the braking effect is produced by pressing tightly on the brake hub. Remove braking, hand brake lever back to the original position, eliminate tension, friction disc in the role of the spring back, so that the friction disc and the brake hub are separated.

(III) The caliper disc brake consists of an inner caliper (2), an outer caliper (5), a friction disc (12), a piston (9) and a brake disc (1).

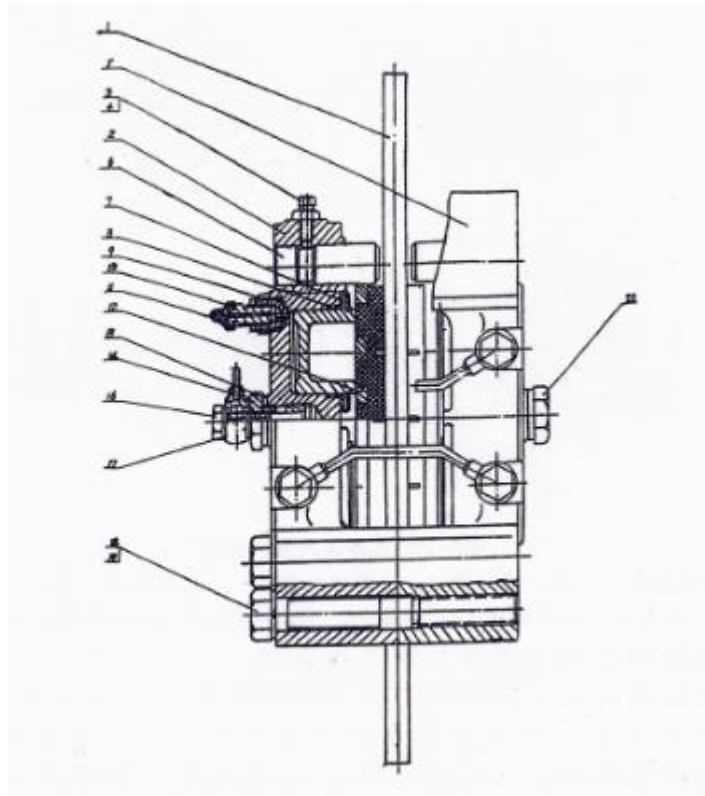


Fig. 2-19 caliper disc brake

1. Brake disc 2. Inside clamp 3.4. Fastening screw 5. Outside clamp 6. Pin 7. Dust shield 8. Seal 9. Piston 10. Exhaust nozzle 11.

Rubber cap 12. Friction disc 13. Gasket 14. Bolt 16.20. Hollow screw 17.23. Gasket 18.19. Bolt gasket

Matters needing attention in foot brake system:

1. Mineral brake fluid should be added to the oil storage cup of the main brake pump when insufficient oil is found. The small holes on the oil storage cup cover should communicate with the atmosphere.

2. Mixed gas in hydraulic system will affect braking performance. After replacing parts and cleaning system, exhaust should be carried out. The method is as follows:

a, remove the fouling in the hydraulic line, oil storage cup, fuel inlet and vent port.

b, oil storage room is filled with brake fluid.

c. Put a transparent tube for deflation on the deflation nozzle, and put a person in an oil pan at the other end of the tube to collect the oil discharged.

d, loosely open the gas nozzle, step down the brake pedal continuously until it reaches the bubble free liquid column. Tighten the vent before loosening the brake pedal. When discharging, if the liquid level of the oil storage room is below the specified value, it is necessary to replenish it in time so as to prevent the air from entering the system again.

IV、Working device hydraulic system

It is mainly composed of gear pump, priority valve, multi-way reversing valve, boom cylinder, dump cylinder, working oil tank and pipeline.

The pressure oil passes from the gear pump through the priority valve to the multiway reversing valve. The oil is transferred to the boom cylinder or tipping cylinder by manipulating the corresponding spool valve. When the working device is not working, the middle oil passage of the oil through the multi way reversing valve is filtered through the oil filter.

The structure and working principle of the multi-directional valve:

The multi-way reversing valve (see figure) is mainly composed of a safety valve (1) an oil inlet valve body (2) a dump reversing valve (3) an arm reversing valve (4) and a return oil valve body (5). Detailed structure and working principle refer to "Z series multiple directional valve operating instructions".

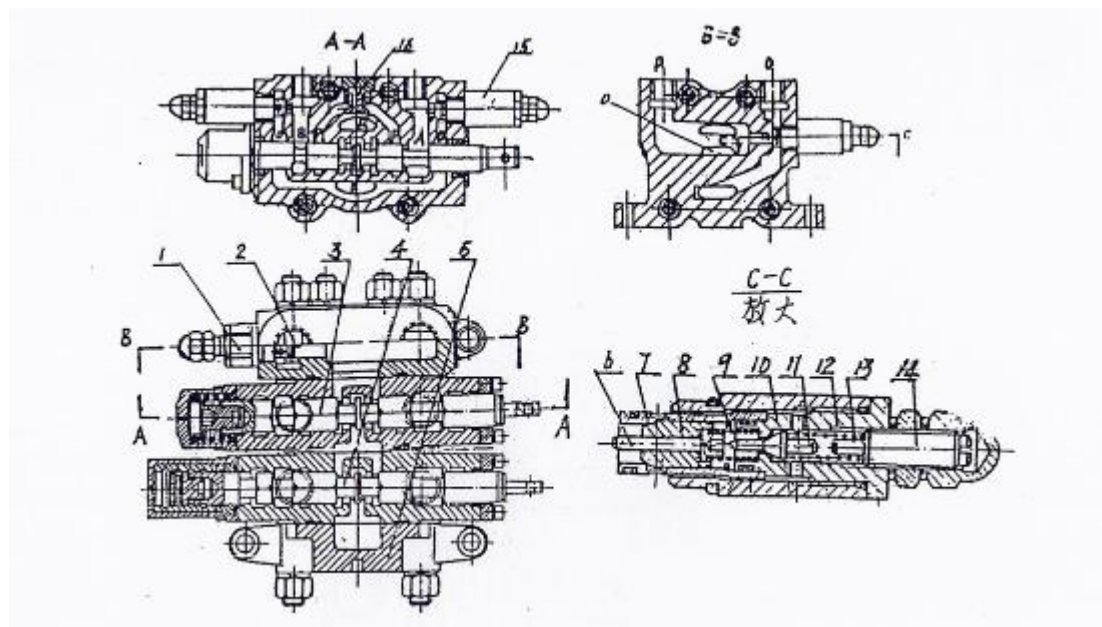


Fig. 2-20 structure of multi-directional valve

1. Safety valve 2, oil inlet valve body 3, dump reversing valve 4, boom reversing valve 5, oil return valve body 6, slide valve 7, sleeve 8, main valve core 9, 13, spring 10, seat 11, pilot valve core 12, valve body 14, adjustment bolt 15, oil inlet valve 16, one-way valve

A series of parallel connection oil paths are used between the tipping bucket and the movable arm reversing valve.

