

# OPERATION MANUAL

FOR

SHANGHAI -50 TRACTOR  
SHANGHAI -504 TRACTOR



OPERATION MANUAL

FOR

SHANGHAI-50

SHANGHAI-504

TRACTOR

## FOREWORD

Model Shanghai-50 wheeled tractor is a medium-sized, agricultural tractor suitable for both dry and paddy field jobs. It features compactness of constructure, accessibility of controls, smooth steering and easy maintenance. This tractor can be used for ploughing, harrowing, sowing, harvesting, transportation and other farming operations when equipped with suitable implements or a trailer. It can also serve as a fixed power unit.

Model Shanghai-504 tractor, a new version based on Model Shanghai-50, is a four-wheel driven tractor suitable for the work heavily-loaded or in damp and heavy-soiled fields. In addition to the advantages of Shanghai-50 tractor, it is characterized by good sealing ability and reasonable weight distribution between the front axle and the rear one. As a result, in 1985, Shanghai-504 tractor won the first place in two items in tractor pull competition in the "Field Day" International Competition held in Orange, Australia, which was attended by China, the United States, Britain, Italy, Japan, etc.

The best use of the tractor and its service life depend very much on the proper operation, good maintenance and the selection of the implement to be used. Hence, it is most earnestly expected that our users would read attentively and follow this manual in the application and maintenance, for which this manual is composed by us. In order to improve the quality of our products, we are looking forward to the comments and advice on our tractor from our customers.

It should be noted that some description in this manual will differ from the tractor in view of improvements of the tractor.

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# Chapter I Specifications of Tractor

## I. General Specifications

### Chassis

Model	Shanghai-50	Shanghai-504
Type	Agricultural, medium-sized, wheeled tractor for both paddy and dry field jobs	
Power of P.T.O. shaft(kw)	33	40HP
Traction force (N) (with adhesion coefficient being 0.84 and slip 15%)	14700	17640
Traction power (kw)	27.5	29
Over dimensions (mm)		
Length	3100	3280 129" 10.76'
Width(with normal track)	1670	1820 71.7"
Height		
to top of steering wheel	1550	1600
to top of upright muffler	2320	2370
to top of cab	2330	2380 = 93.7"
Wheelbase (mm)	1900	1950
Track(mm)		
front wheel	1313(normal), 1413, 1513	1450
rear wheel	1346(normal),1392, 1498	1500
Ground clearance(mm)	400(to bottom of engine sump) 465(to bottom of front axle)	334(to bottom of front axle housing) 360(to bottom of transfer box)
Structural Weight(kg)	1860	2240 4928#
Min. operational weight(kg)	2020	2420 5324#
Weight distribution(kg)		
front wheels	780	1060 2332#
rear wheels	1240	1360 2992#

Designed speed (km/h)	At engine 2000rpm and rolling radius of rear wheels 0.59M	At engine 2000 rpm and rolling radius of rear wheels 0.64M
I	2.15	2.13 6.32
II	3.54	3.52 2.18
III	6.71	6.67 4.12
IV	8.58	8.54 5.29
V	14.13	14.09 3.7
VI	26.86	26.69 16.5
Rev.I	2.84	2.82
Rev.II	11.35	11.27
Turning radius(m)		
without brake	3.29	4.5 14.7 M
with brake	3.01	

### Engine

Model	495A. 495A-33	495A-18
Type	Four-stroke, vertical, water-cooling, spherical combustion chamber, left-set	
Bore stroke(mm)	95 × 115	
Rated power (kw)	36	
Rated speed (rpm)	2000	

### II Transmission

Clutch	Dry, single plate, constant-mesh, dual-action	
Gear Box	Planetary reduction compound type	
Rear central drive	Spiral bevel gear set	
Rear differential	Closed type	
Differential lock	Splined sleeve, manual controlled	
Rear final drive	External spur gear fixed inside the latter box	
Transfer box		Spur gear with "Engage-Disengage" system
Front central drive		Spiral bevel gear set
Front final drive		Straight bevel gear Dual-stage
Front differential		Closed-type

### III Steering and Brakes

Steering type	Mechanical type two drag-rods	Separated, power assistance type
Steering gear	Screw-and-nut recirculating-ball two drag-rods	Screw-and-nut recirculating-ball single drag-rod
Bore of steering cylinder(mm)		40
Stroke of steering cylinder (mm)		200
Steering trapeze		Rear positioned
Steering overflow pump		
Model		HLB-D8-312
Continuous outlet flow L/Min		12
Adjusting range of pressure relief valve(Pa)		$50 \times 10^5 - 65 \times 10^5$
Brakes	Disc, double-plate, dry type	
Braking mechanism	Mechanical type	

### IV Front Axle & Wheels

Front axle	Telescopic sleeves, balanced arm type	
		Driven by bevel gear, wholly-closed
Front wheels	6.00-16	8.3-20
Rear wheels	12.4/11-28 for dry field 11-28 for paddy field	11-32 or 13.6-28
Tyre pressure. (Pa)		
front wheels	$245 \times 10^3$	$147 \times 10^3$
rear wheels	$137 \times 10^3$	$137 \times 10^3$
Front wheel alignment		
toe-in(mm)	4-12	
camber	2°	
Steering knuckle main pin inclination	9°	7°
Caster	0°	
Swinging angle	14°	10°

### V. Working Equipment

Towing equipment		
Type	Fixed	
Hitch pin diameter(mm)	32	34
Height of hitching point from ground (mm)	500	550



Hydraulic linkage		
Hydraulic system type	Integral type(with draft & position control)	
Hydraulic pump type	Plunger type(4-plunger, double-row)	
Theoretic flow of pump(L)	19	
Bore of hydraulic cylinder	76	
Pressure relieve valve setting(Pa)	17160×10 <sup>3</sup>	
Rated lifting weight(KG)	850	
Hydraulic linkage type	Rear-mounted, three-point linkage, ball-hinged	
Hole size of upper hitching point (Diameter×width)(mm)	φ 22×51	φ 25.4×51
Hole size of lower hitching point (Diameter×width)(mm)	φ 28.5×38	φ 28.4×45
Implement hitching triangle (W×H)(mm)	720×510	720×560
P.T.O.shaft		
Type	Semi-independent	
Speed r/min	766 540/1000	540/1000
Rotation direction	Clockwise (looking from rear end)	

### VI Electrical Instruments & Installation

Diagram p.37

Electrical system	12V, Single-line, with negative-pole grounded
Battery	3-Q-150(6V)
Alternator	2JF-200 silicon rectified alternator
Regulator	FT 111
Starting motor	2Q2C
Headlights	ND 140×190T-1
Rear working light	T-134
Instrument lights	NZ2-1
Horn	DL 41Ds
Front small lights	J 107
Rear light Assy	J168
Turn signal indicating lights	XD1
Speedometer	301-SH×45
Ammeter	307C
Oil pressure gauge	308C
Water temperature gauge	WT-102C
Air pressure gauge for braking	YTQ-60

Fuses - p.37

### VII Accessories

Cab		
Type	Metal Structure, integral	
Overall dimensions(mm)		
length	1920	
width	1670	
height	1700	
Inside electrical installations		
ceiling fan	DYF-300	
ceiling light assy	67-1	
Braking equipment for trailer		
Type	pneumatic brake	
Capacity of air tank(L)	23	
Exhausting clearance of braking valve (mm)	1-1.5	
Operation pressure of braking valve (Pa)	$588 \times 10^3 - 637 \times 10^3$	
Pressure relief valve setting (Pa)	$785 \times 10^3 \pm 50 \times 10^3$	
Ballast (kg)		
front axle	80 (4 pieces)	
rear axle	360 (12 pieces)	
	420 Kg	

### VIII Capacities(L)

Fuel tank	62 - 16 gal $\pm$ 3.4	
Engine sump	10 10 qts $\pm$	
Gearbox/rear axle housing	34	35 L
Front axle housing		26 L
Oil tank of steering		2.5 L
Radiator	12.4 L - 3.3 Gallon	
Air filter	0.5 L	
Steering box	1 L	

## Chapter II <sup>Breaking</sup> Running-In

It is essential to run – in a new tractor or an overhauled tractor before putting it into service. If not, the tractor parts will be excessively worn, and even part sticking and damages will be caused, which will consequently shorten the service life of the tractor.

### 1. Preparations before Running – In

- 1) Check and tighten all exterior fastening bolts, screws and nuts.
- 2) Lubricate at all lubricating points referring to the lubricating chart.
- 3) Check the oil level in the engine sump, transmission/rear axle housing, front axle housing, oil container of power steering, steering box and air filter. Add up oil to the required level if insufficient.
- 4) Fill up the fuel tank and the radiator.
- 5) Check the pressure of the tyres.
- 6) Check the connections of the electrical circuit.
- 7) Make sure that all control levers be in the neutral positions.

### 2. Running – In Engine under No Load (for 30 minutes)

Start the engine as described in this manual. After starting, firstly run the engine at idle speed for 5 minutes and see if the engine works normally. And then speed up the engine to the rated speed and run it without load.

When running – in the engine under no load, pay frequent attention to the leakage of water, oil and gas, the readings of all meters and unusual sounds produced by the engine. Stop the engine immediately to eliminate the trouble if necessary.

### 3. Running – In the Hydraulic Lift System

Start the engine and put the hydraulic pump control lever to “engage” position. Make several up – down movements by operating the hydraulic lift control lever (inner lever) and inspect whether there is appearance of sticking and clashing in the hydraulic system. Then attach implement, whose weight must be less than 300 kg, to the hydraulic linkage. With the engine running at rated speed, make evenly up – down movement of the implement for at least 20 times by operating the inner lever.

### 4. Running – In the Tractor under No Load (for 2.5 hours)

Run – in the tractor under no load referring to the gears and time specified in the table underhere (when the tractor is in the fourth gear, set the control lever of the sliding gear of the transfer box in “engage” position).

Gear	II	III	IV	Rev.I
Running-in time (min.)	30	30	60	30



During the course of running – in the tractor under no load, maintain the engine speed at about 1500 rpm and simultaneously pay attention to the followings:

- 1) Whether the readings of all meters are normal.
- 2) Whether the clutch can get engaged smoothly or released thoroughly.
- 3) Whether it is easy to shift the gears of the gear box and the transfer box and whether the gear is getting out of mesh automatically in the gear box.
- 4) Whether the differential lock can get engaged or disengaged.
- 5) Whether the maneuvering and braking performance<sup>are</sup> of the tractor is good.

### 5. Running – In the Tractor under Load

When running in the tractor with load, increase the load gradually and speed up the tractor from low gear to high gear one by one. Run in the tractor with load referring to the gears, fuel throttle and time specified in the table underhere (when the tractor is in the fourth gear, set the control lever of the sliding gear of the transfer box in “engage” position).

Load	Fuel Throttle	Running-in Time (Hr.)			Total
		II	III	IV	
Equipped with a trailer loaded with 2T weight	3/4 open	2	3	3	8
Equipped with a trailer loaded with 4T weight	full open	4	5	6	15
Equipped with a plough (ploughing depth 16~18cm) (ploughing width 100cm)	full open	4	<del>5</del>	<del>6</del>	15

### 6. Maintenance after Running – In

- 1) Drain the oil from the engine sump when it is still hot. Clean the fuel filter, oil filter and air filter.

After completion of the cleaning, refill with fresh oil as specified. *10-30 Castrol (30W)*

- 2) Tighten the cylinder head nuts. Check and adjust the valve – to – rocker clearance.
- 3) Drain the lubricating oil from all transmission housings when it is still hot. Fill with an amount of light diesel fuel oil and run the tractor in the second – speed gear for 2 – 5 min<sup>utes</sup>. Drain the oil right after the tractor is stopped and refill with fresh lubricating oil as specified.
- 4) Drain the hydraulic oil from the oil container of power steering and steering cylinder when it is still hot. And then refill with fresh hydraulic.
- 5) Change the cooling water.
- 6) Lubricate at all lubricating points referring to the lubrication chart.
- 7) Check the toe – in of the front wheels and the free travel of the clutch pedal and brake pedals. Make adjustments if necessary.
- 8) Check and tighten all exterior fastening bolts, screws and nuts.

# Chapter III Operation of Tractor

## 1. Controls, Instruments and Switches

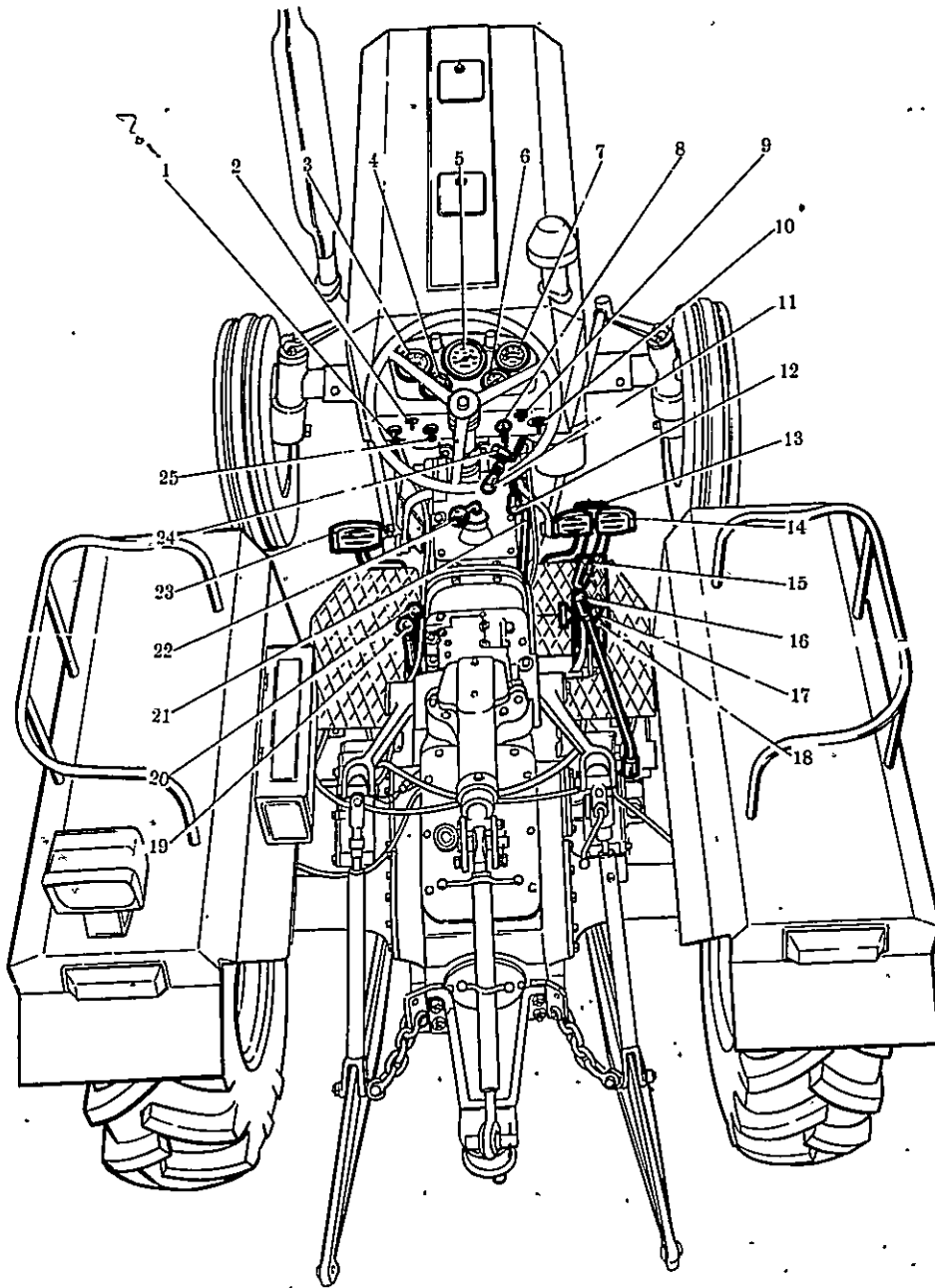


Fig 3-1 Controls, instruments and switches

1. dual-position switch; 2. turn signal light switch; 3. ammeter; 4. air pressure gauge; 5. <sup>Tachometer</sup> speedometer; 6. water temperature gauge; 7. oil pressure gauge; 8. lock switch; 9. horn button; 10. heater-starter switch; 11. engine stopping lever; 12. hand throttle lever; 13. interlocking plate of brake pedal L.H.; 14. L.H. & R. H. brake pedals; 15. position control lever of hydraulic lift (inner lever); 16. control lever of differential lock; 17. draft control lever of hydraulic lift (outer lever); 18. foot throttle pedal; 19. control lever of P. T. O. shaft; 20. hydraulic pump control lever; 21. parking latch; 22. shift lever of gear box; 23. clutch pedal; 24. decompressing lever; 25. dual-position switch.

## Starting the Engine

### 1) Work prior to starting

- a. Check the oil level in the engine sump and transmission/rear axle housing is between the upper marking line and lower one on the dip sticks (see Fig. 3-2, Fig. 3-3). Check that the oil in the front axle housing is at such a level that it just overflows when you slacken off the oil-inspecting plug of the housing. (see Fig. 3-4) Check the radiator is full of water and the fuel tank with sufficient fuel.

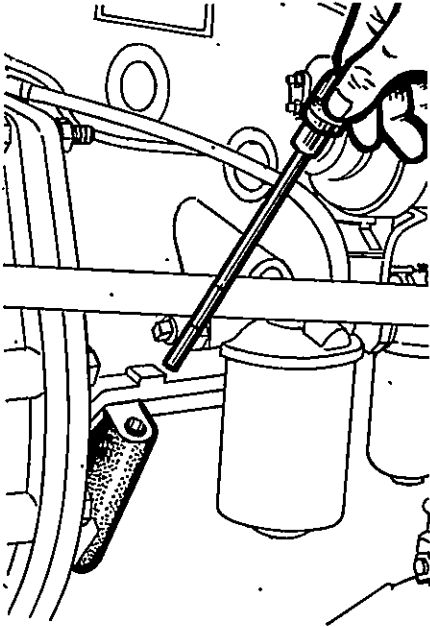


Fig. 3-2  
Checking the oil level  
in the engine sump

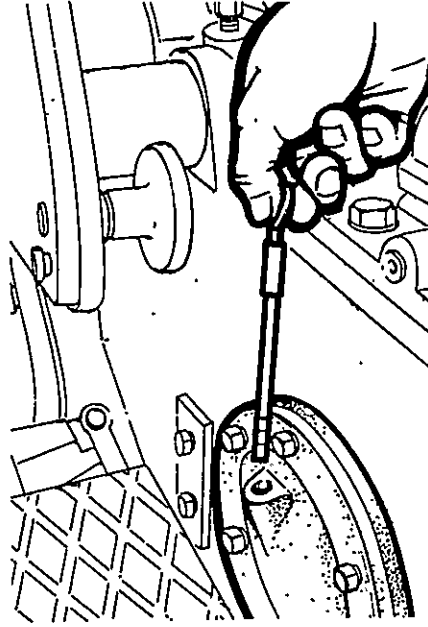


Fig 3-3  
Checking the oil level  
in transmission/rear axle housing

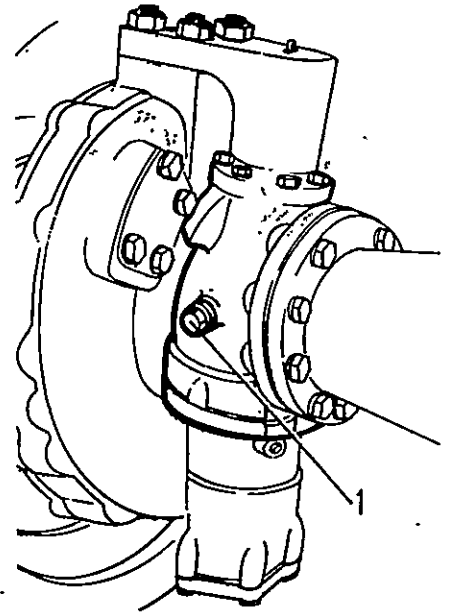


Fig 3-4  
Checking the oil level  
in the front axle housing

- b. Open the oil container of the power steering and check the oil level is 15~20 mm lower than the mouth of the container (with the power steering cylinder full of the oil). (see Fig. 3-5)

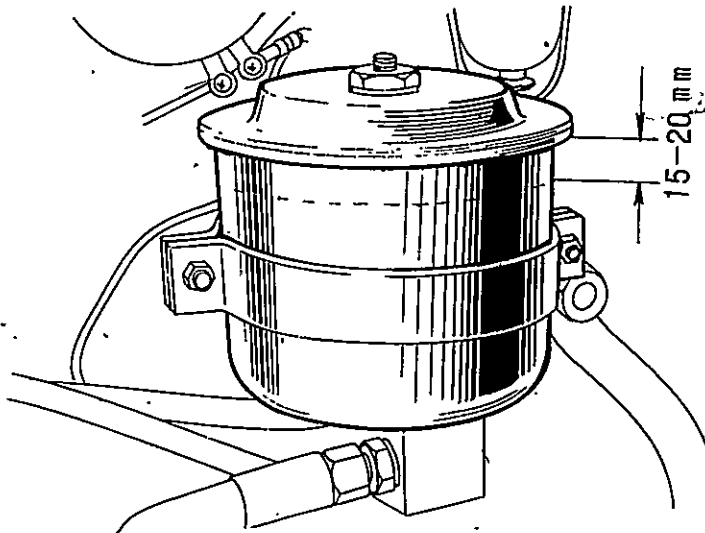


Fig. 3-5 Checking the oil level in the oil container of power steering.

