Chapter 1: Crawler Bulldozers

1.1 Product introduction

Chapter 2: Structure and Principle

2.1 Transmission diagram

A1st sun gear (33 teeth) B1st planetary gear (24 teeth) C1st ring gear (81 teeth)

D 2nd sun gear (number of teeth 21) E 2nd planetary gear (number of teeth 23) F 2nd planetary gear (number of teeth 24)

G Second ring gear (81 teeth) H Third sun gear (33 teeth) I Third planetary gear (24 teeth)

J third ring gear (number of teeth 81) K fourth sun gear (number of teeth 42) L fourth planetary gear (number of teeth 19)

M Fourth ring gear (81 teeth) N Fifth ring gear (42 teeth) O Drive gear (29 teeth)

P driven gear (number of teeth 24) Q small bevel gear (number of

teeth 21) R bevel gear (number of teeth 49)
S final deceleration first pinion (number of teeth 12) T final deceleration first gear (teeth 45) U final deceleration second pinion (teeth 12) V final deceleration second gear (teeth 55) P1 working device oil pump P2 transmission oil pump P3 steering clutch oil pump
1. Engine 2. Torque converter 3. Universal joint 4. Gearbox 5. Central transmission 6. Steering clutch
7. Steering brake 8. Sprocket 9. Track 10. P.T.O.

2.2 Radiator

Radiator mainly is made up of upper water tank (1), radiator core (12), lower water tank (10) and other relevant accessories. (See Figure 2-2) The cooling water flows through the thermostat into the upper water tank (1), removes the air in the water, and then flows through the radiator core (12) into the lower water tank (10). When the cooling water flows through the radiator core (12), due to the The fan at the rear end cools down the heat in the water in the core. The cooled cooling water is drawn out by the water pump through the lower water tank and pressed to the cylinder block of the engine.

The heat dissipation system is a closed system, and the pressure valve installed on the water tank keeps the pressure of the water tank below 0.075 Mpa, thereby increasing the evaporation temperature of cooling water, reducing water loss and improving heat dissipation efficiency. The power of the fan (13) is transmitted by the belt pulley at the front end of the engine through the V-belt. The cooling effect is enhanced

by the forced air supply of the fan.

1. Upper water tank 2. Hose 3. Inlet pipe 4. Fan guard 5. Hose 6. Pulley 7. Shaft

8. Cover 9. Outlet pipe 10. Downpipe 11. Windshield 12. Radiator core 13. Fan

Figure 2-2 Radiator

2.3 Power output device

Flywheel housing assembly and transfer case assembly (see Figure 2-3, Figure 2-4).

The main function of the flywheel housing is to complete the power output.

1. Flywheel housing 2. Idler gear (Z=51) 3. Bearing 4. Transfer case transmission gear (Z=56) 5. Bearing 6. Cover

Figure 2-3 Flywheel housing assembly

1. Flywheel housing 2. Transfer case 3. Driven wheel 4. Transfer case cover 5. Main shaft

6. Driving wheel 7. Cover 8. Driven wheel 9. Lubricating pipe 10. Distributor

Figure 2-4 Transfer case assembly

The transfer case is installed on the upper part of the flywheel housing.

The gear on the upper part of the flywheel housing drives the main shaft (5) and the driving wheel (6) to rotate, thereby making the driven wheels (3) and (8) rotate.

Remove the cover (7) and install the working oil pump. The driven wheel (3) drives the variable speed oil pump. Install the steering oil pump in front of the flywheel housing.

The lubricating oil for the gears and bearings of the transfer case comes from the oil return hose of the oil cooler, is distributed by the distributor (10), and drips into the relevant parts through the lubricating pipe (9).

2.4 Torque Converter

1. Drive gear 2. Drive housing 3. Turbine 4. Torque converter housing 5. Pump wheel 6. Drive gear 7. Guide wheel shaft

8. Cover 9. Coupling 10. Turbine output shaft 11. Guide wheel hub 12. Guide wheel 13. Oil pump casing

14. Drive gear 15. Strainer 16. Drain plug 17. Turbine hub 18. Pressure plate 19. Guide

20. Pressure regulating valve 21. Relief valve 22. Coarse filter combination 23. Oil return pump combination 24. Cover

Figure 2-5 Torque converter assembly

When the pump wheel, turbine and guide wheel are filled with working oil, when the pump wheel rotates, the pump wheel makes the oil impact on the turbine blades, so that the turbine rotates. The oil flows out from the turbine into the guide wheel, and flows out from the guide wheel into the inlet of the pump wheel to complete the oil cycle. The guide wheel can change the rotational motion of the liquid, so that the turbine torque may be increased, and the turbine torque varies

with the working conditions. Therefore, when the load increases, the turbine will receive a larger resistance torque, thereby automatically reducing the speed. Therefore, the hydraulic torque converter can ensure the smooth transmission of the machine.

The power input route is: drive gear→drive shell→pump wheel

The power output route is: turbine→turbine hub→turbine output shaft

There is a safety relief valve (see Figure 2-6) at the oil inlet of the torque converter, and the set pressure is P=0.87～0.9 Mpa to prevent the torque converter from being damaged by high pressure. The pressure oil from the gearbox control valve passes through oil port A, and then through the oil circuit of the torque converter housing, and flows to the oil pump side.

The pressure oil is full of oil port A, and when the hydraulic pressure applied to the pump wheel becomes 0.7 Mpa, the pressure oil can compress the spring (1) and push up the slide valve (2), and then flow through the oil port B to Relief valve circuit for gearbox lubrication. At the same time, in order to give full play to the performance of the torque converter and maintain a certain amount of oil in the torque converter, a pressure regulating valve is installed at the oil outlet of the torque converter (see Figure 2-7), and the set pressure P=0.4 ~0.5 Mpa, the pressure oil from the torque converter passes through the channel of the torque converter housing and fills the oil port C. If the oil pressure of oil port C rises to 0.45±0.05 Mpa, the pressure oil can

compress the spring (4), push up the slide valve (3) and flow to the oil cooler circuit through oil port D.

Figure 2-6 Relief valve Figure 2-7 Pressure regulating valve

In addition, the lower part of the torque converter housing is provided with an oil return pump to remove working oil from the transfer case, flywheel housing, lubrication and leakage from the torque converter, and return the oil to the rear axle box.

2.5 universal joints

The structure of the universal joint (see Figure 2-8)

1. Oldham coupling assembly 2. Connecting plate 3. Bolt 4. Bolt

Figure 2-8 Universal joint

The function of the universal joint is to complete the power transmission between the torque converter and the gearbox, and it can ensure the smooth transmission of motion when the coaxiality of the turbine output shaft and the centerline of the gearbox main shaft is within the allowable range.

2.6 gearbox

The structure of the gearbox (see Figure 2-9).

The role of the gearbox is to:

1. Realize the forward and reverse of the bulldozer.

2. Different output transmission ratios (including parking) can be obtained.

1. Gearbox housing 2. First clutch cylinder block 3. First clutch piston 4. Brake driving plate 5. Friction plate 6. Plate 7. First, second and third

row of planetary wheel shafts 8. Second clutch piston 9. The first Second clutch oil cylinder 10. Third and fourth clutch oil cylinders 11. Third clutch piston 12. Fourth clutch piston 13. Plate 14. Fourth planetary wheel shaft 15 Fifth clutch outer hub

16. Fifth clutch oil cylinder block 17. One-way valve steel ball 18. Rear axle box 19. Housing 20. Output sleeve shaft 21. Input shaft

22. Bearing housing 23. Cover 24. Bearing housing 25. Bearing baffle 26. Fifth clutch piston 27. Fifth clutch inner hub

28. The fourth planetary row spring 29. Butterfly spring 30. The fourth planetary carrier 31. The third planetary row spring 32. The second planetary row spring 33. The first planetary row spring 34. The first, second and third row of planets Frame 35. Bolt 36. Second row planet wheel shaft 37. Bearing seat

38. Bearing seat 39. Shaft end baffle 40. Coupling

The first clutch is the forward clutch The second clutch is the reverse clutch

The third clutch is the third gear clutch The fourth clutch is the second gear clutch

The fifth clutch is the first gear clutch

A1st sun gear (33 teeth) B1st planetary gear (24 teeth) C1st ring gear (81 teeth)

D 2nd sun gear (number of teeth 21) E 2nd planetary gear (number of teeth 23) F 2nd planetary gear (number of teeth 24)

G Second ring gear (81 teeth) H Third sun gear (33 teeth) I Third

planetary gear (24 teeth)

J third ring gear (number of teeth 81) K fourth sun gear (number of teeth 42) L fourth planetary gear (number of teeth 19)

M fourth ring gear (number of teeth 29) N fifth ring gear (number of teeth 42) O driving gear (number of teeth 34)

P driven gear (number of teeth 24) Q small bevel gear (number of teeth 21) R bevel gear (number of teeth 49)

S final reduction first pinion (number of teeth 12) T final reduction first gear (number of teeth 45)

U final reduction second pinion (number of teeth 12) V T final reduction second gear (number of teeth 55)

Figure 2-9 Gearbox

This machine adopts a planetary gear multi-plate clutch structure. Relying on the hydraulic pressure to be operated by the control valve, the forward third gear and the reverse third gear speed can be obtained.

1. Principle of planetary gear mechanism and clutch structure

1. Working principle of planetary gear

The planetary gear mechanism is composed of sun gear (A), planetary gear (B), ring gear (C) and planet carrier (D). (See Figure 2-10). The planetary gear (B) is mounted on the planetary carrier (D), and it meshes with the sun gear (A) and the ring gear (C) simultaneously.

A. Sun gear B. Planetary gear C. Ring gear D. Planet carrier

Figure 2-10 Working principle of planetary gear

If the ring gear is fixed, the motion is transmitted from the sun gear (A) to the planetary gear (B). At this time, the planetary gear (B) rotates on its own, and at the same time, its axis revolves around the sun gear (A). In the structure shown in the figure, the rotation direction of the planetary gear shaft is the same as that of the sun gear (A). (See Figure 2-11).

Figure 2-11 Figure 2-12

If the planetary carrier (D) is fixed, the motion is transmitted from the sun gear (A) to the planetary gear (B), and then transmitted from the planetary gear (B) to the ring gear (C), so that the ring gear (C) rotates. In the configuration shown, the rotation of the ring gear (C) is opposite to that of the sun gear (A). (See Figure 2-12).

The above principles are the structural principles of the first, third and fourth rows of planetary gear mechanisms.

The first planetary gear mechanism is driven by the sun gear (A). The third and fourth rows of planetary gear mechanisms are driven by the planetary carrier (D). To obtain the output rotation direction opposite to the above, it is only necessary to add a set of planetary gears (E) (see Figure 2-13). This A→B→E→C motion transmission form is exactly the structural principle of the second-row planetary gear mechanism.

A. Sun gear B. E. Planetary gear C. Ring gear D. Planetary carrier Fifth row clutch

Figure 2-13 Figure 2-14

2. Each clutch mechanism

The fifth row clutch of the transmission is a lockup clutch. (See Figure 2-14).

As shown in the fixing method of each planetary ring gear (see Figure 2-15), it is realized by clutch.

The engagement of the clutch is realized by pushing the piston (3) through the pressure oil from the control valve. (See Figure 2-16)

The separation of the clutch is realized by pushing the piston (3) back to its original position by the return spring (33) after the pressure oil is disconnected. (See Figure 2-17). The effect of the butterfly spring (42) is to accelerate the return speed of the piston (3) and improve the separation effect of the main and driven friction plates.

Figure 2-17 Disengagement of clutch Figure 2-18 Fifth row clutch

(Fig. 2-18) is a schematic diagram of the fifth row clutch. When the clutch is disengaged, the working oil in the back space of the oil cylinder block (16) is subjected to the centrifugal force generated during rotation, therefore, only the butterfly spring (29) cannot guarantee the rapid separation between the friction plates. This will leave the clutch half-disengaged, potentially causing a malfunction the next time you change gears. In order to eliminate this phenomenon, a steel ball check valve (17) is specially installed.

When the fifth row of clutches is engaged (see Figure 2-19), the pressure oil from the control valve enters the oil chamber to push the piston (26), and at the same time, the pressure oil also pushes the steel ball (17) of the one-way valve, thereby blocking the valve seat

hole. The clutch engages quickly.

Figure 2-19 Fifth row clutch engaged Figure 2-20 Fifth row clutch disengaged

When the pressure oil from the control valve is cut off, the steel ball (17) moves in the direction of the arrow (see Figure 2-20) due to the centrifugal force. At this time, the small hole of the valve seat is opened, and the working oil in the gap at the back of the oil cylinder body (16) is discharged along the small hole of the valve seat. The normal separation of the friction plate is guaranteed.

2. The power transmission route of each gear row of the gearbox

1. Go forward one gear to pass the route. (See Figure 2-21).

At this time, the first and fifth row clutches are engaged simultaneously.

The power transmission route is: A→B→(34)→J→O→P→Q (at this time: J, N, H, K, L fifth row of clutches are integrated).

2. Advance to the second gear delivery route. (See Figure 2-22)

The power transmission route is as follows: A→B→(34)→J→(30)→L→K →O→P→Q

Figure 2-22 Transmission route for forward second gear

3. Go forward to the third gear delivery route. (See Figure 2-23)

At this time, the first and third clutches are engaged simultaneously.

The power transmission route is: A→B→(34)→J→I→H→O→P→Q

4. Back up one gear to pass the line. (See Figure 2-24)

At this time, the second and fifth clutches are engaged

simultaneously.

The power transmission route is as follows: D → E → F → (34) → I → J → (J, K, etc. become one) → O → P → Q

5. The transmission route of the second gear and the third gear is omitted.

As long as the second and fourth clutches are engaged simultaneously, the second reverse speed can be obtained. The second and third clutches are engaged simultaneously to obtain the third gear speed backward.

2.7. Central drive

The main functions of the central drive are:

1. Change the power transmission direction (vertical to horizontal).

2. One-stage deceleration to increase torque.

The central transmission, steering clutch, steering brake, etc. are all installed in the rear axle box cavity. (See Figure 2-25)

The central transmission is composed of a large bevel gear (8) (engaged with the gearbox output gear Q), a horizontal shaft (9), a bearing seat (7), bearings, etc.

