

## **Preface**

Huanghai Jinma (HHJM in short) —70-80 serial tractors are a new serial wheel tractors developed according to the new situation of home and oversea agricultural-machinery markets and increasing demands of customers.

HHJM—70-80 serial tractors are new models using kinds of new techniques and technologies on the base of years' production experiences of HHJM—16-65 serial tractors to make them have more reasonable structures and more completed performances. The advantages include larger power, less fuel consumption, high efficiency & nice look, easy operation, easy maintenance, convenient repair, economical cost and good complex use. So the model is sure to get satisfying economic profits.

HHJM—70-80 serial tractors take upright and energy-saving diesel engines as power devices. Direct driving is adopted between engines and drive unit, supported with 8-gear gearbox for the operations of rotary tillage, ploughing, reaping and transportation, hydraulic suspending system with completed performances, low-pressure and wide-coverage drive tires with good adhesion, and reliable air cushion brakes. The serial wheel tractors are equipped with dual clutch, full hydraulic steering. Both two-wheel driving and four-wheel driving are available.

To make the machines easier to operate and maintain, we edited the manual. Customers are expected to carefully read the manual before operating the machine and smartly use them to let the machine work best. The manual introduces the basic model. Real object may have nonconformities with the manual. If this happens, contact us without hesitations. Your advices are valuable for our new edition.

Jiangsu Yueda Yancheng Tractor Manufacturing Co.,Ltd

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# **Chapter One     Safety Rules**

## **and Important Notices During Operation**

### **1.1 Safety Rules of Operation**

1.1.1 Please operate a tractor for the safeties of your life and means and for the happiness of your family.

1.1.2 Only after the driver gets special training, gets drive certificate that is timely approved, and carefully reads the manual, can he operate the tractor.

1.1.3 When tractor starts, please heed whether there is any barrier on the road and if there are people between tractor and farm tool or trailer.

1.1.4 Don't leave the driver's seat to start or operate tractor. Make sure that gearlever in the position of neutral gear and control handle in raiser position when starting tractor.

1.1.5 Don't start engine in the way of bridging over stub pillars, or the tractor will travel by itself and out of control.

1.1.6 No getting on and off is permitted when tractor is traveling. No repairing or checking under tractor is permitted when it runs.

1.1.7 Gearlevers must be put on the position of neutral gear before driver leaves control position.

1.1.8 Left and right brake pedals must be chained together when transporting.

1.1.9 No quick turn or single-side brake is permitted during h-speed driving.

1.1.10 Stop engine before refueling, No smoking when refueling or checking fuel system.

1.1.11 No over load or overloading operations is permitted to avoid damage.

1.1.12 Neutral gear or stepping on clutch is forbidden when sliding and going down declivity.

1.1.13 Spark extinguisher device must be set up on vent pipe when tractor works in courtyard or reaps.

1.1.14 Good lightening facility should be ready when tractor works in nights.

1.1.15 Don't limply drive or operate when you feel not so well or feel tired. Drunk driving is forbidden to avoid accidents.



**Caution: Comply local traffic rules when driving on roads.**

### **1.2 Important Notices**

1.2.1 Unning-in according to "Tractor Running-in Rules" is needed for new tractors and heavily repaired tractors.

1.2.2 Bolts, nuts and loose-able parts of all connecting parts, such as directive

wheel and tie rod should be checked usually and loosed parts should get tightened.

1.2.3 Do check oilway, circuitries and cooling water before starting the tractor. Don't fill unstrained diesel into fuel tank. Pay attention to all the meters after starting tractor.

1.2.4 When tractor runs supported with hanging farm tools, knob of dropping speed control valve (under driver's seat) should be screwed out widdershins and lock the equipment to avoid the lifting control hand being touched to escape accident caused by sudden dropping of farm tool. When driver leaves tractor, farm tool must be dropped to ground.

1.2.5 When PTO Shaft is not in use, handle should be in separation point position.

1.2.6 Parking on a slope, you must use parking brake and use triangle chock to stop up the rear wheel.

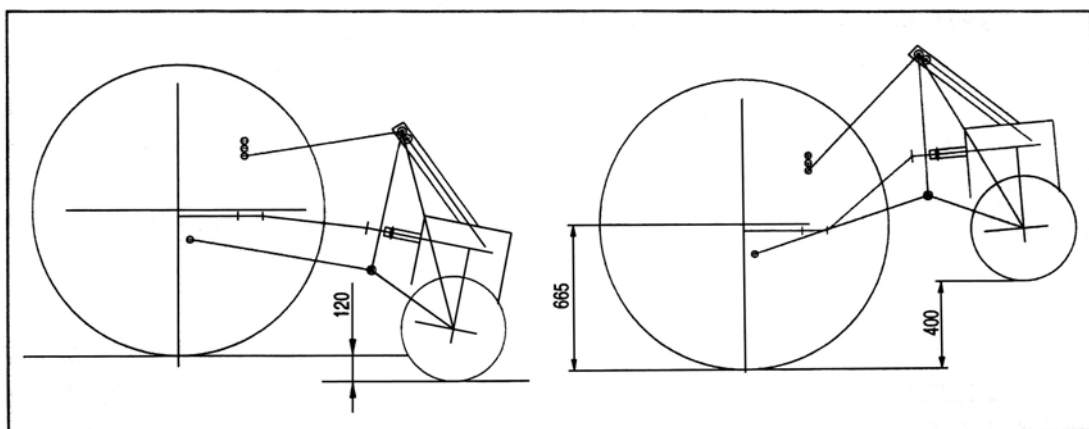
1.2.7 Radiator surface should be cleaned duly to guarantee the radiating result, be careful to screw off the radiator cover when engine is still hot. Stop the engine and then unscrew the radiator cover to the first gear and screw down the cover after loosing the pressure.

Only when engine stops, can cooling water be refilled to radiator. Water in cooling water rout and heater unit should be let out in winter.

1.2.8 Exhaust elbow and muffler are high temperature components. Keep away from them in half an hour after starting engine or stopping engine to avoid scald.

1.2.9 Only separate earth cable from accumulator, can wiring be repaired.

1.2.10 Working with tractor in troubles is not allowed, especially when it has no oil pressure, too-low pressure, too-high water temperature or it sounds abnormally. If the above troubles happen, tractor should be stopped in no time and trouble-shooting is needed.



a. Cultivation of Tractor  
Supported with Rotary Cultivator

b. Lifting of Tractor  
Supported with Rotary

Fig. 1

1.2.11 Before driving farm tool with PTO shaft, tie-in rationality of tractor and farm tool should be checked. When begins usual cultivation, inclination between PTO shaft and joint drive shaft should not be over  $10^{\circ}$  . See Fig.1 for cultivation and lifting of rotary cultivator. Ground clearance of coulter roller of rotary cultivator is not less than 400mm. See Fig.2 for cultivation and lifting of plough. The tip of first plough is over 490mm in height.

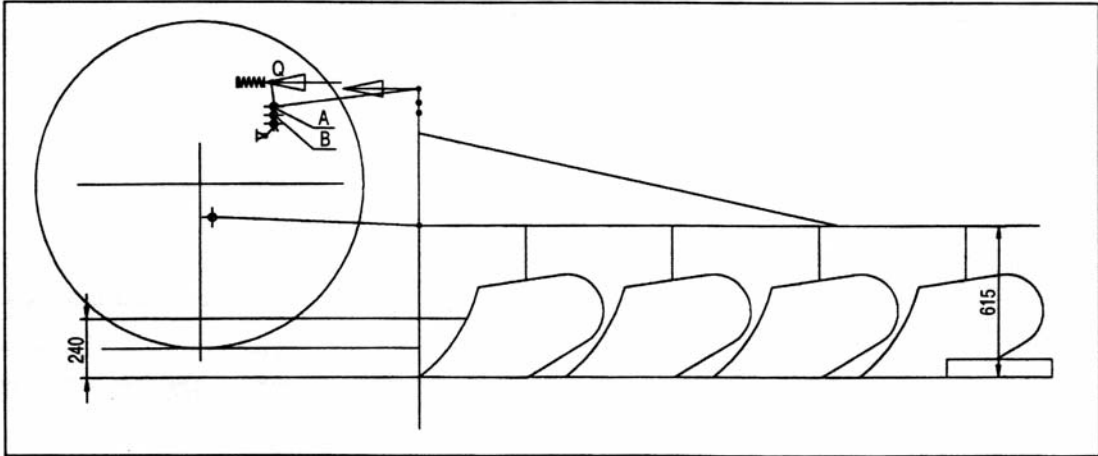


Fig.2 a. Cultivation of Tractor Supported with Plough

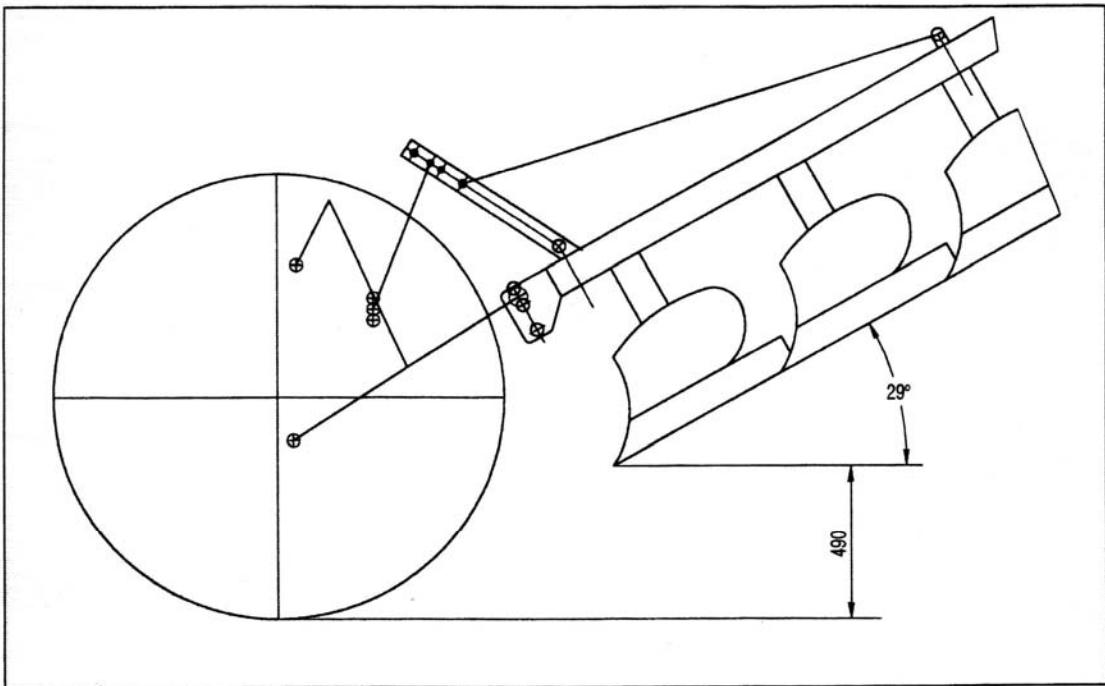


Fig.2 b. Lifting of Tractor Supported with Rotary Cultivator

1.2.12 During the course of using tractor, Safety Mark must be attentioned to avoid the accident (Please see Safety Mark Fig. 3).



Fig.3 a. Back of Tractor



b. Front of Armour Plate of Rear Wheel



c. In The Front of Guard Board of Rear Wheel



d. Upper Face of Gearbox





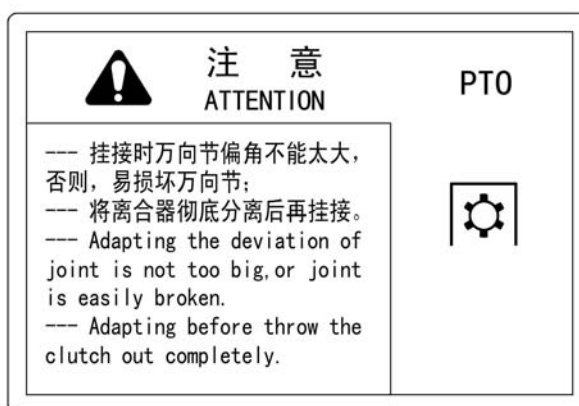
e. Upper Side of Guard Board of Rear Wheel



f. Back of Tractor



g. In The Front of Guard Board of Rear Wheel



h. Back of Tractor



i. Upper Side of Cover



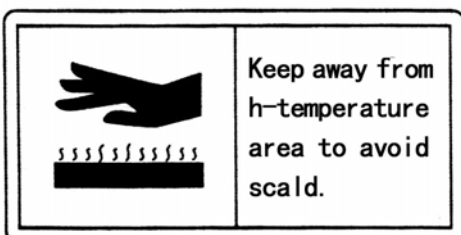
j. By Refill Opening



k. Near Fan Belt



l. On Protective Cover Electrical Generator



m. Near Muffler

## Chapter Two      Summary of Products

### 2.1 Features of Products

HHJM700/704, 720/724, 750/754, 800/804 wheel tractors are middle-sized wheel tractors used both in paddy field and glebe. The models have such advances as tightened structures, easy operation, flexible turning, powerful lifting and easy repair and maintenance.

### 2.2 Main Uses and Range of Applicability

HHJM700/704, 720/724, 750/754, 800/804 wheel tractors, equipped with some agricultural tools, can be used to plough, harrow, seed and harvest in glebe, equipped with trailer, can be used for transportation. Through PTO shaft and with special machine, it is for compost made of stalks applied to farmland. It can also be used as the original power for lift pump, thresher and so on. Besides, for its flexible turning and fine seal, it can be used in paddy fields when it is equipped with paddyfield wheels.

After suitable improvement, connected with knapsack-type reaper, it can be used for reaping wheat, maize and so on.



**Caution: Equipped with knapsack-type reaper, the condition of heat abstraction is not so good. So for continuous work for long time, it is our advice to set up an auxiliary heat-abstracting device.**

### 2.3 Product Models

This manual introduces HHJM700/704, 720/724, 750/754, 800/804 wheel tractors and their powers:

Powers for HHJM700/704 tractors are 51.5kw.

Powers for HHJM720/724 tractors are 53kw.

Powers for HHJM750/754 tractors are 55kw.

Powers for HHJM800/804 tractors are 59kw.

