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ZETOR

8011 • 8045 • 12011 • 12045

OPERATOR'S MANUAL

Dear Owner of the New Tractor,

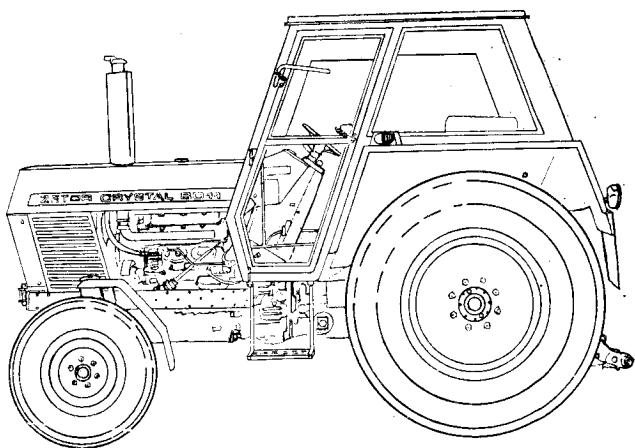
We are submitting to you a manual containinig many important items of advice for a good operation, exploitation and maintenance of the tractor. By observing all instructions given in the present manual you will ensure a trouble-free performance, safe travel, economical exploitation and a long life of your tractor.

Since our products keep on being improved, texts and figures may not always be identical with the machine supplied. All data on tractor weights referred to in this manual are solely informative.

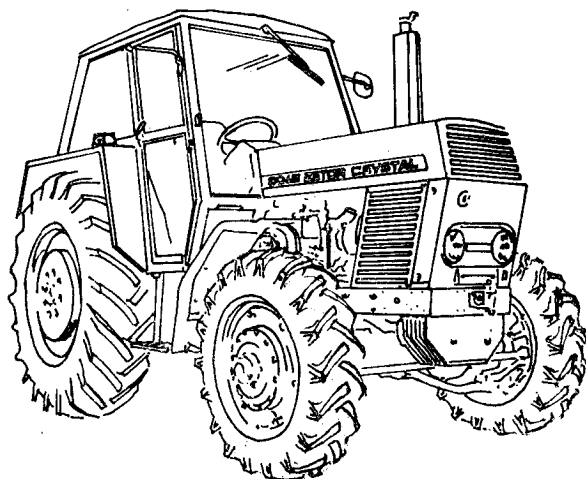
ZETOR

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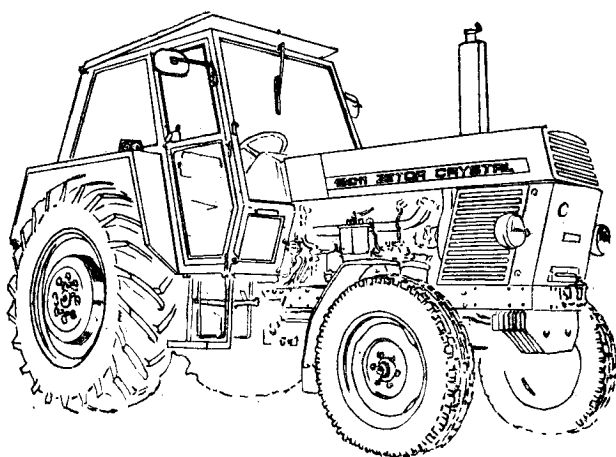
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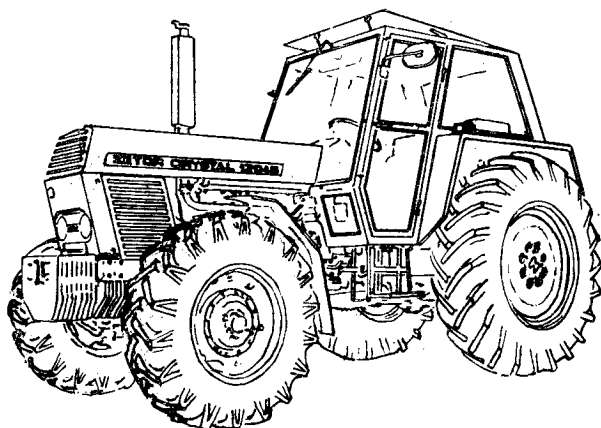
ZETOR 8011



