3Ton Site Dumper

Operation Manual

CONTENTS

IMPORTANT INSTRUCTIONS

1、 New dumper should go through with running-in process accordingly before taking up loads for normal operation, otherwise its service life will be shortened.

2、 Driver should be trained before driving.

3、 At high speed, the dumper is not allowed sharp turning. When it is to downgrade, empty lever or step on the clutch pedal to be prohibited.

4、 Please use diesel oil and oil as required and before pouring into the fuel tank, it should be sufficiently precipitated and filtered.

PREFACE

The features of model SD30 dumper is a compact construction, light operation, maneuverable steering, economical and reliable service, as well as easy maintenance. in addition, the dumper is equipped with hydraulic tipping skip and complete electrical system.

Proper operation and service are essential to prolong life and satisfactory performance of dumper. This manual provides operating instruction and information concerning lubrication and service as required for more efficient use of this dumper. A separate manual is furnished for the engine of this dumper. Be familiar with the instructions in both manuals before attempting to operate the engine and the dumper.

Along with the development of the product and according to the users opinion, the dumper will be improved continuously. Therefore, after a time, a part of the content of this manual may be inconsistent with the object.

Chapter 1 Main Specifications

A. General

1	Payload	3000kg	
2	Unloaded Weight	2500kg	
3	Skip Capacity	1.5m³	
4	Max. Speeds	25km/h	
5	Hand Braking Gradient	18%	
6	Max. grade ability	36%	
7	Sliding Distance	75m	
8	Braking Distance	≤2.5m	Payload 10km/h
9	Min. turning radius	8.45m	
10	Min. ground clearance	248mm	
11	Acoustical noise	≤86db(A)	
12	Discharging angle	48.4°	
13	Discharging time	8S	
14	Working pressure of hydraulic system	16mpa	
15	Wheel base	2000mm	
16	Wheel tread	1470mm	
17	Power of Diesel Engine	30kw（NB485）	38kw(F3L912)
18	Speed of Diesel Engine	2600r/min (NB485)	2500r/min(F3L912)
19	Overall dimensions (L×W×H)	3900×1795×1820 (mm)	

B. Engine

(Refer to "Operation Manual for Diesel Engine" for further details)

1	Model:	NC485	F3L912
2	Type:	water-cooled, four-stroke	Air-cooled, four-stroke
3	Cylinder bore ×Stroke	85mm×100mm	100mm×120mm
4	Rated power	30kw	38kw
5	Rated speed (R/Min)	2600	2500
6	Max. torque / Speed	131.N.M/1820r/min	230N.M/1600r/min
7	Net Weight	275kg	210kg

C. Transmission System

1	Clutch type:	single-disc, dry type, constant-contact
	Diameter of Friction plate:	φ254
2	Gearbox type:	Gear and Mechanical type
	Transmission ratio gearbox:	Four forward speeds and one reverse speed
	Ⅰ=6.4 , Ⅱ=3.09, Ⅲ=1.69, Ⅳ=1, R=7.82	
3	Propeller shaft:	Tubular, open, universal-joint tube with needle bearing
4	Transfer case:	Gear, Constant mesh third grade reduce speed
	Speed ratio:	2.3
5	Driving axle:	
	Main Drive:	Spiral bevel gear
	Main drive ratio:	5.833
	Differential type:	Straight-tooth, bevel gear
	Axle shaft	Full floating type

D. Running System

1	Frame type:	Channel beams welded, articulated frame
	Swing rail frame:	Steel plate welded
2	Model of Tyre:	12-16 .5(12 layers)
	Pressure of Type:	450Mpa
3	Rim type:	9.75H

E. Braking System

1	Foot brake	Hydraulic shoe type, four-wheel drive
2	Hand brake	Central caliper disc type, mechanical control

F. Hydraulic System

1	Oil pump:	Gear pump type model CBT-F416 (Left revolving)
	Model	CBT-F416 (Left revolving)

2	Steering gear:	
	Type	Opening irresponsive type
	Model	BZZ200
3	Valve block:	FK
4	Mutiple unit valve	34DLS-E10L
5	Tipping oil cylinder:	HSGK02-80/45
6	Steering oil cylinder:	HSGK01-63/32
7	Filter for returning:	WU-100*80
8	Filter for suction:	WU-100×80

G. Electrical System

1	Battery	12V model 6-QA-150
2	Starter	QD1315D
3	Generator	JF11
4	Adjustor	FT111

H. Capacity of Fuel, Cooling-water and Lube

Item No.	Remark Position	Capacity (liter)	Name	Type	Remark
1	Fuel tank	52	Light diesel oil	GB252-81	Summer: 0#, Winter: -10# or -20#
2	Water tank	10.5	Clean soft water		
3	Engine	3.5	Oil	GB5323-85	Summer: 40# or 30# Winter: 20#
4	Gear box	3.2	Gear oil	SH0350-92	GL-3 type 80W/90
5	Transfer case	4.0	Gear oil	SH0350-92	
6	Driving axle	2.5×2	Gear oil of hyperbola	SH0350-92	GL-4 type 80W/90
7	Store tank for general pump	1.5	Braking liquid	GB10830-89	924 (JG)
8	Hydraulic oil tank	50	Hydraulic oil	YA-N32	

Chapter 2 Driving and operation

Ⅰ. Instrument and operation system

Before starting the dumper, In order to avoid mistakes, it is necessary for driver to know operation system, electrical system and parts, the function and operation step. The electric panel is as shown in Fig.2-1.

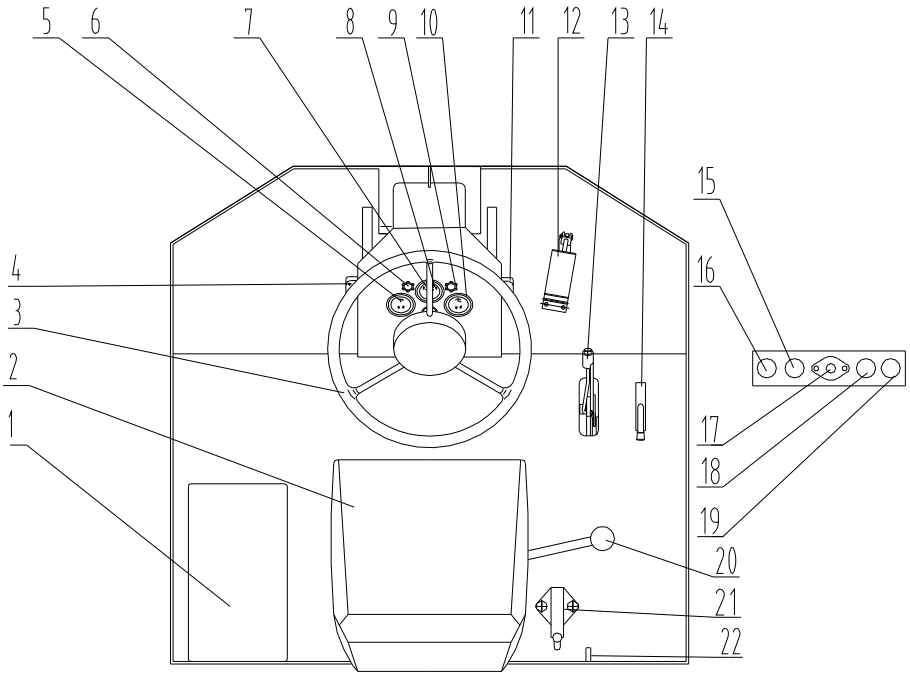


Fig.2-1 Diagram of instruments, switch & operation system

1, toolbox 2, seat 3, steering wheel & hydraulic steering device 4, clutch pedal 5, water temp. meter 6, left steering indicator light 7, ampere meter 8, instrument light 9, right steering indicator light 10, oil manometer 11, foot brake pedal 12, accelerator pedal 13, hand brake handle 14, hydraulic valve operation handle 15, electrical switch 16, starting button 17, horn button 18, three-grade switch 19, steering light switch 20, shift lever 21, general knife switch 22, extinguish lever

1， Toolbox: small tools can be put inside it.

2， Seat: absorber and adjusted seat.

3， Steering wheel & hydraulic steering device: full hydraulic steering device, the pressure oil supplied by gear pump can be distributed to steering oil cylinder.

4， Clutch pedal: controlling clutch releasing and joining, when push the pedal, clutch will be releasing. Loosing the pedal, clutch will be joined. It is quick for releasing and steady for joining. Foot will off the pedal when joining.

5， Water temp. meter: indicating cooling water temperature. It is controlled by sensor on engine. When hand point to ‘H’, temperature is high. When hand point to ‘C’, temperature is low.

6， Left steering indicator light: when turn on left steering switch, it can be flash in the same time accompanying front & rear left steering lamp.

7， Ampere meter: indicating battery charging current or battery discharging current. When charging, the hand point to ‘+’, when discharging, the hand point to ‘—’.

8， Instrument light: when pull out the three-grade switch to first grade, it will be lighting.

9，Right steering indicator light: when turn on right steering switch, it can be flash in the same time accompanying front & rear right steering lamp.

10，Oil manometer: indicating the engine lubrication oil pressure and controlled by oil inductor on engine . Before starting engine, the hand point to 'L', it means no pressure. after starting engine, the hand point to 'H', it means oil pressure coming. When driving dumper, the driver must attend the indicator, if any deviant phenomenon, dump will be stopped at once for checking and repairing.

11，Foot brake pedal: this brake system is full hydraulic brake, when push down the pedal, dumper will be braked.

12，Accelerator pedal: controlling fuel supply to engine to change engine turning speed.

13，Hand brake handle: for dump stop using. Control the center clamp brake to stop dumper.

14，Hydraulic valve operation handle: for skip turning and reset. When push handle to front, the skip will tip to front. When pull handle to rear, the skip will reset. In the course of skip tipping to front or resetting, if put the handle in middle position, the skip will stop at any position.

15，Electrical switch: control all power source, insert key then turn to right, all circuit is working. When turn to left, except starting circuit the other circuit is working.