The structure and working principle of tipping bucket and boom oil cylinder are similar to that of bucket reversing valve.

The cylinder used in the loader is a double acting single rod piston type cylinder, which is mainly composed of cylinder head 1, cylinder 4, piston 2, piston rod 5 and sealing components. When the pressure oil enters the A oil way, the oil moves the piston to the right. The oil on the right side of the piston flows back through the B oil way to the tank, when the piston rod reaches out. In the same way, when B oil inlet, A oil return, piston left shift, piston rod retraction, because the piston rod and piston are connected, so the oil pressure on both sides of the piston area is different, under the same oil pressure, the piston on the left side of the force is large.

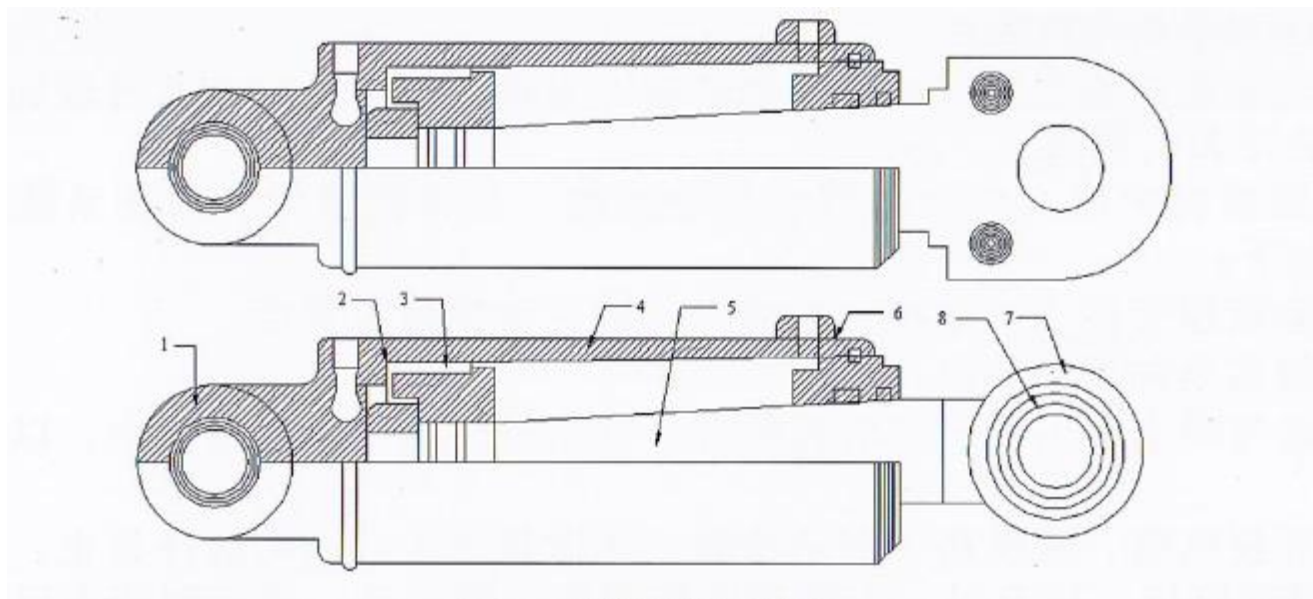
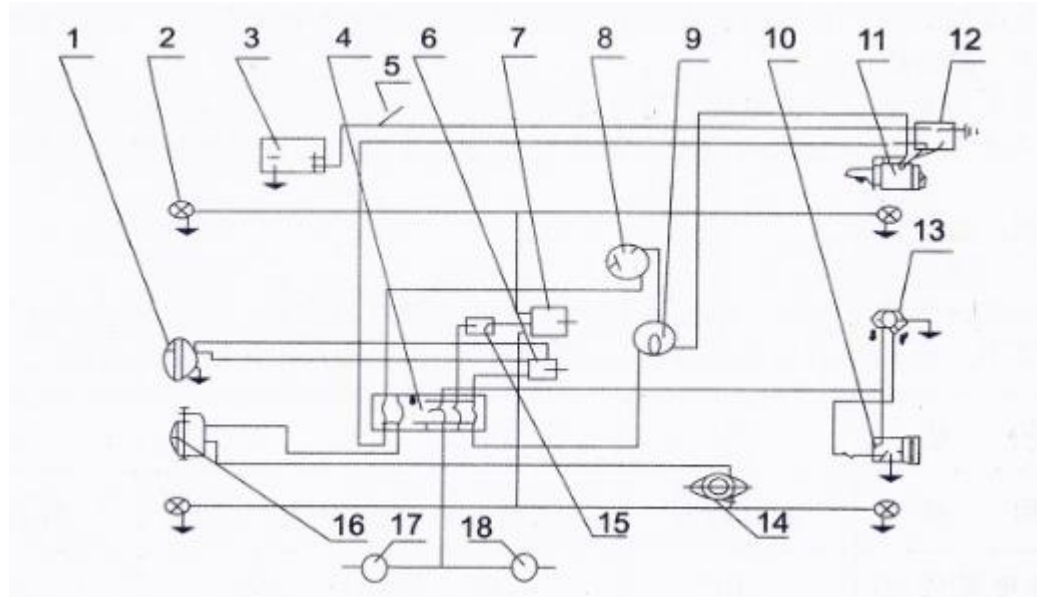


Fig. 2-21 schematic diagram of cylinder structure

- 1, cylinder head 2, piston 3, Y type sealing ring 4, cylinder 5, piston rod 6, guide sleeve 7, earring 8, cylinder sleeve.

