

OPERATION MANUAL

FOR

SHANGHAI - 50 TRACTOR
SHANGHAI - 504 TRACTOR

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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	245×10^3	147×10^3
rear wheels	137×10^3	137×10^3
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 ³	
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	
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 ^{Breaking} 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^{are} 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	5	6	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^{utes}. 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

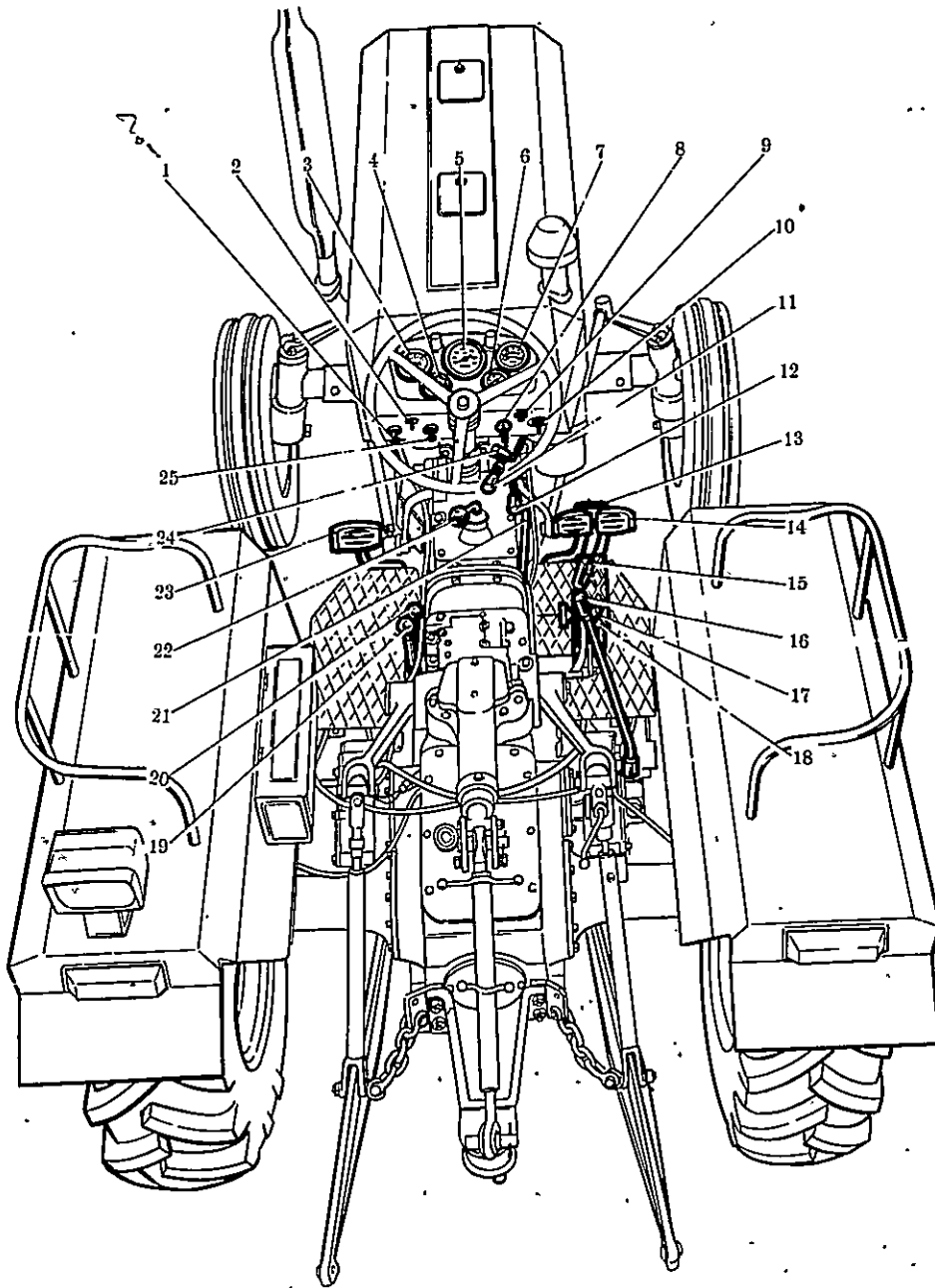


Fig 3-1 Controls, instruments and switches

1. dual-position switch; 2. turn signal light switch; 3. ammeter; 4. air pressure gauge; 5. *Tachometer* 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.