16，Starting button: press the button, engine is started to running.

17，Horn button: for horn working using.

18，Three-grade switch: pull out to first grade, instrument light and front side lamp is lighting. Pull out to second grade, the front dipped headlight will be continued turned on, when pull out to third grade, the front dipped headlight will be turned off, and high beam is turned on. When push the lever to bottom, all lights will be turned off.

19，Steering light switch: control all steering lights and the steering indicator light on panel.

20，Shift lever: control the shift to change the dumper speed.

21，General knife switch: circuit from battery through general knife switch to connect earth pole. It can be turned on or turned off according if necessary.

22，Extinguish handle: control engine extinguish, push it to rear, the engine will be extinguish. Pull it to front, it is in reset position.

Ⅱ. Engine operation

1， Fuel, oil and cooling water

a, Fuel

According different season, using different brand diesel oil. In winter, $-10^{\#}$ or $-20^{\#}$ light diesel oil will be used. In summer, 0# or 10# light diesel oil(GB252-81) will be used.

After 48 hours depositing, the diesel oil can be fill into the fuel tank through fuel filter. All case for filling oil must be clean.

b, Oil

HC-$14^{\#}$ oil is used in summer and HC-$8^{\#}$ or HC-$11^{\#}$ (SY252-81) oil used in winter. Especially HC-$8^{\#}$ is suitable for used in lower environment. Oil must be cleaned before filled into engine.

c, cooling water

Only cleaned soft water can be used as cooling water (rain, snow or cleaned river water). The hard water must be intenerated after used as cooling water. The intenerating water method is as follows:

1， after water boil, then deposit the water.

2， Add 20 gram caustic soda into each 30 liters hard water.

2，Preparing before starting engine

a，check fuel enough or not.

b，check oil in sump enough or not, pull out the oil gauge, oil indicator line must be between the two scale lines.

c，check cooling water enough or not.

d，check engine's water access and oil access, and keep no leakage phenomenon.

e，check engine's connection parts, keep no loosing and keep running parts flexible.

f，check dynamo belt and the circuit connect with battery, keep joint tight.

g，exhaust the air in fuel pipe to end.

3，starting engine

a， put the shift lever at neutral gear.

b， Keep the accelerator pedal at medium position.

c， Turn on the general knife switch, insert the key into electrical switch, turn to right to turn on whole circuit, then press the starting button to make engine running. Loosing hand after engine working. Each time starting no more than five minutes.

4，Starting engine in winter

According to the above said method can not starting engine in winter, the follow methods can be used: In colder environment, we can fill 60-80^0 degree warmer water into water tank, if one time no success. Several times effort can be made. Or we can heat oil to 80^0 degree, then fill the oil into head block.

5，Attention in engine running

a， check the oil manometer at once after engine running, the oil pressure is normal or not. If not, engine must be stopped to be repaired.

b， After engine starting, make it runs at a low speed for several minutes. After the head block is warm then accelerate it step by step.

c， Engine can not working in overload condition for a long time.

d， Attention exhaust gas color and engine working sound, if any exceptional phenomenon occur, engine must be extinguish at once for check.

e， Always check the battery be charged or not. (if in charging condition, the amperometer hand point to "+"), if not, maintenance is necessary.

f， Water temperature must be always noticed, 60-90 degree is normal.

6， Stop engine running

a， make engine running-in idle speed for several minutes.

b， Push the extinguish handle to rear, then engine will be extinguish.

c， Turn the key to left to close position. Take out key and then turn off the general knife switch.

d， If engine running at a very high speed, engine must be stopped. We can push the decompression lever or block intake pipe to make engine stopping running.

Ⅲ，Dumper Operation

1，Checking and preparing before dumper working. Besides the preparing before engine running, the following checking is necessary:

a， check transmission system, such as the oil for gearbox, transmission case and driving axle is enough or not.

b， The oil for hydraulic system is according with standard or not.

c， Tyre air pressure is normal or not, the wheel bolts/nuts is tighten or not.

d， Lubrication oil is enough for all lubricating position or not.

e， All connection bolts/nuts is tighten or not.

f， Check water leakage, oil leakage and air leakage phenomenon.

g， All said above is normal, the dumper is allowed to be working.

2， Driving and Working

a， starting engine according to engine starting step, notice all instrument are normal or not. Let engine running 5—10 minutes at idle speed. When water temp. is up to 60 degree, dumper can be driven.

b，step clutch pedal to make clutch releasing completely, then shift to 1st gear.

c，loosing hand brake, accelerate engine, meantime make clutch disc joint slowly and smoothly, then dumper can move.

3，Attention in driving and operation

a, 1st gear is used for starting move, then change to higher gear step by step. High gear for starting move is strictly forbidden.

b，Releasing clutch must be quick and jointing clutch must be smooth.

c，When road is bad, lower gear is necessary. Accelerating dumper must be smooth, accelerating quickly must be forbidden.

d, Overloading and overspeed is forbidden. Down slope in neutral gear and swerve quickly at high speed are not allowed.

e, In the course of driving, operating hydraulic valve is not allowed.

f, when brake dumper, first loosing accelerator pedal quickly, then step down clutch pedal, at last step down brake pedal at same time.

g, while driving dumper, instruments, indicator and engine working condition must be noticed.

h, when working at night, keep lighting system in a good condition.

I, it is necessary to check the tyre pressure constantly. Keep four tyre pressure same.

4，Parking dumper

a， park dumper at safe and convenience location.

b， down the dumper speed, step down clutch pedal and brake pedal. Make shift lever in neutral gear and then brake dumper with hand brake.

c， keep engine running at idle speed for 5—10 minutes, then extinguish engine.

d， turn off electrical switch, take out key turn off general knife switch.

e， if slope at park location, it is necessary to make tyre no turning.

f， In winter, the cooling water must be exhausted if parking dumper to avoid to damage the head block and water tank.

g， If parking a dumper for a long time, the earth pole wire must be dismounted from battery. If in cold season, battery must be dismounted from dumper and place it in home. Battery must be charged timely if it is not used during a season or more.

Chapter 3 Running-in Process of New Dumper

Ⅰ, The meaning of running-in

Before put into using, New vehicle and heavy repaired vehicle must be grinded in for the following reason:

1, Vehicle, especially engine including a lot exactitude running parts, its surface is not ideal smooth just after been produced. If it is put into using under big load condition. It will be get surface abrasion quickly. If going on reasonable running-in process, the running parts will get better concert and prolong the vehicle life.

2, The connection parts can be loose at the begin of working, so it is necessary to adjust and tight the parts during running-in.

In a word, running-in process is necessary for prolonging life and getting good economic benefits.

The time for running-in is not less than 50 hours.

Ⅱ，Running-in Process

New vehicle running-in time is not less than 50 hours. During the running-in, vehicle speed must be from low speed to high speed, and load from light to heavy, can not over the rated load and may on the good condition road. There is two step for vehicle running-in, that is idle load running-in and working running-in.

a， idle load running-in for ten hours as following steps:

1， after starting the engine, first running 5 minutes at low speed in idle gear. Then accelerate the engine gradually, and keep engine running 10 minutes at radio highest speed.

2， Operating hydraulic lever, make skip tipping and resetting again and again for five minutes.

3， Driving in idle load condition, it is necessary for running-in at all forward gear and reverse gear. Total time is 10 hours. The time for every gear running-in is as follows:

Gear	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ
Time (h)	1	2	3	3	1

b， Working running-in

It is necessary for working running-in that from light load to heavy load, but no than radio load. The relationship for working time and load is as following table:

Load (%)	25	50	75	100
Time (h)	8	12	16	4

Ⅲ，Attention during running-in

1. It is necessary to notice engine when working, especially engine oil pressure and cooling water temperature.
2. Always notice the transmission system, It is necessary for repairing if any exceptional and overheating phenomenon.
3. check all instruments. Keep them working in normal condition.
4. keep all system no oil leakage, water leakage and air leakage phenomenon.
5. keep steering system flexible and no locking phenomenon.
6. keep brake system reliable.
7. keep skip tipping and reset reliable, make hydraulic lever flexible.
8. always check connection parts.

Ⅳ，The work after running-in

1. All the oil will be drain out after running-in, and cleaning engine using diesel oil. Then refill oil into engine according requirement.
2. Check fan belt, hydraulic circuit and all oil seal condition.
3. Check all connection parts and electric system.

Chapter 4 Technical Maintenance

Ⅰ，Timely maintenance

In order to prolong the dumper life and avoid accident occur. It is necessary for dumper to be had

maintenance timely. There are six grade maintenance, there are daily maintenance (8 h), 1st grade maintenance (50 h), 2nd maintenance (200 h), 3rd maintenance (600 h), season-change maintenance (1200 h) and heavy repair (2400 h).

The maintenance and service for engine refer to Engine Operation Manual.

1，Diary Maintenance

a， check dumper before working

1， check fuel, oil, cooling water and leakage.

2， Check all instruments at different speed.

3， Check steering system, brake, tyre, lights, horn and wiper.

b, check after two hours working

1， notice the instruments, engine and frame working condition.

2， When park dumper, it is necessary to check the temperature of hub, brake drum, gearbox and axle.

3， Check the liquid surface height of oil, cooling warter.

4， Check the connection condition of transmission shaft, tyre, steering system and brake system.

c, Maintenance item after parking

1， cleaning dumper.

2， Add fuel, lubrication oil, cooling water.

3， Check fan belt and tyre.

2, 1st grade maintenance

Besides diary maintenance, the following is necessary.

1. Clean oil filter.
2. Clean battery and check the electrolyte height.
3. Clean engine nozzle.
4. Clean carbon brush and rotor of starter and dynamo.
5. Check cylinder block air channel and inlet/outlet valve
6. Check electric circuit joint.
7. Check radiator and tube.
8. Check steering gear, clutch pedal and brake pedal. Adjusting free range if necessary.

3，Second Grade Maintenance

Besides first grade maintenance, the following item must be done.

1， check cylinder pressure, cleanup carbon, and calculate the abrasion of cylinder.