The correct meshing of a pair of bevel gears can be achieved through the adjustment pad (10) and the adjustment pad between the gearbox pinion bevel gear assembly and the housing. And it can be judged by checking the tooth side clearance and meshing marks.

The standard backlash of a pair of spiral bevel gears is 0.25-0.33 mm.

The tooth marks should be in the middle of the tooth height. (See

Figure 2-26)

1. Outer drum 2. Pressure plate 3. Outer friction plate 4. Inner tooth plate 5. Inner drum 6. Hub 7. Bearing housing

8. Large bevel gear 9. Horizontal shaft 10. Adjusting pad 11. Large spring 12. Small spring 13. Bolt

If the meshing is not normal, it should be adjusted according to the method indicated in the table below until it is suitable.

Lubrication adopts semi-immersion and semi-splash method.

2.8 steering clutch

Steering clutches are located in the left and right chambers of the rear axle case, one set on each side. Its function is to turn on or cut off the power from the central drive to the final drive to realize the forward, reverse, turning and parking actions of the whole machine.

The structure of the steering clutch is shown in Figure 2-25. It is mainly composed of an outer drum, a pressure plate, inner and outer friction plates, and springs.

This model adopts a wet type, multi-piece, spring compression, hydraulic separation structure, and is a constant mesh type.

Under normal circumstances, due to the action of the spring, the inner and outer friction plates are combined, and the power from the horizontal axis passes through the hub (6) → inner drum (5) → inner tooth plate (4) → outer friction plate (3) → The outer drum (1) is passed to the final drive to drive the disc.

When the pressure oil from the steering control valve enters the

inner cavity of the hub (6), (see Figure 2-27), the piston (10), the bolt and the pressure plate (2) are pushed to move in the direction of the arrow, (to overcome the large, Small spring pressure), so that the friction between the inner tooth plate (4) and the outer friction plate (3) is separated, and the outer drum (1) stops driving, thereby cutting off the power transmission.

Figure 2-27

If the oil pressure is cut off, the above-mentioned parts are forced to move in the direction shown in the figure due to the pressure of the large and small springs, so that the inner tooth plate (4) is engaged with the outer friction plate to realize power transmission. (See Figure 2-28)

Figure 2-28

2.9 Steering brake

This model adopts wet, belt and floating brakes with hydraulic power assist. (See Figure 2-29)

1. Housing 2. Rocker arm 3. Rocker arm 4. Spring 5. Slide valve 6. Valve body 7. Piston 8. Rocker arm 9. Cover

10. Stud 11. Return spring 12. Cover 13. Adjusting bolt 14. Bracket 15. Lever 16. Block

17. Rod 18. End 19. Brake Lining 20. Brake Band

Figure 2-29 Steering brake

Its main function is to stop the transmission of the final drive gear by holding the outer drum of the steering clutch tightly, so as to realize

the turning or parking of the vehicle.

1. Action principle

When the outer drum of the steering clutch is turning forward (see Figure 2-31a). When a little braking force is applied on the brake pedal, the gap between the brake band and the outer drum decreases until some parts are in contact. Due to the effect of friction, the upper part of the brake band will withstand the tail end (18) so that the A pin into the groove of the lever (15). If continue to apply braking force, then bar (17), B pin, lever (15) will move by arrow direction. Realize the action of holding the outer drum tightly. At this time, point A is used as the fulcrum of rotation.

If the clutch outer drum is turned back (see Figure 2-31b), the rod (17), B pin and lever (15) move in the direction shown in the figure. Realize the action of holding the outer drum tightly. But at this moment, the fulcrum of rotation has been transferred to point C. The braking effect of the two is basically the same.

(a) (b)

Figure 2-31

2. Booster

The steering brake is equipped with a brake booster, and its application can greatly reduce the driver's brake operation force. See the hydraulic part for its hydraulic action principle.

The brake booster of this model is composed of rocker arm (2), valve body (6), slide valve (5), rocker arm (8), etc. (see Figure 2-32).

Figure 2-32 Structure of booster

2.10. Final drive

A two-stage spur gear reduction structure is adopted, and its structural form (see Figure 2-34).

1. Half shaft nut 2. Sprocket bracket 3. Primary drive gear 4. Second stage drive gear 5. Ring gear 6. Drive disc

7. Ring gear hub 8. Bearing seat 9. Sprocket hub 10. Nut 11. Nut 12. First stage large gear

13. O-ring 14. Floating seal ring 15. Secondary driving gear 16. Half shaft 17. Outer shell 18. Guard plate

19. Nut 20. Nut 21. Sprocket

Figure 2-34 Final drive

The function of the final drive is to increase the output torque through the two-stage deceleration, and at the same time transmit the power to the running mechanism through the sprocket (21).

It adopts the form of splash lubrication and floating oil seal mechanism.

2.11 Traveling mechanism

The traveling mechanism is mainly composed of a trolley frame (7), a sprocket cover (3), a guide wheel (1), supporting wheels (4), (5), supporting rollers (2) and a track tensioning device. (See Figure 2-35) to realize the walking motion of the bulldozer.

1. Guide wheel 2. Support wheel 3. Sprocket cover 4. Track roller (one side, five on each side)

5. Track rollers (both sides, two on each side) 6. Guard plate 7. Platform frame

Figure 2-35 Walking system

1. Track tensioning device

The function of the tensioning device is to ensure sufficient tension of the crawler belt and reduce the jumping of the crawler belt during walking and the falling off during the winding process. Its structure (see Figure 2-36).

1. Support 2. Shaft 3. Oil cylinder 4. Piston 5. End cover 6. Spring front seat

7. Large buffer spring 8. Small buffer spring 9. Spring back seat 10. Nut 11. End cover

12. Bushing 13. Oil seal 14. Wear ring 15. Oil seal 16. Grease nipple

2. Guide wheel

The idler pulley acts as a guide for the chain link and track. Its structure (see Figure 2-37).

1. Guide wheel 2. Bushing 3. Shaft 4. Guide plate 5. Floating oil seal 6. Guide

Figure 2-37 Guide wheel

3. Track rollers

Support the weight of the bulldozer and prevent the lateral derailment of the track. Track rollers can be divided into single-sided track rollers and double-sided track rollers. (Figure 2-38) shows the structure of double-sided track rollers. Except for the difference in

the shape of the supporting wheel hub (1), the other structures of the single-sided supporting wheel and the double-sided supporting wheel are the same.

1. Load hub 2. Bushing 3. Outer cover 4. Floating oil seal 5. Shaft

Figure 2-38 Bilateral rollers

Four, supporting wheel

Support the upper crawler to prevent the crawler from drooping too much, reduce the vibration of the crawler during walking and avoid the lateral slip of the crawler. Supporting roller structure, (see Figure 2-39).

1. Bracket 2. Shaft 3. Floating oil seal 4. Support roller

5. Cover 6. Nut 7. Floating oil seal seat 8. Floating oil seal seat

Figure 2-39 Supporting wheel

5. Tracks

The function of the track is to transmit the weight of the bulldozer, ensure the adhesion performance of the bulldozer, and make it have sufficient driving force. structure (see Figure 2-40).

1. Dustproof ring 2. Fixed pin 3. Seal ring 4. King pin 5. Chain rail joint

6. Main shaft sleeve 7. Axle sleeve 8. Track 9. Track bolt 10. Track nut

Figure 2-40 Track assembly

6. Balance beam

Connect the frame and the walking system to act as a buffer. At

the same time, it is guaranteed that the trolley frame can swing up and down relative to the uneven ground. structure (see Figure 2-41).

1. Balance beam 2. Shaft 3. Bushing 4. Bushing

Figure 2-41 Balance beam

2.12 Hydraulic system

The hydraulic system consists of two parts: working device hydraulic system and variable speed steering hydraulic system.

1. Working device hydraulic system

Figures 2-42 and 2-43 respectively show the hydraulic principle and structural diagram of the bulldozer.

1. Working oil tank 2. Working oil pump (PAL200) 3. Main relief valve 4. Check valve 5. Lifting slide valve

6. Oil supply valve on the ascending side 7. Oil supply valve on the descending side 8. Rapid drop valve 9. Bulldozing blade lifting cylinder 10. Check valve

11. Ripper spool valve 12. Oil supply valve on the ascending side 13. Oil supply valve on the descending side 14. Safety valve on the ascending side 15. Selection valve

16. Ripper ascending cylinder 17. Reversing valve 18. Tilt check valve 19. Ripper tilt cylinder 20. Flow check valve

21. Tilt slide valve 22. Bulldozer tilt cylinder 23. Filter 24. Rear axle box 25. Steering pump

26. Lifting follow-up booster 27. Ripper follow-up booster 28. Tilting follow-up booster 29. Sales valve

A. Main overflow pressure output plug (PT1/8)

Figure 2-42 Working device hydraulic system

Figure 2-43 Schematic diagram of the hydraulic structure of the working device

1. Working oil pump

The working oil pump is driven by the transfer case gear, which converts mechanical energy into hydraulic energy. The structure is shown in Figure 2-44.

1. Driving gear 2. Front pump cover 3. Bushing 4. Pump body 5. Rear pump cover

6. Sealing sheet 7. Ring 8. Sealing ring 9. Driven gear

Figure 2-44 Working oil pump

2. Hydraulic working principle of the working device

The hydraulic working principle of the working device is shown in Figure 2-45

The working principle is: the gear pump sucks the working oil from the working oil tank (1), and pumps it into the reversing valves (4), (5), (6). If the working devices are not manipulated, the oil will go through the reversing valve to the oil filter (7). If the oil filter core is blocked at this time, the oil will push open the safety valve of the oil filter and return to the working oil tank. If the reversing valve (4) or (6) is manipulated, the shovel cylinder is controlled to realize the rise, fall, maintenance and floating of the shovel and the tilt cylinder is controlled to realize the left, right and maintenance of the shovel.

There are inlet check valves (11), (18) before the reversing valve to overcome the nodding impact that may be produced when each working mechanism reversing. A selector valve (14) is installed in the hydraulic device of the scarifying system to control the oil flowing out from the reversing valve (5) to the oil cylinder (12) or oil cylinder (13) to realize the rise, fall and maintenance of the scarifier.

Fig. 2-45 Schematic diagram of the hydraulic working principle of the working device

The ripper selection valve is between the two circuits of the ripper lifting cylinder circuit and the tilting cylinder circuit and the ripper control valve. When the selection valve is not activated, it is connected to the lifting cylinder circuit of the ripper; when the lubrication is moving, it is connected to the tilting cylinder circuit of the ripper.

At the inlet of the tilting cylinder circuit of the ripper, a control check valve (15) is installed to prevent oil from flowing backward in the lower part of the tilting cylinder.

In order to obtain the ideal movement speed of the tilting cylinder, a flow valve is installed, as shown in Figure 2-46.

Figure 2-46 Flow valve

In order to prevent the system pressure from being too high due to excessive load when the ripper is working, an overload valve (16) is installed for protection.

During work, if the load is too large, the system pressure will exceed the set pressure (14.0Mpa) for a short time. At this time, the

relief valve (3) is opened as shown in Figure 2-47, and the working oil flows back to the oil tank through the relief valve to protect the system.

Figure 2-47 Relief valve

When the direction of the external force is the same as that of the piston of the oil cylinder, the oil cylinder will generate a vacuum phenomenon, and the oil filling valve will be installed. See Figure 2-48 and Figure 2-49.

All the above-mentioned valves are assembled in the oil tank of the working device.

In order to prevent dust from polluting the working oil, the oil tank of the working device is a closed structure, see Figure 2-50.

Figure 2-48 Oil supply valve (dozer cylinder) Figure 2-49 Oil supply valve (ripper cylinder)

A inlet B to blade cylinder bottom (down) C. D. to ripper E. to tilt cylinder bottom (left tilt)

F. To tilt cylinder head (tilt right) G. To blade cylinder head (up) H. Pump suction port

Figure 2-50 Working device oil tank

3. Blade cylinder

The blade cylinder is a double-acting piston cylinder. See Figure 2-51.

1. Bushing 2. Gland 3. Cylinder head 4. Cylinder body 5. Piston rod 6. Bushing 7. Nut 8. Bimetal sleeve

9. Sealing ring 10. Bimetal sleeve 11. Dust-proof seal 12. Baffle 13.

Sealing ring 14. Wear-resistant ring

15. Piston 16. Valve seat 17. Shock valve

Figure 2-51 Blade cylinder

In order to prevent hydraulic shock and excessive pressure when the piston travels to the cylinder head or cylinder bottom, a buffer valve (17) is specially installed. Its working principle is: the pressure oil pushes the piston (see Figure 2-52) to move towards the bottom of the cylinder. When the piston is close to the bottom of the cylinder, the front end of the buffer valve rod contacts the bottom of the cylinder, so that the buffer valve rod is released from the tapered sealing surface, and the cylinder The front and rear chambers communicate with each other, and the oil pressure is released to decelerate and unload.

In the same principle, when the piston moves toward the cylinder head, the buffer valve plays the role of deceleration and unloading.

Figure 2-52 Working principle of shock valve

The bottom of the shovel cylinder is equipped with a quick-falling valve (Figure 2-53). The function of this valve is: when the oil is fed from the bottom of the cylinder (that is, the shovel is lowered), the cylinder is automatically differentially connected so that the piston of the cylinder is in the position of the shovel. Before cutting the soil, a greater descending speed can be obtained to reduce the occurrence of vacuum in the cylinder.

Figure 2-53 Quick drop valve Quick drop valve working principle

When the oil from the reversing valve fills the bottom side of the oil cylinder, the oil enters from port A, and the oil on the other side of the oil cylinder returns to the oil tank through port B and orifice C. Due to the throttling effect of the orifice C, the oil produces a pressure difference at C. The quick-falling spool is pushed open under this pressure difference, so the oil communicates with the A port through the B port, which speeds up the movement speed of the piston and realizes the differential connection.

When the shovel cuts the soil, because the movement speed of the oil cylinder slows down, the throttling effect is reduced, and the pressure difference is reduced, so that the quick-drop valve core is reset, the differential connection is released, and the oil cylinder can output sufficient thrust.