- c. Open the cock of the sediment cup. (see Fig. 3-6)  
d. Set the engine stopping lever at the supply position. (see Fig. 3-7)  
e. Set the hand throttle half open. (see Fig. 3-8)  
f. Put the shift lever of transmission, the control lever 1 of the hydraulic pump, the control lever of the P. T. O. shaft 2 and the control lever of the sliding gear of the transfer box 3 at the neutral position. (see Fig. 3-9, Fig. 3-10)



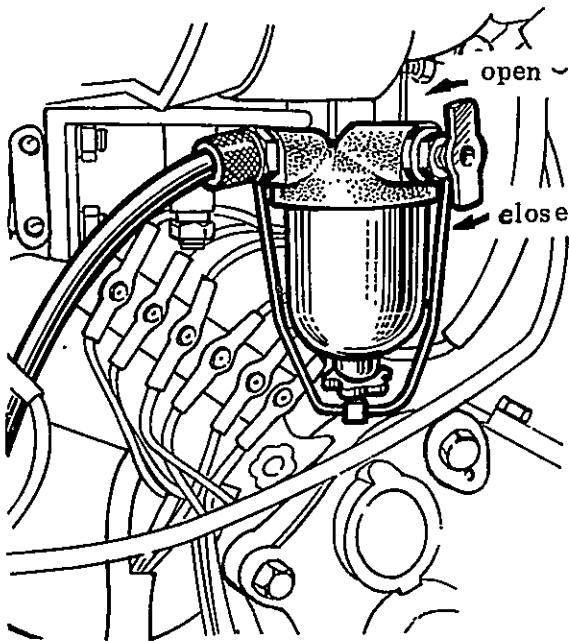


Fig. 3-6  
Direction of the cock  
of the sediment cup

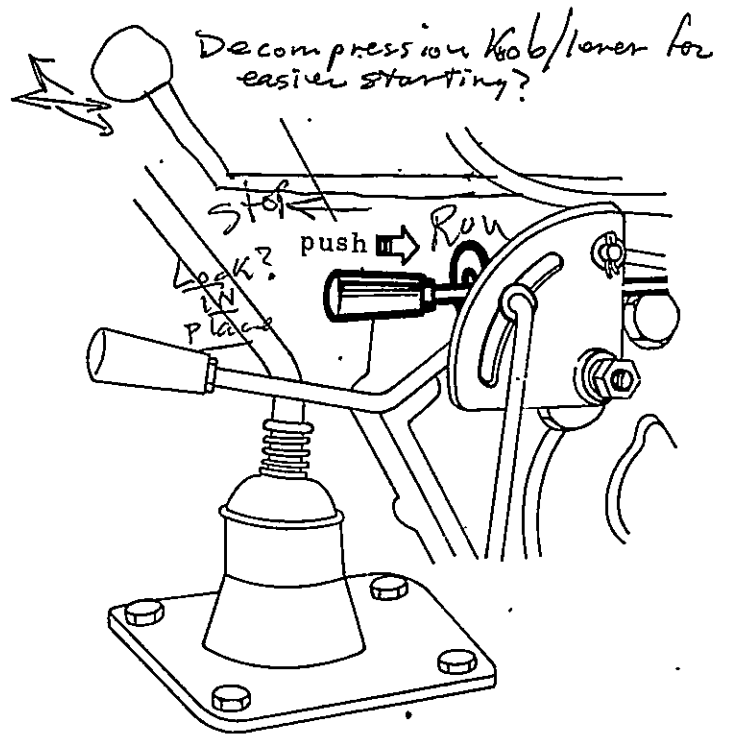


Fig. 3-7  
Position of the engine  
stopping lever

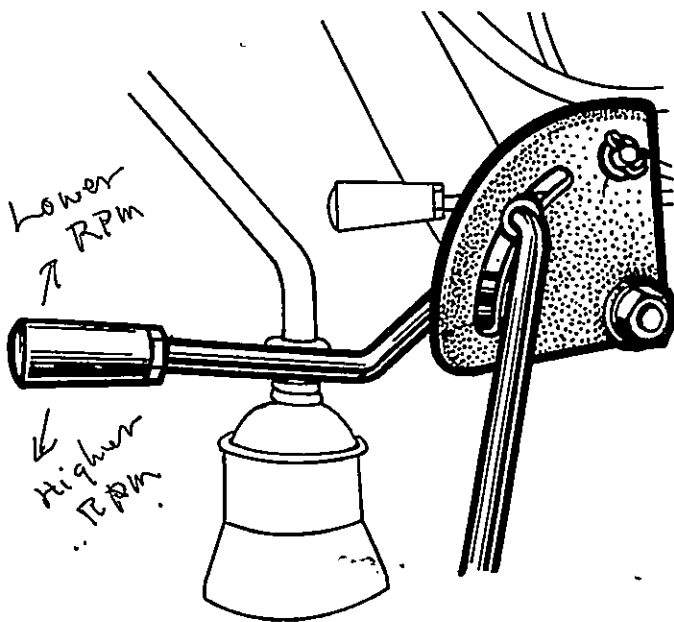


Fig. 3-8  
Control of the hand throttle

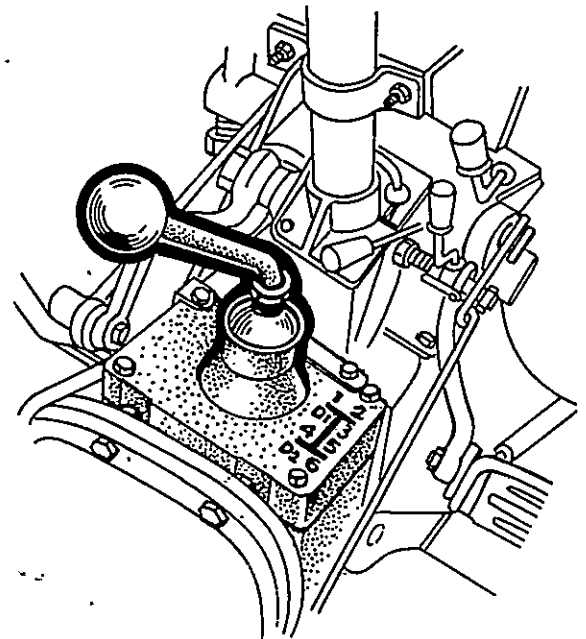


Fig. 3-9  
Position of the shift lever  
of the gear box

Fig. 3-10

Position of the levers:

1--control lever of the hydraulic pump

2--control lever of P. T. O. shaft

3--control lever of the sliding gear of the transfer box

4WD drive LEVER

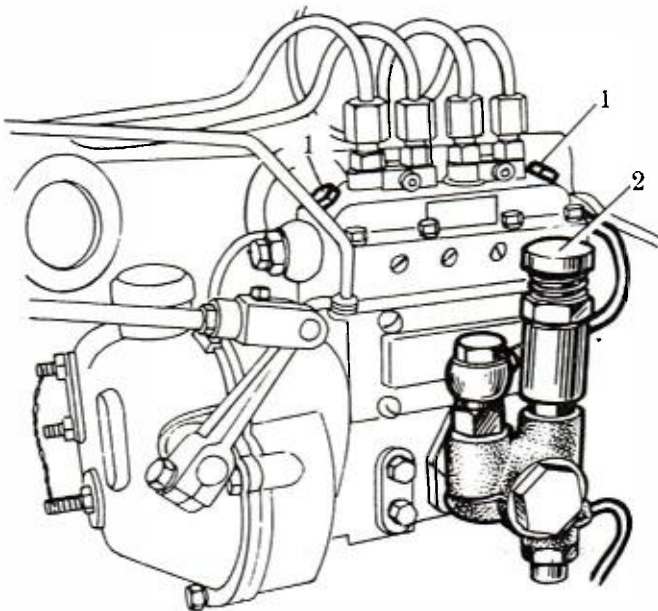
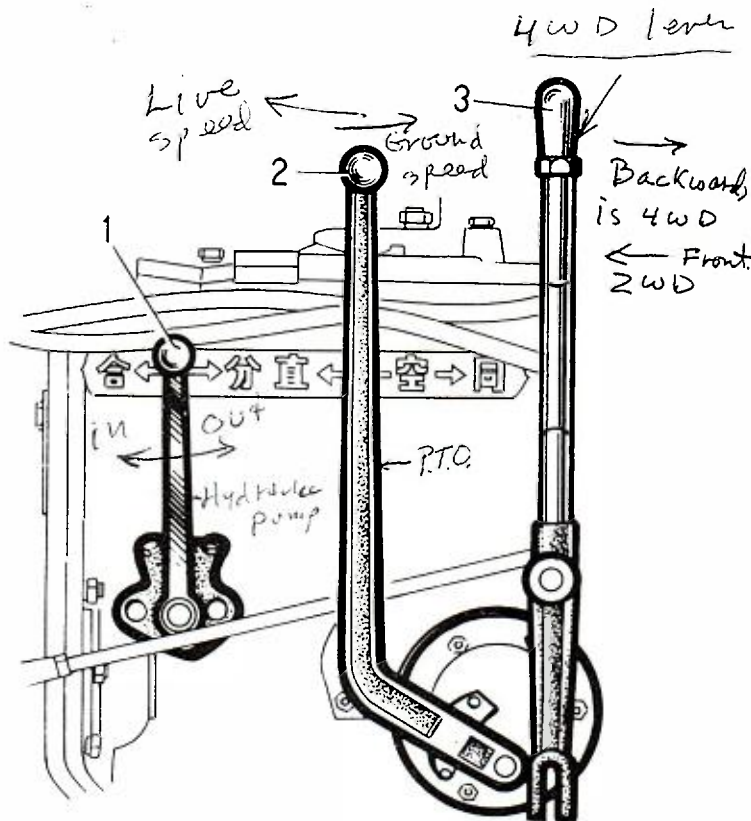


Fig. 3-11

High pressure pump

1--bleeding screw

2--lever of the hand-priming pump  
Push button

g. When the tractor has been in inaction for a long time or carrying out cold starting, bleed the air from the fuel feed circuit by slackening the bleeding screws in turn and actuating the lever of the hand-priming pump. Tighten all bleeding screws after the air in the circuit is bled out. (see Fig. 3-11)

2) Starting

a. Normal starting (at ambient temperature above 5 °C) 40 °F

Insert the key into the lock switch and turn it clockwise to close the electrical circuit. Turn the heater-starter switch 2 clockwise to "starter" position. Release the switch and let it back to "O" position as soon as the engine is started. (see Fig. 3-12)

b. Starting the engine in cold climates (at temperature below 5 °C) 40 °F

Turn the heater-starter switch 2 counter-clockwise to "heater" position and hold it for 30-40 seconds to pre-heat the engine, then turn it further to the stop of the switch. Release the switch and let it back to "O" as soon as the engine is started. (see Fig. 3-12)

3) Notes on the starting

- a. The continual starting time should not exceed 15 seconds. If the engine fails to start in the first attempt, it is necessary to make a pause of about 2 minutes before making another attempt. If the engine can not yet be started after three successive attempts, detect the cause before any further trying.
- b. After the engine fires, run the engine at about 800 rpm for several minutes. The tractor <sup>use</sup> starting is allowed only after the oil pressure gauge has a reading of  $294 \times 10^3 \sim 490 \times 10^3$  pa and the water warms up.
- c. In extremely cold winter season, to help the starting of the engine, heat the oil in the engine sump  $70 \sim 90$  °C and fill the radiator with hot water of  $80 \sim 90$  °C.

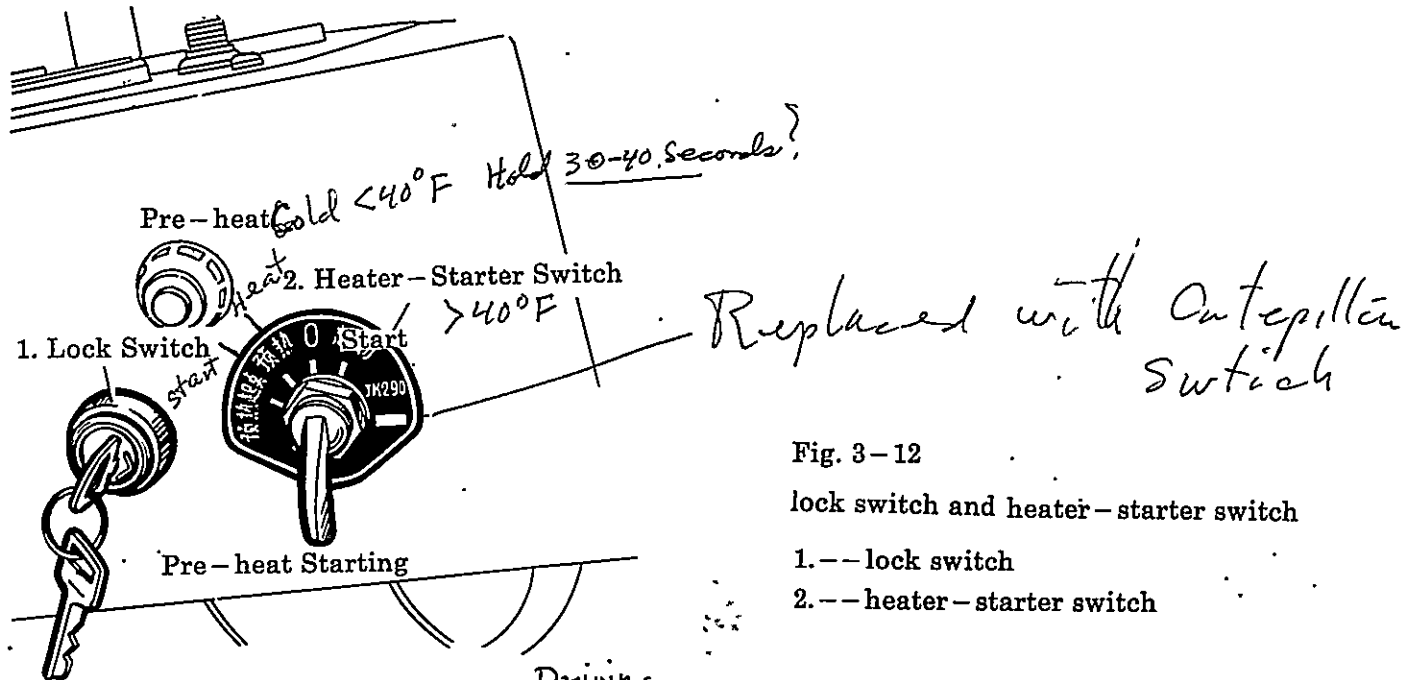


Fig. 3-12

lock switch and heater-starter switch

1.-- lock switch

2.-- heater-starter switch

Driving  
3. Starting the Tractor

- 1) With the engine running at a low speed, depress the clutch pedal (see Fig. 3-13) and then shift the gear shift lever smoothly to the desired gear. (see Fig. 3-9)
- 2) Actuate the horn and observe whether there is any obstacle around.
- 3) Speed up the engine gradually and release the clutch pedal slowly to <sup>ALLOW</sup> make the tractor start moving smoothly.
- 4) Gradually increase the engine speed to <sup>ALLOW</sup> make the tractor reach the required speed (see Fig. 3-14)

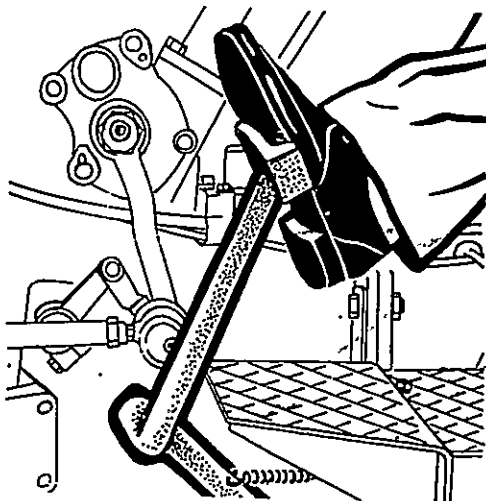


Fig. 3-13 Disengaging the main clutch

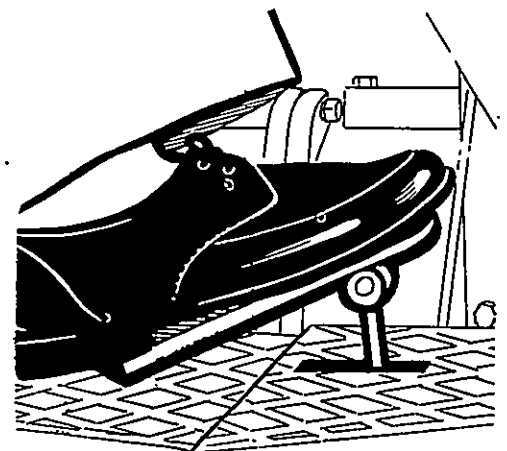


Fig. 3-14 Control of the foot throttle



#### 4. Steering of the Tractor

- 1) When the tractor is running on the road at a high speed, slow down the speed of the tractor before turning. If it is a gradual turn, turn the steering wheel early but slowly, turn less and then return less. If it is a sharp turn, turn the steering wheel late but quickly, turn more and then return more.
- 2) When the tractor turns sharply or turns in the soft field, the steering may be not so sensitive due to the sideway slipping of the front wheels. In this case, turn the steering wheel and meanwhile depress the correspondent brake pedal (when turning left, depress L. H. brake pedal and turning right, depress the R. H. brake pedal) to facilitate the steering. (Beforehand, separate the interlocking plate of the brake pedals.) (see Fig. 3-15)

#### 5. Shifting of the Tractor

Depress the clutch pedal to disengage the clutch before shifting gears (see Fig. 3-13). When the tractor stops, set the gear shift at the position of desired gear. The position of the shift lever are shown in Fig. 3-9.

*2nd Rpm*

*From page 2.*  
 1 - 1.3  
 2 - 2.2  
 3 - 4.1  
 4 - 5.3  
 5 - 8.7  
 6 - 14.5 mph?

1. 2. 3---low speed gears

4. 5. 6---high speed gears

B1, B2---low and high speed reverse gears

R<sub>1</sub>, R<sub>2</sub>

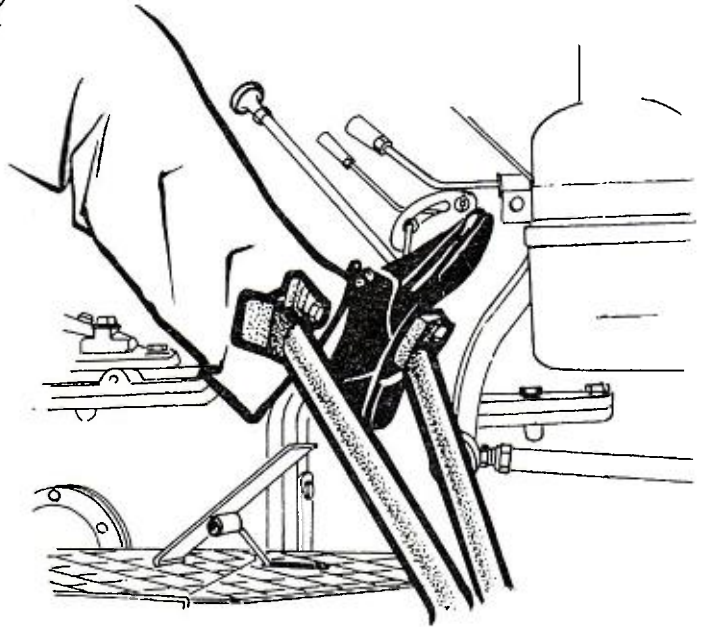


Fig. 3-15 Using single brake

#### 6. Braking of the Tractor

- 1) Prior to usual braking, throttle down the engine and depress the clutch pedal. Then gradually depress the brake pedals (see Fig. 3-16) to stop the tractor steadily.
- 2) When making an emergency stop, the clutch pedal and the brake pedals must be depressed at the same time. Never depress the brake pedals alone to avoid excessive wear of the brake and the choke <sup>to</sup> (kill) the engine.
- 3) Never apply single brake to have a sharp turn when the tractor is running at a high speed on the road.

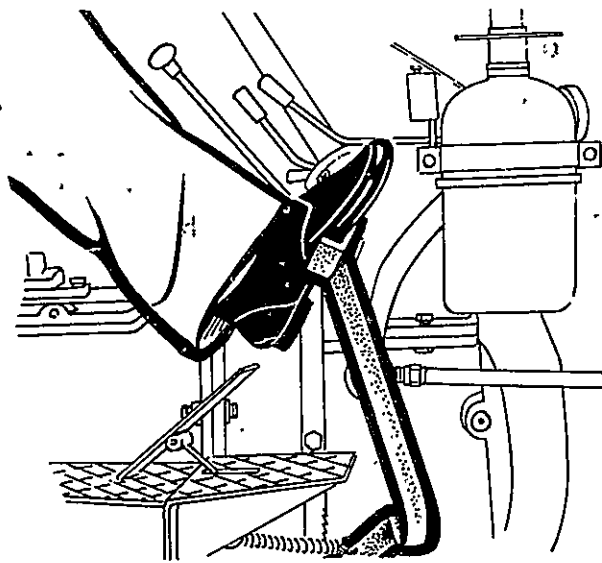
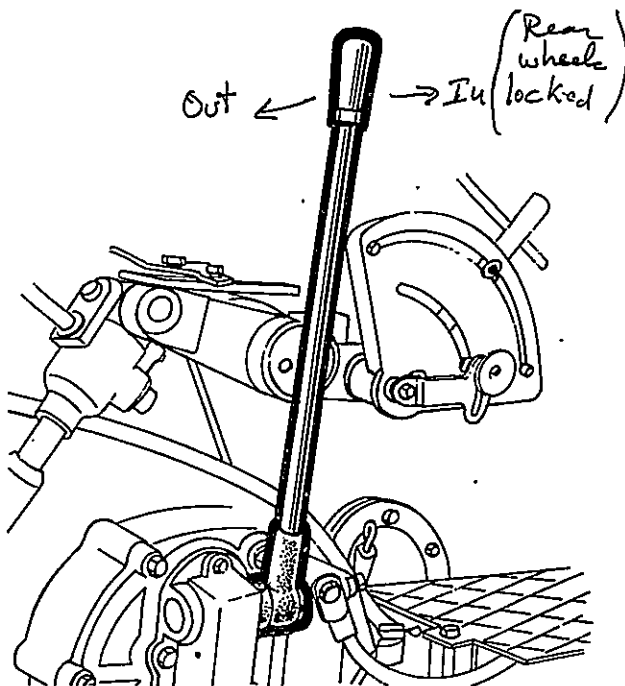


Fig. 3-16

Operation of the brakes

### 7. Stopping of the Tractor and Engine

- 1) Decrease the fuel throttle to slow down the tractor. (see Fig. 3-14)
- 2) Depress the clutch pedal and then depress the brake pedals as well. After the tractor stops, put the gear shift lever in the neutral position (see Fig. 3-9)
- 3) Release both clutch pedal and brake pedals. Slow down the engine and run it at idle speed.
- 4) Pull out the engine stopping lever so that the pump stops delivering the fuel and the engine stops. Then put the lever back at the position of delivering fuel. (see Fig. 3-7)



### 8. Operation of the Differential Lock

Push the differential lock control lever rightwards, The two differential side gears get rigid—locked so that both rear drive wheels rotate at the same time which can overcome the slipping of one of the rear wheels and helps the tractor drive out of the slippery spot. As soon as the tractor gets out of slippery spot, the differential lock control lever must be released. (see Fig. 3-17)

Never apply the differential lock when the tractor is turning or running at a high speed.