Chapter 3 Electrical Equipment

The single cylinder electrical system adopts AC voltage of 12 volts, and the four cylinder machine is 24 volts, and the negative electrode grounding system is made.



1. Front and rear headlights 2. Steering lights 3. Bubbles 4. Fuse box 5. Power switch 6. Double switch 7. Steering switch 8. Amperometer 9. Starting switch 10. Generator 11. Electric starter 12. Starting relay 13. Regulator 14. Horn button 15. Flasher 16. Horn 17. Water temperature table 18. Oil gauge

I. Battery

The battery model is single-cylinder N120-12V, four-cylinder N140-24V, its function is when the engine starts, power supply to start the motor, when the engine normal work, if the generator voltage is lower than the battery voltage, then power supply to the machine battery charging, in order to store part of the electricity.

Attention should be paid to:

1. Keep charging regularly. If you don't use it for a long time, you should charge at least once a month.
2. Check the level of electrolyte regularly. The liquid level should be 10-15 millimeters higher. Distilled water can be added when it is insufficient.

If the loss of electrolyte leakage is known, the electrolyte with a specific gravity of 1.28 should be added.

3. Check whether the vent of the accumulator is blocked, remove the external mud and stolen goods, wipe out the overflowing electrolyte, and coat the electrode with a thin layer of calcium-based grease to prevent corrosion.

- 4, do not overuse starters.

- 5, the battery should be tightened so as not to be damaged by shock.

II. Generator and regulator

- 1, alternator:

The generator has two terminals marked "armature" and "magnetic field" and a grounding pin marked "grounding". They shall be connected to the terminal post marked with the same text on the relay regulator, and the "grounding" screw shall be connected to the "grounding" screw on the relay regulator.

Both ends of the generator are bolted to the generator bracket, and a generator foot is used to adjust the tension of the triangular belt.

2. Relay regulator:

The relay regulator consists of three devices: a cut-off device, a regulator and a current limiter.

The relay regulator is marked with "armature", "magnetic field", two terminals and a ground screw. The "armature", "magnetic field" and the grounding screw posts on the side of the base shall be connected with the corresponding connecting posts and grounding screws on the generator. Battery terminal is connected with No. 1 terminal of ammeter, and No. +terminal of ammeter is connected with No. 1 terminal of battery.

If the regulator is not working properly or after 1000 hours, a skilled electrician is needed to make adjustments.

III, starter.

Its purpose is to start the generator by supplying battery power. Starter gear movement is driven by electromagnetic, and with a unidirectional roller clutch, can prevent the starter armature from damage with the high-speed rotation of the engine after starting.

IV. Other

1, fuse box:

When a fault occurs in the circuit and the current is overloaded, the fuse can automatically fuse, thus ensuring the complete operation of the electrical equipment. There are four fuses in fuse box assembly. The usage and working current of each fuse are shown in the following table:

Number of files	1	2	3	4
purpose	Total fuse	Charging circuit	Headlights and taillights	Cornering lamp
Working current (ampere)	30	20	6	6

If the circuit is found to be abnormal, should immediately check whether the fuse box corresponding to the fuse is blown, according to the blown fuse class, check the protected components. After troubleshooting, pull out the guard wire plate, pull off the movable head, remove the spare fuse from the fuse plate end about 60 mm, close around the fixed head, then pull back the movable head, and then insert the fuse plate into the fuse box in situ.

2. Ammeter:

Amperometer is used to indicate the charging and discharging current of the battery, when the generator charges to the battery, the pointer is biased to "+"; conversely, it is "one" and zero without current passing.

3, electric lock:

When the key is inserted into the keyhole, pull it to the right and connect all the electrical appliances except the motor. Then pull to the right, the starter will turn on the power and start the engine. In order to protect the starter motor, it is necessary to pull the key to the left immediately after the engine starts.

4, switch: the switch controls the whole electrical system. When the power is stopped, the power should be disconnected, so as not to discharge the battery.

Chapter 4 Driving operation

Before driving and operating, it is necessary to be familiar with the structure, technical maintenance and operation methods of loaders so as to ensure safe operation and improve the life and productivity of loaders.

Attention should be paid to the following safety precautions in driving and operation.

1. Drivers must study the traffic rules, mechanical structure and operation methods, and read the instructions 2. No passengers are allowed anywhere except in the cab.

3, pay attention to the working conditions of the parts that the instrument reacts at any time.

4. During operation, personnel are not allowed to walk under the boom and bucket.

5, the engine should stop immediately when the engine is out of order, so as to prevent malfunction caused by steering failure.

I. Running in of Loaders

Loaders have been thoroughly inspected and tested before they leave the factory. When new cars are used, they must be commissioned. New cars that have not been commissioned must not be used formally. Trial operation can make the friction parts of the machine run in and out to avoid failure, thus ensuring the loader to work reliably and prolonging its service life. But at the very beginning, the harsh working conditions will obviously shorten the service life of the machine.

New cars should be used for the first 100 hours.

(I) Empty car trial run (about 8h)

1. After the machine is started, it runs in low gear for 5 minutes, then gradually increases to the maximum speed for 10 minutes.

2, control the working device, make the boom rise and fall, the bucket tipping and collecting, about 15 minutes.

3. When running empty cars, all grades of advance and retreat should be carried out from low speed to high speed respectively.

When driving, they should make steady left and right steering and braking.

After eight hours of trial run, the following tasks are carried out:

1. Check the sturdiness of all bolts and nuts, especially the cylinder head bolts, exhaust pipe bolts, front and rear axle bolts, wheel nuts, steering wheel nuts, etc.

2, clean oil filter and fuel filter element.

3, check the appropriate degree of tightness of the fan belt.

4. Check battery electro-hydraulic specific gravity and liquid level storage, tighten battery cable bolts, check electrical system connections, generator power supply status, lighting and steering signals, etc.

5. Check the transmission oil quantity. When the engine is idle, the oil surface should be in the center of the oil mark.

6, check the hydraulic system, the sealing system of the brake system.

7. Check the connecting and fixing of each joystick and throttle components.

(II) Operation test run (about 20h)

1. According to the method of operation control, loading should be gradually increased.

2. In the process of operation test, besides checking the items of empty car test run, we should also observe the shoveling capacity of loader in different materials.