2， Check and adjust the valve clearance.

3， Check engine fuel supply condition.

4， Check and adjust the clearance of clutch release fork and release bearing side surface.

5， Check gearbox and bearing cover.

6， Clean engine lubrication system, change oil filter core.

7， Check gearbox and rear axle gear oil.

4，Third Grade Maintenance

Besides first and second maintenance, the following item must be done.

1， check and adjust axial direction of connection rod and crank shaft bearing.

2， Cleaning piston and piston ring, calculate the abrasion of cylinder.

3， Cleaning valve and check the seal condition. Grinding it if necessary.

4， Check dynamo adjustor and adjust it if necessary. Check running parts, replace it if necessary.
5， Clean dust and carbon inside exhaust pipe and muffler.
6， Check engine working condition, replace the parts if necessary.
7， Re-paint the dumper, if necessary.
8， Clean injection pump.
9， Clean fuel tank, hydraulic oil tank and all pipes.

5，Season- Changed maintenance

1， Clean fuel tank and adjustor, using suitable fuel according with season.
2， Clean engine and battery. Adjusting electrolyte relative density.

6，Heavy Maintenance

1， Clean engine, clutch, gearbox, transmission gear, driving axle, brake system and hydraulic system, replace the bad parts.
2， Replace lubrication oil.
3， Check all shaft and bushing, replace it if necessary.
4， Check driving axle and hydraulic cylinder connection condition.
5， Check frame and skip, repair it if necessary.

Ⅱ，Lubricating whole dumper

The following rules must be complied when lubricating dumper or its parts.

1， clean oil cover and nozzles before lubrication.
2， Using grease gun to fill grease to all lubrication point until it is full.
3， If ersatz grease is used, it must be replaced according with season. The standard grease can be used whole year.

The step for dumper assembly parts lubrication is as follows:

1， Engine sump: check oil surface height using gauge, please refill oil when necessary. When going on second grade maintenance, engine lubrication oil must be replaced. When replace oil, the primary oil must be discharged to end and then fill fuel to clean engine, make engine running 2-3minutes at idle speed, at last discharge the fuel and then re-fill new lubrication oil.
2， Timing service: check oil surface when going on second maintenance. Refill oil when necessary.
3， Oil filter: replace filter core when going on second maintenance. Clean filter.
4， Gearbox and transmission gear: check oil surface height when going on second maintenance, refill oil until oil out from the overflow exit.
5， 1st shaft front bearing in gearbox and clutch release bearing must be cleaned and fill grease when repairing them.
6， Transmission shaft: Refill grease to it when at first grade maintenance. Disassemble it and clean it then refill grease what at third grade maintenance.
7， Driving axle: Check oil surface height at second grade maintenance, refill grease when necessary. Replace gear lubrication oil at every third grade maintenance.
8， Hub bearing: clean it and refill grease into it at every second maintenance.
9， Park brake: Refill grease to the pin of brake shoe arm at every first maintenance.
10， Battery: Clean its surface when season change.
11， Engine and starter: clean its bearing and refill grease at every third maintenance.
12, Water pump bearing: Refill grease at every first maintenance.

13, Frame: Refill grease to frame joint point, swing frame pin, skip pin, cylinder pin and cylinder turning shaft at every grade maintenance. Disassembling the fr

me for cleaning and lubrication when season maintenance.

14, Hydraulic system: Check oil quantity at every grade maintenance. Refill oil if necessary. Clean oil pipe, oil tank and replace filter core.

15, Air cleaner: sweep filter dust. Repair it if necessary. Replace it at third grade maintenance.

16, Other item: Going on necessary maintenance to shield, transmission parts and operation parts.

Lubrication Table

Item	Lubrication position	Qty.	Maintenance type					Remark
			Diary	1st grade	2nd grade	3rd grade	Season change	
1	Engine sump	1	Fill	Fill	Replace		Replace	Engine oil
2	Engine governor	1		Fill	Fill	Fill	Replace	Engine oil
3	Water pump bearing	1		Fill	Fill	Fill	Replace	Calcium base grease
4	Clutch release bearing	1				Replace	Replace	Calcium base grease
5	1st shaft front end bearing of gearbox	1				Replace	Replace	Calcium base grease
6	Oil tin of clutch general pump	1		Fill	Fill	Replace	Replace	Brake liquid
7	Clutch medium rocker arm shaft	2		Fill	Fill	Replace	Replace	Calcium base grease
8	Gearbox	1		Fill	Fill	Replace	Replace	Gear oil
9	Auxiliary box	1		Fill	Fill	Replace	Replace	Gear oil
10	Universal joint bearing (three)	2 for each		Fill	Fill	Replace	Replace	Calcium base grease
11	Transmission shaft slid spline (two)	2 for each		Fill	Fill	Replace	Replace	Calcium base grease
12	Pin of park brake shoe arm	5		Fill	Fill	Replace	Replace	Calcium base grease
13	Driving (front/rear)	1 for each		Fill	Fill	Replace	Replace	Hyperbola gear oil
14	Hub bearing (front/rear)	2 for each		Replace	Replace	Replace	Replace	Calcium base grease
15	Brake cam shaft & adjusting arm	4 for each			Fill	Replace	Replace	Calcium base grease
16	Dynamo bearing	2				Replace	Replace	Calcium base grease
17	Starter bearing	3				Replace	Replace	Calcium base grease
18	Battery pole	4				Replace	Replace	Calcium base grease
19	Frame connection pin	2		Fill	Fill	Fill	Fill	Calcium base grease
20	Swing frame pin	2		Fill	Fill	Fill	Replace	Calcium

								base grease
21	Skip tipping pin	2		Fill	Fill	Fill	Replace	Calcium base grease
22	Skip cylinder & steering cylinder	6		Fill	Fill	Replace	Replace	Calcium base grease
23	Hydraulic system	1		Fill	Fill	Replace	Replace	Mechanical oil
24	Oil filter core	1		Replace	Replace	Replace	Replace	
25	Hydraulic oil & oil suck filter	2			Clean	Replace	Replace	

Chapter 5 Structure and Adjusting

Ⅰ, Diesel Engine

About Engine structure and adjusting, please refer to Model JD2102 Engine operation manual.

Ⅱ, Clutch

Model FJ30 dumper is adopted NJ130 auto clutch assembly. It is dry, single-disc and spring clutch. The diameter of driven plate is 254mm. it is as shown in Fig.5—1.

Clutch pressure disc has three release lever, the head of release lever must be flat and their error is between 0.5mm. When clutch in joining condition the surface of three release lever head is away from flying wheel is 51.50-53mm, away from release bearing surface is 3-4mm, no less than 2mm.

When each third grade maintenance or replace assemble, it is necessary to check release lever head whether they are in one surface or not. Re-adjusting the lever head if necessary. Tighten lock nut after adjusting. Totally check friction plate assembly, replace it if necessary. It must to calculate the new assembly. The error must be not more than 0.7mm inside radius 120mm circle. The free clearance of friction plate assembly is no more than 10.2mm, if it is more than 10.4mm, the friction plate assembly may be turned or grinded. If it is possible, the assembly may be tested through balance, the no balance is no more than 20g.cm.

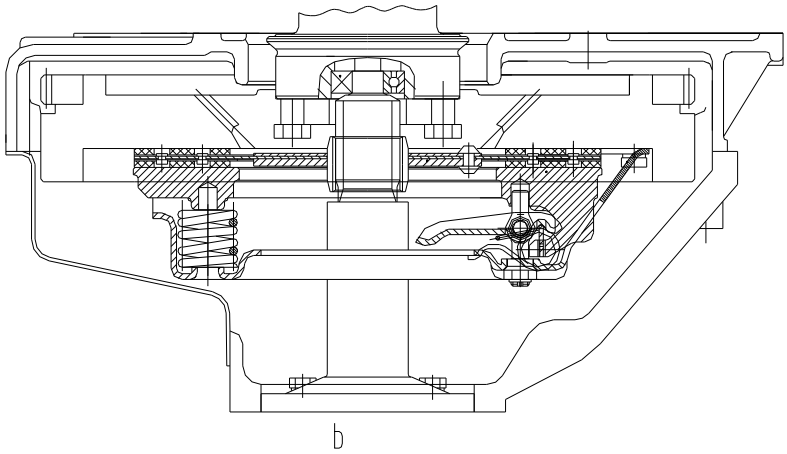


Fig.5—1 Clutch assembly configuration
a-friction plate assembly b-clutch assembly

In order to avoid clutch release bearing contacting release lever end side when clutch in joining condition, returning spring is amounted between hook plate which is on release bearing sleeve and first shaft. Do not damage it when disassembling it.

The clutch hydraulic operating system is consist of clutch pedal, oil cup, master release cylinder(BJ130), branch cylinder(BJ130) and oil pipes. The configuration is as shown in Fig.5-2.

In order to keep clutch and hydraulic system working in normal condition. It is necessary to adjust clutch operation system termly, keep clutch pedal free moving range 30—40 mm and transmission branch cylinder total moving range no less than 19mm.

Clutch pedal free moving range is the feedback of master cylinder & push lever end side clearance, branch cylinder & release fork clearance and clutch release bearing & clutch release lever clearance. So it is necessary to keep the three clearance right.

1， Adjusting clutch master cylinder

Loosing master cylinder push lever lock nut, turning push lever till it only up to master cylinder piston, then back turning push lever 3/4 circle and tighten lock nut. At this time, the clearance between master cylinder push lever end side and piston is about 1mm and clutch pedal free moving range is 5mm.