## Chapter Three      Technical Specifications of Tractors

### 3.1 Parameters of Complete Machines

Tractor Model Name of Parameter		HHJM -700	HHJM -720	HHJM -750	HHJM -800	HHJM -704	HHJM -724	HHJM -754	HHJM -804
Type		4×2 (2-wheel drive)				4×4 (4-wheel drive)			
Dimen- sions	Length (from the fore bob weight end to end of draft link)	4010				4058			
	Width	1929				1929			
	Height	2568				2568			
Spread of Axles		2188				2236			
Usual Tread of Fore wheels		1450				1450			
Usual Tread of Rear wheels		1510				1510			
Minimal Road Clearance		430				340			
Turning Circle Radii									
Unilateral Brake		3.9±0.3				4.3±0.3			
Unilateral Un-brake		4.6±0.3				5.5±0.3			
Tractor Mass(kg)									
Structural Mass		2670				2960			
Minimal Service Mass		2900				3190			
Mass Distribution(kg)									
Fore Shaft		1350				1470			
Rear Shaft		1550				1720			
Additional Mass (Choice) kg									
Fore Shaft		165or220				165or220			
Rear Shaft		360or540				360or540			
Rated Tractive Force N		12500	13500	14400	15000	14500	15000	16000	16700

Theoretical Velocity    km/h				
<div>Tractor Model</div> <div>Theoretical Velocity</div> <div>Gear</div>	HHJM- 700/720	HHJM- 750/800	HHJM- 704/724	HHJM- 754/804
First Gear	2.27	2.37	2.27	2.37
Second Gear	4.01	4.19	4.01	4.19
Three Gear	6.45	6.74	6.45	6.74
Four Gear	8.09	8.46	8.09	8.46
Five Gear	9.06	9.47	9.06	9.47
Six Gear	16.05	16.78	16.05	16.78
Seven Gear	25.82	26.99	25.82	26.99
Eight Gear	32.35	33.82	32.35	33.82
First Reverse Gear	3.15	3.29	3.15	3.29
Second Reverse Gear	12.61	13.18	12.61	13.18

### 3.2 Engine Parameter

Tractor Model		HHJM -700/704	HHJM -720/724	HHJM-750/754		HHJM -800/804
Engine Parts and Parameter						
Engine Model		LR4105T79	R4105	LR4105T79A	LR4108T79(A)	R41051T14
Engine Type		4-cylinder upright water cooling 4-stroke Diesel				
Cylinder Bore×Travel(mm)		105×125			108×125	105×135
Rated Output and rotate Speed		51.5KW 2200r/min	53KW 2200r/min	55KW 2300r/min		59KW 2300r/min
Fuel Consumption Rate in Rated Operating Mode g/KW•h		≤238				≤235
Engine Oil Consumption Rate in Rated Operating Mode g/KW•h		1.6				2.0
Compression Ratio		17				
Total Displacement of Piston l		4.3			4.6	4.676
Ignition Order		1-3-4-2				
Gas Distribution Phase (Angle counted by turning of crankshaft)	Starting Point of Inlet Valve	12° ahead from TDC				
	Closing Point of Inlet Valve	38° back from BDC				
	Starting Point of Exhaust Valve	55° ahead from BDC				
	Closing Point of Exhaust Valve	12° back from BDC				
Valve Clearance (cold state) mm	Inlet Valve	0.30—0.40				
	Exhaust Valve	0.40—0.50				
Cooling Way		Forcible Cooling				
Net Mass of Engine Kg		Electric Starting				
Dimensions(L×W×H)mm		844×619×828				

### 3.3 Drive System

Tractor Model Parts	HHJM700/704/720/724/750/754/800/804
Clutch	Dual Action Clutch
Gearbox	IZ Type Epicyclic Deceleration Constitution
Central Drive	Spiral Taper Gear Pair
Differential Gear	4-epicyclic Wheel Closed Type (With Differential Block)
Final Drive	External Gearing, Built-in Type
Fore Drive Axle	Bi-universally-jointed Epicyclic End Deceleration
Transfer Case	Straight-cut Gear

### 3.4 Travel, Turning, and Brake

Tractor Model Part Parameter	HHJM-700/720/750/800	HHJM-704/724/754/804
Frame Type	No Frame	
Type of Fore Shaft (Fore Drive Axle)	Inverted-U Pipe Equilibrium	Bi- universally-jointed Epicyclic End Deceleration
Fore Axle Tilt Angle	$\pm 12^\circ$	$\pm 12^\circ$
Toe-in of Front Wheel mm	4-12	0-3
Toe-out of Front Wheel	$2^\circ$	$1^\circ$
Tumble Home of Main Shaft	$9^\circ$	$7.5^\circ$
Specification of Front Tire	6.50-20	8.3-24
Specification of Rear Tire kPa	14.9-30	14.9-30
Air Pressure of Front Tire kPa	195-220	120-150
Air Pressure of Rear Tire	195-220	120-150
Type of Redirector	Cycloid Rotary Disk Valve Static Hydraulic Redirector	
Brake	Dry-type, Disc-type Brake	

### 3.5 Working Device

Tractor Model Part Parameter	HHJM700/704/720/724/750/754/800/804
Type of Lifter	Semi-divided positioned Type
Model of Gear Pump	CBN-E316FL
Model of Constant Flow Pump	HLCB12/10
Model of Dispenser	Outlaid Unload Control
(Diameter×Travel)Oil Cylinder	Single Acting $\Phi 110 \times 130$
Safety Valve Type of System and Oil Cylinder	Fissure Damping Valve Direct Action Type and Cone Valve Direct Action
System Pressure MPa	$16 \pm 0.5$

Opening Pressure of Safety Valve MPa		18±0.5
Plow Depth Control		Force-Position Integrated Control and Floating Control
Max. Lift Force in the Position of 610mm back from Lower Hook Station KN		11.6 11.9 12.4 13.2
Hydraulic-pressure Output Joint	Specification of Diameter	M18×1.5
	Quantity	1
	Output Discharge l/min	30.4
Type of Hanging Device		Postpositional Three-point Suspending
Hanging Connection Triangle mm		560×720(H×W)
Connecting Aperture of Upper Suspending Point mm		Φ 22.4
Connecting Aperture of lower Suspending Point mm		Φ 28.7
Type of PTO Shaft		Semi- separate Type
Rotate Speed r/min		720
Circumrotating Direction		Clockwise (Facing the head-ward of Tractor)
Shaft Extension		8-38×29.4 or 6-35×28.91×8.69
Pulling Device	Diameter of Joint Pin mm	Φ 32
	Terracing Clearance of Joint Pin mm	620(Midpoint)

### 3.6 Electric System

Tractor Model Part Parameter	HHJM700/704/720/724/750/754/800/804
Electric System	One-wire System, Minus Earth
Starting Motor	QD141G
Generator	JFZ1512Y
Accumulator	6-QA-150 or 6-QA-165
Rear Combination Light	Z-HX
Rear Working Lamp	WD
Starting Switch	JK290
Electric Horn	DL129G DL129G Simple-tone Horn
Flasher	
Fuze Box	Crisscross Winding Fuze Box
Combined Meters	HX-ZB151(Water Thermometer、Fuel Meter、Speed Counter)

### 3.7 Air-brake Device

Type of Air-brake Device	Air-off Brake
Capacity of Air Tank L	23
Starting Pressure of Safety Valve KPa	$800 \pm 50$
Exhaust Opening Clearance of Brake Valve mm	1-1.5

### 3.8 Capacities of Oil and Water Filling

Tractor Model Part Parameter	HHJM-700/720/750/800	HHJM-704/724/754/804
Capacity of Fuel Tank L	78	78
Underpan Capacity of Engine Oil	15	15
Final Drive Capacities of Gear-box, Rear Axle and Transfer Case L	40	42
Capacity of Fore Drive Axle L	0	11.5
Capacity of Redirector (for circular type) L	2.5	2.5
Capacity of Lifter L	21	21
Cooling Liquid L	15	15



## **Chapter Four      Running-in Rules**

Before working, new tractor or heavily-repaired tractor should get running-in, because processed parts will have tool marks on the surface to different extents. If tractor with heavy load and without running-in, the abrasion of parts will be increased. The parts even can be stuck or damaged to shorten the life of tractor.

### **4.1 Preparation before Running-in.**

4.1.1 Check the external bolts and nuts of tractor, if loosen, tighten them.

4.1.2 Fill grease to every oil site according to lubrication table.

4.1.3 Check the oil positions of engine oil bottom pan, gearbox-rear axle, lifter, fore lifter, turning oil tank, redirector, and air filter. Fill grease or lubrication oil to oil sites according to lubrication table.

4.1.4 Refill fuel and cooling water.

4.1.5 Check air pressure of tires

4.1.6 Check connections of electric and fuel routs.

4.1.7 Put shift bar arm in neutral gear, hand throttle in idle speed position and hydraulic hand in dropping position.

### **4.2 Running-in without load of engine (15min)**

Start engine according to the steps stipulated in engine manual. After starting, make engine run with idle speed for 5 minutes and watch running of engine. And then raise the rotate speed to rated one and run without load

During the course of running-in without load of engine, listen to the engine carefully. Make sure there is no water leak, oil leak or gas leak. Read all meters to see if all are ok. Stop and disposal all trouble, if there are.

The time of running-in without load is 15minutes.

### **4.3 Running-in of Hydraulic System**

Start engine and control lifter handle to lift and drop suspending mechanism several times to watch if there's block, suction, and emptiness, and then hang an agricultural tool or something else whose weight is below 500kg.

Control lifter handle with rated rotate speed of engine to make the tool smoothly lift and drop for at least 50 times.

In the condition that tractor is resting, let engine run with low, middle and high speeds, reposefully and control steering wheel to left and right 10 times respectively. Watch follow of left-and-right turning of the front wheel of tractor. Make sure it sounds normal and the steering wheel is easy and smooth to control.

If problems happen during running-in, causation should be found out and problems should be resolved.

#### 4.4 Free Travel Running-in of Tractors (5h)

During running-in (Form 4-1), the rotate speed should be controlled at about 1500r/min and notice the following points:

4.4.1 Watch all the meters.

4.4.2 See if the engaging of clutch is easy and disengaging is thorough.

4.4.3 See if shifting of gear-box is flexible and easy without automatic out-of-gear.

4.4.4 See if differential block can be joined and separated.

4.4.5 See if control and brake of tractor are OK.

Only when all troubles are disposed, can the running-in go on.

Form 4-1 Check List of Running-in Time of Gears and Run Without Load

Gear	I	II	III	IV	V	VI	VII	VIII	First Reverse Gear	Secondly Reverse Gear
Running-in Time (min)	30	30	30	30	30	30	30	30	30	30

#### 4.5 Load Running-in of Tractors (50h)

Load running-in (Form 4-2) means the tractor works with some load. Load must be increased little by little, and speed be controlled from low gear to high gear. The noticeable items are the same as 4.4.

Form 4-2 Check List of Tractor Load Gun Opening, Gears and Loaded Running-in.

Load	Gun Opening	(h) Running-in Time of All the Gears					Totally
		I	II	III	IV	V	
3 Tons For Trailer Hanged	3/4	2	2	3	3	4	14
6 Tons For Trailer Hanged	Wideopen		4	4	4	4	16
Hanging Plough (Plow Depth 16-20cm)	Wideopen		4	4	6	6	20

#### 4.6 Maintenance After Running-in

After running-in of tractor, in drive system, lubrication system and hydraulic system are some metal powder or impurity mixed in lubrication oil. So it's necessary to wash and replace all oil in lubrication system and hydraulic oil system. Only after finishing necessary technical maintenances, can it be put into normal use. The following are items of technical maintenance:

4.6.1 After stopping the machine, drain out the lubrication oil in engine oil sump. When it's hot, wash diesel filter, engine oil filter and then refill new lubrication oil.

4.6.2 Maintain and adjust diesel according to manual of diesel.

4.6.3 Let out lubrication oil in gear box-rear axle cover when it is hot and fill in some light diesel. Let it run for 2-5min with II gear. Let out diesel at once after stopping the tractor and fill in lubrication oil according to rules.

4.6.4 Let out hydraulic oil in hydraulic lifter and steering oil tank, wash their filters, and then fill new hydraulic oil.

4.6.5 Refill cooling water.

4.6.6 Fill every lubrication point with lubrication grease according to lubrication sheet.

4.6.7 Check toe-in of front wheel, clutch, free travel of brake pedal, adjust them if necessary.

4.6.8 Check and tighten all the external fixed bolts and nuts.

## Chapter Five Operation of Tractors

Correctly operating tractor can let all the functions performance fully and lessen abrasion of tractor to avoid accidents. It's very important to finish h-quality, effective, low-cost and safe working.

### 5.1 Operation Control Devices and Meters of Tractors

#### 5.1.1 Control Structure of Tractor (Fig-4)

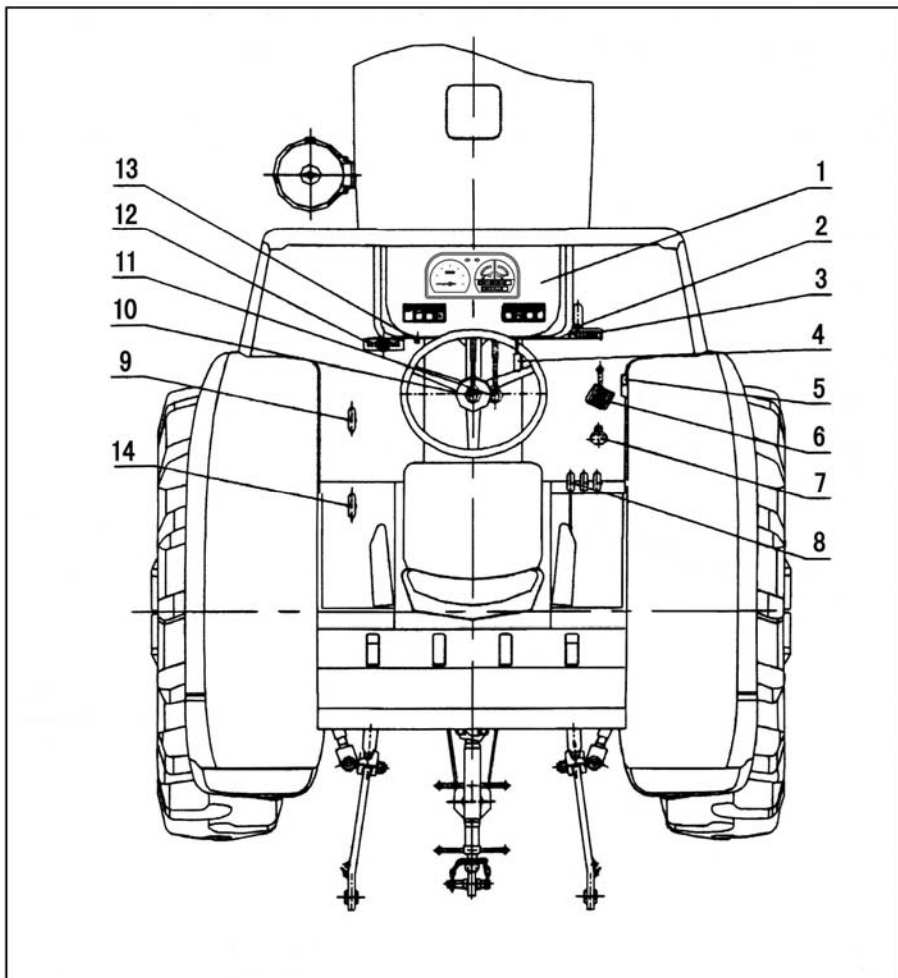


Fig.4 Operating Gear

1-Gage Board    2-Interlocking Board of Brake-pedal    3-Left & Right Braking Pedal  
4-Parking Braking Handle    5-Control handle of Hand Throttle    6-Foot Accelerator Pedal  
7-Pedal of Differential Block    8-Control Crank of Distributor Mechanism  
9-Control Handle of PTO Shaft    10-Main Shift Bar    11-Assistant Shift Bar

12-Clutch Pedal 13-Burnout Stayguy 14-Fore Driving Axle of Control Handle (Choice)  
 5.1.2 Meters and Switch (Fig. 5)

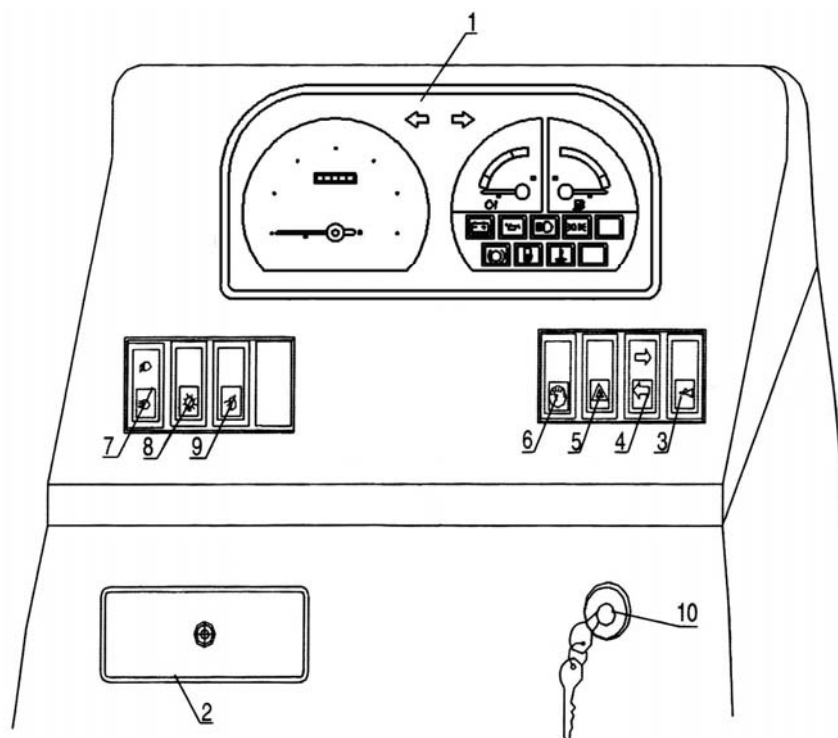
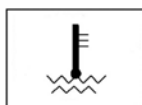


Fig. 5 Meters and Switch

1-Combined Meters Assembly    2-Fuse Box Assembly    3-Loudspeaker Switch  
 4-Steering Switch    5-Danger Warning    6-Switch of Night Lighting  
 7-Dimmer Switch    8- Lighting Switch    9- Lamp Switch    10-Ignition Lock

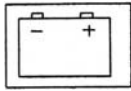
Rotate-speed timing meter of the combined meters includes rotate-speed meter and work-hour meter. The yellow numbers reference speed of transporting tractor (km/h) and the white numbers mean the rotate speed of engine (r/min)



Water temperature gage: Green Scale Line is 40-60°C, while red one is 60-100°C.