3. During loading and unloading period, the loading and unloading capacity can not exceed 70% of the common load.

4. It is advisable to shovel loose materials in the closing period and not to rush too fast.

(III) In the process of trial operation, we should pay attention to the following points:

1. Are there any loosening phenomena of bolts and nuts in each connection area?

2, there is no abnormal sound in each part.

3, whether the reading of the instrument panel is normal.

4, whether there are three leakage phenomena in each system (refer to oil, gas and water).

5, whether the steering and braking are flexible and reliable.

6, whether the working device is normal.

7, in case of emergency, avoid sudden start, sudden turn and sudden braking.

8, attention should be paid to the lubrication condition of loaders, replacing or adding lubricating oil or grease according to the prescribed time.

9. Always pay attention to the temperature of gearbox, clutch, front and rear axle, wheel hub, brake and brake drum. If overheating occurs, the reason should be found out and eliminated.

10, avoid high temperature and heavy load work.

(II) Use of Loaders

(1) matters needing attention

- * be careful not to approach the edge of the cliff.
- * When building dikes, filling or unloading materials under a cliff, a pile should be unloaded first, and then pushed backwards to push the previous pile.
- * Load relief when material is toppled off a cliff or when the machine reaches the top of the slope, resulting in increased speed and danger. So be sure to slow down.
- * when a bucket is loaded, no sudden start, steering or parking is allowed.
- * When unstable materials, such as circular, cylindrical or sheet materials, are loaded into the lifting device, the materials may slip onto the cab and cause serious damage.
- * when loading unstable materials, avoid raising the working device or overcharging the angle.
- * if the working device stops suddenly, the landing action may cause the machine to roll over.
- * in the load state, pay special attention to the careful operation of the working device.
- * no lifting operation is prohibited by using a bucket or boom.
- * only the permitted loader operation can be carried out, and other operations may cause serious accidents.
- * It is prohibited to work in fog, snow, heavy rain and other poor visibility conditions until the weather improves and visibility improves.

When working in tunnels, bridges, wires and other places with height restrictions, avoid shovels hitting other objects.

* When unloading into the truck, check whether there are any loader accessories and be careful not to bump the bucket into the truck cab.

* Especially in narrow areas, indoors and other places where the machine works, in order to prevent accidents caused by touching other objects, the machine must run at a safe speed.

* place foot on foot brake pedal only if necessary.

* repeat foot brake pedal only when necessary.

* when the downhill, foot brake pedal, if necessary, the engine can be used to assist braking, and no block pulley is allowed.

* when lifting the boom, the hopper must be leveled, otherwise the oil cylinder and rocker arm will be damaged.(I)Empty car driving

1. Starting engine

Check if there are any people or obstacles around, then alert the horn and start the engine. Before starting, put the joysticks in a neutral position, then insert the key into the electric door, and turn clockwise in a position, turn on the power supply, step on the throttle, and then start the engine. The starting engine should not rotate continuously for more than 15 seconds. If the engine can not start, start again after 30-40 seconds interval. Unable to start for three consecutive times, check the cause and start again.

2、Start and drive

Do not suddenly increase the throttle before idling for 5 to 10 minutes.

Engine continuous idle or no load high-speed operation can not exceed 20 minutes.

It is necessary to turn the engine in time and space, gradually loading, and moving the engine at medium speed.

(1) Gently press down the accelerator pedal and run the engine at no load for about 5 minutes.

(2) Only in cold areas heating hydraulic oil temperature, the method is as follows: in the heating process, check whether the engine speed is stable. Continuous pushing and pulling the position control rod to raise the temperature of hydraulic oil. The release time at the hopper position shall not exceed 10 seconds. During the operation, the oil reaches the safety pressure, which will raise the temperature of the hydraulic oil faster.

(3) After the preheating operation is completed, check whether the instructions are normal.

(4) Operate engine at low load until engine water temperature reaches normal value.

(5) Check whether the exhaust color, sound or vibration is abnormal. If abnormal, repair immediately.

(6) Whether the handles are flexible and reliable.

(7) Whether the steering wheel is loose or loose.

(8) Whether braking is reliable.

(9) Working device movement is normal.

*Before driving, check whether the vehicle is safe around, and then honk the horn before starting. No people standing behind the train. There is a blind spot at the back of the car, so you should be careful when driving.

*When starting a vehicle on a slope (front facing down), start the diesel engine, step on the accelerator pedal, gradually retract the bucket, step on the brake pedal, and release the parking brake. Put the clutch pedal in the required gear position; release the brake pedal, step the accelerator pedal and gently release the clutch pedal to start smoothly.

(1) Confirm that the shift lever is in the neutral position, and the parking brake handle is placed in the braking position.

(2) Insert the key into the power switch and turn it to the connecting position clockwise.

(3) Press the start button and add a little fuel to start it.

(4) The starting vehicle should not rotate continuously for more than 15 seconds. If the vehicle can not start, start again after 30-40 seconds interval. Unable to start for three consecutive times, check the cause and start again.

(5) After starting, the engine is idling for 5 minutes at low speed, and the meter reading should be normal.

(6) Lift and lift the bucket to the transport location.

(7) Step down the brake pedal, release the parking brake handle and release the brake.

(8) Step down the clutch pedal and put the high and low speed joystick at the required gear. Move the shift lever to the desired position.

(9) Step on the accelerator pedal, slowly loosen the clutch pedal to start smoothly, then start the vehicle, the machine can run.

3、Shift

*When driving at high speed, do not shift gears suddenly. When shifting, use the brake to slow down and shift gears.

Shift according to the following steps:

Step down the clutch pedal and move the shift lever to the desired position.

When mining or loading operations, use only II files or III files.4.Parking and stalling (1) Reduce throttle and reduce speed of loader.

(2) Push down the clutch pedal and then the brake pedal. When the loader stops, put the gearshift lever in the neutral position, pull the stop brake handle to the brake position, and brake.

(3) release the clutch and brake pedal and reduce the throttle to idle the engine.

(4) Flameout pull line forward, the fuel pump stops supply, the engine immediately flameout, and then push back to the position of fuel supply.

(5) turn the start switch key to "OFF" position to turn off all power supplies.