Fig. 3-17

Operation of the differential lock

### 9. Operation of the P. T. O. Shaft

- 1) Depress the clutch pedal to the end so that the P. T. O. clutch is disengaged (see Fig. 3-18) and the P. T. O. shaft stops rotation.
- 2) Set the hydraulic pump control lever at "Engage" position. Then put the P. T. O. control lever either forwards or backwards. With the control lever forwards, the engine power is directly transmitted to the P. T. O. shaft, called «Live Speed» (In this case, the speed of P. T. O. shaft is 766 rpm), and with the control lever backwards, the engine power is transmitted to the P. T. O. shaft by the synchro driving gear (as optional), called «Ground Speed» (In this case, the speed of the P. T. O. shaft varies with the tractor speed). (see Fig. 3-10)

*tractor stopped - no PTO turning?*

- 3) When replacing P. T. O. shaft of 1000 rpm with P. T. O. shaft of 540 rpm or vice versa, unscrew off the round nut 2. and locking nut 1. and then pull out the P. T. O. shaft to be replaced.

(see Fig. 3-19)

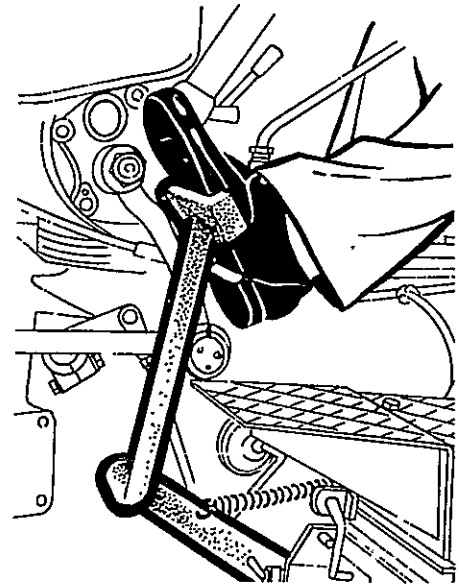


Fig. 3-18  
Disengaging the  
P. T. O. clutch

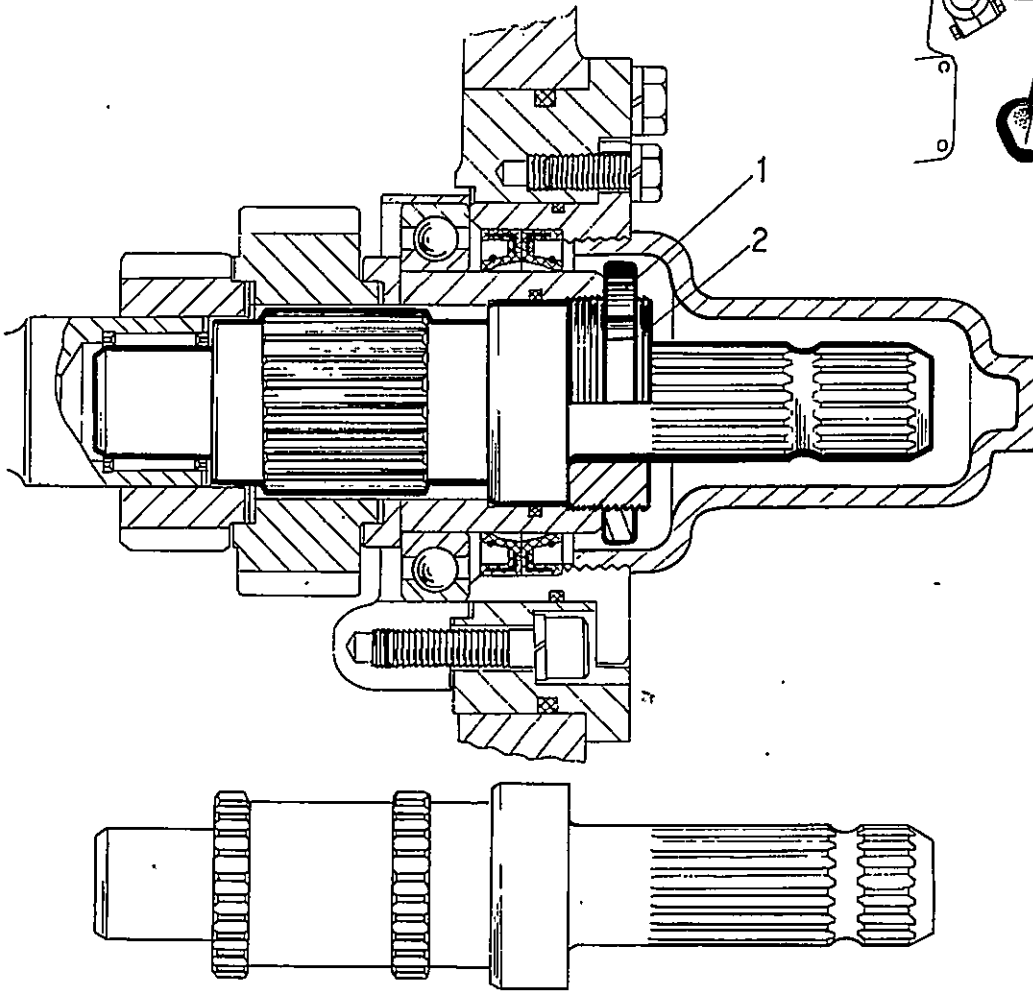


Fig. 3-19  
Replacing the P. T. O. shaft of 1000 rpm with  
the P. T. O. shaft of 540 rpm or vice versa

#### 10. Operation of the Control Lever of the Transfer Box Sliding Gear

Put the control lever of the sliding gear of the transfer box at the position "Engage". Thus, the power is transmitted to the front axle to drive the front wheels. When the lever is at the position "Disengage", no power is transmitted to the front axle. (see Fig. 3-10)

#### 11. Operation of the Control Lever of Hydraulic Pump

Depress the clutch pedal to the end so that the P. T. O. clutch is disengaged. Then set the control lever of the hydraulic pump in the front groove on the positioning plate so that the hydraulic pump is engaged. (see Fig. 3-10)



## 12. Operation of the Hydraulic lift

### 1) Lifting and lowering the implement

When position control lever 1 (inner lever) is shifted in the "Up-Down" range on the quadrant, the implement is respectively kept to different heights from the ground. (see Fig. 3-20)

### 2) Controlling the implement lowering speed

The lowering speed of the implement is higher when the inner lever is turned to the "Fast" position. To slow down the lowering speed, turn quickly the inner lever to the "Slow" position and then turn slowly the lever to the "Fast" position. (see Fig. 3-20)

### 3) Controlling the plowing depth

#### a. Position control:

With the position control lever 1(inner lever) at a position in the "Up-Down" range, the implement is kept at a working position with respect to the tractor. The working depth can be selected while the tractor working. After the required working depth of the implement is obtained, lock the inner lever by the locking knob 2 in order to get a constant working depth. (see Fig. 3-20)

#### b. Draft control:

With the position control lever (inner lever) placed at the "Slow" position, the draft control lever 1 (outer lever) is actuated by the hydraulic power to adjust the plowing depth. After the plowing depth adjusted, lock the outer lever by the locking knob 2. (see Fig. 3-21)

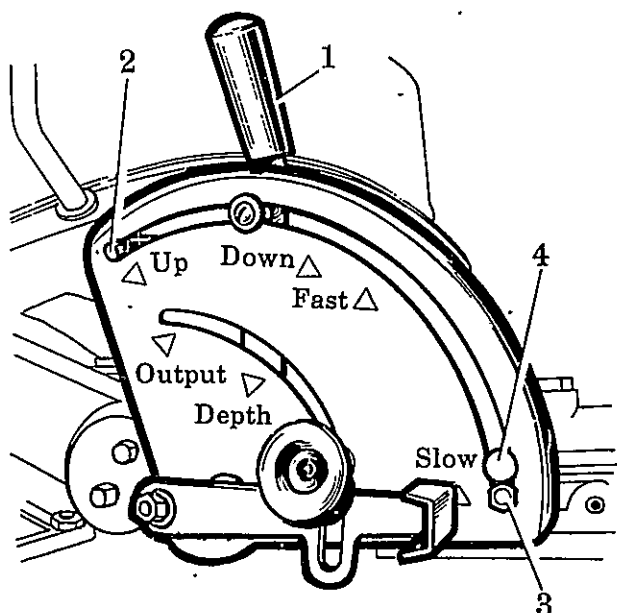


Fig. 3-20

Operation of the position control lever

- 1-- position control lever
- 2-- locking knob

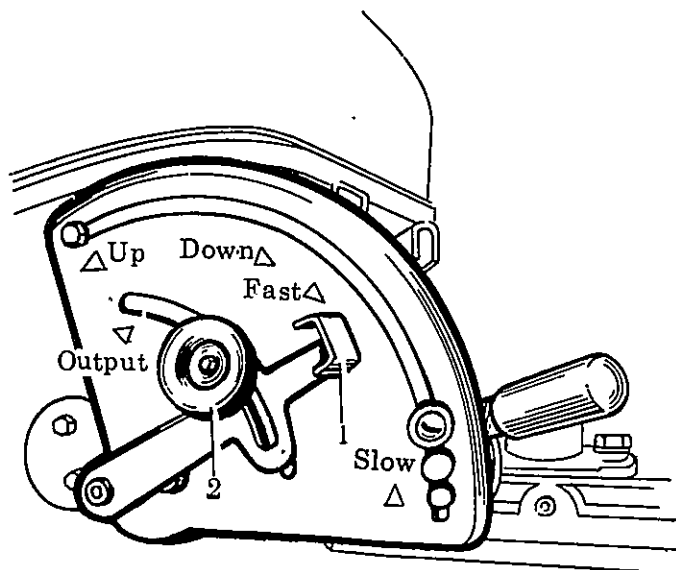


Fig. 3-21

Operation of the draft control lever

- 1-- draft control lever
- 2-- locking knob

### 4) Levelling of the implement.

The adjustments of the implement angle of incidence and the tilt are done by means of the adjusting lever of the top link 1 (see Fig. 3-22) and the adjusting lever of the R. H. lift rod 1 (see Fig. 3-23).

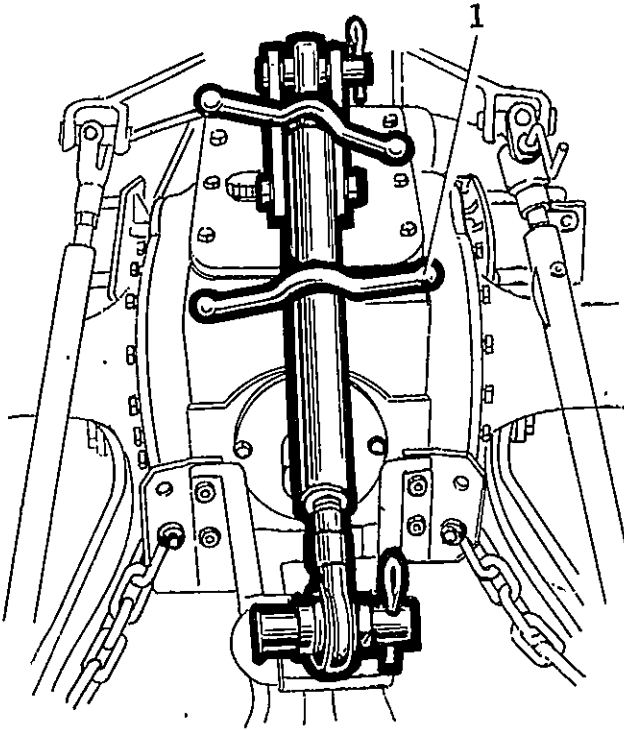


Fig. 3-22

Forward  
Back · Levelling the implement by the  
adjusting lever of the top link.  
1 -- adjusting lever of the top link

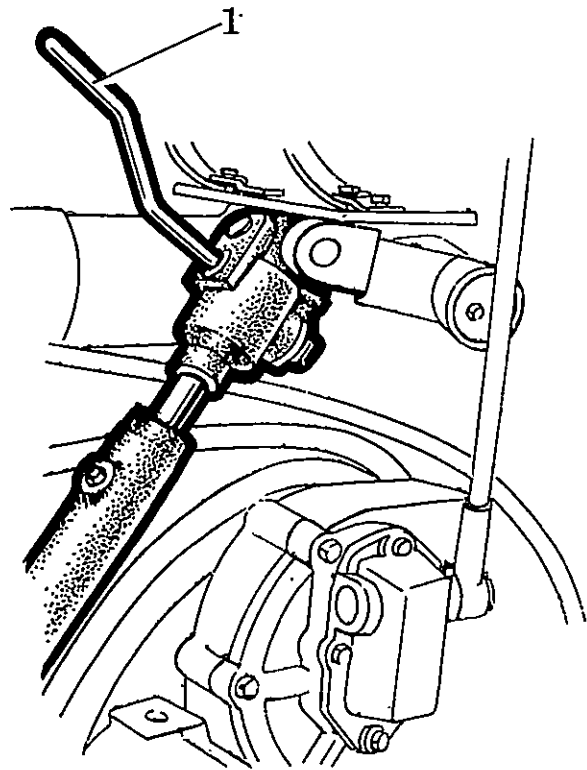


Fig. 3-23

Side Levelling the implement by the  
adjusting lever of the R. H. lift rod  
1 -- adjusting lever of the R. H. lift rod

## Chapter IV Adjustments and Maintenances

### 1. Clutch

#### 1. Adjustment of clutch and its operating system.

1) Adjusting the free travel of clutch pedal In the course of using, the wear of the friction disc facing and the pressing plates, the clearance between the throw-out bearing and the heads of the throw-out levers will decrease (the normal clearance is 2-2.5mm), even cause the contact with each other, because of which the slip of clutch will occur, so will the disappearance of the free travel of the pedal. Under such conditions, the controlling system must be checked and adjusted, whose methods are as follows.

Remove the pin 1, slacken the nut 3 and turn the connecting fork 2 counterclockwise until the pedal free travel of 25-35mm is obtained (the corresponding distance between the throw-out bearing and the heads of the three throw-out levers should be 2-2.5mm).

And then tighten the locknut. (Fig. 4-1)

2). Adjusting the throw-out levers in case the above stated 25-35mm free travel can not be obtained, which tells you that the throw-out bearing has touched the flange of the first bearing, separate the engine from the transmission housing. Slacken the nut and turn the adjusting screws of the throw-out lever counterclockwise with a screw-driver until the distance of 158.5mm from the heads of the throw-out levers to the rear surface of the engine block is got. At adjustment, make sure that the three heads of the throw-out levers should maintain an equal distance to the rear surface of the cylinder block, the max. permissible deviation being 0.15mm. After adjustment, tighten the locknut, and install the engine to the transmission housing. Then check whether the free travel of the clutch pedal is in the range of 25-35mm. (see Fig. 4-2)

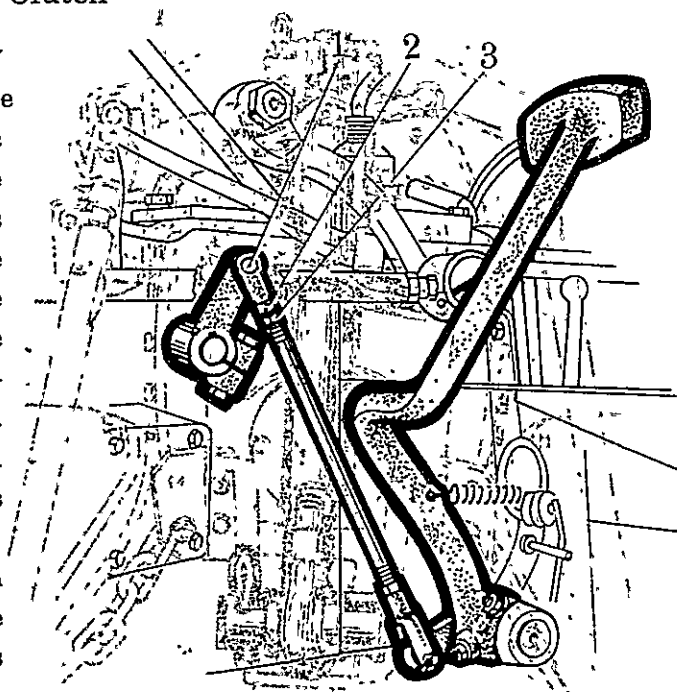
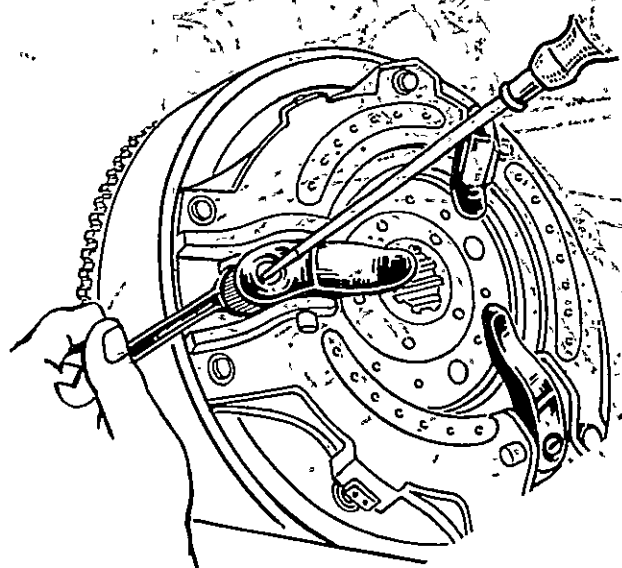
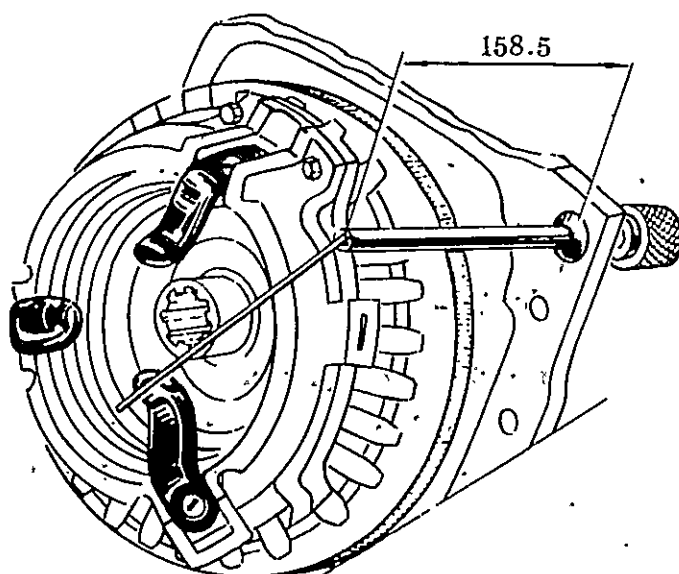


Fig. 4-1 Adjustment of free travel

1.pin 2.connecting fork 3.nut



a. Adjusting the throw-out levers



b. checking the throw-out levers

Fig. 4-2 Adjustment of the clutch throw-out levers

### 3). Adjusting the disengagement travel of P. T. O. clutch

In order to prevent too early disengagement or engagement of the P. T. O. clutch, there should be a proper pedal travel from the disengagement of the main clutch till the beginning of P.T.O. clutch disengagement. For the purpose of getting this proper travel, it should be ensured that the clearance between the caps of the three adjustment screws and the three ears of the pressure plate of the sub-friction disc is 1.8mm. To adjust, slacken the locknuts 4 and turn the adjusting screws 2 until the clearance 3 of 1.8mm between the caps of the three adjusting screws and the three ears of the subpressure plate is obtained with a feeler 3. After the adjustment, tighten the locknuts 4. (Fig. 4-3)

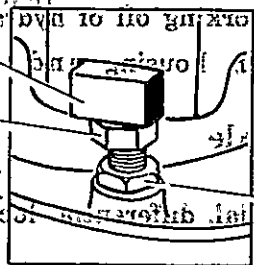
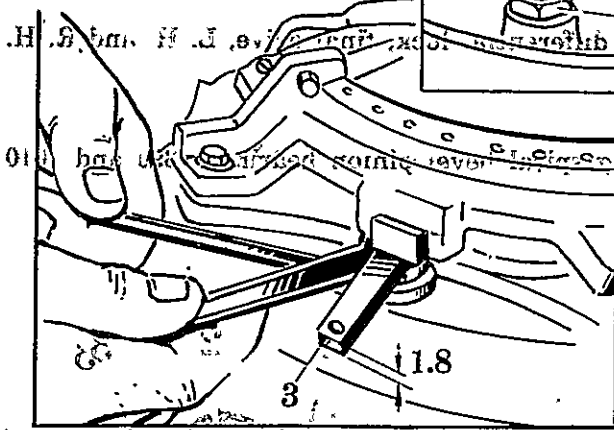
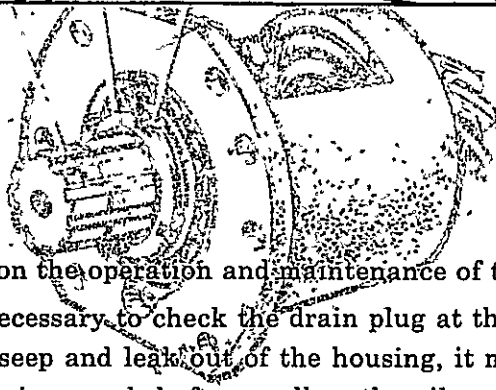


Fig. 4-3

Adjusting the clearance between



1. Pressure plate of the sub-friction disc
2. Adjusting screw
3. Feeler
4. Nut



Adjustment of the clearance between

the driving spiral bevel pinion bearings

### 2. Notes on the operation and maintenance of the clutch

1). It is necessary to check the drain plug at the bottom of the transmission housing. If there any oil is found to seep and leak out of the housing, it must be done timely to have a check at the rear oil seal on the engine crankshaft as well as the oil seals on the transmission drive gear shaft and the P. T. O. clutch shaft.

2). It is not necessary to lubricate the throw-out bearing 986713 in the course of using. If the throw-out bearing is lack of grease clean the bearing first and then add the clean grease/into the bearing with special equipment.

3). As assembling the clutch, in order to make sure that the spline bores of the main and P. T. O. clutches are concentric with the bore of the bearing installed on the flywheel, the clutch should first be fitted on a specialized mandrel, then insert it into the flywheel bearing boue. In this way the engine can be conveniently connected to the transmission housing.

4). At the juncture of the flywheel, the intermediate plate of sub-friction disc and the clutch cover are separately inserted sets of sector-shaped shims which, if necessary, can be adequately removed in number during overhauls for the purpose of maintaining sufficient of the diaphragm springs.