Fuel Meter: Scale mark shows the fuel quantity in oil tank. When pointer points at “F” on the upper left, it means the fuel in fuel tank is full, when pointer points at the red mark near “E” on the lower left, it shows the oil in oil tank is not enough. If during using tractor pointer still points at “F” on the upper left while it has no oil or enough oil, it means oil sensor has short circuit and should get disposal, if pointer points at “E” on the lower left and fuel tank is full, it means there is trouble in flow sensor.



Warning Light for Battery Charging (Red): When key is turned on ignition position, the light on, after starting engine the light is off, this shows normal battery charging.



Warning Light for Oil Pressure of Engine (Red): When key is turned on ignition position the light is on, after starting engine the light is off, which means the pressure of lubrication system is ok. When engine works with idle speed, the light may be on. This is because the pressure of lubrication system is low with idle speed, this is normal, if engine works with normal rotate speed and the light is on, the engine should be stopped and checked at once.

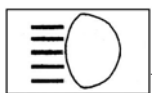


Warning Light of Air Pressure (Red): When air pressure of air brake system is below 0.4Mpa, the light is on, which shows there's trouble in brake air route or the warning is out of work and should get checked and repaired. Use key and before engine is started, the light is on, which means normal work.

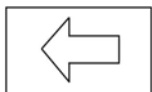
●**Notice: Before engine is started, key is turned on ignition position, you should make sure the above three lights are all on, or maybe the lamp bulbs are damaged and need repaired.**



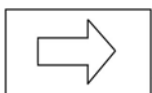
Parking Lights (Green): In nights, when tractor parks on a road, and to make traffic safe, small lights should be on to attract running vehicles around. Make light switch on the position of "1" and small parking lights are all on.



Headlight Indicator (Blue): When light switch is at the position of "2" and dimmer switch at "2" the light will be on. This means the headlight is distance light.



Left Directing Indicator (Green): When tractor turns left, switch on left directing indicator, and the light will be on.



Right Directing Indicator (Green): When tractor turns right, switch on left directing indicator, and the light will be on.

Light Switch: "0" position means cutting off the power, "1" position for lighting

parking light, “2” position for controlling power of headlight and if switch on the position, you can control the shifting dim light and distance light through dimmer switch. (Fig. 6-a)

Dimmer Switch: “2” position: distance light is on. “0” position: dim light is on. “1” position: Spare. The switch is a normally closed switch. Switching of distance and dim lights is controlled with light switch. (Fig. 6-b)

Switch of Top and Rear Lights: “0” position: cutting off power. “1” position: top light is on (for driving room sometimes). “2” position: rear light is on. (Fig. 6-c)

Steering Switch: “2” position: switch on right directing light. “0” position: cutting off power. “1” position: switch on left directing light. (Fig6-d)

Loudspeaker Switch: Press wane switch to “1” position: Switch on loudspeaker route, to “0” position: turn on preheat circuit (spare), release wane switch at the position of “0” position (The switch can reset itself). (Fig. 6-e)

Danger Warning Switch: “1” position: Fore, rear, left, and right steering lights, left and right directing lights on the meter and indicator of danger warning switch are all on. When tractor stops on road with troubles or it needs to warn vehicles in front or behind, It can attract passing-bys to avoid accidents. (Fig. 6-f)

Night Light Switch: “1” position: all indicators of switches and meter lights are on, “o” position: all indicators are off. It’s to lighten every switch for night driving (Fig.6-g).

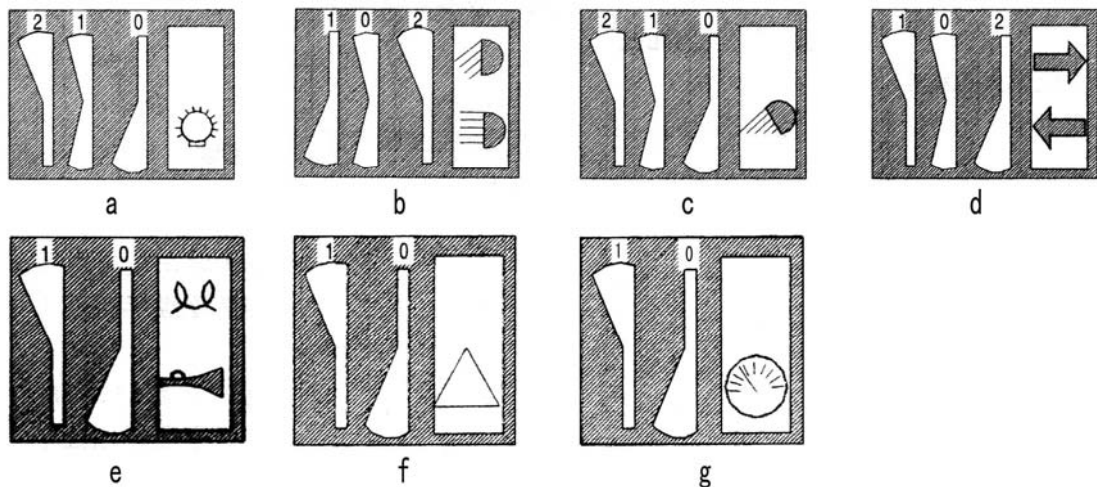


Fig.6

## 5.2 Startup of Engines

●Notice: Before used, tractor needs careful and complete check to eliminate incipient fault and avoid accidents.

### 5.2.1 Preparation before Starting Engine,

a. Check lubrication oil levels of engine oil sump, tractor gearbox-rear axle and hydraulic system with a dipstick. Water radiator should be fulfilled with cooling water,

and fuel tank should be filled with enough fuel.

b. Pay attention to oil level in steering oil tank and steering oil tank must be fully filled with oil.

c. Turn on the switch of sediment bowl.

d. Pull burning-out stayguy locking device to release burningout stayguy back and now the injection pump is on the position of oil supply.

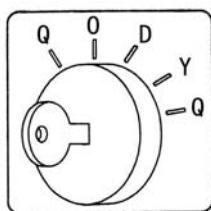
e. Hand throttle is set on the position of “semi-open”

f. Check joystick of gearbox and control handle of PTO shaft to set them on the position of neutral gear and hydraulic control handle on the position of dropping position.

g. If tractor has been not used for long time or is cold started, deflation bolt on h-pressure oil pump should be released. Press handle of fuel supply pump with hand. Tighten deflation bolt after exhausting all air in oil route.

#### 5.2.2 Starting Engine:

Insert key into electrolock and turn key deasil. (Fig. 7)



ACC gear, an assistant gear, is to assist electrical components, such as warm air, rain scrape, fan and so on, ON gear, ignition gear, is to get the whole vehicle power, ST gear is to start the whole vehicle and after starting, it should be returned to ON gear.

Fig.7 Gear of Ignition Block

#### ●Notice:

a. Once engine starts, lose hold at once and key rebounds itself. Or, started engine will drive the starting electric machine on the contrary to damage the electrical machine.

b. Continual starting time cannot be over 15s. If it cannot be started in 15s, you should start it a second time after 2mins. If failed in continual three starting, try it after finding the cause of trouble.

c. After starting the engine, make it freely rotate for minutes with a rotate speed of 800r/min. Only when the oil-pressure indicator is off and water temperature is high, can the tractor leave.

d. Oil pressure cannot be lower than 98kPa in any condition, or the trouble should be eliminated firstly.

e. When starting engine, you must step on the clutch pedal at the same time to switch on starting safety switch, or engine cannot be started (only for the models exported to USA)

### 5.3 Starting of Tractors

5.3.1 Engine is in low speed condition, step down on clutch pedal and then put gear shifting level of gearbox into needed gear position.



5.3.2 Ring the loudspeaker to see if there is fraise.

5.3.3 Speed up engine little by little and release clutch pedal slowly to make tractor start smoothly. After starting, clutch pedal should be released at once to avoid slip attrition.

5.3.4 Gun gradually to get work speed needed by tractor.

5.3.5 Semi-clutch-engaging to lower traveling speed is not allowed in operation. Don't keep foot on clutch pedal during running to avoid accelerating abrasion of speedup-tripping lever and friction wafer and damage of release bearing.

## 5.4 Steering of Tractors

5.4.1 Turning on road, if the speed is too high, tractor should be slow down first. Early turning and slow rotation and few rotation and few returning is for turning a big corner, late steering and quick rotation, and multi-steering and multi-rotation is for sharp turn.

5.4.2 When tractor turns little or changes direction on soft land, and steering doesn't work due to sideslip of fore wheel, you should step down on the brake pedal on the relevant side at the same time of turning steering wheel to help steering.

**Warning:** a. When tractor runs with high speed, single-side brake for sharp steering is forbidden. If fore wheel sharply turns with an outer corner, steering wheel should be returned a little when safety sounds cheep to avoid long-time overload of hydraulic steering system.

b. Before it works in field or is backed, work parts of farm tools that are under earth must be raised to above the ground to avoid damaging farm tools or any casualty.

## 5.5 Gear Shifting of Tractors

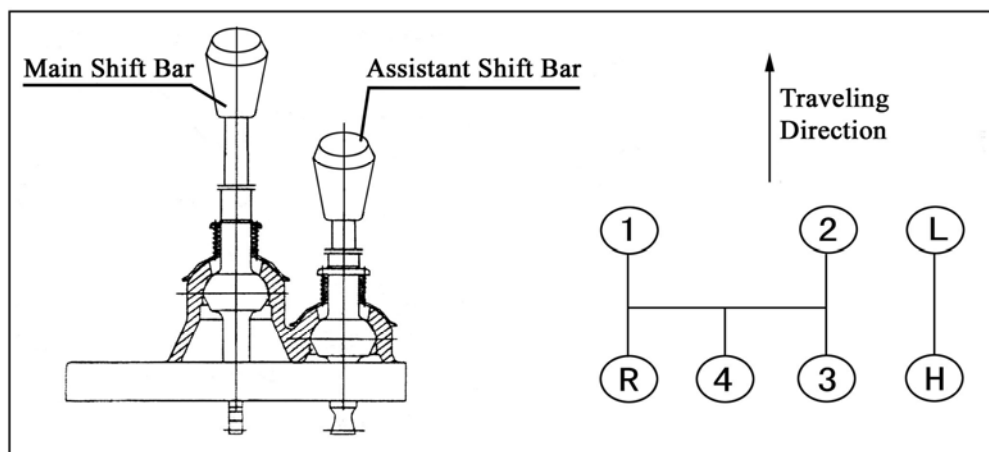


Fig. 8 Gear Shifting Position Diagram

To shift gears, step down on clutch pedal first to separate main clutch, and put shift bar of gearbox into the needed gears. (Fig. 8):

When shifting gears, it is common to step down on clutch to separate main clutch completely to avoid impact on gears during putting into gear. When shifting gears, shift bar can't be overexerted, or it is easy to break the shift axle travel limiter and cause disorderly gears.

## **5.6 Braking of Tractors**

5.6.1 Generally, the first step is to lower gears and step down on the clutch pedal and then step down on clutch pedal gradually according to specific circumstances to stop tractor smoothly.

5.6.2 For emergency stop, clutch and brake pedal should be stepped down at the same time and don't step down on only brake pedal to avoid friction wafer of brake being sharply fretted and engine stopping.

5.6.3 When tractor is running on roads, single-side brake for sharp turning is forbidden. The left and the right brake pedals should be locked together with interlocking board.



**Warning: Before using the tractor, brake should get checked. When tractor has path to run, left and right brake pedal must be locked to avoid wandering or even turning over during braking.**

## **5.7 Tractor Stopping and Cut-off of Engines**

5.7.1 Slow down accelerator and reduce tractor speed.

5.7.2 Step down on clutch pedal and then brake pedal. After tractor stops, you put shift bar of gearbox into neutral gear position.

5.7.3 Release clutch and brake pedals. Lower gear to run with idle speed.

5.7.4 Pull back the flameout slide rod, oil pump stops supply and engine will stop at once. Then push it back to the position of oil supply.

**●Notice: After stopping the tractor and before engine stops, driver can't leave the machine. If you have to park on sloping field, engage a gear please (forward gear for uphill position and backward gear for downhill position). If winter temperature is lower than 0°C and tractor has no antifreeze, cooling water must be let out in the condition of idle speed, and then stop the tractor to avoid uncompleted draining of cooling water and freeze off the machine body and water tank.**

## **5.8 Operation of Differential Block**

Step down pedal of differential block, two half-axle gears are locked by positive-acting and two rear wheels run at the same time. This can avoid skid due to sinking of one-side rear wheel to drive tractor out of slide path. Release pedal immediately after that to return the position automatically. Differential block is not

allowed to use when tractor turns or runs with high speed. (Fig. 9)

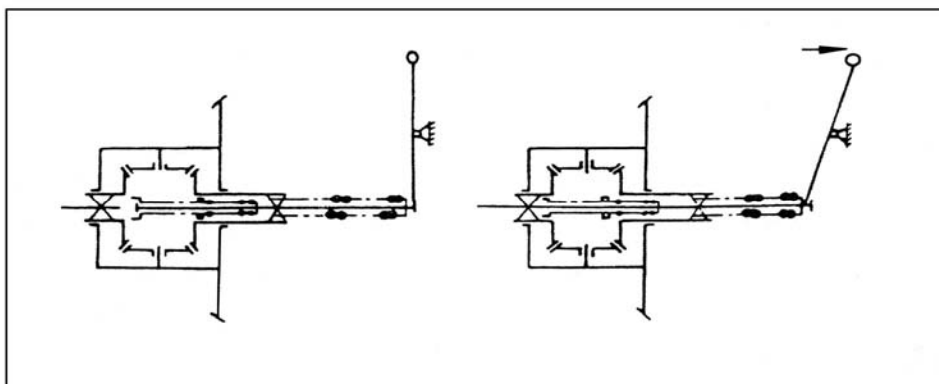


Fig. 9 Differential Block

●**Notice: Differential block is not allowed to use when tractor turns or runs with high speed to avoid damaging parts and accelerating abrasion of tires.**

### 5.9 Operations and Use of PTO Shaft

5.9.1 Step down the clutch pedal entirely, assistant clutch is separated and PTO shaft stops turning.

5.9.2 Press down the control bar of PTO shaft and PTO shaft is engaged.

5.9.3 When rototilling, rotate speed of engine should be controlled at 1800r/min and try to use the Low I gear.

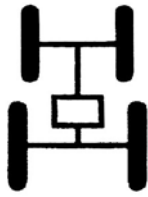
**! Warning: when PTO shaft is engaged, only operators can be near farm tools for personal safety.**

### 5.10 Operation of Front Driving Axle

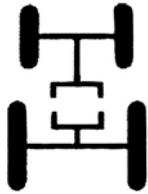
When 4-wheel driving tractor works with heavy load in fields or on moist soft earth, only rear wheels drive it. When traction is not enough, hitch fore drive axle to increase the traction of tractor and reduce slip times to raise the work adaptability of tractor. The following are the operation steps to make it easy to engage and separate fore axle:

When tractor works with heavy load in fields or on moist soft earth or works in paddy field, to improve attaching performance, fore drive axle is often hanged. Now pull upward the control handle of fore drive axle to connect fore drive axle. If it is difficulty, hold the handle and slowly pull it upward, and control the tractor to make two connected gears slightly relatively move. Push the control handle down and the fore drive axle will be separated at once.

When connecting the fore dive axle, tractor should run straight forward with low speed without traction.



Control handle upward—*anastomosis*  
(That means front wheels drive)



Control handle downward—*anastomosis*  
(That means front wheels don't drive)

Fig. 10

●**Notice:** 1. Tractor transports on hard roads, connecting fore drive axle is not allowed, or early abrasion of front tires is caused. Only in raining or snowy weather and on slippery paths, or when rear wheels are easy to slide during uprising, can the fore drive axle be connected. When tractor runs out of difficulty section, fore drive axle should be separated.