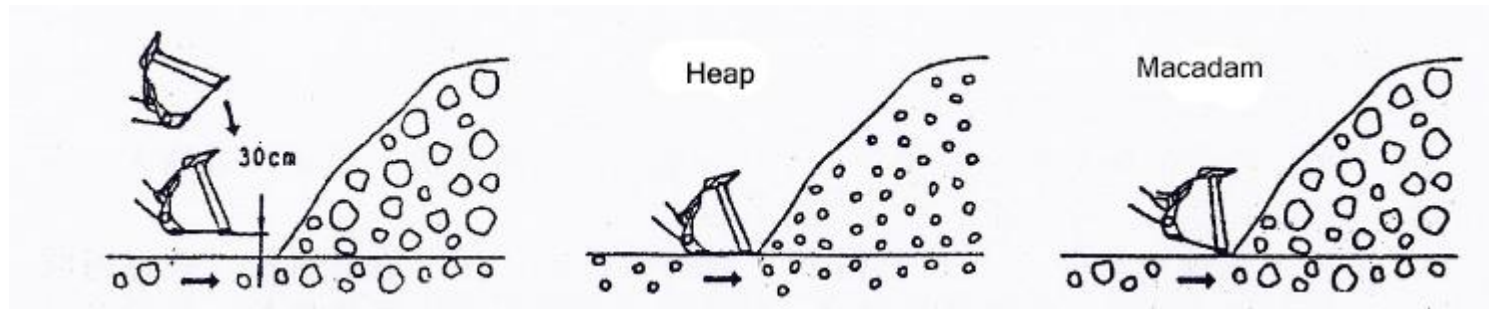
In addition, pay attention to putting the bucket flat before parking, and turn off the power supply.

5. Operation manipulation is related to driver's operation proficiency. Drivers with different proficiency have different operation methods. The loading and unloading method described below is for reference only. Comrades who use this machine can master it by themselves in the operation practice, constantly improve and summarize the operation methods, so as to improve the service life of the production and machinery in the handling operation.

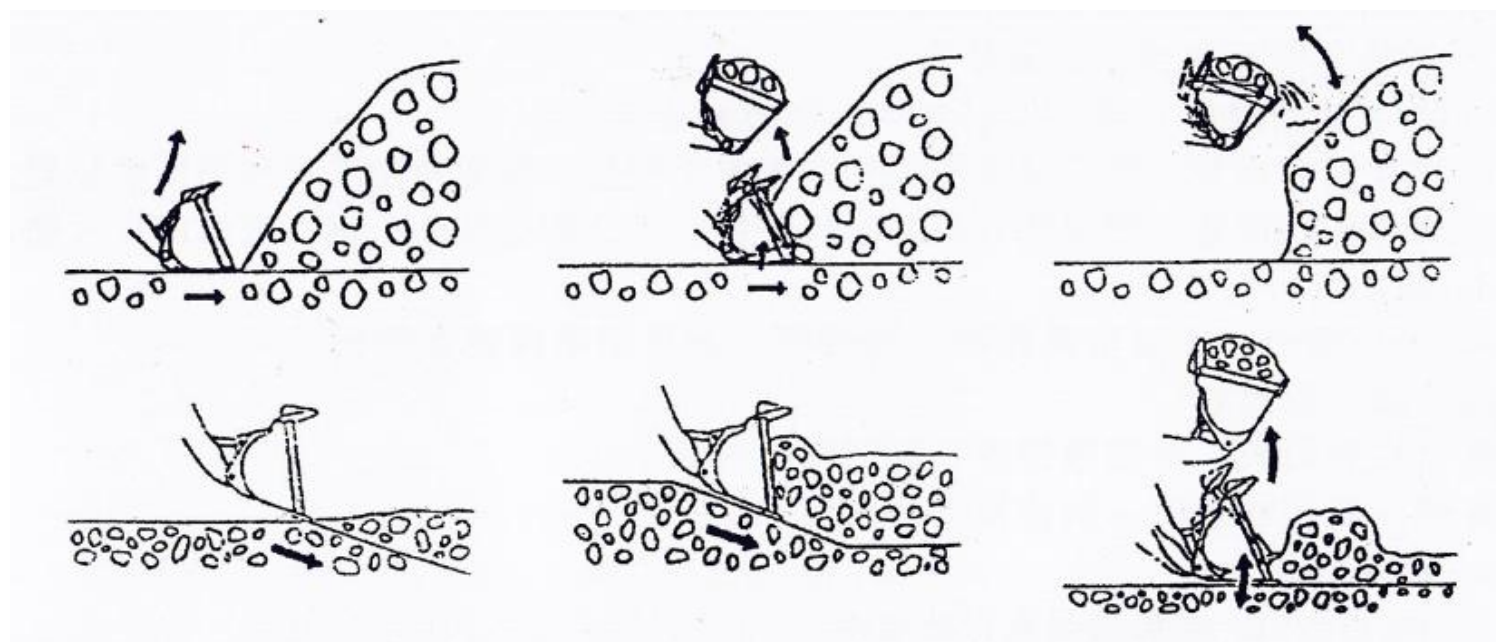
Before the operation, we should clean up the field, fill the pits, remove the damaged tires, and obstruct the operation.

(1) shovel excavation operation warning: when digging or digging, the front side of the loader body should be moved forward. Don't turn it around.

1. when loading loose material, operate in 1 or 2 gear. When loading a larger proportion of material, operate in 1 stalls. Drive and lower the bucket, stop the bucket at the ground 30cm and then slow down



2. shift gears before approaching the material, step down the accelerator pedal after shifting, and insert the bucket into the material. 3. if the shovel is loose material, leveling bucket; if the shovel material is gravel, turn the bucket slightly. 4. push the bucket into the material while lifting the boom to prevent the bucket from being inserted too deep. The front wheel will generate enough traction when lifting the boom. 5. check whether enough materials have been shovelled, and control rods and hopper are manipulated to fill the bucket. 6. if loading too much material. Quickly collect and turn over the bucket to shake off the excess load. This avoids dropping when transporting materials.



When excavating and loading on the flat floor, the blade will be slightly down (shown) and the front loader. Attention should be paid to avoiding ten sides of load inclination bucket, causing imbalance. This operation should be carried out in first gear.