## 2. Gear Box

The gear box is composed of a conventional three-shaft gear box, which offers three forward and one reverse speeds, and a planetary gear reduction unit, which doubles the speed range bringing it up to six forward and two reverse speeds. All gears are controlled by one shift lever. During the use adjustments are usually not required. However, the following notes should be taken.

1. Before shifting each time, in order to prevent gears from shock with each other, the clutch pedal should be depressed to disengage the clutch;
2. At shifting, the shift lever can't be shifted too roughly in order not to break the shift bar travel retaining plate, for this would cause disorderly gear shifting;
3. This transmission housing is open to the rear axle housing so that their lubricating oil can flow into each other and it is also used as the working oil of hydraulic system. To drain oil, screw off the oil drain plug of the transmission housing and the rear axle housing.

## 3. Rear Axle

The rear axle is composed of central drive, differential, differential lock, final drive, L. H. and R. H. rear axle shafts, P. T. O. shaft and control system etc.

### 1. Adjustment of the central drive

- 1). The adjustment of the clearance between the driving spiral bevel pinion bearings 7390 and 7610 (Fig.4-4)

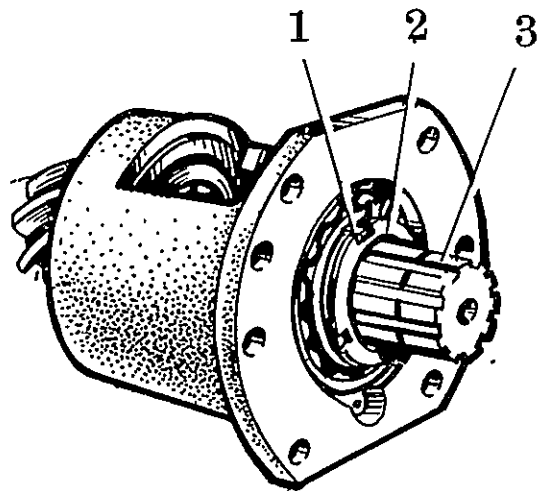


Fig. 4-4

Adjustment of the clearance between the driving spiral bevel pinion bearings

1. lock washer
2. round nut
3. driving spiral bevel pinion

When the bearings 7309 and 7610 have end play, unlock the lock washer 1 and tighten the round nut 2 until the driving spiral bevel pinion 3 gets a resistance torque of 1.57-2.35N. m. Then relock the nut by means of the lock washer.

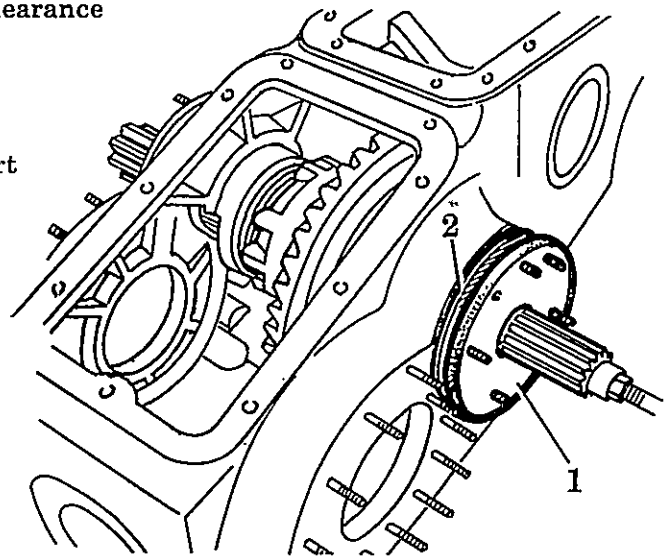
### 2). Adjustment of the clearance of the differential assy bearing 7215

When the bearing 7215 has end play, it is necessary to take away the shim stacks 2 of equal thickness at the juncture of both L. H. and R. H. bearing housing brackets 1, then tighten the bolt to fix the brackets. Adjust it until the driven spiral bevel gear can be turned with slight force (with the driving spiral bevel pinion and the final reduction gears of both sides removed.) (Fig. 4-5)



Fig. 4-5 Adjustment of differential bearing clearance

1. short semi-shaft support
2. washer



### 3). Measuring the backlash

The normal backlash of the spiral bevel gears is 0.20-0.35mm. It can be measured in two ways. The first method is to set the touching point of a dial gauge on the big tip of the tooth surface of the driving spiral bevel pinion and the convex tooth surface of the driven spiral bevel gear and then sway the gear (with the driving spiral bevel pinion not rotating). In this way the value of the clearance can be directly obtained from the dial gauge. The other method is to use lead sheets, that is, to insert a piece of 0.5-1mm thick lead sheet between meshing surfaces of the spiral bevel gears (that is between the concave tooth surface of the driven spiral bevel gear), then turn the gears in the direction same as the tractor moving forward. The thickness of the extruded part of the lead sheets between the teeth surface shows the actual backlash. It can be got by measuring the extruded lead sheet with a caliper. In both methods the measuring points must be not less than three points and they should be uniformly distributed on the circumference of the gear.

### 4). Checking the meshing impression of the spiral bevel gears

Thinly and evenly coat the tooth surface of the driven spiral bevel gear with red lead oil, then turn the spiral bevel gear set several turns. The impression of the red lead oil sticking on the tooth surface of the driving spiral bevel pinion is just the meshing impression. When forward, the driving spiral bevel gears convex surface is under the force, so the red lead oil should be coated on the concave surface of the driven spiral bevel. When backward, the driving spiral bevel gears concave surface is under the force, so the red lead oil should be coated on the convex surface of the driven spiral bevel gear. The length of the normal impression should be not less than 50% of the tooth length, and the height not less than 40% of the tooth height. It should be found on the middle part of the tooth surface, slightly leaning to the small tip, but not less than 5mm from the tip.

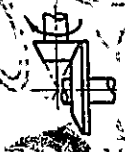

### 5). Adjusting the backlash and the impression

Adjusting the backlash and the impression is carried by increasing or decreasing the thickness of the adjustment shim stack at the juncture of the bearing housing bracket of the driving spiral bevel pinion and the adjustment shim stacks at the juncture of the gearing housing brackets of different thickness made in our factory, being 0.1, 0.3 and 0.5mm. Carry out the adjusting procedures referring to Chart 4-1.




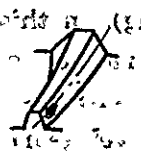
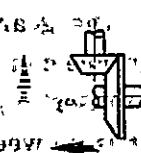


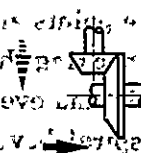
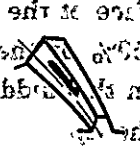

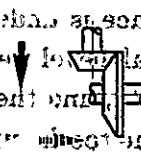
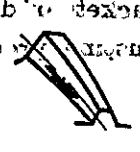
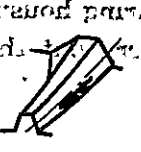
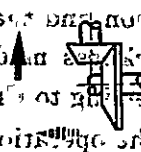
## 2. The operation and maintenance of the rear axle

1). Through the opening on the sloping wall of the rear axle housing, the lubricating oil splashed up by the driven spiral bevel gear flows into the oil bowl 1 on the bearing housing bracket of the driving spiral bevel pinion, then, through the small hole on the oil bowl, flows into the bearing 7309 for lubrication. So the small hole must be always kept open. (Fig. 4-6)

Chart 4-1 Adjustment of the backlash and the impression of the spiral bevel gear set

 <p>Forward</p>	 <p>Reverse</p>	<p>Checked impression</p>	<p>Adjustment</p>
--	--	---------------------------	-------------------

Impression of the driving spiral bevel pinion

<p>1</p>	<p>Not less than 5</p> 		<p>Normal</p>	<p>Its length is not less than 50% of the tooth length. Its height is not less than 40% of the tooth height. It is found in the middle part and slightly leaning to the small tip of the tooth surface, but not less than 5 mm from it.</p>
<p>2</p>			<p>Leaning to the big tip</p>	<p>Displace the driven spiral bevel gear close to the driving spiral bevel pinion. If the backlash becomes excessively small, displace the driving spiral bevel pinion outwards.</p> 
<p>3</p>			<p>Leaning to the small tip</p>	<p>Displace the driven spiral bevel gear away from the driving spiral bevel pinion. If the backlash becomes excessively big, displace the driving spiral bevel pinion inward.</p> 
<p>4</p>			<p>Leaning to the tooth top</p>	<p>Displace the driving spiral bevel pinion close to the driven spiral bevel gear. If the backlash becomes excessively small, displace the driven spiral bevel gear rightwards.</p> 
<p>5</p>			<p>Leaning to the tooth root</p>	<p>Displace the driving spiral bevel pinion away from the driven spiral bevel gear. If the backlash becomes excessively big, displace the driven spiral bevel gear leftwards.</p> 

- 2). The central drive gears should be exchanged in set when either of the central drive gears is damaged.
- 3). When the differential lock is used, the tractor must move straightly and the turning tractor is not permitted, otherwise, the tractor parts may be damaged.
- 4). In the case of tractor reversing, the P.T. O. control lever must be set at neutral position, otherwise, the implements may be damaged, even accident may take place.
- 5). Add the lubricating oil according to the seasons and the table of lubrication (Fig. 4-7)

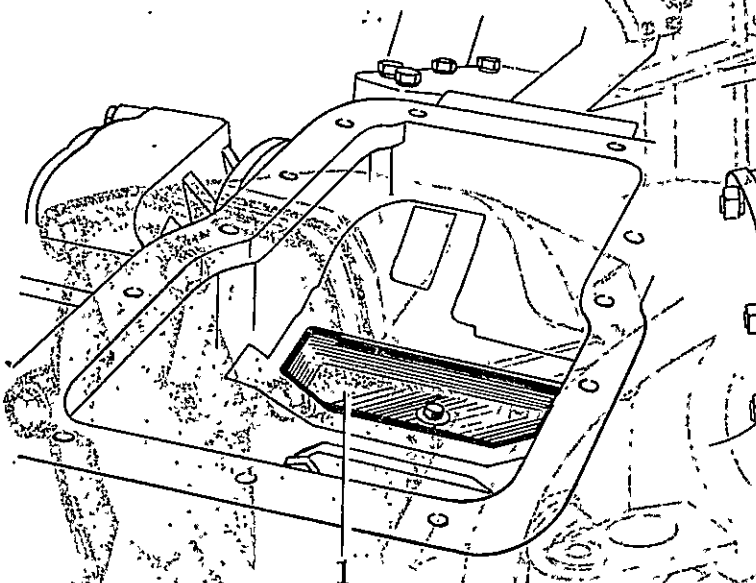


Fig. 4-6. Driving spiral bevel pinion bearing oil bowl

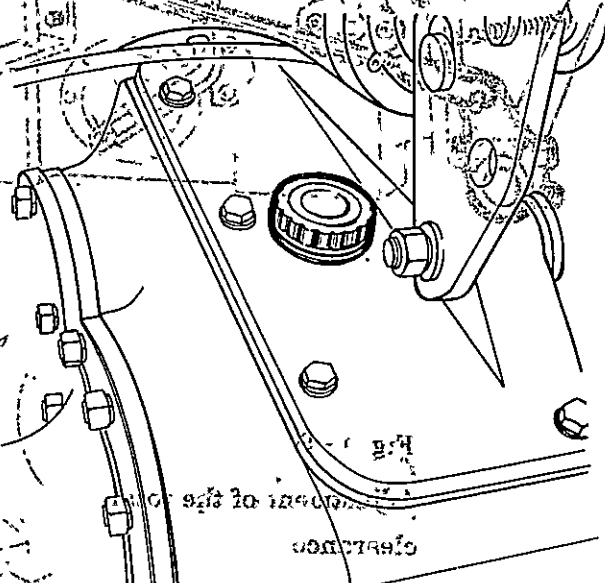


Fig. 4-7. Rear axle oil plug

#### 4. Power Transfer Box (PTB as referred below)

PTB is composed of both driving and sliding gears, power shaft as well as operating mechanism etc. When in use, adjustments are generally not necessary. However the following attention should be paid throughout its employment and maintenance:

1. The sliding gear shifting lever of the PTB should be always left at "off" position unless when the tractor is at work in the fields, with lever at "on" position.
2. The sliding gear shifting lever is not to be manoeuvred unless the main clutch is disengaged or the gear box is at neutral position.
3. The PTB and the rear axle share the same lubricating oil. Slacken the PTB's draining plug when the oil is to be discharged.

#### 5. Brake

There are two disc brakes on the tractor. They are symmetrically fixed at both sides of the rear axle housing and linked with the brake control mechanism.

##### 1. Adjustment of the brake and the operating mechanism

##### 1) Adjustment of the free travel of the brake pedals

The total clearance between the two friction disc assies and two brake pressure plates in the case of not braking is about 1-1.2mm and the corresponding free travel of the brake pedal is 90-120mm. When the friction discs are worn and the free travel too big, adjustment of the free travel should be carried out because of its poor brake. The adjustment is as follows: slacken the locking nut 1 on the linking rod, turn the nut clockwise, the free travel is then decreasing; if counterclockwise, it would increase. The left and right brake pedals should be adjusted to have the same free travels. After the adjustment, lock the nut again. (Fig. 4-8)

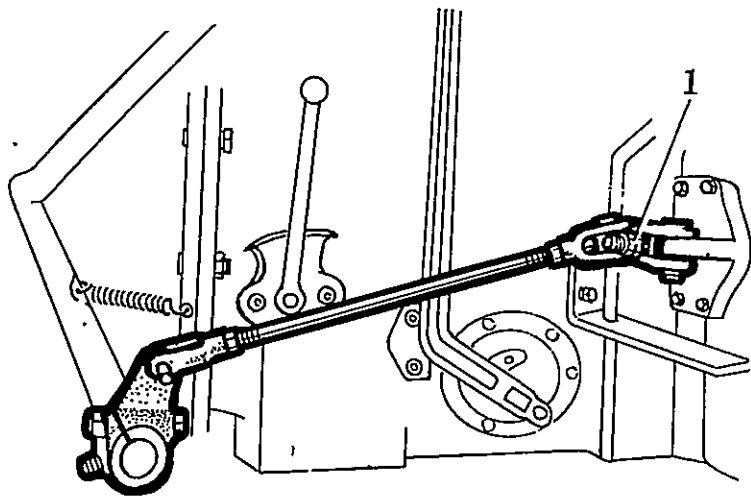


Fig. 4-8

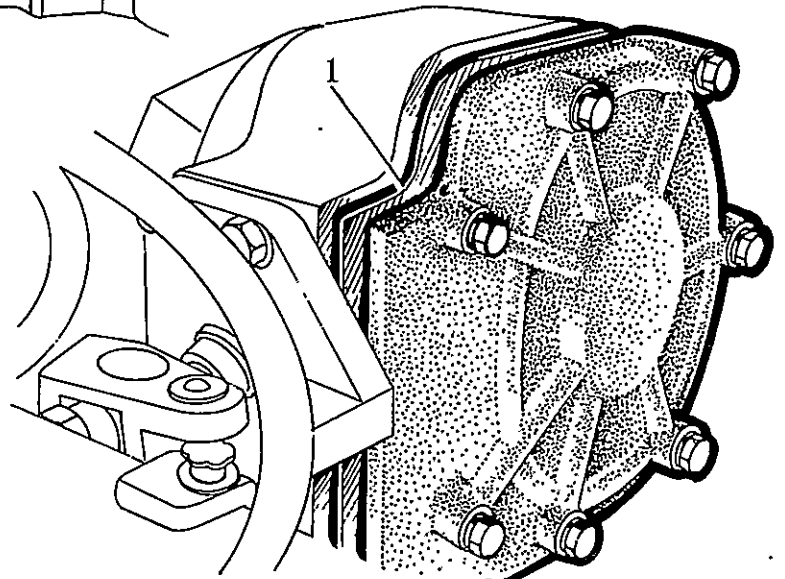
Pedal free travel adjustment

1. Locknut

Fig. 4-9

Adjustment of the total clearance

1. Adjustment of stacks



## 2). Adjustment of the total clearance.

When the difference between the total clearance in the left brake and that in the right one is too big, the above described adjustment may be not able to meet the adjustment requirement. In this case, first adjust the total clearance in each brake by means of increasing or decreasing the thickness of the gaskets 1, then carry out the above described adjustment. (Fig. 4-9)

## 2. The use and maintenance of the brake.

- 1). When oil or dirt existing is found on the surface of the friction disc, clean it with gasoline and let it dry before refitting. Otherwise, this may result in decreasing of the friction coefficient and ineffective braking or the friction disc being burned due to overheat.
- 2). Check often the working condition of the oil seals which are respectively mounted in the brake housing and brake cover plate. Renew them if necessary.
- 3). Never use single brake when tractor running on road. It is necessary to interlock the left and right brake pedals with the interlocking plate.

## 6. Steering apparatus and hydraulic actuator

Shanghai-50 model tractors have their steering apparatus mounted on the same level of the gear box with both left and right swinging arms linked through the longitudinal drawing rods to the front axle's steering knuckle arms.

Shanghai-504 model tractors, however, adopt the disintegrated hydraulic power assistant steering system which consists of a steering apparatus, an hydraulic actuator, an oil tank, transversal drawing rods, oil pumps and pipes.

Besides the longitudinal double drawing rods have been replaced by the single-rod type. The hydraulic actuator is mounted to the left of the driver.

## 1. Adjustment of the steering.

### 1). Adjustment of the free travel of the steering wheel

The free travel of the steering wheel is adjusted to be about  $15^\circ$  in the factory. During the using course, however, the wear of the steel balls and the upper and lower seats and other relative parts will result in increasing clearance between the steel balls and their seats so that the free travel of the steering wheel will increase. This time, adjustment therefore must be carried out. Unlock the lock washer 1 and slacken the nut 3, then turn the steel ball upper seat 2 with a spanner until the clearance there clears up. Then, tighten the nut and lock the lock washer. (Fig.4 - 10)

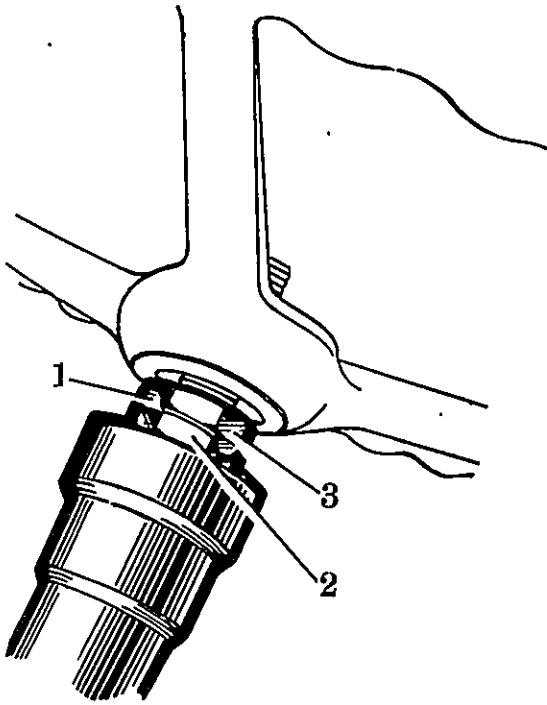


Fig.4-10

Free travel steering wheel adjustment

1. Lock washer
2. Steel ball upper seat
3. Nut

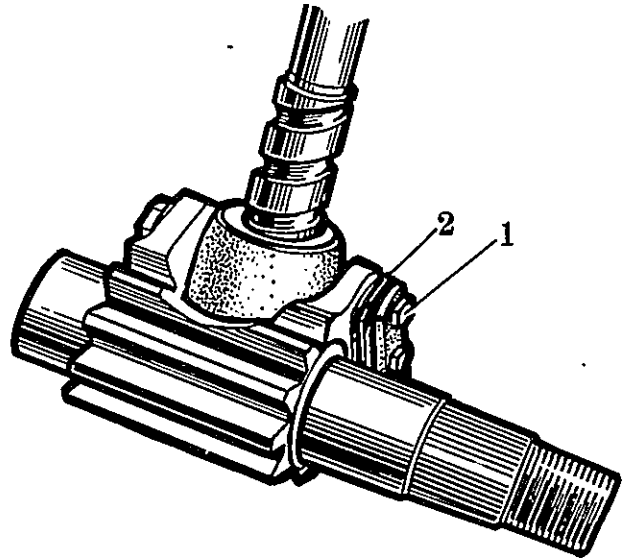


Fig.4-11

Adjustment if clearance between the peg and the steering nut.

1. Screws
2. Shims

### 2). Adjustment of the clearance between the peg and the steering nut

During the using course, the increasing clearance between the peg head and the nut will result from the wear, which will cause the looseness of the steering wheel and the damages to the steering parts. In this case, adjust the clearance by decreasing the thickness of the shims at the juncture of the peg and the primary rocker shaft. Proceed as follows: slacken the screws 1 securing the peg. By withdrawing the shims 2, adjust the fitting condition of the peg and the steering nut until there is no clearance but the nut can be turned with a slight torque force. (Fig.4 - 11)

## 2. Operation and Maintenance of the steering apparatus and the hydraulic actuator

- 1). Check the oil level of both hydraulic actuator and oil tank according to this manual's instruction. Always keep it sufficient.
- 2). The oil pipes connecting the oil pump, tank and hydraulic actuator at their inlets and outlets must be well fastened to prevent oil leakage. When there is leakage, check as early as possible the washer-type ring which, if is damaged, should be replaced at once.



- 3). Constantly check the piston rod of steering cylinder to see if there is any leakage. If so, examine the oil ring which, if is out of efficacy, should be substituted immediately.
- 4). To avoid the acting ball end 2 from striking the lower bracket 1 of the dynamo as the front axle swings, at the mounting of the steering apparatus assy, make sure that the acting ball end 2 incline outward, never inward. (Fig.4-12)

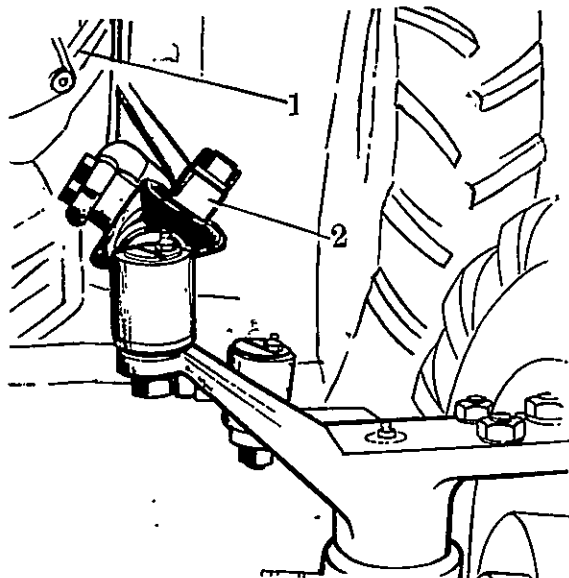


Fig.4-12  
Acting ball end

### 7. Front Shaft

The front shaft, used for mounting the front wheels, is also the front support of tractor. It bears through the front wheels the weight of the front part of tractor.