2. During tractor transporting, if the for tires fray early and patterns of two sides of a tire fray unequally, the left and the right tires can be exchanged.

3. To avoid early abrasion of tires, inflation pressure must meet stipulation.

### 5.11 Use of Bob Weight

#### 5.11.1 Rear-positioned Weight (choice)

To increase the traction of tractor, set up cast-iron bob-weights that is 45kg per piece. Two pieces (90kg) four pieces (180kg) or six pieces (270kg) can be set on one side.

#### 5.11.2 Front Bob Weight (choice)

Front bob weights of HHJM tractors are all 27.5kg per piece. You can choose six pieces or eight pieces.

### 5.12 Operation and Use of Hydraulic Suspending System

#### 5.12.1 Theory and Operation of Hydraulic Lifter

Semi-divided positioned hydraulic lifter involves combined load and position control handle (Fig.11.) Position control, combined load and position control and floating control are available.

a. Fig. 11 shows the working theory of hydraulic lifter. Control handle 6 is to lift and drop farm tools to control plow depth.

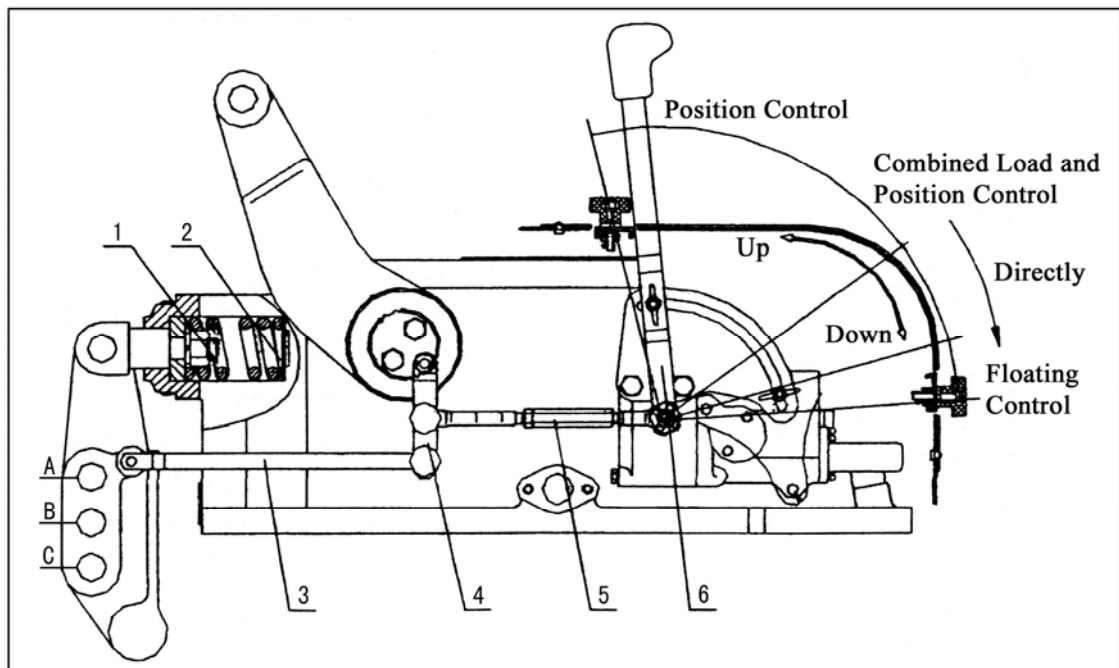


Fig. 11 Functional Diagram of Hydraulic Lifter

- |                           |                    |                      |
|---------------------------|--------------------|----------------------|
| 1- Spring of Load Control | 2-Adjusting Gasket | 3-Load Control Level |
| 4- Position Control Level | 5- Regulating Nut  | 6-Control handle     |

b. Use of Control Handle of Lifter (Fig.12)

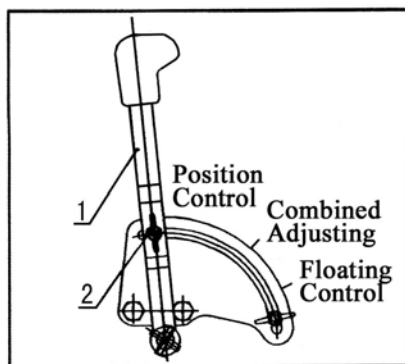


Fig.12 Control Way of Hydraulic System

- |                             |
|-----------------------------|
| 1- Handle                   |
| 2- Butterfly Nut on Stopper |

#### (1)Combined Load and Position Control

Use combined load and position control during plowing. Lockpin of gag lever post of the suspending gear should be inserted on non-gag post hole. Moving the control handle controls plow depth. In the range of combined control, the lower control handle stays the deeper plow depth is. When reaching the required plow depth, tighten the butterfly nut on stopper. Make sure that every time the farm tool is lifted or dropped, the control handle touches the stopper to keep the plow depths consistent

#### (2)Position Control

When it rotary tills, mows, and reaps (Lockpin of gag level post of suspending gear

should be inserted on gag post hole), suspending lifting level is under pulling force, and load control spring is not useful. Now the combined control is actually the position control. In the range of position control, the lower the handle moves, the more the farm tool drops.

### (3) Floating Control

When using farm tools with land wheels, you can choose floating control. Put control handle in the range of floating control, and now through land wheel, the farm tool will move forward with undulate following the earth's surface.

#### 5.12.2 Lowering Speed Control of Farm Tool (LSCFT)

Adjust the control hand wheel to change the lowering speed (Fig. 13). Proper lowering speed can keep the farm tools from severely impinge against land caused by too high speed dropping.

The control hand wheel of lowering speed directly controls the lowering speed valve on cylinder end. Turn the control hand wheel of lowering speed deasil, the farm tool will drop faster. Contrariwise, drop more slowly

When with farm tools, tractor moves for long distance, back out the control hand wheel of lowering speed widdershins for safe transfer.

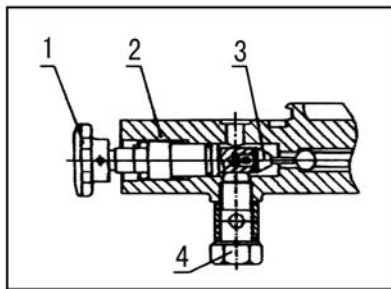


Fig.13 Control Valve of Lowering Speed  
and Simple Hyddraulic Output

1- Control Handle Wheel of Lowering Speed

2- Cylinder End

3-Control Valve of Lowering Speed

4- Jam of Hydraulic Outlet

#### 5.12.3 Simple Hydraulic Output

When hydraulic oil needs transmitting, take down the jam head of hydraulic outlet on the upper part of cylinder end, and connect up h-pressure oil pipe. At the same time, take down oil-return plug on lifter body and connect up oil return pipe for hydraulic output. During operating, put the suspending bar in the lowest position and then tweak fast. Then put the control handle on the position of “lifting” to let hydraulic oil exported to hydraulic devices needed. Move the control handle down and incoming oil in hydraulic oil pump will return to oil pool. Returned oil in hydraulic devices flows back to oil pool through oil return pipe.

#### 5.12.4 Operation of Hanging Setup

HHJM tractor is equipped with three-point suspending device to connect farm tools. Height of lifting level can be adjusted according to two schemes (Only one adjusting way for specific model). Scheme I is to change the length of lifting level through adjusting the outer sleeve of lifting level 2 to control the lifting height of draught link (See Fig. 14a), scheme 2 is to change the length of lifting level through adjusting

regulating handle to control the lifting height of draught link (See Fig. 14b and Fig. 15).

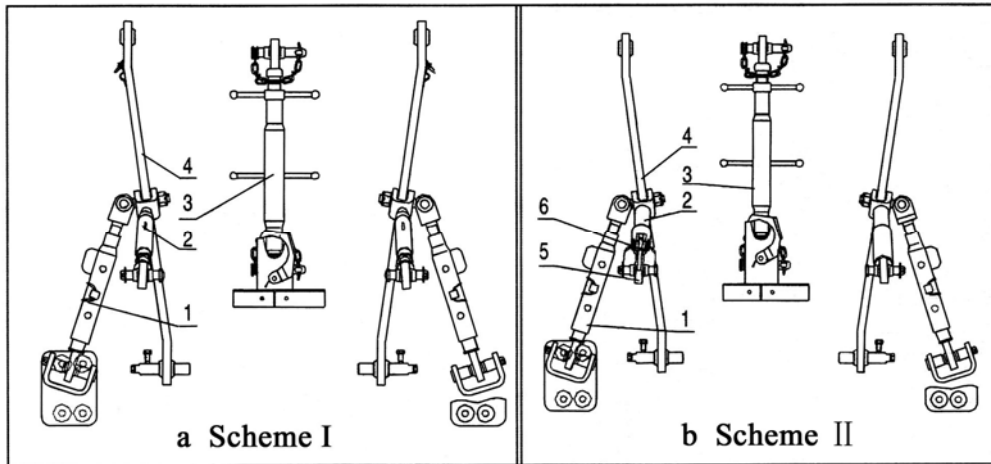


Fig.14 Elementary Diagram of Adjusting Suspending Mechanism

1- Gag Lever Post    2- Lifting Lever    3- Upper Link    4- Draught Link  
5- Regulating Handle    6- Locking Spring

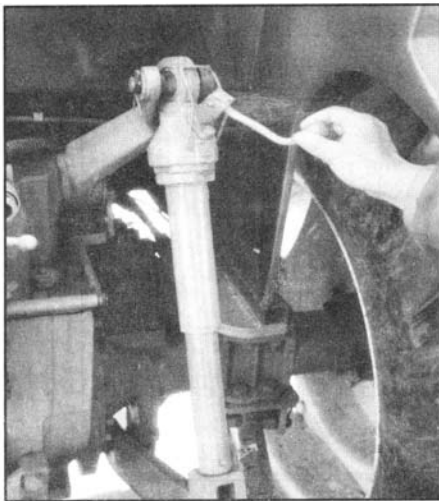


Fig. 15 Suspending Adjusting Device

There are three hanging holes for upper link on the rocker of load adjusting spring. When using combine load and position control, in normal condition, use the middle B hole, while the upper A hole for earth with large resistivity and the Hole C for position control.(See Fig. 11)

#### 5.12.5 Hanging Farm Tools.

Put the control handle to the lowest position, tractor slowly backs up to approach farm tools, connect up the upper left link and then right link, and then lock it up with lockpin.

#### 5.12.6 Operation of Rotocultivator

##### a. Adjusting Rototilling Depth

1) Move the handle up slowly, and rotocultivator will rise slowly. When handle

reaches the highest position, the rotocultivator gets to the top position,

2) Control Handle moves down slowly and the rototilling will drop slowly from the top position. When the cutter tooth is 10cm away from the ground, supported by power, serrated knives rototilling rotates. After rototilling serrated knives cut into earth, the rotary tillage begins. If the handle keeps moving down, the plow depth will be increased to get required one and use orientation handwheel under the fan plate to ward below hand rod to lock the handle wheel.

#### b. Operation of Rototilling

To turn at the end of a field, cut the power transmitting first, and then lift the rototilling (to avoid damage).

### 5.12.7 Choice of Using Ways of Plough and Operation.

#### a. Height-adjusting Operation

Height-adjusting means to control plow depth with land wheels supported on plough. Control handle moves up to the top position, the plough will rise to the top position. Control handle moves down to the lowest position, the plough will drop. Land wheel controls the dropping height of plough. Dropping of handle has no effect on the height.

#### b. Combined Adjusting Operation

Take off the land wheel of plough. Move the control handle down to a certain position, and the plough will drop to a certain position. The plow depth is controlled by the different positions of the fan plate on the handle. This way is called combined adjustment.

After confirming the depth of plowing, lock out the position at the trough of back closure of the board opposite to handle to make sure that moving of handle can be controlled with the position fixing hand-wheel under the fan plate to guaranteed the same dropping position ever time to make every plow cycle have the same plow depth.



**Warning: with heavy farm tools, the control handle should be moved upwards slowly to avoid turning over.**



## Chapter Six Adjustments and Maintenance of All the Parts

### 6.1 Adjustments and Maintenance of Clutch

#### 6.1.1 Adjustment of Clutch and Control System.

##### a. Adjustment of free Travel of clutch pedal

When clutch is used, abrasion of friction wafer and platen makes the clearance between the head of clutch finger and end face of release bearing reduced gradually (the normal clearance is 2-2.5mm). Sometimes it even can cause head of clutch finger touching the end face of release bearing to make clutch skid and pedal free travel disappear. In this condition, control system should get check and adjusting. The following are the adjusting steps:

Release blocking nut, revolve withershins control operating rod to get a clutch pedal free play of 40~45mm (the relative clearance between the head of clutch finger and release bearing is 2~2.5), and then put nuts tightly.(See Fig. 16)

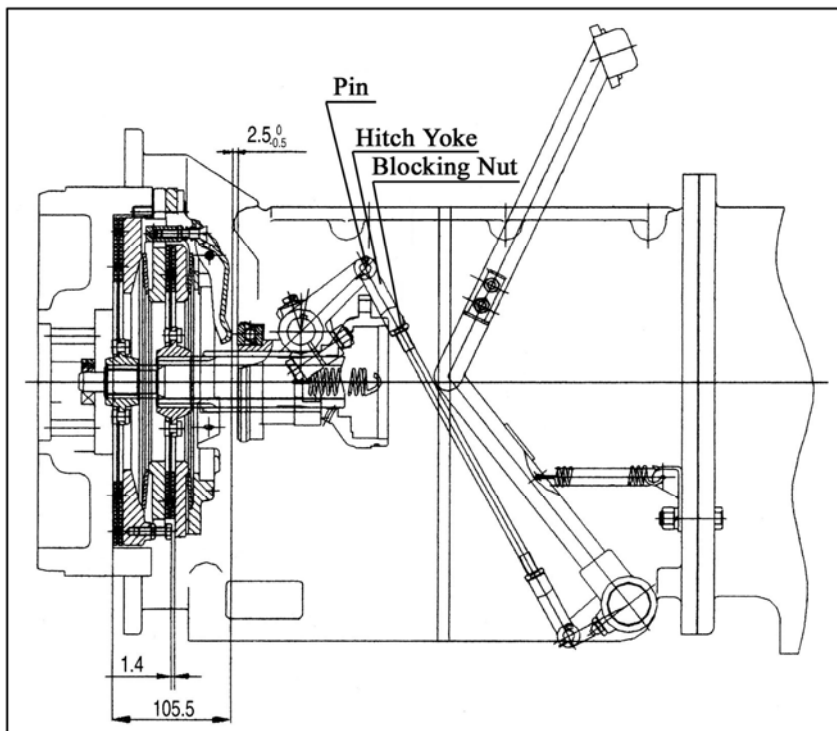


Fig.16 Adjustment of Clutch Pedal Free Travel

##### b. Adjusting Clutch finger

When the above adjusting way can't result in a free travel of 40~45mm, it means the release bearing base has moved back and lean on the No.1 bearing seat. Move the

peep hole cover on gear box, release nut and turn adjustable bolts of tripping lever with a wrench to get a clearance between three heads of clutch finger and the rear end face of engine flywheel casing of 95.5mm.. Three clutch fingers should share a same side and error should not be bigger than 0.2mm. After adjusting, put nuts together tightly. And then mount the cover of sighting port. See if check pedal free travel is in the range of 40~45mm(See Fig.17).

