OPERATION MANUAL

(30-40)

MADE IN CHINA

Executive Product Standard:Q/320901YT 010-2004/009-2005

Preface

Thank you for your trust on our HHJM 30-40 series wheel tractors (hereinafter HHJM -300B, HHJM -304B, HHJM-350, HHJM-354, HHJM-400A, and HHJM-404). This series is reasonable in structure, excellent in materials and completed in performance. In order to help customers operate, adjust , repair and maintain the products in a better way, and for better performance of this series, we compile this operation manual. As for the operation & maintenance manual of engines, please refer to diesel engine manual.

With technical development and requirements from our customers, descriptions in the manual may differ from the real structure of your tractors and the differences will be involved in the next version. If what you want to know is beyond this book, please contact the agent or the manufacturer.

Precaution Symbols

In this manual, this precaution symbol means some important safety information. Seeing this symbol, you should read the contents below it carefully and inform other operators to protect from possible hurts.

"**Warning** " and "**Attention** ": These focus on correct steps or techniqus in operations. Driver or stander-bys will be hurt or even die due to ignore.

 **"Important"** : These focus on correct steps or techniqus in operations. Your ignore can result in the damages to tractors or equipments.

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Chapter One Precautions for Safe Operations

1.1 Only after reading the manual carefully, can the driver who has got special training and driving license with a full survey record operate the tractor. Tractor cannot be operated without licenses.

1.2 This machine only can be operated, maintained and repaired by the persons who are familiar to its features and know related safe operation rules.

1.3 Driver should pay especial attention to the precaution symbol on the machine.

1.4 It is forbidden to drive tractors after being drunk, tired or taking some antipsychotic.

1.5 During operating the tractor, driver should strictly comply with the informed steps according to the precaution symbols to avoid accidents. When the symbols are lost, polluted or abased, they should be replaced in time.(See Fig.1--1~Fig. 1-7 for precaution symbols)

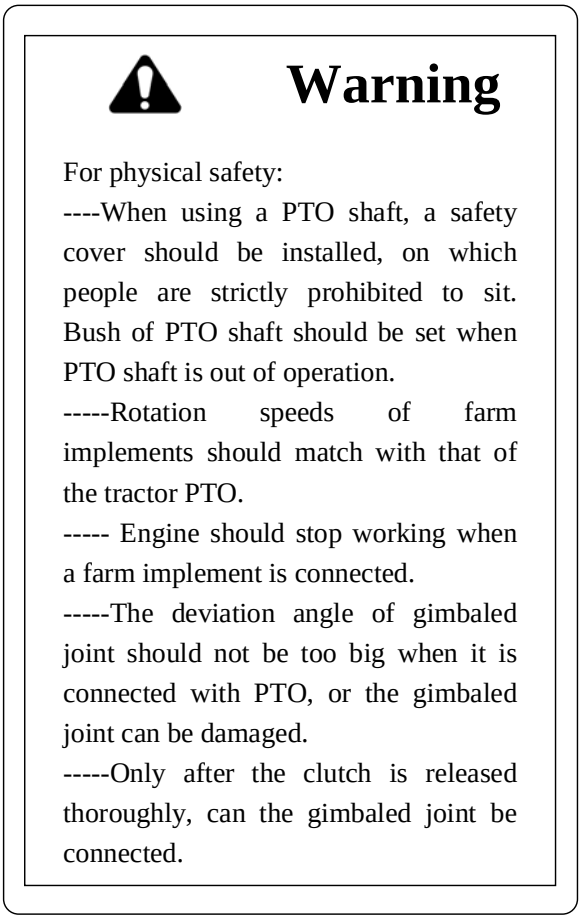


Fig.1-1 Stuck to the back of the tractor

Fig. 1-2 Stuck to the left-back wheel protecting case.

Warning

For physical safety:
----Read and comprehend the operation manual before operating tractor;
----When starting the tractor, put into neutral gear and release the clutch.
-----Sliding down aslope with neutral gear is strictly prohibited.
-----Only when sitting on the driver's seat, can an operator start engine;
-----Drunk driving or fatigue driving is strictly prohibited;
-----Before maintaining and repairing tractor, operator should stop engine and take down the key. When engine works, don't open or disassemble the safety cover.

Fig. 1-3 Stuck to the front of the dashboard

Attention

For physical safety:
----Keep yourself far away from lifting area of the lift link when operating hydraulic lifter;
----three-point hitch gears are only applicable for the farm implements specially designed for three-point hitch suspending linkages.

Fig. Stuck to the back of the tractor

Warning

To avoid casualty caused by overturn or bump, the left and the right braking pedals should be jointly locked up.

During parking, slide or rolling can happen casualty, so parking brake is needed then.

Fig.1-4 Stuck on the right-back wheelguard plate

Attention

Easy to cause fire.
Keep sparker away.

Fig. 1-6 Stuck beside the oil filler of the fuel tank

Fig.1-7 Stuck near the water tank

1.6 Before operation, a new tractor should have a running-in following the related regulations. And then normal loaded work can be done.

1.7 Before the tractor moves, on its path should be no any barrier, and no people between the tractor and the rear implement or trailer.

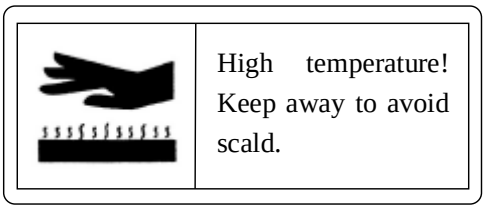


Fig. 1-8 Stuck on the muffler

1.8 Don't leave driver's seat to start or control the tractor. Each gear shifter should be placed at the " neutral gear" before starting or getting off the tractor.

1.9 Don't get on or off the tractor during its running. Before repairing the tractor, the machine should be stopped and the key should be taken off. Repair or check under the tractor is forbidden when the engine runs.

1.10 To avoid turn-over, only low gears can be used, especially going on high slopes or muddy path. When going down-slope, clutch engaging or neutral gear is not allowed. Let the running tractor not too near to any ditch, to avoid damage due to broken trenches.

1.11 In transportation, the left and the right brake pedals should be joined and locked together. Move PTO handle to the "Apart" position.

1.12 When the suspended implement of the tractor is transferred, hydraulic lifter should be at the position of "neutral".

1.13 No sharp turn is permitted while driving at a high speed. Sharp turn caused by one-side brake is prohibited either to avoid turn-over or parts damaging.

1.14 You'd better check and fasten bolts of wheel radial plates and the bolts or nuts in other key positions.

1.15 When transferring to another field or operating with hung farm implements, high speed is forbidden to avoid the damage to parts of lifting system and suspending system. Before leaving the tractor, driver should drop its farm implement first, stop the engine and take off the key to prevent others from starting the tractor.

1.16 Before starting the tractor, you'd better check oil duct, electric circuit and cooling water. In any case, it is not allowed to fill the fuel that has not been precipitated or filtrated into tank. After starting the machine, you'd better pay attention to all indicators and meters.

1.17 Before filling fuel into tank, you'd better stop the engine; Smoking is prohibited during fuel filling and check & repair for fuel system.

1.18 When deep treaded tires working or transferring in fields, high speed is not allowed; Deep treaded tires can't be used for transportation.

1.19 Tractor cannot be used with over load to avoid damage to organs. Load limit of the trailer is 3 tons.

1.20 Dirt should be eliminated from radiating water tank to guarantee its heat radiating performance. When the water tank is too hot, you can't water the engine or water tank with cold water to avoid breaking the tank. You should reduce its load and only after the water is not so hot can cooling water be filled with the engine running.

1.21 You should tell your next shift about any troubles of the tractor. During operation in night, fine lightings are necessary.

1.22 When it works below 0 ℃ in winter, exhaust all water in the case of idling operation to avoid organs freezing caused by remained water.

1.23 Manufacturer is not responsible for any reduced reliability of the machine, personnel hurt or machine damaging due to any unauthorized reform on the tractor.

1.24 During running or working, if one of the tractor's driving wheels is found severe wheelspin, you can use the differential lock following its instruction. The differential lock is forbidden to use in any other case to avoid machine damaging or other accidents.

1.25 During harvesting or operating in field yard, a spark extinguisher should be installed on air exhaust.

1.26 Exhaust elbow and muffler are high temperature components. Within a half hour after starting or stopping the engine, anyone is not allowed to get near to avoid burn.

1.27 Faulted tractor cannot be put into use, especially when oil pressure is zero or too low, water is too hot or abnormal sound or smell come. The machine should be stopped for check and the trouble should be shot in time.

1.28 Only after taking earth wire off from the battery can electric parts be repaired.

1.29 Don't stop the tractor on a big slop. If so, its park brakes should be used and a triangle should be stuck under the rear wheels.

1.30 The protecting components for driver are not indispensable. However when installing safety frame on the tractor, a seat belt is necessary; when removing the frame from the tractor, the seat belt should be removed too to avoid use by mistake.

1.31 When working in fields or muddy area, you'd better remove the dirt from your shoes and keep the pedals clean. Catch the armrest careful when getting on or off the tractor.

1.32 When driving along the road, you'd better follow the local traffic rules

1.33 In any case kids or no-drivers should be kept far away from the machine to avoid hurts.

1.34 Before using PTO, a protecting cover need be installed.

Chapter Two General Description

HHJM30~40 series wheel tractors (HHJM-300B, HHJM-304B, HHJM-350, HHJM-354, HHJM-400A and HHJM-404A) are the newly developed wheel tractors accoording to demands from our international markets.

HHJM30-40 series wheel tractors are newly developed with kinds of new technologies, new techniques, and new structures and on the years' production experiences of 18-30 series. The new series has more reasonable structures and better improved performance. They are more powerful, economical in oil consumption, high efficient, nice in appearance, easy in operation and maintenance, convenient for being supported, economical in use and perfect in integrated performance.

HHJM30-40 series wheel tractors are equipped with 30hp, 35hp, and 40hp vertical and oil-saving diesels respectively. Direct transmission is used between the engine and the transmission system and an 8-gear gear box is installed for the work of rototilling, ploughing, harvesting, transportation and so on. They have a hydraulic suspending system with perfect performance, low-pressure broad driving wheel tires with fine adhesion, and air-braking device with reliable performance. Besides, customers can select different types of tractors according to their own requirements and economic situations. The series include single-acting clutch and dual-acting clutch, 2-wheel driving and 4-wheel driving, mechanical steering and entirely hydraulic steering.

Warning:

1. Manufacturer is not responsible for any reduced reliability of the machine, personnel hurt or machine damaging due to any unauthorized reform on the tractor.

2. You can only use the implements specially designed for this series. Customers should try to avoid possible damages to the machines caused by the farm implements that don't follow the configuring regulations.

Chapter Three Key Technical Specifications of the Tractor

3.1 Parameters of the whole unit

Tractor Model / Data Name	HHJM -300B	HHJM-350 HHJM-400A	HHJM-304B	HHJM-354 HHJM-404A
Model	4 × 2 (2-wheel driving)		4 × 4 (4-wheel driving)	
external dimensions mm	2930 1450 1954	3090 1450 1954	3070 1440 1985	3230 1440 1985
axle base mm	1620	1776.5	1677	1833.5
usual tread between fore wheels mm	1050~1450(adjustable)		1200/1300(dispensable)	
usual tread between real wheels mm	1150~1450(adjustable)		1150~1450(adjustable)	
Min. road clearance mm	355		292	
radii of turning circle m Unilateral brake unilateral un-brake	 2.8 3.2	 3.0 3.5	 3.1 3.9	 3.4 4.2
tractor mass kg structural mass Mi. service mass	 1298 1453	 1328 1483	 1585 1750	 1615 1780
mass distribution kg Fore shaft rear shaft	 587 866		 845 985	
Additional mass (elective) kg fore shaft rear shaft	 60 160		 60 160	
Rated tractive force N	5900	7000	6400	8810

Theoretical Velocity km/h

1. Type 300B, 304B, 350 and 354 tractors with real driving wheels: 11.2-24, starting rev is 2300r/min, finally transfer to quick gears

Type 400A tractor with real driving wheels: 11.2-28, starting rev is 2300r/min, finally transfer to quick gears

404A tractor with real driving wheel tires: 11.2-28, starting rev is 2300r/min, finally transfer to slow gears

2. speeds in () are for bi-acting types

Type / Theoretical speed / gear	HHJM-300B/304B/350/354	HHJM-400A	HHJM-404A
I-gear	1.88(2.2)	2.05(2.4)	1.87(2.19)
II-gear	2.37(2.94)	2.59(3.21)	2.36(2.92)
III-gear	3.86(4.13)	4.12(4.5)	3.84(4.1)
IV-gear	6.12(6.12)	6.68(6.68)	6.09(6.09)
V-gear	8.67(10.15)	9.45(11.07)	8.61(10.08)
VI-gear	10.94(13.58)	11.93(14.81)	10.87(13.49)
VII-gear	17.81(19.03)	19.43(20.76)	17.7(18.91)
VIII-gear	28.25(28.25)	30.81(30.81)	28.07(28.07)
reserve I-gear	1.75(2.8)	1.91(3.05)	1.74(2.78)
reserve II-gear	8.09(12.92)	8.82(14.09)	8.04(12.83)

3.2Engine parameter

Type / Engine Data	HHJM-300B/304B				HHJM-350/354				H-400A/404A
Engine type	SL2105	ZN390	Y480	LL480	SL3100	TY395	Y485	LL485	ZN490
Engine model	four-stroke, water-cooling and vertical type								
Cylinder Bore × Travel mm	105 × 110	90 × 95	80 × 90	80 × 90	100 × 117	95 × 105	85 × 95	85 × 95	90 × 100
Rated Output and rotate Speed kW/r/min	22.1/2200	22.1/2400	22.1/2300	22.1/2350	25.7/2200	25.7/2300	25.7/2300	25.7/2350	29.4/2400
Fuel Consumption Rate in Rated Operating Mode g/kW·h	⩽ 246	⩽ 250	⩽ 287	⩽ 258	243.0	⩽ 248	⩽ 285	⩽ 258	⩽ 250
Engine Oil Consumption Rate in Rated Operation Mode g/kW·h	1.63	⩽ 2.72	⩽ 2.72	‹2.3	1.63	⩽ 2.04	⩽ 2.04	‹2.3	⩽ 2.72
reserve ratio of torque	⩾ 15%	⩾ 15%	⩾ 15%	⩾ 15%	⩾ 15%	⩾ 15%	15%	⩾ 15%	⩾ 15%
limit of smoke	⩽ 4.5	⩽ 4.5	4.5	⩽ 4	⩽ 4.5	⩽ 4.5	⩽ 3.5	⩽ 3	⩽ 4.5
Compression Ratio	17	18	22.5	18or22	17	18	22	18or	
Total Displacement of Piston l	22	18							
Ignition Order	1.905	1.813	1.809	1.809	2.757	2.23	2.043	2.156	2.545

Tractor Model / Engine Parameter		HHJM-300B/304B				HHJM-350/354				HHJM-400A/404A
Engine Type		SL2105	ZN390	Y480	LL480	SL3100	TY395	Y485	LL485	ZN490
Gas Distribution Phase	Starting Point of Inlet Valve ahead from TDC	12 ℃	12 ℃	14.5 ℃	14.5 ℃	12 ℃	8 ℃	14.5 ℃	14.5 ℃	12 ℃
	Closing Point of Inlet Valve back from TDC	44 ℃	38 ℃	37.5 ℃	37.5 ℃	44 ℃	52 ℃	37.5 ℃	37.5 ℃	38 ℃
	Starting Point of Exhaust Valve ahead form BDC	52 ℃	50 ℃	56 ℃	56 ℃	52 ℃	52 ℃	56 ℃	56 ℃	50 ℃
	Closing Point of Exhaust Valve back from BDC	12 ℃	14 ℃	12 ℃	12 ℃	12 ℃	8 ℃	12 ℃	12 ℃	14 ℃
Valve Clearance (cold state) mm	Inlet Valve	0.30~0.35	0.25~0.30	0.20 ～0.25	0.21~0.31	0.30~0.35	0.30~0.35	0.20 ～0.25	0.21~031	0.25~0.30
	Exhaust Valve	0.40~0.45	0.25~0.30	0.25 ～0.30	0.21~0.31	0.40~0.45	0.40~0.45	0.25 ～0.30	0.21~031	0.25~0.30
Cooling-system		water cooling								
starting model		electric starting								
Net Mass of Engine kg		275	195	195	230	325	330	200	240	205
Dimensions(mm)										
L		582	684	692	687	712	666	692	757	777
W		330	562	494	494	530	500	494	494	516
H		736	675.5	610	610	744	678	610	620	696.5
Capacity of oil pan L		7.0	5	5.5	7.1~8.4	10.0	4.5	5.5	6.8~8.1	7
Generator Model		JF131	TF11A	2JF200	JFWBC1	JF131	JT11or 2JF200	J2JF200	JFWBC1	JF11A
Starting Motor		QDj1309-ky	QD138	QD100 C3	QD1538 or QDZ157Y	QDj1401	QD1525or QD1315D	QD1315A	QD1538 or QDZ157Y	QD139

3.3 Transmission system

Part \ Type	HHJM-300B/350/400A	HHJM-304B/354/404A
Clutch	single-acting, dry and constantly-engaged friction type gual-acting, dry and constantly-engaged friction type	
Gearbox	two-axial, direct teeth （4+1） × 2 combination type	
Central Drive	spiral taper gear	
Differential	two planetary gear teeth, bevel gear type (with differential lock)	
Final Drive	external gearing direct teeth type	
Fore Drive Axle	——	whole-sealed bevel gear type
Transfer Case	——	spur gear

3.4 Traveling, steering, and braking

Type / Part Parameter			HHJM-			HHJM-		
			300B/350		400A	304B/354		404A
Frame Type			No Frame					
Type of Fore Shaft(Fore Drive Axle)			Inverted-U Pipe Epuilibrium			tri-sentor separable axisle shousing of conic reducer		
Fore Axle Tilt Angle			± 13 °			± 12 °		
Toe-in of Front Wheel mm			4~11			3~11		
Toe-out of Front Wheel			2 °			3 °		
Tumble Home of Main Shaft			8 °			8 °		
tires for farm use	Front Wheel	Specification of Tire	5.00-15 8PR		6.00-16 6PR	7.50-16 6PR		
		Max. air pressure Pa	530		340	210		
		Max. load kg	565		560	650		
	Rear Wheel	Specification of Tire	9.5-24 6PR/8PR	11.2-24 6R/8PR	11.2-28 6R/8PR	9.5-24 6PR/8PR	11.2-24 6R/8PR	11.2-28 6R/8PR
		Max. air pressure kPa	210/280	180/240	180/240	210/280	180/240	180/240
		Max. load kg	940/1110	1045/1225	1115/1305	940/1110	1045/1225	1115/1305
tires for paddy fields	Front Wheel	Specification of Tire	as the tires for the farm use			6.50-16-6PR		
		Max. air pressure Pa				270		
		Max. load kg				600		
	Rear Wheel	Specification of Tire	9.5-24 6PR/8PR		11.2-24 6PR	9.5-24 6PR/8PR		11.2-24 6PR
		Max. air pressure M kPa	240/280		210	240/280		210
		Max. load kg	1315/1435		1465	1315/1435		1465
tires for lawn	Front Wheel	Specification of Tire	31 × 9.5-16-4PR					
		Max. air pressure Pa	160					
		Max. load kg	850					
	Rear Wheel	Specification of Tire	13-20-6PR					
		Max. air pressure kPa	120					
		Max. load kg	1050					
Type of Redirector			**worm-and-roller type (TS30A) or fully-hydraulic steering(BZZ-E80)**					
Brake			Disc-type Brake					

3.5 Working unit

Parts and Parameter \ Tractor Model		HHJM-300B/304B/350/354/400A/404A
Type of Lifter		Semi-divided positioned Type
Model of Gear Pump		CBN-E310(turn flat port to right for connection)
Model of Constant Flow Pump		CBT1-E306HL062L or HLCB-06/06
Model of Dispenser		Outlaid Unload Control
cylinder（diameter × stroke）mm		85 × 100
Safety Valve Type of System andOil Cylinder		Damping Valve Direct Action Type and Cone Valve Direct Action
System Pressure MPa		16
Opening Pressure of Safety Valve MPa		18
Plow Depth Control		Force-Position Integrated Control
Max Lift Force in the Position of 610mm back from Lower Hook Station kN		4.96/5.79/6.6
Hydraulic-pressure Output Joint	Specification of Diameter	M16 × 1.5
	Quantity	1
	Output Discharge l/min	12
Type of Hanging Device		Postpositional Three-point Suspending
Hanging Connection Triangle mm		460 × 718 ± 15(H × W)
Connecting Aperture of Upper Suspending Point mm		Φ19
Connecting Aperture of Lower Suspending Point mm		Φ22
Type of PTO Shaft		combined type
Rotate Speed r/min		540/720
Circumrotation Direction		Clockwise(Facing the head-ward of Tractor)
Shaft Extension		I Type(6-35 × 28.91 × 8.69)or(8-38 × 32 × 6) [GB/T 1592-2001]
Pulling Device	Diameter of Joint Pin mm	Φ33
	Terracing Clearance of Joint Pin (Midpoint) mm	368/512(not essential)

3.6 Electrical System

<table>
<tr><td>Type / Parts</td><td colspan="5">HHJM-300B/304B/350/354/400A/404A</td></tr>
<tr><td>Electric System</td><td colspan="5">One-wire System,Minus Earth 12V</td></tr>
<tr><td>Engine oil</td><td>TY395
TY3100</td><td>SL2105
SL3100</td><td>ZN390
ZN490</td><td>Y480
Y485</td><td>LL480
LL485</td></tr>
<tr><td>Starting Motor</td><td>JT11or
2JF200</td><td>JF131</td><td>JF11A</td><td>2JF200</td><td>JFWBC1</td></tr>
<tr><td>Generator</td><td>QD1525 or
QD1315D</td><td>QDj1309-ky
QDj1401</td><td>QD138
QD139</td><td>QD100C3
QD1315A</td><td>QD1538 or
QDZ157Y</td></tr>
<tr><td rowspan="2">Electrical Equipments</td><td rowspan="2">ordinary type</td><td colspan="3">luxury type</td></tr>
<tr><td colspan="2">single meter</td><td>combined meters</td></tr>
<tr><td>Accumulator</td><td>3QA-120S</td><td colspan="3">95D31 80Ah</td></tr>
<tr><td>Ammeter</td><td>C107-30A</td><td colspan="2">C107-001 or C107-311A</td><td rowspan="6">DYZH-1 STZB-2,YT/3</td></tr>
<tr><td>Oil Pressure Meter</td><td>C103-001/C103-YT-102</td><td colspan="2">C103-0011 or C103-002 or C103-YT312</td></tr>
<tr><td>oil gage</td><td>C102-001</td><td colspan="2">C102-0011 or C102-003 or C102-002</td></tr>
<tr><td>water thermometer</td><td>C101-002</td><td colspan="2">C101-0021 or C101-003 or C101-001</td></tr>
<tr><td>chronometer</td><td></td><td colspan="2">C105-004 or C105-001</td></tr>
<tr><td>revolution meter</td><td></td><td colspan="2">C106-005 or C106-001 ～ 004</td></tr>
<tr><td>head light</td><td>BL30-Q（square light）</td><td colspan="3">ZH250-Q（combined lints）ZH300-Q（combined lights with turning indicator）</td></tr>
<tr><td>rear light</td><td>SSWD-2</td><td colspan="3">SSWD-2</td></tr>
<tr><td>turning light</td><td>C202-003</td><td colspan="3">C202-003</td></tr>
<tr><td>Electric Horn</td><td>C502-Q280</td><td colspan="3">DL129</td></tr>
<tr><td>Fuze Box</td><td>C503-001</td><td colspan="3" rowspan="3">BX2152-2(fuse box)
ZDH-101(central control electric box)</td></tr>
<tr><td>Flasher</td><td>BX-410/BX-505</td></tr>
<tr><td>adjustor</td><td>C501-001</td></tr>
<tr><td>starting switch</td><td>JK424 or JK290A</td><td colspan="3">JK290A</td></tr>
</table>

3.7 Perfusion capacity

Part Parameter \ Tractor Model	300B	350/400A	304B	354/404A
Capacity of Fuel Tank l	35	35	35	35
Final Drive Capacities of Gear-bos,Rear Axle and Transfer Case l	18.5	18.5	20.2	20.2
Capacity of Fore Drive Axle l	——	——	6.6	6.6
Capacity of Redirector (worm-and roller) l	0.9	0.9	0.9	0.9
Capacity of Lifter l	8.8	8.8	10	10
Cooling Liquid l	7.2	7.2	7.2	7.2

3.8 Air-brake Device

Type of Air-brake Device	Air-off Brake
Capacity of Air Tank L	10
Staring Pressure of Safety Valve kPa	0.65~0.7
Exhaust Opening Clearance of Brake Valve mm	1.5~2

3.9 Parameter of high clearance

Parameter \ Tractor Model		HHJM-300H	HHJM-350H	
Engine Type		SL2105BT	TY395IT	SL3100BT
Dimensions mm	Length(between the fore bob weight and the lower lever)	2940	3095	
	Width	1400	1450	
	height (to the top of the exhaust pipe)	2197	2197	
usual wheel base of front wheels mm		1250~1550(adjustable)		
usual wheel base of rear wheels mm		1250~1700(adjustable)		
road clearance	under the front shaft	520	520	
	under the gear box	512	512	

Chapter Four Operation of the Tractor

4.1 Fuel and lubricating oil

See Fig. 4-1 for the fuel and lubricating oil of the tractor.

Fig. 4-1 The fuel and lubricating oil of the tractor

Site	Season and Envirenmental Temperature	Oil Specification
Fuel Tank	Summer（Above 10 ℃）	0#, -10 # solar oil（GB/T 252-2000）
	Winter（Below 10 ℃）	-10# solar oil （GB/T 252-2000）
Oil pan of engine, hydraulic-pressure steering gear of lifter, oil pan of air filter, and injection pump	Below 0 ℃	20# 40# diesel oil（GB/T 5323-1994 ）
	Between 0 ℃ -25 ℃	30# diesel oil（GB/T 5323-1994 ）
	Above 25 ℃	40# diesel oil（GB/T 5323-1994 ）
Gear box, transfer case, front driving axle, and mechanical steering device	Summer（Above 10 ℃）	40# diesel oil（GB/T 5323-1994 ）
	Winter（Below 10 ℃）	30# diesel oil （GB/T 5323-1994 ）
Each grease nipple	For all seasons	ZFG2# complex calcium lubricating grease(SH0370-1992)
engine, starter, bearing6203-E	For all seasons	ZFG2# complex calcium lubricating grease(SH0370-1992)

Warning:

1. Before filling fuel into tank, you'd better stop the engine; Smoking is not allowed during fuel filling and check & repair for fuel system.

2. In no case can gasoline or alcohol be filled in diesel oil. This mixture can lead to fire or explosion because it is more detonable than pure gasoline in fuel tank. Different grade oil can't be mixed for use.

● **Important:**

1. Only very clear fuel can be used. Fuel should be precipitated for above 48 hours and then only the middle and top fuel can be filled into the tank with a filter. No full fuel for volatilization and screw down the tank cover after filling.

2. Fill fuel before the tank is empty. To fill fuel after the oil is used out in the supplying system, air must be exhausted from the supplying system firstly.

3. Do use a clean filling tool. Don’ t wash or wipe with diesel oil. Wipe the

overflowed diesel oil at once.

4. Wash fuel tank regularly, discharge precipitated oil, and wash diesel oil filter.

5. Don’t use open oil drum to transport fuel.

6. Put all cloth with oil into containers with covers. No dog-end can touch it.

7. You’d better check the engine oil on each lubricated site very often. Fill oil at the sites in time. Fill grease into grease nipples regularly.

4.2 Water

4.2.1 Only clear and soft water can be filled into water cooling tank to avoid inefficient performance caused by scale incrustation.

4.2.2 Hard water(in well, spring and so on) should be softened and then be used. Follow the steps below to soften the hard water:

1. Boil up hard water, precipitate and filter it.

2. Use caustic soda to treat hard water at a rate of 1.5g/l

Working in cold areas, anti-icing fluid can be used for cooling water.

Attention:

When the engine works or just after it is stopped, the water tank has a high temperature, so it is dangerous to open the tank cover at that time. Only after the tank is cooled down can it be opened. To open it , you can loose the cover first to release its inside air pressure.

● **Important:**

1. Dirt should be eliminated from radiating water tank to guarantee its heat radiating performance. When the water tank is too hot, you can't water the engine or the tank to avoid breaking the tank. You should reduce its load and only after the water is not so hot can cooling water be filled with the engine running. Check cooling water in the tank that should be kept full. Cooling water can’t be less than 2/3 of the tank volume.

2. When the water in tank is over 100 ℃ , stop the engine immediately. Have a necessary check and repair on the water tank after it is cooled.

3. When finishing operation in the cold area with a temperature under 0 ℃ , you should discharge all the water with tractor idling.

4. 3 Running-in

To put into use, new tractors or heavily repaired tractors must run in first, because newly manufactured parts have more or less tool marks on the surfaces. If you use the tractor with a heavy load without running-in, abrasion on the parts will be more severe and the parts can even be stuck and damaged to shorten the tractor life.

4.3.1 Preparation before Running-in

1. Wash the housing of the engine.

2, Check and tighten the external bolts and nuts.

3. Check the oil level in each lubricating box, refill oil if not enough.

4. Fill grease to every oil site.

5. Fill fuel and cooling water.

6. Check the toe-in of front wheel (4-11mm); Check air pressure of the front and the rear tires and adjust the pressure to the rated value.