#### 1. Adjusting the front wheel toe-in

To reduce wear of the front tires, the regular examination and adjustment of the front wheel toe-in are necessary. The methods are as follows: locate the tractor on level ground and set the front wheels at straight forward position (by turning the steering wheel from the left stop to the right stop and then backing it half of the turns, that is, the middle position of the steering wheel) and respectively adjust the lengths of the L.H. and R.H. steering drag links until the value BA is within the range of 4-12mm. (This time the extended length of one drag link is certainly equal to the shortened length of the other).(Fig.4-13)

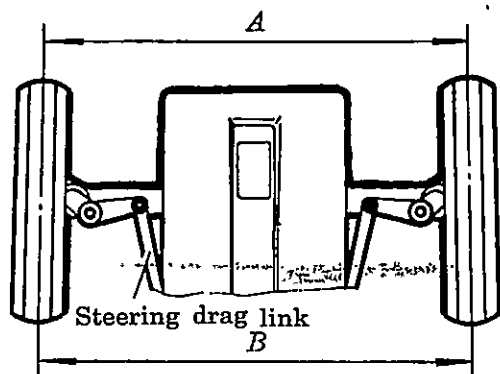


Fig.4-13  
Illustration of the front toe-in.

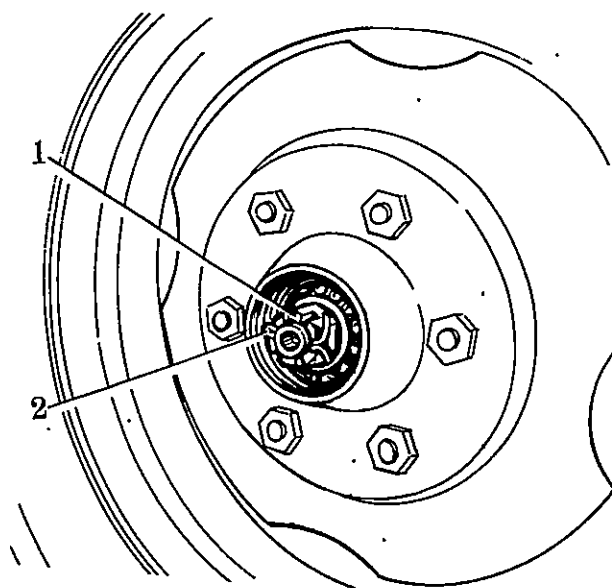


Fig.4-14  
Front bearing clearance adjustment.  
1. Cross nut 2. Cotter pin

## 2. Adjusting the bearing clearance of the front hub.

In the using course, the wear of the front wheel hub bearing would cause the increase of its clearance, so the bearing would be damaged easily if the adjustment is not carried out in time. To adjust, firstly easily if the front wheels from the ground in order that the front wheels' bearings are free of load. Then remove the hub cap and withdraw the cotter pin 2. Screw in the cross nut 1. Then back it out  $1/6 - 1/15$  of a turn, At last, re-fix the cotter in and the hub cap.

## 3. Adjusting the clearance between the end planes of the pivot pin sleeve and the front shaft bracket.

In the using course, the clearance at both ends of the pivot pin sleeve will increase as a result of the wear of the washers 1 there. This would cause the appearance of the shock load. So the clearance must be adjusted in time. To adjust, withdraw the adjusting shim 3 between the pivot pin seat 2 and the front shaft bracket 4 to make the outer shaft tube assy 5 swing freely but there is no obvious axial clearance. (Fig.4-15)

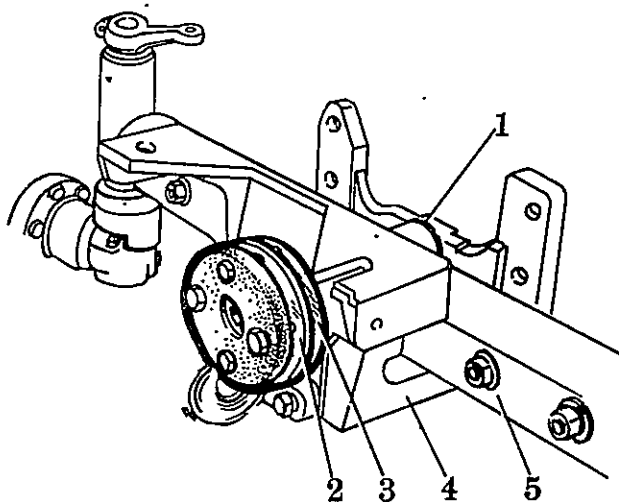


FIG. 4-15

Adjusting the clearance between the end planes of the pivot pin sleeve and the front shaft bracket.

1. Washer      2. Pivot pin seat      3. Adjusting shim  
4. Front shaft bracket      5. Shaft tube assy

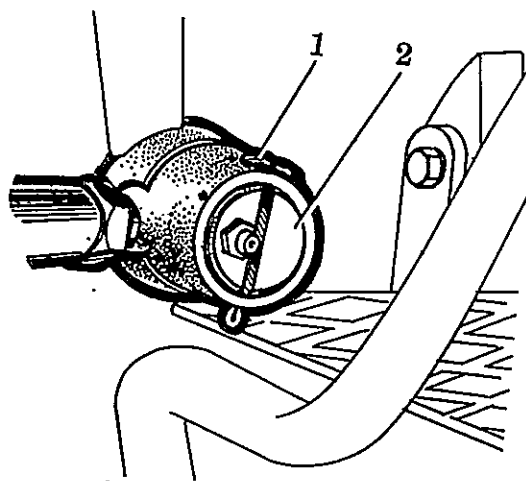


Fig.4-16

Adjustment of clearance of steering drawing bar joints

1. Cotter pin      2. Sealing bottom

## 4. Adjustment of clearance of steering drawing bar joints

The idle travel of the steering wheel may increase because of wear of the ball end and its seat. So the adjustment is needed. To do it, first take off the cotter pin 1, then tighten the sealing bottom to the extreme and finally back it  $1/4 - 1/2$  turn to have the required clearance. (Fig.4-16)

## 8. Front Axle

The front axle is composed of central drive, differential, LH and RH final drive etc.

1. Adjustment of the front central drive.

- 1). Adjustment of the clearance between the driving spiral bevel pinion bearings 7308, 2207107 (Fig4. - 17).

When the bearings 7309 and 227107 have end play, unlock the lock washer 1 and take away the adjusting washer 2 (the washer has three thicknesses - 0.1, 0.2 and 0.5mm), then tighten the round nut until the driving spiral bevel pinion gets a resistance torque of 0, 78 - 1.47Nm. Then relock the nut.

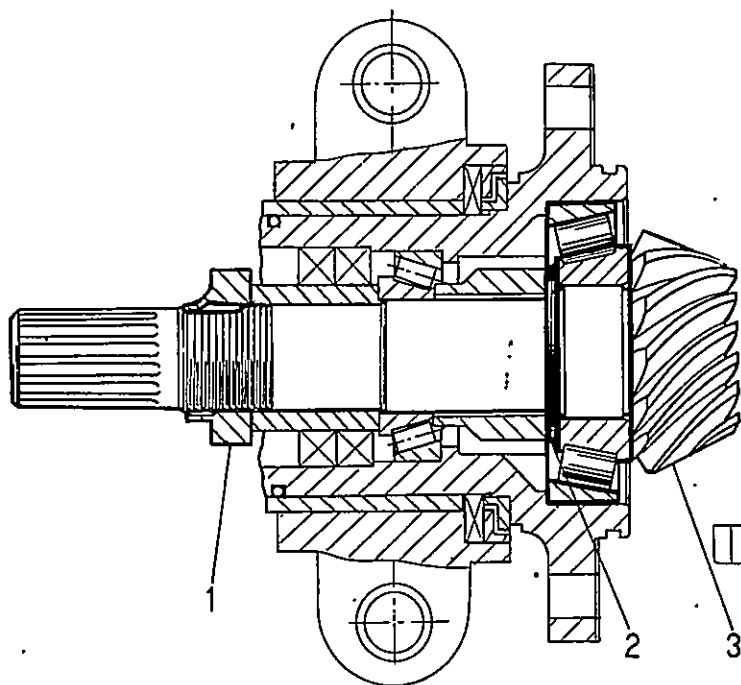


Fig. 4-17

Adjustment of the clearance between the driving spiral bevel pinion bearing 7308 and 2207107.

1. Lock washer
2. Adjusting washer
3. driving spiral bevel pinion

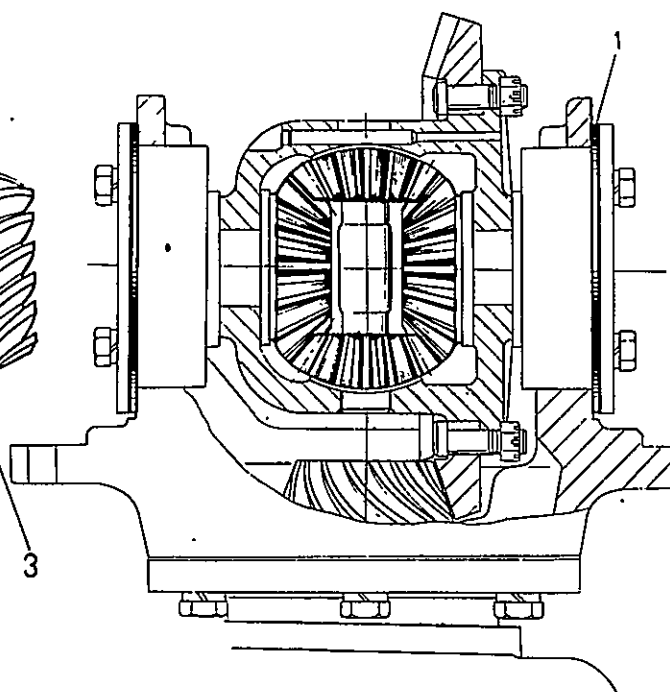


Fig. 4-18

Differential assy bearing 7209 clearance adjustment.

1. adjusting washer

- 2). Adjustment of the clearance of the differential assy bearing 7209 (Fig. 4-18)

When the bearing 7209 has end play it is necessary to take away the shim stacks of equal thickness at the juncture of both LH and RH bearing housing brackets, then tighten the bolt to fix the brackets. Adjust it until the driven spiral bevel gear can be turned with a friction torque of 1 - 1.5Nm.

- 3). Checking and adjustment of the backlash and impression of the spiral bevel gear set.

The method is the same as that of the rear central drive. The normal backlash of the central drive gears is 0.13 - 0.39mm. The length of the normal impression should be not less than 50% of the tooth length, and the height not less than 50% of the tooth height. It should be found on the middle part of the tooth surface, slightly leaning to the small tip, but not less than 3mm from the tip.

- 4). Adjusting the backlash and the impression.

Adjusting the backlash and the impression is carried out by increasing or decreasing the thickness of the adjustment shim stack at the juncture of the bearing housing bracket of the driving spiral bevel pinion and the adjustment shim stacks at the juncture of the gearing housing brackets of the LH and RH differential axle shafts. Carry out the adjusting procedures referring to Chart 4-1.

2. The adjustment of backlash of the media-driving bevel gear (Fig. 4-19).

The backlash of the media driving bevel gear is 0.2-0.4mm. To adjust, increase or decrease the adjusting washers between the up cover, the cover of the bearing, the front axle housing and the transmission housing.

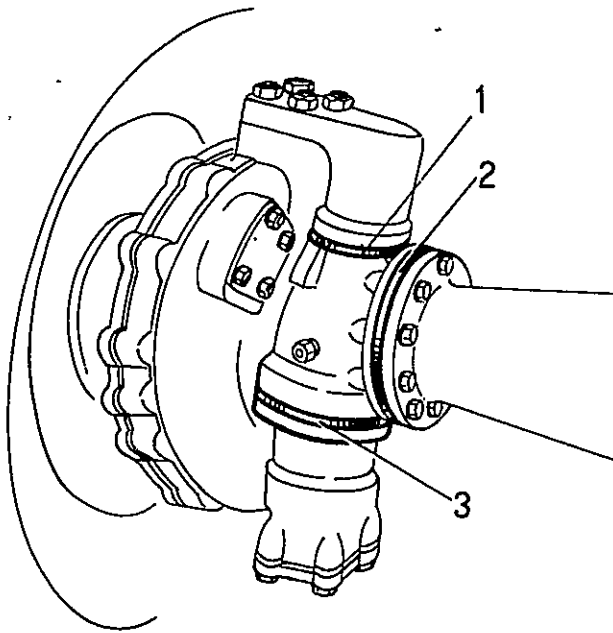


Fig. 4-19 Adjustment of the backlash of the media-driving bevel gear.

1, 2, 3 adjusting washers

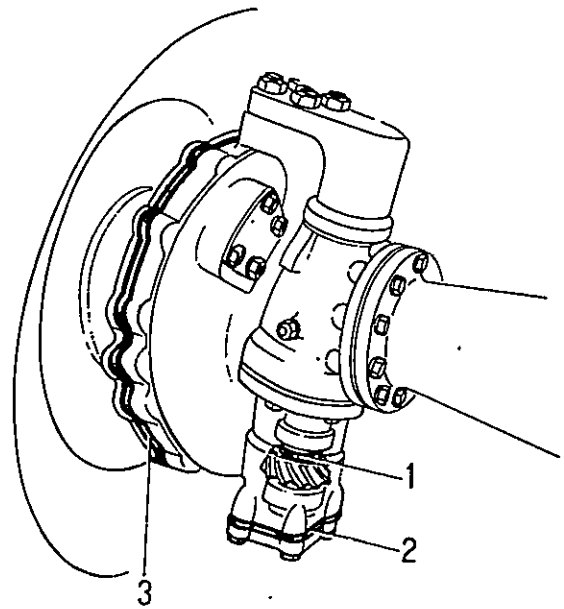


Fig. 4-20 Adjustment and inspection of the backlash and the impression of the final drive bevel gears.

1., 2., 3. adjusting washers

3. The adjustment and inspection of the backlash and the impression of the final drive bevel gears (Fig. 4-20).

The backlash of the final driving bevel gear is 0.3-0.6mm. To adjust, increase or decrease the adjusting washers between the housing cover, the bottom cover and the final reduction housing as well as that of the final driving and driven gears.

The inspection of the impression is the same as that of the rear central drive. The length of the normal impression should be not less than 50% of the tooth length, and the height not less than 50% of the tooth height. It should be found on the middle part of the tooth surface, slightly leaning to the small tip; but not less than 2-2.5mm from the tip.

4. In the using couse, the clearance between the pivot pin fixing flange and the cover of the flange may increase as a result of the wear. This would cause the appearance of the shock load. So the clearance must be adjusted in time. To adjust, slacken the bolt 1 and withdraw the suitable number of the adjusting shims 2 to make the front axle swing freely but there is no obvious axial clearance. (Fig. 4-21)

5. Operation and Maintenance of the front axle.

- 1). Check the oil level of the front axle housing at the oil inspection plug according to this manual's instructions. Always keep it sufficient.
- 2). The central drive gears, as well as the LH and RH drive gears should be exchanged in set when either of the central drive gears is damaged.
- 3). Add the lubricating oil or grease according to the seasons and the lubrication table.

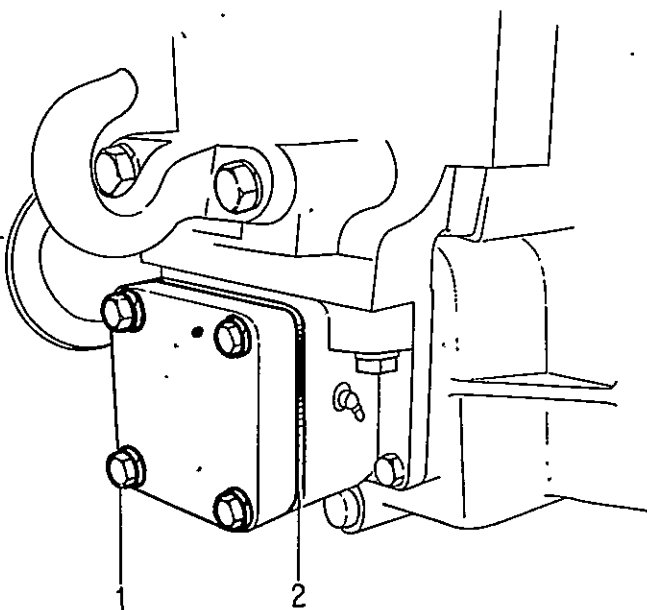


Fig. 4-21

Clearance adjustment between the pivot pin fixing flange and the cover of the flange.

1. Bolt 2. Shims

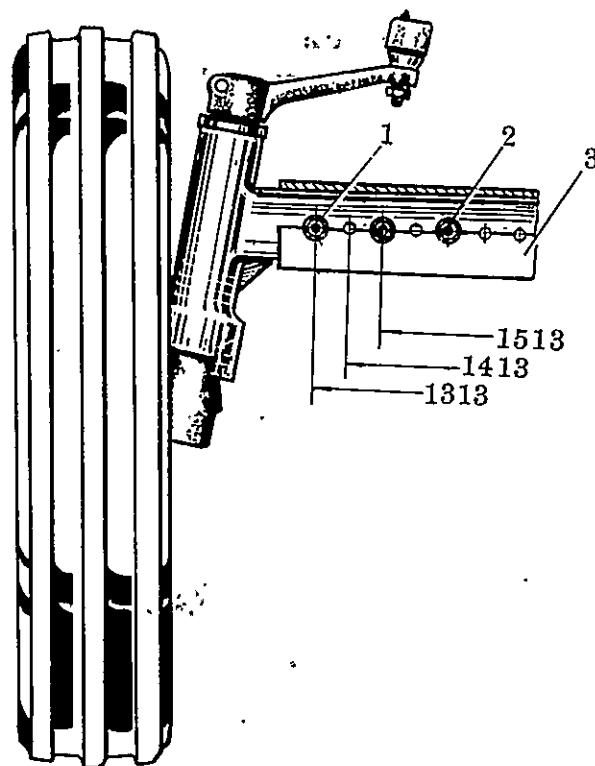


Fig. 4-22

1. Clamp ; 2. Dowel pin

## 9. Wheels

The front wheel are supplied with tyres 6.00-16, on which there are rib-tread to prevent tractor from side slip. The rear wheel are supplied with tyres of two sizes, on which there are herringbone-treads to increase the adhesion of the tyre. The tyres 12.4/11-28 are used for the dry field jobs or transportation, while the high-lug tyres 11-28 for the muddy field jobs.

The Shanghai-504 adopts 8.3-20 as its front tires, which are the driving one, 11-32 or 13.6/28 as its rear ones.

### 1. Adjustment of the track.

#### 1). Adjusting the front wheel track

The adjustment range (for the tractor of 1313, 1413, 1513mm) is illustrated in Fig. 4-22. The adjustment method is as follows: Jack up the front end of the tractor to make the front wheels off the ground. Slacken the clamp 1 and withdraw the dowel pins 2. Move the front wheel support to obtain the desired track width and insert the dowel pins. Then tighten the bolts of the clamp.

#### 2). Adjusting the rear wheel track.

The adjustment range (1346, 1392, 1498mm) of the rear wheel track width is illustrated in Fig. 4-23. The adjustment is done by different arrangement of the rear wheel rims 2 and discs 1 and interchanging the L.H. and R.H. wheels. (Be sure that the indicator of the rotation direction on the tyre is corresponding to the rotation direction of the wheels when tractor moving forward.)



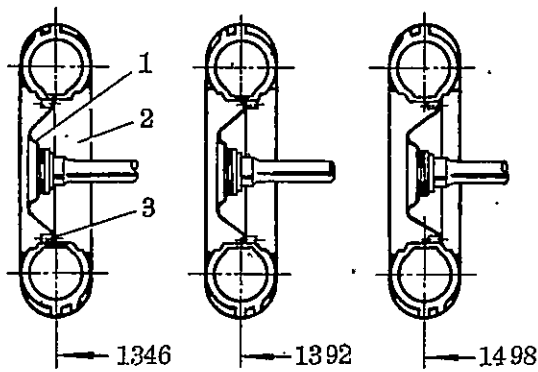


Fig. 4-23

Adjustment of the rear wheel track.

1. disc 2. rim 3. ear

## 2. Use and maintenance of the tyres.

### 1). The tyre pressures are specified as follows:

Front tyre 6.00-16:  $245 \times 10^3 \text{Pa}$

Rear tyre 12.4/11-28, 11-32 and high-lug tyre 11-28:  $137 \times 10^3 \text{Pa}$

Rear tyre 8.3-20:  $98 \times 10^3 \text{Pa}$

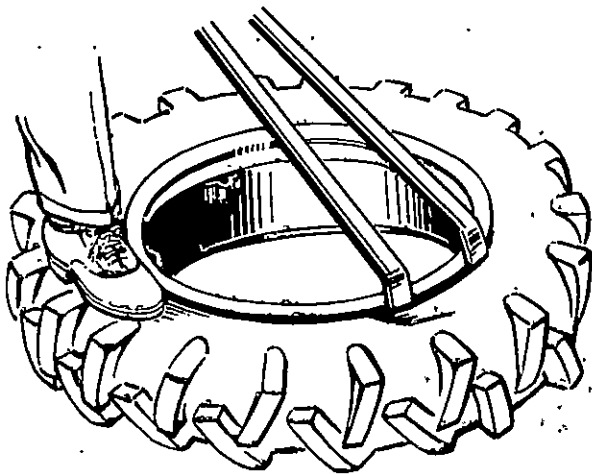
Check the tyre pressure with a tyre gauge.

- 2). The tractor is not allowed to go on working when the driving wheels slipping obviously.
- 3). Neither run the tractor at a high speed on undulatory road, nor cross over the broken stone, tile blocks and coal cinders. Don't use emergency braking unless it is necessary.
- 4). In the case of the tyre treads worn unevenly, interchange the L.H. and R.H. tyres.
- 5). Keep the tyres from being stained with fuel, oil, grease or other dirt. If stained, flush or clean them with water.
- 6). When the tractor is to be not in use for a long time, it is necessary to jack it up to keep the tyres from load.