ZETOR 8045



ZETOR 12011



ZETOR 12045

SPECIFICATIONS

Z 8011 Z 8045 **Z 12011** **Z 12045**

I. Engine

Model	Z 8001	Z 8601
Type	4-stroke direct injection Diesel	
Cylinders	4	6
Bore	110 mm	110 mm
Stroke	120 mm	120 mm
Compression ratio	17 : 1	17 : 1
Engine power output	55,2 ÷ 58,8 kW (75—80 hp)	81 ÷ 88,3 kW (110—120 hp)
Cylinder liners	wett	
Cylinder head	common for all cylinders	
Work sequence of cylinders	1, 3, 4, 2	1, 5, 3, 6, 2, 4
Nominal revolutions	2200 rpm	
Injection timing	24°+2° before TDC	
Injection pressure	15.7 MPa (160 atm)	
Nozzles	DOP 150 S 525 - 1402	
Air cleaner	VTCP 350 (COL 350)	VTCP 500
Cooling system	liquid forced feed with thermostat	
Oil pump	geared	
Oil filter	centrifugal, full-flow type	

Fill up Data:

Engine	10 litres	18 litres
Injection pump	0,3 litres	0.37 litres
Air cleaner with oil filling	1.8 litres	—
Gearbox	50 litres	
Rear half-axle	8 litres	
Power-assisted steering	8 litres	
Front axle main transmission housing	3.5 litres	
Front wheel reducers	2×1.25 litres	

Z 8011 Z 8045 Z 12011 Z 12045

Cooling system

without heating 18 litres 23 litres

with heating 20 litres 25 litres

Brake fluid tank 0.2 litres

Fuel tank 90 litres 130 litres

Engine weight 480 kg 580 kg

II. Clutch

single-disc, dry

III. Gearbox

4 road speeds, 4 reduced speeds and 4 reverse speeds. In the case that the tractor is provided with a torque multiplier, the number of speeds is doubled.

Speeds:

Higher speed range tyre 16.9/14-34 tyre 18.4/15-34

1st speed 6.92 km/h 7.16 km/h

2nd speed 10.91 km/h 11.28 km/h

3rd speed 17.34 km/h 17.93 km/h

4th speed 24.68 km/h 25.5 km/h

Reduction ratio 2.917

Lower speed range

1st speed 2.37 km/h 2.45 km/h

2nd speed 3.74 km/h 3.86 km/h

3rd speed 5.94 km/h 6.14 km/h

4th speed 8.46 km/h 8.75 km/h

Reverse gear (speeds)

1st speed 3.25 km/h 3.36 km/h

2nd speed 5.11 km/h 5.28 km/h

3rd speed 8.14 km/h 8.4 km/h

4th speed 11.57 km/h 11.95 km/h

IV. Steering

Power-assisted steering fitted

V. Brakes

Foot brakes	disc-type, dry, controlled by ball expanding mechanism with power-assistance, double pedal control,
Hand brake	disc-type, mechanically controlled, braking effect compensation

VI. Power Take-off Drive

Standard	540 rpm at 2200 rpm of engine in
PTO speed	Z 8011, Z 8045
	540 rpm at 1900 rpm of engine in
	Z 12011 and Z 12045
	1012 rpm at 2200 rpm of engine in
	Z 8011, Z 8045, Z 12011 and Z 12045

VII. Hydraulic System

	Z 8011	Z 8045	Z 12011	Z 12045
Operating pressure	14,7 MPa (150 kp/cm ²)			
Hydraulic pump capacity at 1870 rpm and pressure 14.7 MPa	31 litres/min			
Hydraulic piston pump capacity at 1000 rpm PTO and pressure 17.6 MPa	3.8 litres/min			
Lifting power at lower link extremity	21.6 kN (2200 kp)	33,3 kN (3400 kp)		

VIII. Electrical System

Storage battery	2×12 V		
Alternator	14 V, 35 A		
Voltage regulating relay	14 V		
Starter	12 V/3 kW (4hp)	24 V/4.4 kW (6 hp)	
Switch of the batteries	—	12 V/24 V	

IX. Tyre Sizes

Front tyre	7.50-20	11.2/10-24	7.50-20	14.9/13-24
Rear tyre standard	13.6/12-36	13.6/12-36	18.4/15-34	
Rear-optional	16.9/14-34	16.9/14-34		

X. Main Dimensions and Weights

	Z 8011	Z 8045	Z 12011	Z 12045
Overall length (without towed implement hitch)	3945 mm		4255 mm	
Overall width (rear wheel track - standard, without ballast weights)	1930 mm		1965 mm	
Ground clearance	420 mm		445 mm	
Swinging draw-bar height in basic position	427 mm		447 mm	
Wheel base	2385 mm		2695 mm	
Front wheel track	adjustable to 4 positions up to			
Z 8011 and Z 12011	1350—1800 mm (each 150 mm)			
Z 8045 and Z 12045	rigid 1500 mm		rigid 1710 mm	
Rear wheel track				
13.6/12-36 — adjustable from - to (each 75 mm)	1350—1875 mm		—	—
16.9/14-34 — adjustable by disc rotation	1500—1725 mm		—	—
18.4/15-34 — adjustable by disc rotation	—	—	1500—1720 mm	
Overall height measured to top of exhaust pipe	2350 mm		2470 mm	
Front axle ballast weights				
Basic I (7 pcs)	200 kg		140 kg (5 pcs)	
Basic II (7 pcs)	160 kg		160 kg	
Additional (4 pcs)	120 kg		120 kg	240 kg (8 pcs)
Rear wheel ballast weights				
Basic - 2 pcs + 12 discs	390 kg		390 kg	