2， Adjusting clutch branch cylinder

Take down release fork returning spring, push branch piston up to cylinder bottom, loosing push lever lock nut. Turning push lever to keep lock nut contacting release fork,

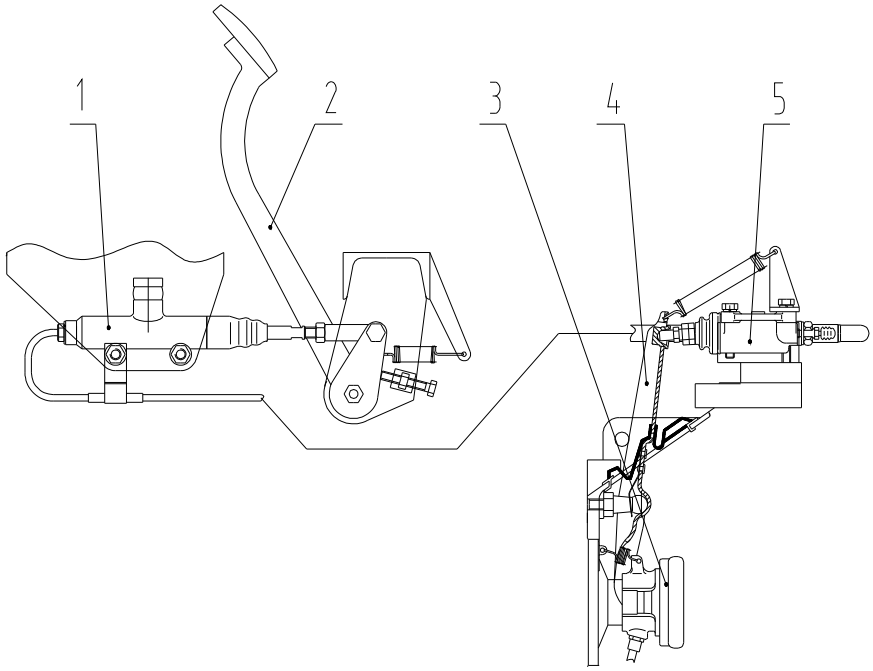


Fig.5—2 Clutch operation system configuration

1, master cylinder 2, pedal arm 3, release bearing 4, release fork 5, branch cylinder

4， Empty air from clutch branch

Air or oil leakage is not allowed in clutch hydraulic pipe, or pedal can be no pressure, no enough effective range and release incompletely, and it can cause clutch working in abnormality condition. It needs two person to do this, one person step clutch pedal and the other empty air.

First, take down branch cylinder deflation valve rubber cap, connecting a plastic pipe to deflation valve, the other side into a glass cup that brake oil in it. Step clutch pedal several times, making master cylinder pipe fulfilling oil, then loosing deflation valve. At this time, air bubble can appear if air inside the oil pipe. Step clutch pedal several times again, keep pedal pressure condition, loosing deflation valve again. Repeat above operation several times until the air emptied completely. At last tighten deflation valve and cover the rubber

In the course of deflation, the brake oil quantity is no less than 2/3 cup volume . it is necessary to refill oil into cup if oil is less.

If feel pedal no pressure again after deflation no soon, and there is air out when re-deflation, this indicates no seal position around the mater & branch cylinder pipe system. When maintaining brake system, please keep all joint copper washer no warping, can not using steel washer instead of copper washer, all rivet joint no damaged. After dismount master & branch cylinder or oil pipe, air deflation must to be done.

It, clutch working a long time, adjustment no correct and deflation incompletely, can make clutch release incompletely or semi-contact for a long time. This can cause clutch press disc and friction plate abrasion roughly, burning to split, even cause release bearing burning to bad and make clutch can not working. Every grade maintenance, it is necessary to adjust all clearance of clutch, and every third grade maintenance, it is necessary to clean master & branch cylinder, oil cup and pipe and refill new lubrication grease into release bearing sleeve.

Ⅲ， Transmission

Model NJ130 auto transmission is selected for Model FJ30 dumper, it is three-shaft gear type, there is four

forward gear and one reverse gear.

This type transmission is straight gear slide-gear shift type, and transmission operation system is upper cover direct operation system.

Transmission using and maintenance:

（1） When clutch release completely, the gear-shift operation can be done.

（2） Do not shift hard, if gear-shift no success, clutch can be loosed and then shift again.

（3） If abnormal voice occur, it is necessary to stop dumper to check, after it repaired then driving again.

（4） Keep transmission lubrication oil clean, washing it termly and replace lubrication oil. The oil must be filled to check hole.

Ⅳ，Auxiliary box

This type auxiliary box has three grade gear down, the ratio is 2.421, the structure is as shown in Fig.5—3.

It is necessary to clean auxiliary box and replace lubrication oil. If oil leakage occur, please check oil seal paper gasket, bolt is tight or not and the oil surface is higher or not.

Ⅴ，Transmission shaft

There are three transmission shaft, they are upper transmission shaft, front transmission shaft and rear transmission shaft. They all are Model BJ130 auto transmission type (the length is different), the structure is as shown in Fig.5—4.

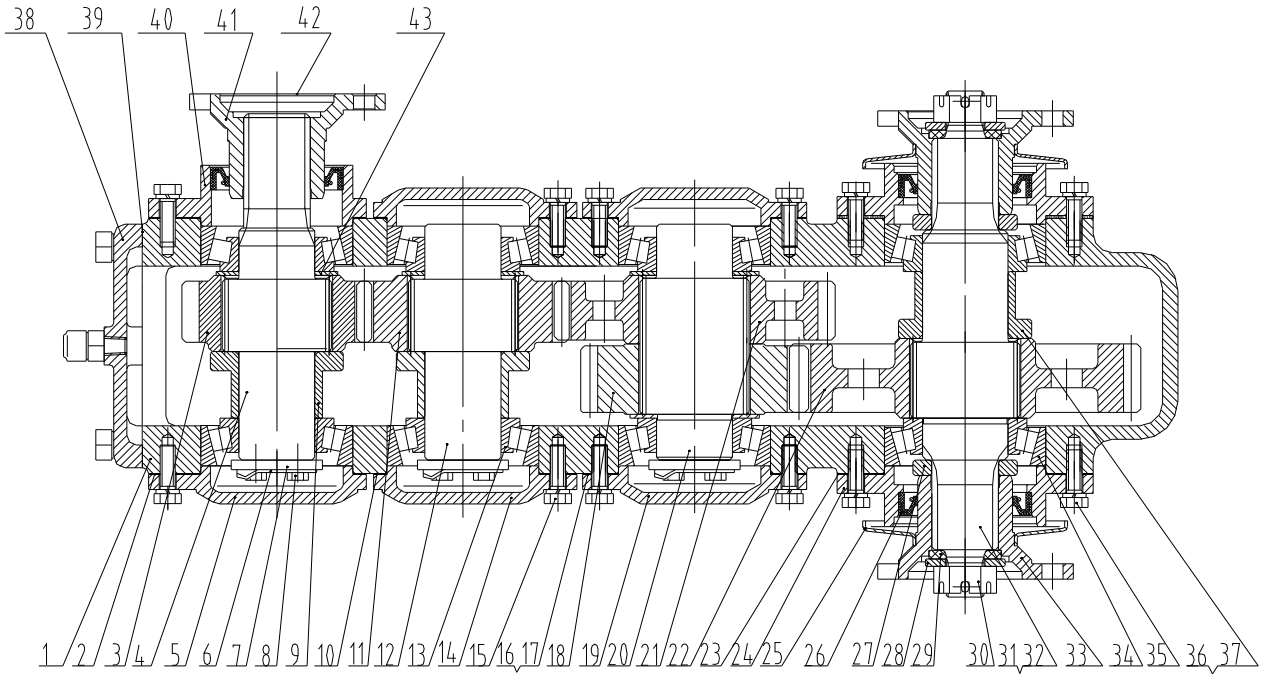
Upper transmission shaft transfer transmission output power to auxiliary box, front & rear transmission shaft transfer power to front & rear driving axle respectively.

Front transmission shaft is consist of flange fork, cross-shaft assembly, sleeve fork and medium support.

The following may be noticed during working:

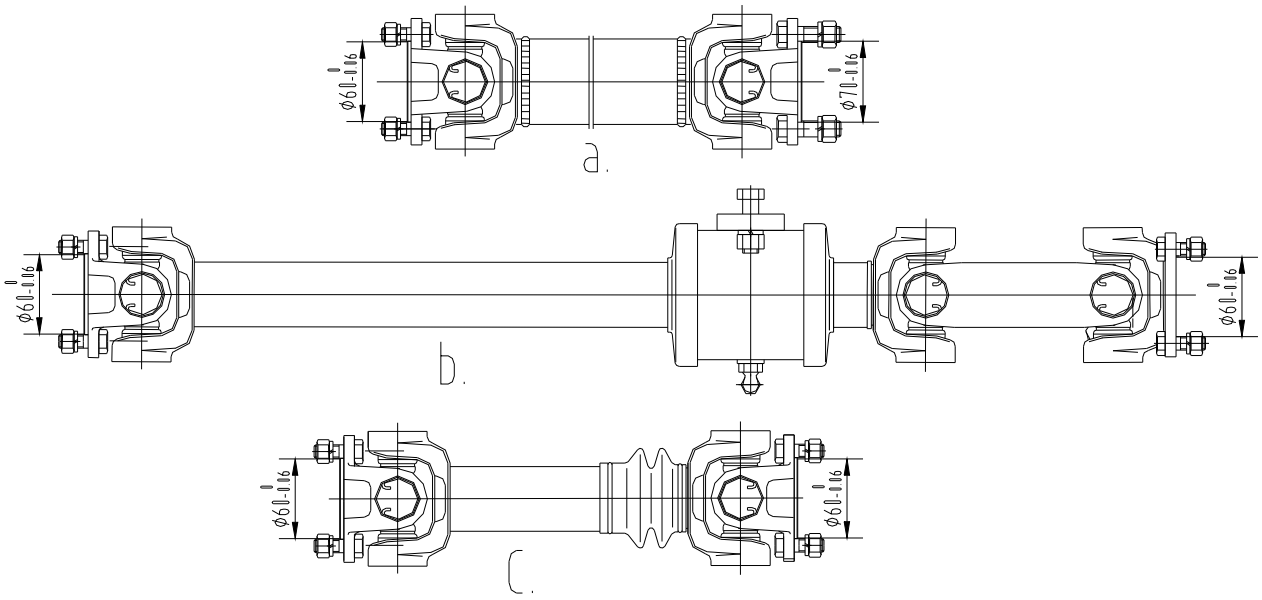
（1） Attention all transmission shat bolts tight or not, all bolts must not be loosing.