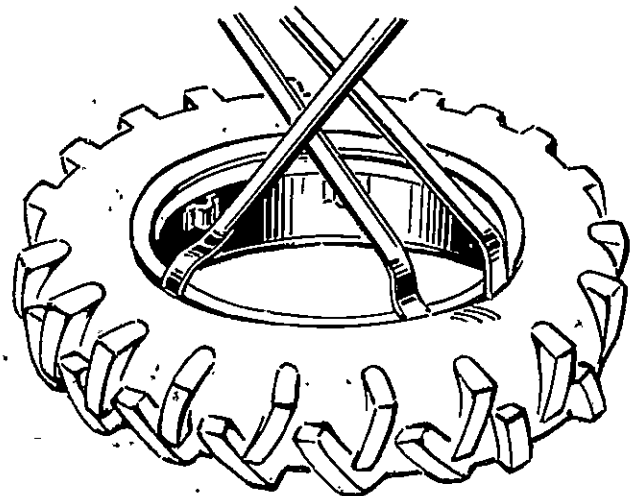
### 3. Disassembly and reassembly of the tyres

#### 1). Disassembling the tyres

- a. Bleed the air from the tyre tube.
- b. Press the tyre bead from the flat into the middle recess of the rim (as shown in Fig. 4-24a).
- c. Insert a crowbar into the rim to pry the tyre bead about the valve out of the rim. Then pry the tyre bead with another two crowbars until the whole bead of one side is out of the rim (as shown in Fig. 4-24b).



(a)



(b)

Fig 4-24

Illustration of the tyre disassembly

- d. Take the valve out of the hole in the rim. Then take the tube out of the rim and the tyre.

- e. Press the halfpart of the tyre bead of the other side into the middle recess of the rim with the method as shown in Fig. 4-2, and pry out the tyre from the other part with the crowbars.
  - f. Pay attention not to damage the tube when using crowbar.
- 2). Reassembling the tyres
- a. Cover the inside of the tyre and the outside of the tube with a thin coat of talcum powder.
  - b. Put the rim on level ground. (The side where the valve is fitted must be at the top) pry the tyre into the rim with crowbars or hammer it into the rim.
  - c. Stand up the rim and the tyre and push the tyre to the one side of the rim. Then put the tyre tube into the tyre. (It is advisable to pass firstly the valve through the hole in the rim and screw on the valve cap and lock up with wire.) In consideration of the heavy weight of the rear tyre, it is advisable to put three woodblocks or bricks of 10mm thick evenly under the tyre to raise it up and put the tube in the tyre as shown in Fig. 4-25
  - d. Push the rim close to the half part of the tyre and stand on the other half part of the tyre to press the tyre into the middle recess of the rim with feet. Then insert a crowbar into the rim and with it pry the tyre bead into the rim as shown in Fig. 4-25

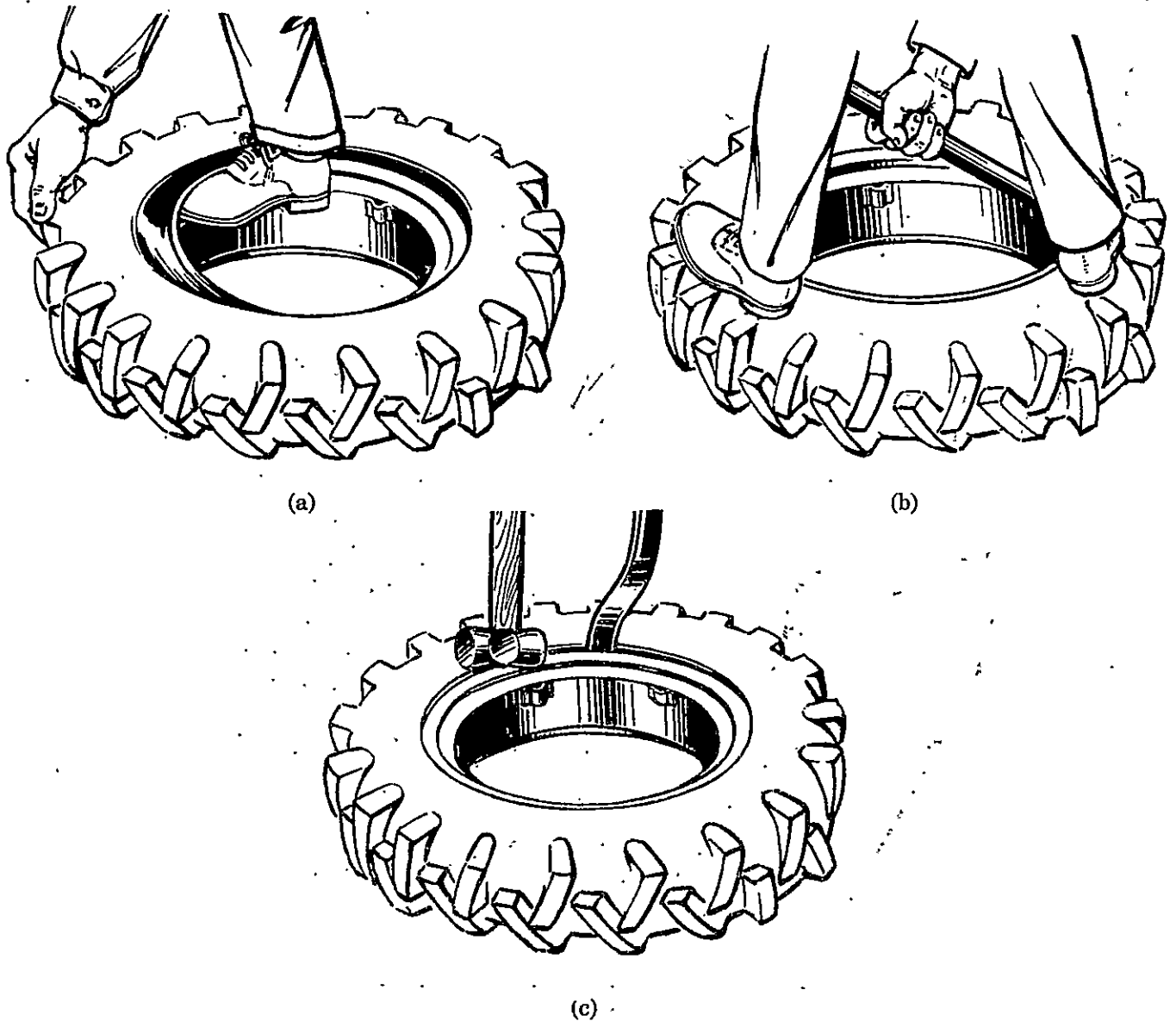


Fig. 4-25

Illustration of the tyre assembly

## 10. Hydraulic Lift System —

Hydraulic lift system consists of the hydraulic system and the lift system. The functions of the hydraulic lift system include to control the Hi—Lo position of the implement, to control the lowering speed of the implement, to depend on the soil resistance for automatic control of plough depth and to provide hydraulic power outlet.

The lifting and the lowering of the implements are realized through the position control lever (inner lever) and the draft control lever (outer lever). To connect the agricultural implements, leaving the inner lever at the position of lowering, back the tractor slowly to the implements. First connect the L. H. and R. H. linking arms then the upper linking arm and lock it with the nut.

### 1. Adjustment of the control mechanism.

#### 1). Adjustment the outer fork lever

At position control, when the implement is raised and kept highest with the inner lever at the position of "lifting" and the hydraulic pump control valve at "neutral", the relative positions of the implements, inner lever and the control valve are under the control of the outer fork lever 9. The adjustment is as follows:

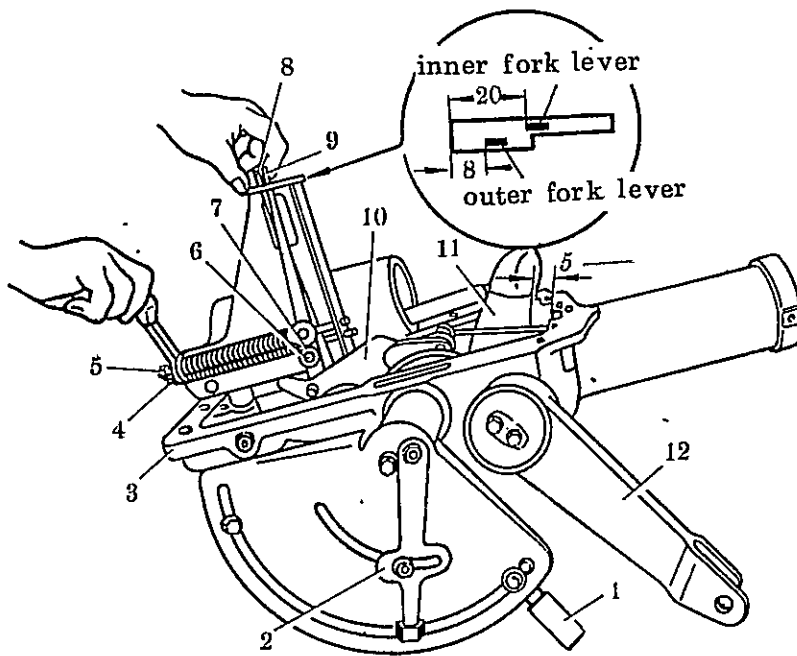


Fig . 4- 26

Adjustment of the inner and outer fork levers

- |    |                      |
|----|----------------------|
| 1  | inner lever          |
| 2  | outer lever          |
| 3  | hydraulic lift cover |
| 4  | nut of inner fork    |
| 5  | nut of outer fork    |
| 6  | nut                  |
| 7  | eccentric cam        |
| 8  | inner fork lever     |
| 9  | outer fork lever     |
| 10 | outer fork           |
| 11 | crank                |
| 12 | lift arm             |

- Slacken the nut 6 of the eccentric cam 7 on the outer fork lever 9.
- Place the lift arm 12 at the highest position but be sure that there is a safety distance of 5mm between the rear end of the hydraulic lift cover and the crank 11, meanwhile put the lever at the up position.
- Adjust the supporting point of the outer fork lever 9 by the nut 5, making sure that the front side of the lower end of the outer fork lever is 8mm. After the adjustment, lock the two nuts 4.

2). Adjusting the eccentric cam.

The fast or slow lowering of the implement as well as the relevant positions of the implement, inner lever and the control valve is controlled by the eccentric cam. To adjust:

- a. Place the lift arm still at the highest position.
- b. Put the inner lever 1 at the Fast position and make the front side of the lower end of the outer fork lever 9 slightly contact the front edge of the slot in the bracket.
- c. Make the eccentric cam 7 in contact with the front end of the outer fork and then tighten the nut 6.
- d. With the lift arm still placed at the highest position but the inner lever set at the "Slow" position, see if the front side of the lower end of the outer fork lever is 6mm from the front edge of the set in the bracket.

3). Adjusting the inner fork lever:

Turn the inner lever 1 upward until the implement is lifted to the desired height. (Be sure that the check chain of the lower link is not in tension, otherwise damages may be caused to the parts.) Stop turning the inner lever, place the upper positioning bolt 2 against the lever and tighten it. Then, turn the inner lever 1 to the "Slow" position until the implement is lowered to the end. Place the lower positioning bolt 3 against the lever 1 and then tighten it.

Take the relative position of the outer lever and the control valve during the hydraulic output as the condition of adjustment, the methods are as follows: (Fig. 4-26)

- a. Put the outer lever 2 at the top of the quadrant.
- b. Adjust the supporting point of the inner fork lever 8 by the nut 4, making sure that the lower end of the inner fork lever is 20mm from the front edge of the long slot in the bracket. After the adjustment, lock the two nuts 4.

4). Adjusting the rocker lever of the control valve.

- a. Before putting the hydraulic pump into the rear axle housing, adjust the position of the supporting point of the rocker lever 3 by turning the nut 1, making sure that the supporting point is about 49mm from the rear cover of the hydraulic pump. (Fig. 4-2)
- b. After fitting the hydraulic lift cover assy and the hydraulic pump assy, check from the inspection window at the right side of the rear axle housing if the relative position of the inner and outer levers and the rocker lever is correct. Put the inner lever at the "Fast" position and the outer fork levers at the "Deep" position to make the lower ends of the inner and outer fork levers in contact with the front edge of the slot in the bracket. In this case, the inner and outer fork levers should slightly keep in contact with the roller at the upper end of the rocker lever. If not, readjust the

position of the supporting point until the requirement is met.

- 5). Adjusting the upper and lower positioning bolts on the quadrant (Fig. 3-20).

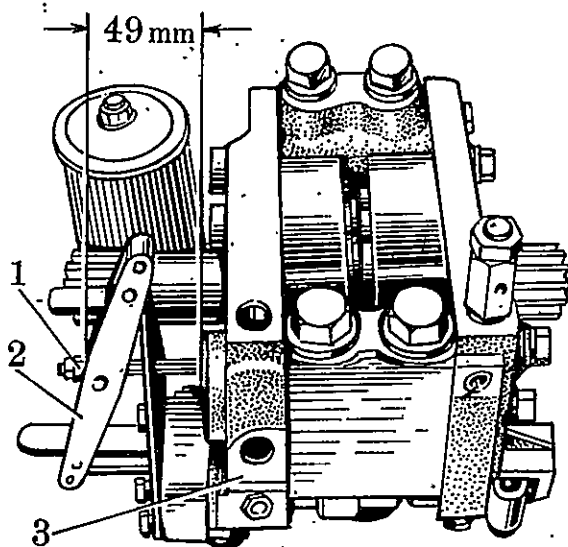


Fig. 4-27

Adjustment of the rocker lever  
of the control valve

Turn the inner lever 1 upward until the implement is lifted to the desired height. (Be sure that the check chain of the lower link is not in tension, otherwise damages may be caused to the parts.) Stop turning the inner lever, place the upper positioning bolt 2 against the lever and tighten it. Then, turn the inner lever 1 to the "Slow" position until the implement is lowered to the end. Place the lower positioning bolt 3 against the lever 1 and then tighten it.

6). Adjusting the locking knobs on the quadrant .

There are two locking knobs, one for the inner lever and the other for the outer lever.

- a. After the implement lowering speed is chosen, put the inner lever 1 at the position corresponding to the selected lowering speed. Then place the locking knob 4 against the inner lever and tighten it. (Fig. 3-20)
- b. When working on draft control operation, put the outer lever 1 at the position corresponding to the selected plowing depth. Then put the locking knob 2 at the middle of the slot in the outer lever 1 and then tighten it. (Fig. 3-21)

2. Notes on operation and maintenance

- 1). When it is not necessary to use the hydraulic pump, put the hydraulic pump control lever at the "Disengage" position.
- 2). Do not put the outer lever at the hydraulic power outlet position.
- 3). Do not use the outer lever to lift the implement.
- 4). Before using the inner lever, put the outer lever at the bottom of the quadrant.
- 5). Clean periodically the hydraulic pump filter according to the maintenance regulation.

Fig. 4-27 Adjustment of the rocker lever of the control valve

? Negative Ground  
 / 11. Electrical System  
 Ground  
 2 51204 ba series

The electrical system with its negative pole earthed, is a direct current 12 volt, single-wire system. It consists of starting wiring, light and signal wiring, light and signal wiring. The wiring diagram of the electrical system is shown in Fig. 4-28.

The starting wiring includes a starter, a charging alternator, a regulator, batteries, an electric heater plug, a lock switch, a heater-starter switch, an ammeter etc. The uses and maintenance of the above elements turn to the instruction manual of the 495a model engine.

Light and signal wiring includes headlights, rearlight, front and rear small lights, instrument lights, turn signals and horn etc.

Uses of the lighting and signaling gadgets: (Fig. 4-28)

- 1, Headlights: with double-filament bulbs, controlled by the R.H. dual-position switch 13. When the switch is pulled out to the 1st position, the low beam is on, when to the 2nd position, the high beam on.
2. Rearlight, front and rear small lights and instrument lights are all controlled by the L.H. dual-position switch.

When the switch is pulled out to the 1st position, the small lights, rearlight and instrument lights are on, when to the 2nd position, the instrument lights and the rear working light on.

3. Turn signals, including the front and rear turn indicating lights and the flasher are controlled by the turn signal signal lights (i. e. the front and rear small lights), turn signal light switch. Turning the switch lever left indicates a left turn of the tractor; while turning it right, a right turn of the tractor.



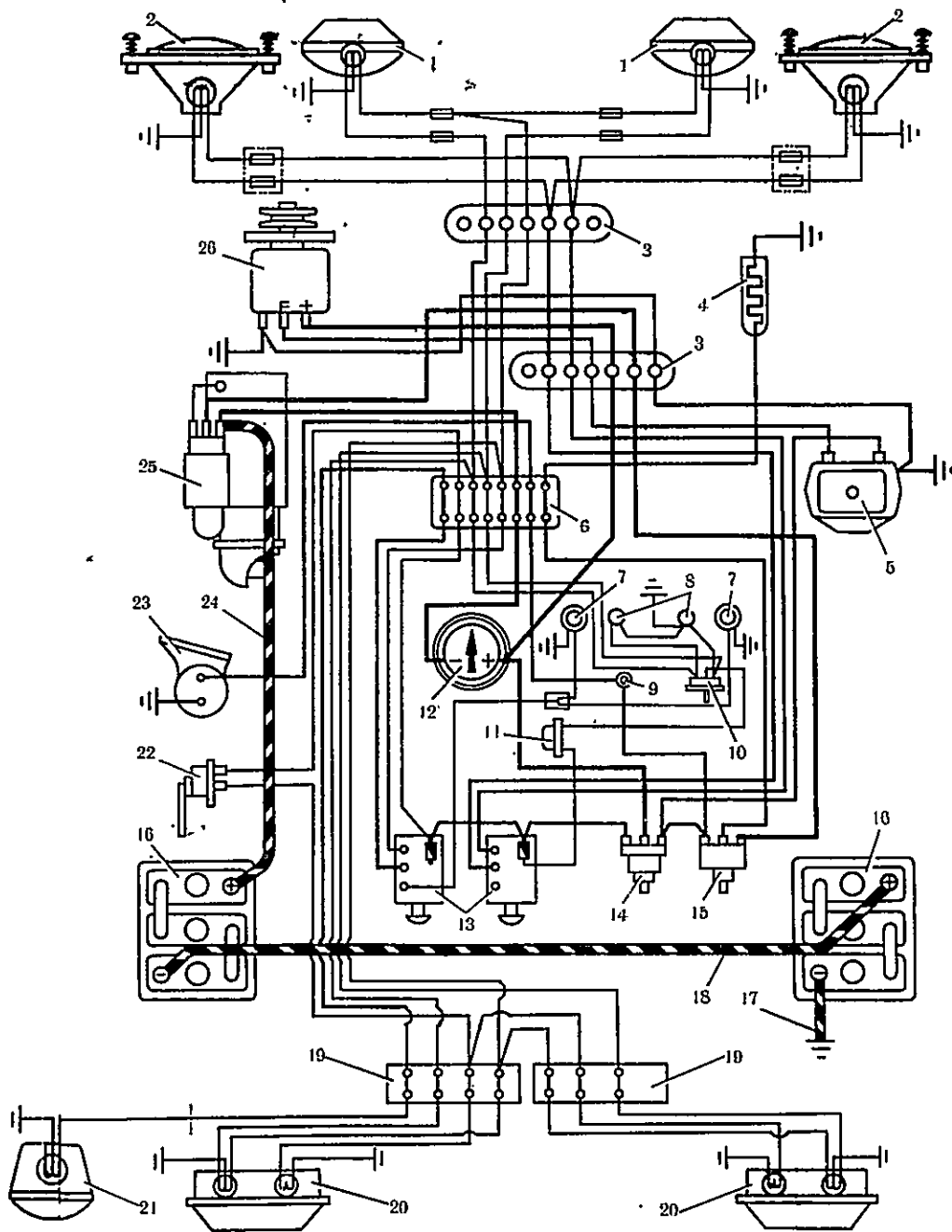


Fig. 4-28 Wiring diagram of electric system

3 Fuse boxes?

1. small light 2. head light ND140×90T-1 3.5-heads connecting block DP801 4. pre-heating plug 5. regulator 6. fuse box 7. instrument light NZ2-1 8. turn signal light XD1 9. horn button JK260 10. turn signal light switch JK812-1 11. flasher SD56 12. ammeter 307C 13. dual-position switch JK107 14. lock switch JK422 15. heater-starter switch JK290 16. battery 3-Q-15 17. <sup>Ground</sup> earth cable of battery 18. connecting cable of batteries 19. four wires combination 20. rear light assy 21. rearlight TaiShan25 22. stoplight switch JK514 23. horn DL40GS/ 12 24. connecting cable from battery to starter 25. series DC dynamo 26. silicon rectified alternator JF2200

Solenoid

Fuse No.	1	2	3	4	5	6	7	8
Rated Current(A)	6	6	6	6	6	30	10	20
Elements protected	rear light	brake light	left turn	right turn	front rear small light	total current	horn	heating plug
Diameter Copper Wire Substituted(mm)	0.16	0.16	0.16	0.16	0.16	0.7	0.24	0.4

4. Stop light: It is controlled by the stop light switch which is actuated by the brake pedal LH rocker arm. (The stop light bulb is in the rearlight assy.)
5. Horn is controlled by the horn button.
6. Fuse box: There are 8 fuses in the box. The fuse is made of finned wire. The working currents and their electrical elements protected are listed as above.

## 12. Trailer Braking

### 1. Employment

The trailer braking apparatus is <sup>mainly</sup> used on tractor trailers for the sake of safety during transportation when a halt is necessary.

### 2. Composition

The apparatus consists of <sup>1.</sup> air compressor; <sup>2. Com-</sup> pressed air container; <sup>3. valve</sup> 8, air <sup>Hoses</sup> conduits 4 and <sup>or lines</sup> control mechanism etc.