When the oil is fed into the cylinder head side, the quick drop valve has no effect.

4. Tilt cylinder

The inclined cylinder is also a double-acting piston cylinder, and its structure is shown in Figure 2-56.

1. Cover 2. Gland 3. Cylinder head 4. Oil cylinder body 5. Piston rod 6. Nut 7. Support

8. Retaining ring 9. Sealing ring 10. Wear ring 11. Piston 12. Baffle 13. Bimetal sleeve

14. Sealing ring 15. Bimetal sleeve 16. Dustproof seal

Figure 2-56 Tilt cylinder

5. Rotary servo valve

In order to save effort when manipulating the reversing valve of the working device and improve its fine-tuning performance, a rotary servo valve is specially set up. Its structure is shown in Figure 2-57.

1. Sleeve 2. Oil seal 3. Oil seal 4. Pin 5. Spring 6. Rod

7. Rotor 8. Piston 9. Detent 10. Spring 11. Rod

Figure 2-57 Rotary servo valve

The oil for the swing servo valve comes from the steering pump and returns to the rear axle box. See Figure 2-58.

1. Valve sleeve 6. Handle 7. Spool 8. Piston 12. Oil cylinder 13. Connecting rod

Figure 2-58 Hydraulic principle of rotary servo valve

The action output end of the rotary servo valve is connected with the stem of the reversing valve of the working device through the connecting rod, and can control the reversing of the reversing valve. There is a positioning mechanism in the closed position.

If the handle (6) is manipulated, the spool (7) will turn clockwise through an angle (see Figure 2-59). Then the passages A and C are opened, and the pressure oil enters the bottom of the oil cylinder (12) to push the piston (8) and the valve sleeve (1), so that the valve sleeve (1) also rotates clockwise through an angle, and the connecting rod (13) is operated to change Move some distance towards the stem. Due to the rotation of the valve sleeve (1) at this time, the A and C passages are blocked, and the piston (8) stops moving. Only by continuing to

manipulate the handle (6) can continuous motion be maintained.

If the operating handle (6) makes the spool (7) turn counterclockwise through an angle, (see Figure 2-60). At this time, the passages B and C are opened, and the pressure oil enters the other side of the oil cylinder, pushing the piston (8), pulling the valve sleeve (1), so that the valve sleeve also rotates counterclockwise by an angle, and the reversing valve is driven through the connecting rod (13). The rod moves a certain distance. Due to the rotation of the valve sleeve (1), passages B and C are blocked, and the piston (8) stops moving immediately. Only by continuing to manipulate the handle (6) can continuous motion be maintained.

Figure 2-59 Figure 2-60

Figure 2-58 is a neutral working condition. At this time, A, C or B, D passages are blocked, the cylinder piston does not move, and the valve sleeve does not rotate.

Since the operating force of the handle only needs to overcome the frictional force between the valve core (7) and the valve sleeve (1), and the output force is provided by the oil cylinder, the operating force is greatly reduced.

It should be noted that the pressure oil for the slewing servo valve comes from the steering pump in the chassis hydraulic system and returns to the rear axle box.

2. Variable speed steering hydraulic system

1. See Figure 2-61 for the system schematic diagram of the

variable speed hydraulic pipeline.

1. Magnetic primary filter 2. Variable speed oil pump 3. Oil filter 4. Pressure regulating valve 5. Quick return valve 6. Pressure reducing valve 7. Speed valve

8. Directional control valve 9. Safety valve 10. Relief valve of hydraulic torque converter 11. Hydraulic torque converter 12. Oil temperature gauge of hydraulic torque converter

13. Torque converter pressure regulating valve 14. Oil cooler 15. Relief valve for transmission lubrication 16. Transmission lubrication

17. Lubrication of P.T.O. 18. Housing of hydraulic torque converter 19. Oil return pump 20. Rear axle box 21. Relief valve for brake lubrication

A. Hydraulic torque converter relief valve pressure measuring port (PT1/8) B. Hydraulic torque converter pressure regulating valve pressure measuring port (PT1/8)

C. The clutch pressure measuring port of the transmission (PT1/8)

Figure 2-61 Schematic diagram of variable speed loop system

The structural diagram of the variable speed loop system is shown in Figure 2-62.

Figure 2-62 Schematic structure of variable speed loop system

The variable speed pump is a gear pump connected to the transfer case for the purpose of converting mechanical energy into hydraulic energy. The variable speed pump sucks the oil filtered by the coarse filter from the rear axle box, and the discharged oil is filtered by the

fine filter and then enters the variable speed valve to realize the forward, backward, and variable speed of the vehicle. The oil overflowed from the steering brake valve enters the hydraulic torque converter together. There is an overflow valve at the inlet of the hydraulic torque converter. The overflowed oil lubricates the gearbox and P.T.O transfer case and enters the hydraulic torque converter. The oil in the torque converter is maintained by the pressure regulating valve at the outlet to have sufficient working pressure for the oil in the torque converter. After being cooled by the oil cooler, the oil passing through the pressure regulating valve lubricates the gearbox and transfer case on the one hand, and lubricates the left and right brakes through the overflow valve on the other hand.

The torque converter case is filled with drained fluid from the relief valve, torque converter leaks, transfer case lubrication, etc. For this reason, an oil return pump is installed inside the hydraulic torque converter to discharge the oil in the torque converter housing to the rear axle box.

Variable speed control valve structure, see Figure 2-63

1. Limiting cover 2. Pressure regulating valve spring (small) 3. Spring seat 4. Pressure regulating sleeve spring 5. Pressure regulating valve spring

6. Pressure regulating valve 7. Piston valve (A) 8. Pressure regulating valve 9. Piston valve (B) 10. Cover 11. Limiter

12. Piston valve spring 13. Quick return valve 14. Quick return

valve sleeve 15. Piston 16. Pressure reducing valve 17. Pressure reducing valve spring

18. Limiter 19. Control valve body (A) 20. Limiter 21. Limiter 22. Safety valve spring

23. Directional control valve 24. Control valve body (B) 25. Safety valve 26. Piston 27. Cover 28. Speed valve

1 to 1 speed clutch (No.5) 2 to 2 speed clutch (No.4) 3 to 3 speed clutch (No.3)

F to forward clutch (No.1) R to reverse clutch (No.2)

Figure 2-63 Variable speed control valve

The valve (8) is a pressure regulating valve, and the adjustment pressure of the bulldozer is 2.0Mpa to ensure the engagement of each row of clutches except the first gear. When this pressure is reached, the regulator opens to supply oil to the torque converter.

Figure 2-64 Pressure change curve

The valve (13) is a quick-return valve, and the joint action of this valve and the pressure regulating valve (8) can make the clutch action of each gear row of the gearbox engage smoothly and separate thoroughly.

When manipulating the gearbox to shift gears, the pressure of the system changes according to the curve in Figure 2-64. At the moment when the gearbox is operated to shift gears, the pressure drops sharply, which completely disengages the clutch. The pressure then rises slowly, smoothing the clutch engagement, avoiding shocks and

helping to increase the life of the drivetrain.

Valve (16) is a pressure reducing valve, which is specially set for the first gear clutch. Its outlet pressure is 1.25Mpa (that is, the first-gear clutch engagement pressure).

Valve (25) is the starting safety valve. It is set to avoid accidents when the vehicle starts running suddenly when the shift handle is placed in the gear position (1st, 2nd, 3rd gear). The function of this valve is: the vehicle will start smoothly only when the shift handle is first placed in neutral, and then each gear is shifted in turn.

Valve (28) is a speed valve. It is used to manipulate the actions of each row of clutches in the gearbox to obtain different forward and backward speeds.

Valve (23) is a directional valve. It is used to manipulate the action of the first clutch and the second clutch of the gearbox to make the bulldozer move forward or backward.

Each valve of valve (8) to valve (23) returns oil to the rear axle box.

2. Steering brake pipeline

Refer to Figure 2-65 and Figure 2-66 for the structural schematic diagram and schematic diagram of the steering brake hydraulic pipeline.

Figure 2-65 Structural schematic diagram of steering brake hydraulic pipeline

1. Magnetic primary filter 2. Steering pump 3. Oil filter 4. Steering main relief valve 5. Steering control valve

5a. Steering valve 5b. Brake valve 6. Steering clutch 7. Brake booster 8. Steering gear housing (rear axle box)

A. Steering main decompression measuring port B. Left clutch pressure measuring port C Right clutch pressure measuring port

D Left brake booster pressure gauge port E. Right brake booster pressure gauge port

Figure 2-66 Schematic diagram of steering brake hydraulic pipeline

The steering pump is a gear pump connected to the transfer case to convert mechanical energy into hydraulic energy.

The oil in the steering gear housing passes through the magnetic filter, is sucked up by the steering pump, and sent to the steering control valve, brake booster and pressure reducing valve through the oil filter.

The oil overflowed by the relief valve enters the torque converter circuit.

It should be noted that in the steering brake circuit, there is an oil passage leading to the servo valve, which is the rotary servo valve that helps the driver to operate the working device, and the oil returns to the rear axle box.

The structure of the steering control valve is shown in Figure 2-67.

1. Valve body 2. Stem 3. Stem 4. Spring 5. Stopper 6. Adjusting spring 7. Stopper 8. Steering valve

9. Piston 10. Return spring 11. Plug 12. Plug 13. Return spring 14. Piston 15. Brake valve

16. Valve body 17. Shaft 18. Adjusting spring 19. Return spring 20. Guide 21. Adjusting bolt

22. Lever 23. Stop 24. Return spring 25. Stop 26. Spacer ring

Figure 2-67 Steering control valve

The functions of the steering control valve are:

(1) When the steering valve and brake valve are in neutral position:

Oil from the steering pump enters the main relief valve (27) and oil inlet ports A and D of the steering control valve. Because the circuit to the steering clutch and brake booster is closed, the oil pressure in the circuit is constantly rising. As a result, the main relief valve (27) opens and oil flows into the torque converter circuit. If the driver does not operate the steering lever, the oil will continue to decompress to keep the clutch engaged and the brake disengaged. The circuit pressure in this state is 2.16 Mpa.

(2) When the pressure in the steering valve starts to rise:

When pulling the steering lever, the lever (22) will push the shaft (3) in the direction of the arrow (→) compressing the spring. The compressed force of the spring (6) will push the diverter valve (8) in the direction of the arrow (→) to close the circuit between the inlet ports B and G. At the same time, the circuit between the oil inlet ports A and B is opened, and the oil flows into the steering clutch. When the circuit from the pump to the clutch is filled with oil, the oil pressure begins to rise again. The oil entering the oil inlet C pushes the piston (9) through the small hole "a", and the reaction force pushes back the steering

valve (8) as shown by the arrow direction, so that the spring (6) is compressed, and the oil inlet A The pathway between and D is closed. In this state, the oil pressure in the circuit from the oil inlet to the clutch is balanced with the installation load of the spring (6), so as to keep the oil pressure stable. When the steering lever is pulled again, the installation load of the spring (6) will gradually increase, thereby also increasing the circuit oil pressure coming from the oil inlet B. As a result, the clutch is partially actuated. See Figure 2-69.

(3) When the oil pressure of the steering valve increases to the maximum value:

On the basis of the state described in Section 2, when the steering lever is pulled, the stopper (5) will be in contact with the steering valve (8), and the spring (6) assumes the minimum installation height. At this time, the shaft (3) starts to push the steering valve (8) through the spring (4), so that the force of the steering lever action is increased rapidly. If the steering lever is pulled some more, the shaft (3) is pressed against the spring (4), and its applied load gradually increases, and the oil pressure of the circuit after the oil inlet B also increases continuously. When the applied load of the spring (4) reaches the maximum value and the oil pressure in the circuit reaches 1.57 Mpa, the clutch is completely disengaged. See Figure 2-70.

Figure 2-70

(4) When the oil pressure of the brake valve starts to rise:

On the basis of the state described in Section 3, when the steering

lever is pulled again, the adjusting bolt (21) pushes the shaft (17) in the direction of the arrow, and the shaft (17) presses the brake valve (15) again. The passage between oil inlets E and F is closed, while the passage between oil inlets D and E is open, allowing oil to flow to the brake booster. On the other hand, the oil entering the oil inlet presses the piston (14) through the small hole "b". The reaction force pushes back the brake valve (15) in the direction of the arrow, compresses the spring (1), and blocks the passage between the oil inlets D and E. In this state, the oil pressure of the circuit from the oil inlet E to the booster will be balanced with the work load of the spring (18), thereby keeping the oil pressure stable. If the steering lever is pulled again, the work load of the spring (18) will gradually increase, and the oil pressure behind the oil inlet E will also increase, resulting in braking. See Figure 2-71.

Figure 2-71

(5) When the oil pressure of the brake valve reaches the maximum value:

When the steering lever is pulled to the end of its travel, the shaft (3) will move in the direction of the arrow until it comes into contact with the stops (23) and (25). Steering valve (8) does not move at all. Adjust the bolt (21) to push the shaft (17) to press the brake valve (15) in the direction of the arrow. Even if the shaft (3) reaches the stroke end, the shaft (17) cannot reach the stroke end, and the oil entering the oil inlet F pushes the piston (14) through the small hole "b" of the brake valve

(15). The reaction force reverses the brake valve (15) in the direction of the arrow, thereby compressing the spring (18) and closing the passage between the oil inlets D and E. In this state, the circuit oil pressure from the oil inlet to the booster will be balanced with the elastic force of the spring (18). The maximum installed load of the spring is reached to maintain the oil pressure at a certain value and complete the braking operation. In this state, the circuit oil pressure after the oil inlet E is 1.66 Mpa. See Figure 2-72.

Figure 2-72

(6) When the steering valve and brake valve are in neutral position: When the steering control lever is released, the elastic force of each spring pushes back the shaft (3), the shaft (17), the brake valve (15) and the steering valve (8) in the direction of the arrow respectively. Then the steering valve (8) closes the passages of the oil inlets A and B, and opens the passage near the oil inlet G, so that the oil in the steering clutch is discharged into the rear axle case through the oil inlet G. The brake valve (15) closes the passage between the oil inlets D and E, and opens the passage between the oil inlets E and F, so that the oil in the brake booster can be discharged into the rear axle box through the oil inlet H, See Figure 2-73.