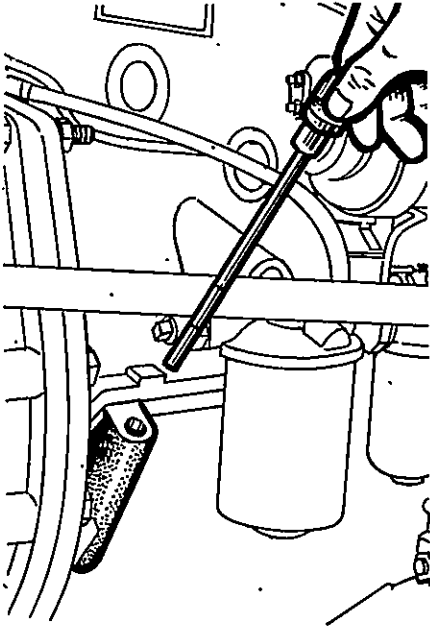


Fig. 3-2
Checking the oil level
in the engine sump

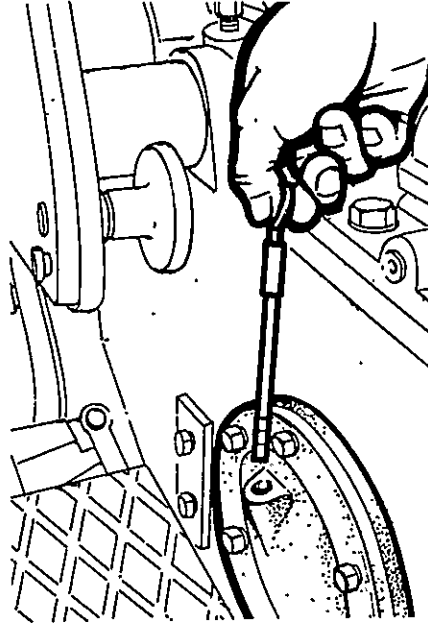


Fig 3-3
Checking the oil level
in transmission/rear axle housing

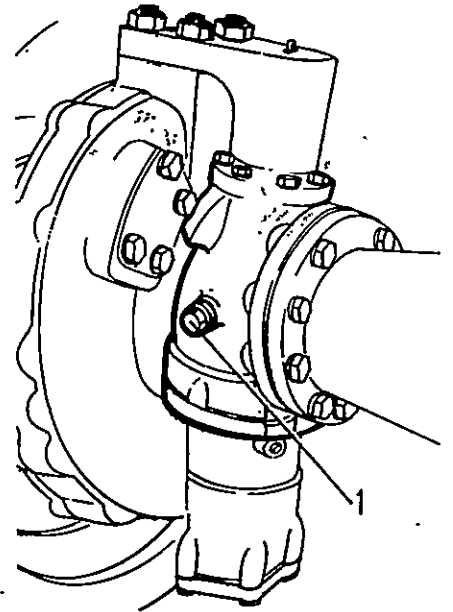


Fig 3-4
Checking the oil level
in the front axle housing

- 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)

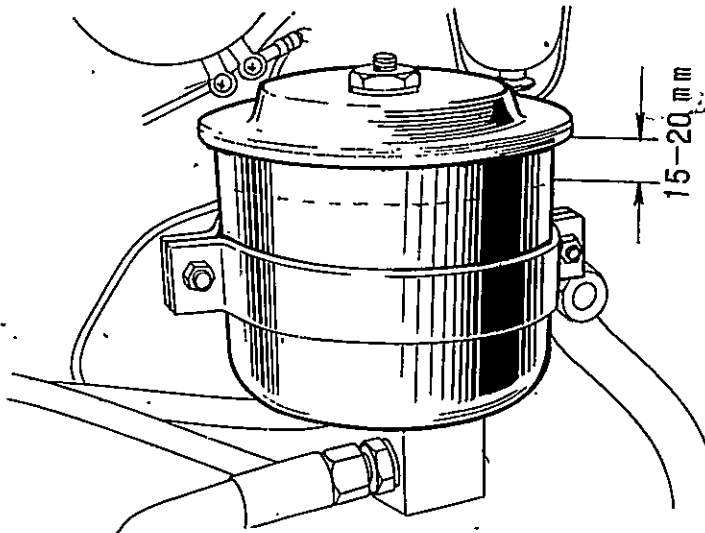


Fig. 3-5 Checking the oil level in the oil container of power steering.

- 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)