1. turn the blade slightly downward.
 2. front loader and push arm lever ahead. When digging the soil, cut into a thin layer at a time.
 3. gently and up and down the lever control lever to reduce the resistance of the loader to move forward.
- When shovel digging operation is carried out, the shovel digging force should not be applied to the side of the bucket.

(II) Flat work

When the ground is working, the loader is running on the reverse side. If you have to work in advance, the bucket will be closed. The angle should be greater than 20 °C.

1. shovel the soil into the bucket and drive it in reverse gear. The machine makes the soil fall evenly from the bucket.
2. bucket teeth are panted, and the soil is spread out after using the traction force.
3. the bucket will dig the soil again, the boom will float, the bucket will be put on the ground, and the rear loader will be leveled.

(III) Pushing operation

When pushing material, the bucket can not be in the unloading position. When pushing, the bottom of the bucket is parallel to the ground.

(IV) Loading and carrying operations

Warning: drop bucket is used to reduce the center of gravity during the operation.

The loading and carrying methods of wheel loaders include the following cycle processes: Shovel loading and unloading one loading (pour dump truck, furnace mouth, etc.).

Good maintenance of transport routes.

It is more efficient to transport materials within 100m distance, and its speed should be according to the condition of the road. No lifting operation is allowed during transportation. Arms, especially when the ground is uneven

(V) Loading operation

Choose the right method to minimize the number of turns and rows. Cheng, improve work efficiency.

Warning: keep the work area flat, avoid heavy turning when heavy haul transportation. Brakes. When driving at high speed, insert the bucket into the stack or gravel pile.

Right angle loading.

The front face of the loader is aligned with the material pile. After shoveling the material, it runs straight and reverse. Then the dump truck is opened between the loader and the material stack.

This method requires short loading time and effectively shortens the working cycle time.

V shape loading The dump truck is put in place, so that the loader to the pile and dump truck to the pile. The included angle is 60°. After loading the bucket, the loader is running backward.

Turn, turn it toward the dump truck, move the loader forward and load the material into the dump truck.

This loading method has small turning angle and high efficiency.

When the bucket is filled with the collecting bucket or lifting to the maximum height, the first vibration bucket is used to make the load stable.

When you pay attention to heap operation, you should avoid the counterweight iron touching the ground.

(VI) unloading operation

When the loader approaches the unloading site, it lifts the bucket to the required height and pushes forward the bucket joystick to make the bucket tilt forward. If the loading operation is carried out, at a certain distance from the trunk, after lifting the bucket to the unloading height, the truck slowly approaches the trunk for unloading. When discharging, attention should be paid to motion mitigation to reduce the impact of materials on vehicles. When the material is adhered to the bucket wall, the bucket control rod can be operated back and forth to make the bucket shake and discharge the material.

(VII) other operations

The machine can be directly used for bulldozing, leveling, excavation, traction and other operations; if the replacement of the corresponding working device can also carry out a variety of operations, such as grasping wood, pushing snow and other operations. Note: The installation of the working device must be approved by the manufacturer or sales office and under its guidance. **Safety precautions**

1. Drivers must have a formal driver's license, be familiar with the instructions of the aircraft and the engine, and use, repair and maintain them in accordance with the provisions.
2. Under the arm bucket, stop standing.
3. Turning must be slowed down, no sudden turning and braking, no high-speed driving in rainy and snowy weather, and pay attention to avoid turning on the slope.
- 4, strictly prohibit downhill and steering when the engine is out of order, so as to avoid the malfunction of hydraulic steering.
- 5, after loading the bucket can not exceed the transport location of high-speed driving.
6. The center of gravity of goods is not allowed to be loaded during loading.
- 7, no overload operation is allowed.
- 8, ramp parking in addition to tightening the handbrake, the wheel with triangular wood pad.
9. Loaders must not be near fire.
- 10, always pay attention to whether the meter reading is normal.

Chapter 5 technical maintenance

Loader's working conditions are relatively bad, often in the uneven construction site driving and operation, the parts are vulnerable to strong vibration or collision, making machine parts loose or damaged. Therefore, in order to ensure the good performance, normal operation and prolong the service life of the loader, in addition to being familiar with the structure of each part of the machine, it is necessary to check the technical status of the machine regularly according to the requirements and carry out the technical maintenance seriously. This chapter mainly introduces the technical maintenance of the parts other than the engine, the technical maintenance of the engine. Refer to engine instructions.

I.Cautions for oil and lubrication of Loaders

1、 When adding fuel oil, hydraulic oil and grease, the oil injection tool container and the oil injection part should be scrubbed clean to prevent water, sludge and sundries from entering the oil.

2、 When filling various oils, the machine must be positioned horizontally. Except for an oil level indicating device that can be observed, the oil stopper is usually spilled. The transmission dipstick is on the transmission cover

3、 When filling lubricating oil, dirty oil should be put into the original working oil level, in the case of no-load, so that the engine runs for a few minutes, after stopping operation, clean oil will be put into the net, and then add clean new oil, if the viscosity of the oil is too large can be heated and diluted before refilling.

4、 Under different working conditions at low or high temperatures, the types of working oils and lubricants should be replaced according to actual conditions and application requirements.

II.The type of oil used for loaders (see Table 5-1)

Table 5-1 types of oil for loaders

Project model	HW Series loaders
Fuel tank	Summer (above 10 °C) 0, winter (below 10 °C) -10 diesel
Oil sump	Summer (10 °C above) CC40, winter CC30 diesel oil
Gearbox and drive axle	18#Hyperbolic gear oil
Hydraulic oil tank	Winter 46, summer 68 antiwear hydraulic oil (national standard oil)
Various oil injection Tsui	Combined calcium base lubricating oil
Brake fluid	Adding "912" synthetic brake fluid

III. LubricationCorrect lubrication can greatly reduce the friction resistance of the machine and parts of the wear and tear, thus extending the life of the machine. When lubricating, pay attention to the matters needing attention in the oil mentioned above, please select the lubricating oil according to Table 5-1. Please lubricate the engine according to the instructions of the engine. **IV. routine maintenance**Routine maintenance is carried out before, after and during the operation of each shift, which is of little content and short time. However, it is very important for normal operation and accident reduction. The main tasks of routine maintenance are: 1. Keep the machine exposed before and after the operation. 2, check whether there is loosening and loss of fasteners, and tighten up and make up. 3, whether the parts are damaged.