（2） Fill grease to all cross-shaft, front transmission slide spline and medium support termly.



1.Case **2.** 1st shaft bearing cover washer **3.** 1st shaft gear **4.** 1st shaft **5.** 1st shat bearing cover **6.** Stop ring **7.** Retaining ring **8.** Bolt M6*16 **9.** Sleeve **10.** 2nd shaft bearing cover washer **11.** 2nd shaft gear **12.** 2nd shaft **13.** Bearing 7508 **14.** 2nd shaft bearing cover **15.** Bolt M8*25 **16.** Washer 8 **17**. 3rd shaft bearing cover washer **18.** 3rd shaft gear (1) **19.** 3rd shaft bearing cover **20.** 3rd shaft **21.** 3rd shaft gear (2) **22.** Output shaft gear **23.** Output shaft gear cover washe **24.** Output shaft bearing cover **25.** Dust cover **26.** Oil seal ring PD50*70*12 **27.** Washer **28.** Flange washer **29.** Seal washer **30.** Nut M20*1.5 **31.** Pin 4*40 **32.** Output shaft **33.** Output shaft flange **34.** Bearing 7509 **35.** Bolt M10*25 **36.** Washer 10 **37.** Sleeve (1) **38.** Case cover **39.** Case cover washer **40.** Input shaft bearing cover **41.** Input shaft flange **42.** Input shaft flange washer **43.** Washer

Fig.5—3 Auxiliary box configuration



a.Top transmission shaft **b.** Front transmission shaft **c.** Rear transmission shaft

Fig.5—4 Transmission shaft assembly

Ⅵ，Driving axle

All of front axle and rear axle are driving axle, the parts of front and rear axle are same, therein to reducer and differential assembly are same as Model BJ130 auto. Only clearance adjustment of driving and driven spiral gear is different from Model BJ130 auto. Driving axle is consist of axle case, main reducer & differential assembly, semi-shaft and wheels.

The main transmission gear is a couple spiral gears, the torque is very large when working. In order to make it works smoothly, the spiral driving gear and spiral driven gear must match each other.

（1） Adjustment and assembly for spiral driving gear (Fig.5—5)

When fix two conical bearing to spiral driving gear, the bearing adjustment washer 2 can be used to adjust the axial clearance of two conical bearings. Increasing washer thickness, the axial clearance will be big, if decreasing, the clearance will be small. At last the clearance will be adjusted to zero and the bearings will rotate freely.

(2) Adjustment for gear side clearance

The mesh clearance of driving gear and driven gear for rear axle is 0.18—0.24mm(calculate on big

side), and for front axle, it is 0.3—0.36mm. The clearance can be adjusted by bearing adjustment nuts 3 which are at each side of differential case. The used gauge is micrometer. Let the lever head contact spiral driven gear on large end side arc face, then swing gear, the value will be indicated.

(3)Adjustment for driving hub axial clearance

Turning the adjustment nuts, which are at each end side of the axle, to adjust the bearing axial clearance to zero, i.e. there will be no clearance and bearings rotate freely. Fix lock washer and tighten the nut to enough tight.

Fig 5—5

1,2 Adjusting washer 3, Adjusting nuts 4, Bearings

5, Spiral driving pinion 6, Spiral driving gear A, direction

Ⅶ，Brake system

1，Foot brake

Model BJ130 brake is used as foot brake for dumper, it is four-wheel brake, hydraulic transmission, self-increase force, shoe and same type in front and rear wheel, and Model BJ130 master brake cylinder are adopted.

When step brake pedal down, push lever push master cylinder piston and push brake oil inside pipe into branch brake cylinder, that will push piston moving to make brake shoe pressing on brake drum, dumper is braked.

The clearance of brake shoe and brake drum will increase for a long time working, the adjustment will be done as follows:

(1) Adjustment for front brake and rear brake

Support the required adjustment wheel up, take the rubber cover which is on brake base plate. Insert screw driver into adjustment hole, make adjustment tooth down, it will make brake shoe open, at the same time, rotate wheel until it can not turn. Then adjust the nut to rotate up 2-3 teeth. Then fix the rubber cover, And it is over (Fig.5—6). Front and rear brake may be adjusted in the mean time.

After adjustment, step the brake pedal down, the total moving range is not more than 1/2 of the total range.

(2)Adjustment for brake pedal free range

In order to ensure dumper in normal condition when releasing brake pedal., the free range of brake pedal is 8—14 mm

The free range adjustment will be completed by adjusting the distance of brake pedal arm hole and pull lever when the piston is in the front of the cylinder. (Fig, 5—7)

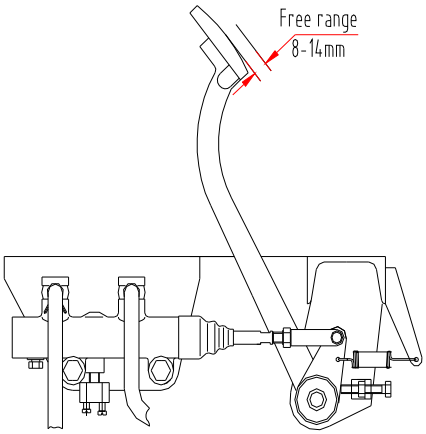


Fig. 5—7 Adjustment for brake pedal free range

Fig. 5—6 Adjustment for front and rear brake

3， Hand brake

Model NJ130 clamp-disc type hand brake is used for dumper.

The foot brake is used when in driving course. The hand brake is used when in parking

Hand brake clearance adjustment is as follows:

Rotate the hand brake connection steel wire joint fork, change the steel wire length. Pull hand brake operation lever, when the pawl move to 3rd –4th gear, dumper is braked, the adjustment is over.

Chapter 6 Hydraulic System

It is adopted articulated frame and hydraulic tipping systen for Model FJ30 dumper (Fig. 6-1). It is consist of one Model GBN-E316 gear pump, one Model BZZ1-E350C full hydraulic steering, one Model FKA2103016 valve, one Model 34DLS-E10L multiple unit valve, one Model HSGK01-80/45E-1301 discharging oil cylinder, one Model HSGK01-80/45E-1301 steering oil cylinder, one WU-100*100-J type suction oil filter, one Model WU80-100-J returning oil filter and oil pipe. Working compression of hydraulic system is 10Mpa (100kg/cm^2).

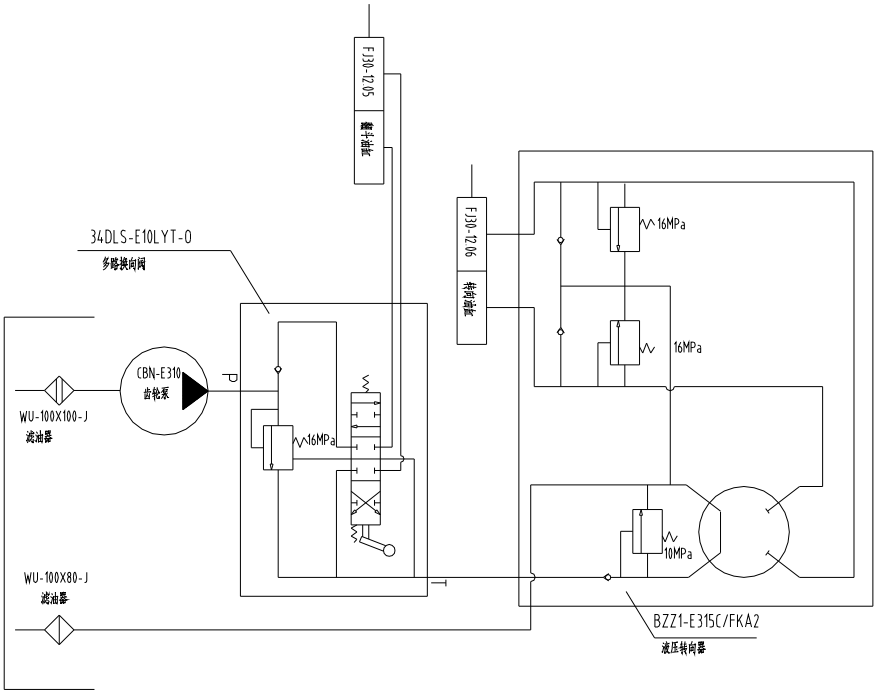


Fig. 6-1 Hydraulic system theory chart

A. Gear pump

Gear pump supply source for hydraulic system and be mounted on the timing gear case of engine and to drive by gear directly. With gear pump to make part mechanism nergy of engine will change hydraulic energy of far distance transit by oil pipe.

1. Working theory of gear pump (Fig. 6-2)

Gear pump is consisted of a pair outer mesh and a case of containing the gear. In normal, it is full oil in it. There is compression oil cavity and suction oill cavity in the case, but they are no communication each other by meshwire M. When active gear circle at direct direction and passive gear will circle at retrorse direction. Wherefore, active gear and passive gear will enter into left cavity of mesh, each wheel gear will tumble in the other gear space, between two gear cubage will minish and pressing oil from gears, the cavity will become compression oil cavity of output oil; the two gear leave right cavity of mesh and each wheel gear leave the other one also, between two gear cubage will augment and to reach part vacuum, the oil of oil box is sucked the right cavity under the air compression and the right cavity will become suction cavity of output oil. Following transit of gears, to enter into oil of suction cavity will be uninterrupted to take compression oil cavity with gear space of wheel gear and be to extrude also. Thus, it will engender a uninterrupted compression oil current.

Fig. 6-2 Working theory of gear pump

2. To be disassembly and assembly of oil pump correctly

It need to be disassembly and assembly for inspection, to obviate trouble and repairing of oil pump. To be disassemly and assembly is right or not, it will directly relate using performance and life of oil pump.