Figure 2-73

There is a brake booster in the steering control. The brake booster is used on bulldozers, and its purpose is to reduce the force of the steering lever and brake pedal during steering braking.

When the brakes are disengaged: Oil from the steering pump has two routes. One is through the steering control valve to the oil cylinder port A, and the other is directly to the oil cylinder port B through the steering control valve. Because the steering lever is not operated, the interlock control valve does not operate, and the circuit to cylinder port A is also closed. Therefore, the oil only flows to port B, and then flows to port C through the small hole "a". Because the brake pedal is not pressed, the circuit between the C oil inlet and the D oil inlet is closed. The oil pressure in the circuit continues to rise until the main relief valve (27) is opened, and the oil flows to the torque conversion circuit. At this time, the normal value of the oil pressure in the circuit is 2.16 Mpa. See Figure 2-74.

Figure 2-74

When the steering joystick is pulled out to produce a braking effect: pull out the steering joystick completely to make the steering control valve act, and the oil from the pump flows into the oil filling port A. The oil entering port A pushes the piston (6), the direction of the arrow (←) indicates an increase in pressure, and the top of the piston (6) pushes the rod (5) to produce a braking effect. At this time, the normal value of the oil pressure in the circuit is 1.66 Mpa. See Figure 2-75.

Figure 2-75

When depressing the brake pedal for braking: When the pedal is depressed, the rod (11) presses the slide valve (7) in the direction of the arrow (←) to open the circuit between the oil inlets C and D.

Therefore, the oil from the pump flows from the B port to the C and D ports through the small hole "a". The oil entering the D port pushes the piston (6) in the direction of the arrow (←), and due to the increase in pressure, the passage between the D port and the A port is finally opened, and then it is discharged into the steering gear housing through the oil port A . Press the pedal further to compensate for the loss of oil when the oil passes through the open passage, and finally press the oil port A down through the spool valve (7). The above operations are carried out continuously in a short period of time, and then the top of the piston presses down the rod (5), thereby smoothly tightening the brake band and acting as a brake. When the pedal reaches the end of its travel, the passage between inlets D and A is closed. The main pressure relief valve opens and oil flows into the torque converter circuit. At this time, the normal value of the oil pressure in the circuit is 2.16 Mpa. See Figure 2-76.

Figure 2-76

2.13 Electrical system

The electrical system consists of four major parts:

2.13.1 Three-level alarm electronic monitoring device (see Chapter 8 for details);

2.13.2 The starter motor part;

2.13.3 Charging system part;

2.13.4 Lighting section.

The bulldozer power supply is powered by a battery, which is DC 24

volts, and the negative pole is grounded.

See Figure 2-77 for the schematic diagram of the electrical system.

2.14 Working device

The working device mainly refers to the bulldozer blade and the ripper, that is, the device that completes various operations of the bulldozer.

1. Bulldozer

Bulldozing blades are available in various forms such as straight tilting blades, angled blades, and U-shaped blades. Among them, straight-tilted blades are standard configurations, and angled blades and U-shaped blades are available for users to choose freely.

1. Straight tilting blade

The structure of the straight tilting blade is shown in Figure 2-89.

1. Bulldozer 2. Knife edge 3. Knife angle 4. Push rod 5. Adjusting screw 6. Tilt cylinder 7. Arm 8. Support

Figure 2-89

The push rod is a box-shaped structure with good bending strength, compressive stability and rigidity. The front end is hinged with the blade by a cross joint, and the rear end is fixed on the trolley support (8).

Under the action of the shovel cylinder, the push rod and the cutter head swing around the support (8) to realize the lifting and lowering of the shovel. By changing the length of the adjusting screw (5), the cutting angle of the blade can be changed. The tilt cylinder (6) can make the blade tilt left and right in a direction perpendicular to the

ground.

After the blade (2) has been used for a period of time, it can be turned over and reused.

2. U-shaped shovel

The structure of the U-shaped shovel is similar to that of the straight-tilt shovel, except for the shape of the blade.

The connection and action principle of the U-shaped shovel is also exactly the same as that of the straight-tilt shovel.

3. Corner shovel

The structure of the angle shovel is shown in Figure 2-90.

1. Pin 2. Support 3. Arch frame 4. Lower support 5. Upper support 6. Screw 7. Knife angle

8. Blade 9. Blade 10. Pin 11. Pin 12. Bolt 13. Nut 14. Pin 15. Pin 16. Pin

Figure 2-90 angle shovel

The blade (8) is hinged with the arch frame (3) through the upper support (5) and the lower support (4). The arch frame (3) is hinged with the support (2) fixed on the trolley frame. The shovel cylinder uses the arch frame (including the shovel) to perform fixed-axis swing with the support (2) as the axis. By pulling out the pin (7) the lower support (4) is installed on different supports of the arch frame, so that the blade can obtain three different working positions. Realize left and right rotations of 25°.

2. Scarifier

The ripper can be used in conjunction with the bulldozer blade, and

there are two types of single-tooth and three-tooth.

The structure of the three-tooth ripper is shown in Figure 2-91.

1. Bracket 2. Link 3. Connector 4. Pin 5. Pin 6. Pin 7. Pin

8. Beam 9. Rod 10. Tip 11. Guard 12. Pin 13. Pin

Figure 2-91

The ripper is a four-bar linkage mounted behind the frame. The bracket (1), connecting rod (2), connecting frame (3) and beam (8) are all hinged, and the positions of the four hinge points are vertices of a parallelogram, so no matter how the soil loosening cylinder moves , When the tip of the tooth cuts the soil, it can ensure the best cutting angle into the soil.

There are two sets of holes on the beam (8) to obtain two mounting devices. After the tip of the tooth (10) has been used for a period of time, it can be turned over and installed by 180 degrees to prolong the service life.

For hard ground, it can work with one tooth in the middle or two teeth on both sides.

The structure of the single-tooth ripper is shown in Figure 2-92.

1. Bracket 2. Connecting Rod 3. Teeth Tip 4. Guard Plate 5. Gear Rod 6. Beam 7. Tilting Cylinder 8. Lifting Cylinder

Figure 2-92 Single tooth ripper

Single-shank rippers work on the same principle as triple-shank rippers.

3.1 Layout of instruments and controls

1. Shift joystick 2. Accelerator joystick 3. Shift joystick safety lever 4. Left steering joystick 5. Right steering joystick

6 Air conditioner control panel 7. Oil pressure/voltage gauge 8. Cooling water temperature gauge 9. Working oil temperature gauge 10. Oil level gauge/hour gauge

11. Torque converter oil temperature gauge 12. Side light switch 13. Rear light switch 14. Front light switch 15. Start switch

16. Blade joystick 17. Ripper joystick 18. Pin puller 19. Bulldozer control safety lever 20. Deceleration pedal

21. Right brake pedal 22. Left brake pedal

3.2 Use of instruments and controls

3.2.1 Fuel control lever

Push the control lever forward, that is, position ① as shown in Figure 3-2, which is the low-speed-idling position of the engine; pull the control lever backward, and the engine speed increases, as shown in ② position in Figure 3-2; the control lever is in position ② as shown in Figure 3 -2 indicates that the engine is at the rated speed when the position ③ is in operation, that is, the bulldozer is working

, the speed at which the engine normally operates.

To stop the engine, first put the control lever in the "idle" position,

as shown in the figure

3-2 Show the ① position, and then turn the start switch to the off position.

3.2.2 Gear lever

The forward and reverse of the bulldozer each have three speeds, all of which are controlled by the gear lever. See Figure 3-3. When starting the engine, the shift lever must be in the neutral position "N"

position; after the engine starts, operate the shift lever to place the required speed gear.

3.2.3 Gear shift safety lever

This lever is the locking device for the gear lever. When the bulldozer is parked, the shift lever must be in the neutral "N" position and locked with this lever. See Figure 3-4.

3.2.4 Left Steering Rod

Pull the left steering lever backward, the left steering clutch will disengage,

The car body turns to the left; continue to pull the left steering lever backward until it reaches the end, and the left

Face brake promptly brakes, and car body promptly turns to the left

in situ. See Figure 3-5.

3.2.5 Right Steering Rod

The right steering lever controls the bulldozer to turn right, and its operation process is the same as that of the left steering lever. See Figure 3-5.

3.2.6 Deceleration pedal

The accelerator pedal is used to reduce engine speed. This pedal controls the engine

The speed of the second gear is usually used in the first gear, which is 800-850 rpm;

Depress this pedal in one step, it is the second gear, that is, it is in idle running. See Figure 3-6.

When the car drives to the top of a slope or dumps soil on the edge of a cliff, due to the load

If the load is reduced, the speed of the vehicle will increase and become dangerous. At this time, step on the deceleration pedal to control the speed of the vehicle and reduce it appropriately.

3.2.7 Left and right brake pedals

In order to facilitate the driver's manipulation, when the bulldozer

is turning, in addition to using the steering rod,

You can also use the brake pedal at the same time. See Figure 3-7, first pull the steering rod backwards,

The stroke is about 90 mm, then step on the brake pedal on the same side as the steering rod, push

The earth-moving machine turns on the spot; when the bulldozer is working on the level ground, if it encounters a special situation,

If emergency braking is required, immediately depress the middle position of the brake pedal to make the left and right brakes

brake at the same time. Do not put your foot on the brake pedal when you do not need to operate the brake pedal.

3.2.8 Bulldozing blade joystick

This lever is used to operate the bulldozing blade

1. The operating position of the bulldozing blade control lever. See Figure 3-8.

Position 1, the bulldozer is raised;

Position 2 is locked (maintained) to keep the bulldozing blade in a certain position;

Position 3, the bulldozer is lowered;

Position 4 is floating, so that the bulldozing blade can be adjusted to the uneven road surface (under the influence of external force) for free lifting. Joystick position, even with hands off

Rod, bulldozing blade can still maintain a floating state;

Position A, the bulldozing blade is inclined to the right;

In position B, the bulldozing blade is tilted to the left.

When the joystick is in position A and position B, only the bulldozing blade is in the left,

Right tilted position. Bulldozing blades can be operated in both raised and lowered positions

Bulldozing blade tilt operation. But when the bulldozing blade is at the highest and lowest position,

Then the tilt operation cannot be performed. During tilt operation, if the tilt cylinder is in

At the end of the stroke, the piston rod should be pushed back in time.

3.2.9 Safety bar for bulldozing blade manipulation

This lever is the locking device of the bulldozer control lever. When the bulldozer is parked or maintained, this lever must be moved to lock the bulldozer control lever in the direction of the arrow. See Figure 3-9.

3.2.10 Horn button

As soon as the button is pressed, the horn sounds.

3.2.11 Brake lock lever

This lever is the brake pedal lockout. Foot leaves immediately after latching

pedal, the brakes are still on. See Figure 3-10.

In the process of operation, the left and right brake pedals must be stepped on at the same time (that is, as long as the brake pedal is stepped on

center of the brake pedal) and then place the lever in the "locked" position so that the brake pedal is locked. If you want to release the locked state, you still have to depress the middle position of the brake pedal first, and then put the lever in the "relaxed" position.

Use the brake lock lever to lock the brake pedal to stop the bulldozer. It must be done with the engine running, because when the engine stops, the hydraulic brake is applied. Figure 3-10 Brake lock

lever

The booster is in a non-working state, which reduces the braking force. Pay special attention to parking on a slope, which is very dangerous, so the locking mechanism must be operated while the engine is running.

3.2.12 Ether start switch

It is a quick-start device for use in cold temperatures. When operating, first pull out the knob, when the knob is pressed, the ether is sprayed into mist and sucked into the trachea, which makes the engine easy to start, as shown in Figure 3-11.

3.2.13 Light switch

It is to turn on the instrument lights, front lights and rear work lights.

3.2.14 Start switch

The "off" position is the key insertion position, at this time, all the circuit systems are closed; the "on" position is the battery relay (power switch) is turned on; "start" is the engine start. After starting, when the hand leaves the key, the key will automatically return to the "on" position, see Figure 3-12.

3.2.15 Three-level alarm electronic monitoring device

The three-level alarm electronic monitoring device is used to monitor the normal operation of the bulldozer

See Chapter 8 for details.

Chapter 4: Driving

4.1 Inspection before starting, Figure 4-1

1. Carry out according to the daily inspection items (see "regular maintenance" for inspection items).

2. The brake pedal should be in the brake locked state.

3. The shift lever should be placed in the neutral "N" position and locked with the safety lever.

4. Lower the bulldozing blade to touch the ground, and lock the bulldozing blade control lever with the safety lever.

5. Put the fuel control lever in the idle position.

4.2 Engine start, Figure 4-2

1. Insert the key into the start switch, turn to the "on" position, turn on the battery relay (power switch) and then turn to the start position, and the engine starts to work.

2. When starting, pay attention to observe whether the pointer position of the engine oil pressure gauge is normal.

3. The key should not be in the start position for more than 20 seconds.

4. If the start is unsuccessful, the key should be placed in the "on" position immediately, and then start again after waiting for 2 minutes.

5. If it is still difficult to start the engine again, it may be because the oil cut-off valve is not opened. At this time, the oil cut-off valve can be opened by manually operating the knob. After starting, turn the knob back.

6. After starting, the key must be returned to the "on" position (it can be returned automatically).

4.3 Manual operation of oil cut-off valve Figure 4-2

When the electrical system of the oil cut-off valve fails, it must be operated manually. The starting method is shown in Figure 4-3. Turn the knob (1) inward, and open the valve, so that the oil in the "PT" pump can flow into the injector to start the engine; to stop the engine, just turn the knob back.

4.4 Engine running

When the engine is started, do not work immediately, but first

perform "warm-up operation". Proceed as follows:

1. Control the engine at idle speed (the fuel control lever is placed in the "idle speed" position), and make the pointer of the oil pressure gauge point to the normal range. The idling time should not exceed 20 minutes, otherwise there will be oil leakage in the bottom shell of the supercharger.

2. Operate the fuel control lever to control the engine to run at medium speed and no load for about 5 minutes.

3. Run the engine with a light load until the pointer of the water temperature gauge points to the normal range.

After warm-up operation, check: whether the instruments are normal; whether the engine exhaust color is normal, whether there is abnormal noise and vibration; whether there is overflow of oil, fuel, water, etc.