- 4, check whether lubricating oil is added to each lubrication point.
- 5, check all fuel tanks (fuel tank, working tank, brake master cylinder), the oil level must be sufficient.
- 6, whether the engine cooling water is sufficient.
- 7, check the electrical system of the line connector loose, whether the battery power adequacy.
- 8, check the meters, whether the lights are intact and good.
- 9, check whether the manipulation is flexible and reliable.
- 10, check whether there is leakage or leakage after starting, there is no abnormal voice.
- 11, test whether the brake is reliable and whether the steering is flexible.

V.Regular maintenance

(I.) Weekly technical maintenance (about 50h after work)

In addition to routine maintenance items, the following items need to be undertaken.

1. Check whether the stroke of foot pedal is in line with the requirement, if not, adjust it.
2. Fasten the front and rear drive shaft coupling bolts, drive axle coupling bolts and tire nuts.
3. Check the height of the liquid level and the specific gravity of the electrolyte in the battery cell (the specific gravity is 1.24-1.27 at 15 C), if it is not enough to add distilled water and charge.
4. Injection of calcium base grease on injection nozzle.

(II)Monthly technical maintenance (about 200H after work)

In addition to daily and weekly technical maintenance items, the following items need to be added:

- 1, tire pressure measurement. If insufficient, gas should be supplementing.
- 2, clean the filter of fuel oil and hydraulic oil.
- 3, check whether there is leakage or damage to the brake system.
4. Check and tighten wheel hub bolts, brake discs and bearing cap bolts.

(III) Quarterly technical maintenance (about 600H after work)

In addition to daily, weekly and monthly technical maintenance items, the following items need to be supplemented:

1. Check the leakage of multi-way valves, various cylinders, if there is a serious drop in the working device, it should be repaired and eliminated.
- 2, check whether there is any damage to the cylinder of the brake cylinder.
3. Adjust the clearance of the hub bearing and make the outside end of the brake disc runout less than 0.20mm.

(IV)Semi annual technical maintenance (about 1200h after work)

In addition to daily, weekly, monthly and quarterly technical maintenance items, the following items need to be supplemented:

1. Replace all fuel and oil system oil, hydraulic system oil, gearbox, front and rear axle gear oil and brake oil. And clean the pipes, tubing, filters and so on, and then infuse the new oil that has been cleaned.
 - 2, disassemble and wash the brake master cylinder and check the braking effect.
 3. Check the front and rear axles, the main conveyor gear meshing, if the main and driven bevel gear clearance is too large, should be adjusted within 0.2-0.34 mm.
 - 4, check the working device and frame, whether there is deformation or weld fracture.
- Winter technical maintenance 1, replace winter lubricants and fuel.
- 2, when winter temperature is below 0C, antifreeze must be used.
 3. Battery discharge rate should not exceed 25%. High rate of charging should always be maintained.

Chapter 6 Common failures and troubleshooting methods of Loaders

For engine trouble and troubleshooting, please refer to the engine manual.I.complete machine.

Fault feature	Reason	Elimination method
Diesel engine cannot drive after starting.	1.Not hung up2.Torque converter oil leakage3.Oil temperature of torque converter is too high.4.Impeller damage of torque converter5.The cut-off stem of the shift control valve cannot be returned.6.Low gear pressure and clutch slip7.Brake disc brake8.Torque converter oil level is not enough.9.Failure of variable speed pump10.Main pressure regulating valve spring broken.	1.Hang up the file2.Replacement of oil seal3.Check and wash the radiator.4.Remove torque converter and replace impeller.5.Dismantling the cause of shut-off valve not returning and removing6.Adjust pressure to 1.2~1.4 MPa7.Oil pressure relieved to brake disc8.Refueling to specified oil level9.Exclude overhaul or replace the variable speed pump.10.Replacing pressure regulating valve spring
Insufficient driving force	1.Insufficient output power of diesel engine2.Variable speed pressure is too low, clutch skid.3.Oil temperature of torque converter is too high.4.Torque converter oil leakage5.Hand brake is not loosened.6.Brake disc brake	1.Check2.Adjust pressure to 1.2~1.4 MPa3.Check and wash the radiator.4.Replacement of oil seal5.Release hand brake6.Oil pressure relieved to brake disc

II.drive system

Fault feature	Reason	Elimination method
Torque converter has abnormal sound when working.	1Friction and wear of parts2Bad gear engagement3Poor lubrication	1Dismantled, overhauled or replaced2Reassembly adjustment3Improved lubrication
Oil leaking	1Aging and deterioration of oil seal burn2Bolt loosening	1Replacing oil seal and improving lubrication2Tighten the bolt
Low efficiency	1Poor lubrication and high oil temperature.2Improper assembly3Parts manufacturing quality is not good.4Too high oil level causes great loss of oil.	1Improved lubrication 2Readjust assembly 3Replacement parts 4Oil drain to specified oil level.
High temperature of axle housing	1Poor lubrication2Improper assembly of gears and bearings	1 improving lubrication2 adjust as required.
Not on file	1Variable oil pressure low2Incorrect shift lever position.	1 adjustment2 re hang or check the transmission control valve.

III.variable speed oil circuit system

Fault feature	Reason	Elimination method
High oil temperature	1 running with load for a long time 2 oil level is not moved. 3 oil way plug, radiator blockage. 4 oil pump friction	1 temporary parking or idle running for some time. 2 supplementary oil 3 check the oil circuit and radiator, clean and remove dirt. 4 open and repair
Gear shift Low pressure	1 transmission tank oil level through the bottom. 2 main oil way leaking oil. 3 gearbox filter plugging 4 failure of variable speed pump 5 spring failure of pressure regulating valve of variable speed control valve	1, go to the specified oil level. 2 check main oil way. 3 cleaning or replacing filter. 4 disassemble, check or replace the variable speed pump. 5 replace pressure regulating valve springs.
A file change Low speed pressure	1 damage of the sealing ring of the retaining piston. 2 the sealing ring of the oil passage is damaged. 3 oil leakage in the oil passage.	1 replace the sealing ring. 2 replace sealing ring and sealing ring. 3 check the leak and remove it.
	1 shift valve positioning steel ball dislocation. 2 increase lever clearance 3 seal ring leakage	1 re aligning 2 repair or replace parts 3 replace the sealing ring.