	Z 8011	Z 8045	Z 12011	Z 12045
Water filling in rear tyres approx.	500 kg		500 kg	
Maximum tractor weight incl. all ballast weights, cab but without water in tyres	4570 kg	5020 kg	4910 kg	5720 kg
where:				
weight of				
— front axle	1780 kp	2310 kp	1860 kp	2610 kp
— rear axle	2790 kp	2710 kp	3050 kp	3110 kp

XI. Power

Maximum traction power with additional ballast weights and water in rear tyres with implement height of 815 mm on concrete	41 kN	43 kN	43 kN	48,5 kN
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DESCRIPTION OF THE TRACTOR

- Switch box with key (Fig. 1/1)

With fully inserted key

position 0 — starting circuit, windscreen wipers, fan of heating system, ceiling light, charging pilot lamp (which is off when the engine is running) are switched on;

position 1 — both side and tail lights as well illumination of instruments (through the switch) are on;

position 2 — high beam, pilot lamp of the high beam and tail lights are on;

position 3 — dim lights and tail lights are on.

With the key half inserted — circuits of the positions 1, 2 or 3 can be switched on.

- Dashboard illumination switch (Fig. 1/2)
- Starter push button (Fig. 1/3)
- Trafficator switch with electric horn push button (Fig. 1/4)

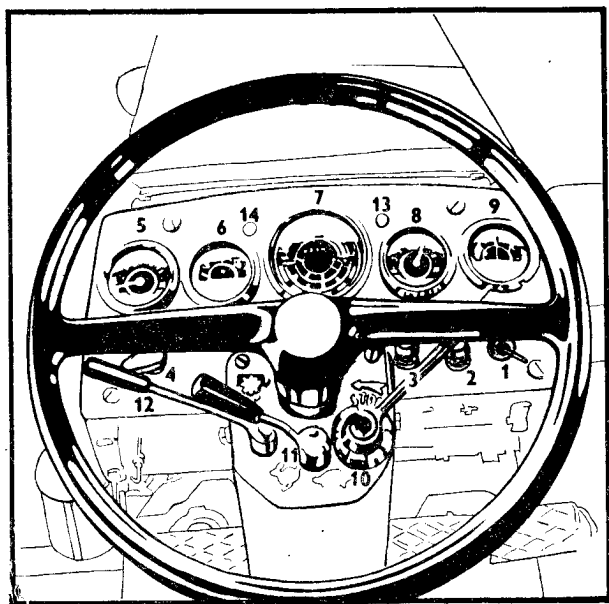


Fig. 1

The operation of direction indicators is checked by green pilot lamps.

Caution: a) A defect of any direction indicator of the tractor is signalled by the change of flashing frequency.

b) A defect of any direction indicator of the trailer is signalled by switching off the pilot lamp. For technical reasons the inspection of the operation of trailer direction indicators could be solved in such a way that in the case of switching off the pilot lamp, the defect is on the other side than on that where the trafficator switch is just being switched on.

- Oil pressure gauge (Fig. 1/5) — a correct oil pressure varies within the range from 0.2 to 0.55 MPa
- Wather thermometer (Fig. 1/6) — operating temperature shall vary within the range from 80 to 95° C (overpressure radiator plug opens the cooling circuit at 106° to 111° C)
- Engine hour counter with speed indicator (Fig. 1/7)
- Air pressure (Fig. 1/8) — operating pressure 0.6 MPa
- Ammeter (Fig. 1/9)
- Fuel delivery hand control lever (Fig. 1/10)
- Torque multiplier control lever (Fig. 1/11)

If the control lever is in its rear position (towards the operator), the torque multiplier is engaged (turtle). If the control lever is in its forward position (in the sense of the travel direction), the torque multiplier is disengaged (hare).

Caution: In case of a torque multiplier defect (torque multiplier slippage — the tractor does not move), shift the torque multiplier control lever in the position „turtle” (until the defect is removed).

- PTO clutch control lever (Fig. 1/12) — engaging
- If the control lever points rearwards (towards the operator) — the PTO clutch is engaged (the brake is disengaged). If the control lever points forwards (in the travel direction) — the PTO clutch is disengaged (the brake is engaged).