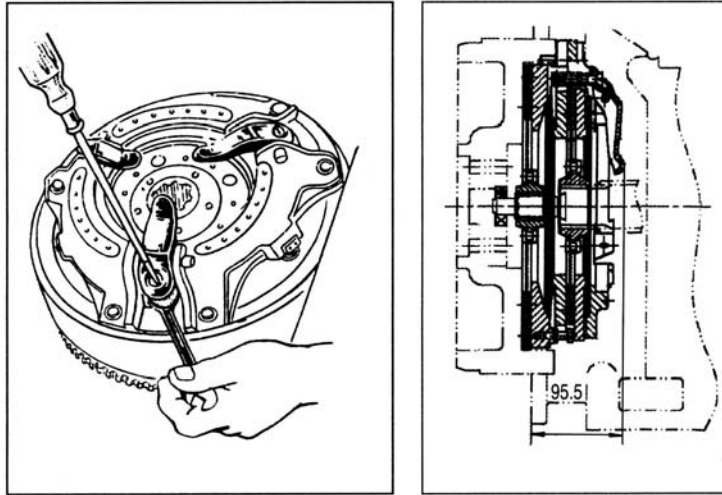


Fig.17 Adjusting of Clutch Finger

#### c. Adjusting Release Travel of Main Clutch

There should be proper pedal travel from the withershins of main clutch to assistant clutch beginning separating to avoid too-early releasing or ir-releasable of assistant clutch. To get a groper travel, the clearance between head end sides of three adjustable bolts 2 on clutch main press board and dummy clubs1 of assistant wafer press board is 1.4mm. During adjusting, release blocking nut (4), turn adjustable bolts, and use clearance gauge to get a clearance of 1.4mm between head end sides of adjustable bolts and dummy club of assistant wafer press board. After finishing adjustment, put nuts together tightly. (Fig. 18)

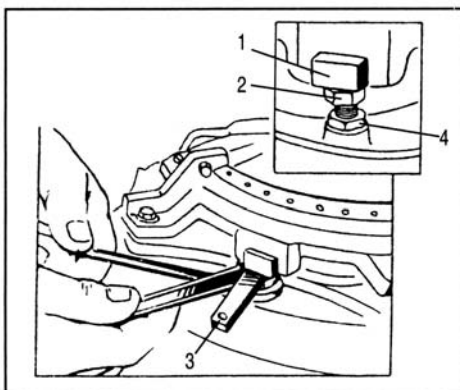


Fig.18 Adjustment of Clearance Between Release Bolt and Hold-down Plate Club of Assistant Friction Wafer

- 1- Hold-down Plate Dummy Club of Assistant Wafer Press Board
- 2- Adjusting Screw
- 3- Chock Gauge
- 4- Nut

### 6.1.2 Maintenance of Clutch

a. Frequently check and see if there's oil seeping or leakage in the cotter pin hole on gearbox bottom. If it is seeped or leaked, timely check the rear oil seals of the first shaft of gearbox and power axle shaft.

b. Release bearing seat needs regular grease filling.

c. When setting up clutch assembly, it will be set up on special core axle. Insert it into the flywheel-bearing hole to make the splined holes of main and assistant friction wafers assemblies homocentric to let engine and gearbox connected easily.

d. There is a group of crescent adjusting spacers respectively between backing strips of assistant friction wafers and between clutch covers. During heavy repair, if main and assistant friction wafers are found heavily frayed, you can reel off some adjusting spacers to guarantee enough pressure on dishing spring.

## 6.2 Adjustments and Maintenance of Gearbox

Gearbox has 8 drive gears and 2 reverse gears. During operation, they don't need adjusting. However the following points should get attention:

Lubrication oil of gearbox is through to rear axle. Refill opening is on lifter body (see Fig.19). When draining the oil, respectively screw off screw plugs of gearbox and rear axle. Wash the slag adsorbed on screw plugs.

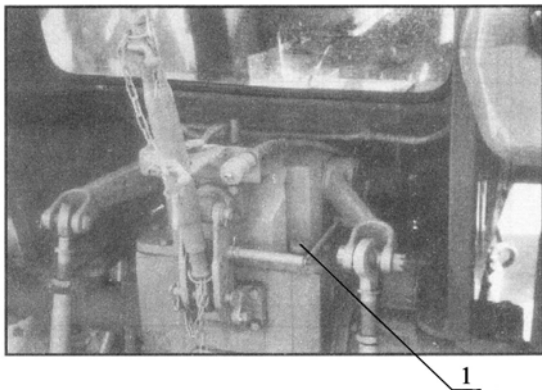


Fig.19 Refill Opening of Gearbox  
1- Refill Opening

## 6.3 Adjustments and Maintenance of Rear Axle

Rear axle consists of central drive, differential gear, differential block, final drive, left-and-right half axis, PTO shaft, control gear and others.

### 6.3.1 Central Driving Spiral Bevel Gear

a. Clearance Adjustment of Driving Spiral Bevel Gear Bearing 30209, 32310

If there's axial clearance of bearings 30209 and 32310, you can release Anti-receding Spacer, tighten round nut until pre tightening moment is 0.75—1.50N.m during singly turning driving spiral bevel gear. Lock the Anti-receding Spacer tightly (Fig.20).

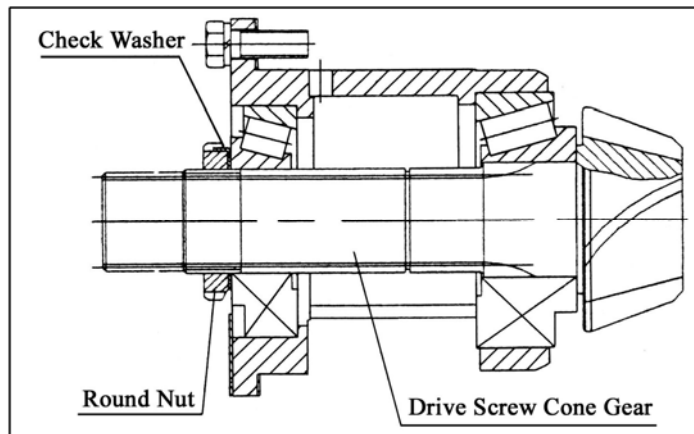


Fig.20 Clearance Adjustments of Driving Spiral Bevel Gear Bearing  
b. Axial Clearance Adjustment of Differential Gear Assembly Bearing 30215 (Fig.21).

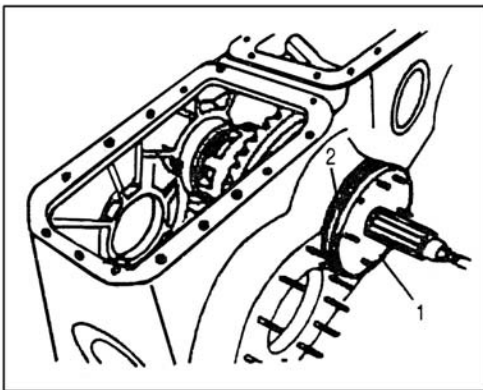


Fig.21 Clearance Adjustment of Differential Bearing  
1- Bearing Seat of Semi Minor Axis  
2- Spacers

If there's axial clearance of differential gear assembly bearing 30215, you should take off spacers (2) from the bearing seats of left and right short half axles (1) equally. Tighten the bolts that fix the bearing seats of left and right short half axles. Pull driven spiral bevel gear with hands (Disassemble the driving spiral bevel gear and Final Reduction Gear on both sides). It's better to turn with little force.

c. Pretightening and Adjusting of Differential gear Bearing 30215

1)Put differential gear assembly into the body of rear axle. Oil lubrication oil on bearing and tooth surface, drive in bearing (NJ311E) outer ring to reach the designated position in left-and right short half axles assemblies. Install the two assemblies (without adjusting spacers) into case hole to support differential gear assemblies.

Tighten the two countersunk head bolts on the left at first, and tighten five special M12×25 bolts with a moment of 60N·m.

2)Screw five special bolts M12×25 equally into short half axle assembly on the right to get a frictional resistance moment on differential gear of 5.5-8N·m (drag torque

of driving bevel gear included). Or you can twine galloon on cover of differential gear to get a pull force of 70-100N measured with a spring scale.

#### d. Measuring Flank Clearance

Normal-direction backlash of central drive gear pair is 0.3~0.4mm. The two measuring ways are: The first way, position contact of micrometer with dial indicator on the big end tooth face of driven spiral bevel gear (move direction is normal to tooth face). Fix driving spiral bevel gear, rock the driven spiral bevel gear according to the revolving direction, and the reading on dial indicator is the backlash. The other way is to put a lead sheet with a length of 15~20mm and a ply of 0.5mm between the forward stress surfaces (concave of the driving spiral bevel gear, and convexity of the driven spiral bevel gear) and turn the gear. The thickness of the extruded big end of the lead sheet is the normal-direction backlash. Whichever way you use, the measured points should be more than three points and they should also distribute around the gear circle.

#### e. Check and Adjustment of Region of Engagement

Paint thin and homogeneous red lead on the two tooth faces of driven spiral bevel gear. Divide the gear into four parts equally with 3~4 teeth every part. Positively and negatively turn the gear for several rounds. The impression stuck on the driving spiral bevel gear is meshed impression. The two tooth faces of gear teeth have contact zones of tine-length direction not less than 50% of gear height. The meshing zones are located in the middle on the small end of tooth face but it should be not less than 5mm from ends.

See Fig.22 for adjusting ways.

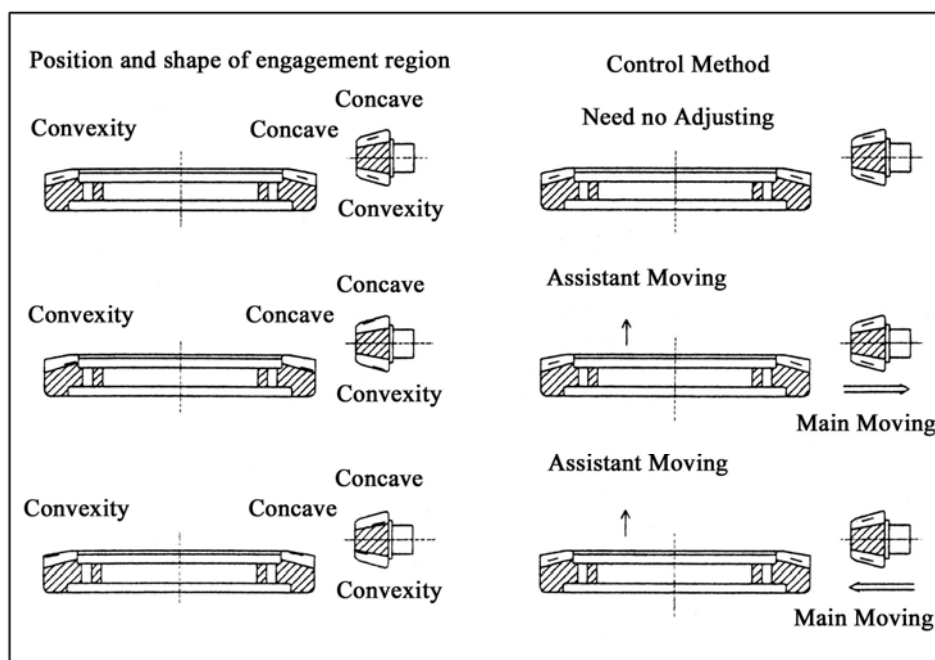


Fig.22 Control method of engagement region

#### f. Adjustment of Flank Clearance

Flank clearance is adjusted by increasing or reducing the adjusting spacers of driven spiral bevel gear bearing seat and the final flank clearance is 0.2~0.4mm.

#### 6.3.2 Operation and Maintenance of Rear Axle

- a. Central transmission driving and driven spiral bevel gear pairs must be exchanged in pairs.
- b. When using differential block, tractor should be kept running straightly without turning steering wheel. Or the parts can be damaged.
- c. When tractor backed, PTO shaft Control handle should be positioned on the neutral gear to avoid the abrasion of farm tools or accidents.

### 6.4 Adjustments and Maintenance of Brake

There are two wheel brakes on the tractor that are set on the left and the right short half axles of rear axle symmetrically and connect with brake control gear.

#### 6.4.1 Adjustments of brake and control gear

##### a. Adjustments of the Free Travel of Brake Pedal

When brake strip assembly and brake pressure plate are non-brake condition, the relative surface total clearance is 1~1.4mm and the relative free travel of brake pedal is 90~120mm. After the brake strip is frayed, the free travel of brake pedal needs adjusting. The following are the adjusting ways: Release the blocking nut on the draught rod of brake plate and then turn the nut clockwise to reduce the free travel of brake pedal, contrarily it will be increased. During adjusting, the free travels of the left and the right pedals should be kept the same, and it is guaranteed that the clearance between brake rocker arm and brake rocker arm seat is  $8\pm2$ mm. Tighten the nut after adjusting. (See Fig. 23(a) (b)).

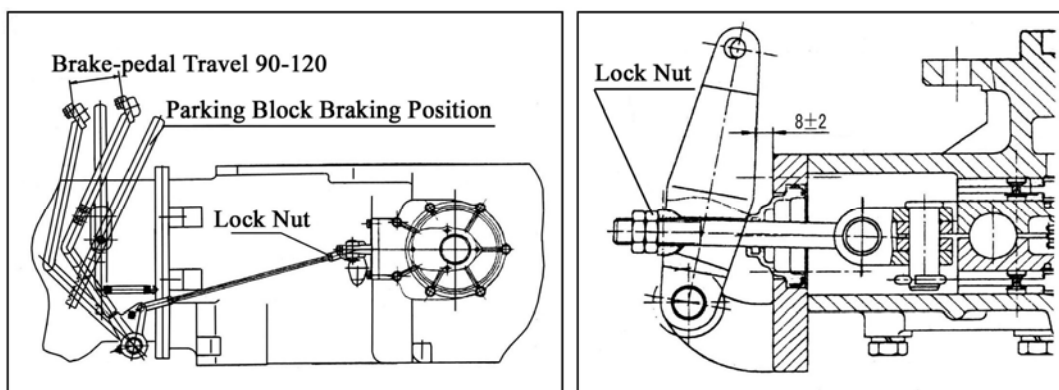


Fig.23 a. Free-travel Adjustment of Brake-pedal b. Free-travel Adjustment of Brake-pedal

b. Adjustment of the total clearances between the left and the right brake strips: When the total clearances are not the same and different widely, the above adjustments can't meet requirements. You can increase or reduce adjusting spacers 1 on brake cover and start the above adjustments after adjusting total clearances (Fig.24).

c. The brake results of the left and the right brakes should be kept the same. Check

the pulling length of the tires during an emergency brake on a concrete road. Adjust them by adjusting the positions of blocking nuts on the brake plate draught rod and then tighten them.

#### 6.4.2 Operation and Maintenance of Brake

a. When brake strips are found oil stained, wash and air with gasoline first and then install them on tractor.

b. Check the leakproofness of the oil seal on brake body and cover frequently. Replace it if it has no effect.

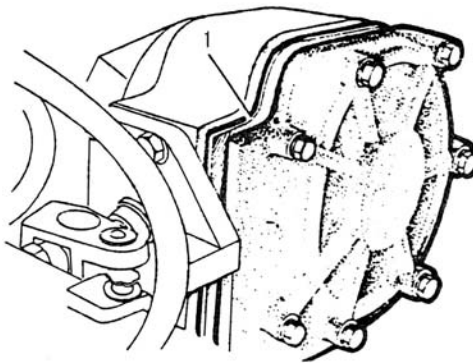


Fig.24 Adjustment of the total clearances between the left and the right brake strips  
1- Adjusting Spacers

● **Notice:** The left and the right brake pedals should have a same free travel, or tractor will have a quick yaw during emergency brake to result in accident.

### 6.5 Adjustments and Maintenance of Steering System

#### 6.5.1 Full-hydraulic Steering

HHJM70~80 serial wheel tractors are equipped with separated-positioned full hydraulic steering, consisting of cycloid rotary-spool-valve full hydraulic steering, steering oil cylinder, oil tank, cross tie, continuous-flow overfull pump and oil pipes. Steering oil tank is installed on the right of the fore axle. See Fig.25 for oil pipe joints. See Fig.26 for hydraulic steering theory. It needs no adjusting during operation but the following need attention during operation and maintenance.

a. Check the oil level in the steering oil tank (Steering oil cylinder and pipes should be full of oil when refilling), add it timely if it is not enough.

b. Continuous-flow overfull pump, oil tank, steering oil tank, and the joints of inlet and outlet of redirector and oil pipes should be tightened to avoid oil seeping. If there is oil seeping, spacers and seal rings should get checked timely to see if they are damaged.

c. Frequently check if there's oil impregnate at the piston rod of oil cylinder. If there is oil impregnate, check oil seal timely. If the oil seal is disabled, replace it timely.

d. If the steering cross tie ball spigot and steering oil cylinder both have loose bolts on the two ends, replace the damaged parts in no time.