4.5 Engine stopping

1. Before stopping the engine, idle for 5 minutes to allow the engine to cool down slowly before stopping the engine;

2. When stopping, turn the key on the start switch to the "off" position, and then pull out the key.

When the engine has not cooled down, stopping the engine

immediately will affect the life of the various parts of the engine, so do not perform an emergency stop unless necessary.

4.6 Bulldozer start Figure 4-4

The bulldozer can start (forward driving) only after the engine is running normally. The operation steps are as follows:

1. Pull the fuel control lever (1) backward to increase the engine speed;

2. Operate the safety lever (7) to release the locking effect on the bulldozer control lever, operate the bulldozer control lever, and lift the bulldozer to about 400-500 mm from the ground;

3. Press and hold the middle position of the brake pedal (3),

Brake lock lever (4), release on brake pedal (3)

The locking effect makes the brake pedal return to the normal position;

4. Operate the shifting safety lever (5) to release the locking effect on the shifting lever (2), and then place the shifting lever at the first speed position, that is, the bulldozer starts to move forward;

5. When starting, step on the deceleration pedal, and then put the shift lever in the first forward position, then slowly release the pedaling

force, slowly return to the deceleration pedal, so that the engine speed increases gradually, which can prevent a sudden start;

6. After starting, place the shift lever at the desired speed position.

4.7 Bulldozer forward, reverse, speed change

Set the shift lever to the desired speed position. The bulldozer can also change speed while driving, and there is no need to stop and change speed.

When changing forward and backward driving, you must step on the speed brake, and after the engine decelerates, then manipulate the gear lever to change the driving direction of the bulldozer.

4.8 turns

When driving, if you want to turn left (right), if you pull the side steering lever to the middle, the steering clutch will be disengaged (at this time, you can feel it in your hand), and you can make a slow turn (big turn); If the steering lever on this side is pulled to the bottom and the brake pedal on the same side is stepped down, the steering in place (small turn) can be performed, as shown in Figure 4-5.

If you want to make a big turn to the left on the ramp, you should pull the right steering lever to the middle, that is, you can turn to the left slowly (reverse operation); Pull the left steering lever to the end (do

not reverse the operation), see Figure 4-6.

4.9 Temporary parking of bulldozers, Figure 4-7

When the bulldozer stops temporarily, it is not necessary to stop the engine. The steps are as follows:

1. Push the fuel control lever (1) forward to make the engine run at low speed;

2. Put the shift control lever (2) in the neutral "N" position, and manipulate the safety lever (5) to lock the shift control lever;

3. Depress the middle part of the brake pedal and manipulate the brake locking lever (4) to lock the brake pedal;

4. Operate the bulldozing blade control lever (6), lower the bulldozer blade to touch the ground, and manipulate its safety lever to lock the bulldozing blade control lever.

4.10 Operation in Cold Period

4.10.1 Preparations before operation in the cold season

When the temperature is low, it is difficult to start the engine, and the cooling water is prone to freezing, so antifreeze should be added to the cooling water. When the temperature is below 0°C, add antifreeze according to the instructions. Figure 4-6

When using antifreeze, first empty all the cooling water, clean the interior, remove scale, etc., check whether the radiator, water pump, water supply hose, etc. are leaking, and then put in antifreeze.

Antifreeze is a flammable liquid, and fire is strictly prohibited when using it.

When there is no antifreeze, in order to prevent the engine from overcooling, you can install cap-shaped side covers and radiator louvers, and pay full attention to the heat preservation of the engine body.

Always pay attention to whether the pointer of the water temperature gauge is within the normal range during operation.

As the temperature drops, the function of the battery will decrease, and the charging capacity will decrease. Therefore, the charging rate should be increased to 75% first. Figure 4-7

above, and pay attention to heat preservation.

The charging rate changes according to the temperature, see the table below, and convert according to the measured specific gravity of the electrolyte.

In addition, when the battery needs to be replenished with distilled water, in order to prevent freezing, do not replenish after the

operation is completed, but should be replenished the next day and before the operation.

4.10.2 Engine start

When the engine is difficult to start in the cold season, an ether device can be used. The usage method and steps are as follows: see Figure 4-8.

Before starting the switch, first pull the ether starting knob, wait for 2-3 seconds, put the starting switch in the starting position, start the engine, and at the same time push the ether starting knob, then the ether will spray mist gas, To help the engine start, the knob should not be pushed in for more than 2 seconds; after starting, turn the start switch back to the running position (it can return automatically). If it fails to start successfully once, operate again according to the above method after 2 minutes. After starting, when the engine speed slows down and is about to stop, please spray with ether, but the engine speed should not exceed 1000 rpm during operation. During normal operation, absolutely do not carry out the above-mentioned ether spraying operation. Spraying more than a certain amount of ether into the engine will cause an abnormal explosion. Therefore, avoid using too much ether.

When using ether, pay attention to the following items: Do not approach the fire; do not touch the human body when using ether gas. If you touch it, please wash it with water; Pressure, so that all the internal liquid gas is released; spare ether gas cylinders should be

kept in a safe place outside the car body, and relevant storage regulations must be followed for places where large quantities are stored.

Figure 4-8

4.10.3 After the daily operation is completed

1. To clean the mud and water on the car body, park the car on a solid and dry concrete floor. If there is no such suitable place, you can lay a wooden board on the ground and park the car on the wooden board. This is for Prevent the attachments from freezing or the walking device from freezing on the ground, which will affect the use of the bulldozer the next morning.

2. Clean the water on the surface of the piston rod of the hydraulic cylinder, otherwise the mud on the rod and the frozen water droplets will enter the sealing ring together, which will damage the sealing ring;

3. Open the drain plug. Drain any accumulated water from the fuel system to prevent overnight freezing;

4. In the cooling water, if there is no antifreeze, open the faucet (or plug) on the lower part of the radiator and the faucet (or plug) behind the right side of the cylinder part, and drain the cooling water to prevent freezing at night. Contains antifreeze, do not throw away this water, the cooling water can still be used when pouring water into the water tank the next day;

5. If all the cooling water is replaced with new ones, the anti-corrosion agent in the anti-corrosion device should also be replaced with new

ones at the same time, and three DCA-4L anti-corrosion agents should be put in;

6. In order to prevent freezing, the chuck of the anti-corrosion device should be removed, and it should be kept warm with recycled wire, and then installed again the next day. When the chuck is removed, the faucet of the anti-corrosion device should be closed tightly.

7. The performance of the battery will decrease significantly at low temperature, so pay attention to heat preservation, cover it well or move it to a warm place indoors, and install it the next day.

4.10.4 After the cold period

1. As the seasons change, when the weather is warm, the lubricating oil in each device should be replaced with oil of specified viscosity;

2. Drain all the antifreeze, clean the cooling system, put in clean soft water, and add anti-corrosion agent again;

3. Remove the ether cylinder and keep it in a special place, and put it in a dark place.

Chapter 5: Maintenance and Maintenance

Carry out technical maintenance correctly and in a timely manner, that is, to carry out technical maintenance work such as inspection, cleaning, lubrication, adjustment, and fastening of machinery frequently and regularly. This can improve production efficiency, reduce wear and avoid unexpected failures, that is, improve the economy of the bulldozer, prolong the service life of the bulldozer, and reduce maintenance costs.

The specified maintenance hours of the machine are recorded by the chronograph.

When the working environment conditions are poor, it should be carried out earlier than the specified maintenance time.

5.1 Precautions for maintenance

Matters needing attention during maintenance:

1. During maintenance, the relevant regulations in the "Safety Operation Regulations" must be followed.

2. When performing maintenance under the vehicle, a mark should be hung on the driver's seat, and if necessary, mark around the vehicle.

3. According to the maintenance content, when the bulldozing board needs to be lifted, it must be supported under the board to prevent it from falling.

4. When using the bulldozing blade to lift the car body, the joystick must be locked, and at the same time, it must be filled under the track to prevent the whole machine from falling.

5. When cleaning the vehicle, refueling, checking the tension of the fan belt, and checking the running part and its nearby parts, the engine must be stopped.

6. When maintaining, checking and charging the battery, turn off the engine and remove the battery cover at the same time. When the battery and charger connector are removed, the charger switch should be turned off.

7. It is strictly forbidden to approach open flames during

maintenance, including smoking, electric sparks and other fires.

8. When opening the gearbox, be careful not to drop things.

9. When performing oil supply, oil discharge and other inspection and maintenance on the hydraulic system, the pressure must be reduced first. The method: lower the bulldozer to the ground, turn off the engine, and operate each joystick two or three times before slowly loosening each cover.

10. Special adjustment tools should be used when adjusting the oil pressure, otherwise failures will occur during difficult maintenance.

11. During inspection and maintenance, except for necessary personnel, other personnel should not approach.

12. The refueling part, the surface of the oil mark and all refueling containers must be kept clean; clean products should be used for oil, butter, etc.; when checking and replacing oil, it should be carried out in an environment with less dust, all of which are to prevent Garbage mixed in.

13. After maintaining the oil filter, run the engine at a medium speed for 5-10 minutes to remove the air in the oil circuit.

14. The amount of lubricating oil added should be appropriate, neither too much nor too little.

5.2 Maintenance list

1. Oil usage table

According to the temperature, fuel oil, lubricating oil and water usage, replace them according to the requirements in the table below.

1) Daily maintenance list

maintenance time Maintenance item	Comprehensive inspection
Check for oil and water leaks	○
Loose inspection of bolts and nuts of each part	○
Short circuit, broken wire, poor contact	○
Cooling water check supplement	○
fuel level check	○
Engine oil pan oil level check	○
Torque converter, gearbox, steering clutch, final drive oil level inspection	○
Remove fuel tank water and sediment	○
Three-level alarm electronic monitoring device	○
Check the dust removal indicator	○
Steering rod travel check	○
Brake pedal travel check	○

2) 250, 500 hours maintenance list

maintenance time Maintenance item	250 working hours
Grease (butter)	

Cooling fan shaft (1 place)		○
Tensioner shaft (1 place)		○
strut	Straight tilting blade (1 place)	○
	Angle shovel (2 locations)	
Tee (1 place)		○
Cylinder ball joints (2 places)		○
Cylinder bracket (4 places)		○
Cylinder support beam (4 places)		○
Tilt cylinder ball joint (1 place)		○
Diagonal strut ball joints (2 places)		○
Pole ball joint (3 places)		○

3) 500 hours maintenance list

maintenance time / Maintenance item	250 working hours	500 working hours
Oil replenishment check		
final drive tank	○	

working oil tank	○	
Check and adjust the tension of AC motor drive belt	○	
Cleaning and replacement of torque converter, gearbox, steering fuel filter elements	○	
Loose inspection and fastening of track shoe bolts	○	
Battery pack fluid level check	○	
Vent Cleaning		
Final drive breather		○
Steering clutch case breather		○
Ether starter check		○

4) 1000 hours maintenance list

maintenance time / Maintenance item	1000 working hours
Grease (butter)	
Trolley braces (2 locations)	○

Universal joint (2 places)	○
Torque converter spindle (1 place)	○
Guide wheel adjustment lever (2 places)	○
Radiator inspection and cleaning	○
Replacement of torque converter, gearbox, steering clutch oil	○
Cleaning of torque converter and oil filter element of working oil tank	○
Replacement of oil in the working oil tank and replacement of the filter element of the oil filter	○
Final drive tank oil change	○
Inspection and replenishment of oil quantity of traveling gear components	○

5) 2000 hours maintenance list

maintenance time / Maintenance item	2000 working hours
Grease (butter)	
Balance beam shaft (1 place)	○
Decelerator pedal shaft (2 places)	○
Gear lever control shaft (3 places)	○
Brake pedal linkage shaft (6 places)	○
Fuel control lever linkage shaft (3 places)	○
Push knife plate joystick linkage mechanism shaft (3 places)	○

6) Unscheduled maintenance items

Replace cooling water	Twice a year (spring, autumn) or after 1000 hours
Air filter inspection, cleaning, replacement	Unscheduled maintenance
Track tension check and adjustment	Adjust at any time

5.3 Maintenance details

5.3.1 Daily maintenance

1. Check for water leakage and oil leakage

After the vehicle is turned, check whether there are signs of water leakage and oil leakage, especially the joints of high-pressure hoses, hydraulic cylinders, floating oil seals and radiators. If leakage is found, the cause of the leakage should be analyzed and repaired in time.

2. Check the tightness of the bolts and nuts of each component. If there is any looseness, tighten it, especially the bolts of the air filter, muffler, rollers and track shoes.

3. Check the electrical part to see if the lines are normal.

4. Inspection and supply of cooling water.

Open the water inlet cover (see Figure 5-1) to see if the cooling water can be seen at the bottom of the filter, if not, add water from the water inlet to the position shown in the figure. Turn off the engine when adding water. After stopping adding water, run the engine at idle speed for about 5 minutes, and then check the amount of water. If it does not meet the requirements shown in Figure 5-1, add water again. If it is found that the amount of water added is larger than usual, check the cooling system for water leakage.

When the water temperature is high, do not open the cover immediately to prevent hot water from spraying out, but open the cover slowly to lower the pressure in the water before opening it.

5. Check the fuel, see Figure 5-2.

When the operation is over, open the cap, check the oil quantity with the oil dipstick G, refuel from the fuel filler F, and ensure that the fuel is full. If the cap is open and the vent hole is blocked, the fuel supply will often be stopped, so check and clean it from time to time.

6. Check the oil quantity of the engine oil pan.

Use the dipstick G to check the oil quantity, if the oil quantity is insufficient, replenish it from the oil filler port F, see Figure 5-3.

When checking the oil level with the engine stopped, use the side marked "ENGINE STOPPED" on the dipstick.

If you check the oil quantity while the engine is idling, first make the pointers of the engine oil pressure gauge and water temperature gauge point to the normal range, and then use the oil dipstick on the side engraved with "ENGINE IDLING" (engine idling) to check the oil quantity .

7. Check the oil quantity in the steering clutch box, this inspection includes the oil quantity inspection of the gearbox and torque converter.