7. Check batteries and connections of the electric circuit in electric system.

8. Put shifter at neutral gear, hand throttle in idle-speed position and hydraulic hand in dropping position.

4.3.2 Running-in of the engine without load

After starting the engine according to stipulated steps, you should listen to the engine carefully. Make sure there is no water leak, oil leak or gas leak. Read all indicators to see if all are OK. Do next running-in step after making sure that the engine works normally. Run the engine from low speed to middle speed and then high speed for 7 minutes, 5minutes and 3 minutes respectively, totally running-in of the engine without load costs 15 minutes.

4.3.3 Running-in of Hydraulic System

After connecting farm implements to the suspending mechanism, control the lift& drop handle with the engine running at a rated rev to make the suspending unit lift and drop equably for 10 minutes and at least 20 times. Don’t drop or lift the farm implements on hard ground to avoid damage. After running-in, its oil pump should be stopped from working.

4.3.4 Travel running-in without load for 2 hours

Start and move the tractor according to stipulations and do running-in following the steps and rules below:

III-gear	20min.
IV-gear	30min.
V-gear	30min.

VI-gear 30min.

Reverse I-gear 10min.

During the travel of free running-in, do steering operations and use the brake suitably. Pay attention to the following items:

1) Watch and listen carefully to the operations of its engine, transmission system and travel & steering.

2) Watch and see if clutch, brake and gear shifting work normally and smoothly.

3) See if indicators and electric units work well.

When abnormal things or troubles happen, you'd better find out their causations. Only after shooting the troubles can load running-in be done.

4.3.5 Running-in with load for 48 hours

The running-in of the tractor with load is to make the tractor operating with a certain load from a small load to heavy one and at speed from low gear to high gear.

Time (h) / gear / load	3	4	5	6	totally	approximative traction value
Basic configuration 150kg (1/4 load)	3	4	5	5	17	With a 2-wheel trailer coupled, it can do transportation with a load limit of 2tons.
Basic configuration 300kg (1/2 load)	3	5	5	5	18	It can tow two plowshares with a plow width of 60cm and a plow depth of 12cm.
Basic configuration 450kg (3/4 load)	3	5	5		13	It can tow three plowshares with a plow width of 71cm and a plow depth of 15cm.

See Fig. 4-2 for Loaded running-in and load

When abnormal things or troubles happen, you'd better find out their causations. Only after all troubles are disposed, can the running-in go on.

4.3.6 After the running-in is finished, do the following maintenance and then the tractor can be put into use.

1. After the machine is stopped, discharge the lubricating oil from the oil pan of diesel engine. Wash oil pan, engine oil filter cloth and engine oil cleaner, and fill new lubricating oil to rated level.

2. Discharge the lubricating oil from gear box, hydraulic system and front driving axle when it is hot. Fill in some diesel oil, travel for 2-5minutes at II-gear and reverse I-gear, wash it, exhaust the washing oil and fill in new lubricating oil.

3. Wash diesel oil cleaner (including the filter cloth in fuel box) and air filter.

4. Discharge cooling water, wash the cooling system of the engine with clean water.

5. Check and adjust the free travels of the clutch pedal and brake pedal, and the operating of the brake.

6. Check and tighten the bolts and nuts at every key connecting site.

7. Check oil nozzle and valve clearance. Adjust them if necessary.

8. Check the work of electric system.

9. Check and adjust toe-in of the front wheels.

10. Fill lubricating grease to every grease nipple site.

● **Important:**

1. See if the operation of engine is right.

2. See if clutch adjustment normal and its releasing is completely.

3. See if gear shifting of gear box including front driving handle, crawling gear shifting are flexible and easy. Try to avoid possible spontaneous out-of-gear or failure interlock.

4. See if brake adjustment is proper and the performance is reliable.

5. See if steering control is flexible.

6. See if electric units and meters work normally and reliably.

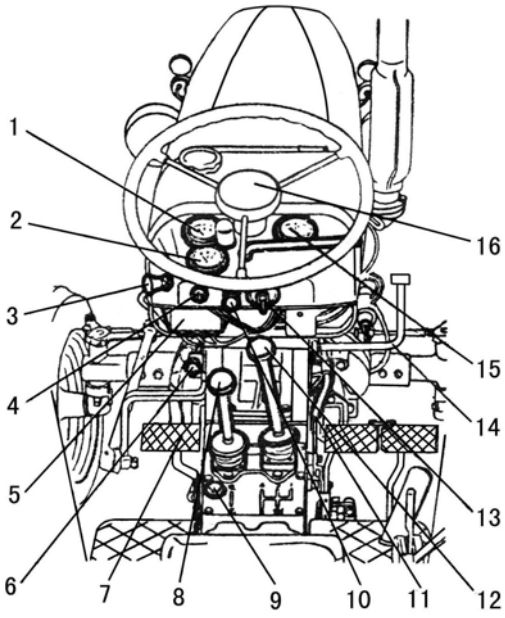


Fig. 4-1 Control device and indicators

1 water thermometer 2 oil pressure gauge 3 rear lamp switch 4 Turn light switch5 relay governor 6 shut-off lever 7 clutch pedal 8 assistant gear shifter 9 dip stick of gear case 10 tri-grade light switch 11 decompression handle 12 key gear shifter 13 preheating switch

14 hand throttle15 ammeter 16 horn button

4.4 Steering mechanism and meters

1. Preheating Starting Switch

Insert key into the switch, position “O” means the electric circuit not through; turn clockwise to the position “D”, all electric circuits except starting and preheating electric circuits are energized (after starting, the key should be kept in this position); turn to position “Y”, heater plug is energized; turn to the position of “Q”, starting circuit is available. Turn anti-clockwise to the position “Q” and it can be started directly.

（2）Hand Throttle

Push ahead, and the oil supply will be increased; pull back, it will be reduced.

（3）decompression handle

Turning clockwise means decompression (exhaust valve is released)

（4） Shut-down Lever

Pull the lever backward and the engine will be shut down. Then the lever will be rush into the original position for next starting.

（5） Switch of Three-grade Lights

The most inside position means to shut down. Pull to the first grade, the real lights will be on; pull to the second grade, beam dipped headlights and the rear lights will be on; pull to the third gear, headlights on full beam and rear lights will be on.

（6）Handle of Driving Output Shaft

It acts as the general pivot of lifting mechanism, gear oil pump and PTO shaft.. When it is placed at the site of “engaged”, all the above positions have power in, while at the site of “releasing”, they are cut off. To engage it, you ‘d better step on the clutch pedal.

（7） Use of Hydraulic System

Control models of hydraulic suspending system include integrated force & position control, position control, and floating control. The action is carried out through force-control spring assembly, right plate of lift shaft, welded middle arm unit, connecting lever and response lever.

8. Handle of PTO Shaft

Pushing ahead means low speed, pulling back means high speed, and the middle position means neutral gear. To change speed, you’d better step on the clutch pedal first.

4.5 Control and Drive

Warning:

1. Only after reading the manual carefully, can the driver who has got special training and driving license with a full survey record can operate the tractor. Tractor cannot be operated without licenses. Overload is forbidden.

2. Drivers should pay especial attention to the safety & warning

symbols and understand them correctly.

3. It is forbidden to drive tractors after being drunk, tired or taking some antipsychotic.

4. Don’t leave driver’s seat to start or control the tractor. Before starting the tractor, every gear shift lever should be placed in the position of “neutral gear”. To get off the tractor, every gear shift lever should be placed in the position of “neutral gear”.

5. Before the tractor moves, its path should be no any barrier, and no people between the tractor and the rear implement or trailer.

6. Don't getting on or off the tractor when it is running. No repair or check under the tractor is allowed when the engine runs. People are forbidden to sit on the fender apron. Casualty accident can happen when it parks, so parking brake is necessary.

7. To go on an abrupt slope, you’d better select a proper gear. It is not allowed to shift gears on an abrupt slope. When going down the slope, it is forbidden to stop the engine or out-of-gear or turn sharply. For emergency stop, you should step down the clutch pedal and the brake pedal at the same time. Don’t just step down the brake pedal, or some mechanical parts will be damaged.

8. For transportation operation, the right and the left brake pedals should be locked together. For high-speed driving or full-load operation, it is strictly forbidden to use unilateral brake to get a sharp turn.

9. High speed is not allowed when operating or transferring to other field with hung farm implements. Lift the working units of farm implements out of the earth to avoid damages to the parts of lifting system and suspending system. When leaving the tractor, driver should drop farm implements to the ground, stop the engine and take off the keys to avoid others’ starting tractor.

10. For emergency parking, you should step down the clutch pedal and brake pedal at the same time. Don’ t only step down the brake pedal , or the brake will be damaged

11. Driving on road, you should follow the local traffic rules.

Attention:

exhaust the air in the system.(This step can be omitted generally.)

3. Check and see if every gear**1. Carefully check and listen to the engine and all parts of the tractor when they are working to see if there are abnormal sound and noise, especially check the technical situations of clutch and brake, check and tighten the bolts and nuts at every key site of the tractor. Check air pressure of the tires, aerate the tires if necessary.**

2. When the machine is turnup during operation, shift to a low gear, release the clutch and discharge the load to avoid lengthways turn-over.

3. When engine is over speed, unloading is not allowed. You’ d better immediately pull shut-down lever, and turn the decompression rod to the decompression position or keep air away from entering engine or cut off the oil way.

4. Watch the color of the exhausted air. Too much black smoke is not allowed to avoid overload of the engine. If the clutch slides or cannot separate thoroughly or brake doesn’ t work well, the machine should be stopped for check.

Operations during nights need complete lighting equipments.

6. When 4-wheel driving tractors travel without load or are engaged in transportation, the front driving lever should be placed in the neutral position.

7. To avoid turn-over, especially travel on steep slope and muddy

roads. Only low gears are allowed. When going down the slope, it is forbidden to step down the clutch and slide with neutral gear.

8. To avoid the pollution caused by the exhaust gas don’ t start the diesel in a room that is closed without fine ventilated conditions. When a diesel transfers, keep human and animals far away from the exhaust gas.

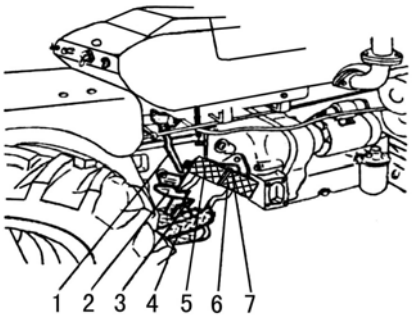


Fig. 4-2

1 braking indicator switch 2 fixed jaw of brake 3 brake arm of trailer4 foot throttle5 left brake pedale 6 right brake padel 7 interlock piece of brake pedal

4.5.1 Starting the Engine

Before a new shift begins to work and start the engine, they should do shift technical maintenance first (detailed description is below). Dispense its troubles and do the following work before starting the engine:

1. Release the switch of fuel tank.

2. Pump the oil with hands, fill fuel into fuel system, and shift lever in the neutral position.

4. Hand throttle should be pulled into the position of “fully opened”.

5. Insert the key into the switch of preheat starting.

6. Turn the decompression handle to the decompression position (decompression can be omitted in hot weather)

Finishing the above steps, you can start the engine as the following steps:

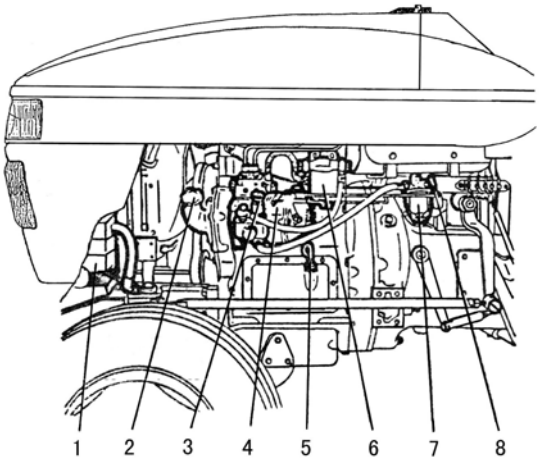


Fig. 4-3control device and indicators

1 battery 2 engine oil filter 3 fuel supply pump 4 high-pressure oil pump assembly 5 dip stick of engine 6 filter for engine oil 7 sediment bowl 8 switch of oil tank

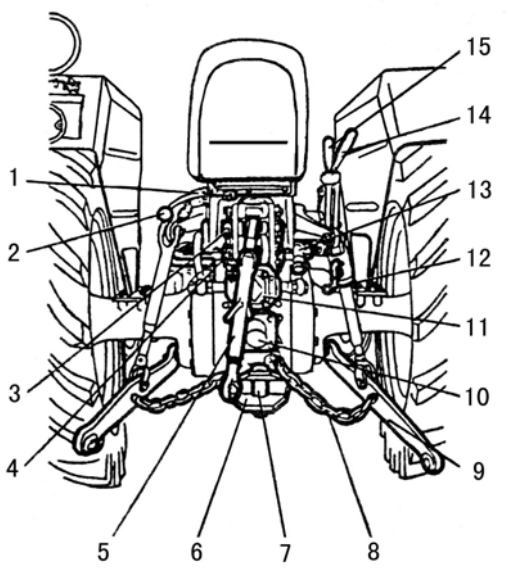


Fig 4-4

1 fueling tap of lifter 2 PTO shaft handle 3 force-control coupling siteof top link 4 position-control coupling site of top link 5 top link 6 hitch iron 7 towing pin8 anchoring chain9 lower link 10 PTO shaft housing 11 gear oil pump 12 length-controling handle of anchoring chain 13 drain line of lifter 14 force-control handle 15 position-control handle

he engine (slowly churning during heating). It is not allowed to brake the oil pan of the engine with fire, or the machine body will be damaged （1）Starting Preheated Machine

Turn the preheat-starting switch anti-clockwise until you can hear the sound of ignition and then return to the position “D” immediately. Put the hand throttle in the low-speed position. Attention: If the engine has been started while the starting switch is still kept in the starting position, the motor will be burned in several minutes.

（2）Starting Cold Machine

Turn the crank shaft with engine crank handle for 5-10 rounds, turn the preheat starting switch clockwise to the position “Y” and stay there for about 10 seconds, then turn to the position “Q” and stay there for 5 seconds. And then reset the compression handle. After ignition, the starting switch will be reset to the middle position “D” and put the hand throttle to the position of small oil supply. Starting the engine costs over 15 seconds and the engine isn’t alive yet. The storage battery should

rest for 10 seconds and then have another try to start.

3. When it is hard to start due to a temperature of below 5 ℃ , usually you need a engine oil preheater that will be energized for 15 minutes, fill some 20~30 ℃ water , and the engine can be started. Or you can fill some 80~90 ℃ water, discharge switch should be on at the beginning to discharge some cold water until the water from the engine is 40~50 ℃ and the turn off the discharge switch. At the same time, the engine oil will be heated to 60~70 ℃ and be filled into it.

4.5.2 Start to Move

1. Step down the clutch pedal thoroughly, and shift the main and assistant gear shifting levers to needed gear stably and slowly.

2. Release the clutch pedal slowly and at the same time gradually gear up to make the tractor start moving slowly and stably.

3. Sound the horn and l to drive people around away.

4.5.3 Driving Tractor

1. Turn the steering wheel to get a direction change. Sharp turn is allowed under low gear. single-side braking can be used to minus the turning radius during field operations (especially in paddy fields) to raise its flexibility and production; however when it operates with high speeds or transports on roads, single-side braking cannot be adapted for sharp turn to avoid turn-over.

2. When the tractor is engaged in transportation or travel on roads, the left and the right brake pedals should be interlocked. When the tractor is parked, especially when it is stopped on a slope, you must use a fixed jaw to lock the brakes to avoid automatically moving.

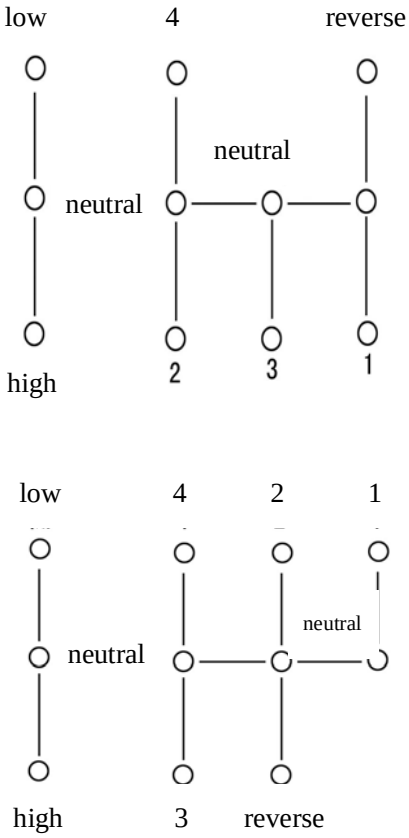


Fig 4-5 tractor gear shifting position

3. Gear selection: Select a proper gear to get a high production and economic performance. See Fig.4-3 for the speeds and uses of every gear.

I-gear and II-gear cannot be used to plough and harrow, or be used as the pull force. Or the transmission system will have severe overload to avoid damage. During working the tractor should be kept from overload. Follow the steps below to distinguish:

1). V-gear is adapted for working. Put the throttle in the semi-open position to let the tractor work with loads, and then push the throttle to the fully-open position. If now the tractor speed is increase, it

means no over load, while if it slows down, it means over load.

2). When V-gear is used for working and engine sounds heavy with black smoke, it means overload. Change to IV-gear. Every time you shift gears, clutch pedal should be stepped down fully first to avoid breaking gears.

4.5.4 Parking

1. Lower down the gear for a slower moving

2. Step down the clutch pedal and push the main gear shifting lever to the neutral position.

3. Release the clutch pedal to make the engine freely run with a low speed.

4. To reduce the water temperature and oil temperature slowly, engine should be kept running for a while at a slow speed. It is forbidden to stop the engine under a high temperature.

5. Push the hand throttle to the position of "closed"

6. Pull out the shut-down lever

7. Turn off the oil tank switch after stopping the tractor.

8. To prevent the cooling water from being frozen in winter that can cause frost crack, you should turn on the two discharge switches and open the water tank to discharge all the water.

gear	action	theoretical velocity (km/h)	rev (r/m)	tractive fore allowed KN (kgf)	
				paddy field	dry field
1	rototilling, transplant	basic configure 1.66		3.92~4.41 (400~450)	5.39~5.88 (500~600)
2	rototilling, transplant	basic configure 2.10		3.92~4.41 (400~450)	5.39~5.88 (500~600)
3	harvesting	basic configure 3.40		3.92~4.41 (400~450)	5.39~5.88 (500~600)
4	ploughing, harrowing , and sowing	basic configure 5.40		3.92~4.41 (400~450)	5.39~5.88 (500~600)
5	ploughing, harrowing , and sowing	basic configure 6.60		3.92~4.41 (400~450)	5.39~5.88 (500~600)
		speedup tupe 8.25		2.94~3.43 (300~450)	3.95~4.90 (400~500)
6	ploughing, harrowing , and sowing	basic configure 8.40		2.94~3.43 (300~450)	3.95~4.90 (400~500)
7	road transportation	basic configure 13.70		1.96~2.45(200~250)	
8	road transportation	basic configure		0.98~1.47(100~150)	
revers e-I		basic configure 1.55			
revers e-II		basic configure 6.20			
action -I	fixed operation, rototilling		540		
action -II	fixed operation, rototilling		720		

Fig.4-3

● **Important:**

1. When working in fields or muddy area, you'd better remove the dirt from your shoes and keep the pedals clean. Catch the armrest careful when getting on or off the tractor.

2. Watch the values on every meter. The value of engine oil indicator should be in the range of 196 ~343 kpa (2-3.5 kgf/ cm2), the value of water temperature indicator is in the range of 70 ─ 90 ℃, finger of ammeter should be at the middle position or the charging position of "+". When an indicator doesn't work well, it needs repairing or replacing. Don't use an indicator with malfunction.

3. You should tell your next shift about the troubles and malfunctions you found.

4. Try to avoid barriers on roads when driving tractors.

5. Driving on roads, farm implements cannot be put into use.

4.6 Operation and Use of the Working Units of Tractor

4.6.1 Operation and use of PTO shaft

Rev of PTO shaft is the combination of 540 r/min. and 720r/min., or the combination of 540r/min. and 1000r/min.

1. Push the control handle of PTO shaft to the middle neutral position, take down the protecting cover of PTO shaft and connect the working mechanism and PTO shaft.

2. Step down the clutch pedal to the bottom, put the handle of the driving PTO shaft to the position "conjunction", and then put the handle of PTO shaft to needed gears according to the requirements of working mechanism

3. Release the clutch pedal slowly to run the working units. You'd better run at a slow speed to check the operation of the working units.

Warning:

1. When using PTO shaft, a safety protecting cover should be installed. People are not allowed to stand on the protecting cover. When the operation is over, an axial sleeve is needed to cover the PTO shaft.

2. When selecting implements, you make rotating speed of the farm

implement match that of PTO shaft;

3. Stop the engine to couple farm implements.

4. Coupling with the PTO shaft, gimbal joint can’ t have a too big deviation angle;

5. To couple with gimbal joint, the clutch should be released thoroughly first.

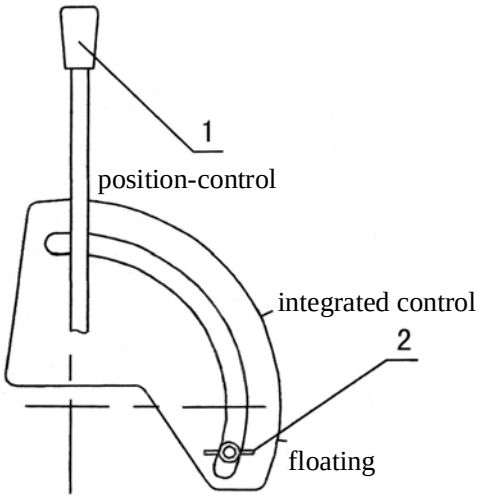
6. When the machine travels for a long distance, the control handle should be at the neutral position. Cut off power to avoid breaking farm implements and personnel hurts.

7. When the PTO shaft is being coupled, only work staff can be near to the farm implements to guarantee personnel safety.

8. When the engine works, to engage or separate the PTO shaft, you should step down the clutch pedal.

4.6.2 Control and Use of the Hydraulic Suspending System

Control models of hydraulic suspending system include integrated force and position control, position control and floating control. The action is carried out through force-control spring assembly, right plate of lift shaft, welded middle arm unit, connecting lever and response lever.



1 handle 2 stopper of butterfly nut

Fig. 4-4 control of hydraulic system

（1） Operation of the control handle of hydraulic suspending system

The operation of hydraulic suspending system is done through control handle.

During plowing, when the soil resistivity is changeable, use the integrated force & position control. Plow depth depends on the different positions of the control handle. In the range of the integrated control, the lower the control handle is, the bigger the plow depth is; on the contrary, the depth is smaller. When you get your needed plow depth, tighten the butterfly nut of the stopper of the handle. Make sure that every time the farm implement is raised or dropped, the control handle can touch the stopper to get a coincident depth on a whole.

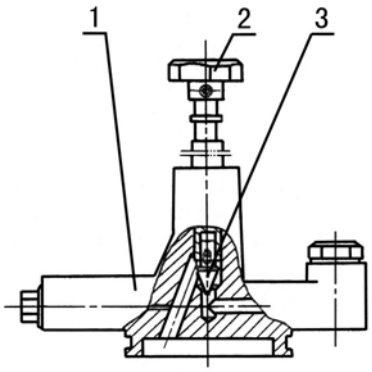
2）Position Control

When doing the operations of rototilling, mowing, and harvesting with the implement, the suspending lift rod is pulled, so the force control spring can’t work. Now the integrated control only acts as position control. In the range of position control, the more the handle move down the lower the implement 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 then through the land wheel, the farm tool will undulate following the earth’s surface.

（2）Control over the Dropping Speed of Farm Implements



1 cylinder end 2 control handwheel for dropping speed

3 control valve for dropping speed

Fig. 4-5 use of the control valve for dropping speed

Adjust the control hand wheel (2) to change the dropping speed (See Fig 4-5).A proper dropping speed can keep the farm implements from severely impinging against land due to high speed dropping.

The control hand wheel(2) for dropping speed directly controls the lowering speed valve(3) on the end of cylinder(1). Turn the hand wheel clockwise, the implement drops slowly, on the contrary, it will drop fast.

When the tractor moves for a long distance with farm implements, control the dropping speed wheel (2) until the implement can't drop any more (Don't lock it up) to let the wheel act as a hydraulic lock for a safe transfer.

(3) Simple Hydraulic Output

When pressure oil needs transmitting, take down the jam head of hydraulic outlet on the upper part of cylinder end, and connect up high-pressure oil pipe. At the same time, take down oil-return plug on lifter body and connect up oil return pipe for hydraulic pullet. During operating, suspending levers should be placed in the lowest position and screw up the control handwheel, put the control handle in the position of "lifting" to let hydraulic oil exported to hydraulic devices needed. Move the control handle down and oil from in hydraulic oil pump will return to oil pool. Returned oil in hydraulic devices flows back to oil pool through oil return pipe.

Use hydraulic output valve for hydraulic output: one or two hydraulic output valve groups can be adapted onto this series. During hydraulic output, output oil pipe can be joined to the quick change coupler on the output valve. During the output, the lifter cannot work. Only when hydraulic output valve is set in the middle position, the lifter will work.

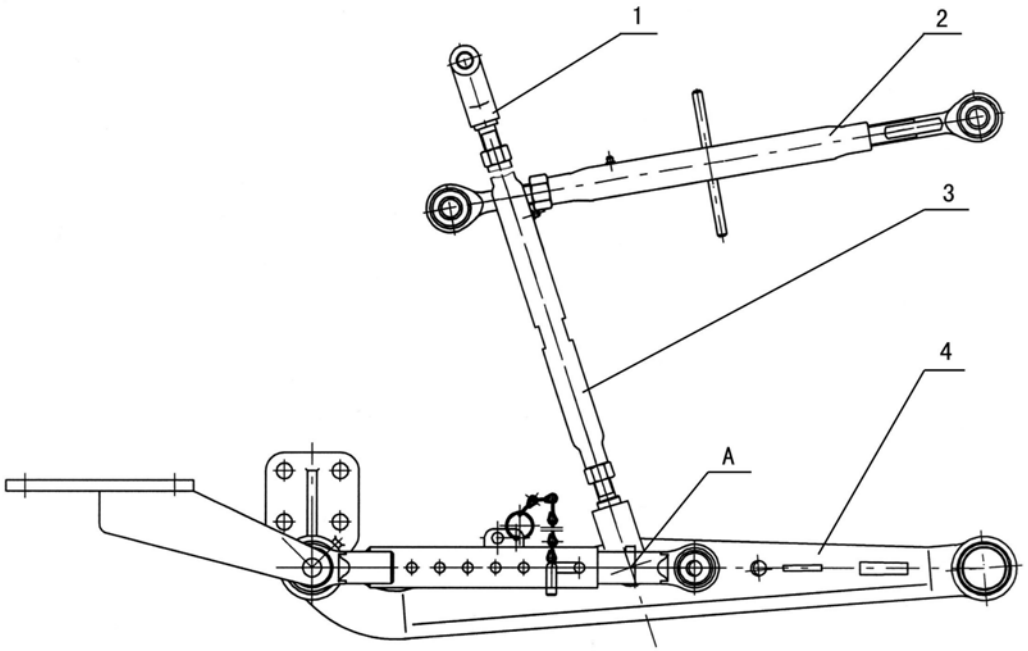
5. The Coupling adjustments between suspending mechanism and suspending plough

1) Preparation for connecting with plough

Install the top link on the rocker of load control spring (Fig. 4-6). Connect the top end of the left lift lever to the front hole A of the left lower link; connect lower end of the right lift lever to the front hole A of the right lower link. There are 4 connecting holes on the rocker of the force control spring (or position control base). When the integrated force & position control is engaged, usually the upper middle hole is used while the top hole is used for light load. As for the heavy load over 35HP, the lower hole should be used;

During normal operation with 30HP, use the middle and lower holes; use the upper hole with light loads. The selection depends on the force-adjustment deflection in the trial plowing. Over deflection or collar rot, move the top link to the lower hole. On the contrary, connect to the upper hole.

2) Plow coupling



1 right lifting lever 2 top link 3 left lifting lever 4 lower link

Fig. 4-6 suspending gear

Through adjusting lifter helix, the lower hanging point of the plow connects to the coupling site of the lower link. The top suspending-point coupling pin connects to the top suspending point of the plow by the top link’s self adjustment.

3) Adjustment of the Plow

a. Horizontal adjustment of the plow frame: Generally, adjust the lengths of the left and the right diagonal draw bars to get your needed plow depth. At the same time, the plow frame should be kept level to get a coincident plow depth;

b. Fore-and-aft horizontal adjustment: adjust the top link of the suspending mechanism. When the front plowshare or the rear plowshare leaves furrows, the top link should be longer; when the rear plowshare is too deep, the top link should be shortened to keep the plow frame even.

c. Adjustment for the plow width: the width adjustment is done by adjusting the width adjustor of the plow. The adjustor can change the left and the right suspending points’ relative positions fron-and-aft. Move the right suspending point ahead to get a wider furrow, and on the contrary, the furrow will be narrow. The adjusting the width adjustor can get a normal position of the plow frame without second plowing or missed plowing.

Attention:

1. Keep people far away from the lifting area of the lifter when operating hydraulic lifters

2. 3-point suspending unit is only for the farm tools especially designed for 3-point suspending devices.

3. High speed is not allowed when operating or transferring to other field with hung farm implements. Lift the working units of farm implements out of the earth to avoid damages to the parts of lifting system and suspending system.