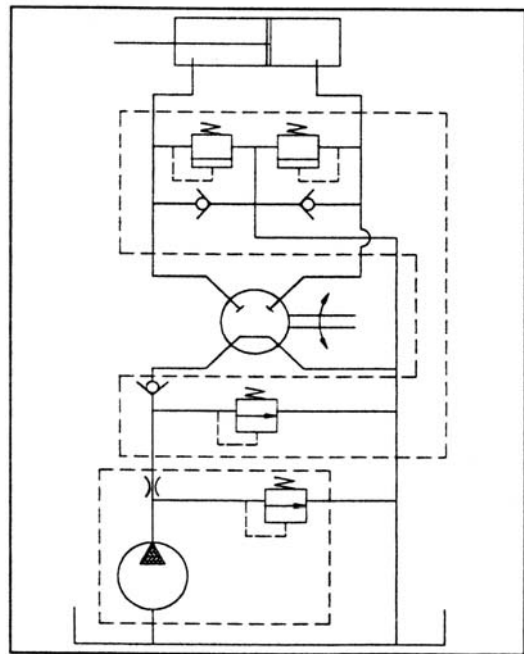
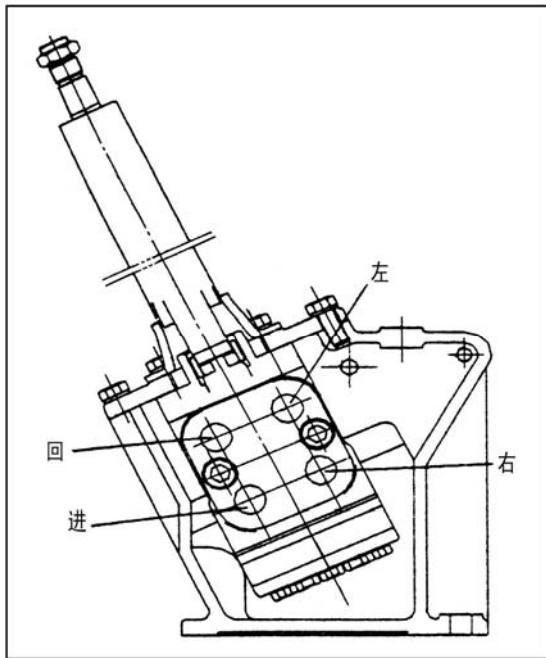


Fig.25 Position of fuel pipe union      Fig.26 Principle Figure of hydraulic Steering

## 6.6 Adjustments and Maintenance of Fore Shaft (Axle)

Fore shaft (axle) is to set up the front wheels and also the fore support of tractor. It endures all the weight of the front tractor through front wheels.

### 6.6.1 Adjustment of Toe-in of Front Wheel

To lessen the abrasion of the front tires, toe-in of front wheel should get checked termly (Fig.27).

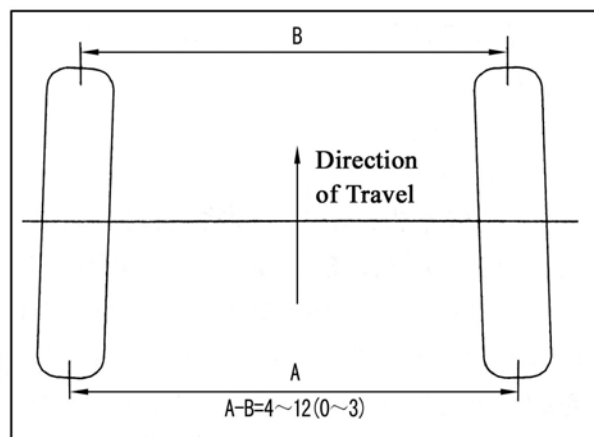


Fig. 27 Adjustment Diagram of Toe-in of Front Wheel

The following are the adjusting steps:

- a. Make directive wheels face straight-ahead.



b. At the same level height with the center of directive wheels, measure the clearance between the front ends and the back ends of the two directive wheels.

c. Screw the cross tie to make the clearance of between the front ends 4~12(0~3) mm less than between the back ends.

d. Tighten nuts on the two ends of cross tie.

#### 6.6.2 Adjustment of the Clearance of the Front Wheel Bearings:

During using, the front wheel bearing is frayed to let the clearance increase. The bearing can be easily damaged without timely adjusting the clearance. When adjusting, support the front axle to let the front wheel bearings unloaded. Disassemble the boss cover, pull down the cotter pin, tighten the castle nut, and then regress 1/10~1/30 round. Install cotter pin and front wheel boss cover at last (Fig. 28).

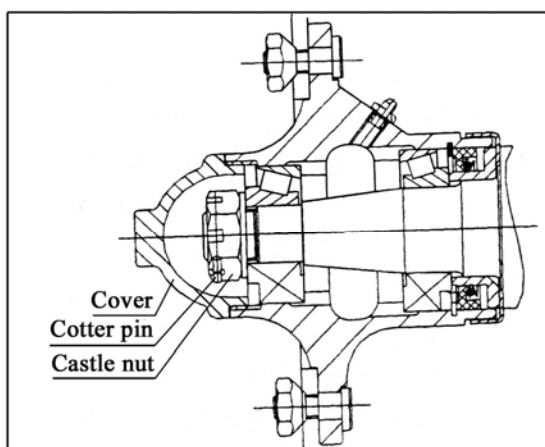


Fig. 28 Adjustment of the Clearance of Fore Bearings

6.6.3 Adjustment of Clearances between the two ends of pivot center cover and between supports of front axles (Fig.29):

The abrasion of the spacers on the two ends of pivot center cover leads to the increase of the clearance to cause impulsive load. So it needs adjusting timely.

Adjusting way: Reel off the spacers between pivot center seat and the front axle support to let the casing discreteness here swing flexibly without obvious axial clearance.

#### 6.6.4 Refill Lubrication to Four-wheel Drive Front Axle

Front axle of HHJM704/724/754/804 tractor is divided into three oil containers.

The central oil container is in the front axle of tractor. Check the oil level from the front inlet port of the front axle termly. If the level is obviously reduced, refill lubrication oil until the inlet port. When replacing engine oil, screw out the oil drain plug on the fore axle bottom to discharge all the dirty oil and then screw tightly the plug. Refill oil from the inlet port until the inlet port and then screw the inlet plug tightly.

When endmost transmission oil level needs checking, turn tires. Screw out the plug and oil level should reach the plug hole, or engine oil heed refilling. When replacing

engine oil, turn front wheel to let the plug in the lowest position. Screw down the plug and discharge entirely stained oil to let the tie-line of screw plug and the central point of front wheel in level position. Refill new engine oil to plug mouth and tighten screw plug.

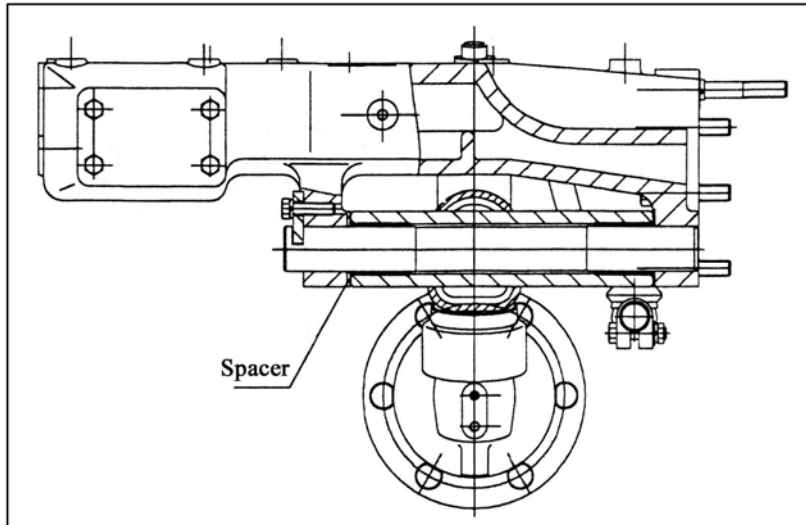


Fig.29 Adjustment of Clearances between the two ends of pivot center cover and between supports of front axles

#### 6.6.5 Refill lubrication grease of the front axle

Fill lubrication grease to the central balance pin of the front drive axle.

Grease cups of two lubricating main pins on sides of the front drive axle need lubrication grease refilling at least twice every year.

### 6.7 Adjustments and Maintenance of Transfer Case

For four-wheel driving tractor, oil drain plus of transmission system are on the flanks of transfer case. Only from here can the dirty oil of drive system be discharged completely while the inlet position doesn't change.

### 6.8 Adjustments and Maintenance of Wheels

The ribbed pattern on outer casings of front tires can prevent sideslipping of tractor.

#### 6.8.1 Adjustment of Tread

Adjusting Way: Support the front shaft of tractor with a jack to let the front wheels leave the ground. Release the nut<sup>3</sup>, draw out bolt<sup>2</sup>, disassemble cylinder wrist<sup>1</sup>, adjust cylinder position, and release adjustable bolt of cross tie. Move the support of directive wheel to a needed tread, insert bolt into nut and tighten it. Adjust cross tie to a relative length, tighten the adjustable bolt of cross tie, tighten cylinder wrist, insert cotter pin and lock nut up. (Fig.30)

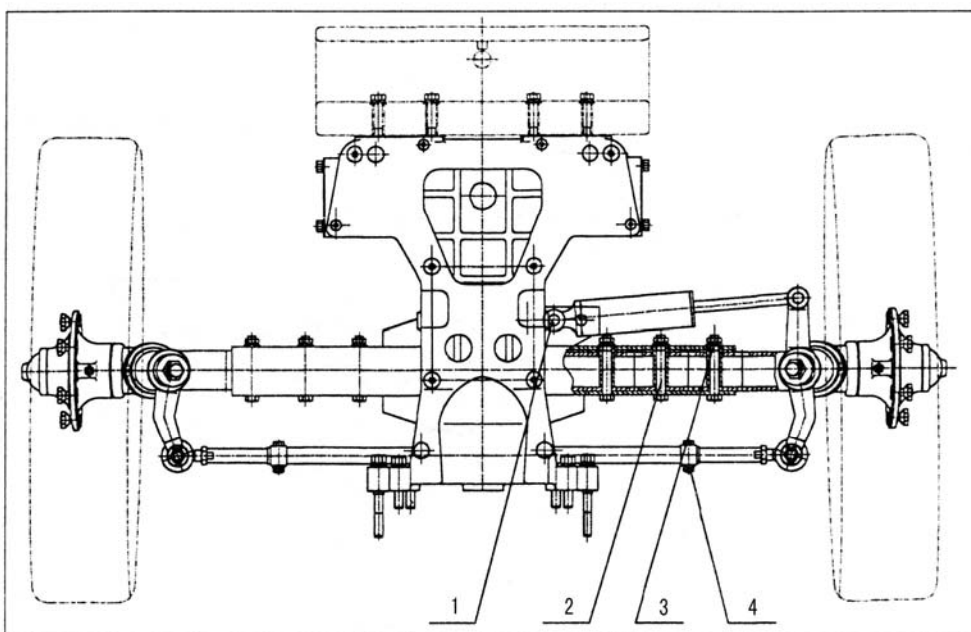


Fig.30 Adjustment of Front-wheel Tread

1- Pin of oil cylinder    2- Bolt    3- Nut    4- Adjustable Bolt of Cross tie  
See Form 6-1 for Adjustment of Front-wheel Tread

Form 6-1 Adjustment Range of Front-wheel Tread

Model	Tire Spec	Adjustment Range of Front-wheel Tread
HHJM-700	6.5-20	1350-1650
HHJM-720	6.5-20	1350-1650
HHJM-750	6.5-20	1350-1650
HHJM-800	6.5-20	1350-1650

**Notice:** Front-wheel Tread of four-drive is a fixed value.

#### b. Regulating of Rear-wheel Tread

Regulating Way: The tread is regulated by changing fittings of circular rim and radial plate and exchanging the left and the right wheels (Fig.31). When regulating, revolving-direction mark of tires should be the same with the running direction of ongoing wheels.

See Form 6-2 for Tread adjustment of Rear Wheel

Form 6-2 Adjustment Range of Rear-wheel Tread

Model	Tire Spec	Adjustment Range of Front-wheel Tread
HHJM-700/704	14.9-30	1370, 1390, 1510, 1650, 1770, 1790
HHJM-720/724	14.9-30	1370, 1390, 1510, 1650, 1770, 1790
HHJM-750/754	14.9-30	1370, 1390, 1510, 1650, 1770, 1790
HHJM-800/804	14.9-30	1370, 1390, 1510, 1650, 1770, 1790

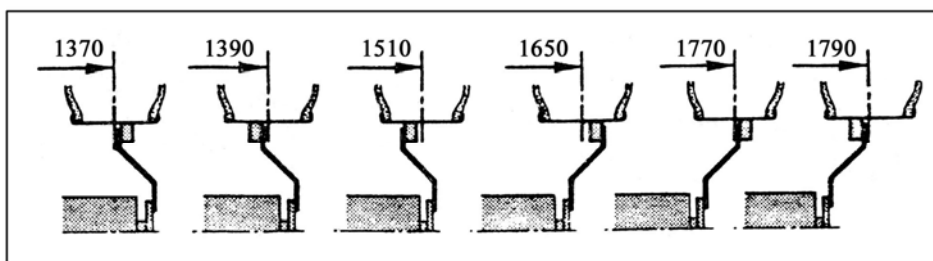


Fig. 31 Adjustment of Rear-wheel Tread

#### 6.8.2 Use and maintenance of Tires

a. Air-pressure of tires should meet requirement: Air-pressure of directive wheel is 0.2~0.25Mpa. Air-pressure of drive wheel is 0.11Mpa (field husbandry), 0.14 Mpa (transportation).

b. When drive wheel has a severe trackslip, stop the tractor.

c. Don't drive with high speed on any uneven path or get cross detritus, pad or cinder. Try not to use an emergency brake.

d. When the abrasion of tire strias is not even, the left tires and the right tires need exchanging.

e. Don't let tires stained with fuel, lubrication oil or other dirt. Wash or rub up if necessary.

f. If tractor will not work for a long time, prop up the tractor to keep tires from enduring pressure.

#### 6.8.3 Disassembling and assembling Tires

##### a. Disassembling Tires

1) Deflate the air in inner tubes.

2) Press a cover tire side in to the flute in middle of steel ring from the plane of steel ring.

3) Extrude tommy bar into steel ring. Pry cover-tire side near air tap out steel ring with another tommy bar and then trade off the two tommy bars until pry the whole cover tire out steel ring.

4) Take out air tap of inner tube from the air hole of the steel ring and then take out inner tube from steel ring and cover tire.

5) Press one border of the other side of cover tire into flute of steel ring and take out the cover tire from the other border with a tommy bar.

6) Don't pry inner tubes broken when using tommy bars.

##### b. Assembling Tires

1) Smear a thin layer of talcum powder on the inner side of cover tire and the outside of inner tubes.

2) Set the steel ring level (the side with air tap faces upward), set cover tires into the steel ring by prying with tommy bars or beating in with hammer.

3) Pick up tires and steel rings, push cover tires to one side and position inner tube into cover tire (You can make tap traverse air tap hole and screw air tap cover and fasten it with lead wire).

4) Push steel ring to half side and step on the other half cover tire. Press cover tire into the flute in middle of steel ring, extrude tommy bar into steel ring, and pry cover tire into steel ring with tommy bar.

## 6.9 Adjustments and Maintenance of Electric System

The voltage of electric system of the tractor is 12V with silicon rectification generator, minus earth, and earth return system. The system consists of engine starting equipments and lightening signal. See Fig.32 for the elementary diagram of electric circuit:

Engine starting equipments includes starting electric machine, charging generator, storage battery, ignition switch. See diesel manual for the details of the operation and maintenance of these equipments.

Lightening and signal devices include head light, Front combined lights, Backward Light, railing light (steering and position), Rear Light Assembly (steering, position and braking), combined meters, fuse box and so on.

The following are the operation of lightening and signal devices.