Pay attention to the following during application:

(1) Before disassembly, first to clean tie-in of oil pump and dirt and oil of oil pipe please.

(2) With wood stopper or others special plug to seal the door of oil pump for preventing dust enter into. Absolute not allow to seal the door of oil pump with dirty cotton yarn.

(3) Pump cover, pump case and shaft sleeve is manufactured with aluminium alloy and soft. So they are nice parts, the nick and injure will damage sealed performance of oil pump. Wherefore, not to knock it for disassembly and assembly. When taking seal parts, not touch the ring slot of pump cover.

(4) When cleaning parts of oil pump, pay attention to divide the rubber seal parts and others parts and the rubber seal parts cann't clear with gasoline for preventing aging and changing quality.

(5) When disassembly, it should check rim of resistance oil of framework oil seal on the front cover if they are demaged or fray. If they are not to be demaged or fray and no need change oil pump and to take out the framework oil seal from the front cover.

(6) To check two shaft sleeves add gear thickness's summation and difference of length of the oil

pump casing, up to clearance of aseembly. The clearance should be in 0.06~0.15mm and the best is 0.08~0.13mm. So the shaft sleeve and gear end have been fray. It should repair when the clearance excess 0.30mm.

(7) To ensure the middle part of two samll seal rings lean to the door of suction oil and the oil slot of shaft sleeve toward to the door of suction oil.

(8) The rubber plug smear lubracating oil to encase into the hole of profile of the shaft sleeve. Pay attention to the direct of the rubber plug when assembly, to prevent mistake of assembly to destroy the plug.

(9) Assembly of gear oil pump is Ok, it should be even screw down four nuts with plier. The moment is 5~6kg/m.

(10) Check gear oil pump and drop a lot oil at the door of suction oil of gear oil pump and even revolution main driven shaft of oil pump with 8mm end-wrench. If too tighten (the moment excess 0.3kg/m), it should be disassembly and check the clearance of shaft direct if too smallness and compression of seal ring if too big (it should be between 0.25~0.45mm). Absolutely not allow to realize even revolution of main driven shaft with the way which to loosen nuts.

B. Redirector

Structure of moel BZZ1-E350C Full Hydraulic Redirector (Fig. 6-3), “P” point is intaking oil and “O” point is returning oil, “A” and “B” point and two cavities of the steering oil cylinder be each other communication. The steering shaft and parts 1 connect, the steering oil pipe and parts 2 connect. When the steering gear running and taking part 1 and part 7 core by the steering shaft. The part 6 valve sleeve is not move, the valve core and valve sleeve will form a steering valve, its main function be to control pressure oil direct. At the same time, rotor 9 will run together valve core also, and part 13 stator will form a cycloid needle wheel mesh and its function be to test starter and to ensure entering into volume of the steering oil cylinder and redirect angle of steering gear is direct proportion (redirect angle of the dumper and redirect angle of steering gear is direct proportion).

Fig. 6-3 Hydraulic redirector

1. Connection block 2. Front cover 3. Valve 4. Spring slice
5. Pin 6. Valve sleeve 7. Valve core 8. Connectiong shaft 9. Rotor
10. Rear cover 11. Seperating plate 12. Steel ball 13. Stator

Returning oil of the redirect oil cylinder return oil box through hole of steering gear, about 6^{o}~7^{o}, the way of oil cylinder will open completely. The rotor will take connection shaft 8, because the connection shaft and valve sleeve is connected with pin, the valve sleeve will run also till redirect angle of the rotor and redirect angle of the steering gear is equal, the valve sleeve will return the middel place (to close the gate of oil cylinder). “P” point and “O” point will connect, mixing oil will be stopped.

When the steering gear is not move, the valve sleeve 6 and the valve core put the middle place by the spring slice 4, oil liquid enter into inner cavity of the valve core with the valve core and hole of the valve sleeve end and return oil box through the oil pipe.

There is a safe valve “a” and “b” , single-direct valve “c” and flooding valve “d” on the redirector casing (Fig. 7-1). Function of the safe valve be to protect system from damaging when the steering oil cylinder pressure be over high. Function of the single-direct valve be to supply oil by oil box when returning way of the redirector is negative pressure. Function of the flooding valve be to adjust working pressure of the system, the numerical value of adjustment is 9806kpa ($100kg/cm^2$).

C. Oil cylinder

The dumper adopt a model HSGK01-80 / 45E-1301 oil cylinder to change power, the structure is as shown in Fig. 6-4, it is consisted of piston, piston ring, ear ring, cylinder, joint bearing. The diameter of piston is 80mm and working distance is 295mm. Oil cylinder of tipping adopt a model HSGK01-80 / 45E-1301 oil cylinder, the structure is same of the transit oil cylinder. The diameter of piston is 80mm and working distance is 315mm.

Fig. 6-4 Structure of oil cylinder

1.Cylinder head 2.Piston 3.Y seal ring 4.Piston lever 5.Guided sleeve

6. Ear ring 7. Cylinder 8. Joint bearing

D. Mutiple unit valve

The Mutiple unit valve adopt 34DLS-E10L type, it is consisted of a three phase cross changing direct valve, a sigle-direct valve D, a flooding vavle C and a safe valve E. The changing direct valve will be controlled by hand. It have three position to control tipping, middle place and returning. The structure view Fig. 6-5.

Fig. 6-5 Multiple unit valve

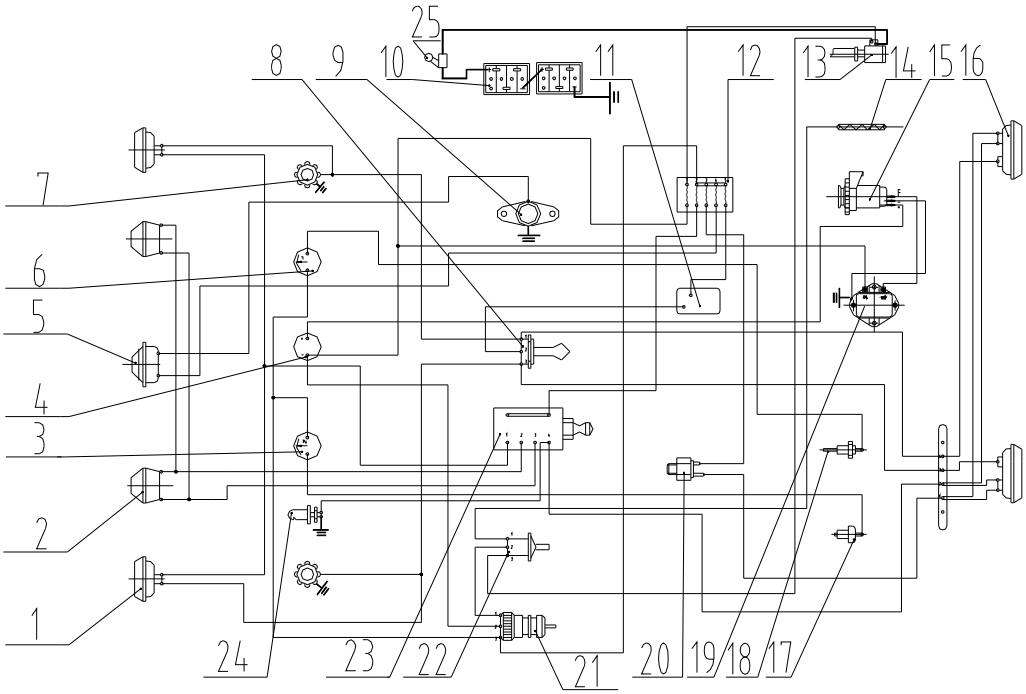
The fully oil where the pressure oil from oil pump through single steady vavle supply to redirector first for the dumper. From intake P of changing direct valve enter into and open single direct valve D. oil enter into pressure oil cavity P of changing direct valve. If to control changing direct valve handle, the slide valve turn left or turn right, oil liquid will be from A or B to A or B cavity of tipping oil cylinder as needed, the bucket will finish discharge motion. If not control changing direct valve handle, the handle will be automatic at the middle place with spring and the circle slot of slide valve left side and the hole of valve left side and the skew hole K of flooding valve will form a channel. The oil of P will enter into the valve through resistance hole of flooding valve core C, the hole will be lossed and made front and rear pressure of hole not equal. Open the flooding valve core C, oil liquid will return oil box through O of returning oil valve.

Function of single direct valve above said, pressure oil from gear pump will be invariablenes flux to redirector. So, it will appear tipping and reposition slow or stop in the case of the engine's speed low. It is caused because supply oil of gear pump is not enough and it may increase power and increase supply oil of gear pump to reach normal work of bucket.

E. How to use hydraulic system

The main hydraulic parts are nice parts in the hydraulic system, so correctly to use and maintenance be very important for ensuring the working perforance of every hydraulic in the hydraulic system and prolonging using life.

1. Strictly add hydraulic oil as requirement and guarantee to use clean oil.
2. Often check every hydraulic parts if leak, hydraulic oil temperature must control at 5~80^{o}C.
3. Hydraulic system can not be disassembly random. When replacing the seal ring and removing from trouble, be disassembly the parts, it shoule be packing every tie-in of oil pipe and end of oil pipe with clean fabric or cotton yard.



1. Front signal lamp 2. Head lamp 3. Oil pressure gauge 4. Ampere gauge 5. Horn 6. Water temperature gauge 7. Steering indicator light 8. Steering switch 9. Horn button 10. Battery 11. Flashing 12. Fuse box 13. Starter 14. Pre-heating plug 15. Generator 16. Tail lamp 17. Oil pressure sensor 18. Water temperature sensor 19. Redirector 20. Brake lamp switch 21. Electric lock 22. Pre-heating starting switch 23. Third lever switch 24. Instrument panel 25. Power switch

Chapter 7 Electrical Equipment

Electrical system of the adopts single wire, negative pole to be iron D.C. Voltage, 12V by two storage battery with type 3-QA-150 for Model FJ30 Dumper. Its function is to supply electriity to starter, when the engine is started. When the engine is running at normal condition, power will be supplied to electrical equipments from storage battery, in case it is higher, then the generator will charge the battery to reserve some electrical energy. Wiring harness of the whole dumper is consisted of up and down wiring harness, and to be connected with connection-peg for above the floor.