4. With heavy farm tools connected, the lifting control handle should move up slowly to avoid turn-over.

5. Trailer should be connected to the drawing plate.

4.6.3 Differential Lock

During the travel or operation of the tractor, if one of the driving wheels is found too severely sliding to stop the tractor from moving, you can control the differential lock as the following steps:

1. Step down the pedal of the differential lock, shift to a low gear.
2. Turn the hand throttle to the max. position.
3. Press the control lever of the differential lock at the low right position of the driver's seat. Release the clutch pedal slowly to engage the clutch. Now the two driving wheels of the tractor drives at the same time to let the tractor out of the sliding area.
4. After driving from the sliding area, the tractor cannot turn, or it is possible to damage the mechanical parts.

Attention:

1. During normal driving and direct changing of the tractor, the differential lock should be forbidden to use, or the differential lock will stop the tractor from turning and this will lead to breaking parts and enhancing the abrasions of the tires.

2. If one of the rear wheels has wheelspin, speed down the engine before stepping down the differential lock to avoid impact on the transmission box.

3. When the differential lock is engaged, release the control lever of the differential lever immediately to let it reset.

Chapter Five Technical Maintenance of the Tractor

For continuous normal work and a longer life of the tractor, technical maintenance rules should be strictly followed and technical maintenance should be often done to see the technical situation of the tractor.

Technical maintenance is done regularly and is classified into the following grades according to their cycle period :

1. Shift technical maintenance: Just after a new shift’ work begins or after a new shift’s 10~12 working hours

2. I-grade technical maintenance: once every 250 working hours

3. II-grade technical maintenance: once every 500 working hours

4. III-grade technical maintenance: once every 1000 working hours

5.1 Shift Technical Maintenance

Follow the steps below just after a new shift’s work begins or 10~12 hours after work beginning

1. Check the oil levels of oil pan of the engine, transmission box and the lifter. Fill new engine oil if necessary.

2. Check and see if the water in the radiator is full, wash the dirt between the cooling plates away to avoid inefficient heat dissipation.

3. Check and see if fuel tank has enough fuel.

4. Check and see if the fuel sediment bowl contains water or dirt. Eliminate them and discharge the air from the oilway.

5. Check every connecting site and the engine. Eliminate fuel leakage, engine oil leakage and cooling water leakage if there are.

6. Check the height and the proportion of the electrohydraulic in the batteries. Electrohydraulic should be 5-8mm higher than the polar plate. Top up distilled water or electrohydraulic (the check can be done once every 60 hours in winter or humid areas).

7. Check the air pressure of the tires following the Item 3.4 in the Chapter Three “Key Technical Specifications of The Tractor”. If you have no pressure tester at hand, you can watch the tire tread of the rear tires. It is OK with 2-3 teeth touching the ground.

8. Check and see if every assembly of tractor and engine is fastened and reliable.

9. Fill grease to the lubricated points below with a grease gun.

a. bearing of king pin, ball pin of crossover shoe, pendulum shaft and front wheel hub.

b. shaft liner of brake pedal

c. suspending gear

d. driving axle

10. Check and see if the tools along with the tractor are all here.

11. Start the engine and watch is the pressure of engine oil and cooling water is normal.

12. When the tractor travels toward a working site or gets near to farm tools, you should have try to push the control handle of the suspending lifter or the handle of PTO shaft, watching their performances and listen to the working gears.

5.2 I-grade Technical Maintenance

Do the following maintenance every 250 working hours:

1. Do all the shift maintenance work .

2. Replace the engine oil in oil pan of engine, wash the engine-oil filter, and replace filter elements.

3. Turn out the discharge plug screw to discharge fuel and wash the fuel tank.

4. Wash the fuel filter, then install it and exhaust the inside air.

5. Wash and brush the air filter.

6. Clean the battery with cloth, Check electrohydraulic specific density and single-frame voltage. The specific density is kept 1.285 and voltage 1.7V. Eliminate the zinc sulphate from electrode nipple joint and oil with grease to protect against corrosion.

7. Wash the oil-intaking filter of the lifter.

8. Check and adjust brakes.

9. Check and adjust the travels of clutch.

10. Check the bearing clearance of the front wheels. Adjust it if it is too loose.

5.3 II-grade Technical Maintenance

Do the following maintenance every 500 working hours:

1. Do all the work of I-grade technical maintenance.

2. Wash the filter cloth of suction filter of the oil pan.

3. Check the oil spraying pressure and mist spraying quality. Wash the fuel injector and adjust it if necessary.

4. Check valve spring and adjust valve clearance (intake valve 0.38~0.48mm, exhaust valve 0.38~ 0.48mm)

5. Check the nuts on cylinder cover, bolts on links and bolts on flywheels to make sure that they are fastened and reliable.

6. Check the tautness of its fan belt (press the belt with your hand, a 15mm dent is OK)

7. Check the sealing between the valve and its base. Turn crankshaft, listen carefully and make sure there is no air leakage. Do grinding if necessary and eliminate carbon deposit from its air flue.

8. Check the clearance of free turning angle of the steering wheel, do adjustment if necessary.

9. Replace the engine oil of the transmission box.

10. Check the toe-in.

11. Check the king pin of steering knuckle and its bush. Wash it.

12. Wash the inside of the lifter and replace engine oil.

5.4 III-grade Technical Maintenance

Do the following maintenance every 1000 working hours:

1. Do all the work of II-grade technical maintenance.

2. Eliminate carbon deposit from its air flue, check the sealing of air valve (grind it if necessary). Eliminate the carbon deposit from piston and check the carbon deposit on piston ring. Check piston ring working gap and the abrasion of cylinder liner, link bearing, and crank bearing. Replace them if necessary.

3. Check the abrasion of cam, tappet and rocking arm.

4. Check the oil supply of injection pump for its equality. Do adjustments if necessary.

5. Check the advance angle of fuel supply, do adjustment if necessary.

6. Check the flexibility of the shaft of the cooling water pump and its sealing ring. Replace it if it works not so well.

7. Wash the water scale away from the cooling system. Top up the cooling system with the mixture of 10L water, 750g caustic soda (caustic soda]) and 200g kerosene. Run for 5-10 minutes at a middle speed, remain the mixture for 10-12 hours (in severely cold winter, make it work continuously or do something to keep temperature) and then restart the diesel, make it run 5-10 minutes at a middle speed, discharge the washing liquid, and wash it with clear water.

8. Replace the filter element of the air filter and engine oil filter.

9. Dissemantle and check the engine. Have a test on stator insulation and electrical brush, wash its ball bearing and oil with lubricating grease. Replace the oil seal if necessary (Oil new seals with engine oil.)

10. Replace the lubricating grease of the front wheel rim bearing.

11. Check the bush of every gear, seal ring and reinforced seal. Replace them if necessary.

12. Check the oil level of steering gear. Top up if it is not enough.

13. After finishing the whole assembling, have a short-time operation to test the performances of

every gear.

14. Knock the body of the muffler to eliminate dusts from it.

15. When tractor operation is over, store it in a dry and ventilated place.

16. For maintenance, only the parts that meet product standard can be used to replace malfunctioned parts.

5.5 Technical Maintenance in Winter

When operating tractors under a temperature below 5 ℃, special technical maintenance is necessary. Now besides shift technical maintenance, you should follow the rules below:

1. Engine can't be started without water in cooling system. You can pour 60~80 ℃ water into the water tank for safe starting.

2. After being cold started, the engine should be preheated for a while until the water is above 60 ℃.

3. When the tractor operation is over and it rests for a long time, all the water in cooling system will be discharged (for those without anti-icing fluid), and discharged water has the temperature of 50~55 ℃.

4. Fuel and lubricating oil selections depend on air temperatures or seasons.

5. In severely cold seasons, for easily starting the engine, you'd better store the tractor in a warm garage .

5.6 Technical Maintenance for long-time storage

The tractor that is to be stored for a long time should get a thorough check and test for its technical situation before its storage.

1. You'd better store the tractor in a dry garage, and support it's front and rear wheels with wood blocks to leave ground. If you have to park in an open area, a tarp is necessary to cover the tractor with drainage lead around it. The storing area should be far from fire resources such as oil store and kitchen.

2. Wash and clean the tractor body before its storage. Oil the sites that need lubricating , following Fig. 4-1 <<Fuel and Lubricating Oil of Tractor>>.

3. After parking, the cooling water should be discharged from the diesel; dissemble the batteries and keep it well; cover air exhaust mouths.

4. Start the engine once every three months, and let it run for 20 minutes at various speeds. Watch abnormal performances.

Attention:

1. Only the persons who are familiar to the features of the machine and have related safe-operation skills can maintain and repair the machine.

2. Read the parts book relative to this manual and the manual for diesel before maintenance.

Chapter Six Structure and Maintenance of the Tractor

6.1 Transmission System

6.1.1 Clutch

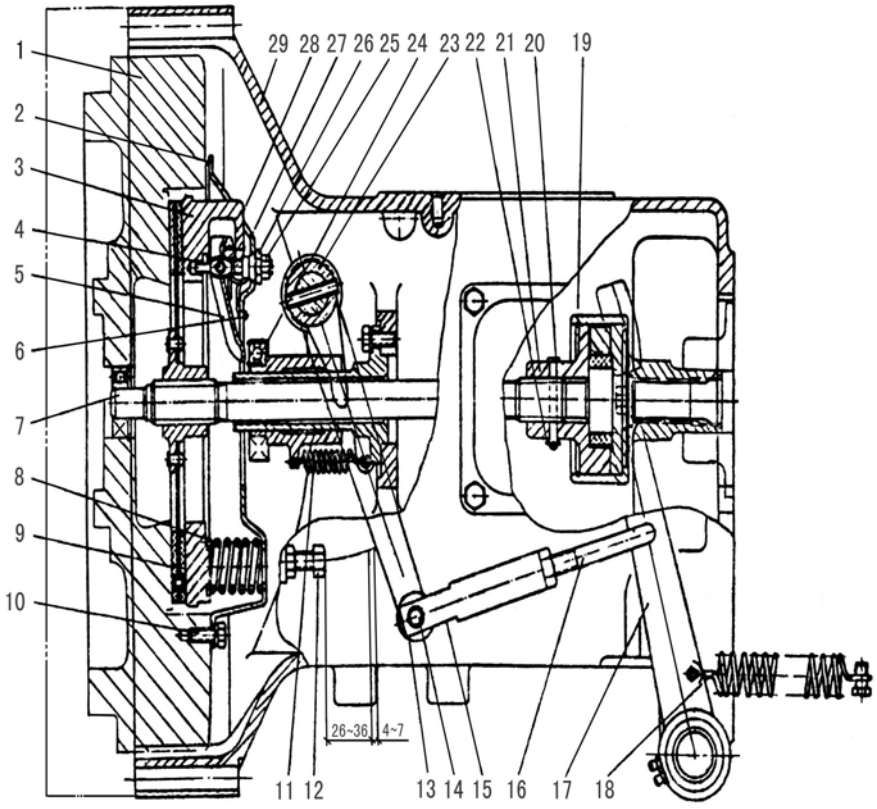


Fig. 6-1 Cluch Assembly

1. flywheel 2. clutch case 3. clutch pressure plate 4. pin 5 releasing lever 6. spring of releasing lever 7. clutch shaft 8. clutch pressure spring 9. driven disc assembly 10. tightening screw 11. pullback spring of release bearing base 12. limit screw 13. releaseing rocker 14. pin 15 adjusting fork 16. push rod 17 clutch pedal assembly 18. pullback spring 19. roundwire snap ring 20.pintle 21.driving shaft coupling 22. split pin 23. clutch release fork 24. releasing bearing 25 nut 26 adjusting nut of releasing lever 27. adjusting bolt of relaesing lever 28. block of releasing lever 29 body of bridge piece

1、Single-acting clutch

1) Structure and action principle: uniwafer dry frictional clutch. See Fig. 6-1 for its structure.

Main clutch parts include engine flywheel 1, clutch case 2, clutch pressure spring 8, and clutch pressure plate 3. Clutch case is fastened with 6 screws 10, pressure plate is installed in clutch case, three

claws of the pressure plate are put in the holes on clutch case, and between the pressure plate and the clutch case 6 pressure springs are installed to press the plate towards flywheel end. Its driven part is a driven plate assembly. The whole driven assembly is installed between flywheel and clutch pressure plate and pressed by the pressure plate. Friction force on the contact surface makes the driven part turn along with driving part. The clutch shaft 7 extends into the wheel hub of the driven plate assembly and be connected by spline. The power is transferred to the transmission system through the clutch shaft. When the pressure of the clutch pressure spring is overcome and the pressure disc doesn't press tightly to the friction disc, the friction force disappears and the driven part doesn't run along with the driving part any longer. Clutch control system includes releasing lever 5, block of releasing lever 28, spring of releasing lever 6, adjusting bolt of releasing lever 27, adjusting nut of releasing lever 26, releasing bearing 24, pullback spring of release bearing base 11, releasing rocker 13, push rod 16, adjusting fork 15, clutch pedal assembly 17, pullback spring 18, pin 14 and so on.

Clutch is released through controlling bearing assembly and clutch pedal assembly. when the clutch pedal is stepped down, the releasing lever is pushed through the push rod of clutch, the adjusting fork of clutch push rod, releasing rocker of clutch, pin and releasing bearing assembly.

When the releasing lever is pushed ahead, the releasing lever will be rotated with the pin 4 in the adjusting bolt of the releasing lever as a pivot.

When the clutch pedal is released, the releasing rocker and the releasing fork will be reset due to the action of the pullback spring. Here the clutch releasing shaft will be reset due to the action of the pullback spring of the releasing bearing base, besides, the releasing lever will also be reset without the action of releasing bearing. The pressure plate will press the driven plate again due to the action of the pressure spring. Here the clutch is engaged.

（2）Adjusting clutch:

For a reliable power transfer, the driving sector must press the driven sector very tightly to avoid clutch trackslip. There should be 2-2.5mm gap between the releasing bearing 24 and the interfaces of three releasing levers 5. During the clutch being released, only a slight force can eliminate the gap. This travel of the pedal is called as "free travel", converted to releasing rocker's 4-7mm. From this time on, you continue to press the clutch pedal to make the releasing rocker 13 swing ahead until it touches the limit screw 12. Its straight distance is called as "working travel", converted to the swinging of releasing rocker, about 26-36mm. During operation, the free travel will be reduced gradually in response to the abrasion of the driven plate 9 and the forwarding movement of the pressure disc 3, so regular check and adjustment are necessary and the following are the steps:

1. Turning the adjusting fork 16 to shorten or prolong the push rod can change the free travel; screwing in or out the limit screw can change the working travel.

② clutch can't be released thoroughly:

First, adjust the working travel to its max. value. If it doesn't work, open the check winder on the right of the body of the bridge piece, releasing the fastening nut 25 and tighten the three adjusting nuts 26 at

the same time. The revolution angles must be the same and use the control test of the releasing clutch to test its reliability. After finishing the adjustment, tighten the nuts 25.

③ When the clutch skids:

One possible situation is that the free travel disappears, or the three releasing levers are even compressed, you just need to adjust the free travel to the rated value; the other case is that the free travel is ok, and then you must adjust the three adjusting nuts, screwing out a same revolution angle. Control the releasing clutch to check the reliability of your adjustment.

The above adjustments on the tractor are just emergency methods. A more reliable method is to disassemble the clutch assembly for adjustments. Refer to "Installation of Clutch".

（3）Use of Clutch

1) Clutch should be released quickly and thoroughly, but no impulse force.

2) Clutch should be engaged equally and stably.

3) Driver should not put feet on clutch pedal during driving to avoid semi-engagement or unreliable engagement that can lead to severe abrasion of clutch and releasing bearing.

4) It is not permitted to control the speed through clutch.

2、Dual Clutch

Adjustments on the dual clutch

Fig. 6-2 shows a coordinated control duable clutch that consists of three main sectors: driving sector,

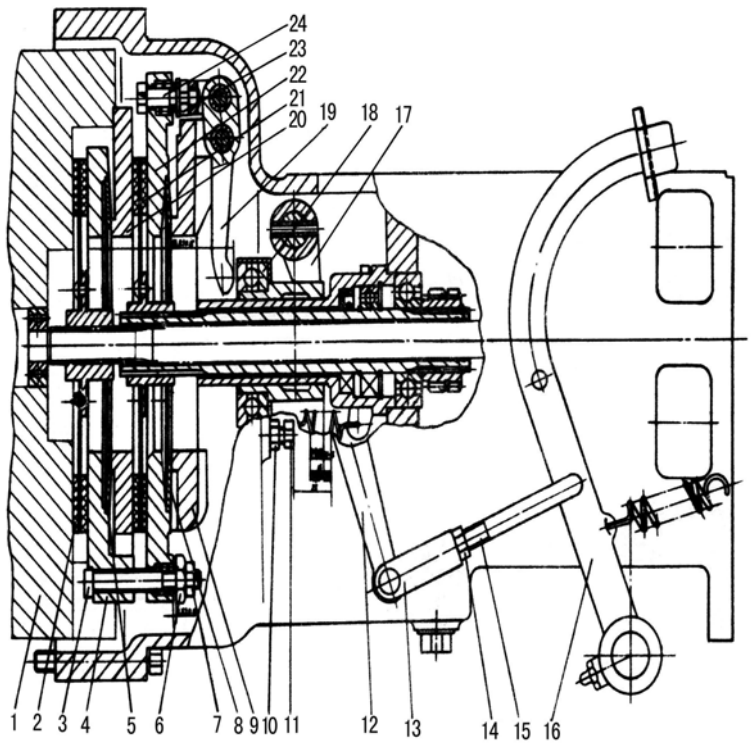


Fig. 6-2Dual clutch

1.flywheel 2.PTO clutch driven plate assembly 3 .link 4.assistant clutch pressure disc 5 .disk spring 6adjusting nut 7 .M10 × 1 nut M10X1 8. disc spring 9. clutch case 10. M10 nut M10 11. M10 × 45 bolt M10 × 45 12 .clutch releasing rocker 13 .adjusting for of clutch link 14. M10 Nut M10 15. link of releasing fork 16 .clutch pedal 17 . releasing fork of clutch 18. rolling bearing 996713 19. releasing lever 20. fixed pressure disc 21.driven plate assembly of the key clutch 22. pressure plate of the key clutch 23. nut M10 × 1 24.adjusting screw

driven sector, and control sector. The driving sector runs together with the engine fly wheel, while only when the clutch is engaged, will the driven sector run along with the engine.

During the dual clutch operating, the continuous abrasion of parts will cause the clutch skid and inexhaustive separating, which will stop the tractor from working normally. So adjusting in time is necessary.

The dual clutch should be adjusted on a clamp. Adjusting steps are: adjust the length of adjusting screw to get a 99.6mm distance from the three releasing levers 19 to the end face of the assistant clutch pressure plate with a difference value of 0.1 mm allowed. After adjustments, lock it up with M10 × 1 nut 23.

Adjust the free travel of clutch pedal 16. First length of the clutch push rod 15 is adjusted to guarantee a gap of 2.5 ± 0.5mm between the end face of the three releasing levers of the key clutch and releasing bearing 18.(to guarantee a free travel of 5.5-7mm of the clutch rocker 12). After the adjustments, lock up the nut 4.

Limit adjustment of the working travel of the clutch pedal16: Release nut 10, turn the adjusting bolt 11 to let the lower end of the clutch rocker 12 get a working travel of 25, and then lock up nut 10.

Attention:

1) With safety considered, the engine cannot be started without released clutch.

2) When you released the clutch pedal, your action should be quick and when you engage it, action should be slow. Before speed changing, the clutch pedal should be stepped down completely.

3) During operation, don't put your feet on the clutch pedal, or the abrasion of the clutch is increased.

6.1.2 Shaft coupling

(1) Construction and action principle

Shaft coupling is set for three purposes: one is to assort with the axial error between the clutch shaft and the shafts of transmission box; another one is to absorb some of the impact force from the engine to protect the transmission system; the third one is to prolong the life of the driven disc of the clutch. Now nylon embed-type coupler is adpated for single actions of HHJM30-40 series tractors, while friction ball for their double actions.

(2) Disassembling

Open the square window on the left of the housing of the bridge piece, disassemble the pintle20 of the splint pin22 of the roundwire snap ring 19. Drop out the driving coupler 21 and the nylon elasticity sector is easy to drop out. Stores of installation are in reverse orders.

6.1.3 Gear box assembly

(1) Constructure of the gear box (see fig. 6-3 and fig. 6-4)

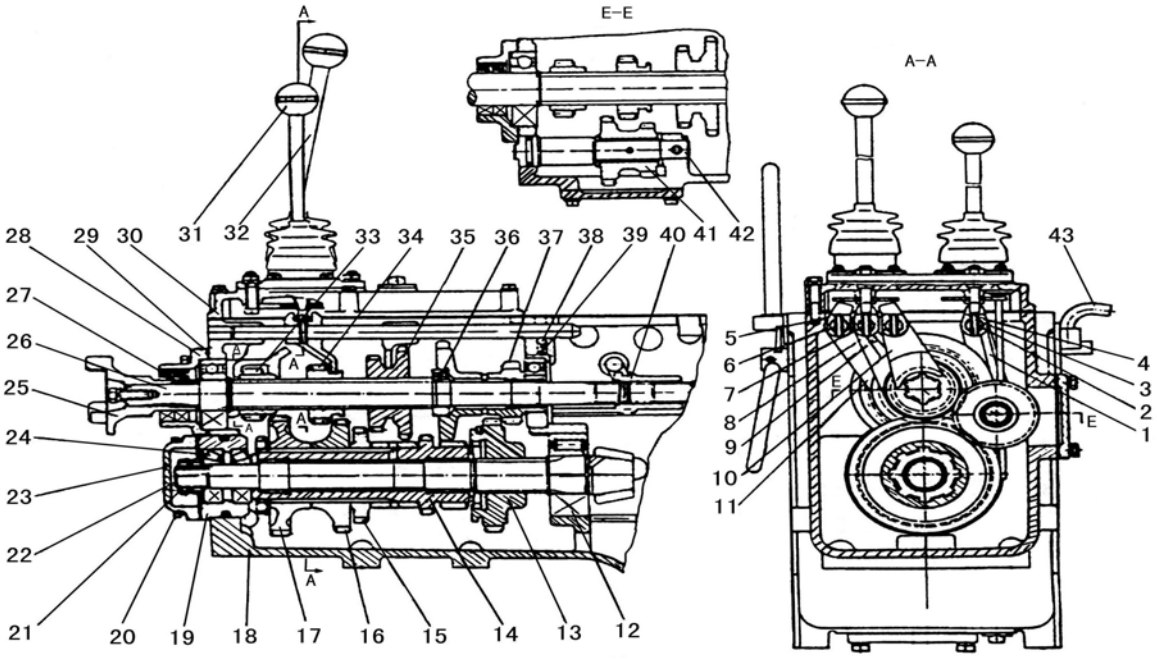


Fig. 6-3 single-acting gear box assembly

1 gear shifter 2 shift shaft 3 shifting block 4 elastic cylindrical pin 5 III-IV gear shifting block 6 III-IV gear shift shaft 7 II-reverse gear shift shaft 8 II-reverse gear shifter 9 I-gear shift shaft 10 I-gear gear shifter 11III-IV gear shifter 12 bearing NUP2308 13 gear sliding gear14 bi-axis spline housing15 III-gear driven gear 16 II-gear driven gear 17 I-gear driven gear 18 housing of transmission case 19 bi-axis front bearing housing20 washer 21 round nut 22 No.2 shaft 23 front bearing housing of No.2 shaft 24 bearing31305 25 shaft coupling 26 No. shaft 27 oil sealing 28 front bearing housing of No.1 shaft 29 paper shim of No.1 shaft 30 gear box cover assembly 31 assistent gear shifter 32 keing gear shifter 33 I-gear sliding gear 34 II-reverse gear sliding gear 35 Ⅲ - Ⅳ gear sliding gear36 bearing6006 37 gear dual gear 38 steel ball 39 lock spring of declutch shift shaft 40 spline joint sleeve 41 reverse-gear gear 42 reverse-gear shaft43 air pipe

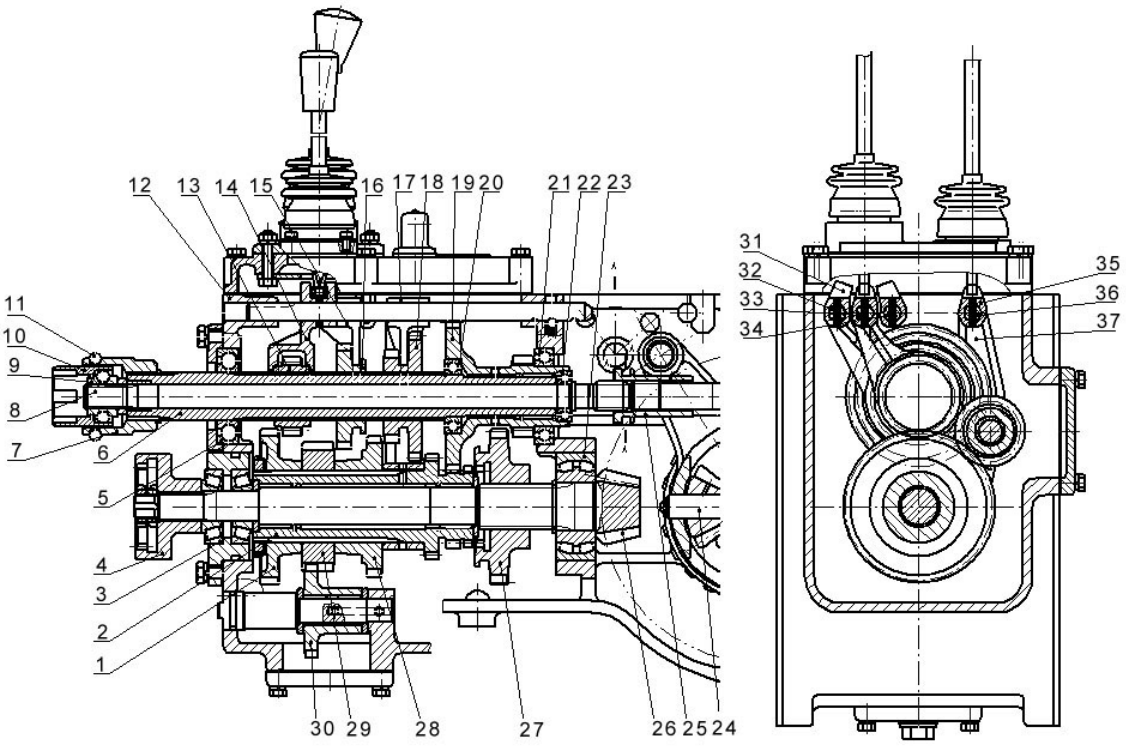


Fig.6-4 dual gear box assembly

1I-gear driven gear 2 bi-axis spline housing 3 rolling bearing 31305 4 coupling annular gear 5 rolling bearing6208 6 I-shaft 7 主离合器联轴节从动套 joint driven bush of main clutch 8 power take off drive shaft 9 副离合器联轴节从动套 joint driven bush of assistant clutch

10 副离合器联轴节联接套 joint connecting bush of the assistant clutch 11 steel ball 10.3188 G400 b 12 传动箱体合件 transnission case 13 Ⅰ - 倒档滑动齿轮 I-reverse sliding gear 14 Ⅰ - 倒档拨叉 I-reverse shifting fork 15 Ⅲ档拨叉 III-gear shifting fork 16 Ⅲ档滑动齿轮 III-sliding gear 17 Ⅱ - Ⅳ档拨叉 II-IV gear shifting fork 18 Ⅱ - Ⅳ档滑动齿轮 II-IV gear sliding gear 19 高低档双联齿轮 high & low gear dual gear 20 滚动轴承 rolling bear 6007 21 滚动轴承 rolling bear 6010 22 滚动轴承 rolling bear6004 23 调心滚子轴承 self-aligning roller bearing 22308C 24 差速器总成 differential assembly 25 花键联接套 spline coupling bush 26 第二轴 II- shaft 27 高低档滑动齿轮 high& low gear sliding gear 28 Ⅱ档从动齿轮 II-gear driven gear 29 Ⅲ档从动齿轮 III-gear driven gear 30 倒档齿轮 reverse-gear gear 31 Ⅲ - Ⅳ档拨头 III-IV gear shifting fork 32 Ⅱ - Ⅳ档拨叉轴 II-IV gear shifting fork shaft

33 Ⅲ档拨叉轴 III-gear shifting fork shaft 34 Ⅰ - 倒档拨叉轴 I-reverse gear shifting fork shaft 35 高低档拨头 high & low gear shifting block 36 高低档拨叉 high&lower gear shifting fork 37 高低档拨叉 high&lower gear shifting fork

（4+1）× 2 gear shifting of the gear box is done through controling the key and assistant gear shifters. The key gear shifter can get four forwarding gears and a reverse gear, while the assistant gear shifter can get a high-speed gear and a low-speed gear. Gear distributions are some diffirent between the single-acting gear box and the bi-acting gear box, so you should first see clearly the gear distributions on the key or the assistant gear shifters.

Step down the clutch pedal, select your needed gear, look around, release the clutch pedal slowly, and then the tractor can travel and take power out. A proper working speed of the tractor cannot only get the best productivity and economical efficiency but also prolong its life. Overload is not proper during tractor working. It is better for the engine to have a certain power margin. Speed selection for tractor’s working in fields should let the engine have about 80% load. If it is light loaded and slow operation, higher gear together with small fuel supply can save your fuel.