### 6.9.1 Adjustment of Headlight

Just like Fig.33 shows, Light Distribution Curve is applicable to right-driving system. If the adjustment of headlight needs checking and adjusting, follow the next steps:

- First, check the air pressure of tires to meet the rule. Position the tractor (unload) on the level ground, facing a glabrous and flat wall.
- Mark a “t” on the wall corresponding to the CL of the headlights.
- Let tractor 5m away from the wall and turn on the dim light.
- Datum point P-P (Fig.33) lies 5cm lower than the “+” marks.



Fig.33 Light Distribution Curve

- Turn adjustable bolts of headlights boltsto adjust Light Distribution Curve of headlights.

6.9.2 Maintenance of Fuse flake in fuse box. See Form 6-3 for electric currents and protected electrical appliances gears. When electric element has open circuit, check the

fuse in fuse box firstly. If it's damaged, take down a spare golden fuse from circuit board immediately to electric elements.

Form 6-3 Electric Currents and Protected Electrical Appliances of Every Gears

Fuze Grade	Rating Working Current (A)	Protected Electric Apparatus
I	10A	Brake Lamp and Trumpet
II	10A	Direction Light
III	10A	Headlight dim light
IV	10A	Headlight traffic beam
V	15A	Meter power Buzzer Main Power Relay Engine Adjuster
VII	10A	Parking Lights

6.9.3 Group meters are adopted including: water temperature gage, fuel meter, speed indicator, steering indicator, lower and upper beams signaling, position light, charge lamp, warning device of engine oil pressure and air-pressure alarm device.

## 6.10 Adjustments and Maintenance of Air-braking Device of Trailers

### 6.10.1 Use of Air-braking Device of Trailer

The air-braking device is mainly used on tractor-trailer to brake during tractor-trailer transporting for its safe running

### 6.10.2 Buildup of Airbraking Device of Trailer (Fig.34)

Trailer air-braking device consists of compressor1, air tank2, braking valve9, air pipe11 and control gear.

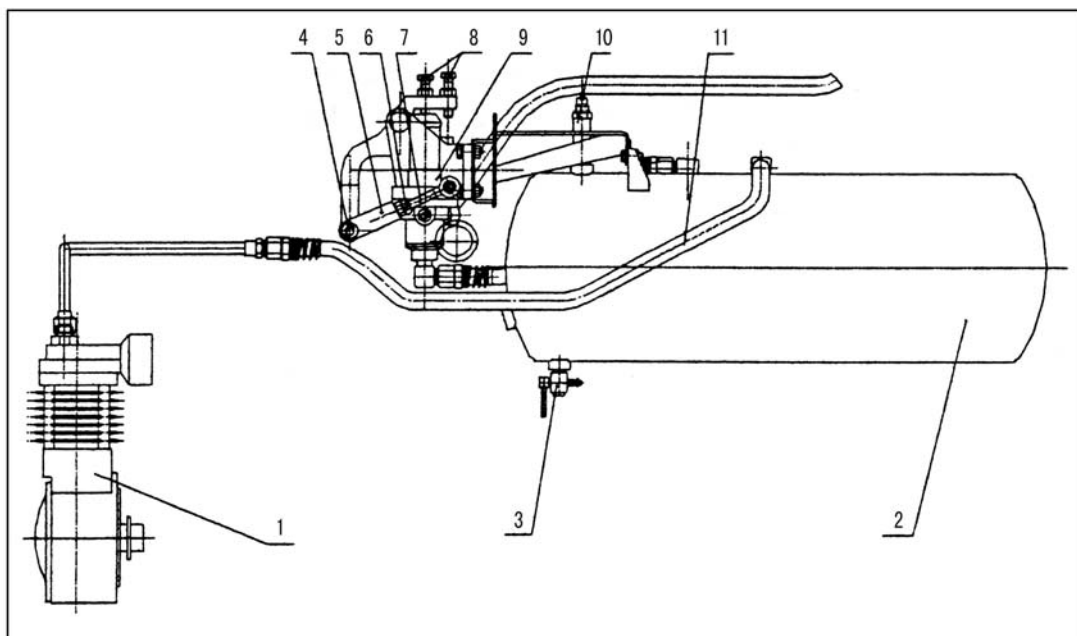


Fig.34 Air Braking Device

- 1- Inflator    2- Air Tank    3- Water Drain Valve    4- Pin    5- Hitch Yoke  
 6- Lock Nut    7- Brake Valve Level    8- Governing Screw    9- Brake Valve  
 10- Emergency Valve    11- Air Pipe

#### 6.10.3 Adjustment and Maintenance of Airbraking Device.

a. There should be no blow-by or retardance in gas circuit. You can check it by laying thick suds (neuter) on all the pipe tie-ins of gas circuit with a brush.

b. When engine runs at a rotated speed, the system pressure should hit 0.54Mpa after the air compressor works 2minutes and above 0.7Mpa after eight minutes. Check seals of inlet valve and drain tap and piston ring if the pressure is not enough.

c. When pressure is over  $0.8 \pm 0.05$  Mpa, safety valve 10 should open.

d. Under the pressure of 0.8Mpa in airbraking system, the engine stops. Keep it for 5minutes, the air pressure decline should not be over 0.1 Mpa.

e. When unit travels normally, the pressure of air cylinder should be not less than 0.4Mpa.

f. Before the unit traveling, braking should be checked. Check every part of airbraking device to see if they are reliable and flexible.

g. After finishing work everyday, open water drain valve 3, and discharge water in air tank 2.

h. When tractor works in fields, disassemble braking valve 9, air tank 9 and air pipe 11.

i. Braking adjustment of trailer unit of tractor: the trailer must be braked 0.3~0.8 seconds earlier than the main machine to guarantee that when unit brakes, the trailer doesn't strike the main machine. The following are the steps:

Release blocking nut 6, disassemble hitch yoke 5 and pintle 4, and then screw out or screw in brake valve handspike 7 (excess length or shorten length). Thus the trailer can brake earlier or later. After adjusting, put block nut together tightly.

j. Two adjustable bolts 8 on the draw arm of braking valve have been adjusted on a special test desk when the machine left the factory and also painted with a red mark. They can't be tweaked optionally.

**●Notice: Adjustment beyond the above requirements will cause severe safety accident.**

### 6.11 Maintenance of Hydraulic Suspending System

#### Adjustment of Lifter

6.11.1 when assemble load adjusting spring assembly, adjust with adjusting spacers to avoid transmutation or clearance after assembling adjusting spring.

#### 6.11.2 Adjustments of Control Handle and Reactive Lever.

a. Install lifter on tractor, connect pipe routs and fill hydraulic oil.

b. Install suspension rod, and hang a proper thing with a weight of about 200~300kg on the low suspending point.

c. Put control handle on the lowest point.  
d. Start engine and put gear on the middle point.  
e. Slowly control handle up and lift arm and the heavy rise slowly. When the handle moves to the top position, the angle between lift arm and level should be  $53^{\circ}$ . If it's less than  $53^{\circ}$ , the adjusting turnbuckle on the reactive lever should get adjusting, and increase the length of reactive lever (S) until reaching  $53^{\circ}$ . Or, it cannot reach the lifting travel.

f. Lock relative nuts after adjusting.

#### 6.11.3 Oil and maintenance of Hydraulic Suspending System

a. Lifter body is an oil tank of hydraulic suspending system. See Fig. 35 for the inlet and outlet ports. Only No. N100 driving hydraulic dual-purpose oil is applicable.

b. Check the oil level in lifter body to see if it is in the range of oil gauge every 50 hours.

c. After a new tractor works 100hours, oil filter should be checked (See Fig.36) and wash the filter element.

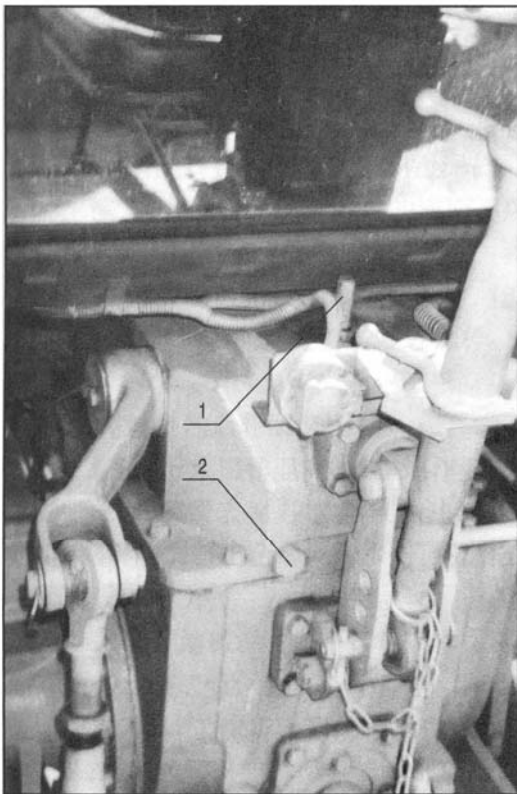


Fig.35 Location map of hydraulic fluid connection of Raiser

1-Refill Opening

2- Oil Discharge Outlet

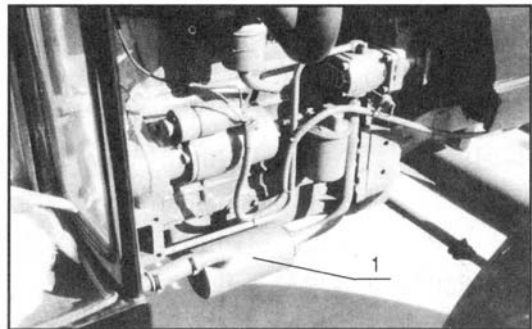


Fig 36 Location map of Fuel Strainer

1- Fuel Strainer



## **Chapter Seven      Technical Maintenance of Tractors**

For normal work of tractor and a longer life, technical maintenances rules should be strictly followed. The rules are stipulated according to the cumulative load working hours as following:

1. Shifting technical maintenance,
2. Technical maintenance after cumulative load 125h working hours.
3. Technical maintenance after cumulative load 125--500h working hours.
4. Technical maintenance after cumulative load 125--1000h working hours.
5. Special maintenance in winter

### **7.1 Shifting Technical Maintenance**

7.1.1 Clean dusts and sludge from tractor

7.1.2 Check the liquid level in water tank and fuel box. If not enough, refill in it .hub nuts

7.1.3 Check and see if nuts of front and back wheel bosses are loosen. Check and tighten key bolts and nuts on brakes, redirector and so on.

7.1.4 Check the air pressure of front and back tires.

7.1.5 When working in paddy fields, (shifting about for dry land) refill lubrication grease on every oil site according to the lubrication sheet (All the water and furrow should be forced out until the clear lubrication grease appears).

7.1.6 Maintain the diesel according to the rules of everyday technical maintenance in diesel manual.

### **7.2 Technical Maintenance after Accumulated 125 Working Hours**

7.2.1 Finish all the items of shifting technical maintenance

7.2.2 Check the oil level in gearbox-rear axle, steering oil tank, refill oil if not enough.

7.2.3 Check and adjust the free travels of clutch and brake pedals.

7.2.4 Check and adjust toe-in of front wheel

7.2.5 Maintain diesel according to the rules of “technical maintenance after cumulative 125 working hours” in diesel manual.

### **7.3 Technical Maintenance after Accumulated 500 Working Hours**

7.3.1 Finish all the items of technical maintenance after cumulative 125 working hours.

7.3.2 Discharge lubrication oil and hydraulic oil from gearbox-rear axle, steering oil tank, and hydraulic oil tank. Wash cover of gearbox-rear axle, redirection body, lifter body and hydraulic oil tank. Treat and clean the discharged lubrication oil and hydraulic oil and refill them again. If not enough, add it.

- 7.3.3 Wash the gauze of filter in hydraulic system and gauze in steering oil tank.
- 7.3.4 Check and adjust free travel of steering wheel.
- 7.3.5 Check and adjust pressure of safety valve.
- 7.3.6 Check the elasticity of front wheel bearings. Adjust them if necessary.
- 7.3.7 Check and see if the three heads of clutch fingers share a same plane with an error less than 0.2mm. Adjust it if necessary.
- 7.3.8 Check the fixture of all tie-ins of electric wirings, and clear away oil stain and rusts,
- 7.3.9 Check the abrasion of end face spacers of pivot center and fixed blind flange. Adjust them if necessary.
- 7.3.10 Maintain diesel according to the rules of “technical maintenance after cumulative 500 working hours” in diesel manual.

#### **7.4 Technical Maintenance after Accumulated 1000 Working Hours**

- 7.4.1 Finish all items of “Technical Maintenance after Accumulated 500 Working Hours”
- 7.4.2 Replace lubrication oil and hydraulic oil in gearbox-rear axle, steering oil tank or redirector and hydraulic system.
- 7.4.3 Clear away carbon deposit from muffle of air delivery pipe
- 7.4.4 Check the abrasion of the front wheels. Exchange the left and the right front wheels if necessary.
- 7.4.5 Eliminate the scale deposit in cooling system.
- 7.4.6 Check and adjust the clearance between bears of central driving gear pair.
- 7.4.7 Finish all the items of technical maintenance after accumulated 1000 working hours.

#### **7.5 Special Maintenance in Winter**

- 7.5.1 Replace with winter lubrication oil and fuel.
- 7.5.2 If tractor stops and is stored for a long time in sinter, fill anti icing fluid in cooling water. If no anti icing fluid, discharge all the cooling water.
- 7.5.3 Every time a new working term begins start engine according to requirements of winter starting.
- 7.5.4 Discharge rate of storage battery can't be over 25% in winter, and a big charge rate should be kept.
- 7.5.5 After working, tractor should stop in a warm shed where is lee and warm.

#### **7.6 Technical Maintenance During Long-time Storage of Tractors**

- 7.6.1 Long-time Deposit
  - a.If the deposit team is less than one month and refilled engine oil has a working time of not more than 100 hours, tractor needs no protecting. If it's over one month, when tractor is hot engine oil must be discharged completely to refill new engine oil and

engine should run several minutes with low accelerograph.

b. Fill in fuel tank fully, wash and maintain air filter, let out the cooling water from cooling system (if the cooling liquid is anti icing fluid, it needs no discharge).

c. Put all control handles on neutral-gear positions (including switch of electrical system and brake), set rightly the fore wheel of tractor, put suspension rod in the lowest position.

d. Take off storage battery, paint lubrication grease on terminal, and store it in a lucifuge and ventilating room with a temperature of not less than 10 °C. As for common storage battery, liquid level of electrolyte should get checked once every month and check the charging and discharging with densimeter. If necessary, append distilled water to stated level, and the storage battery should get complementary charging with 7A electric current.

e. Support the front and the back axles of tractor to let tires slightly and bleed air from tires, of jack up tractor termly to check air pressure of tires.

f. Scrub tractor, wax painted piece with olefin, lay repellent on non-painted pieces, and cover a shield on the whole machine.

#### 7.6.2 Starting Tractor from Its Storage

a. Take down all protective slipcovers, rub away the protective oil from mental surface, and check inflation pressure of tires.

b. Install storage battery, connect cable and earth wire, and check the degree of tightness of alternator belt.

c. Check the oil levels of gearbox, hydraulic system and steering system.

d. Check the cooling liquid level in radiator.

## Chapter Eight Usual Troubles and Their Disposals

### 8.1 Common Troubles of Clutch and Repair

Trouble	Causes	Disposals
1. Clutch skids	1) Friction flake is stained with oil. 2) Friction flake wears badly, and rivet heads stick out. 3) Pressure of film spring reduces. 4) Driven wheel warps. 5) Free travel of pedal disappears.	1) Clean with gasoline. 2) Replace. 3) Replace 4) Repair or replace 5) Adjust according to the regulations
2. Separation is difficult and gearshift sounds	1) Free travel of pedal is too long. 2) The driven wheel warps badly. 3) The driven wheel spline is too tight. 4) 3 separation rod heads are not at the same level.	1) Adjust according to the regulations. 2) Replace 3) Burr the spline 4) Readjust
3. Clutch vibrates	1) Friction flake breaks. 2) The driven wheel wraps. 3) 3 separation rod heads are not at same level	1) Replace 2) Replace 3) Readjust
4. While separate main clutch, power transmission shaft stops turn.	Clearance between separation screw heads on the main clipping board and ear on the secondary clipping board is too narrow.	Adjust according to the regulations.
5. Pedal of clutch is stepped down to the lowest position, but power transmission shaft still does not stop turn.	1) Clearance between separation screw head on the main clipping board and ear on the secondary clipping board is too narrow. 2) 3 troughs of ears for secondary clipping board on clutch cover are too shallow.	1) Adjust according to the regulations. 2) Add adjustment washer properly.