Fig. 4-29

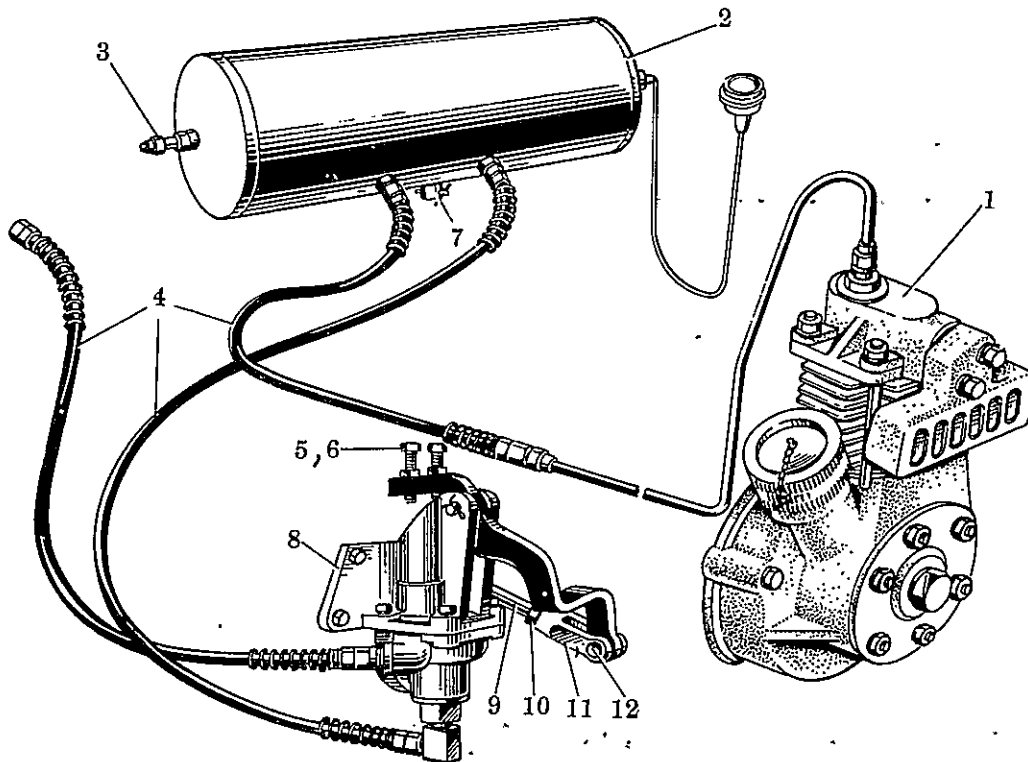


Fig 4-29 Trailer Braking

### 3. Use and adjustment

- 1). In air conduit, there should be no leakage or blockage which can be detected by smearing a layer of dense soap water (neutral) on the joints with the help of a brush.
- 2). The system pressure should reach  $539 \times 10^3 \text{Pa}$  within 2' min. after the compressor starts working at the rated engine speed and  $686 \times 10^3 \text{Pa}$  within 8 min. If not, seals of the air valves and the piston rings of the compressor should be examined.
- 3). When the pressure is over  $784 \times 10^3 \text{Pa}$ , the safety valve 3 should be able to open.
- 4). When the brake system is under  $8 \text{kg/cm}^2$ , stop the engine for 5 min. The maximum pressure reduced should be less than  $98 \times 10^3 \text{Pa}$ .
- 5). During normal transportation, pressure on the barometer should not be lower than  $441 \times 10^3 \text{Pa}$ .
- 6). Try the brake before trailer starts moving to ensure a good performance of its components.
- 7). At the end of a working day, open the draining valve 7 to release water gathered in the pressed-air container.
- 8). The brake, pressed air container and air conduit should be dismantled when the tractor is to work in the fields.
- 9). To avoid a collision between trailer and tractor, trailer must be braked 0.3–0.8sec. earlier than tractor. If it is not satisfied, the following adjustments shall be necessary:  
Turn loose lock nut 10, dismount linking fork 11 and pin 12. Then turn out (to prolong) or turn in (to shorten) brake pushing rod 9. The trailer's braking thus can be advanced or retarded respectively. After the above adjustment, tighten the lock nut again.
- 10). The two regulating screws 5 and 6 on the brake dragging rod are already adjusted on special test bench before a tractor goes out of our factory. Identified by a red paint on them, the screws are generally not to be turned. The rated pressure is  $588 \times 10^3$ — $637 \times 10^3 \text{Pa}$  and the air outlet opening is 1–1.5mm.

## Chapter V Maintenance of Tractor

In order to keep the tractor always in good working order and prolong its service life, the users must rigidly follow the maintenance procedures.

According to the working time, the maintenance procedures can be divided as follows:

1. Maintenance after every shift
2. Maintenance after every 125 working hours
3. Maintenance after every 500 working hours
4. Maintenance after every 1000 working hours
5. Special maintenance in winter season

### 1. Maintenance after every shift

1. Clean the tractor of dust and mud.
2. Check the water level in the radiator and the fuel level in the tank. Refill each if insufficient.
3. Check the bolts of the front and rear wheel hubs. Tighten them if they are loose.
4. Check the pressure of the front and rear tyres.
5. Lubricate all the lubricating points referring to the lubrication chart (Every shift if working in paddy field, every other shift if working in dry field.) Inject grease until all mud and water are squeezed out and fresh grease overflows.
6. Maintain the diesel engine according to daily maintenance of the model 495a diesel engine operation manual.

## 2. Maintenance after every 125 working hours

1. Complete all items of the shift maintenance.
2. Check the oil level in the transmission, rear axle, front housing, steering box and hydraulic oil tank. Refill them if insufficient.
3. Check and adjust the free travel of the clutch pedal.
4. Check and adjust the front wheel toe-in.
5. Maintain the diesel engine according to the maintenance after every 125 working hours specified in model 495A diesel engine operation manual.

## 3. Maintenance after 500 working hours

1. Complete all maintaining items specified in the maintenance after every 125 working hours.
2. Drain the lubricating and hydraulic oil from transmission, rear axle housing, front axle housing, steering box, hydraulic oil tank, hydraulic cylinder and hydraulic pump and clean the transmission/rear axle housing, front axle housing, final reduction housing and steering box. The drained oil should be cleaned by proper means before refilling with it. Add fresh oil if insufficient.
3. Clean the cartridges of hydraulic pump and hydraulic oil tank.
4. Check the pressure of relief valve of hydraulic pump. Adjust it if necessary.
5. Check and adjust the free travel of the steering wheel.
6. Check and adjust the bearing clearance of front wheel.
7. Check whether the heads of the clutch release lever are in the same plane, the max. permissible deviation should be limited in 0.2mm and adjust them if necessary.
8. Check the fastness of all wiring joints. Clean off oil and rust.
9. Check the wearing condition of both pivot shafts washer and fixing flange. Adjust if necessary.
10. Renew the grease inside the front hub.
11. Maintain the diesel engine according to maintenance after every 500 working hours specified in model 495A diesel engine operation manual.

## 4. Maintenance after every 1000 working hours

1. Complete all maintaining items specified in the maintenance after every 500 working hours.
2. Renew the lubricating and hydraulic oil in the rear axle housing, front axle housing, steering oil tank and steering box.
3. Clean <sup>out</sup> the accumulated carbon in the exhaust pipe.
4. Check the wearing condition of the front wheels. Interchange the L.H. and R.H. if necessary.
5. Clean the cooling system of the deposits.
6. Check and adjust the bearing clearance of the central driving and driven spiral bevel gears.
7. Maintain the diesel engine according to maintenance after every 1000 working hours specified in model 495A diesel engine operation manual.

## 5. Special Maintenance in Winter Season

1. Use lubricating oil and fuel for winter season instead.
2. When the tractor is to stop for long periods in winter season, add anti-freeze coolant into cooling water. If there is no anti-freeze coolant, drain thoroughly the cooling water.
3. Before every shift work, carry out the starting procedures according to starting requirement of winter season.
4. In winter season, the discharge extent of the battery should not exceed 25%, the battery should always keep a higher voltage.
5. After work, the tractor should be parked in a shed where the tractor is kept away from the cold wind. weather

## Chapter VI Trouble Shooting

### 1. Clutch

Trouble symptom	Causes	Remedies
1.Clutch slipping	1.Friction disc stained With oil. 2.Excessive wear of friction disc, rivets protruding. 3.Pressure of diaphragm spring weakend. 4.Driven plate warped 5.Pedal no free travel.	Clean friction disc with gasoline or replace it. Release friction disc.  Replace diaphragm spring.  Repair or replace. Readjust it as required.
2.Clutch incompletely disengaged, sound heard when shifting gear	1.Too large free travel. 2.Driven plate excessively warped. 3.Too close fit of spline sleeve of driven disc. 4.Three heads of release levers not in the same plane.	Readjust as required. Replace.  Remove burrs before re-assembly  Reajust
3.Shaking of clutch	1.Friction disc cracked. 2.Driven plate warped. 3.Three heads of release levers not in the same plane.	Replace. Replace. Readjust.
4.P.T.O. shaft stopped rotation when main clutch disengage.	1.Too small clearance between adjusting screws on main pressure plate and ears of sub-pressure plate	Readjust as required
5.P.T.O. shaft not stopping rotation when clutch pedal depressed to end.	1.Too large clearance between adjusting screws on main pressure plate and ears of sub - pressure plate. 2.Too shallow three recesses of clutch, cover.	Readjust as required.  Increase adjusting shims.

## 2. Transmission and Transfer Box

<p>1. Gears slipping to neutral.</p>	<p>1. Positioning spring slackened.                  2. Taper of gears splined causing axial force.                  3. Poor meshing of drive and driven gears after shifting.                  4. Tooth axis deviation or uneven wear of tooth surface.</p>	<p>Replace spring.                   Replace gear.                   Check shifting travel and position of gear.                  Replace gear.</p>
<p>2. Gears engagement out of order</p>	<p>1. Shift bar travel retaining plate broken.</p>	<p>Replace.</p>
<p>3. Gears difficult or unable to engage.</p>	<p>1. Main clutch incompletely disengaged.</p>	<p>Adjusting.</p>
	<p>2. Tooth corners excessively worn or damaged.                  3. Too close fit between sliding gear and spline shaft.</p>	<p>Replace gear.                   Modify them with hand stone.</p>
<p>4. Abnormal noise heard in transmission and transfer housing.</p>	<p>1. Insufficient lubricating oil.                  2. Excessive wear of bearings and gears.                  3. Burs and hard points on tooth surface.</p>	<p>Add oil as required.                  Replace gear or bearing.                   Remove them with hand stone.</p>
<p>5. Oil leakage into clutch housing.</p>	<p>1. Rear oil seal of crankshaft damaged.                  2. Oil seals of transmission driving gear shaft and P.T.O. clutch shaft damaged.</p>	<p>Replace.                   Replace.</p>



### 3. Front Axle and Rear Axle

1. Abnormal noise heard in central drive gears set.	1. Undue meshing of central gear set. 2. Too big clearance of bearings of driving spiral bevel pinion and the differential.	Readjust clearance and meshing impression. Readjust clearance.
2. Overheating of rear axle housing.	1. Too low oil level. 2. Too small clearance of bearings and gears.	Add oil to required level. Readjust. Replace.
3. Lever of differential lock fails to return.	1. Return spring ineffective. 2. Control lever stuck.	Disassembly, clean and remove the burs.

### 4. Brake

1. Brake ineffective.	1. Friction disc stained with oil 2. Friction disc excessive worn. 3. Too large free travel of brake pedal.	Wash with gasoline.  Replace Readjust.
2. Tractor deviated when brake applied.	1. Different travels of R.H. and L.H. brake pedals. 2. Oil leaks into one of brakes.	Readjust.  Disassembly and clean.
3. Brake incompletely disengaged and overheating	1. Too small free travel of brake pedal. 2. Return spring of brake pressure plate ineffective. 3. Too small clearance of friction disc. 4. Brake pedal fails to return.	Readjust.  Replace.  Readjust.  Check the return spring.

### 5. Front Wheels and Steering

1. Front wheels swinging,	1. Excessive wear of bush of front wheel support. 2. Excessive wear of front rear ball joints of drag links and their seats. 3. Excessive wear of adjusting shim of front axle bracket. 4. Improper toe-in of front wheel. 5. Too large clearance between rocker shaft sets. 6. Front wheel rim warped.	Replace  Readjust or replace.  Readjust or replace.  Readjust. Replace.  Rectify.
---------------------------	--	--

<p>2. Sharp wear of front tyres.</p>	<p>1. Improper toe-in of front wheel. 2. Too low air pressure of front tyres.</p>	<p>Readjust. Inflate tyres to specified pressure. Put control lever of transfer box to neutral.</p>
<p>3. Too large free travel of steering wheel.</p>	<p>3. Power is still transmitted to front axle when not in field. 1. Excessive wear of steering wheel steel balls 2. Excessive wear of steering shaft, nut and steel balls.</p>	<p>Replace.</p>
<p>4. Steering becomes too heavy.</p>	<p>1. Insufficient hydraulic oil. 2. Too low oil pressure 3. Oil strainer clogged.</p>	<p>Add oil as required. Readjust pump pressure as required. Clean strainer.</p>

### 6. Hydraulic lift System

<p>1. Being able to lift when not loaded but unable to lift or lift too slowly when loaded.</p>	<p>1. Too low oil level in rear axle housing. 2. Oil strainer clogged. 3. Serious leakage of hydraulic cylinder. 4. Oil leakage of pressure relief valve.</p>	<p>Add oil to required level. Clean it. Replace piston oil ring. Readjust or replace.</p>
<p>2. Unable to lift implement.</p>	<p>1. Hydraulic pump control lever not in "engage" position. 2. Sealing ring of high pressure pipe damaged. 3. Oil leakage of pressure relief valve.</p>	<p>Put it to "engage" position. Replace. Readjust pressure or replace.</p>
<p>3. Implement out of control, rising without limit.</p>	<p>4. Serious leakage of hydraulic cylinder. 5. Oil strainer clogged. 6. Eccentric cam falling off. 7. Implement too heavy or working too deep in field.</p>	<p>Replace piston oil ring. Clean it. Readjust and then refix it. Change implement or readjust it.</p>
<p>4. Hydraulic lift jerky.</p>	<p>1. Control valve stuck to "up" position. 2. Improper adjustment of forks. 1. One of plungers damaged. 2. Distance between retaining nut and plunger end less than 136mm.</p>	<p>Renew oil in rear axle housing. Replace control valve and sealing washer. Replace. Readjust.</p>

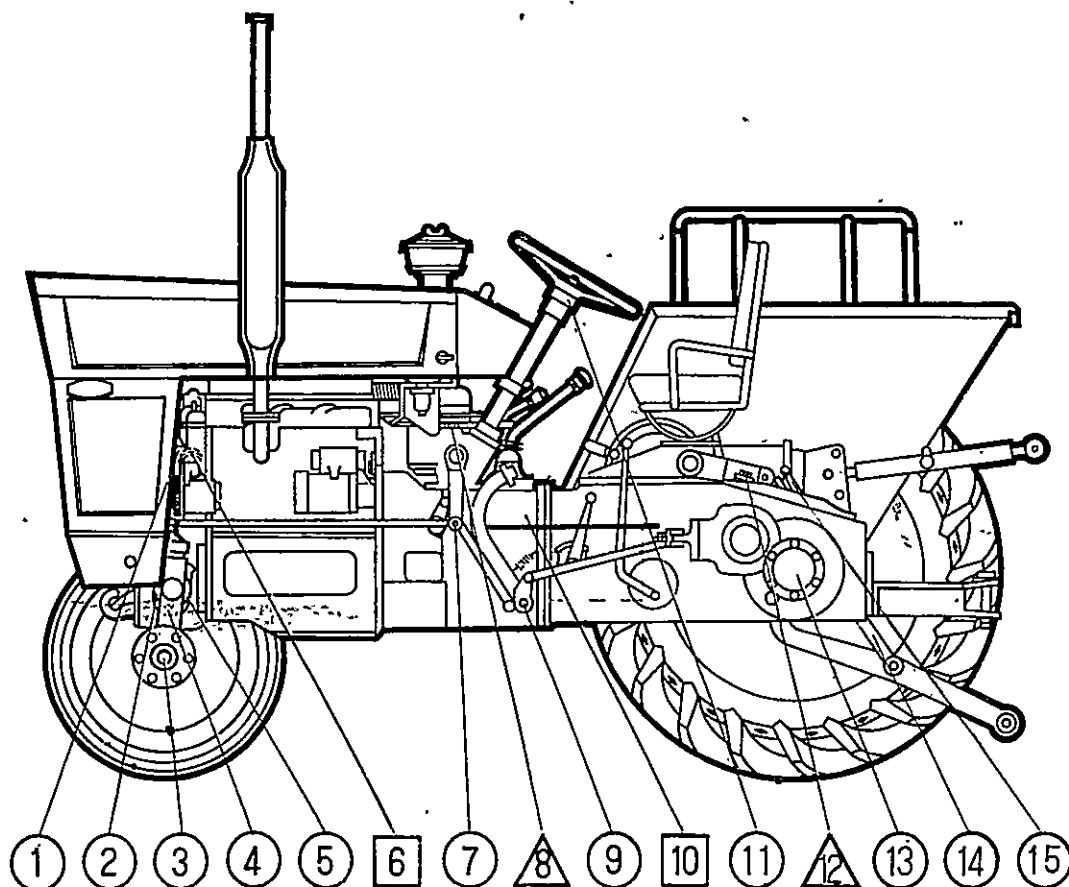
## Chapter VII Appendices

### 1. Fuel, lubricants and coolants

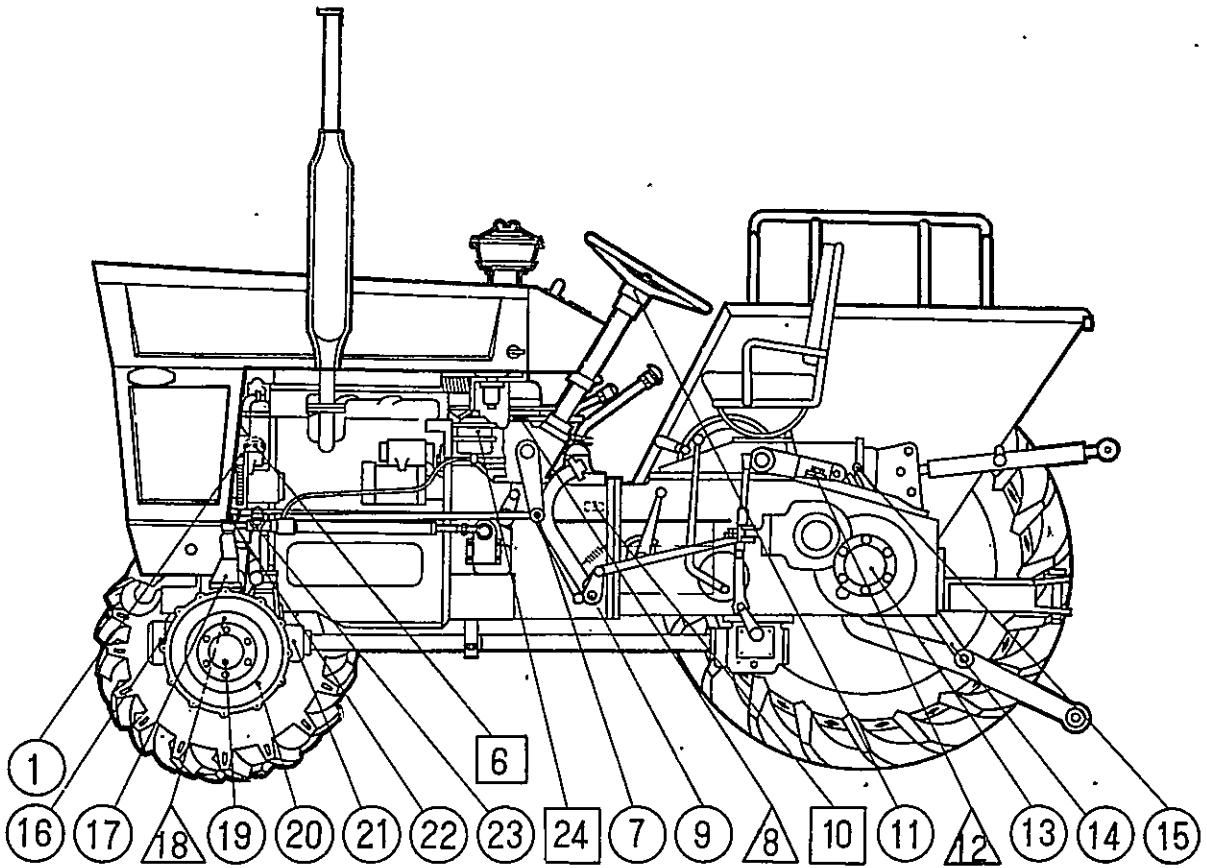
Fuel, lubricants and coolants used in the tractor are listed in the table hereunder.