6.1.4 Differential gear and differential lock

Constructure of the differential gear (see fig. 6-5):

Differential gear is taper gear type consisting two planet gears. The big taper gear 5 is fixed on the differential housing 14 by the six bolts 4. Two face gears 15 that can turn inside the differential housing are installed inside the differential housing and are connected to the final driving small gears by splines; there are two planet gears installed on the planet gear shaft 17 that is installed on the differential housing,

（2）Adjustment for the differential assembly

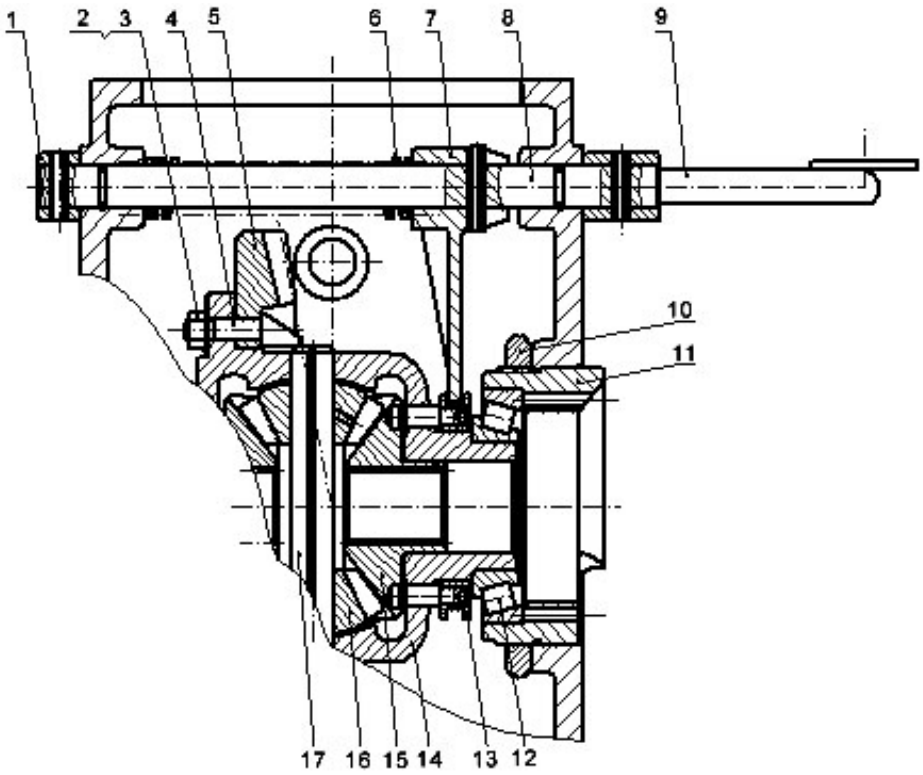


Fig. 6-5 control device of differential lock

1 bearing bush 2 washer10 3 nut M10 4 retainer bolt 5 big taper gear 6 pullback spring of diffirencial lock 7 fork of diffirential lock 8 fork shaft of diffirencial lock 9 pedal of diffirential lock 10 adjusting nut if diffitencial lock 11 bearing support 12 bearing 30212 13 diffirencial lock assembly 14 diiffirencial housing 15 right axle shaft gear 16 epicyclic gear 17 planet gear shaft

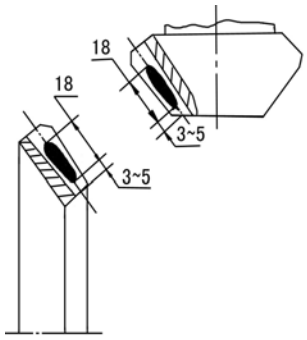


Fig.6-6 Ideal contact face of bevel gear

Put the differential assembly into the middle of the transmission box (the big taper gears should be out its left side), then put the inner ring of bearing 30212 and adjusting nuts of differential into its two bearing journals' end. After that, put the differential bearing with the outer ring of bearing 30212 into two bigger holes on the wheel box's two sides and screw the differential adjustment nuts. Pay attention to the joggle of the big taper gear (the big spiral umbrella) and No.2 axes(the small umbrella) and adjust it if necessary. After adjusting, fix the adjusting nut orientation slice, two M8 × 14 bolts and the orientation lock slice above the differential adjusting nut (on the wheel box), then fasten the bolt's six

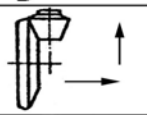
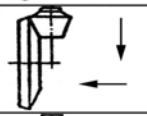
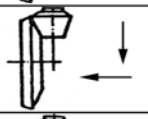
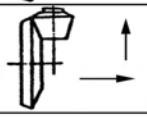
tooth contacting of big gear	adjusting girections]	moving directions of gears
	normal print	
	adjust big gears towards mnall gears. move small gears outward if the clearance is too small	
	adjust big gears apart from small gears. move small gears inside if the clearance is too big	
	adjust small gears towards big gears. move big gears outward if the clearance is too small	
	adjust small gears leaving from big gears. move small gears inside if the clearance is too big	

Fig. 6-7 print adjusting of helical beval gear

conners by curving the lock slice.

The adjustment of the screw wimble gear should be done after the wheel box has run for 1~2 minutes without oil. The side gap of the taper gear should be between 0.15~0.25mm and the ideal touching trace are shown as Picture 6-6. The interface of the small gear should be higher than the the bigger one. Under the lesser burthen, the touching trace's length should be half of the gear's length. Because the interface will move to the bigger end under full burthen, so you should make sure that the interface is closer to the smaller end when fixing and testing. The screw wimble gear and its adjustment are shown as Fig. 6-7.

1. The adjustment of the screw wimble gear should be done after the wheel box has run for 1~2 minutes without oil. The side gap of the taper gear should be between 0.15~0.25mm and the ideal touching trace are shown as Picture 6-6. The interface of the small gear should be higher than the bigger one. Under the lesser burthen, the touching trace's length should be half of the gear's length. Because the interface will move to the bigger end under full burthen, so you should make sure that the interface is closer to the smaller end when fixing and testing. The screw wimble gear and its adjustment are shown as Fig. 6-7.

2. The adjustment of the screw wimble gear's trace can be realized by adding or reducing the two axis’ s' underlay and screw the adjusting nuts on the differential's two sides. At the same time, the adjusting nut can also be used to fasten the differential braking and the total friction torque should be between 0.98~1.47 NM(0.1~0.15 KgN/M)

The differential lock's control is on the tractor's left side(Fig. 6-6), which consists of differential lock assembly(13), differential lock's joy stick(9), differential dial forked shaft(8), differential lock dial fork (7) and differential lock spring(6). While working, if getting stuck or sliding, the differential lock

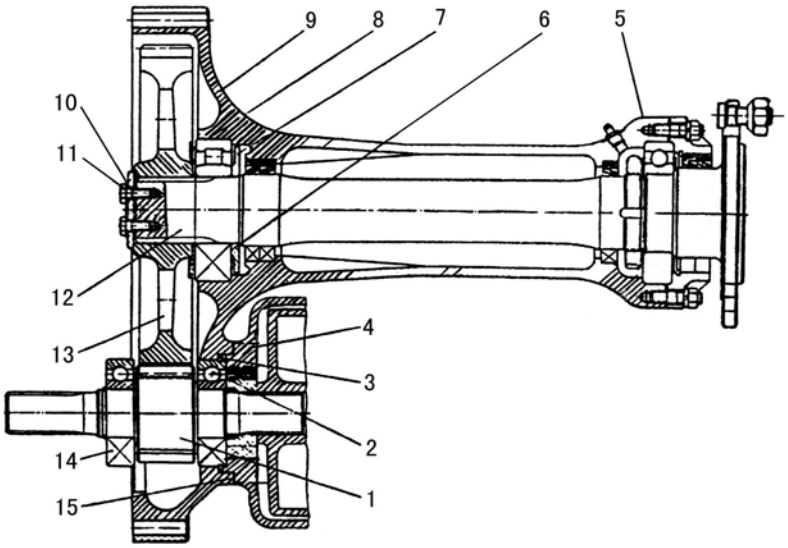


Fig.6-8Final Transmission Assemble

1 final transmission small gear2 ball bearing6308N 3 limit ring4 brake housing5 ball bearing 213 6 roller bearing NU311 7 base plate 8.baffle9 final transmission housing 10 safety collar 11 screw12 driving shaft 13 final transmission big gear 14 rolling bearing 6308 15 paper shim of brake housing

can be joined as follows to make the tractor move out the lubricious area:

1. Step the clutch pedal, and switch the main and assistant gearlever to low gear.
2. Put the accelerograph control to the maximum.
3. Use your right foot to step the differential lock footplate.
4. Loosen the clutch pedal slowly to make the tractor move out of the lubricious area slowly.
5. Loosen the differential lock footplate and it will come away automatically.

● Important:

The central transmission big and small gears are a pair of matched gears. Make sure that they are fixed correctly. It's better that they are replaced together with the bearing, otherwise the service life will be shortened.

6.1.5 Final transmission

See Fig. 6-8 for the structure and operating principle:

HHJM-30-40 series of tractors are equipped with 2 sets of straight teeth cylinder gears (external mesh) final transmission systems, distributed at both sides of the transmission case. Engine transmits its power through clutch and transmission case, and the power is divided by differential mechanism into two parts and transmitted to the right and the left final small transmission gears and then to two driving shafts. Its structure is as Fig. 6-8.

One end of the small final transmission gear (1) is supported in the differential bearing seat with rolling ball bearings 308(4), a spline is inserted into spline hole of differential mechanism half shaft gear and connected with haft shaft gear, another end is set in final transmission housing (9) with ball bearings (2), and its axial position is fixed with limit ring (3) and brake housing (4). Driving shaft (12) is set in the final transmission case with two bearings(5) and (6), big final transmission gear(13) is fixed on the spline of the driving shaft, and engaged with small final transmission gear. The position of the big final transmission gear on the driving shaft is fixed with two M8 × 20 screws (11) and a safety washer (10). The final transmission case is fixed on the external side of transmission case with twelve bolts.

Lubricating oil in final transmission case: As transmission case is through to the final transmission case, no additional lubricating oil need be filled into the final transmission case, but if lubricating oil in the final transmission case need be drained off, lubricating oil in the transmission case shall be drained off

at the same time. Base plate (7) is used for stopping oil and as dismantling tool when connection between bearings NU311 external ring and case is too tight. The block bearing on the small-end driving shaft of the end transmission case shall be often oiled with lime grease.

6.2 Travel& Steering System

6.2.1 Steering gear

1. Mechanical steering gear

(1)Structure and work principle:

The steering gear is a spherical worm rolling wheel type, fixed on a bridge piece case with 4 bolts,

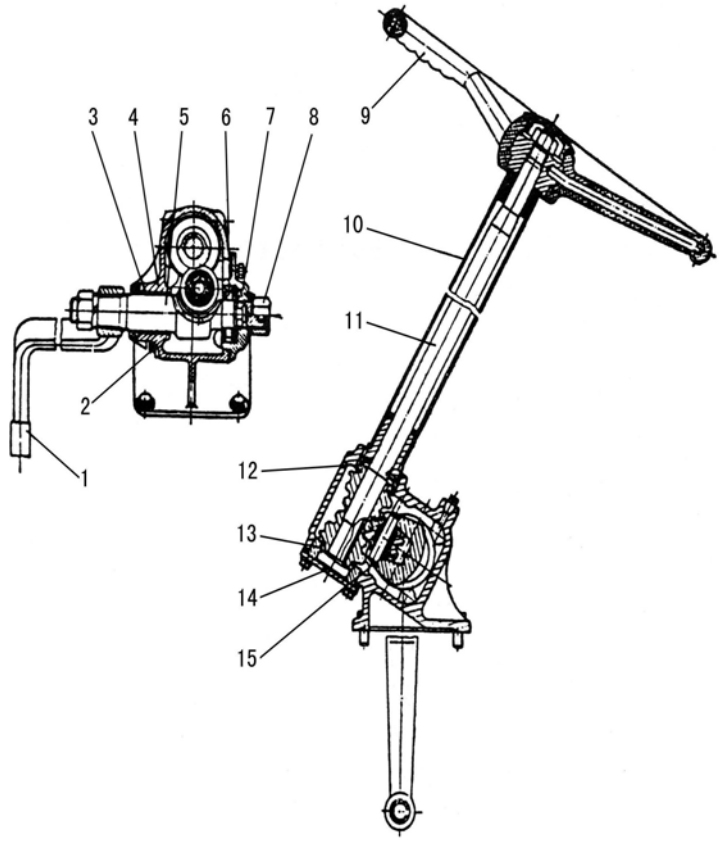


Fig. 6-9 Mechanical Steering Gear Assembly

1. steering lever 2 screw plug II-1/4〞, 3. Sleeve 4. case of steering gear 5. steering lever assembly 6. bearing NUPZ05 7. steering side cover assembly 8. adjusting nut assembly of steering lever axis 9. steering wheel assembly 10. steering sleeve 11. assembly of steering shaft with steering worm 12. bearing 977907 13. bearing 977097K 14. lower cover of steering gear 15. rolling bearing 776701

Steering shaft makes an angle of 600 with tractor longitudinal axis, as Fig. 6-9.

Assembly of steering shaft with steering worm (11) is installed in steering gear case, and set on 977097K and 9077097(12) bearings on the steering gear case. Steering lever assembly (5) is set in the steering gear case assembly (4) with sleeve, its left end is set on the sleeve (3) and right end on NUP205 bearing of side steering cover assembly on steering gear case(7), so the rolling wheel (bearing 776701) on steering lever axis assembly is engaged with the worm, steering lever (1) is connected to its shaft with triangle spline, steering wheel (9) is also connected to steering shaft with triangle spline.

When steering, turn steering wheel to rotate steering lever shaft through worm on steering shaft through rolling wheel. Here steering lever will sway froe-and-back to control the trapeziform mechanism of front axle for steering.

(2) Adjustment

When installing steering gear, worm bearing shall be pre-tightened through adding or reducing spacers between steering gear case and lower cover of steering gear (14). When tightening 4 bolts of lower cover of steering gear and the lower cover presses bearing. Pre-tightness of worm bearing shall be: rotational stress of steering wheel is within 2.45 to 4.9 N(0.25 to 0.5kg) at its radial 190mm site without the lever shaft and the rolling wheel.

Rolling wheel axial shall be 6mm away from the worm axis to adjust their mesh clearance. During adjustment, twist right nut (8) off, turn screws of steering lever shaft with a special spanner, make steering lever shaft axially move left and right. Apply a force of 7.85 to 1.75N(0.8-1.3kg) at the radial 190mm site of steering wheel along tangent line, turn the steering wheel left or right 200 ° from central position to test the following: when rolling wheel of the lever shaft is at both ends, mesh clearance of steering gear assembly shall allow the steering wheel to turn 30 ° without load. When rolling wheel of lever shaft is at the central position, there shall not be mesh clearance within a steering angle of 45 ° left or right.

(3) Dismantlement of steering gear.

① Open cover to dismantle steering wheel.

② Remove connectors between instrument panel and other wires or circuit.

③ Separate hand throttle from its stand, and oil tank from instrument panel.

④ Dismantle instrument panel and back stand of oil tank trestle.

⑤ Separate longitudinal pull rod connector from steering lever, and take down the steering lever.

⑥ Loose 4 bolts of the steering gear and the bridge piece to remove steering gear assembly.

⑦ Dismantle screw plug II-1/4 ″ (2) and drain lubricating oil from the case.

⑧ Remove steering sleeve pipe (10)

⑨ Loose 4 bolts on the side cover of steering gear, remove side cover assembly of steering gear

and steering lever assembly.

⑩ Loose 4 bolts on the lower cover of steering gear, remove lower cover of steering gear, take off bearing 977907K, steering shaft worm assembly and bearing 977907 respectively.

(4) Installation of steering gear:

① Before installation, clean all parts and oil each inter faces with lubricating oil, paper spacer surface with butter.

② If part damaged, replace it.

③ After parts are all and complete, install them in the anti-order of dismantlement, and adjust them according to the regulations.

Attention: To install the steering lever, the steering lever shaft shall be at the central position.

④ After installation, fill lubricating oil into steering gear case with a level up to the lower side of filling hole.

2. BZZ-E80 type hydraulic steering gear

BZZ-E80 type hydraulic steering gear is a fully-hydraulic one of cycloidal rotary plate valve type, consisting of a slave valve and an engaged pair of a couple of cycloidal pin gears. It works quickly and stably, and is simple in structure, and easy in installation. Manual steering operation can be done when engine stops.

⑴ Structure

Structure of steering gear is as Fig. 6-10. Slave valve is formed by valve core, sleeve and valve

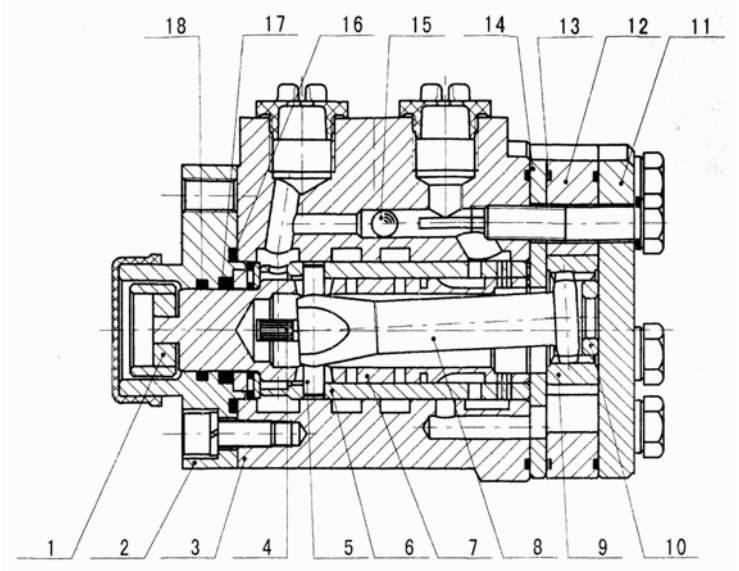


Fig. 6-10 Hydraulic Steering Gear Assembly

1. cross connecting block 2. front cover3. valve body 4.spring flake 5. bolt 6. valve sleeve 7.valve core 8. coupling shaft 9. rotator 10. positioning pole 11. back cover 12. stator 13. O- ring 14. separating plate 15. steel ball 16. O- ring 17. X-ring 18. O- ring

body to control flow direction; an engaged pair of cycloidal pin gear is formed by rotator and stator as a measuring motor to guarantee that oil-intake volume to oil cylinder is proportional to rotational angles of steering wheel. During manual steering, it is used as hand oil pump, and coupling shaft is used as rotational torsion moment.

⑵ Precautions for installation

① To install steering gear, it shall be concentric with steering pole with axial clearance between them. After installation, inspect to see if steering wheel is flexible in operation. Pipeline installation shall follow the principles: "P" means connection to oil outlet pipe of oil pump, "T" to oil tank, "A" to left hollow of oil tank, and "B" to right hollow of oil tank.

In oil suction pipe, flow speed shall be within 1 to 1.5m per second while in pressure oil pipe and return pipe, oil flow speed shall be within 4 to 5m per second.

Attention: When tightening bolts into front cover of steering gear, depth shall not exceed thickness (17mm) of cover, tightening torque shall be 30 N.m.

② According to strength requirements of steering parts, diameter of steering wheel shall not exceed 500mm. In the circuit of steering gear, an oil filter with a precision of 30μm shall be set. In general, oil tank position of steering system shall be higher than installation position of steering gear, and return oil pipe shall be inserted into oil level to replenish oil, and lest air comes into oil pipeline when manual steering.

Oil consumption of steering gear is 17 to 33 centistoke. you better use low solidification hydraulic oil, oil temperature for steering gear shall be 10 to 80 ℃, normal oil temperature shall be 30-60 ℃.

Run-in: before operation, people shall clean oil tank, fill it with oil to the highest oil level, loose spiral connector of transfer oil cylinder to make oil pump operate in a low speed to bleed air, until no foams in oil.

Dismantle the connector between piston rod of steering oil cylinder and steering wheel, turn steering wheel to make piston move to the left terminal or right (do not stay at the positions), fill oil into tank to the regulated level.

Tighten all spiral connectors, connect piston rod, inspect to see if steering system works normally under all conditions.

Surfaces with oil shall be kept clean lest impurities block parts in steering gear, people shall often inspect filter and oil level, and replace if necessary. (If oil drops to paper, there is a black central spot, the oil must be replaced.)

During using steering gear, if its operation is not flexible or fails, people shall have a check, and shall not turn steering wheel by force to avoid damaging parts. No turning steel wheel by two persons at the same time.

6.2.2 Brake

(1) Structure and work principle of brake:

The tractor is equipped with sealing disc brakes, they are set on the left side and the right side of the final transmission (small) gear shaft respectively, the right brake or the left brake may be applied in single side, its structure is as Fig. 6-11 with pressing plates (12) and frictional slice assembly (13).

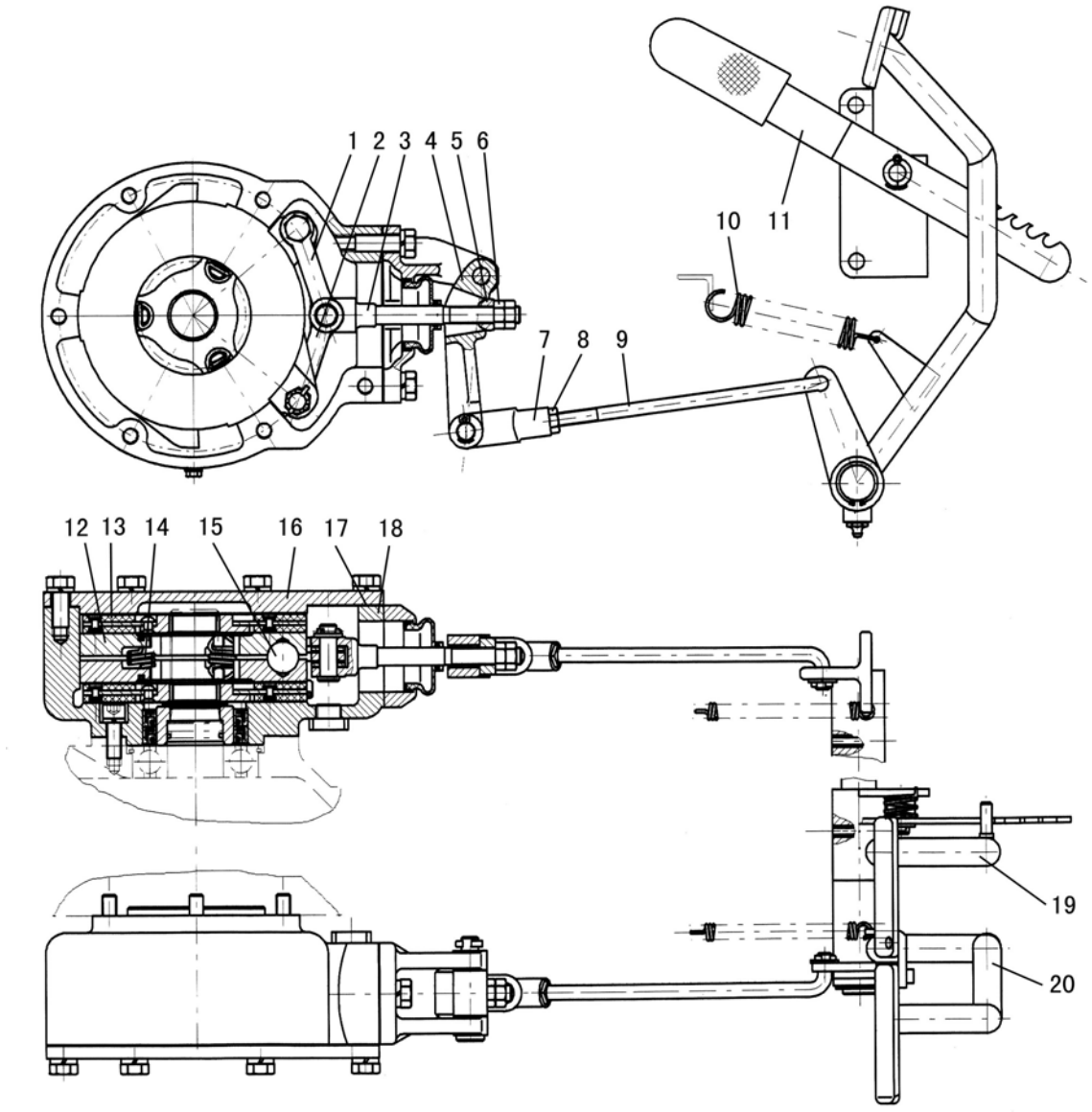


Fig. 6-11 Brake Assembly

1. pull plate 2. fork pull plate 3. adjustment rod 4. sway arm 5. shim block 6. nut 7. adjustment fork of brake pull rod 8. nut 9. brake pull rod 10 pedal springs of clutch 11. welded brake pedal unit 12. pressing plate 13. frictional slice assembly 14. pressing plate springs 15. steel balls 16. brake cover 17. paper spacer of brake cover 18. brake case 19. left brake pedal welding body 20. right brake pedal welding body

Two pressing plates (12) are pulled by each other with 3 springs (14)with 3 steel balls (15) between 2 pressing plates. The pressing plates may rotate around the steel balls, and two pressing plates are connected with a pull plate (1) and a fork pull plate (2), another end of pull plates is connected to adjustment rod (3), and put an adjustment rod in the sway arm (4). The other end of the sway arm is connected to adjustment fork (7) of brake pull rod, brake pull rod (9), left brake pedal (19) and the right welded brake pedal unit (20). When treadling brake pedal, two pressing plates are pulled by the pull plate through brake pull rod, adjustment fork, sway arm, adjustment rod to make the pressing plates rotate around steel balls. As there is a spade concave in the pressing plate, clearance between two pressing plates get wider, so the frictional slices are pressed. As frictional force functions, the frictional slices stop rotating, so the final transmission (small) gear connected to the frictional slices also stop rotating, driving wheel stops work.

When releasing pedal, the pressing plate returns to the original position by the spring (14), and the frictional slices also return to original position and separate from the pressing plate.

If single-side brake is applied, turnning radius may be reduced. When two pedals are locked together, treading on any pedal can operate two driving wheels. Locking the welded brake pedal unit (11) can keep tractor braking for long time.

(2) Adjustment of brake

After brake is used for some time, frictional discs may wear out; so clearance between frictional discs and pressing plate gets wider, which will reduce brake function. So brake shall be often adjusted for safe operation. Adjustment method is to loose nut (8), adjust adjustment fork (7) of brake pull rod to change the length of pull rod. After adjustment, tighten it with nut (9) to adjust the clearance.

If free state and braking state of brake can not be adjusted well by the above method, it can be adjusted by adding or reducing brake cover paper spacers between brake cover (16) and brake case (18). Add paper spacers if brake travel is too short, otherwise reduce paper spacers.

If adjustment of the left brake is not identical with that of the right brake and emergency brake is applied during a high speed, tractor will have different braking marks and deviate from its course, people can prolong the brake pull rod at the side where braking track is longer or shorten the one at the side where braking track is shorter until the left braking track is as long as the right one and the brake works reliably, and then tighten nut (9), firstly test with III-gear, then IV-gear after adjustment.

(3) Application and maintenance of brake

① Do not put your foot on pedal when brake is not applied to avoid quickened wearing of frictional slices.

② Braking shall be engaged entirely, do not stop at its middle position.

③ For braking, firstly treadle the clutch pedal, then treadle brake pedal. Treadle two pedals at the same time under emergency.

④ During transportation, the left and the right brake pedals shall be locked together. In particular, when tractor is going at a high speed, don't apply single side brake.

⑤ Brake frictional slices shall not be stained with oil.

Warning:

Before starting-up, the left brake pedal shall be locked with the right brake pedal. If applying single side brake, tractor may overturn.

● **Important:**

Free travel of the left brake pedal of tractor must be identical with that of the right one; otherwise tractor will deviate from its course and lead to accident in case of emergency brake.