### 8.2 Common Troubles of Gearbox and Repair

Troubles	Causes	Disposals
1. Be out of gear self	1) Self-locking spring of gearshift axle lacks pressure. 2) Gearwheel spline hole has taper, to lead to axial force or clearance is too wide. 3) After gearing, driving and driven gearwheels do not mesh on whole teeth width. 4) Teeth direction is not right or teeth surface wears unevenly.	1) Replace spring. 2) Replace gear- wheels. 3) Inspect gearshift travel and position gearwheel. 4) Replace gear- wheel.
2. Gearing is disordered	Travel limit flake of gearshift breaks.	Replace
3. Gearing is difficult or fails.	1) Main clutch cannot separate completely. 2) End circle of gearwheel wears or is damaged.	1) Adjust 2) Replace gear- wheel

	3) Slide gearwheel and spline axle match too tightly.	3) Smooth and repair with oil stone.
4. Gear case sounds	1) Lack of lubrication oil. 2) Bearing and gearwheel wear strictly. 3) There is burr or hard spots on the gearwheel surface.	1) Fill to the regulated level with lubrication oil. 2) Replace gear- wheel 3) Smooth with oil stone
5. Oil comes into gear case	1) Back oil seal of engine crank is damaged. 2) Oil seals of first bearing stand of gear case of power driving axle is damaged.	1) Replace 2) Replace

### 8.3 Common Troubles of Back Bridge and Repair

Troubles	Causes	Disposals
1. Central transmission sounds abnormally	1) Central transmission gears abnormally. 2) Clearance between driving arc conic gearwheel and differential gearwheel is too narrow	1) Adjust secondary gearing mark of gearwheels and side clearance. 2) Adjust clearance
2. Back bridge case overheats	1) Oil level is too low 2) Allowance bearings or gearwheels gear are too narrow.	1) Raise the regulated oil level. 2) Readjust.
3. Differential lock handle can not return back	1) Return spring of differential lock does not work. 2) Push rod of differential lock is blocked.	1) Replace 2) Dismantle, clean, or smooth burr.

### 8.4 Usual Troubles and Their Disposals of Brake

Troubles	Causes	Disposals
1. Brake fails	1) Brake friction flake is stained with oil. 2) Brake friction flake wears badly. 3) Free travel of pedal is too long.	1) Clean with gasoline. 2) Replace 3) Re-adjust.
2. When brake tractor deflects.	1) Travels of right and left brake boards are not concerted 2) Oil comes to brake on one side.	1) Re-adjust. 2) Dismantle and clean.
3. Brake separating is difficult, and heats	1) Free travel of brake pedal is too short. 2) Return spring of brake clipping plate fails. 3) Clearance between brake flakes is too narrow. 4) Brake petal cannot return.	1) Re-adjust 2) Replace 3) Re-adjust 4) Check and see if return spring fails.

### 8.5 Usual Troubles and Their Disposals of Travel & Steering System

Troubles	Causes	Disposals
1. Front wheel sways	1) Directive wheel stand sleeve wears. 2) Steering pull rod ball head holt or ball head wears.	1) Replace 2) Replace

	3) Washer of front axle stand wears. 4) Front bind adjustment is not in conformity with the regulation. 5) Front rim sways. 6) Steering oil cylinder leaks air.	3) Adjust or replace 4) Re-adjust 5) Rectify or replace 6) Inspect oil level of steering cylinder and exhaust.
2. Front wheel wears early	1) Front bind adjustment is not in conformity with the regulations. 2) Front tyre pressure is lower.	1) Re-adjust 2) Fill air to the regulated pressure
3. Hydraulic steering system leaks oil	1) Rubber rings or bolts on the pipe connectors are damaged or loose. 2) Valve, plate, stator and back cover of hydraulic steer connector surface rubber is damaged. 3) Axle radial rubber ring is damaged. 4) Bolt at steer gear connector loosens	1) Replace rubber rings or tighten bolts. 2) Clean and replace rubber rings 3) Replace rubber ring 4) Tighten bolts
4. Hydraulic steering is heavy	1) Gear oil pump is lack of oil, leaks oil or filter network in steering oil box is blocked, slow-turn is light, quick-turn is heavy. 2) Steering system contains air, when operate steer, oil cylinder moves sometimes and does not move sometimes. 3) Steering oil box lacks of oil 4) Spring of safety valve gets weak or steel ball seal fails, light load steering is easy, but heavy load steering is difficult. 5) Oil is too viscous 6) Single-direction ball valve in the valve system fails. Quick-turn and slow-turn steering is difficult, and steering idle. 7) Steering system leaks oil, including internal leakage and external leakage.	1) Inspect gearwheel oil pump, clean filter network. 2) Exhaust air in the system, inspect and see if oil pipeline contains air 3) Fill oil to the regulated level. 4) Clean safety valve and adjust safety spring pressure 5) Use regulated oil 6) Wash, maintain or replace 7) Inspect and find oil leakage points.
5. Hydraulic steer system fails	1) Bolt breaks or deforms 2) Connecting axle mouth breaks or deforms 3) Set rotator and connecting axle wrongly 4) Piston or piston seal ring of steering oil cylinder is damaged.	1) Replace bolt 2) Replace connector axle 3) Re-install 4) Replace piston or seal ring.
6. When hydraulic steering, steel steering	1) Spring breaks 2) Steering axle sleeve and steering vertical pillar sleeve	1) Replace spring flake 2) Repair or replace

wheel can not turn to central automatically	are not concentric, turn resistance is great. 3) Steering axle blocks valve core 4) Central pressure drop is too big or when steering wheel stop turn, steer is not unloaded 5) Steering axle and valve core are not concentric.	3) Repair 4) Repair or replace 5) Re-set and adjust
7. Hydraulic steering system steers automatically	1) Clearance between rotator and stator is too big. 2) Seal of oil cylinder piston is too bad, when steering piston reaches final end but driver does not feel final end and steering wheel turns and oil cylinder does not move.	1) Replace rotator and stator 2) Replace piston seal ring.

## 8.6 Usual Troubles and Their Disposals of Hydraulic Suspending System

Troubles	Causes	Disposals
1. System works without load, and cannot work with load or lift slowly.	1) Oil filter network is blocked. 2) Oil cylinder leaks oil. 3) Safety valve leaks oil badly	1) Clean filter network 2) Replace seal ring of piston 3) Rectify pressure or correct it
2. Can not lift farm tools	1) Oil pump is damaged 2) Sensor rod of distributor looses 3) Safety valve leaks oil 4) Oil cylinder leaks oil badly 5) Oil filter network is blocked. 6) Tool is too heavy or enters soil too deeply.	1) Replace oil pump 2) Re-adjust 3) Correct pressure or replace 4) Replace seal ring of piston 5) Clean filter network 6) Choose proper tools and plough depth.
3. Lift farm tools unlimitedly	1) Oil pipe looses 2) Oil pipe contains air	1) Tighten connector fix bolt 2) Exhaust air
4. Farm tools quiver while they rise	1) Oil pipe looses 2) There is air in oil pipes	1) Tighten connector 2) Exhaust air

## 8.7 Usual Troubles and Their Disposals of Electric System

### 8.7.1 Common Troubles of Start Motor and Repair

Troubles	Causes	Disposals
1. Start motor does not work	1) Battery lacks of power 2) Battery polar pillars are not clean, cable looses. 3) Cable connector looses, lap joint iron rusts. 4) Ignition switch and other control circuit break. 5) Contact between carbon brush and commutator is bad 6) Internal circuit of start motor breaks, shorts or lap joint	1) Recharge according the regulations 2) Clean and tighten connectors 3) Tighten connector, connect stably. 4) Check circuit connect stably 5) Maintain adjust and clean 6) Check start motor
2. Starting motor can not start generator	1) Buttery content is not plenty 2) Cable connecting badly	1) Recharge 2) Adjust

	3) Commutator surface is burnt or is sustained with grease 4) Carbon brush wears badly, carbon brush spring pressure is not plenty, so that their connecting is bad. 5) Electric-magnetic switch main contactor is burnt 6) Bearing is damaged badly.	3) Smooth commutator and clean 4) Replace or adjust 5) Maintaining and smooth 6) Replace bearings
3. Release starting switch to start motor to work	Switch main contactor spot is adhered fixedly.	Check main contact spot of switch, smooth its surface.

### 8.7.2 Common Troubles of Motor and Repair

Troubles	Causes	Disposals
1. Motor can not work	1) Connecting wrong, connector breaks, connecting is bad. 2) Rotator coil breaks 3) Rectifier diode is damaged 4) Carbon brush contacting is badly 5) Adjustor is damaged	1) Repair circuit 2) Repair or replace generator assembly 3) Replace diode 4) Clean and replace carbon brush 5) Replace adjustor
2. Generator recharge is not plenty	1) Delta belt looses 2) Carbon brush connects badly, slide ring is sustained with oil. 3) Adjustor is damaged 4) Electrolyte of battery is not plenty or sulphation is bad, too old.	1) Adjust tension of delta belt according the demand. 2) Adjust and wash 3) Replace adjustor 4) Adjust Electrolyte to the regulated level, replace the battery if sulphation is bad
3. Recharge electric current of generator is so strong to burn electric bulb	1) Adjustment voltage of adjustor is too high 2) Magnetic coil of adjustor seals off	1) Adjust voltage to proper value 2) Check and repair r magnetic coil, re-weld the welding fixedly.

### 8.7.3 Common Troubles of Battery and Repair

Troubles	Causes	Disposals
1. Battery content is not plenty	1) Polar plate sulfates, (recharge is not plenty for long time, electrolyte level is too low, electrolyte rate is too high, or electrolyte contains imparities). 2) Circuit connects badly, oxide on the polar plate is too plenty, recharge is not plenty.	1) Battery should be kept recharge fully, electrolyte level should be kept to higher 10-15mm than polar plate, fill with distilled water when it is not plenty 2) Tighten connector, clean oxide, pillar is applied with



		vaseline.
2. Discharge too quickly	1) Electrolyte contains impurities 2) There as short circuit in external circuit of battery. 3) Electrolyte flows from the battery to make positive and negative pillars short-circuit. 4) Put metal tools between positive and negative pillars to leads to short- circuit. 5) Active substance drops from polar plate, many and precipitates make polar plate short- circuit, and insulation plate damage	1) Fill electrolyte made from chemical pure sulphuric acid and distilled water. 2) Check position of short circuit and repair it. 3) Wash surface and pillars of battery with alkali water to keep its surface clean. 4) Prohibit putting metal rods on the surface of battery. 5) Replace battery or repair.
3. Active substance drops off badly. When recharge electrolyte contains brown substance, battery content is not plenty.	1) Battery starting motor takes too long time. 2) Recharge electric current is too intense or recharge takes long time, to make polar plate warp. 3) Rate of electrolyte is too high. 4) Fixing of battery is not stable, polar plate vibrates badly.	1) Turning on motor time should do strictly according to regulations, forbid discharging for long time. 2) Implement the relative regulations strictly 3) Fill electrolyte with the regulated gravity 4) Tighten fix bolt of battery.
4. Case breaks	1) Air hole is blocked, gas produced by recharge can not be exhausted, so pressure in battery rises. 2) Battery discharge quickly, electrolyte temperature rises rapidly, electrolyte and gas expand quickly. 3) Fix of battery is not stable tractor vibrates, fiercely.	1) Check hole and keep it open. 2) Check and repair short circuit. 3) Tighten battery.

#### 8.7.4 Common Troubles of Combined Instruments and Repair

Troubles	Causes	Disposals
1. Water thermometer always shows low temperature	1) Circuit is broken, connector and plug contactor are bad. 2) Water temperature censor is damaged.	1) Check and connect circuit, get rid of impurities of plugs and connectors 2) Replace censor.
2. Water thermometer always shows high temperature	1) Water censor is short- circuited, or damaged. 2) There is short circuit somewhere	1) Replace censor 2) Repair circuit, fix breakdowns.
3. Oil gauge shows abnormally	1) Circuit is broken or shorts. 2) Oil gauge censor is broken, shorts or connected badly.	1) Repair 2) Repair or replace censor.

### 8.7.5 Common Troubles of Lamps and Repair

Troubles	Causes	Disposals
1. Front lamp fails	1) Circuit shorts, short circuit fuse breaks. 2) Connectors of switch of lamp and light-changing switch is badly. 3) Lamp bulk is burnt.	1) Repair and connect them 2) Repair, replace 3) Replace lamp
2. Rear lamp fails	1) Circuit is burnt, short circuit fuse is burnt 2) Rear lamp switch is connected badly, or damaged.	1) Repair circuit, fix breakdowns such as short circuit, broken circuit. 2) Repair or replace

### 8.7.6 Common Troubles of Front Bridge and Repair

Troubles	Causes	Repair
1. Noise	1) Gearing mark of central transmission gear is not proper 2) Clearance of central transmission gear is too wide or is damaged. 3) Differential device axle is worn or is gripped. 4) Epicyclic gear or washer is worn. 5) Final transmission gear engages badly.	1) Adjust gear meshing mark 2) Adjust or replace 3) Replace axle of differential device 4) Replace epicyclic gear or washer 5) Adjust final transmission gear
2. Transmission axle heats	1) Transmission axle deforms 2) Central bearing stand looses	1) Rectify or replace transmission axle 2) Tighten bearing stand
3. Front tyre wears badly	1) Rim and wheel plate deform badly. 2) Adjustment of front bind is not proper 3) Steer connecting and two oil cylinder bolts are born badly. 4) When transportation, tyre pressure is short 5) When transportation front driving bridge is not separated	1) Replace rim and wheel plate 2) Adjust front bind 3) Replace bolts 4) Fill air according to the regulation 5) When transportation separate front bridge

### 8.7.7 Common Troubles of Hydraulic Transmission Device and Repair

Troubles	Causes	Disposals
1. Lift speed of load oil cylinder is low or fails.	1) Safety valve leaks internally 2) Oil pump works badly	1) Clean safety valve, get rid of impurities, re-adjust pressure or replace 2) Replace oil pump

2. Load oil cylinder abruptly loses pressure	1) Work oil is polluted to block safety valve at open state. 2) The system leaks oil 3) Oil pump is damaged	1) Replace work oil or replace safety valve assembly 2) Check system 3) Re-adjust or replace oil pump.
3. Lift operation of load oil cylinder loses pressure	1) Safety valve lacks of pressure 2) Work efficiency of oil pump is low 3) System pressure is low	1) Replace safety valve 2) Replace oil pump 3) Check system
4. Valve flake, front and rear cover connectors leak oil, and other positions leak oil	Seal rings are damaged	Replace seal rings

## Chapter Nine      Appendix

### 9.1 Moment Table of screwing Down Main Nuts and Bolts

No.	Positions	Screwing Moment(N.m)
1	Connecting bolts of gearbox and rear bridge	60-80
	Connecting bolts of engine and gearbox	
	Connecting bolts of half-axle sleeve and rear bridge	
	Connecting bolts of steering connector arm and flange axle	
	Connecting bolts of longitudinal pull rod and steering connector arm	
	Connecting bolts of differential stand and front bridge case	
	Connecting bolts of differential stand and bearing stand of driving conic gearwheel shaft	
	Connecting bolts of internal and external sleeve pipes	
2	Connecting bolts of lift case and rear bridge	90-120
	Connecting bolts of front sway-axle and front bridge case	
	Connecting bolts of epicyclic stand and hub	
	Connecting bolts of front axle (bridge) stand and engine	
	Connecting bolts of pull stand	
	Connecting bolts of sway-arm axle stand and front bridge stand	
3	Connecting bolts of front hub and steel ring	100-140
4	Connecting bolts of rear bridge radial plate and steel ring	5
	Connecting bolts of rear bridge differential case and driven conical gear	
5	Connecting bolts of long half-axle and radial plate	140-150
6	Connecting bolts of lift arm and sway-arm clipping plate	150-160
7	Fix bolts of lift oil cylinder	160-170

## 9.2 Size Figure of Suspending System