A. Storage Battery

Storage battery of the dumper is plastic complete closed, its excellence is small bulk, weight light, big capacity. To pour into new storage battery with confected electrolyte for urgent need and to use after 30 minutes. But it should to be charge for new one.

Pay attention to the following during application:

1. External surface should be keeping clean, and avoid lower capacity from self-discharge.
2. To check whether vent hole of battery is blocked or not constantly, Otherwise the pole-board will be destroyed.
3. To check the height of eletrolyte level frequently. The level should be 10~15 mm over the pole plate. In case it is insufficient, add distilled water for supplement only and fountain or river water be prohibited.
4. To check relative-density and height of eletrolyte level frequently. In winter, it should to check once every 10~15 days and every 5~6 days for summer. With eletrolyte densimeter to test relative-density of eletrolyte. Relative-density of eletrolyte be shown in the following list:

Condition of climate (In winter)	Storage battery of full-charge, 15°C relative-density	
	Winter	Summer
Lower than -40°C area	1.310°	1.270°
Highter than -40°C area	1.290°	1.250°
Highter than -30°C area	1.280°	1.250°
Highter than -20°C area	1.270°	1.240°
Highter than -0°C area	1.270°	1.240°

5. Keep the storage battery in charge condition constantly. If any abnormal condition is found, and it should check electrical energy of battery. When relative-density of eletrolyte lower to 1.18~1.20, to charge immediately, otherwise the pole plate of battery will be sulfuration and to reduce using life. Current of charge is 1/10 capacity, charge time about 13~16 hours. When voltage of one battery of two raise to 2.4V, current of charge be to half and charge time about 3~5 hours. When relative-density of eletrolyte not raise and keeping 2~3 hours no change, its charge is enough. Temperature and relative-density of eletrolyte modification be shown in the following list:

Temperature of eletrolyte	+45	+30	+15	0	-15	-30	-45
Modification	+0.02	+0.01	0	-0.01	-0.02	-0.03	-0.04

6. Connection pole of the storage battery and wire should be compact touch and not shock, otherwise connection pole will be damaged. In order to prevent tie-in corrosion and to smear vaseline on the connection pole.
7. If it is not used, it should remove from dumper and put into desiccation, shady and cool, airiness room, charge the battery once at least every month.

B. Starter

Structure of starter (Fig. 7-1)

1. Working theory of starter

Starting switch connect to power supply, electrical current enter into suction winding and safeguard winding in the electromagnetism switch of starter. Suction winding connect to iron by starting motor and safeguard winding touch with iron directly. After electrified, two loops will engender magnetic force to inbreathe moving iron and transport fork will drive small gear and flying wheel for meshed. When driving gear and flying wheel reach complete meshed, to push touch plate with moving iron and connect main touch point of the electromagnetism switch of starter and to connect suction loop, the main electric circuit of starter connection and revolution. Small gear will bring flying wheel to start engine.

So its circumvolving speed is rapidness After starting engine, thus, if the engine bring starter to run and to be worked bad result. Mesh is a monomial clutch (as shown in Fig. 7-1), its mean is what starter's torque can transport engine flying wheel by mesh, contrarily it is not. Wherefore it will been protect.

After starting swich shut down, suction loop shut down power and moving iron will return the primary position by return spring. Small gear will release mesh and engine starting.

2. Pay attention to the following during application
   (1) Mounting of starter should be firm, secure, connection wire is well.
   (2) Starter and storage battery connecting wire should be correct.
   (3) Not over 10 seconds for every working time. Rest spacing must have 1~2 minutes for continuous working.
   (4) When continuous starting unsuccess for three times, it should check starter, electromagnetism switch, storage battery, connection wire and supply oil pump of engine immediately, waiting for trouble is remedied to re-start.

Fig. 7-1 Starter

1. Electric brush 2. Rear cover 3. Rectifier 4. Armature winding 5. Magnetic pole 6. Suction iron wimble pole 7. Outer cover 8. Mesh 9. Front cover

C. Generator and regulator

Silicon rectifier generator is adopted in the dumper. Rectifying circuit and alternator is one whole generator. Three phase alternating current is exhaled with generator and by six pieces silicon diode of cover of generator compositive three phase bridge type rectifying circuit, the alternating current is changed direct current. Its excellence is small bulk, weight light, structure compact, convenient maitenance and lower speed charge performance. When trouble of short circuit is occurred, it may automatic to limit output current and keep in the regulation range, not cause the generator is damaged and it can prevent storage battery reverse to input big current. So it need voltage regulator only. Working theory for generator and regulator is as shown in Fig. 7-2.

Fig. 7-2 Regulator circuit chart

R1=1Ω; R2=8.5Ω; R3=13Ω; K1-Up touch point; K2-Down touch point

1. Troubles remedies of generator

When generator is running during driving, it can generate electricity in the case of 1000rpm, and ammeter

will indicate current. If it cann't generate electricity and must stop to check. It should check tension of fan belt first, if it be to check magnetic field wire of regulator, if all are normal condition, it should be to check generator. To dismount all lead wire on the generator and to be taking armature of generator (+) and magnetic field (F) connect with a lead wire, and to start generator. To touch connection pole of magnetic field from fire wire of storage battery and to improve speed of generator slowly. It can measure voltage of generator armature to be grounded, if voltage is augmenting with speed, it express that the generator is well. If voltage no indicating, the generator isn't work.

With multimeter R*1 to measure resistance of each connection pole, and to judge generator be well or poor. The way, to measure resistance which magnetic field F to be grounded, it should be 5~6Ω in normal condition; the obverse resistance is which armature of generator (+) to be grounded, it should be 40~50Ω and reverse resistance must be 1000Ω. Silicon diode interior turnoff, it must dismount generator and leave connection pole of diode for test and to check each. The obverse resistance of diode is 8~10Ω, the reverse resistance should exceed 1000Ω.

When generator proceed the third grade maintenance or over 600 hours for working, to check once and change lubricating grease in the bearing. If electric brush is frayed, it should be to change also. And then it should be to measure resistance of magnetic field winding (rotor) in the two slippery rings (Fig. 7-3). If resistance be on high and low side, it express what the magnetic field winding will be short circuit or turnoff. The slippery ring and magnetic pole or rotor shaft should be insulation, otherwise it will be to iron or short circuit. To check armature (stator) winding for generator (Fig. 7-4), and each two stator winding random to connect in the three tie-in of stator winding, otherwise circuit will be turnoff. Every tie-in and iron pole should be insulation, otherwise circuit will be short circuit. In order to check silicon diode of rear cover of the generator (Fig. 7-5), if it is damaged and must instead of it with the same type. To press only for assembly and not allow to check it with megohm instrument or others A.C. electrical source for pretecting diode.

Fig. 7-3 Checking magnetic field winding for generator

Fig. 7-4 Checking armature winding for generator

Fig. 7-5 Testing silicon diode

2. Working theory of regulator and adjustment

Regulator is usded for regulating a relative numerical value for the voltage adjustment of generator and voltage of storage battery. Touch point K1 and K2 will be uninterrupted closing or cutting to change resistance of excitation winding wire of generator, for changing current of excitation winding. Output voltage will reach a dynamic balance. When the generator speed is very low, the touch point K1 will close, the storage battery will supply eletricity to excitation winding. When the generator speed is high, voltage of generator is higher than the storage battery, up touch point K1 will close. But the generator will supply eletricity to excitation winding by itself. When the output voltage reach the adjustment voltage (about 28V), up touch point K1 will cut and automatic to connect resistance R1 and R2. So the excitation current will minish and magnetic field will lower, the output voltage of generator will get low also. Up touch point will re-close with spring, the excitation current will get big and output voltage will get high again. Wherefor up touch point K1 will close once again, repeating above things, output voltage will keep a dynamic balance. When speed of generator is ver y high, instantaneous voltage is much higher and suction of iron pole get big also and down touch point K2 will close. The current of magnetic field winding will be short circuit (no current in the excitation winding), output voltage will decline rapidly and suction of iron pole will minish also, down touch point K2 will be closed with moving arm by spring. After the voltage get high, K2 close again. Repeating and repeating, output voltage of generator will be no change, but only to be limited in the area of working voltage.

Regulator is a very nice instrument. In general, please don't open the cover. If regulator is not work, cutting electric source and to analyzed first. When trouble of regulator is confirmed, to check whether dirty or burned out for the touch points and whether looseness or cutting for bracket of the touch point and winding tie-in. Please don't adjust the spring first. If the touch points need to adjust, it may use platinum sand or NO. 00 sand paper and oil stone to adjust. And then to adjust clearance of the touch points 0.25~0.30mm and clearance of the gag bits 1.28~1.32mm. If no any result, to repair or change new parts by professional person.

At speed of generator is 3000~4000rpm or output current is 10~12A to adjust regulator. To adjust pothook and tension of spring for changing voltage of motor to reach 27.5~28.5V (Fig. 7-6). Testing pole of multimeter (+) connect fire wire of regulator and testing pole of multimeter (-) to be iron for testing. Be careful to adjust slowly.

3. Pay attention to the following for generator and regulator:
   (1) To connect generator and regulator must be correctly and pole of to be iron of generator, regulator and storage battery msut be same.
   (2) To check generator for condition of generating electricity with fire wire and magnetic field short circuit is prohibitted.
   (3) With multimeter or ohm-meter to check diode or insulation of generator is allowed, but not allow with megohm meter and 220V alternating current electrical source, otherwise diode will be burned out.