Assembly	Season	Fuel and lubricants Grade no.	
Fuel tank	As specified in Model 495A diesel engine operation Manual		
Engine oil sump			
Radiator			
Transmission/rear axle housing, front axle housing, steering gear housing, transfer box	Winter	HL57-22	hyperbolic oil
	Summer	HL57-28	SY1102-60S
Grease nipples		Compound calcium-base grease SYB1409-62S	
Oil container of power steering		No.20 mechanical oil HJ-20	

### 2. Lubrication Chart



Model Shanghai 50 Tractor



Model Shanghai 504 Tractor

- - Grease
- - Lubricating oil
- △ - Gear oil

No.	Lubrication position	No. of lubricating point	Interval(h) <sup>hrs</sup>
1	Water pump shaft	1	Every shift
2	Front ball joint of steering drag link	2(R.H. and L.H.)	Every shift
3	Front wheel hub	2(R.H. and L.H.)	Renew it after every 500h
4	Steering knuckle king pin (upper and lower bush)	4(2 R.H. and 2 L.H.)	Every shift
5	Pivot shaft (front and rear bush)	2	Every shift
6	Oil filling hole, engine	1	Replace after 30hr for new engine and then every 125h
7	Rear ball joint of steering drag link	2(R.H. and L.H.)	Every shift
8	Oil filling plug of steering box	1	Replace after every 1000h
9	Pedal shaft of clutch/brake	2(R.H. and L.H.)	Every shift
10	Bracket of foot throttle pedal	2	Every shift
11	Thrust bearing of steering wheel	1	Every shift
12	Oil filling hole of transmission/rear axle housing	1	Renew after every 1000 h
13	Bearing of rear-axle shaft	2(R.H. and L.H.)	Every shift
14	L.H. and R.H. lift rods	2(R.H. and L.H.)	Every shift
15	Levelling box	1	Every shift
16	Front axle shaft	1	Every shift
17	Steering knuckle arm and connecting arm	2(R.H. and L.H.)	Every shift
18	Thrust bearing of final reduction housing	1	Renew after every 1000h
19	Rear bush of pivot shaft bearing seat	2(R.H. and L.H.)	Every shift
20	Front bush of pivot shaft bearing seat	2(R.H. and L.H.)	Every shift
21	Steering ball joints	1	Every shift
22	Bush of ball pin	4	Every shift
23	Oil filling hole of front axle 2	1	Every shift
24	Hydraulic oil tank		Renew after every 1000h

○ grease    □ lubricating oil    △ gear oil

3. Table of Rolling Bearing, Rolling Needle and Steel Ball

Serial No.	National Standard	Name and Type of Bearing	Mounting Position	Quantity
1.	GB276-64	Bearing 110	Holes of intermediate gear, rear axle housing.	2
		Bearing 115	Bush of 540/1000 r/min P.T.O. shaft.	1
		Bearing 206	Front and rear ends of output shaft of transfer box, upper end of king pin, front final drive.	2
		Bearing 211	Front and rear ends of counter shaft, transmission housing.	2
			Front end of output shaft, transmission housing.	1
		Bearing 213	Rear axle shaft, near rear wheel end.	2
			Front axle shaft, near front wheel end.	2
		Bearing 304	Hole of intermediate gear, transfer box	2
		Bearing 307	Upper end of drive gear, front final drive.	2
		Bearing 308	Drive shaft, inner side, front axle housing.	2
			Low end of drive gear, front final drive.	2
		Bearing 312	Rear axle shaft, outside of final reduction gear.	2
		Bearing 406	Both ends of front axle housing.	2
Bearing 407	Low end of intermediate drive gear.	2		
Bearing 410	Rear axle shaft, inside of final reduction gear.	2		
2	GB277-64	Bearing 50211	Rear end of transmission main shaft.	1
3	GB278-64	Bearing 60230	Engine flywheel.	1
		Bearing 60309	Rear end of P.T.O shaft, rear axle housing	1
		Bearing 80211	P.T.O clutch shaft, transmission	1
4	GB283-64	Bearing 92309	Driving gear shaft, transmission.	1
		Bearing 92311	L.H. & R.H. differential axle shaft.	4
		Bearing 42310	540/1000r/min P.T.O shaft	1
		Bearing 42311	Both sides of L.H. & R.H. differential axle shaft.	4
		Bearing 42312	Rear axle shaft, near final reduction gear.	2
		Bearing 42507	540/1000 r/min P.T.O. counter shaft.	2
5	GB290-64	Needle Bearing 943/20 or 7943/20	Output shaft, transmission.	1
		Needle bearing 942/35 or 7942/35	P.T.O clutch shaft, P.T.O shaft, transmission and P.T.O. shaft, rear axle housing.	3

6	GB297-64	Bearing 7209	Differential, front axle.	2
		Bearing 7215	Differential, rear axle.	2
		Bearing 7308	Driving bevel gear, front axle.	1
		Bearing 7309	Driving spiral bevel pinion, rear axle.	1
		Bearing 7508	Front wheel hub.	2
		Bearing 7605	Front wheel hub.	2
		Bearing 7610	Driving spiral bevel pinion, rear axle.	1
		Bearing 2007107	Driving bevel gear, front axle.	1
7	Gb301-64	Bearing 8109	Front wheel support.	2
		Bearing 8111	Housing, front reductor.	2
		Bearing 8204	Levelling box, hydraulic hitch.	1
8	GB308-77	Steel ball 5/16"	Steering shaft.	28
		Steel ball 3/8"	Steel ball upper and lower seats, steering wheel.	12
		Steel ball 15/32"	Shifting bar, transmission.	5
		Steel ball 7/8"	Pressure plate, brake.	10
		Steel ball $\phi$ 10	Fork, transfer box.	1
		Steel ball $\phi$ 12	Control lever of P.T.O. shaft Relief valve, hydraulic pump.	1 1
9	GB309-77	Rolling needle $\phi$ 3 $\times$ 20	Reverse gear.	58
		Rolling needle $\phi$ 3.5 $\times$ 30	Planet pinion	60
10		Long cylindrical roller bearing without race 64805	Driving gear shaft, transmission.	1
11		Thrust bearing 986713	Thrust seat, clutch.	1
12		Needle bearing 9247/32	Output shaft. 540/1000r/min	1



4. Table of Oil Seal and Sealing Ring

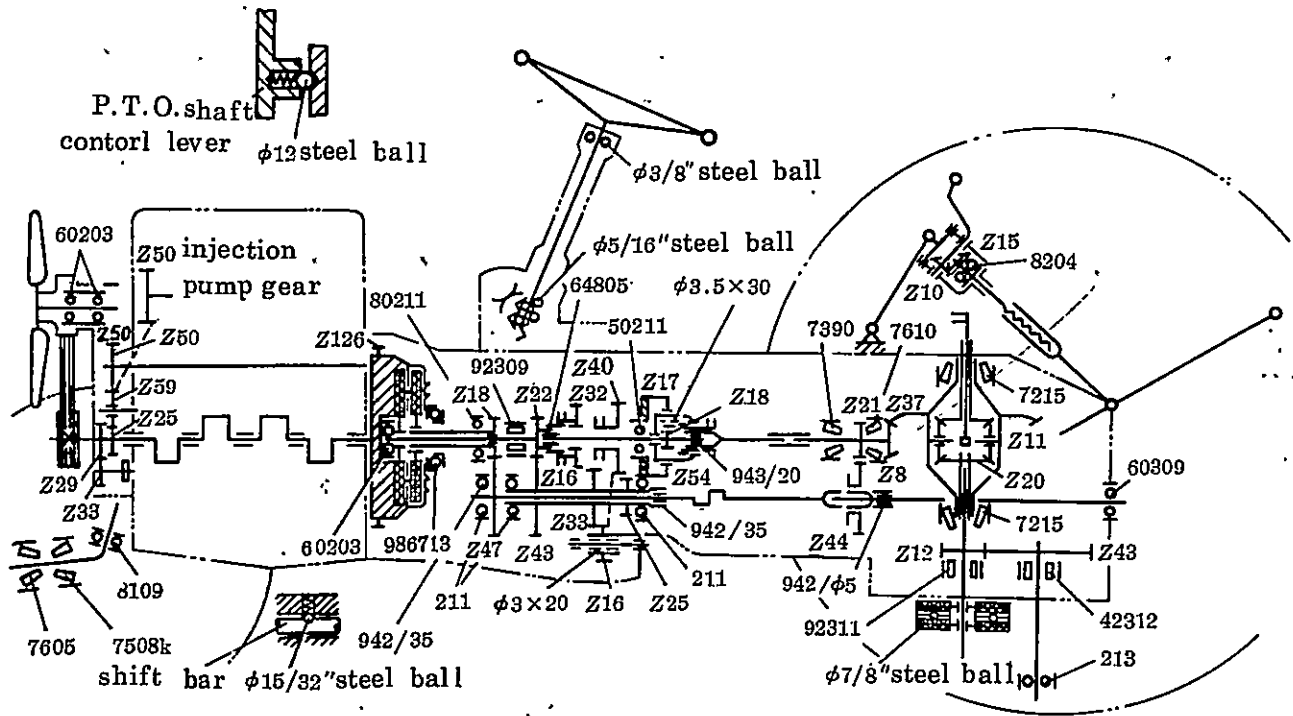
Serial No.	Code	Name and Dimension of Seals	Mounting Position	Quantity
1	HG4-692-67	Oil seal PD45×62×12	Bearing seat of driving gear shaft.	1
		Oil seal PD60×90×12	Rear axle shaft.	4
		Oil seal PD75×100×12	Rear axle shaft.	4
			P.T.O. shaft (540/100 r.p.m.).	2
		Oil seal PD50×72×12	P.T.O. shaft, rear axle housing.	1
		Oil seal PD55×85×12	Brake housing (L.H.& R.H.).	4
		Oil seal PD 40×62×12	R.H. brake cover plate.	1
		Oil seal SD50×70×12	Front final reductor.	2
		Oil seal SG45×65×12	Bearing seat of driving bevel gear, front axle.	2
		Oil seal PD30×50×10	Oil seal seat, transfer box.	2
		Oil seal PD20×40×10	Guider of steering cylinder.	1
Oil seal W40×52×7	Steering knuckle, front axle.	2		
2		Oil seal PD29.5×40×10	P.T.O. clutch shaft.	2
	45-40139	Oil seal PD32.5×45×7	Steering box and side cover	2
	45-31156	Oil seal 60×85×14	Front wheel hub and front wheel support.	4
	45S-31127	Oil seal 74×100×12	Front axle shaft	2
	45S-31129	Oil seal	Front axle shaft.	2
	45S-31111	End oil seal	Seal ring seat	2
	45S-31150	Oil seal 83.5×112.5×6	Bearing seat of rear pivot shaft	1
	45S-31177	Oil seal 63.5×95×6	Bearing seat of front pivot shaft	1
45-31024	Oil seal 45×52×8	Bush of front pivot shaft and front wheel support.	4	
3	HG4-335-66	Y-Ring20×32×6	Guider of steering cylinder.	1
4	GB1235-76	O-Ring12×1.9	Sliding Valve assy.	2
		O-Ring13×1.9	Hose assy of steering cylinder	2
		O-Ring16×2.4	Control lever, hydraulic pump.	1
			Inlet pipe of steering.	3
			Pipe union of hydraulic tank.	1
		O-Ring 18×2.4	Shift fork bar of P.T.O. shaft	2
		O-Ring 20×2.4	Fork assy of transfer box	2
		O-Ring 22×2.4	Outlet of steering pump	1
		O-Ring 24×2.4	Inlet of steering pump	1
			Inlet and outlet joints of hydraulic oil tank.	2
		O-Ring 26×2.4	Differential lock control shaft	1
		O-Ring 30×3.1	Differential lock control lever.	2
			Front pivot shaft.	1
		O-Ring 38×3.5	Link of plunger.	1
		O-Ring 50×3.1	Guider of steering cylinder.	1
O-Ring 55×3.1	Outer sleeve assy.	1		
	Quadrant assy	1		

4	O - Ring 60 × 5.7	Rocker shaft.	2
	O - Ring 65 × 3.1	540/100rpm P.T.O shaft.	1
	O - Ring 85 × 3.1	Bearing seat of driving bevel gear.	1
	O - Ring 90 × 3.1	Cover of front final reductor.	2
	O - Ring 100 × 5	Bearing seat of P.T.O. shaft.	1
	O - Ring 110 × 3	Front axle housing.	2
		Bearing seat of driving bevel gear.	1
	O - Ring 115 × 3.1	Seal seat of 540/1000rpm P.T.O. shaft.	1
	O - Ring 120 × 3.1	Bearing seat of P.T.O. shaft.	1
	O - Ring 135 × 3.1	Transfer housing.	1
	O - Ring 150 × 3.1	Bearing housing bracket differential axle shaft.	2
	O - Ring 180 × 5.7	Bearing housing bracket 540/1000rpm P.T.O. shaft.	1

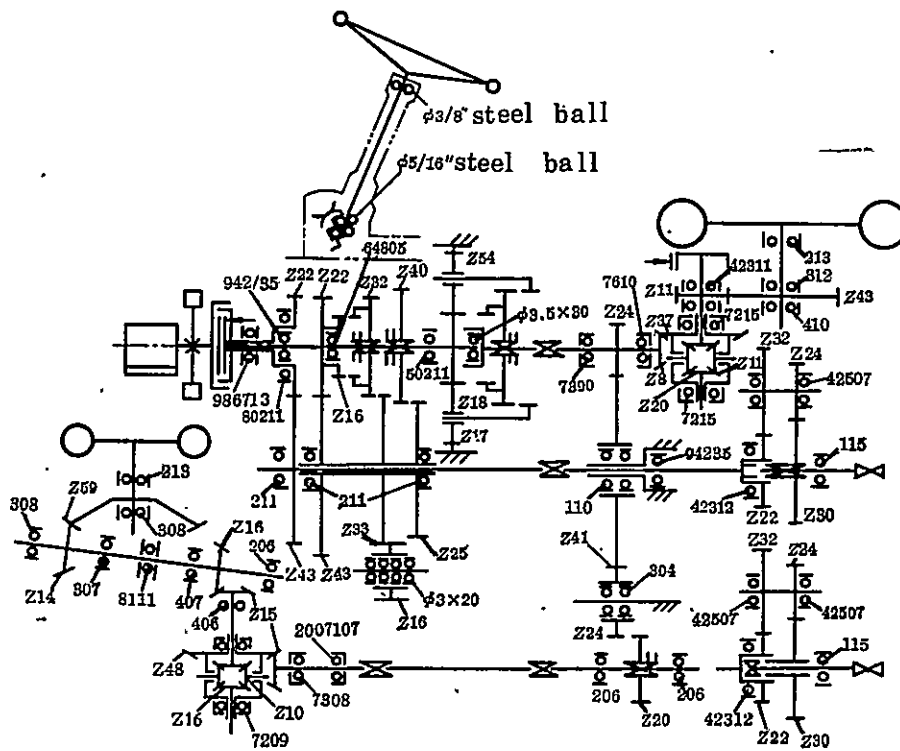
5. Table of astening Torque for Main Screws and Nuts

Serial No.	Mounting Position	Fastening Torque (Nm)
1	Lock nut, steering drag link (front and rear).	15 - 25
2	Bolts, front final reductor or housing and cover.	30 - 50
3	Bolts, front final driven gear and disc.	45 - 55
4	Bolts, engine and transmission housing.	60 - 80
	Bolts, gear box and rear axle housing.	
	Bolts, rear axle housing and rear axle shaft housing.	
	Bolts, rear axle housing and hydraulic lift cover.	
	Bolts, front wheel support and outer axle tube.	
	Bolts, cross bar bracket and final reductor housing.	
	Bolts, front axle shaft housing and king pin casing.	
	Bolts, front axle shaft housing and differential support.	
	Bolts, differential support and bearing housing of driving bevel gear.	
	Bolts, front pivot shaft and front axle shaft housing.	
5	Bolts, front axle bracket and engine.	90 - 120
	Bolts, rear axle housing and drawing bracket	
	Bolts, hydraulic lift cover and hydraulic cylinder.	
	Bolts, front axle bracket and bearing seat of pivot shaft.	
6	Bolts, front wheel rim and disc.	100 - 140
7	Bolts rear wheel rim and disc	120 - 140
	Bolts, rear differential case and driven spiral bevel gear.	
	Bolts, steering arm or connecting arm and front final reductor housing.	
8	Bolts, front axle shaft, rear axle shaft and disc.	150 - 200

### 6. Schematic Diagram of Power Train



Model Shanghai 50 Tractor



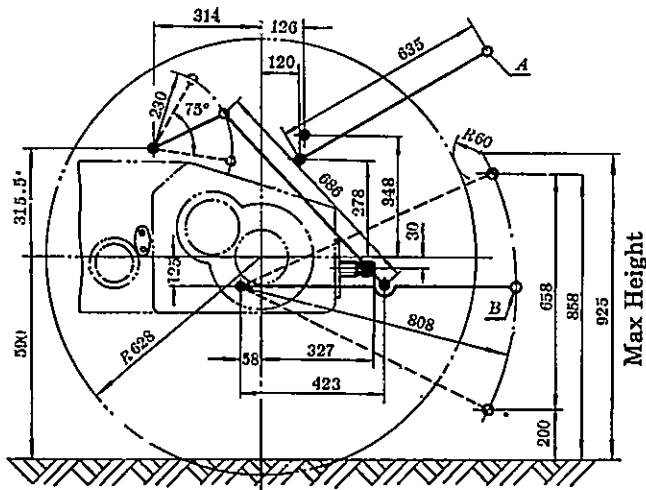
Model Shanghai 504 Tractor

### 7. Gear Table

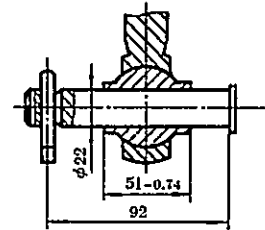
Ser. No.	Part No.	Description	Module	No.of Teeth	Pressure Angle	Spiral Angle & Direction	Tooth Modification displacement
1	45-37106	Gear,P.T.O. clutch shaft	3.5	18	20°		1.735
	45-37106-1	Gear,P.T.O. clutch shaft	3.5	22	20°		2.45
2	45-37108	Driving gear shaft	3.5	22	20°		2.45
3	45-37112	II, III speed sliding gear	3.5	32	20°		0.7853
4	45-37114	I reverse sliding gear	3.5	40	20°		-0.8
5	45-37127	I speed driving gear	3.5	25	20°		2.1
6	45-37133	II speed gear	3.5	33	20°		0.515
7	45-37134	Constant mesh gear	3.5	43	20°		-1.14977
8	45-37138	Power output shaft driven gear	3.5	47	20°		-0.485
	45-37138	Power output shaft driven gear	3.5	43	20°		-1.15
9	45-37132	Reverse gear	3.5	16	20°		0.8
10	45-37116	Gear, Transmission main shaft	2.5	18	20°		1.125
11	45-37166	Planet pinions	2.5	17	20°		1.112
12	45-37147	Planet ring gear	2.5	54	20°		0.588
13	45-38106	Driving spiral bevel pinion	8	8	20°	36°29' (L.H.)	
14	45-38110	Driven spiral bevel gear	8	37	20°	36°29' (R.H.)	
15	45-38124	Gear L.H. differential axle Shaft	6	12	20°		3.42
	45-38132	Gear R.H. differential axle Shaft	6	12	20°		3.42
	45S-38124-1	Gear L.H. differential axle	6	11	20°		4.26
	45S-38124-1	Gear R.H. differential axle Shaft	6	11	20°		4.26
16	45-38177	Final reduction gear	6	43	20°		2.10
	45S-38177	Final reduction gear	6	43	20°		5.028
17	45-38117-1	Differential side gear	5	20	20°		-1.75
18	45-38116	Gear transmission main shaft	5	11	20°		1.75
19	45S-38109	Driving gear	3.5	24	20°		2.1
20	45S-38152	Intermediate gear	3.5	41	20°		-0.8
21	45-38502	P.T.O. shaft driving gear	3.5	22	20°		1.586
22	45-38507	Intermediate gear(1)	3.5	32	20°		
23	45-38508	Intermediate gear (2)	3.5	24	20°		1.59

24	45-38518	P.T.O. shaft driven gear	3.5	30	20°		
25	45S-42111	Intermediate gear, transfer box	3.5	24	20°		2.1
26	45S-42115	Sliding gear, transfer box	3.5	20	20°		0.08
27	45S-31119	Driven gear, central drive	6	16	20°		
28	45S-31112	Final reduction driving gear (R.H.)	5.5	14	20°	6°(R.H.)	
29	45S-31116	Final reduction driving gear (L.H.)	5.5	14	20°	6°(L.H.)	
30	45S-31130	Final reduction driven gear (R.H.)	5.5	59	20°	6°(L.H.)	
31	45S-31133	Final reduction driven gear (L.H.)	5.5	59	20°	6°(R.H.)	
32	45S-31142	Driven bevel gear	4.2	48	20°	32°33'43" (R.H.)	
33	45S-31145	Differential pinion	5	10	20°		
34	45S-31146	Differential side gear	5	16	20°		
35	45S-31155	Driving bevel gear	4.2	15	20°	32°33'43" (L.H.)	
36	45S-31166	Driving gear, central drive	6	15	20°		
37	45S-36131	Driving pinion of levelling box	2.5	10	20°		
38	45S-56130	Gear on shaft of levelling box	2.5	15	20°		

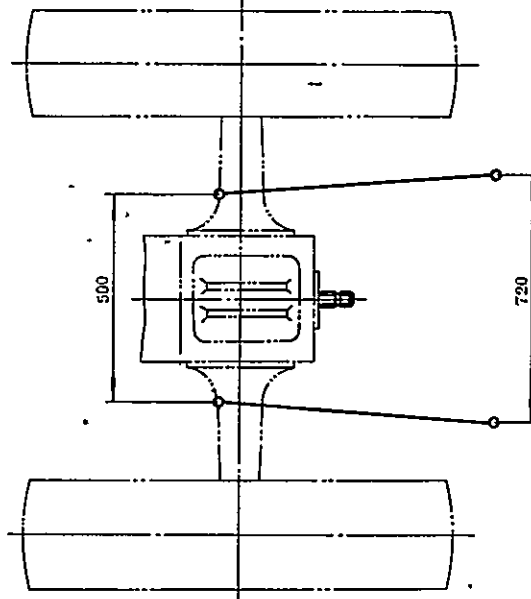
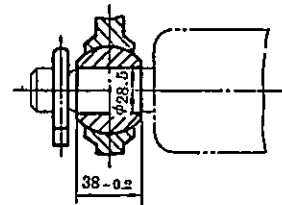
## 8. Dimension of Hydraulic Hitch



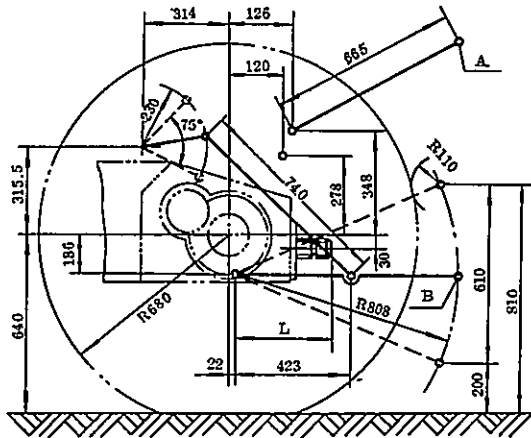
Point A Linking Scheme



Point B Linking Scheme



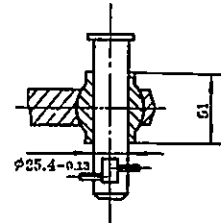
Model Shanghai 50 Tractor



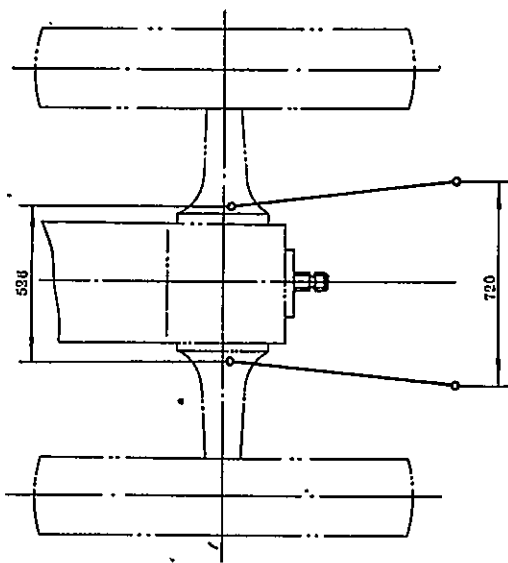
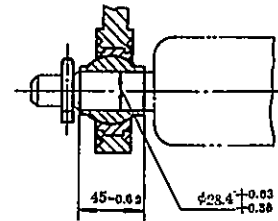
L = 297 (P.T.O. 1000r/min)

L = 300 (P.T.O. 540r/min)

Point A Linking Scheme



Point B Linking Scheme



Model Shanghai 504 Tractor





Address: 1050, Xiangyin Road, Shanghai, China

Telephone: 480906

Cable Address: 8230