6.2.3 Two-wheel Front Driving Axle

（1） Structure (See Fig. 6-12):

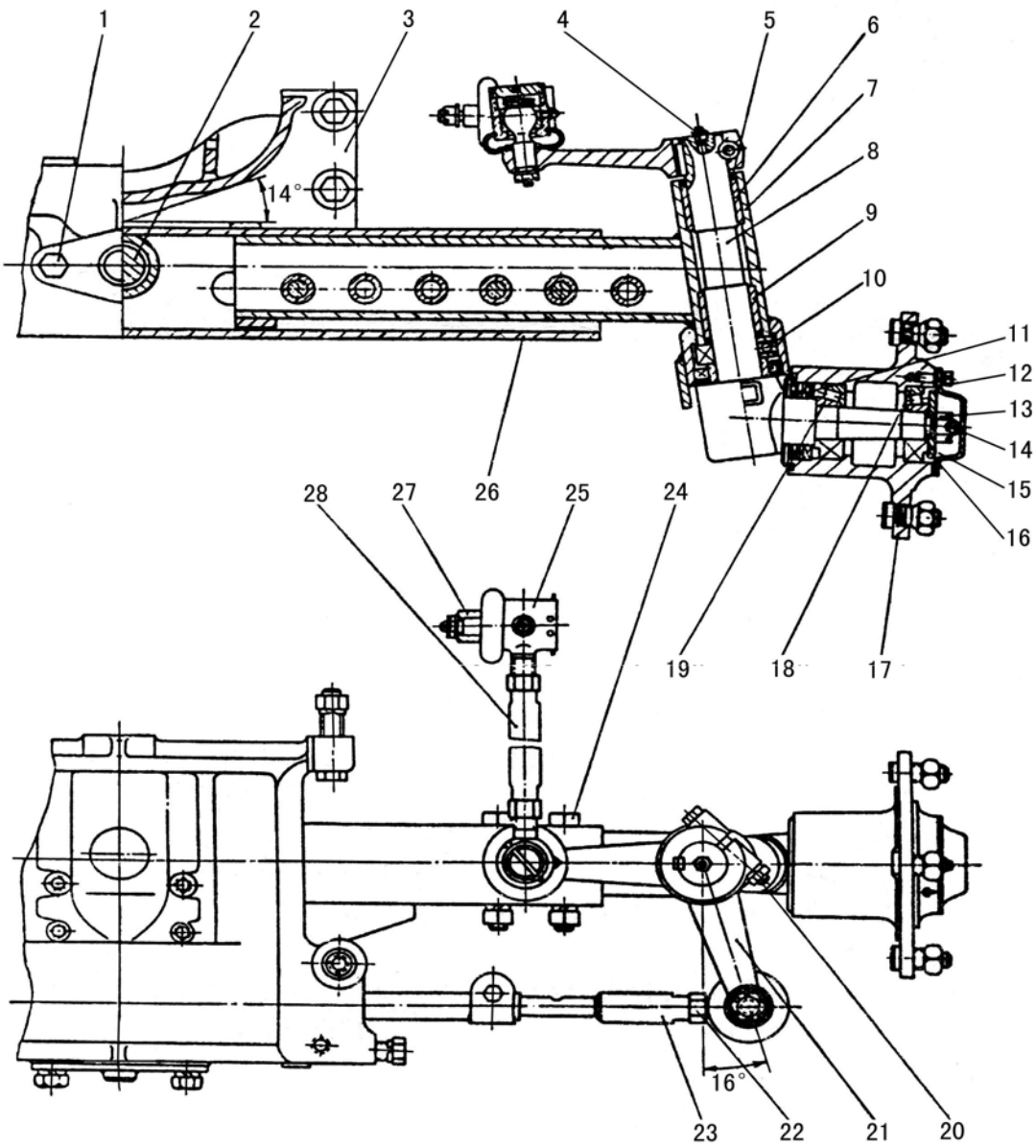


Fig. 6-12 Two-Wheel Driving Front Axle Assembly

1. screw 2. sway shaft 3.stand 4. oil cup 5. seal ring 6. liner sleeve 7.assistant sleeve assembly 8. steering joint assembly 9. bush 10. bearing 51207 11. oil seal 12. paper spacer 13. nut 14. split bolt 15. washer 16. bearing cover 17.front wheel hub 18. bearing 30305 19. bearing 32206 20. bolt 21. left steering arm 22. nut 23. horizontal pull rod assembly 24. bolt 25.steering connector assembly 26. bush assembly 27. steering sway arm 28. longitudinal pull rod assembly

Front axle of 2 － wheel tractor is pipe axle with an adjustable wheel base, setting in front of engine, stand (3) is connected to engine with 6 bolts, sway arm (2) bears against front end and back end of stand and is put in welded sleeve assembly (26), there are 3 bolts (24) in both sides respectively used for fixing left and right sleeve assembly pair (7).

Left and right steering joint assembly (8) is equipped with front wheel rim (17), bearing against two conical rolling bearing 30305 (18) and 32206(19), in the inside of wheel rim there are 2 frame rubber oil seals (11) with spring ends towards the outside to avoid water and soil coming to bearings. There are paper spacers (12) of bearing cover (16) on the outside to avoid oil leakage. There is plentiful calcic grease in the front wheel rim. Washer (15) is used for avoiding accident when front wheel breaks away from tractor as soon as roller ring of bearing breaks. Left and right steering joint assembly and front wheel rim assembly and single thrust ball bearing 51207 (10) on steering joint bolt shall be put in left and right sleeve pair assembly, connected with left (right) steering arm (21) and clipped together with bolt (20), left and right steering arms are connected together with pull rod assembly (23), main bolt of steering joint is equipped with an oil cup (4) to lubricate main bolt and liner sleeve (6) and (9) at its top, rubber sealing ring (5) on the main bolt shall be used lest dust come in and butter leak.

Steering sway arm (27) of steering gear is connected to the left steering arm with longitudinal pull rod (28) as Fig. 6-12. There are steering connectors (left and right) at both ends of longitudinal pull rod and tightened with screws. The steering connector is shown as Fig. 6-13 with ball-head pin (1) and ball-head pin seat (2). They can relatively rotate in all directions in space, the ball-head pin seat is pressed at pull rod connector (8). Ball-head pin seat end is covered with a cap (3) and pressing spring (4). They are pressed with a spiral cover(5), a lock bolt (6) passes the screw cover (5) to avoid it is loose. Its lower end is put in oil seal sleeve of connector (9), and lubricating oil is filled into pull rod connector hollow by grease nipple(7).

(2) Adjustment and maintenance

New tractor’s front wheel has a toe-in of 3 to 11 mm before ex-factory. Adjustment procedure is as Fig. 6-21: loose nuts (22) at both sides, turn transverse pull rod assembly (23) to adjust the distance between the front end and the back end of front wheels, and make the distance 3 ~ 11mm less than that of the back end (when measuring the distance, steering wheel shall be at the middle position). After adjustment, lock transverse pull rod assembly with nuts.

Sum of axial clearances of two conical roller bearings in front wheel rim shall be within 0.05 ~ 0.2mm. During adjustment, bearings shall be free of load. Adjustment procedure is to twist channel nut (13), then reverse 12 ° to 60, and lock nuts with bolt (14).

(3) Dismantlement and installation

① Remove machine cover, air filter stand, battery seat and water tank assembly respectively.

② Lift the front end of engine with a jack

③ Dismantle connectors of longitudinal and transverse pull rods and all steering pull rods.

④ Remove the auxiliary sleeve assembly with front wheel rim.

⑤ Remove 6 screws connecting stand with engine.

⑥ Remove 2 screw (1) of sway shaft assembly respectively, take out sway shaft (2), and separate sleeve assembly (26) from stand (3). Installing order is the opposite procedure.

Dismantlement and installation of the auxiliary sleeve assembly with front wheel rim:

① Remove bolt (20), then remove left and right steering sway arms (21).

② Take out seal ring (5) and auxiliary sleeve assembly (7).

③ Remove bearing cover (16), paper spacer (12), split pin (14) and channel nut (13).

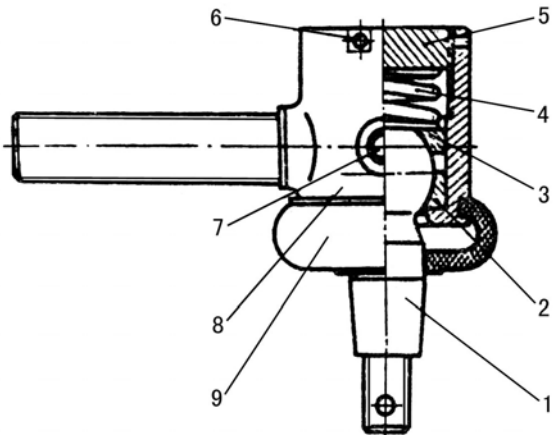


Fig. 6-13 assembly of steering connector

1. ball-head pin 2. ball-head pin seat 3. cap 4. pressing spring 5. screw cover 6. lock bolt 7. grease nipple 8.pull rod connector 9.oil seal sleeve of connector

④ Remove washer (15), bearing 30305 and front wheel rim assembly(17) respectively.

⑤ Remove the inner ring of bearing 32206 and oil seal (11).

Installing order is the reversed one, but clean and maintain parts according to the related regulations.

6.2.4 Front driving axle.

(1)Application of front driving axle

Front driving system of 4-wheel tractor is driven with a control handle (1) (see Fig. 6-14) under the left side of seat. Raise the handle (1), front driving system produces power; press the handle (1) front driving system cuts off power. But before the above operation, you shall treadle clutch pedal (2) to release the clutch entirely.

When 4-wheel tractor goes along highway, power of front driving system shall be cut off to have the front wheels driven for reducing tires wearing. If the tractor is used for transportation for a long term instead of fields work, half shaft (7) shall be removed (see Fig. 6-16) to reduce resistance from front driving system for convenient transport. When

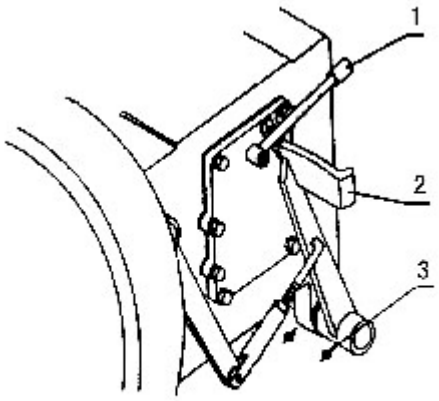


Fig. 6-14 control of front driving power

1. control handle 2.clutch pedal 3. oil cup

the tractor goes along a sticky, wet and sandy path, or works in half- dry paddy fields, its back wheels skid easily, the front driving system shall be given power to raise its traction force.

(2) Structure and adjustment of front driving system.

① Adjustment of toe-in (See Fig. 6-15)

Front driving wheels (1) are at straight driving position, toe-in shall be kept within 3 to 11mm, otherwise adjust it: loose 2 locking nuts (2) at both connecting sleeve (3) ends of transverse pull rod, turn transverse pull rod assembly (4), adjust distances between front ends and back ends of front driving wheels(1) to make the front-ends 3 to 11 mm less than that of the back ends. After adjustment, lock the transverse pull rod assembly (4) with nuts (2)

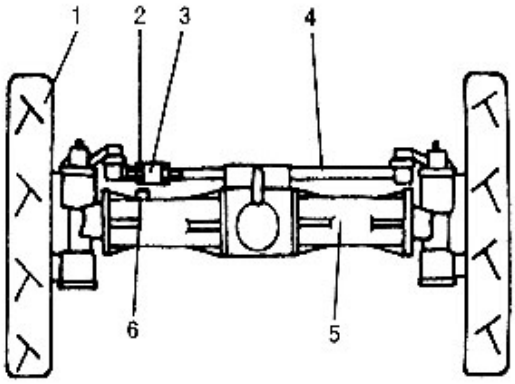


Fig. 6-15 adjustment of toe-in
1. front driving wheels 2. locking nuts 3. connecting sleeve 4. transverse pull rod assembly 5. front driving axle 6. screw plug

② Structure and adjustment of front driving axle

The front driving power turns the front wheels through the following mechanisms, that is, the power goes through the transfer case under the bridge piece housing to the rolling ball coupling joint assembly (Fig. 6-17) to transmit to the central transmission system (Fig. 6-16) to divide into two parts and passes side half shafts to front final transmission.

After bearing s(13) and (15) of driving gear (16) in the front central transmission is used for some time, axial movement will get larger. It is necessary to twist its small round nut (12) to reduce axial movement, so clearance between driving gear (16) and driven gear (18) of central transmission system will get wider, people may remove some adjusting spacers (10), or adjusting nuts (17) at both ends of differential mechanism to get a proper clearance if necessary.

If tractor works in fields, in particular, in paddy fields, it is easy for mud to get into the end surfaces of front and back sleeves (14). To abrase the end surfaces easily, then the axial movement will get wider, plus that removing spacers (10), as the above-mentioned, will let axial movement get wider, so it is necessary to put a thrust washer (11) on every end surface between front axle assembly and seat (9) respectively for repairing or replacing to keep a normal axial movement.

Front final transmission small gear (3) and bearing (2) at main bolt (31) and conical gear (1) (21) and bearing (20) at half shaft (7) will wear out after a long time operation, which leads to the meshing clearance between auxiliary conical gears getting wider, so it needs adjusting. Adjustment procedures

are as the following: loose discharge screw plug (4) at lower end ofthe final transmission case (28) to exhaust lubricating oil.

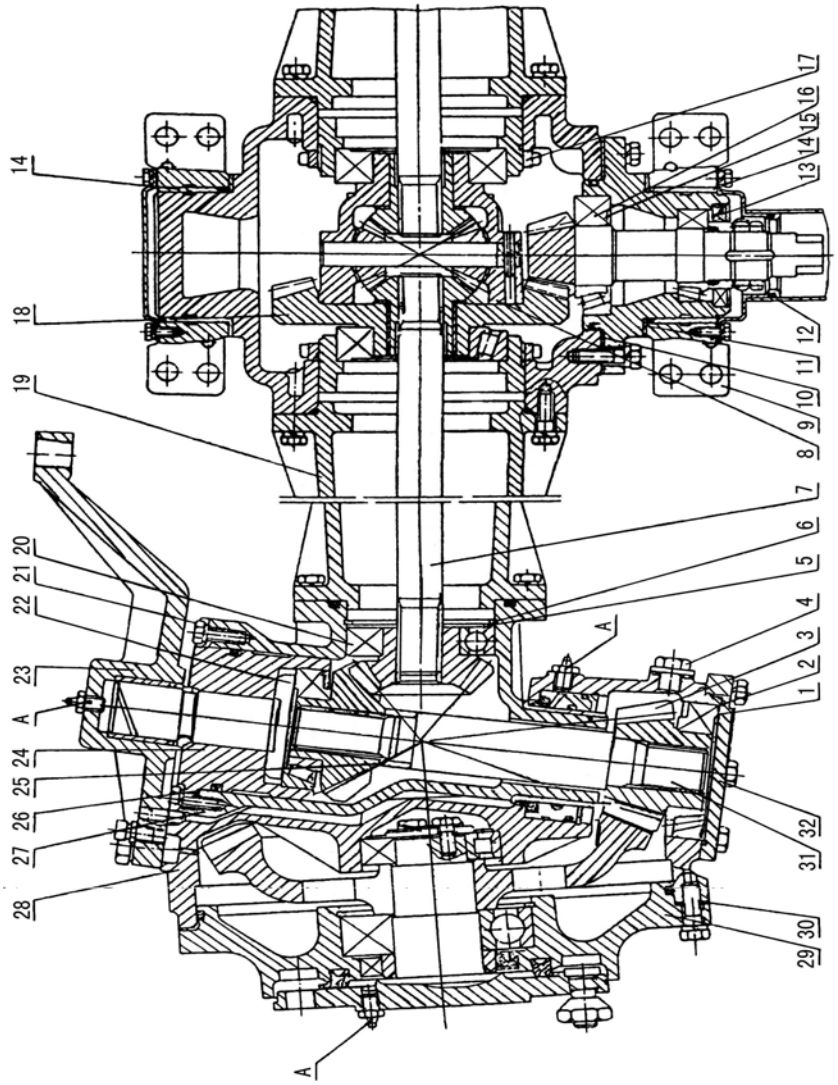


Fig. 6-16 fore central transmission and final transmission

1.rolling ball coupler 2. coupling shaft 3. dust pipe 4. hoop 5. external dust cover 6. welded coupler cover 7. Pressing spring 8. Steel ball 9. bolt 10. PTO shaft of transfer case 11. body of transfer case 12. PTO shaft gear of transfer case 14. sleeve 15. bearing 30208 16. driving gear 17. adjusting nut 18. driven gear 19. half shaft case 20. bearing 6209 21. bevel gear (1) 22. bearing 7208C 23. sway arm 24. axle seat of main pin 25. support seat for bearing 26. adjusting spacer 27. bevel (2) 28. final transmission case 29. end cover of front driving 30. adjusting spacer 31. main pin 32. lower end cover

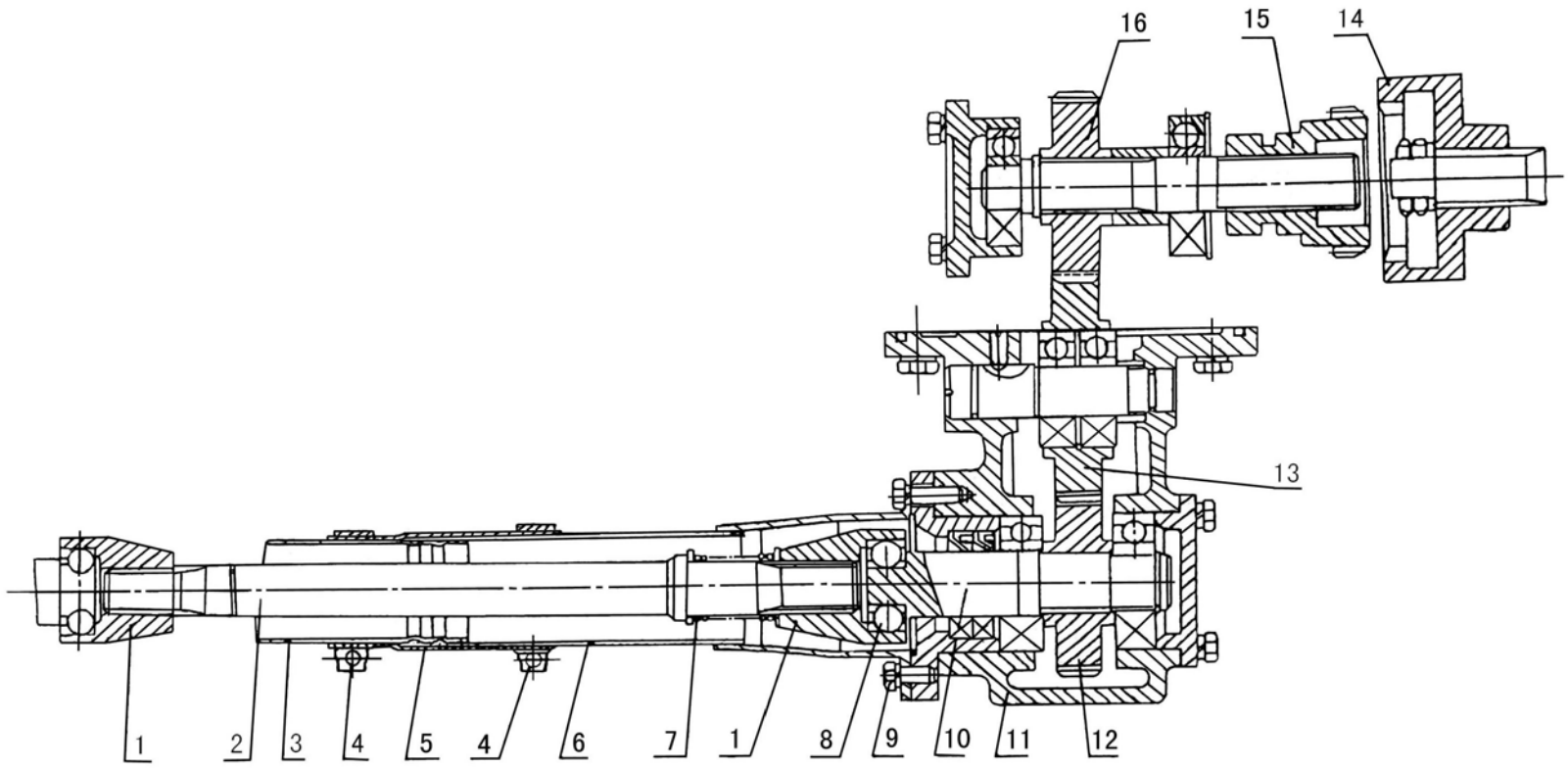


Fig. 6-17 Transfer Case Box and Coupling Assembly

1.rolling ball coupler 2. coupling shaft 3. dust pipe 4. hoop 5. external dust cover 6. welded coupler cover 7. Pressing spring 8. Steel ball 9. bolt

10. PTO shaft of transfer case 11. body of transfer case 12. PTO shaft gear of transfer case

13. middle gear of transfer case 14. internal gear coupler 15. gear coupler 16. PTO gear of transfer case

23. (1) Upper end of main pin : remove sway arm (23) and axle seat of main pin (24). According to meshing clearance of gears, people may abrade the support sleeve (25) at the lower end of bevel gears (2), (27), and at the same time, take out washer (26) to make meshing clearance get less. Just draw out adjustment washer (26) if it is caused by bearing (22) abrasion, then reassemble the dismantled parts.

(2) Lower end of main pin: support half shaft case (19) of front axle with jack to make front wheel rise away from ground, remove front wheels and the lower end cover (32). According to meshing clearance of gears, add adjusting washer(1) or draw out the adjusting washer (30) on the front driving end cover (29) to reduce backlash of gears, and then reassemble dismantled parts.

(3) Half shaft end: remove the whole front final transmission assembly and check ring (6). According to meshing clearance of gears, add adjusting washer (5) to reduce backlash, then reassemble the dismantled parts and the front axle assembly.

After the above procedures, you must turn front wheel by hand to see if they can rotate freely without abnormal noise, then fill in lubricating oil to the rated level, and tighten the inlet bolt.

(4) Transfer case assembly (Fig. 6-17)

Transfer case of 304type tractor is fixed under the left side of bridge piece case; its structure is as Fig. 6-16. Raise control handle (1) in Fig. 6-14, and the internal gear coupler (14) in Fig. 6-17 is engaged with gear coupler(15) to transmit power from two shafts in transmission case to the power input gear (16) of transfer case, then to PTO gear (12) and PTO shaft (10) of transfer case through middle gear of transfer case, and then transmit the power to the front driving axle finally through coupling shaft and other parts to turn the front driving wheels.

Dismantlement and installation of rolling ball coupler

Remove hoop (4), get rid of external dust rubber ring (5), then remove 3 M8 × 20 bolts (9) at front end of transfer case, push dust pipe (2) toward back end, take out rolling ball coupling (1), remove pressing spring (7), then push welded coupling cover (6) forward, remove rolling ball coupling etc. Install according to the reversed procedure and pay attention to the procedure lest balls lost or omitted.

(5) Differential assembly (Fig. 6-18).

After put differential mechanism into front axle

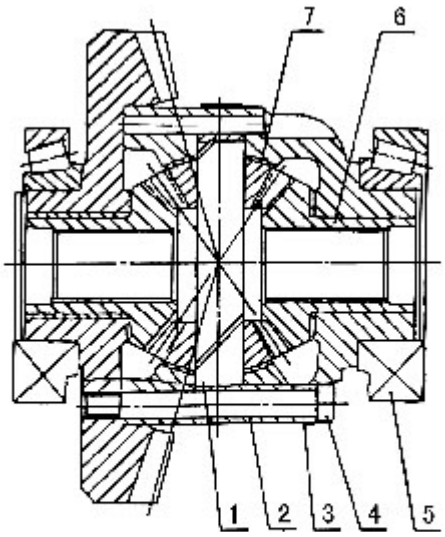


Fig. 6-18 Differential assembly
1. planet gear shaft 2. differential housing 3. single-ear washer 4. bolt 5. bearing 30212 6. half shaft gear 7. planet gear

assembly (Fig. 6-16), put its two shaft necks into internal ring of bearing (6) and adjustment nut (17) respectively, inspect meshing of driven wheel (18) and driving wheel (16), and adjust it if necessary then twist bolt(4) and single ear washer (3) in driven wheel (18) and differential mechanism cover (2), and lock hexagon head of bolt (5) by bending single-ear washer(3).

See Fig. 6-16, you shall adjust driving gear after front driving axle has no oil, and turn for 1 to 2 m clockwise and anti - clockwise, gear clearance shall be within 0.15 to 0.25mm, ideal contact mark refers to Fig. 6-6 and Fig. 6-7.

6.2.5 Wheels

(1) Structure and function

Front wheels and back wheels of HHJM-30-40 series of tractors consist of external tire (1) and tire tube (2), wheel rim assembly (3) and air tap (4) and radial plate (5), see Fig. 6-19, different kinds of tractors are equipped with different tires, refer to Section 3.4 of Chapter 3.

There are patterns “Y” in agricultural driving tires to raise adhesion. There are stripe patterns in the guide wheels to reduce deviation of tractors. There are convex patterns “Y” on the tires to raise adhesion for paddy fields work.

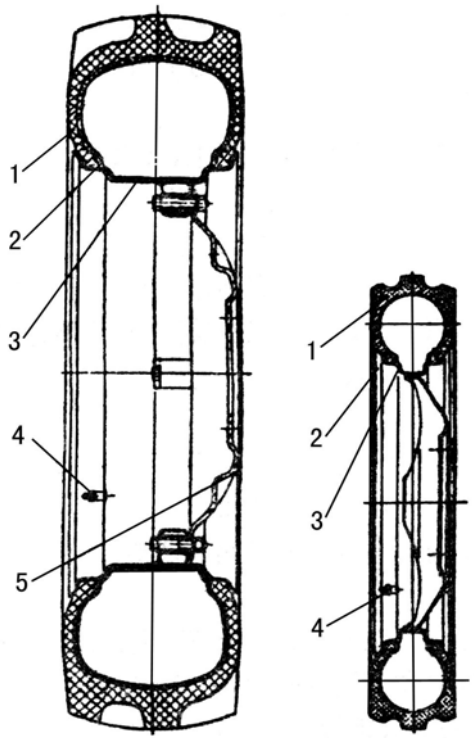


Fig. 6-19 Driving Wheel, Guide Wheel

1. external tire 2. tire tube 3. wheel rim assembly 4. air tap5. radial plate

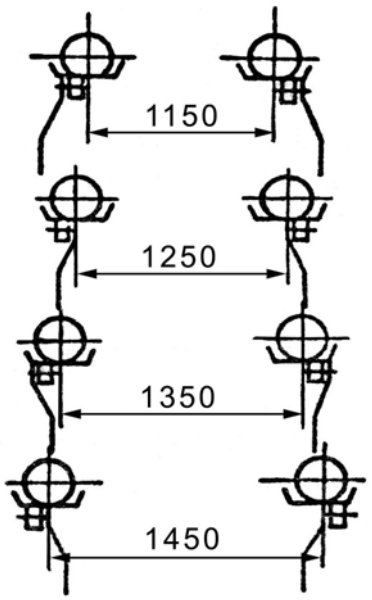


Fig. 6-20 Adjustment of Wheel Base of Driving Wheel

● **Important：**

(1) When tractor is equipped with tires with convex patterns “Y” for paddy fields work, it shall not be used for transportation, and for normal fields work, its speed shall not exceed 15km/h.

(2)Adjustment of wheel base

Front wheel base and back wheel base shall be adjusted for different kinds of fields operations. Wheel base of 2-wheel tractor is adjusted by extension sleeve pipe and auxiliary sleeve pipes, adjustment limit is 1050 to 1450mm, every 100 mm for 1 stage, back wheel base is adjusted by motive radial plate and wheel rim, every 100mm for 1 stage, see Fig. 6-20.

（3）Use and maintenance of tiers：

(1)Correct use and maintenance tires can prolong tires' lives. Do the maintenance following the rules below:

The air pressure of tires should comply with rules. See Item3.4 of Chapter three for details. Check it regularly.

② High speed is only used on flat and smooth roads without stones or carbon residue. Try not to use emergency brake.

③ Don't stain the tires with fuel or lubricating oil.Wash or sweep the stains away if there are.

Keep tires clean.

⑤ If the arasion of tires is not symmetrical, changes the posiitions of the tires.

⑥ If the tractor is stored for a long time, it will be jacked up. No pressure on the tires, and no exhaust from the tires.

（4）Dismantle and reassemble the tires:

Dismantle the tires:

① Exhaust air from the inner tubes.

② From the opposite side to the air nipple, hit the outer tubes into the wheel rims of grooves.

③ Prize the tire sides near the air nipple out from the wheel rims with a tommy bar, and then prize the whole outer tubes from the wheel rims.

④ Take the air nipple of inner tube from the hole of the wheel rim, and then take out the inner tubes from between the wheel rims and the outer tubes.

⑤ Hit a side of outer tubes into the grooves of wheel rims. Take out the outer tubes from the other side with a tommy bar.

Assembling of the tires:

① Clean all the parts for installation, prize the outer tubes into the wheel rims with a tommy bar.

② Talc the inside and the outside of the outer tubes, and then place the inner tubes into the outer tubes (place the air nipple into the hole of the wheel rim firstly.)

③ Prize the outer tubes into the wheel rims with a tommy bar.

④ Aerify the tires till normal air pressure and check to see if there is leakage.

Warning:

1. The size of your tires cannot be larger than what is stiplulated in the manual.

2.Only skilled workers with proper tolls can do the dissembling and replacing the tires or adjusting the wheel bases. During working, try to avoid overturn of tractor or tires due to gravity action.

3. Screw the adjusting bolts of tires and septal lamella to get a needed torque moment . Do regular checks.

● **Important:**

（1）Don't break the inner tubes with your tommy bar.

（2）Distinguish the left and the right tires.

（3）To increase the adhesive force of the rear wheels, install the four bob weights of the tractor.

（4） During operation in paddy fields, tractor should have deep treaded tires for a better adhesive force to increase the traction ability. No bob weight is needed here.

6.3 Working unit

6.3.1 Suspending system

After some working time, when the parts of suspending system are abraded or reassembled, every sector of the system should get an adjustment.

I Adjustment of the distributor (Fig. 6-21)

1.Check the travel of the dropping valve

1) Screw off the plug of the dropping valve.

2) Put the handle in the top lifting position (The key control valve is placed in the lifting location.). Measure the distance h_1 between the steel ball 4 and the upper end of the dropping valve bush.

3) Set the handle in the dropping position (Key control valve lies in the dropping position.). Measure the distance h_2 between the steel ball 4 and the upper end of the dropping valve bush.

4) If $h_1 - h_2 = 2^{+0.2}$, it means the adjustment is proper, or adjust the size through adding or reducing the adjusting washers 6.

5) Screw up the plug of the dropping valve.