First remove the right armrest, see Figure 5-4, check with the oil dipstick G, if the oil is insufficient, add engine oil from the filler port F.

8. The removal of water and sediment in the fuel tank.

Unscrew the switch at the bottom of the fuel tank, drain the sediment and water accumulated at the bottom, and oil will come out during the draining process.

9. Check the electronic monitoring device, see Chapter 8 for details.

10. Air filter alarm indication:

The red luminous LED light 1 flashes to indicate that when the filter element is blocked, the sensor contact is connected to the ground signal, the red luminous LED light 1 flashes to alarm, and the buzzer sounds to prompt. At this time, press the mute key 2, and the buzzer stops beeping. On the contrary, it will sound, see Figure 5-5.

11. Brake pedal travel check.

When the engine is running at idle speed, the standard stroke of the brake pedal is 150-170mm, if it is not within this range, it must be adjusted. The method refers to "adjustment method of each device".

12. Steering joystick travel check.

When the engine is running at idle speed, if the stroke of the steering lever is not within the standard range, it must be adjusted. The method refers to "adjustment methods of each device".

When the joystick stroke is from 0 to 55±5mm, the steering clutch is disengaged; when the joystick is further pulled to make the stroke from 55±5 to 124±5mm, it is brake braking.

5.3.2 Maintenance every 250 hours

Includes the initial 250 hours of service when the bulldozer is in operation and is performed in conjunction with the "Daily Service".

1. Add grease, add butter according to the arrow shown in Figure 5-6.

1. Cooling fan shaft (1 place) 2. Tension pulley (1 place)

3. Strut (1 place) 4. Ball seat (1 place)

5. Oil cylinder ball joint (2 places) 6. Oil cylinder bracket (4 places)

7. Cylinder support beam (2 places) 8. Inclined cylinder ball joint (1 place)

9. Diagonal strut ball joints (2 places) 10. Strut ball joints (3 places)

2. Oil quantity check

(1) Final drive box

As shown in Figure 5-7, open the cover G to check, if the amount of oil does not reach the edge of the lower hole, add oil from the oil supply port F.

(2) Inspection of working oil tank

Lower the bulldozer first to stop the engine, and after about 5 minutes, check the oil indicator G as shown in Figure 5-8. If the oil level in the indicator is not between the upper and lower lines of the indicator window, it must be refueled from the fuel port F, and this inspection should be carried out before the operation.

Figure 5-8

3. Check the tension of generator drive belt

As shown in Figure 5-9, it is a normal tension, that is, you can only press down about 10mm displacement with your fingers (about 60N). Loosen, then move the position of the generator to normal tension. When the V-belt is worn or stretched and loses the adjustment margin, and there are scars and cracks, it should be replaced in time, and the two belts should be replaced with new ones at the same time. After replacement, it must be tested for 1 hour, and then check and adjust the tension.

4. Cleaning and replacement of oil filter parts

The cleaning and replacement of oil filter parts of gearbox and steering clutch are shown in Figure 5-10. Unscrew the bolt (2), open the cover (1), take out the parts, then clean the inside of the housing and the parts, and replace with new parts if necessary. After parts are replaced, it is necessary to exhaust, that is, start the generator, loosen the vent plug (3), and tighten it immediately after the oil is sprayed out.

5. Electrolyte level check

As shown in Figure 5-11, if the liquid level does not reach the specified liquid level (10-12 mm of distilled water passes through the plate). If the electrolyte decreases, dilute sulfuric acid of the same concentration should be added. Metal funnels cannot be used when filling dilute sulfuric acid. The vent hole of the battery cover must be maintained while checking the fluid level.

6. Inspection of track shoe bolts

It is found that the track shoe bolts are loose and should be tightened. The tightening torque is 980-1176N.m.

5.3.3 Maintenance every 500 hours

Include "maintenance every 250 hours".

1. Ventilator cleaning

Take off the ventilation device, and clean the internal dirt and dust with clean diesel oil, see Figure 5-12.

Breather for rear axle case (1) Breather for final drive case (2)

2. Check the ether starting device (if there is such a device).

(1) Take off the ether cartridge check valve and control wire. When removing the ether cartridge, wipe the valve clean to prevent dust from entering the valve; if the bracket of the valve is found to be damaged, it should be replaced. After removing the ether cartridge, the control wire should move well.

(2) When replacing the ether cylinder, check according to the above contents.

(3) Check whether there is oil leakage at the joint, and tighten the mounting bolts.

(4) Perform the test in the following order

a. Remove the nylon tube from the sprayer;

b. Remove the nebulizer;

c. Then connect the sprayer to the pipe;

d. Put the control wire rope in the running position for 2 seconds, check the spraying conditions of each small hole of the sprayer, whether there is mist spraying out, and then put it in the off position.

5.3.4 Maintenance every 1000 hours

Including "maintenance every 250 hours and 500 hours".

1. Add grease. Add butter according to the arrow shown in Figure 5-14.

1. Universal coupling (2 places) 2. Guide wheel adjustment lever (2 places)

2. Radiator inspection

Blow off the soil, garbage, leaves, etc. on the radiator blades with compressed air, or wash them with water. Check the rubber hose at

any time. If cracks and aging are found, replace it in time, and check whether the hose clamp is fastened.

3. Replace the oil in the rear axle box and clean the oil filter, including the oil in the gearbox, hydraulic torque converter, and bevel gearbox. See Figure 5-15.

(1) Drain the oil from the oil drain plugs P1 and P2 at the lower part of the car body, and tighten the oil drain plugs after draining.

(2) Open the bottom plate on the left, remove the bolt (1), remove the cover (2), and then take out the oil filter screen (3) and magnet (4).

(3) Remove the bolt (5), and take out the cover (6) together with the oil filter of the torque converter.

(4) Clean the parts, oil filter, etc. taken out from the inside of the box, and install them as they are. If parts such as the magnet of the oil filter screen are damaged, replace them with new ones in time.

(5) After the oil filter parts are replaced, the specified amount of engine oil must be filled from the filling port F according to the "maintenance every 250 hours".

4. For oil replacement in the working oil tank and cleaning of the oil filter, see Figure 5-16.

(1) Remove the oil drain plug (1) at the lower part of the working oil tank, then loosen the oil drain valve (2) to drain the oil, and tighten the oil drain valve (2) after draining.

(2) Remove the bolts at the rear of the fuel tank, remove the cover, and take out the oil filter parts from the tank.

(3) Clean the inside of the filter and its parts. If there are damaged parts, replace them with new ones in time, and then install them as they are.

(4) After replacing the parts, add the specified amount of oil from the filler port F.

5. For the replacement of final transmission oil, see Figure 5-17.

(1) Open the oil drain plugs P on both sides of the car body to drain the oil, and tighten the oil plugs after the oil is drained.

(2) Add the specified amount of engine oil from the filler port F.

6. Replacement of traveling gear oil

Park the car on a flat ground, and check whether the oil quantity of the rollers, support wheels, and guide wheels needs to be filled according to the following method, see Figure 5-18.

(1) Slowly loosen the sealing bolts of each wheel. If oil seeps out from the thread, it means that it is not necessary to add new oil, and tighten the bolts immediately.

(2) If the sealing bolt is loosened or even removed, there is still no oil leakage, indicating that the oil is insufficient, and new oil must be filled immediately.

5.3.5 Maintenance every 2000 hours

Including "maintenance every 250, 500, 1000 hours" together.

Add grease, add butter according to the arrow shown in Figure 5-19.

3. Shaft of fuel control lever mechanism (3 places) 4. Mechanism shaft of pusher plate joystick (3 places)

Figure 5-19

5.3.6 Unscheduled maintenance

1. Replacement of cooling water

When antifreeze is added to the cooling water, the replacement should be carried out in spring and autumn every year; when no antifreeze is added to the cooling water, the cooling water must be replaced every 1000 hours.

The replacement method is as follows:

(1) Park the vehicle on a flat place, stop the engine, fasten the anti-corrosion ventilation device, and slowly unscrew the radiator cap to reduce the pressure in the water, especially when the water temperature is high, to prevent hot air from spraying out and scalding your hands;

(2) Open three drain valves (radiator, cylinder block, oil cooler) to drain water;

(3) After draining the water, wash it with detergent. The cleaning method should be done according to the method described on the trademark;

(4) Drain all the water after washing, close the drain valves, and add clean water to the required position from the water inlet;

(5) Run the engine at idle speed, open the drain valves to release water, and continue to add water from the water inlet for cleaning until clean water flows out of the drain valves, and then close the drain valves.

(6) Fill up the water from the water inlet as required;

(7) Replace the anti-corrosion agent in the anti-corrosion ventilation device;

(8) In order to remove the air mixed in the cooling water, run the engine at idle speed for 5 minutes, and then run it at high speed without load for 5 minutes;

(9) After the engine stops for about 3 minutes, fill up the water from the water inlet according to the requirements in "Daily Maintenance", and then tighten the water inlet cover.

2. Air filter inspection, cleaning and replacement

When the air filter alarms, the air filter must be cleaned immediately, and the engine must be stopped at this time.

(1) Remove the cover and outer sleeve filter, see Figure 5-20.

Figure 5-20

(2) Clean the inside of the shell and the cover;

(3) Clean the filter screen of the outer sleeve (2); The cleaning method is as follows:

a. Cleaning method with compressed air: use dry compressed air (above 0.6Mpa) to blow air along the pleats from the inner surface, then blow air along the pleats from the outer surface, and finally blow the inner surface again to make the inside and outside No dust on the surface;

b. Water cleaning method: use tap water (below 0.29 Mpa), rinse from the inner surface of the filter along the pleats, then rinse from the outer surface along the pleats, rinse the inner surface again, and

check the filter after drying;

c. For the filter screen with serious dirt, proceed as follows:

Mix 300 grams of detergent in 20 liters of water;

Soak the filter element in the above solution for 15 minutes;

Rinse in running water;

Use an electric fan to dry (never heat and dry), and check the filter screen after drying.

d. If you wash it with warm water at about 40°, the effect will be better.

(4) After the filter is cleaned and dried, check it with light. If there is any damage such as small holes, replace it with a new one;

(5) The filter screen of the outer sleeve should be replaced with a new one after six times of cleaning or after one year of use, and it is not allowed to continue to use; if it is cleaned less than six times, the air filter will still When calling the police, it must be replaced with a new one immediately;

(6) When replacing the filter screen of the outer sleeve, the filter screen of the inner sleeve should be replaced at the same time.

3. Walking part inspection

(1) Check track tension

Park the vehicle on a flat ground, use a ruler (see Figure 5-21), and place it between the supporting wheel and the guide wheel. If the maximum gap between the ruler and the track shoe tooth block is 20-30 mm, it is the standard the tension;

Figure 5-21

(2) Check the gap of the guide plate of the guide wheel. If the gap is too small, the guide wheel will move laterally, causing the center line of the guide wheel to be inconsistent with the track. It is normal if the gap A is less than 4mm, see Figure 5-22.

Figure 5-22

Figure 5-22

(3) Check the chain link pitch, insert a wooden block between the track shoe and the sprocket, see Figure 5-23, make the track loose, and then take the joint pin on the wooden block as the reference, and leave the pin two knots away The position is the starting point, measure the pitch length L of the 4 chain links in the straight line part, and its 1/4L is the pitch of the chain link (it can also be based on the main pin);

Reverse Link Pitch: Tighter 231.85mm

Standard 233.85 mm

Basic Link Pitch: 228.85 mm

Note: The basic chain link pitch is measured after the bulldozer moves forward and stops, and the reverse chain link pitch is measured after the bulldozer moves backward and stops;

(4) Check the track shoe tooth height

When the track shoe is tensioned, measure the tooth height A in the middle of the track shoe as shown in Figure 5-24;

Basic size: 80 mm

Use limit: 25mm

(5) Check the outer diameter of the supporting wheel

a. Measure the height dimension C between the upper and lower planes of the chain link, see Figure 5-25.

b. Stop when the upper plane of the chain link is in full contact with the outer circle of the roller, measure the dimension B as shown in the figure, then the outer diameter dimension A of the roller is A=(B-C)×2

Basic size: 255mm

Use limit: 229mm

(6) Check whether the various wheels are leaking oil, and whether the bolts and nuts are fastened. If any problem is found, it should be repaired immediately.

5.4 Vulnerable parts

For filter parts, bulldozer blades and other vulnerable parts, the wearing parts should be replaced in an irregular maintenance period or when the wear limit is reached.

List of consumable parts

Note: The internal parts in ( ) are replaced at the same time

5.5 Adjustment

5.5.1 Track tension adjustment, see Figure 5-26

To increase track tension, inject butter from the filler port (1). Its adjustment limit stroke is S. When adjusting to S=O, if the track is still loose at this time, it means that the wear of the pins and pin sleeves has reached the limit, and the installation positions of all pins and pin sleeves must be replaced. The method is based on their original installation position, all reversed at the same angle (changing the

original installation position), and then reassembled, or replaced with a new track.

To loosen the tension, loosen the plug (1) about one turn and squeeze out the butter. When loosening the plug (1), do not exceed one turn, but be careful not to loosen parts other than the plug (1), to prevent the internal high-pressure oil from spraying out and causing accidents. When the butter comes out of the plug, if it is not normal, you can move the vehicle back and forth, see Figure 5-27.

5.5.2 Guide wheel clearance adjustment. See Figure 5-28

When the guide wheel is under the action of external force, the bracket (2) can move back and forth along the guide plate (3) on the upper part of the trolley frame, causing the guide plate (9) and the guide plate (3) to wear. Cause the guide wheel to move laterally, tilt sideways, and the track gauge of the guide wheel is not consistent with the track gauge, so that the track roller, the flange edge of the supporting wheel, the side of the sprocket, etc. interfere with the track and cause excessive wear. Therefore, each gap adjustment must be performed.

1. Adjustment of lateral clearance

After walking 1 to 2 meters on the flat ground, when the gap A between the trolley frame and the side guide plate (7) (there are 4 places on the left, right, and inside sides) is more than 4 mm, loosen the bolt (1) and remove the gasket C. Adjust the lateral clearance within the range of 0.5 to 1 mm, and the thickness of each adjusting shim is 1 mm, as shown in Figure 5-29.