Fig. 7-6 Adjustment of output voltage of generator

Chapter 8 General Troubles and Causes Analysis

Position	Trouble	Probable causes	Recommended remedies
A. Engine		Reference to 〝Operation Manual for JD2102 Diesel Engine〞	
B. Clutch	1.Slipping	1. Dirt or dirty oil on friction faces of the clutch facings	Clean
		2. Pressure springs slackened	Replace spring or clutch assembly
		3. Free travel of clutch pedal too small	Re-adjust :free travel of clutch pedal should be adjusted to the range of 30~40mm
		4. Dust cover of clutch wheel cylinder or clutch wheel cylinder piston dirtily, can't go back to the location freely	Clean clutch wheel cylinder and install the dust cover gritted
	2.Vibrating in engage—ment	1. Separate the bearing lacked the oil to rotate agility	It do not rotate and must be changed when clean the bearing and put the lithium base lubricating grease of ZL-2 to boiling
		2. It is heavy to load	Do not allow to overload frequently
		3. Do not release lever in the same plane	Readjust release lever, make it in the same plane
		4. The gearbox used the location to improperly	Should use Ⅰgear or Ⅱ gear to start , it should be in time to shift gears
		5. The friction disc fractures or wears	Change the friction disc or assembly
		6. Operation is improper	Starts and change the speed with Ⅰ gear , it should be in time rapidly to change the gear.
	3.Clutch pedal is inability to pedal	1. Or oil spill that the oil passage leaks gas	The sealed situation of a piecing resumes the oil amount of cup of oil to each check
		2. Master cylinder oil spill	Change master cylinder the cover to enclose
		3. Wheel cylinder oil spill	Change wheel cylinder cover to enclose
	4.Rear footboard is high than front footboard when the clutch pedal was pedaled twice	1. The Master cylinder tappet does not have freedom interval	Twisting the tappet anti clockwise, must guarantee that there are 0.5~1 mms of interval of freedom in the junction in the tappet
		2. Free travel of clutch pedal too small	Readjust wheel cylinder tappet, guarantee that the freedom journey is 30~40 mms
		3. It is dirty to wheel cylinder, the piston can't go back to the location freely	Clean wheel cylinder

Position	Trouble	Probable causes	Recommended remedies
C. Gearbox	1.Trip dog	1. Gears seriously worn	Replace gear
		2. The gear wheel tooth is too big to the error	Replace gear
		3. Lock the ball spring too weak	Replace lock the ball spring
		4. The gap is too big after the second axle spline and gear spline hole are worn	Replace the second axle and gear
		5. The toothed sleeve of teeth of tooth department has worn	Replace the toothed sleeve
	2.Abnormal noise	1. The bearing becomes flexible greatly in front and at the back of the second axle	Bearing before and after changing
		2. Gears seriously worn	Replace gear
		3. The second axle seriously worn	Replace the second axle
		4. The middle axle seriously worn	Replace the middle axle
		5.Axial play of the second axle too large	Replace spacer and tighten nut
	3. Leakage of oil	1. Block of breather plug	Clean or replace breather plug
		2. Oil seal failed	Replace
		3. Refuel too many	Put in right amount
		4. Paper washer excessively worn or clamping bolts worked loose	Replace paper washer or tighten nut
	4.can not engage a gear difficultly or failed	1. The clutch is not separated completely	Readjust
		2. The gear shift of speed change is worn	Repair or readjust
		3. Tooth ends of gear burred	Remove the burrs
		4. Gear shifter seriously interfere in inner	Check and remove
D. Reducer casing	1. Abnormal noise	1. Gear seriously worn or peel off	Replace new gear
		2. Spline shaft seriously worn	Replace spline shaft
		3. Bearing seriously worn	Replace bearing
		4. Driving flange nut worked loose	Tighten nut
		5. The gear oil does not fulfil requirements	Replace gear oil
	2. Leakage of oil	1. Block of breather plug	Clean or replace breather plug
		2. Paper washer or oil seal seriously worn	Replace
		3. Bearing cap of bolt worked loose	Tighten nut
		4. Refuel too many	Put in inner

Position	Trouble	Probable causes	Recommended remedies
E. Propeller shaft		1. Universal joint seriously worn	Replace universal joint
		2. Propeller shaft seriously crocked	Correct or replace propeller shaft
		3. Lack lubricating grease	Annotate the lubricating grease
		4. Flange joint bolt worked loose	Tighten nut
		5. Bearing seriously worn or burn out	Replace bearing
F. Driving axle	1.Abnormal noise in driving	1. The mainly passive gear interval is too big or the gear is worn	Adjust gear interval or replace gear
		2. The spider gear of differential is worn	Replace
		3. The mainly passive gear of bearing seriously worn or worked loose	Replace gear
		4. Lack the oil	Annotate the hypoid gear oil according to the regulation
	2. Wheel hub is heat	1. Pretightening load of the bearing too big	Readjust
		2. Wheel hub bearing seriously worn	Replace bearing
		3. Lack lubricating grease	Clean and refuel lubricating grease
G. Hydraulics system	1.Steering heavy or slowly	1. The hydraulic oil too small	Replenish hydraulic oil
		2. Hydraulic oil viscidity is too great	Replace hydraulic oil
		3. Block of filter gauze or discharge filter	Clean filter gauze or replace discharge filter
		4. Oil pump supports the oil insufficiently	Check gear pump
		5. Steering gear seriously worn	Replace or repair
		6. Steering oil cylinder seriously worn	Repair or replace
		7. Swivel pin of frame is sold or oil cylinder stud lacks the oil	Annotate the lubricating grease
	2. Send out irregular noise when steering	1. The hydraulic oil insufficiently so sucks the air	Annotate hydraulic oil
		2. The pipeline leaks gas	Repair
	3. Steering does not work		Repair

Position	Trouble	Probable causes	Recommended remedies
G. Hydraulics system	4. The skip bucket can't be unloaded or unloads the material slowly by oneself	1. The engine operates at a low speed but the oil pump supports the oil insufficiently	Enlarge the throttle and unload the material
		2. Supports the oil insufficiently when leak in the oil pump	Check oil pump
		3. Oil taking filter gauze or discharge filter is dirty	Clean filter gauze or replace discharge filter
		4. Block of control valve and damping hole of Spill valve	Repair or replace
		5. Control valve and spill valve& valve base or guiding valve& valve body seriously worn	Replace
		6. Sealing seriously worn in oil cylinder	Replace sealing
	5. The skip bucket can't make a reservation reliably	1. Leak in the oil cylinder	Repair or replace sealing of oil cylinder
		2. Control valve and non-return valve& valve base does not seal when the guiding valve and valve body interval is large	Repair or replace
		3. Leak in the Pipeline or connecting	Replace the pipeline or sealing of the connecting
H. Foot brake and hand brake	1. The moment of foot break is worn or failed	1. Break block seriously worn or burn out	Replace break block
		2. There is greasy dirt on the brake block	Clean greasy dirt
		3. There is air in the department pipeline to the brake	Remove air
		4. The free travel of the footboard is too great	Readjust according to the regulation
		5. The oil amount is insufficient in the brake master cylinder	Refuel break fluid
		6. The brake fluid goes bad	Clean
		7. Master cylinder leather cup damage and oil valve lose efficiency	Repair or replace
		8. Leakage of oil in the connecting or wheel cylinder	Readjust or replace sealing
		9. Brake drum and brake shoe interval are too big or the brake drum is variant	Readjust interval, repair or replace break drum
	2. Break mislignment snaking	1. Motive force is inconsistent that every wheel is made	Check and readjust
		2. It is not equal to that control the atmospheric pressure of the left wheel and right wheel	Add Topping up on the stipulation

Position	Trouble	Probable causes	Recommended remedies
H. Foot brake and hand brake	3.The break can't be unclamped	1. The master cylinder does not have free travel or block of oil drain hole	Readjust
		2. Piston spring of the master cylinder is too weak or leather cup is too fail	Add topping up on the stipulation
		3. Piston leather cup of the wheel cylinder was seizure	Clean or replace
		4. Break shoe of return springs lose efficiency	Replace spring
		5. Break drum and friction plate interval is too small	Readjust interval
	4. Hand break does not work	1. Friction plate and hand break plate interval is too large there is oil	Readjust or clean
		2. Every transmission organization joins worked loose or free flight	Repair
		3. Handle soft axle pass long or crooked too little radius	Readjust
J. Wheel	1.Tire seriously worn	1. The atmospheric pressure of the tire is too low	Keep four unanimous according to the sufficient air of regulation
		2. It is unreasonable to use	Loading uniformity can not overload
K. Electric system	1.Electric starter does not work	1. Starting switch or the circuit does not keep in touch well	Check starting switch and circuit, remove failure
		2. Fusing to fuse	Remove failure and replace new fuse
		3. The electric consumption of the battery is insufficient or damaged	Put down or replace the battery
		4. Starting switch contact of electromechanical magnetism of electricity was damage or adjustment is improper	Readjust interval
		5. Commutator of the electric starter is dirty, the electric brush is worn, or spring strength is weak	Clean commutator ,replace electric brush or spring
		6. Armature winding of electric starter and stator winding seriously open circuit& open circuit or ground failure	Put down and check ,repair or replace
	2. The starter can not drive the engine	1. The electric consumption of the battery is insufficient	Supplement electric consumption
		2. The temperature of the engine is too low	Heat the engine
		3. Bearing bush seriously worn	Replace
		4. The electric starter clutch slipping	Repair or replace
		5. Gear and ring gear worked loose	Readjust the partial screw

Position	Trouble	Probable causes	Recommended remedies
K. Electric system	3. The generator does not generate electricity at all or the battery is charged insufficiently	1. Belt of generator too loose	Readjust
		2. Poor contact of line	Check and remove
		3. Adjustment of regulator improper	Repair or replace
		4. The generator electric brush keeps in touch badly	Clean or replace
		5. Rotor coil of the generator seriously open circuit or ground failure	Repair or replace
		6. Stator coil of the generator seriously open circuit or ground failure	Check and repair
		7. The rectifier diode of silicon is damaged	Replace
		8. Connecting wire not firm of the battery	Re-connecting
		9. The battery is out of order	Repair or replace new battery
	4. Abnormal noise during runing of generator or too heat	1. The generator is installed improperly	Check and adjust
		2. Bearing seriously worn	Replace bearing