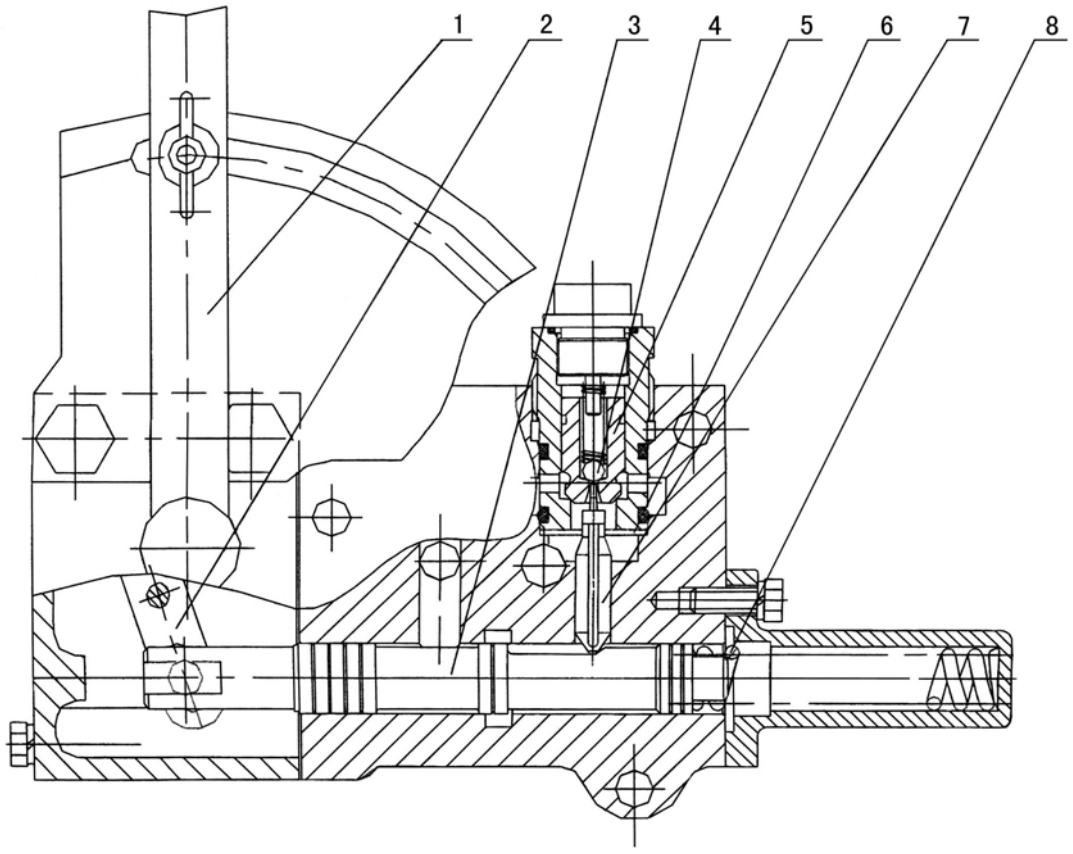


Fig.6-21 Adjustment of the distributor

1 Control handle 2 rocker 3 key control valve 4 steel ball 5 dropping valve 6 adjusting swasher 7 pin 8 key valve spring

2. Installed the wholelly adjusted distributor assembly onto the lifter.

Ⅱ Adjustment of the hydraulic lifter

1. Adjustment of force-position integraded control (Fig. 6-22)

1. Install rocker (1), stand (2) and force-control spring (4). Adjust the adjusting bolt (3) to make the force-control spring contact the rocker rightly. And then, screw up the locking nut (5).

2. Install the welded right pressing plate (8)onto the lifter and couple the middle arm (9) to the right pressing plate, and then couple with link (6) and response lever (10).

3. Set the control handle in the dropping position, start the machine , and then move the control handle slowly to the lifting position. If the lifting height is not enough, extend the response lever (10); shorten it if it is over height. When the control handle is located in the top lifting position, the distance

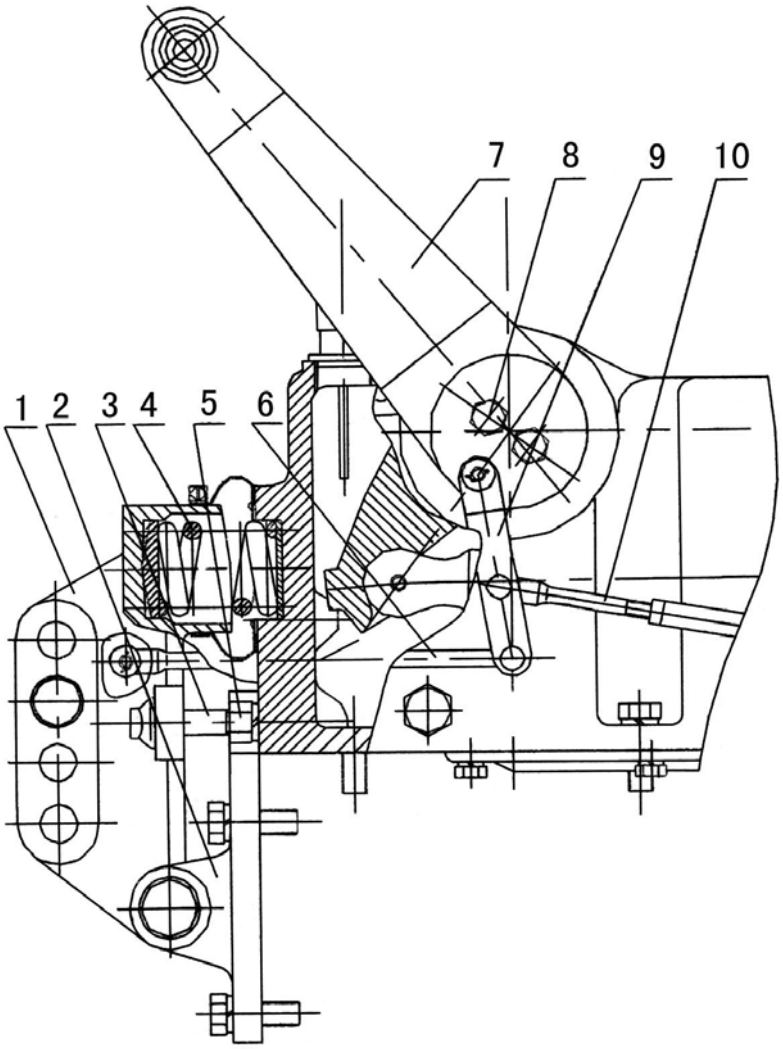


Fig. 6-22 Force-position integrated control

1 rocker 2 stand 3 adjusting bolt 4 force-control spring 5 locking nut 6 link

7 outer lifting arm 8 welded right pressing plate 9 middle arm 10 response lever

between the mark on the outer lifting arm and the one on the housing is not over 3mm (Here the inner lifting arm and the lifting housing have a gap of about 5mm). Lift repeadedly three times and lock up the locknut of the response lever.

III Structure, installation, and adjustment of cylinder piston (Fig. 6-23)

During installation, oil the inner hole of cylinder case (1) with engine oil. Set O-ring (5) and check ring (4) into piston (2), and then install the unit into the hole of the cylinder case. Check ring (4)protects the seal ring (5)2mm clearance on the figure, no axial clearance is allowed between adjacent close

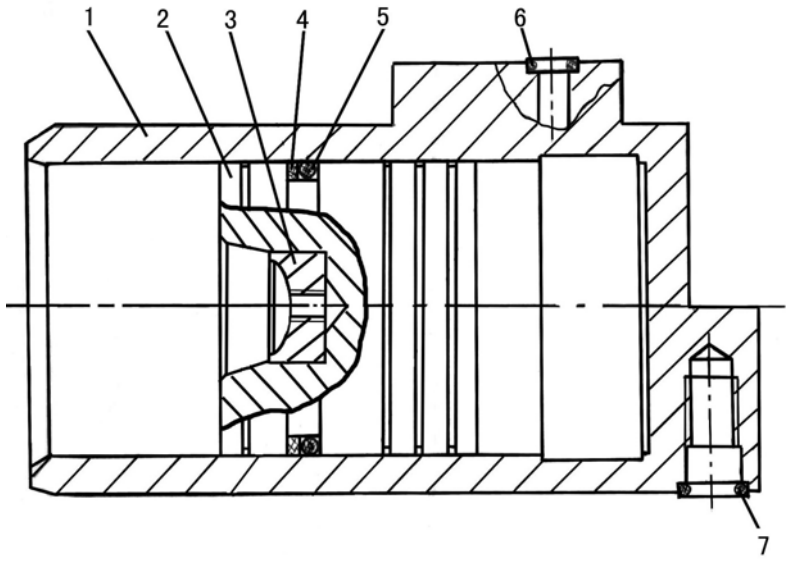


Fig. 6-23 cylinder piston

1 cylinder case 2 piston 3 piston support 4 check ring 5 O-ring 6 O-ring7 O-ring

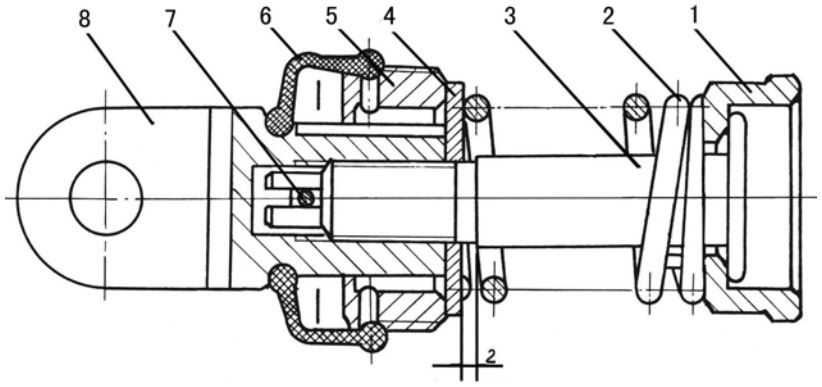


Fig. 6-24 force-control spring assembly

1 spring seat 2 force-control spring 3 spring beam 4 spring clamp 5 nut 6 dust guard 7 pin 8 connector of the top link

parts. Finally press pin (7) into the unit but don’ t cover the nut with the dust guard provisionally. After adjusting the assembly and set in an adjusting pin, cover the nut with the guard.

V. Structure and installation of oil pump & oil pipe assembly (Fig. 6-26)

Oil pump & oil pipe assembly is installed on the external rear end of the tractor's transmission box. Its driving gear is coupled to PTO driving shaft through cruciform joint (7). Oil pump is fixed on the platee the housing. gear oil pump is an exact fitting. Take care during dismantlement or reassembling . Don't hit it.gasket of oil pump (6)with four M10 hexagon socket head cap screws and the gasket is coupled to the transmission box with another three M10 hexagon socket head cap screws.Gear oil pump is through

to intaking & outleting oil pipes through oil pump gasket.

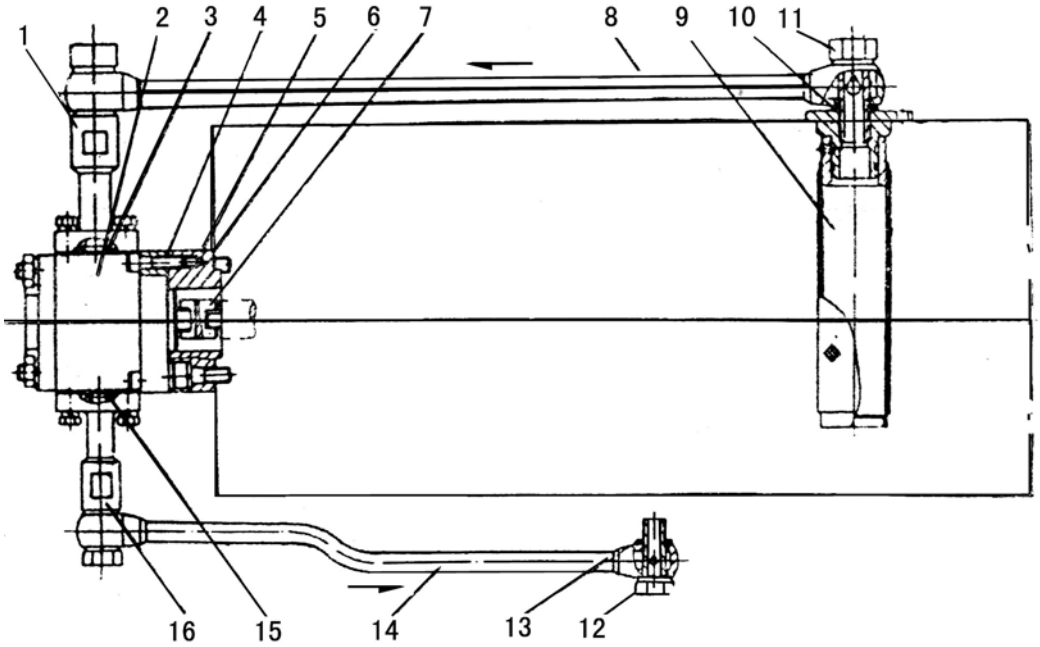


Fig. 6-25 Oil pup & oil pipe assembly

1 low-pressure connector 2 gear oil pump 3 O-ring 4 paper gasket of oil pump 6 plate gasket of oil pump 7 cruciform joint 8 sucker pipe assembly 9 filter element assembly 10 copper washer11 screws of sucker pipes 12 screws of outletting pipes 13 copper washer 14 connector of outletting pipes 15 O-ring 16 high-pressure connector

1. Structure and installation of gear oil pump (Fig. 6-26)

This oil pump belongs to s06 series whose working pressure is 15.6Mpa (160kgN/cm^2) and flow is 12 l/min. (When the rotation speed is 2000r/min.)

Before installation, oil every part's interface with lubricating oil. Set the driving gear (9), driven gear (5) and two bushes (4) into the oil pump housing (3). Set a big seal ring (6) and two aligning pins (not shown in the figure) into the two slots beside the housing respectively. In the middle of the bush isAfter the cylinder piston is installed, do a pressure test on it.

IV Structure, installation and adjustment of force-adjusting spring assembly

During the installation, orderly set spring seat (1),

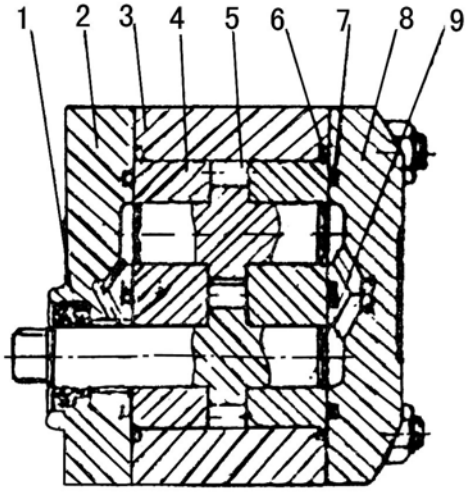


Fig. 6-26 Gear oil pump

1. dual-ported oil seal 2. fore cover of oil pump 3. oil pump housing 4. bush 5. driven gear 6. big seal ring 7. small seal ring 8. rear cover of the oil pump 9. driving gear

force-adjusting spring (2), spring pressing board

(4) onto spring beam(3) Set dust guard (6) and nut (5) onto the connector of the top link(8). And then screw the spring lever into the hole of the connector of the rocker Adjust it till the spring is out of pressure.Except the a hole blocked with a rubber choke. this hole must be set on the oil-intaking side of the oil pump, while the slot end of the bush should face the gear. Don't make a mistake here! And then repectively set two small seal rings (7) right into the fore cover hole (2) and rear cover (8) of the oil pump. Install the whole unit onto the oil pump housing and fix it with 4 coach bolts M10. Set the dual-ported oil seal (1) into the fore cover hole.

After the installation, test the oil pump for its pressure and flow. Do the final adjustment and make

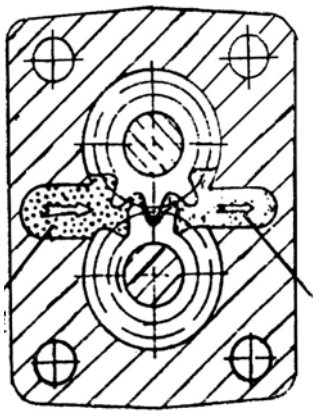


Fig. 6-27 Working principle of the oil pump

sure that the gear bush matches the housing to gurantee the gear have an 0.08-0.10mm axial play insid

Working principle of gear oil pump (Fig. 6-27)

The driving gear of the oil pump is driven by PTO driving shaft. The gear turns the driven gear that is engaged with it. The gear excircle should be kept closely contacting the hole wall of case , so are the two bushes end faces and gear end faces. Thus a sealed working space is formed. When gear turns, a pair of engaged teeth are gradually released and then the working space has a larger and larger capacity to form a vacuum part. So the oil in the oil tank is absorbed into the oil suction chamber through filter and induction manifold under the action of atmospheric pressure. The absorbed oil occupies the spaces of the bend of the teeth and is brought to the oil pressing chamber where the teeth

are engaged gradually and the working space capacity is reduced relatedly. So the oil in the teeth bends is pressed out and transferred to oil outlet pipes. Because there are always a pair of teeth in engaged situation, oil pressing chamber is always separated from the oil suction by the engaged points. So the oil cannot return back.

Ⅵ Structure and functions of the suspending mechanism:

The suspending unit is formed by such assemblies as top link, lower link and brace bar. Through these levers and links, tractor couples with the farm implement as a whole unit.

The brace bar has no left-right difference, use a special bolt on its top and lower ends to extend and withdraw to adjust the height of the lower link and the level position of the farm implement; The left lower link is different from the right one in ends' shapes. During installation, make sure that the end with bend is coupled to the rear axle of the tractor; recess should be stuck to the final transmission case. Don't make a mistake here, or the lower link will break the final transmission case; the top link can extend and withdraw through adjusting coil and the special bolts on the ends. One end connects to the farm implement and the other end couples with the connecting points of the lifter according to your requirenments. When you use force-controling mechanism to control the plow depth, the fore part of the top link should connect with the coupling pin in the middle of a coupling board of the lifter. When you use position-control mechanism, it will connect to the coupling pin under the coupling board. As for the rear coupling point, its position depends on the field conditions. Generally, to plow in dry fields, the rear point should be lower than the fore one. Here the rear coupling point of the top link should be set in a higher than the fore one to get a tilt angle of 5~15 ° (the point is on the farm implement). If working in paddy field with deep plowdepth and the rear coupling point of the lower link is higher than its fore coupling point, tilt angle of the top link can be enlarged.

After the whole suspending system is adjusted, and when the lifter is lifting, dead points can't be allowed. Dead points can cause rapid increase of the oil pump, and if safety valves are opned for a long term, it will shorten the working lives of some parts.

Attention:

system. To leave from the tractor, the farm implements should be dropped onto the ground.

6.3.2 Structure and use of PTO shaft (Fig. 6-28)

PTO consists of the main parts of two pairs of constant engaged gears, engaged bushes, seats of engaged bushes, and PTO shaft. High-gear PTO and low-gear PTO can be shifted through controling PTO handle to move the engaged bush.

Running speed of the PTO shaft depends on that of the engine. When engine speed is 2200r/min,

running speed of PTO shaft can be 540r/min + 720r/min, or 540r/min + 1000r/min.

When the PTO shaft is out of the operation, its handle should be set in the central position, just like Fig. 6-29. (clash gear stays at the neutral postion). When the PTO shaft is put into uses, pushing control handle ahead can get a high running speed, while pushing back can get a low speed. However , when you shift the control handle, clutch pedal should be treadled.

When tractor does transportation or needs no PTO or operations of gear oil pump, put the releasing handle on the right of the transmission case in the position of "Apart", just like Fig. 6-30. This can reduce tractor's power consumption or pump abrasion. When gear pumps or PTO shaft need to run again, put the handle in the position of"Engaging". For both operations, the clutch pedal must be1. Before checking hydraulic system, turn off the engine, and push the hydraulic handle to reducing the pressure inside the system.

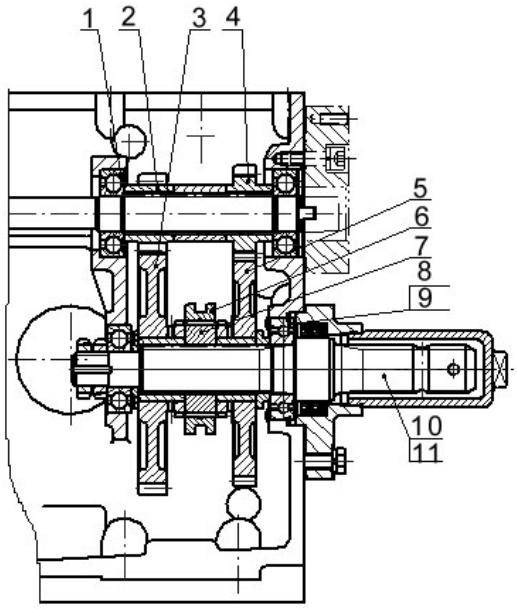


Fig.6-28 Oil pump & oil pipes assembly

1 bearing6305 2 low-gear PTO driving gears3 low-gear PTO driven gears 4 high -gear PTO driving gears 5 high-gear PTO driven gears 6 engaging bush 7 seat of engaging bush 8 check ring72/78.6 9 bearing6207N 10 PTO shaft 11 PTO shaft

2. High-pressure oil will soak into skin to result into hurts. So pay enough attention to it, especially avoid its spraying to eyes.

3. Only after filling enough hydraulic oil into the hydraulic lifter case, can the engine be started to avoid burning out the hydraulic gear pump.

4. To move the farm implements suspended to the tractor, hydraulic lifter handle should be at the site of "neutral". To transfer to operation in another field or operation with farm implements suspended, high speed is not allowed to avoid damaging the parts of lifting system and suspending treadled.

6.4 Electric installation

HHJM30~40 series trasctors use silicon commutating machine as the power resources for battery charging and every electric devices. Electric system is a single-wire one with minus pole connecting to

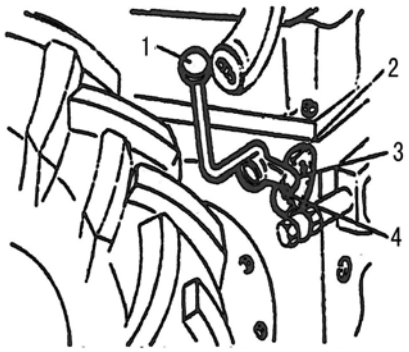


Fig. 6-29 Control position of PTO shaft

1 handle of PTO shaft 2 high gear 3 neutral gear 4 low gear

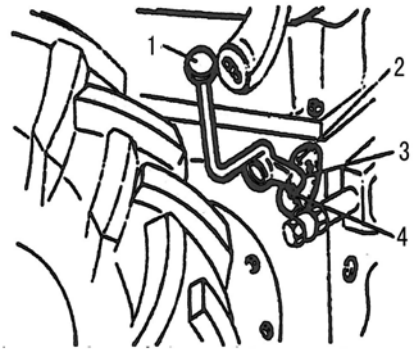


Fig. 6-30 Releasing hadle of driving PTO shaft

earth. See Chapter 8.1 for electric wires.

See Item 3.6 of Chapter 3 for the types and specifications of electric installation. All the electric devices are not the same due to engines of different models, suppliers and special requirenments of some clients. The following is the introduction of some usual electric installation:

6.4.1 Engine

HHJM-30~40 series tractors use 2JF200 type silicon commutating machines that are set on the right of the front of the engine. The crank shaft is driven through a cone belt and transfer mechanical energy into electric energy that can supply the electric resources for battery charging and other electric devices' operations. The distance between the generator and the center of the crank shaft can be adjusted through stand and link to keep a proper tautness of fan's cone belt.

Generator has a rated voltage of 14V and a rated power of 200W. The following is the working features of the generator under 20 ℃ :

no-load voltage 14V

free running speed not over 1100r/min

fully-loaded voltage 14V

fully-loaded current 13A

working speed 3500r/min

1. Structure and principle:

Type 2JF200 silicon rectification generator is formed by stator, rotor, silicon rectifying cells, front and back housings, belt pulley and such other parts.

Generator stator is formed by pressed silicon steel sheets in layers. Threephase winding is embeded on the stator. When rotor (magnetic pole) turns, magnetic field lines of magnetic pole cuts the stator winding, inducting threephase alternating currents that are commutated to direct current through six silicon cells to supply power for battery charging or power consumption of loads.

Rotor consists of a couple of claw poles, magnetic field coil, slip ring and axis. Sliping and magnetic field coil are welded on the ends.

Among the six silicon rectifying cells on the rear housing, three ones (whose outer covers have black letters meaning countercomponents) are directly pressed onto the back housing; the other three ones (whose outer covers have red letters meaning positive components) are pressed onto their bases and then fixed on the rear housing. This can stop battery current from flowing backwards into stator coil. Meanwhile stator armature itself has a certain reactance level to limit the peak output current, so adjustor of the generator only uses a set of voltage adjustors without catch box or current limiter.

2. Usual troubles and causes

Trouble	Position	Causes
No electric power coming from the generator.	connection	Connection has short circuit, open circuit, inefficient connecction or wrong connection.
	generator	Jaw is extremly loose and rotor coil has open circuit. Rectifier cell is damaged. Brush has malfunction.
	adjustor	Adjusting voltage is too low. Connection is wrong. Contactors are singed or oxidated. Relay coil is burnt out.
Charging is not full.	generator	One or two rectifier tube are damaged; Brush has ineficient connection. Springingness is inefficient, slip ring has oil stain, permanent magnet material has fragmentation, or texrope is loose.
	adjustor	Adjusting volage is too low. Contactor is singed
	batteries	Eelectrohydraulic is too little. Batteries are old.
unstable charging	generator	Cone belt is loose Brush has inefficient connection; spring cannot have full pressure. Binding post is loose or inefficiently connceted.
	adjustor	Contactors are dirty. Abnormal adjusting.
abnormal sound	generator	Improper installation Bearing is damaged. The driving sector touches and rubs against the fixed sector.
overcharged	adjustor	Adjusting voltage is over high or maladjusted. Bonding doesn't work well. Stator or rotor scrapes iron.
Generator is burnt out.	generator	Organs have short circuit; stator or rotor scrapes iron.
	adjustor	Coil is burnt out or the contactors are sintered, which leads to maladjustment. Pressure coil or resistance connection is open.

（3）3. Maintenance and repair

1) Check the tautness of the generator's cone belt. You can press at the middle site when the cone belt strains on the three wheels. Generally, it is proper to get a sag of 10-12mm (See Fig.6-31). Check to see if there is open circuit or short circuit at the connecting-wire contactors.

2） See if the ammeter works well, and if the connector lug has good connections. If the ammeter fingure doesn't move, you should dismantle the wiring harness between the "F" (magnetic field) connector lug on the generator and the adjustor, connect the "F" and the "+" on the generator with a brass wire, and here the adjustor is not involved in the circuit. Start the engine and speed up the rev gradually. (Attention: the engine rev cannot be overhigh to avoid the silicon rectifying cell damaged.). If there is no reading on the ammeter yet, it means the engine itself has malfunction; if reading is ok, it means the malfunction happens on the adjustor or its circuitry.

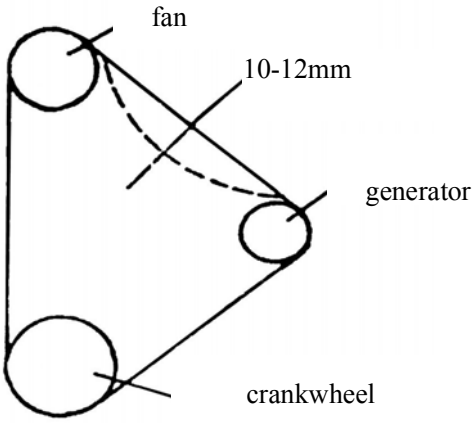
Usually, test the resistance values of the generator with a multi-meter.

Between "F" and "- " 5~6 ohm

Between "F" and "+ " 50~60 ohm

Between "+" and "- " 40~50 ohm

If the resistance values you get following the above steps are smaller than the above values, it means the silicon rectifying cell has short circuit, or it means the rotor winding has short circuit; if the values are over the above values too much, it means the magnetic field coil has inefficient connection and you should go on to find out the malfunction of the generator. You must dismount the generator and check the parts one by one.



tFig. 6-31 check the tautness of cone belt

3) Check the brush. The brush can move up and down in the support hole without being siezed. The

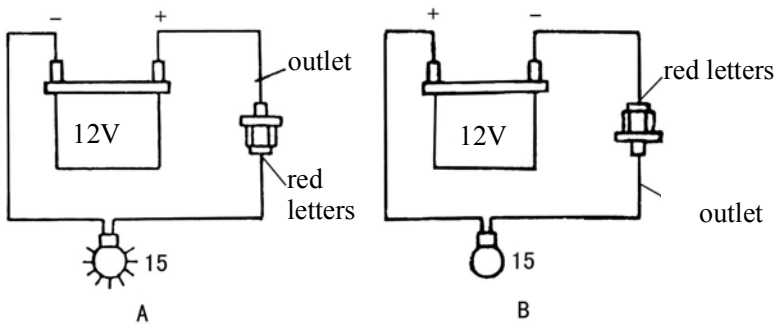


Fig. 6-32 Test silicon rectifying cell on its base

brush and the slip ring should have a cambered touch to prolong the life of the slip ring.The brush designation is DS-4. If the brush has too much abrasion, you should replace them.

n the circuit. If the4) Check the silicon rectifying cell. Use a series circuit formed with a battery and a 12V and 1.5W bulb to test the components (See Fig. 6-32)

The three silicon cells on the base whose case is printed with red letters are at normal polarity. Connect the (+) of the battery to the outgoing line and connect the casing and a bulb to the (-) of the battery, then the bulb should be on(see Fig. 6-32B). Connect the (+) of the battery to the casing and connect the outgoing line and the bulb to the (-) of the battery, the bulb should be off. The three cells on the rear end shield have a contrary situation, that is , the casing that is printed with black letters means negative polarity. Connect the (+) of the battery to the outgoing line and connect the casing and the bulb to the (-) of the battery, the bulb should be off. Connect the (+) of the battery to the casing and the outgoing line connects bulb to the (-) of the battery, the bulb should be on. If in the above cases, the bulb is always on or off, it means that the cells have short circuit or open circuit.