Note: When loosening the bolt (1), do not exceed three turns, otherwise the seat (8) will not be easy to install after falling.

2. Adjustment of clearance in up and down direction

The gap between the bracket (2) and the guide plate (3) is B, and the gap between the upper and lower guide plates (4) and the anti-wear plate of the trolley frame is C. If the sum of the gaps (B+C) is greater than 5 mm, it must be adjusted , the gist of which is as follows:

Pull out the necessary number of shims at (C) and add at (b) to adjust the gap (B+C) to within 2mm. Under normal circumstances, the clearance C=0mm. The steps to adjust the gap are as follows:

(1) In order to grasp the adjustment amount, it is first necessary to measure the gap amount B mm after wear, and then subtract 2 mm (normal gap amount) from this value, and the result is the adjustment amount δ, that is, δ=B-2 (mm);

(2) Loosen the bolt (5) until the spring has no elasticity;

(3) Loosen the bolt (1) (no more than three turns);

(4) Use a lever or bolt (6) to raise the upper and lower guide plates (4) so that C=0mm, and then pull out the gasket at (C), and the thickness of the extracted gasket is the adjustment amount δ measured above;

(5) Insert the gasket thickness δ extracted at (C) into (b) (a total of 8 places on the left, right, inside, and outside). That is, the sum of the gasket thickness at (C) plus the thickness of the gasket at (b) should be the same as the total thickness of the two gaskets before adjustment; that is, the number of gaskets before and after adjustment remains

unchanged;

There are two types of gasket thicknesses: 2mm and 1mm. If the total number of shims is increased or decreased, it will affect the performance of the inner spring, so it is not allowed to increase or decrease the total number of shims.

(6) Tighten the compression bolt (5);

(7) Tighten the bolt (1) with the specified tightening torque;

Tightening torque: 661.5～828N.m;

(8) Assemble the cover (7) as it is.

For the adjustment of the gap in the up and down direction, the maximum adjustment amount δ is 6 mm.

5.5.3 Adjustment of deceleration pedal stroke, see Figure 5-30

If the fuel control lever is placed at 1/2 of the total stroke and the deceleration pedal is stepped on, the gap A=0 mm, and the engine speed should be within the range of 800-900 rpm. If it is not within this range, it should be adjusted according to the following steps:

1. Loosen the lock nut (1), and then adjust the adjusting bolt (2) until the following state appears, that is, when the deceleration pedal is stepped down to make the gap A=0mm, the engine speed can be 800~ If it runs within the range of 900 rpm, it means that the pedal stroke is normal;

Figure 5-30

2. Tighten the lock nut (1) after adjustment.

When adjusting, a tachometer must be used in order to correctly

adjust the engine speed.

5.5.4 Adjustment of Brake Pedal Stroke

Because the brake structure is an external belt type, when the brake belt lining is worn, the stroke of the steering lever and the brake pedal will increase, which will weaken the braking effect, so it must be adjusted.

The adjustment method is as follows: see Figure 5-31.

1. Remove the rear cover, and then remove the brake inspection cover (1);

2. Screw the adjusting bolt (2) for tightening the brake band to the bottom (until it feels blocked), at this time the brake drum and the brake band are attached to each other, see Figure 5-32.

3. Then turn the adjusting bolt (2) back about 7/6 turns;

4. Run the engine at idle speed, and measure the travel of the brake pedal in this state;

Standard travel: 150 ~ 170 mm

5. If it is not within the above standard range after measurement, adjust the bolt (2) again. Turning the bolt clockwise reduces its pedal stroke, and turning it counterclockwise increases its pedal stroke.

6. If the dimension A of the adjustment bolt (2) as shown in the figure is below 105 mm, the brake lining should be replaced;

7. The strokes of the left and right pedals should be adjusted to be consistent, that is, the height difference between the two pedals is allowed to be within 5 mm.

5.5.5 Adjustment of steering control stroke

The adjustment of the steering joystick stroke of this model is shown in Figure 5-33. Position the rod (1) approximately 78mm from the side of the guide block and bring it into contact with the plate (2). Push the rod (4) to the front of the vehicle body, and adjust the length of the flexible shaft (3) while lightly touching the valve rod in the steering valve to ensure that there is no play in the rod (1), and confirm the stroke of the steering lever 124±1.0mm.

5.5.6 Adjustment of the driver's seat

For the convenience of the driver, the height and angle of the seat can be adjusted at will, as shown in Figure 5-34.

1. Seat front and rear adjustment

Turn the rod (4) to the left, adjust the seat to the required position, and then loosen the rod (4).

The front and rear adjustment of the seat is 140 mm, divided into 7 gears.

2. Seat up and down adjustment

Turn the handle (3) to the right to lower the seat, and turn the handle to the left to raise the seat.

The up and down adjustment is 50mm.

3. Backrest adjustment

Pull up the rod (5) to make the backrest reach the ideal position and then release the rod (5).

4. Adjustment of seat weight

Move the handle (2) up and down so that the driver's weight is aligned with the scale for measuring the weight, so that the best condition can be guaranteed.

5. Seat direction adjustment

Pull the handle (3) upwards, and the seat will rotate 15° to the right. After the direction of the seat is adjusted, put down the handle and lock it carefully.

5.5.7 Adjustment of bulldozing blade inclination

Through the manipulation of the joystick, the inclination of the bulldozer can only reach 560 mm. If it is necessary to further increase the inclination, the length of the left and right supports (1) at the joint between the bulldozer and the frame must be changed. After adjustment, the maximum left and right inclination can be achieved. to 765 mm.

The adjustment method is shown in Figure 5-35.

Use the adjustment rod (2) to turn the support (1), if the distance L between the joints increases, the amount of left inclination will decrease and the amount of right inclination will increase; if the distance L between the joints is shortened, the amount of left inclination will increase and the amount of right inclination will increase. reduce.

Note: When making the above adjustments, it can be carried out when the bulldozing blade is off the ground.

5.5.8 Ball Joint Compensation Adjustment

There are seven cricket joints of the bulldozer, which must be compensated and adjusted to ensure that the axial clearance is within 1mm, see the direction indicated by the arrow in Figure 5-36.

Figure 5-36

1. Loosen the bolt, first remove the gasket (1), and then tighten the bolt (2) so that there is no gap at the ball joint;

2. Measure the size of the gap A, and then loosen the bolt (2);

3. Adjust the thickness of the gasket (1) so that the axial clearance is within 1mm;

4. After adjustment, all bolts must be tightened, and the degree of bolt tightening must ensure that the ball joint can rotate flexibly.

Chapter 6: Safe Operation Regulations and Safe Construction Techniques

6.1 Safe operation rules

In order to complete the task safely while maintaining quality and quantity during construction, the driver should not only understand the structure and operation method of the machine, but also be familiar with the performance of the machine and precautions for safe operation. Therefore, work-related injuries and accidents are often caused by carelessness, so safe operating procedures must be followed during operation.

1. General safety matters

1. The driver must be trained to understand the performance, structure, maintenance procedures of the machine, familiar with the

operation method and safety operation procedures, and only after passing the assessment can he drive alone.

2. Non-bulldozer drivers are not allowed to drive bulldozers. If students are driving, they must be guided by an official driver on the machine.

3. Safety protective equipment must be worn correctly.

4. It is forbidden to operate under excessive fatigue or after drinking.

5. Must abide by the regulations of the construction site to prevent accidents.

6. Fuel, grease, antifreeze, battery pack, etc. are dangerous goods, and should not be in contact with fire when in use.

7. When operating indoors, first of all, you must see the gap between the ceiling, the entrance and exit passages and the vehicle, and have sufficient ground strength. When operating for a long time in a poorly ventilated room, you must have ventilation equipment to prevent engine exhaust poisoned.

2. Before work

1. It is necessary to investigate the topography, geology and dangerous areas of the operation site, determine the operation method, and make safety construction marks for dangerous areas, or take relevant safety measures before operating; pay attention to landslides in dangerous areas such as cliffs, and when there are rocks When driving in dangerous places such as falling, in addition to wearing a safety helmet, safety sheds and rubber plates should also be used;

2. When there is a commander, they should unify the password, cooperate with each other, and drive after recognizing the signs of the work site;

3. Know the storage places and usage methods of fire extinguishers, fire-fighting equipment and first-aid kits, etc., so that they can be used quickly in the event of an accident;

4. Carefully check whether there is oil leakage or damage in the sealing part of the diesel oil, lubricating oil and hydraulic system of the vehicle, and whether the parts are normal. If abnormal conditions are found, they should be repaired before use;

5. Check the stock of diesel oil, lubricating oil, etc., and do not smoke when replenishing diesel oil, and do not approach the fire, and check whether the fuel filler cap is fastened;

6. Dead leaves, waste paper and other flammable materials around the engine must be removed to avoid fire;

7. Adjust the driver's seat to the best position for easy driving;

8. Before starting the starter, check whether each joystick remains neutral (neutral position);

9. After starting the engine, check before entering the operation;

Whether the indicators of each instrument are normal;

Whether the travel of each control lever and pedal and the action of each lever are normal (for this inspection, the transmission control lever must be placed in the neutral position);

Carry out a test run in a safe place to check whether the shifting

operation of each gear is flexible. During the test run, start from low speed driving, and check whether the steering and steering braking performance of each gear are normal;

Carefully observe whether the engine exhaust color is normal, whether there is abnormal vibration and abnormal noise;

3. Working

1. When the driver operates, he should sit in the driver's seat and cannot drive away from the driver's seat or standing;

2. When driving, raise the bulldozing blade to 400-500 mm to make the front view clear;

3. In any case, it must be operated correctly, must be running normally, must not overspeed, do not start suddenly, try to avoid sudden braking, sharp turns, do not snake driving, and cannot idle for a long time;

4. Pay attention to the surrounding pedestrians and obstacles, and keep the distance between vehicles;

5. According to the instrument, sound, vibration, exhaust color and the reaction on each operating handle, judge whether there is any abnormality in the vehicle. If any abnormality is found, it should be repaired in time;

6. When towing a faulty vehicle, there must be a mechanism for the driver to control the brake or stop on the faulty vehicle, and use a reliable wire rope to give correct traction. See Figure 6-1.

7. In the construction site, no one is allowed to enter the construction

site except those on site.

4. After homework

1. When parking the vehicle at the end of the work, put the shift lever into neutral, lower the bulldozer and ripper to the ground, put all the safety bars in the locked position, and turn off the engine when leaving the cab;

2. The vehicle should be parked in a designated safe place;

3. As a last resort, the car must be parked on a slope, and stones should be filled on the track, see Figure 6-2.

6.2 Safe Construction Technology

When the bulldozer is in construction, there must be steps. Do not operate hastily or rashly. To master safe construction technology, you should always keep your mind focused, so that it can operate safely and prevent mechanical damage and major personal accidents.

1. General work

1. When working on uneven ground, try to drive at a low speed, avoid sharp speed changes, and do not turn at high speed;

2. When driving, it is not allowed to drive over big rocks, fallen trees or other obstacles. You should use the operating device to remove them before passing. If you cannot remove obstacles and must drive, you should pass at a low speed and reduce the Vibration, protect the vehicle, see Figure 6-3.

3. When working in water, first check the depth of the water, the speed of the flowing water and the quality of the underwater soil, and do

not enter into the water beyond the limit for operation. To remove soil from various parts, check the oil level, oil leakage and water seepage of the engine oil pan, torque converter housing, steering clutch box, final drive box, hydraulic device, and walking parts. Carry out exclusion checks in the fuel tank if necessary;

Note: The allowable value of the water depth should be based on the complete exposure of the supporting rollers, and the cooling fan cannot be flooded.

4. When passing through a narrow field, pay attention to the width and height of the passage, and must be equipped with a commander if necessary;

5. Appropriate lighting equipment should be arranged when working at night. If it is difficult to set up, it must be used before. Figure 6-4 The headlights and working lights ensure the safety of the work, see Figure 6-4.

6. Special attention should be paid when operating in places with fog, smoke, etc., and the operation should be stopped if it is affected;

7. When working near the wires, move the wires to another place as much as possible. If it cannot be moved, obstacles should be set up around the wires, and insulation protection devices should be added to the wires. To prevent electric shock, the driver should wear rubber shoes or leather shoes;

In order to prevent electric shock, according to the size of the transmission voltage, the minimum distance for the vehicle to leave

the power supply is stipulated in the table below:

8. When the bulldozer crosses the bridge, it should know the bearing capacity of the bridge in advance, and only after confirming the safety can it pass at a low speed;

9. When the bulldozer crosses the railway, it should be perpendicular to the railway and run at a low speed. It is forbidden to turn on the railway.

2. Cliff and roadside operations

When operating in dangerous areas, do not operate close to cliffs or roadbeds. When driving according to the track track left by the previous time, if a small amount of soil accumulation is found, it should be leveled before driving.

3. Working on the ramp

1. When driving on a ramp, you should go uphill or downhill in a direction parallel to the slope. If you drive obliquely, it is easy to overturn or skid;

2. Before going uphill or downhill, according to the slope of the slope, the appropriate speed should be selected in advance, and it is strictly forbidden to shift gears on the slope;

3. When going down a steep or long slope, you must drive at a low speed and use the engine to brake. Slipping is strictly prohibited. When the downhill speed still tends to accelerate, you should step down the brake pedal. At this time, the driver must pay special attention to controlling the pedal. Lower the speed of the brake pedal and the

size of the stroke, and lower the bulldozer to cut into the soil to further decelerate, so that the bulldozer touches the ground to increase the resistance to go down. There is a tendency to accelerate, so the driving speed will exceed the maximum speed of this gear when driving on flat ground, so special attention must be paid when driving downhill to prevent accidents, see Figure 6-6.

4. It is forbidden to use the brake pedal for sudden braking on the ramp;

5. When driving on a slope, avoid steering as much as possible, especially when steering on a soft or clay slope, which is prone to slippage and rollover;

6. Avoid iron plates, fallen trees or piled leaves in the forest while driving;

7. When the engine stalls on a slope, the bulldozing blade should be put down first, the car should be parked, and then the gear lever should be placed in neutral, and then the engine should be restarted.