IV.steering system

Fault feature	Reason	Elimination method
Direction Drive hard	1 oil pump, valve and steering cylinder wear, insufficient flow. 2 pipe rinse way 3 insufficient steering pressure.	1 overhaul or replace the oil seal of oil pump valve and cylinder. 2 components in maintenance piping 3 check and adjust relief valve.
Steering wheel Post position To turn to	1 reentry shrapnel damage in steering gear 2 stuck between the oil distributing sleeve and the distributing shaft, stuck between the oil distributing sleeve and the valve parts.	1 repair and replace 2 remove the steering gear and repair it.
Insufficient steering distance	1 steering overpressure valve is too low. 2 serious internal leakage of steering gear.	1 transfer the overflow pressure to the specified value. 2 overhaul steering gear
System oil leakage	1 joint loosening 2 oil seal wear	1 twist tight head 2 replace, oil seal

V. Working device hydraulic system

Fault feature	Reason	Elimination method
Insufficient lifting force or insufficient turning force.	1. oil cylinder oil seal wear or damage2.excessive wear of priority valve, clearance between valve stem and valve body exceeds the specified value.3.oil leakage in piping system4.serious leakage of working oil pump5.improper adjustment of safety valve and low system pressure.6.suction pipe and filter clogging	1.change oil seal2.dismantling and repairing, making the gap reach the specified value or replacement.3 find the oil spill and eliminate it.4.replace the working oil pump.5.adjust the working pressure of the system to the specified value.6.clean the filter and change the oil.
When the diesel engine is running at high speed, the swing boom and rotating bucket is raised slowly.	1.Vide supra2.The piping resistance of the system is large.	1.Vide supra2.Reduce pipeline resistance.
System pressure is insufficient or completely without pressure.	1 failure of safety valve2 shunt valve spool or damping hole blockage.3 leakage within the systema.overload relief valve malfunctionb.The gap of reversing valve is too large.c.cylinder seal damage4.internal leakage of oil pump5.oil temperature is too high6.suction of oil pump	1.cleaning and replacing springs2.cleaning and inspection3.inspection and maintenance4.dismantling5.suspension of work6.clean the oil filter and reduce the resistance of the pipeline.
The boom will sink itself after lifting.	1.inner leakage of boom oil cylinder2.the valve stem clearance of the reversing valve is large.	1.remove and repair cylinder, replace seal.2. repair or replace
Reversing valve failure	1.Displacement and positioning device damage2.Stem deformation or jamming	1.check, repair or replace2.cleaning or replacement.
High oil temperature	1 friction of oil pump, large resistance of pipeline.2oil level is not enough.3working with load for a long time, with poor heat dissipation.	1.remove and repair oil pumps to reduce pipeline resistance.2.go to the specified oil level.3.stop and rest.
Misposition of oil	1.oil level is not2.filter plugging.3.the viscosity of oil is too high to be frozen.4.intake air in oil suction pump.5.oil pump wear	1.go to the specified oil level.2.cleaning filter3.replace the recommended oil or heat dilution, but when heating, be sure to pay attention to safety and open the lid of the fuel tank.4.repair or replace seals.5.overhaul oil pump

VI.braking system

Fault feature	Reason	Elimination method
Insufficient foot power	1.brake oil leakage2.there is gas in the brake hydraulic line3.brake master cylinder leather bowl wear4.wheel leakage to brake pads.5.the brake pad has been worn to the limit.	1.check or replace the oil seal.2.remove the air in the pipeline.3. cleaning or replacing leather bowls.4.check or replace hub oil seal.5.replace brake pads.
Deviation during braking	1. Left and right brake torque is not equal. 2. Left and right tire pressure is different.	1. check the sub pump and pipeline. 2. Consistent tire pressure
Insufficient manual power	1.Clearance between brake drum and brake pad is too large.	1.Resetting as required

VII.electrical system

Fault feature	Reason	Elimination method
Diesel engine starting difficulty	1 battery failure or lack of electricity2 damage of starting switch3 oil is too thick.4 line contact is bad or open circuit.5 excessive carbon brush wear or poor contact.	1 replace the new battery or charge. 2 NEW 3 new lubricating oil. 4 check and repair 5 overhaul or replacement
All kinds of lights are not bright.	1 fuse and bulb failure2 wire disconnect.	1 check and replace 2 check and connect.
Starter generatorNon charge	1 transmission belt slippage2 generator failure3 wire contact is bad or open circuit.	1 adjust the drive belt tightly.2 overhaul or replace3 check generator and battery leads and fasten them.

Attachment: common faults and troubleshooting of hydraulic torque converter

The causes and troubleshooting of faults in the operation of hydraulic torque converters are for users' reference.

Hydraulic torque converter in the course of operation may produce such or such faults, if not eliminated in time, it may develop into a serious accident, therefore, any fault should be taken seriously. When looking for the fault, we should carefully observe and analyze, and then take appropriate measures to eliminate it, do not blindly disassemble.

Fault feature	Reasons and Solutions
Working oil temperature is too high.	1, engine speed drops. Increase engine speed.2, there is gas in working oil. Check the height of the pumping tank; the tightness of the piping system connection; and whether the working oil is deteriorating.3. The temperature of the working oil is too high. Lower oil temperature.4, the working oil inlet and outlet pressure is too low. The sensitivity of each pressure valve action and the leakage of oil should be checked.
oil supply system	1, the torque converter in the low efficiency area is too long. Reduce external load or increase engine speed. 2, the oil level in the tank is too low, or there is gas in the working oil. Add working oil to check the tightness of piping system connection and whether the work oil is deteriorating. 3. the working oil does not meet the requirements, and replace the recommended working oil. 4, the oil pressure of the oil supply system is too low to raise the oil pressure. 5, the cooling system is not adapted to improve the cooling system.
Low oil temperature	1, the pipeline is not smooth or pipeline is not sealed, should check the pipeline.2, back pressure valve failure, replace the back pressure valve.3, auxiliary oil pump fuel supply is insufficient.4. The metal seal in the torque converter is damaged or worn seriously. Replace metal seal ring.5, the oil level in the tank is too low, add working oil.6, filter plugging, cleaning filter lead.7, pressure gauge failure, replacement pressure gauge.