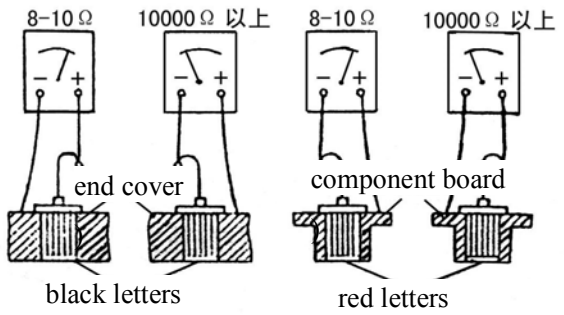


Fig. 6-33 test silicon diode with a multimter (RX100 or RX1000)

Testing a single silicon cell with a multimeter, the forward resistance should be 8~10 ohm, and back resistance should be over 10000 ohm. See Fig. 6-33 for testing steps.

If the forward resistance and the back resistance are both extremly small or big, it means the rectifier cell has short circuit or open circuit, and should get replaced.

5) Maitenance for the rotor. The surface of the slip ring should be kept clean and flat & smooth. Clean oil stains with gasoline; polish blackened the surface of the slip ring with extra-fine glass paper . As for the severely burned rings, put them on a lathe to cut them a little to make a Ra value of surface roughness over 1.6μm.

Magnetic field resistance is 5~12 ohm. Test the insulation between slip ring, jaw and iron core with 220V alternating voltage (See Fig. 6-34). A bulb should be connected in series i bulb light is red

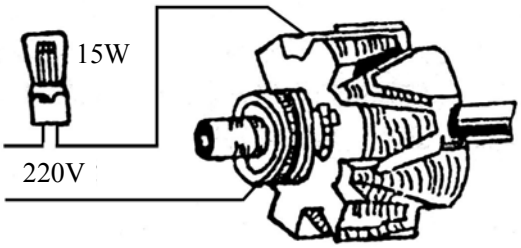


Fig. 6-34 insulation test with a field coil

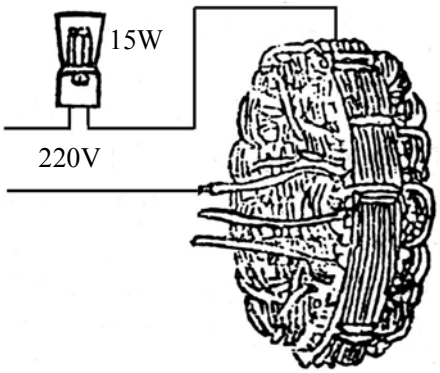


Fig. 6-35 insulation test with a stator coil

and bright, it means the insulation has breakages and they need to be dismounted and repaired.

6) Test the stator. Stator and core inductances also can be tested with 220V alternating current (See fig. 6-35). In the circuit, a bulb must be connected in series. If the bulb light is red and bright, it means the inductances have breakage and they need repairing.

7) Maintenance on bearings. Wash bearing with gasoline. If the bearing is loose and balls have leakage or sounds, they need replacing. Lubricating grease can be 3# complex calcium lubricating grease or 4# high temperature grease, the add-on cannot be too much. It is suitable to fill up to the 2/3 of the bearing room. Wash oil-seal felt in gasoline, then dry it and use a little engine oil, install into the bearing room without offcenters to avoid oil leakage.

● **Important：**

1) 2FJ200silicon rectification generator is minus earth, so the battery must be minus earth. If the battery polarities are connected wrong, silicon rectifying cell will have short circuits or burns out.

2) Such metals as screwdriver cannot armature

3) Don't connect "magnetic field" binding post with the housing to avoid adjustor contactors and winding being burned out.

4) During parking, turn off the electrolock switch or draw out the key to cut the connection between generator exciting coil and battery to avoid battery discharging to the generator to reduce the capacity.

6.4.2 Voltage adjuster

Voltage adjuster works to support alternator. It can automatically stabilize output voltage of generator in a certain range.

A monopole contactor with arc extinction circuit is used for FT111 voltage adjuster, together with

a temperature compensating device. When the generater rev i s 3500r/m and outside load is half, the adjusting voltage of the adjuster is 13.5~14.5V. Now the gap between anchor core of the adjuster and the iron core should be 1.4~1.5mm.

Adjuster is a fine electric instrument, so don't adjust it ad arbitrium. When you can make sure that the adjuster has malfunction, you should check the contactor to see if they are not through due to dirt. Spring can only adjust the voltage reading .

Elongate the spring and the voltage will go up; shorten it and voltage will decrease.

6.4.3 Battery.

(1) Constructure and functions of the battery

Two type 3-Q-105 whole-sealed batteries are used in HHJM-30~40 series tractors with 12V accumulator batteries connected in series. They are installed on the battery support in front of the starter. Batteries are formed by positive plate, negative plate, baffle plate, battery jar, electrolyte, intercell connector, multihole fender, and binding post. In liquid pore plug is a venthole that is for venting the gas coming from the chemical reaction in the batteries, so it should be kept through to avoid pole plate being swelled out.

When engine starts, the battery supplies power to the starter and the preheater plug. During operation of the engine, when engine voltage is higher than battery voltage, it convert electric energy of the battery into chemical energy (charging) for storage. If the generater doesn't generate or the voltage is low, the batteries supply power to the electrical devices on the machine.

(2) The first time for the batteries to charge

Electrolyte should be confected with the special battery sulphuric acid and distilled water.

Specific weight of electrolyte depends on the local temperature: 1.260 for 30~35 ℃ , 1.270 for 25~30 ℃ , and 1.280 for under 25 ℃ . The container for confection should be lead bath and china cylinder that is acid-resistant and anti-high-temperature 100 ℃ . Fill distilled water into the container, then slowly fill pure sulfuric acid into distilled water , churning at the same time. Distilled water musten't be filled into pure sulfuric acid. When the ready electrolyte is cooled down to the envirnmental temperature, fill it into the battery with the liquid 10-15mm higher than the defender. Stand for 5-6hours,and when the electrolyte temperature in the batteries is under 35 ℃ , you can begin the first charging with 7ampere charging current which will last 18-25 hours, then with 4ampere current for 30-40 hours. It lasts untill the specific weight of the electrolyte and the voltage have no changes in 3hours and much air bubble comes up just like "boiling". At last, use distilled water or the electrolyte whose sprcific weight is 1.400 to adjust the electrolyte's specific weight in the batteries untill the rated value, and then charge with 4ampere current for one hour. That is the end of the first charging. Cut off the power resource, stand for 2-3hours, tighten the liquid pore plug, wash the batteries and the around with

clean water.

The time between pouring electrolyte into batteries and the first electric charging should not be over 18 hours. Polarity of the outgoing line of the charging device must be consistent and connected well with that of the binding post of the batteries. Positive and negative points must be in their right sites.

（3） Daily operation and maintenance

1) Every time the starter should start the generater within 15 seconds, then a second starting should be 15-20 seconds later. Too frequent continous startings will make the batteries discharge with large currents for long time and result in shortening the capacities and lives.

2) Clean off the dust and dirt from the batteries. Wipe off the electrohydraulic from the battery surface with a clean cloth, or wash away the spilled electrohydraulic;eliminate the oxid from the battery terminal and connector lug and then paint with vaseline; check and see if the battery terminal and connector lug are closed and fastened;Check air holes on every liquid pore plug of the batteries to see if they are through and wash them.

3) The electrohydraulic level should often be checked. During charging , fill distilled water to make the electrohydraulic level 10-20mm above the defender. Generally, dilute sulfuric acid isn't allowed to fill in.If the electrohydraulic is poured out accidentally, fill in dilute sulfuric acid with a specific weight of 1.280 and regulate the specific weight to rated value.

4) After the batteries discharge, charge them duly to avoid pole plate being vulcanized. As for used batteries, if the batteries aren't used for some time, they should be charged before storage. Then charge them once a month. During being laid up, don't pour out the electrolyte.

5) When using batteries in winter , especially in severely cold areas, you'd better keep the batteries fully charged to avoid the specific weight of electrolyte decreasing and icing up that will result in broken battery jar, band of polar plate and desquamation of active materials.

6) If the following situations happen, charge the batteries with 9ampere current.

a. The specific weight of electrolyte dropps to under 1.175.

b. Single battery has a voltage of below 1.7V.

Single battery has a voltage of above 2.5V, or the specific weight of electrolyte cmoes back to the normal value, and can be stable for 3 hours without changes, meanwhile much air bladder comes up in the batteires. These mean the batteries are fully charged.

(4) Troubles and ways out

Troubles	Causes	Ways out
battery lacks power	When the generator doesn't work, electrical equipments (head lamps) use too much electric power.	Check and repair the generator.
	No charging or the chargong is not enough.	Check the generator or the adjustor.
	A single frame has short circuit.	Test and repair the battery
	Pole plate is sulphurised	
	Electrohydraulic is reduced.	Refill distilled water for supplementary charging.
	self-discharge rate is too high.	Do supplementary charging

Troubles	Causes	Ways out
Battery is over charged.	charging current is too large.	Check the adjustor and adjust the electrohydraulic specific weight.
Too much electrohydraulic consumption.	charging current is too large.	Check the adjustor and adjust the electrohydraulic specific weight.
	battery jar seal has leakage.	Repair the battery.
Electrohydraulic outflowis during charging	electrohydraulic level is too high.	Absorber redundant electrohydraulic
	charging current is too large.	Check adjusting pressure
	The electric circuit has partial short circuit.	Turn off all the switches, take down minus earth line, and brush up against the battery cathode. If there is spark, it means short circuit.

Warning：

1) During engine operation, the battery housing musten't be dismountd. don't let electrolyte toutch eyes, hands or clothese. If it spilles onto your body, wash thoroughly with clear water.

2) Only after the earth cable is cut from the batteries ,can the repair be done.

3) The gas discharged from the batteries is easy to explode. Keep batteries far away from electric spark.

4) Don't discharge in a closed envirenment. Suitable ventilation can prevent acculated fuel gas from explosion.

● **Important:**

1)Inproper use of the batteries will shorten their lives, increase repair costs, while correct operation can get a full performance.

2) For connecting to batteries， don't confuse the positive pole and negative pole, or the batteries and the circuit will have malfunction.

3) When taking down connection from the batteries, begin with the negative plate please, while when you do connection, begin with the positive pole.

6.4.4 Starter

Starters of HHJM-30~40 series tractors are series-excitaion dc motor whose type is ST-50D （2Q2D） 1.5KW. Electric starter is fastened on the rear fixing hole of the right side of the engine with two screws through the starter's end flange to keep the right pisitions of starter gears' engagement.

Troubles	Causes
Starter cannot run	1. The battery lacks electricity, contactors of conducting wire are loose or pile heads are too dirty. 2. Contactors of starter switch are ablated or not closed due to incorrect adjustments. 3. magnetic field coil or armature winding has short circuit, open circuit or earth. 4. Brush insulation has break or earth. 5. Contactors of preheat starting switch are burned out.

Troubles	Causes
Inefficient operation of starter	1. The battery lacks electricity, contactors of conducting wire are loose or pile heads are too dirty. These cause malfunctional contacting. 2. Brush has too much abrasion or inefficient spring, which causes malfunctional contact or too dirty commutator. 3. Magnetic field coil or armature winding partially has short circuit or earth; starter switch contactors are ablated.
blank run of starter	1. One-way clutch slides. 2. The starter switch has a too large magnet travel.
The starter driving gears can't be engaged with flywheel with impact sound.	1. Starter driving gears or flywheel gears are abrased. 2. The switch is closed too early. Starter has run before starter driving gears aren't engaged.

Please limit the starter's working time in 5 sedonds every time, and a second starting should be at least 15-20 seconds later. When starter has continuous failure in starting, the engine circuit system and other parts should get a check. Restart again after troubles cleared. If the starter is kept working for a long time , it will be damaged due to over hot or overdischarge

It is forbidden to use the starter to run the driving gear through the engine to drive the generater. Starter's performance can directly influence the engine's starting performance, so it needs often repairing and maintenance.

1. Troubles and Causes

2.Differentiate malfunctions: First check the battery charging and connection of the conducting wire. If the batteries have full electric power and fine connections, the malfunction comes from starter or its switch, you can put through the two binding posts of starter switch with a screwdriver; if starter has a normal idle running, it means the malfunction comes from the switch, and the switch should get repaired; if the starter can't run yet, it means the malfunction lies in the starter itself. You can use a screwdriver to bond , no spark means the starter has short circuit, while bright spark without starter's running means in the starter is short circuit or bonding.

Repair of the starter

1) dismount the starter and take down its parts.

2) Blow dust away and clean it with kerosene-spoted cloth. Don't let unilateral ball clutch in kerosene.

3) Check with a short circuit testerto and see if rotor has short circuits between coils . Watch the weld of rotor coil and collector, the abrasion of journal spline and the singeing on the surface of collector. If the rotor coil falls off, it need be welded; if rotor has short circuits between coils, it should be sent to a repair factory. If journal has severe abrasion, it should be replaced. If the collector has burned surface, burnish it with 0# nonmetal sand paper. If the singeingon is severe, burnish it with a lathe and 0# sand paper.

4) Check to see if the magnetic field coil and the weld are good.

5) If carbon brush is over abrased, it needs replacing, so its springiness needs checking. After a new brush is built in, put a 0# sand paper whose width equals the carbon brush on the collector and draw the sand paper repeatedly to burnish the furface of the carbone brush till its surface has a circular arc that can match the collector.

6) Connect 25W bulbs in series with 220V ac power to have electrical insulation checks between armature coil, pole winding and housing, and insulated brush rame and rear end housing.

7) Check the contactors and portative force of the electromagnetic switch. If portative force is low and the weld on the copper piece is complete, it should be sent to a repairman shop for repair or replacement; if the switch has malfunction during operation, get its mecarta cover and solder on copper piece burnt off , turn down the two hexagonal bolts and spring washer, take down the mecarta housing, and check the singeing of the contactor. If the contactor is singered, use 0# nonmetal sand paper to burnish it.

8) Check the abrasion of every axial sleeve. Replace them if necessary.

9) After repair and re-installation are over, oil lubricating grease in splines and other parts.

6.4.5 Preheating plug

This tractor’s diesel engine uses type 201 electric heater plug in the intake pipe, as an assistant equipment. See Fig 6-36 for its structure.

Here are its working principles: when the diesel oil enters chamber through oil pipe, it is stopped n the heater plug makes the air hot so that the engine can be started easily. After the engine is started, move back the switch and cut off the electricity, then the resistance and extension bush cool down quickly and the fire die down immediately. The extension bush and vavle lever draw back, the vavle closes again, the oil is blocked to the right and

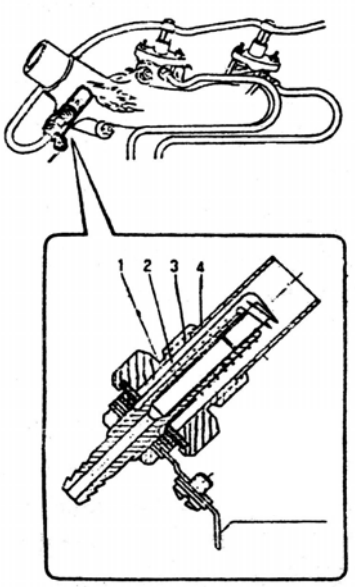


Fig. 6-36 heater plug

1. extension bush 2. valve lever 3. resistance wire 4. guard vocer

the heater plug stops.on the right caused by valve lever's holding. When the diesel engine starts, the switch turns on and the preheating plug gets power, the cover on the extension bush will become longer because of heat to make the vavle lever move left, thus opening the vavle. The diesel oil from the pipe flows into the hot extension sleeve to burn. There is a shield to the right of the preheating plug. It can prevent the air blowing out the fire and on the other side the fresh air coming from the small holes of the shield can make the fire burn up. The fire i

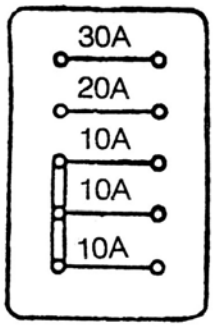


Fig. 6-37 grades of fuse

When using the preheating plug, insulation of the electrocircuit must be ensured, otherwise the function will be affected. The charcoal, which will come into being after a long use, should be scraped carefully by a wood piece (take care not to damage the resistance and its cover), then be cleaned by the gas and dried.

6.4.6 Fuse box

There are five grades of fuses in the fuse box. Between 3 and 4 and 5, they are linked by a connection strap. (Fig. 6-37). They are to protect the following electric equipment.

When the fuse is broken for various reasons, the same type fuse must be fixed after all the malfunctions are eliminated.

Grade 1 — the general fuse, all the electric equipment on the electrocircuit.

Grade 2 — dynamotor recharges the accumulator.

Grade 3 — the head lights, the front minor lights, the indicator lights, the rear lights and the key rear lights.

Grade 4 — brake lights and bugles.

Grade 5 — the two turning lights.

6.4.7 Front and Rear lights and horn

To ensure the safety on the road and in the field, the tractors are equipped with fore and rear lights. The head lights are fixed on the front cover while small front lights are fixed on the two sides of the cover, which can indicate the width and direction. The rear lights are fixed on the left baffle to provide lighting during the night.

The electric horn which is in the front cover is used as the sound signal.

6.4.8 Ammeter, oil pressure meter, water temperature meter and chronometer.

The current watch is to show the amount of electricity. When the dynamotor recharges the accumulator, the finger points at “+”; when the accumulator gives out electricity, the finger points at “-”; when there is no electricity passing, the finger points at “0”.

Situations suggested by the current meter:

(1) when the finger points at “0”, it generally means the accumulator has been fully charged and the dynamotor don’t charge it any longer. When something is wrong either with the dynamotor adjustor or the connection line, the accumulator can't be charged any more. The first time it is hard to start the dynamotor but the engine and the starter are all right, it means there is something wrong either with the dynamotor or the connection line, causing the lack of electricity. If it can be started quickly and the finger points to the positive with the growing rotating speed and turns back to "0" After a while, which means all the electrocircuit are normal. If you are not sure, start it again to confirm.

(2) when the finger points at “+” under normal condition, electrical current falls with the increasing electricity of the accumulator. It will point at “0” when it’s fully charged. The increasing positive electrical current shows that it gives out electricity tempestuously and the stored electricity is not enough. You need to recharge it. If the electrical current is stronger than 4 amp, it shows that voltage of the adjustor is too high, which needs to be checked and repaired.

(3) when the finger points at “-”, it is normal under the condition of using the electric equipment and start the engine when tractor doesn’t work. But if it still points at “-” when the engine runs, it is necessay to check whether something is wrong with dynamotor and the pressure adjustor. Because the dynamotor’s magnetic coil is connected to the accumulator via the pressure adjustor and electrolock, it will give out electricity once the electrolock is switched on, the finger pointing at “-”.

The running parts of the engine must be lubricated by pressure oil. This machine is equipped with YT-102 engine oil pressure watch, which is linked to engine oil entrance with a hollow bolt. The pressure of engine oil is sent from the rubber pipe to the head of watch, which is fixed on the down-left side. The normal engine oil pressure should be between 196 Pa and 343 Pa (2~3.5 kgn/cm^2)

Only water of certain temperature can ensure the engine to work normally, so this machine is equipped with MT-102 water temperature watch to test the water's temperature. The normal temperature for the engine to work is 70-90 ℃. The watch surface is fixed on the up-left side of the dial plate while the induction

6.5 Intake and exhaust system

The air cleaner adopts 1317A paper filtrate element, whose structure and air flowing chart are shown in Fig. 6-38. Air is absorbed in from the swirl. The torsion angle makes the air whirling. The bigger particle is thrown off to the bottom because of the centrifugal force and files up. The briefly cleaned air will be cleaned again through the paper filtrate element before it is absorbed into the cylinder so that it can prolong the cylinder sleeve and piston unit's service life.

According to the dust level of the environmental air, the filtrate element need to be maintained after being used 250 hours (If in dusty environment, it need to maintained less than that). Take out the filtrate element, remove the dust with a soft brush (Fig. 6-39) and knock on the surface gently. If condition permits, airproof the two ends of the filtrate element, blow it from the inside to the outside with compressed air. Never clean it with oil or water.

The muffler is fixed on the exhaust elbow. The waste gas enters the muffler and moves on through the eyelets on the down-side to the muffler cavum, and then goes out through the eyelets on the up-side

of the filtrate element. After several times' swerve, blocking and inflation, the noise is greatly reduced. After being used for about 1000 hours, the dust need to be removed by knocking at the ourside of the muffler in order not to block up or affect the engine's function.

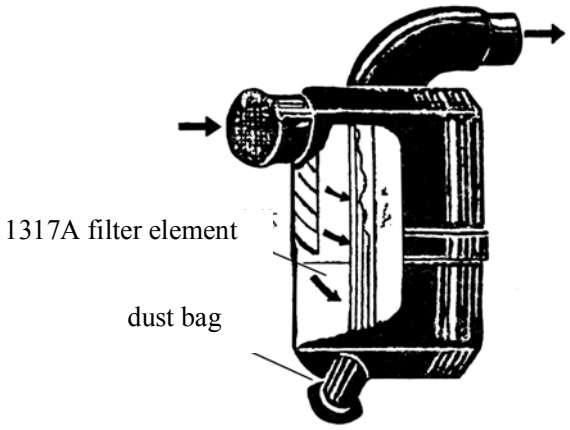


Fig. 6-38 air filter

Fig. 6-39 wash air filter

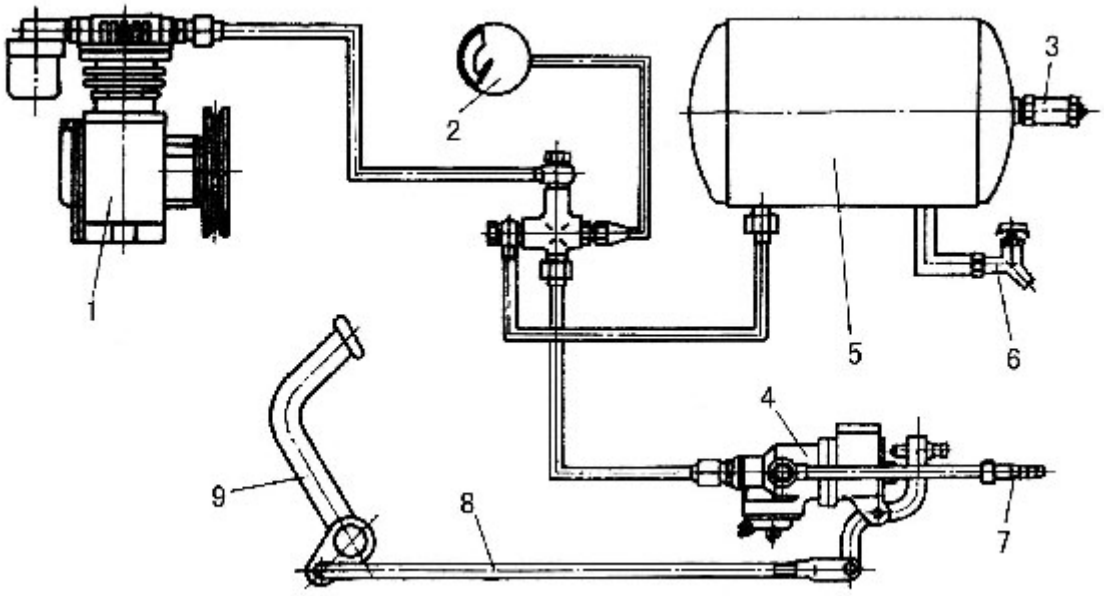


Fig. 6-40 Air braking system of the trailer

1 air compressor 2 barometer 3 safety valve 4 brake valve 5 air tank 6 discharging valve7 outlet pipe of brake valve 8 link lever 9 brake pedal

6.6 Use and adjustment of the air-braking device of the trailer

To ensure the safety of the trailer and the immediate stop, the tractor is equipped with air-braking device. It consists of aie compressor 1, air tank5, braking valve4, air pressure watch 2 and pipelines. (Fig. 6-40)

6.10.1 the working process of the air-braking device of the trailer

The air-braking device works through the compressed air driving the detent on the tailer wheel. The compressed air is sent into the air tank via the air compressor, then from the air vent in the brake valve (hole B in Fig. 6-41) to the trailer wheels' braking windpipe. When the braking pedal is treaded, the linking lever (8 in Fig. 6-40) will drive the draw-arm 10 on the braking valve (Fig.6-41) to wheel around the pintle 13. This will make the braking adjusting bolt 12 above press down the braking tappet9, press the balancing spring7, push core plug assembly5, press the return spring4, push off the valve base unit3(press valve seat spring2), and open the pressure gas passage. Here the compressed air in the air tank goes through hole "A" to valve seat hole, and through hole "B" to the escape pipeof braking valve (7of Fig.6-40) and tee connector, then goes into the braking air chambers on the left and the right of the trailer, pushing the braking levers of the left and right brakes to get trailer's braking performance.

Braking finished, release the braking footplate. The braking adjusting bolt returns back. Tapper and core lever assembly, under the pressure of the compressed spring, return back too. The valve base subassembly3 moves right up touch the valve port on the left housing6 under the action of the compressed seat spring. The passages from the air tank to the left and the right braking air chambers of the trailer are closed again. Here the waste gas (compressed air) goes through pipes, braking valve

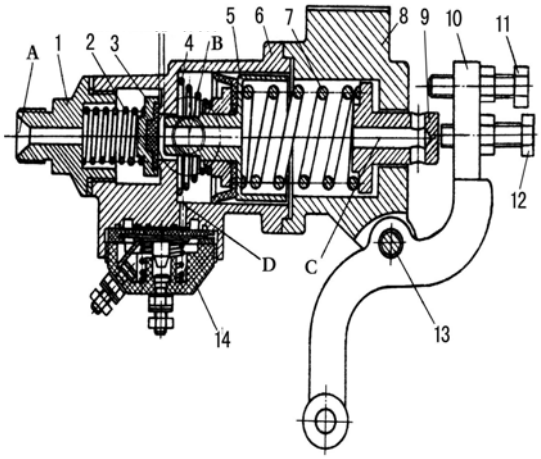


Fig. 6-41 braking valve

1 valve cap contactor 2valve base spring 3 valve base subassembly 4 release spring5 core plug assembly 6 left housing 7 balancing spring 8 right housing9 braking tappet 10 draw arm 11 limit bolt 12 adjusting bolt13 pin 14 air switch of braking lignt

bevel gear assembly (4) are supported on the box case(6) and box housing (1) respectively. Driven bevel gear axis(5) is supported on the box with ball bearing (6305) and is engaged with the driving bevel gear assembly. The box housing and bearing cover(10) both have oil seals 50 × 70 × 12 （2） and 45 × 65 × 12 （11). Belt pulley (9)on the outer end of the driven gear axis is connectholeB, inner hole of core lever, inner hole of tapperC to the outside (Fig. 6-41).

6.10.2 Use and adjustment of the air-braking device of the trailer

① When the air-compressor is working, if the air pressure is less than normal, it’s necessary to check whether it is airproof. If the air-compressor has been working for 24 hours and the engine oil in the air store canister has exceeded 15~20ML, abrasion of the air compressor’s piston ring ought to be checked, or change it if necessary. Check or refill engine oil every 10 working hours.

Braking valve’s use and maintaining: if the air pressure in the air store canister falls quickly after stopping and all the joints are airproof, screw off the valve joint 1 (Fig. 4-41), clean the the dust on the rubber surface of valve base assembly 3 and rub the vestige gently with a soft emery cloth when necessary.

Generally, after being used for 1000 hours, it’s necessary to clean all the parts, rub the valve base, adjust the braking pressure to the maximum and check the seaming after each re-assembling again.

The braking pressure adjustment: when the braking footplate is pressed to the bottom, the maximum pressure to the trailer braking plate should reach 0.45~0.5Mpa. During adjustment, install a barometer in the pipe circuit that goes through the braking air chamber. Just as Fig.4-41showes, turn the adjusting bolt12 to touch tapper9, and then step down the braking pedal to the end. Here if the reading of the boremeter is below 0.45Mpa, the limit bolt11can be screwed out; if it is higher than 0.5Mpa, it needs screwing in, until the reading is in the range of 0.45~ 0.5Mpa. After that, lock it up with a nut.

Adjust braking time: the trailer’s braking time should be almost synchronous with that of the tractor, or it should get an adjustment. Prolong link8 (Fig 4-40) and the trailer’s braking time will be shifted to an early time, while shortening the link will cause delayed braking time. Generally, the air cushion braking should be slightly ahead of the braking time of the tractor.

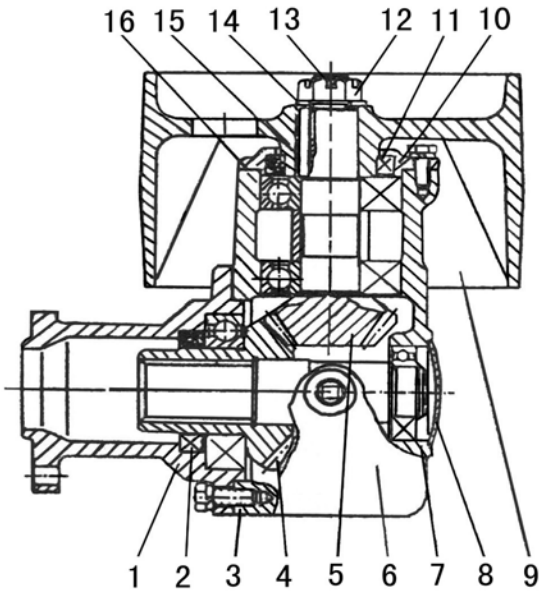


Fig. 6-42 belt pulley assembly

1 housing cover 2 Frame oil seal 3 bolt 4 driving taper gear assembly 5 driven taper gear6 housing 7 check ring 8 堵片 buckling 9 pulley 10 bearing cover 11 frame oil seal12 nut 13 split pin 14 spacer 15key 16 adjusting washers

Attention:Adjustment not following the stipulations will cause accidents.

6.11 Strucure, dismounting&reassembling and adjustment of the belt pulley subassembly

Belt pulley subassembly (Fig.6-42) is driven by a couple of bevel gears.Both ends of the driving ed to the driven bevel gear axis with a dowel(15) and is locked up with nut (12).