4. Snow removal

1. When carrying out snow removal operations on snowy ground, pay attention to whether the ground is inclined to prevent slipping, and pay special attention to selecting an appropriate operating speed;

2. Due to the different quality of snow, the load will change a lot. When doing this, pay attention to the skidding of the vehicle and increase or decrease the engine load at any time;

3. Pay attention to the piles buried in the snow during the operation.

5. Excavating hard soil, frozen soil and ditching operations

An effective method is to place the bulldozer in an inclined position and cut the edge of the inclined blade into the soil for operation; for harder soil, first use a ripper to chop the soil.

6. Ground work

When leveling the accumulated soil on the surface, first level the place with a large height difference, and then flatten the entire area one by one knife by knife. The operation speed should be carried out at a low speed. position, and use low-speed retreat to level the ground; for rocky and rocky ground, do not retreat to level the ground, otherwise the bulldozer body will be damaged.

7. Bulldozing

1. Bulldozing, earth moving, and excavation of gravel are generally suitable within 70 meters. If the distance exceeds this distance, it is more economical to use a scraper. The excavation of slopes should generally be carried out from top to bottom, which can improve work efficiency;

2. When carrying out bulldozing operations down the cliff, the amount of bulldozing should be kept next to the cliff, and the soil reserved for the last time should be used to push the soil reserved for the last time to the bottom of the cliff, as shown in Figure 6-7.

3. When unloading soil on the front of the cliff, or when the vehicle climbs to the top of the slope, the deceleration pedal must be slowly stepped on. While reducing the speed of the vehicle, push the gear

lever into the "neutral" position to prevent the vehicle Accidents caused by automatic acceleration, see Figure 6-8.

8. Logging and uprooting operations

For trees with a diameter of about 100-300 mm, the bulldozer can be raised, pushed 2 to 3 times and then fell down; To impact at high speed, see Figure 6-9.

9. Construction technology to improve the life of the traveling device

There are obvious differences between the life of the walking device and the level of construction technology, so the following points should be paid attention to one by one:

1. Use track shoes suitable for soil quality;

2. Try to avoid sharp start, acceleration, stop and unnecessary high-speed operation and sharp turns;

3. Try to keep working in a straight line, not always turning in one direction, and try to make the turning radius larger;

4. When working, try to remove large rocks or other obstacles;

5. In bulldozing excavation, when there are left and right slopes on the ground, excavation cannot always be carried out on the slopes, and the excavation should be continued on the horizontal sections.

Chapter 7: Common Faults and Troubleshooting

7.1 Electrical part

Fault	Main reasons	solutions
The engine is running	Poor contact	Terminal

normally, the engine is running at high speed, but the light is dim; the engine is running, the light is unstable		slack
Abnormal noise occurs in the AC motor	Generator voltage regulation is unstable	Check and repair disconnectio n
When the engine is running, there will be a sound when the key is inserted into the starter switch pinion	Bad AC motor	Check generator voltage regulator
The starter does not turn when the key is inserted into the starter switch	Poor contact	replacement, repair
Slow engine speed during start	Safety relay failure	replacement, repair
Starter gear disengaged before engine starts	Bad contact, insufficient battery charge; bad starter	Check, Repair, Charge

	switch, bad battery switch	
All instrument lights are off	Poor contact, insufficient battery charge	replace switch

7.2 Engine part

Fault	Main reasons	solutions
After the engine stops, the pointer of the oil pressure gauge does not return to "0"	Defective oil pressure gauge	Replace oil pressure gauge
The pointer of the oil pressure gauge points to the red range	Insufficient oil in the oil pan	Replenish the specified amount of oil
Radiator pressure valve spews steam	Poor oil pipe connection or damaged oil leakage	inspection, repair
The pointer of the water temperature	Defective oil pressure gauge	Replace oil pressure gauge

gauge points to the red range on the right		
The pointer of the water temperature gauge does not move or swings too small	The oil viscosity is too high, the oil pressure gauge is bad	Replace specified oil
The starter turns, but the engine doesn't	Insufficient or leaking cooling water,	Check the make-up cooling water meter,
fuel stops frequently	The fan belt is slack,	adjustment repair or replacement,
Engine exhaust is white or clear white	Deposits of scale and dust in the cooling system.	Replace and clean.
Engine exhaust is black	Bad water temperature gauge	Replace the water temperature gauge,

Engine starts and runs irregularly and unstable	Blockage of cooling fins in the radiator,	cleaning, repairing,
Engine detonation (combustion or mechanical)	The thermostat has a bad seal.	replace the seal

7.3 Chassis

Fault	Main reasons	solutions
Torque converter overheating	fan belt slack	replace the belt
The car does not move forward or has no speed after shifting the gear lever	Engine water temperature is too high	Refer to "Engine Section"
Pull the steering lever on one side, the locomotive will go straight without turning	oil cooler clogged	cleaning, replacement
Steering rod control weight	Insufficient oil circulation due to gear pump wear	Replace the gear pump

Depressing the brake pedal without the locomotive stopping	Hydraulic torque converter and gearbox without oil pressure rise	inspection, repair
track derailment	The connection of the valve pipeline is not fastened well, mixed with air or oil leakage	Check, Repair, Replace
Abnormal wear of the sprocket	Gear pump worn, stuck	Replenish oil
The bulldozing blade goes up or does not go up at all	Transmission oil filter element clogged	to clean

Note: Please contact the factory for repairs except for the above three faults.

It is hoped that the driver will make original records, such as vehicle operation, maintenance time, and fault occurrence and elimination, so as to inform the manufacturing unit to improve the design and improve the quality.

Chapter 8: Electrical System

8.1 Electronic surveillance devices

8.1.1 Electronic monitoring device panel layout

8.1.2 Monitoring items

No.	monitoring items	unit	alarm value	alarm level	Remark
1	battery voltage	V	＜21	1 级	Analog
2	Charging voltage	V	＜25	2 级	Analog
3	fuel level	L	80	2 级	Analog
4	Cooling water level				Analog
5	oil pressure	Mpa	＜0.15	3 级	Analog
6	Cooling water temperature	℃	＞102	3 级	Analog
7	Torque converter oil temperature	℃	＞120	3 级	Analog
8	Hydraulic oil temperature	℃	＞102	3 级	Analog
9	air filter			3 级	Anal

					og

8.1.3 Alarm methods and functions

The alarm mode and function are divided into three levels of alarm:

1. The first level is the item indicator light (red) flashing to remind the driver to pay attention.

2. The second level is that the project indicator light (red) flickers, and the main alarm light flickers, requiring measures to eliminate the abnormal situation.

3. The third level is that the project indicator light (red) flickers, the main alarm light flickers, and the buzzer sounds, requiring immediate shutdown and parking to troubleshoot.

8.1.4 System Operation

1. Connect the start switch of the bulldozer to the "on" position, and the system will enter the operating state at this time, and will automatically perform self-inspection. The item indicator (green) and item alarm indicator (red) will flash alternately, and the alarm indicator will flash at the same time , the alarm buzzer sounds, and the display lasts for 3 seconds (if abnormal, the display does not display);

2. After the self-test is over, the system automatically enters the battery voltage item. At this time, the indicator light (green) of this item is on, and the display shows the battery voltage, which is about 24 volts;

3. At this time, the diesel engine can be started (turn the start

switch to the "start" position). After the diesel engine starts, the system is still on the battery voltage item, and each monitoring item enters the monitoring state;

4. After the diesel engine starts, if the item indicator light (red) flickers, the main alarm light flickers or the buzzer sounds, it means that the system is faulty.

8.1.5 Main engine maintenance

Since this system is a vehicle-mounted electronic monitoring system, the site does not have the conditions, so it is found that the system is faulty or damaged, and the method of replacing spare parts is used to deal with it. Therefore, users are required to be familiar with the judgment method of this system for faults.

1. Fault judgment and elimination

(1) If there is no light and sound when the power is turned on, check whether there is a 24-volt power input. If not, check whether the fuse and power wiring are intact. If there is any damage, eliminate it immediately.

(2) Turn on the power supply and the system does not enter the self-test state. At this time, press the self-test button again. If it still does not enter the self-test state, it means that the monitoring device is faulty and needs to be replaced.

(3) Turn on the power system and enter the self-test state. At this time, if the external buzzer does not sound, press the mute button. If it still does not sound, you should check whether the connection is intact.

If there is a disconnection, it has been connected and there is still no response. Then check whether there is output at the output terminal of the monitoring device. If there is no output, replace the main monitoring device. If there is output, replace the buzzer.

(4) After starting up, if the monitoring device has no lights, the monitoring device should be replaced.

(5) After starting up, when the system enters the self-test state and the display does not display, it means that there may be a fault in a certain channel. First check whether the connection is intact, and then check the sensor signal output. If there is no output or the output exceeds 0-5 volts range, the sensor should be replaced, and then check whether there is a signal input to the monitoring device input. If so, it means that the monitoring device is faulty and must be replaced.

2. Replacement

Replacement can be requested from our factory, and the model, variety and specification should be stated when ordering to ensure the interchangeability of the system.

8.2 Part of starter motor

The starter motor part is composed of starter motor, battery breaker, electromagnetic switch, starter switch and safety relay.

When the starter switch (JK406) is in the "on" position, the battery relay is closed, so that the negative pole of the battery is connected to the fuselage. After the three-level alarm electronic monitoring

device passes the self-test for 3 seconds, the display window shows the battery voltage (about 24 volts) left and right), indicating that the bulldozer is normal and has been started.

The starter switch continues clockwise to the "Start" position, which means that the electromagnetic switch in the instrument panel is closed, and a pair of contacts of the electromagnetic switch makes the starter electromagnet above the starter move, pushes out the gear, and at the same time turns on the starter motor, so that The diesel engine is running (the starting time is generally within 3-5 seconds).

After the diesel engine is running, pay attention to the display values of each point in the three-level alarm monitoring device should be within the allowable range. Due to the running of the diesel engine, the terminal output of the engine will output a DC voltage of about 12 volts. The normally closed contact disconnects the starting circuit of the starter motor to prevent it from starting again and damage the starter motor and starter flywheel.

8.3 Charging system part

The charging part is composed of alternator, charging fuse and so on. The alternator is a self-rectifying generator with an integrated circuit regulator, with an output voltage of 28 volts and a current of 35 amps. Because the engine is integral, it generally does not need maintenance, just pay attention to the tightness of the belt that drives the generator.

The charging voltage in the three-level alarm electronic monitoring device only indicates the output voltage of the generator. Therefore, special attention should be paid to the fuse of the charging system, because after the fuse is blown, the generator will not charge, but in the three-level alarm electronic monitoring device The charging voltage is still indicated.

8.4 Lighting section

The lighting of the bulldozer consists of front lights, side lights, rear lights and cab (cab), refer to (Figure 2-77) electrical schematic diagram.

Chapter 9: Transportation and Storage

9.1 Transportation

During the transportation of vehicles, you must be familiar with and abide by various road rules, regulations on road transportation vehicle restrictions and other traffic rules.

When crossing bridges and tunnels, it is necessary to measure the bearing weight of the bridge and the space size of the tunnel.

It is best to have a special loading and unloading platform. If a ladder is used to load and unload locomotives on the trailer, the following regulations must be observed, see Figure 9-1.

1. The trailer should be braked and the tires should be fixed with square wood.
2. The ladder must have sufficient width, length and thickness to withstand the safe loading and unloading of locomotives, and if

necessary, it can be reinforced with square timber at the lower part.

3. Put the ladder upright, and then slowly load and unload the locomotive.

* When driving on the ladder, the driving direction cannot be adjusted. If adjustment is required, the vehicle can be adjusted after returning to the ground.

4. The vehicle should be installed in an appropriate position on the trailer, and then wooden blocks should be placed on the front, rear and bottom of the track, and then fixed with solid chains or ropes to prevent accidents caused by slipping on the way.

5. Lower the blade and place each handle in the following positions:

Throttle joystick, put it in the low speed position, remove the starter key.

The gear lever is in the neutral position.

Blade control lever in hold position. The brake lock lever is in the locked position.

* If the width of the shovel head exceeds the width of the trailer, the shovel can be turned at an angle or removed for another installation.

* For long-distance water transportation, anti-rust measures should be taken, and anti-rust oil should be applied to exposed cylinder piston rods.

9.2 Storage

9.2.1 Before storage

It is expected that the machine will be stored for a considerable

period of time, and the following measures must be implemented in order to minimize the amount of maintenance when it is used again.

1. After all parts are cleaned, store the machine in a dry building instead of outside. If the conditions are limited, the machine has to be placed outdoors. At this time, wooden boards should be laid on the ground, and the machine should be placed on the wooden board and covered with canvas.

2. Before storage, add enough fuel and lubricating oil, and replace with new engine oil.

3. Apply a thin coat of lubricant to the metal surface (piston rod).

4. For the storage battery, remove the terminals and cover it or remove it and store it separately.

5. If it is estimated that the ambient temperature will drop below 0°C, antifreeze should be added to the cooling water in advance.

6. Various joystick and pedal settings are as follows:

* Put the shift lever in neutral position.

* Set the throttle joystick to the low speed position.

* The blade joystick is set to hold position.

* Set the brake pedal to the free position.

9.2.2 In storage

Start the engine once a month and run the vehicle for a short distance, in order to apply a new layer of oil film to the surface of the machine parts and various parts of the engine.

When operating the working equipment, wipe off the grease on the

hydraulic piston rod.

9.2.3 After storage

After storage (if it is not covered, or the anti-rust operation is not carried out once a month), the following treatment must be done before use:

1. Remove the oil pan and other tank drain plugs to drain the mixed water.

2. Remove the cylinder head, lubricate each valve and rocker arm, and check the operation of the valve.

3. To bleed air from the hydraulic system, run the engine at low speed and do the following: a.

Reciprocate each hydraulic cylinder 4 to 5 times, and the piston stops at 100mm from the end of the stroke;

Then reciprocate each hydraulic cylinder 3 to 4 times. Run to the end of the stroke.

* If the engine runs at high speed at the beginning or the piston moves to the end of the stroke, the air mixed in may damage the piston pad.

4. After starting the engine, run it until it warms up completely.