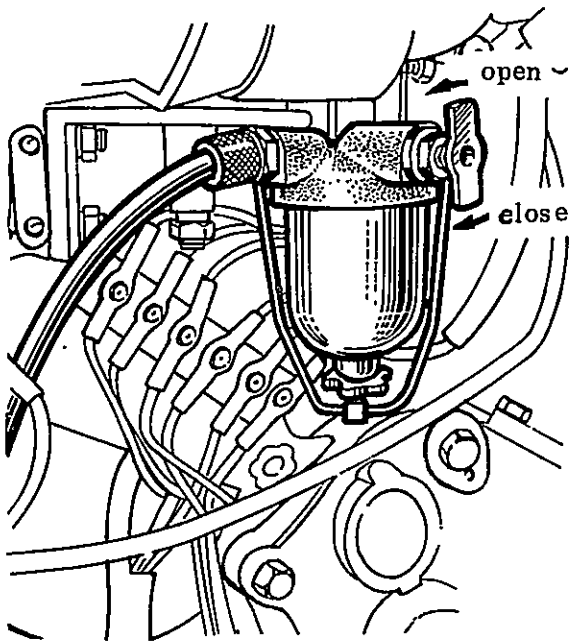


Fig. 3-6
Direction of the cock
of the sediment cup

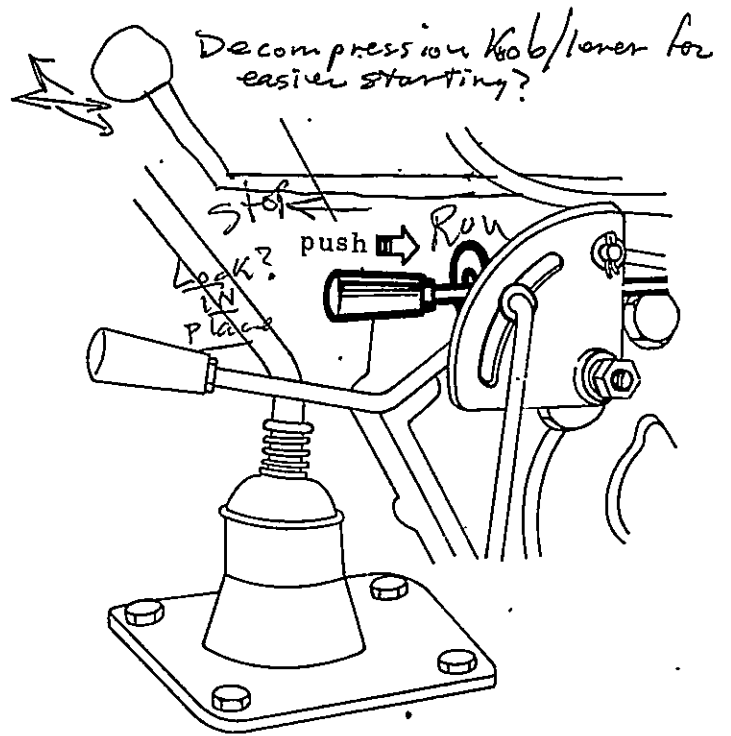


Fig. 3-7
Position of the engine
stopping lever

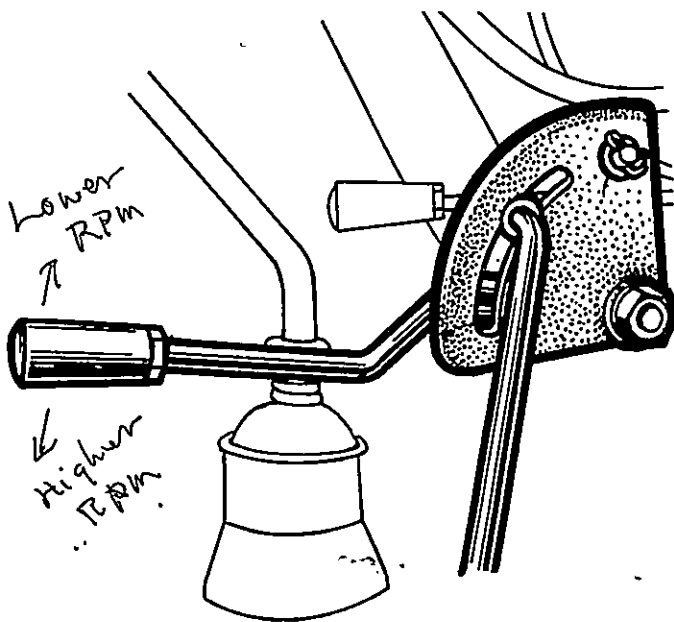


Fig. 3-8
Control of the hand throttle

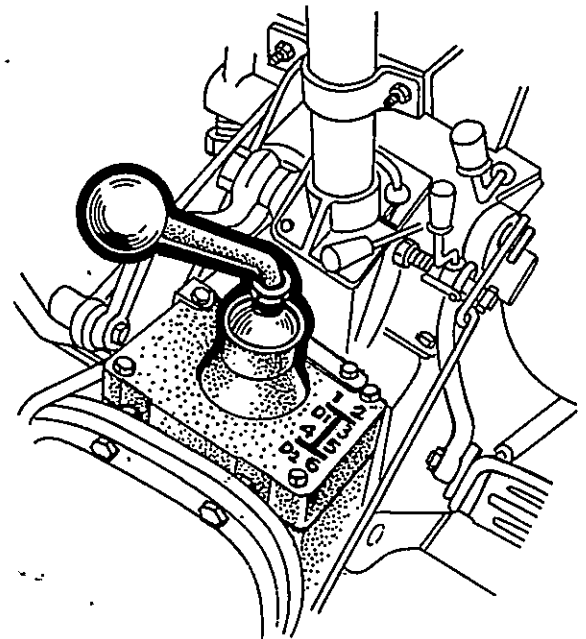


Fig. 3-9
Position of the shift lever
of the gear box