Raising speed ratio of the belt pulley is 1.647. The belt pulley has a diameter of 250mm and a width of 125mm. When engine rev is 2200r/m, the pulley has a rev of 1178r/m and a linear speed is 15m/m.

The pulley is installed on the PTO shaft as a separated accessory and is fixed on the rear end of the drive housing with 4 bolts. Follow the steps below to dismount:

1) Screw out the three M8 bolts from three core holesof the pulley(9).

2) Beat the inner end face of the pulley with a mallet and turn slowly to dismount the driven bevel gear (5).

3) Insert a bar copper into the hole of the driving bevel gear(4) and beat the buckling (8).

4) Release the four M10 bolt (3)

5) Use a bar copper to beat driving bevel gear assembly (4) through the end hole of the buckling.

Assembling steps reversed to the dismounting steps, but the contact mrarks of the two bevel gears should get adjustments.The marks can't be shorter than half of the tooth length and not be more narrow than the height of the tooth. The marks should be distributed on the smaller-end of the pitch cone. Reducing or adding adjusting washers can adjust the marks. After the instllation , the puley should get an operating test . it should be flexible in operation, continous and smooth in gear engagement without impact sound. The allowable error of pulley's diameter run-out is 0.16mm. After reassembling, you should refill lubricating oil to the level of the pulley's center axial line.

A new belt pulley assembly or a newly changed gear should have a 20-h running-in (Its load should not be over half of the max. load of the engine.) , necessary checks , new lubricating oil, and then it can be put into use.

Chapter Seven Main Troubles and The Solutions

7.1 Hard or Failto Start Diesel

Causes	Ways Out
I. Malfunction of fuel system 1.Diesel oil is used out or the switch of oil tank is not turned on. 2. There is air in oil way. 3. Jam in oilway 4. Fuel transferring pump doesn't work. 5. Fuel injector doesn't work well or oil drops around the injector. 6. Distributive value is small or zero (injection pump plunger is abraded or the delivery valve has oil leak)	1. Check the store of diesel oil and refill diesel oil; turn on the oil tank. 2. Exhaust the air and check to see if there is air leak at every fuel pipe union. 3. Wash oil pipe line and sediment bowl; wash or replace the filter element of diesel oil filter. 4. Check the sucker line to see if there is leakage. Shoot the trouble and if it still can't transfer, you should check the oil transfer pump. 5.Wash oil nozzle or grinding the sealing. Replace it if necessary. 6. Repair plunger pair; grinding delivery valve.
II. Inefficient compression pressure inside cylinder (which means easy cracking) 1. Air valve doesn't work well. 2. Piston ring has over abrasion (too big clearance of the opening) 3. Piston ring has block by carbon consolidatannular 4. No clearance between the air valve and rocking arm. 5. Leakage happens at gasket of cylinder head	 1. Grind air valve; check the clearance between the air valve and valve guide pipe. 2. Replace piston ring 3. Dissemble and wash away the carbon deposit. 4. Adjust the clearance of air valve 5. Tighten the nuts of cylinder head. If the gasket is broken, replace it.

7.2 Self-stop of diesel

Causes	Ways out
1. Diesel oil is used out 2. Air enters fuel system 3. Diesel oil filter is blocked 4. Valve stem is felted. 5. Needle valve has seizure 6.Cylinder or shaft has seizure (caused by overheat or oil off) 7. (delivery valve stops working)	1. Top up diesel oil 2. Exhaust air; check the sealing of pips 3. Wash or replace filter element 4. Disassemble and grind air valve 5. Wash or grinding the needle valve, replace the oil nipple pair 6. Check and repair 7. Check and grind

7.3 Inefficient power of diesel

Causes	Ways out
1. Inefficient pressure 2. compression ratio is not the rated value. 3. Injection value is not enough. (due to leakage of delivery valve, abrasions of plunger and sleeve) 4. Two cylinders supply fuel equally (Loose high-pressure pipe adaptors of the two cylinders and watch their operations are coincident). 5. Something wrong with advance angle of fuel supply. 6. fuel injector has malfunctions 7. Clearance of air valve is too small or too large . 8. Intak and exhaust system are blocked 9. Jam if fuel filter.	1. Do as the ways out of "Diesel is Hard to Start or Can't Be Started" 2. Replace with qualified cylinder gasket. 3. Check and adjust injection pump. 4. Adjust injection pump; check the injection quality of the injector. 5. check and adjust the advance angle of fuel supply. 6. Check and repair the injector. 7. Adjust the valve clearance. 8. Clean air filter; eliminate carbon deposit from exhaust pipes and mufflers. 9. Check the filter, and wash or replace it.

7.4 Abnormal air exhaust color(greyish smoke is allowed.)

Causes	Ways out
I、 Black smoke: 1. Diesel is overloaded 2. Fuel supply of every fuel pump is not equal. 3. Jet pressure of the injector is reduces or injection is not efficient. 4. Oil injection is too late. 5. intake system or exhaust system have blocks 6. Clearance of air valve is not proper 7. Compression pressure in cylinder is inefficient	 1. Reduce load. 2. Check and adjust injection pump. 3. Adjuat, wash or replace oil nozzle. 4. Check and pre-set the injection angle. 5. Brush and wash air filter, eliminate the carbon deposit from vent-pipe and muffler. 6. Readjust 7. See the ways-out for the starting difficulties.
II、 Blue smoke 1. Engine oil in crank box in too much. 2. Piston ring has abrasion and inefficient elasticity, or it sticks to annular; return port of oil ring is blocked with carbon deposit. 3. The clearance between piston and cylinder liner is too large. 4. The clearance between air valve and conduct pipe is too large	 1 .Check the oil level and discharge the overfull engine oil. 2. Wash or replace piston ring. 3. Replace the abrased parts 4. Replace the abrased parts
III、 White smoke 1. Water enters diesel. 2. water enters cylinder.	 1. Wash oil tank and diesel filter; replace diesel oil. 2. Dissemble the cylinder head for check

7.5 Too high temperature of exhuasted water

Causes	Ways out
1. Water in the water tank is not enough. 2. Drive belt of the water pump is too loose. 3. The bearing of water pump is seized 4. Too scale incrustation in the cooling system. 5. Thermoregulator has malfunction 6. The diesel has too-long-time operation with overload. 7. Water thermometer doesn't work well.	1. Gradualy reduce the temperature and top up the water tank. 2. adjuat the belt tautness . 3. Replace the bearing of water pump. 4. Eliminate scale deposit 5. Check and replace the thermoregulator 6. Reduce load 7. Repair or replace the thermometer.

7.6 Speed of diesel rises suddenly.

Causes	Ways out
1.Link of fuel injection pump is seized 2. Fork of injection pump is installed wrongly and the distributive value is too large 3. Speed regulator is broken or doesn't work well.	1. Switch off the oil delivery and dissemble the fuel injection pump for check and repair. 2. Check and adjust fuel injection pump. 3. Check and repair speed regulator.

7.7 Abnormal noise during engine running

Causes	Ways out
1. Fuel isn't supplied at a proper time, or the injection pressure is too high. 2. Too large valve clearance will lead to metal dry-friction sound of cylinder head (the sound is clear withlow speed) 3. The clearance between piston pin and the bush of the small end of link is too large(metal slap happens when rev has a sharp change.) 4. Connecting rod bearing shell has too large clearance(during the operation with load, there is heavy slap sound when reducing the rev suddenly; the sound disappears when the tractor has no load or runs at a slow speed.) 5. Air valve touches piston crown (during the operation with loads, there is heavy, equally and rhythmic sound on the cylinder head) 6.Tooth space is enlarged due to too much abrasion of timing gears (clash in gear room can be heard whe nthe rev has a sudden change.) 7. Spring of injection pump plungeris broken (The diesel performance is not reliable and there is spark-out)	1. Adjust the injection time or injection press ure. 2. Adjust the air-valve clearance 3. Replace abrased parts. 4. The crank turns to the upper dead point. Prize the link with a iron rod. Check and see if the clearance between the connecting rod bearing shell and its rod journal is too loose. If necessary, thin the rod journal of the crank. Use a rod journal with a larger size. 5. Check to see if the air-valve clearance is too small, or if valve stem is seized in pipe. Add some copper gaskets if necessary, or replace the related parts. 6. Replace the abrased gears. 7. Repair and adjust injection pump.

7.8 Too-low pressure or zero pressure of engine oil

Causes	Ways out
1. Engin oil in the oil pan is not enough. 2. engine oil is too thin. 3. engine oil pipes has oil leake or blocks. 4. Engine oil is too dirty, or filter has blocks. 5. Booster has a deformed spring, or a wrong adjustment. 6. Abrasion clearance on engine oil pump is severe. 7. washers of engine oil filter are installed in wrong directions. 8. Cranck bearings have severe abrasion clearance. 9.oil manometer doesn't work well.	1. Top up engine oil. 2. Replace with qualified engine oil. 3. Check or wash oil ways. 4. Replace engine oil; wash filter. 5. replace the spring; adjust pressure. 6. repair engine oil pump. 7. Replace washers. 8. Repair it. 9. Replace pressure gauge.

7.9 Brakes

Trouble	Causes	Ways out
1. Clutch slips (If with heavy loads, the power machine sounds not heavy while the rev is reduced, the clutch slips).	1.Dip friction plate with oil. 2. Friction plate has overbrasion. 3. Free travel is small or zero. 4. Driven plate has too large cambering .	1. Wash with gasoline, severe leak needs reparing. 2. Replace driven disc. 3. Readjust as required. 4. Replace it.
2. Seperate not so thoroughly. Gear putting has noise or dificult.	1. Free travel is over enough while working travel is inefficient.. 2. Driven disc has over cambering. 3. Three adjusting nuts of releasing levers are loose.	1. Readjust it according to requirenments. 2.Replace it. 3. Replace it.
3. Tractor trembles when starting to move.	Friction plate is broken.	Replace the friction plate.

7.10 Clutch

Trouble	Causes	Ways out
1. Clutch slips (If with heavy loads, the power machine sounds not heavy while the rev is reduced, the clutch slips).	1.Dip friction plate with oil. 2. Friction plate has overbrasion. 3. Free travel is small or zero. 4. Driven plate has too large cambering .	1. Wash with gasoline, severe leak needs reparing. 2. Replace driven disc. 3. Readjust as required. 4. Replace it.
2. Seperate not so thoroughly. Gear putting has noise or dificult.	1. Free travel is over enough while working travel is inefficient.. 2. Driven disc has over cambering. 3. Three adjusting nuts of releasing levers are loose.	1. Readjust it according to requirenments. 2.Replace it. 3. Replace it.
3. Tractor trembles when starting to move.	Friction plate is broken.	Replace the friction plate.

7.11 Hydraulic suspending system

Trouble	Causes	Ways out
1. Lifting cannot be done whether heavily or light loaded	1. The oil pump can't absorber oil normally. 1) Transmission box (or oil tank) has a too low oil level. 2) Oiltaking filter is severely blocked. 3) Seal rings of oil suction pipe or oil pump are severely leaked or damaged. 2. Splint pins of the outer or inner ends of control handle fall off. 3. Rocking beam falls off. 4) Key control valve is blocked in the middle or lowering position, or the return valve is locked in the starting position.	1. 1) Fill oil to the rated level. 2)Wash or replace the filter. 3) Replace the damaged seal ring. 2. If the outer splint pin falls off, re-install one; if the inner splint pin falls off, open the distributor and re-install a splint pin. 3. Open the distributor, and set the rocking beam and pintle. 4. Beat around the retrn valve. If there are series of lockings, dismantle the distributor and
2. Lifting is right without loads, but not with loads.	1) Oil temperature is too low. 2) Filter of inlet port is blocked. 3) Input pipe, high-pressure pipe and the seal ring inside oil pum are damaged. 4) Oil pump is severely damaged. 5) Return valve, lowering valve and safety valve have leakages. 6) Too oil leakages in pumps, valves and cylinders leand to overhight temprature.	1) Go on running to raise the oil temperatur. 2) Wash filter. 3) Replace seal ring. 4) Repair or replace oil pump. 5) Hit every valve of the distributor with a wood barslightly .Open the return valve, lowering valve, safety valve to wash.Face up with fine abrasive paste 6) Check
3. When handle stays in the lifting position, oil pump sounds piping.	1. Incorrect installation make the inner lifting arm stick to the lifter case to open the safety valve.	1. Readjustment: shorten adjusting lever or position-adjusting lever or force-adjusting lever to lower down the top position.
4. Farm implement shacks after rising (nodds) with quick static dropping.	1 Clappet valve of the distributor is not completely sealed. 2. Dropping valves are not completely sealed. 3. Safety valves of cylinders are not completely sealed. 4. Block of hydraulic output is not sealed completely. 5 Sealings of.dDropping-speed control valves are damaged. 6. Seal rings between distributor, cylinder end and inlet hole of lifter case fall off or are damaged. 7. Seal ring of cylinder piston are abrased.	1. Wash the valves. face up with fine abrasion cream if necessary. 2.The same as the above. 3.The same as the above. 4.The same as the above. 5.Replace the seal ring. 6.Check and replace the seal ring. 7.Replace piston seal ring.

Troubles	Causes	Ways out
5. Farm tools can be lifted normally but can't lift to the top position.(Or over top)	1. Regulating stem is shortened (or becomes longer) (position control lver and force control lever)	1. Adjust the lever length (position control lever, force control lever)
6、Farm tools can't drop	1. Control valve for lowering speed is screwed in too much. 2. The king valve is blocked. 3. Lowering valve is blocked. 4. Pin is shortened or the lowering valve assembly is loosened and screwed out to stop the lowering valve from being turned on.	1. Loosen the lowering-speed control valve. 2. Wash the king valve. 3. Wash the lowering valve 4. Take out the obstruction of the lowering valve, and readjust the clearance of lowering valve's pin or tighten the lowering valve assembly.
7、Abnormally raised oil temperature	1. During transportation, the handle has an overhigh position. 2. The outer lift arm has a wrong top position; safety valve is opened 3. The lowering valve can't move. 4. There are many leakages in pumps, vavles and cylinders, and capacity efficiency is too low.	1. Fix the handle in the transportation position. 2. Readjust and get a propor clearance between the inner lift arm and the body. 3. Loose the lowering valve 4. Check the sealed sites. Replace the severely abrased compoments if necessary.
8. The control handle is hard to use	1.Oil is not clean, king valve is blocked or the pin is blocked.	1. Turn the handle to and fro and wash the king valve or pin.

7.12 Electric system

7.12.1 Starte

Troubles	Causes	Ways out
1. Starter can't work.	1) Connecting wire is broken or malfunctional. 2) Charging is not enough. 3) Brush has malfunction in contacting commutator. 4) There is short circuit and open circuit inside the starter.	1) Get contact points welded and tightened. 2) Charge or replace the batteriy. 3) Clean the surface of commutator replace brush. 4) Check and repair.
2. Starter runs without loads but it is inefficient.	1) Brush has malfunction in contacting commutator. 2) Surface of the commutator is burnt or has oil stain. 3) Connector has malfunctions. 4) Electromagnetic switch doesn't work well. 5) Charging is not enough.	1) Get contact points welded and tightened. 2) Charge or replace the batteriy. 3) Clean the surface of commutator replace brush. 4) Check and repair.
3. The small starting gear is not involved in engagement and the starter runs, which causes impacting.	1) Electromagnetic switch has too short armature travel.	Turn the connecting screws of electromagnetic switch to a proper position.

7.12.2 Batteries

Troubles	Causes	Ways out
1、 Electric store is not enough in batteries.	1. Generator or regulator has malfunction ,no charging current. 2. Connection in charging circuit is loosen or rusted, and itincreases resistance. 3.Short cut happens on polar plate. 4.Electrolyte has too low liquid level. 5.Polar plate is vulcanized.	1. Repair the generator or the regulator. 2. Check and see if the post chuck and connection bolts are loose. Tighten them or eliminate rustiness. 3.Check and repair 4. Add some electrolyte. 5. Electrify it repeatedly and eliminate sulfuration.
2. Discharge auromatically too much	1. Too much impurity in materials of polar plate or impure electrolyte.	1. Discharge or overdischarge the battery entirely to let the impurity on the plate go into the electrolyte. Outlet the electrolyte and wash with distilled water. Refill new electrolyte and re-charge.
3. Battery capacity is reduced obviously (low sparking voltage, high charging voltage, low electrolyte density) polar plate is ;vulcanized.	1. You usualy don't charge enough. 2. You should have charged in time for low-current discharging in a long term. 3. Electrolute is so little that the upper end comes out from the liquid.	1. Charge for a long time with low currents; or engage the cycle of full charging and full discharging. 2. Rejuvenate active materials, or use desulphuration charging. 3. Refill electrolyte .

7.12.3 Meters & Indicators

Troubles	Causes	Ways out
1. Water-temperature finger always stays at the low temperature.	1. Circuit is short or has malfunction. 2. Water-temperature sensor is damaged.	1) Check and repair the circuit.2) Repair or replace water-temperature sensor.
2. Water-temperature finger always stays at the high temperature.	1)There is short circuit. 2. here is short circuit in water-temperature sensor.	1) Check and repair the circuits.2) Repair or replace the water-temperature sensor.
3. Other meters' abnormal indicatings.	1)The circuit is short circuit or malfunctional. 2). Sensor has open corcuit, short circuit or malfunctional contact.	1) Check and repair the circuits.2) Repair or replace the sensor.

7.12.4 Lights

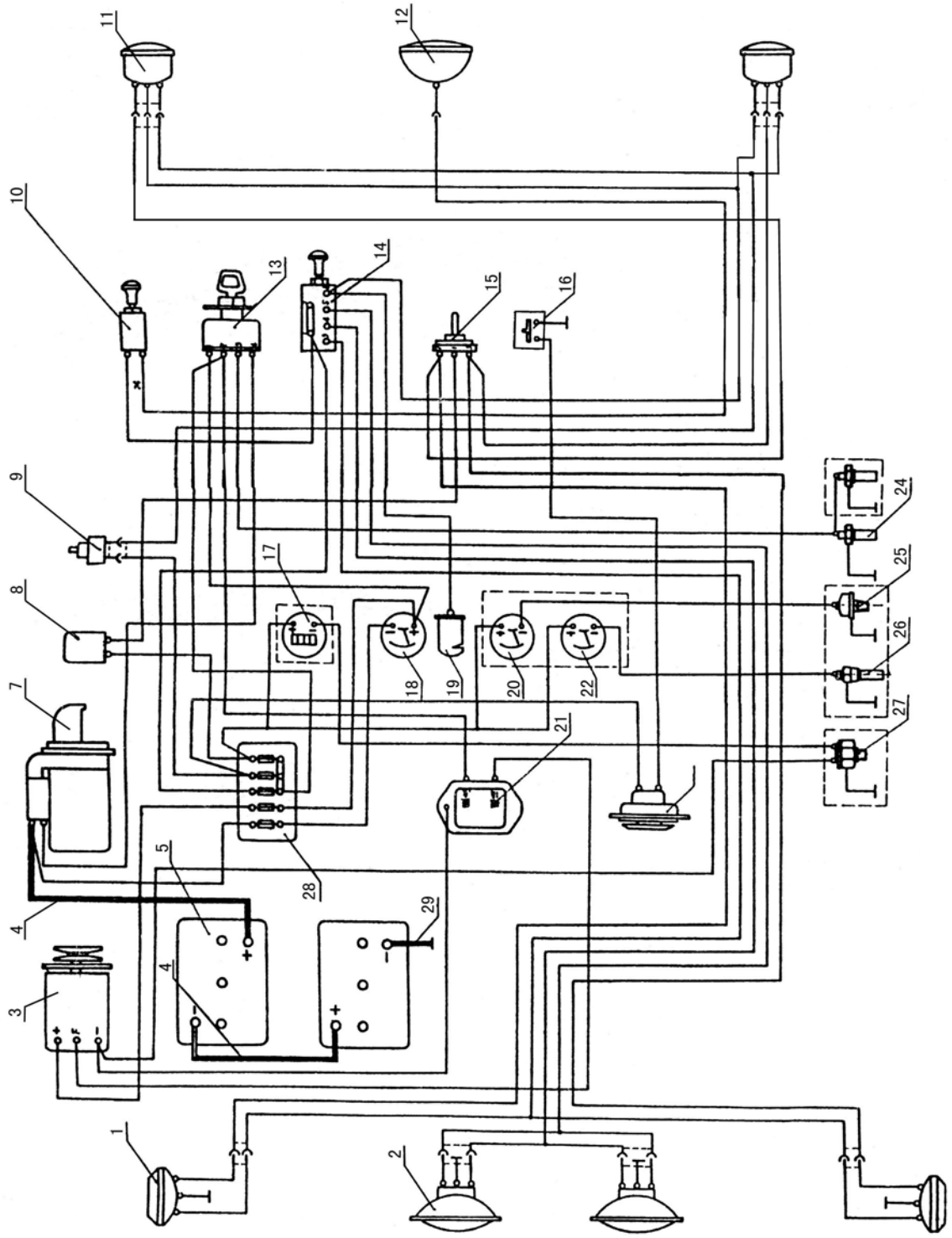
Troubles	Causes	Ways out
1. The headlight has no dipped beam or high beam. 2. The rear lamps don't wrok. 3. Turning indicators don't work. 4. Parking indicators don't work.	1. Circuit is opn or the fuse is broken. 2. Light switch has ill contacts or is damaged. 3. Bulb is damaged.	1. Repair and connect it. 2. Repair or replace it. 3. Replace the bulb.

7.12.5 silicon rectification generator

Troubles	Causes	Ways out
1. Generator has no energy production.	1. Wires are loose, cut off, short circuit or wrongly connected. 2. Diode is damaged, cut off or has short circuit. 3. Rotor and stator coils has open circuit, short circuit or bonding. 4. Adjustor has too low adjusting voltage. 5. Adjustor contact points are burnt or its inside lines are cut.	1. Check and repair. 2. Replace or repair it. 3. Repair or replace it. 4. Raise the voltage properly. 5. Check and repair.
2. Generator has no enogh output .	1. Loops of stator and rotor has short circuit or is broken. 2. One or two diodes are damaged. 3. Belt of the generator is too loose.	1. Repair or replace them.. 2. Replace them. 3. Fasten the belt.
3. Charging current is not stable.	1. Generator belt has trackslip. 2. Charging circuit has wrong contact. 3. Rotor and stator coils are to have open circuit, short circuit or bonding. 4. adjustor has malfunction.	1. Clean he oil stain away or fasten the belt. 2. Check and eliminate the malfunction. 3. Repair or replace them. 4. Repair or replace the adjustor.
4、Abnormal sounds from generator	1. Incorrect installation of the generator leads to interference between rotating sector and fixed sector. 2. bearing is damaged. 3. Rotor touches stator.	1. Find out the interference site and adjust installating position. 2. Replace it. 3. Repair it.
5、burned smell from generator	1. Damaged diode leads to burned parts. 2. Cores of stator and rotor contact, which causes short circuit of stator coils and rotor coils. 3. Adjustor has malfunction, or voltage is too high with overloads in a long term.	① Replace it. 2. Repair or replace the coils. 3. Replace or adust it.
6、Overlarge charging currents	1. Battery cell has short circuit. 2. Voltage of adjustor is too high. 3. Adjustor has inefficient bonding 4. Adjustor contactors are dirty or have malfunction.	① Replace it. ② Lower voltage ③ Check and repair ④ Repair and wash.

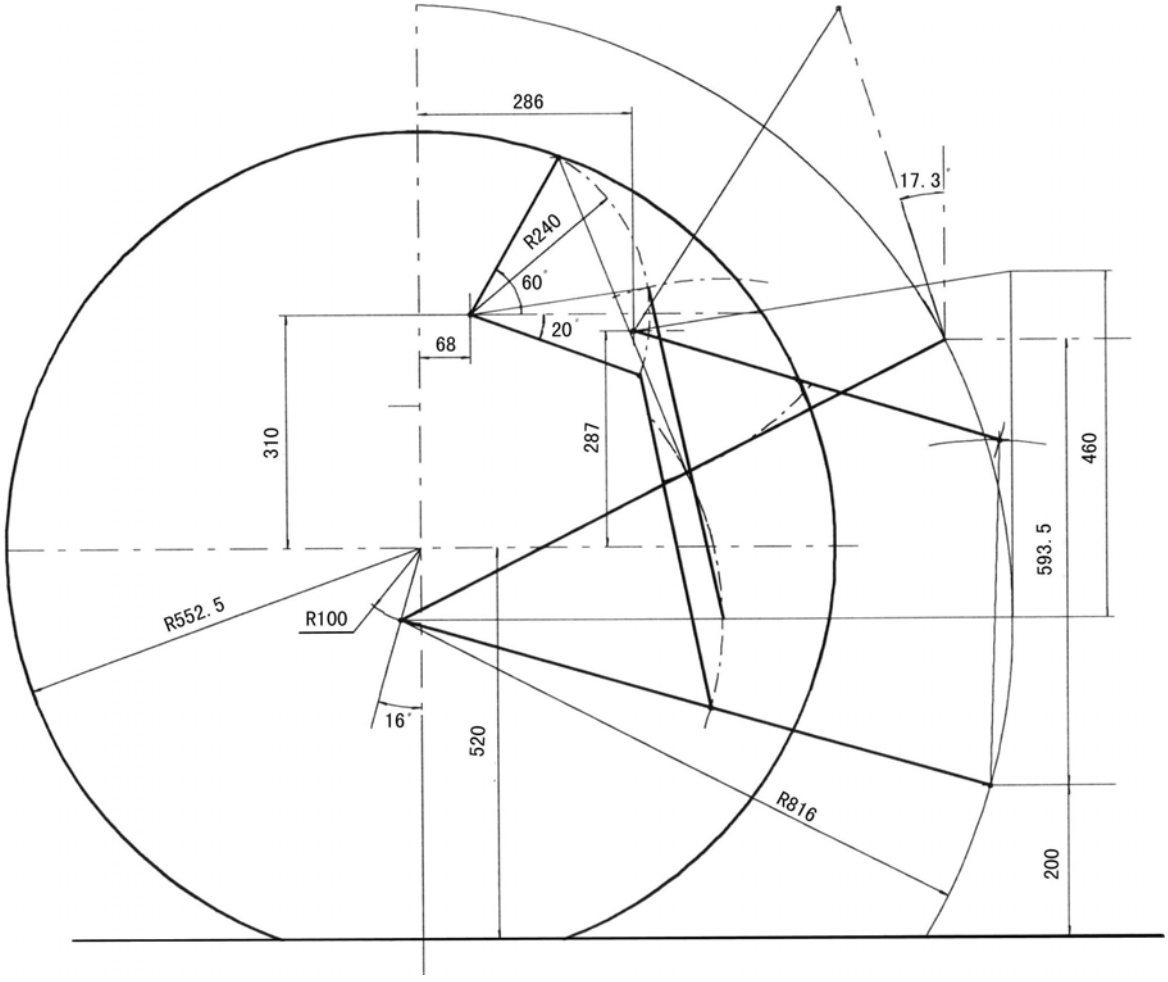
Chapter Eight Appendix

8.1 Electric Wiring Map



Indications of electric wiring map

1、 indicator 2、headlight 3、alternator 4、 series-wound cable of storage battery 5、 storage battery 6、 cable from storage battery to starter7、 starter 8、 flasher 9、 brake indicator switch 10、 single gear switch 11、 bi-color rectangle light 12、 rearl light13、 preheat switch 14、 tri-gear switch 15、 indicator switch 16、horn button 17、 timing meter 18、 ammeter 19、 instrument indicator 20、 engine oil manometer21、 regulator 22、 temperature gage 23、 horn 24、 preheat plug (glow plug)25、 oil manometer sensor 26、 temperature gage/sensor 27、 pressure switch 28、 fuse wire box 29、bonding cable of storage battery



8.2 Size of suspending system

Connecting pin of top link with a diameter of Φ19mm

Connecting pin of top link with a diameter of Φ22mm

distance between front linkage points of tow link, 487mm

distance between real suspending points of lower link , 718mm

length of lower link, 816mm

451.5mm / length of brace bar

8.3 Driver Spare Parts

No.	Code	Name	Quantity
1		compond washer18	4
2		compond washer	4
3	GB 13871-1992	FB75 × 100 × 10	4
4	GB 13871-1992	FB55 × 75 × 8	4
5	GB 13871-1992	FB45 × 65 × 8	2
6	GB 13871-1992	FB35 × 55 × 8	2
7	300.31.111	Oil seal 40 × 64 × 8	4
8	GB 3452.1-1992	O-ring15 × 2.65	4
9	GB 3452.1-1992	O-ring18 × 2.65	2
10	GB 3452.1-1992	O-ring20 × 2.65	2
11	GB 3452.1-1992	O-ring23.6 × 3.55	1
12	GB 3452.1-1992	O-ring25.8 × 3.55	2
13	GB 3452.1-1992	O-ring30 × 2.65	2
14	GB 3452.1-1992	O-ring33.5 × 3.55	4
15	GB 3452.1-1992	O-ring35 × 3.55	2
16	GB 3452.1-1992	O-ring80 × 5.3	1
17		accessories and tools of diesel	1set
18		accessories of lifter assembly	set

8.4 Driver Tools

No.	Name	Specification	Quantity
1	grease gun		1
2	double-head spacer	8 × 10	1
3	double-head spacer	13 × 16	1
4	double-head spacer	18 × 21	1
5	double-head spacer	24 × 27	1
6	box wrench	S=27	1
7	hexagon ring spanner	S=6，S=8	1 for each
8	slip joint pliers	6″ ~8″	1
9	circlip clamp for holes		1
10	circlip clamp for shaft		1
11	corss-head screw er	250 × 8	1
12	engine oil gun		1