- Air pressure pilot lamp is red and whenever the air pressure drops below 65% of the predetermined pressure it is switched on (only on Z 12011 and Z 12045) (Fig. 1/13)
- Pilot lamp of torque multiplier oil pressure is red and whenever the oil pressure drops below 0.8 MPa it is switched on (Fig. 1/14 — Z 12011 and Z 12045 — optional)
- Work searchlight switch (Fig. 2/1)
- Fitting lamp socket (Fig. 2/2)
- Radiator shutter control (Fig. 2/3)
- Fuse box (Fig. 2/4)
- Tractor identity plate (Fig. 2/5)
- Front windscreen wiper push button (Fig. 3/1)
- Front windscreen wiper tank (Fig. 3/2) — fill with anti-freeze in winter

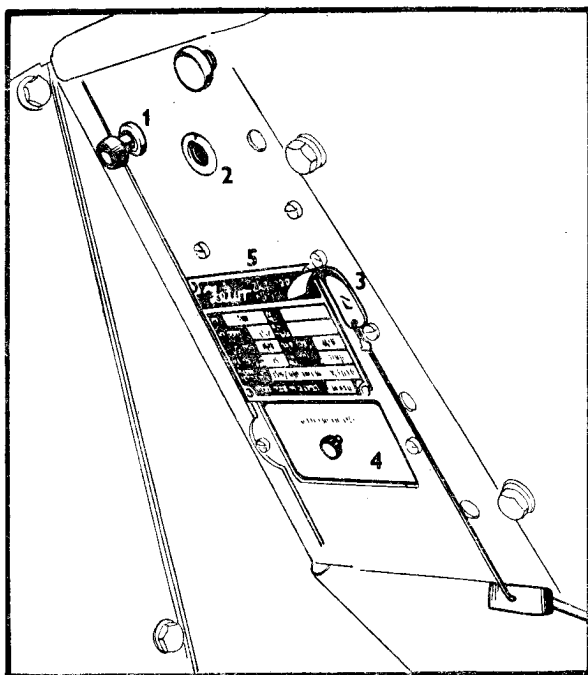


Fig. 2

- Rear windscreen wiper switch (Fig. 3/3)
- Front windscreen wiper switch (Fig. 3/4)
- Cab ceiling lamp switch (Fig. 3/5)
- Heating system and cab ventilation switch (Fig. 3/6)
- Remote control of hot water heating system water tap (Fig. 3/7). If the heating system is in operation, the tie rod shall be in its slid-in position.
- Flap valve of the delivery branch of the heating system fan. When heating the tie rod shall be in its slid-in position (Fig. 3/8).
- Tumbler switch (Fig. 3/9) disconnects electric power supply from the storage battery to the switch box. Electric power disconnecting is carried out by turning the switch lever to the right (upwards). The lever can be taken out.
- Hand brake lever (Fig. 4/1)

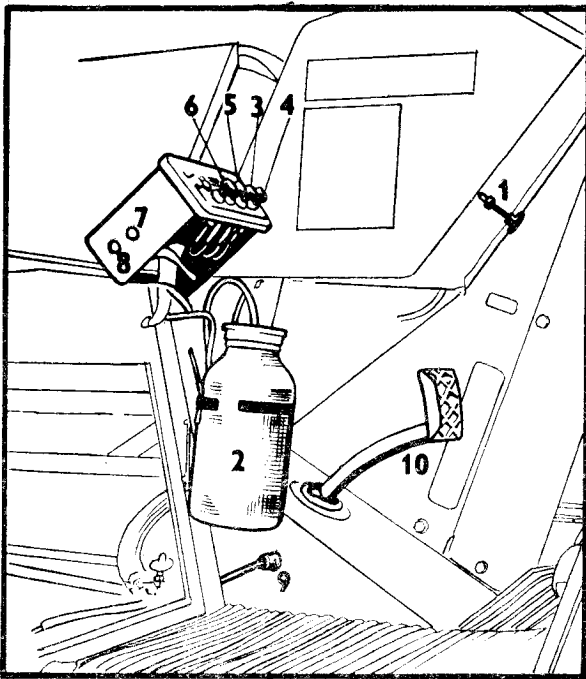


Fig. 3

- Shifting lever of dependent and independent PTO revolutions (Fig. 4/2)
 - Lever position: forwards — independent revolutions of PTO 540 or 1000 rpm;
 - central — neutral
 - backwards — dependent revolutions of PTO (not fitted at present)
- Gear shifting lever of speeds 1, 2, 3, 4 (Fig. 4/3; Fig. 6/6)
- Attached implement control lever for single-axle trailer (Fig. 5/1)
- Throttle (Fig. 5/2) — controls the speed of starting the three-point linkage
- Clutch pedal (Fig. 3/10)
- Latched brake pedals (Fig. 6/1)
- Accelerator pedal (Fig. 6/2)
- Rear axle differential lock pedal (Fig. 6/3)

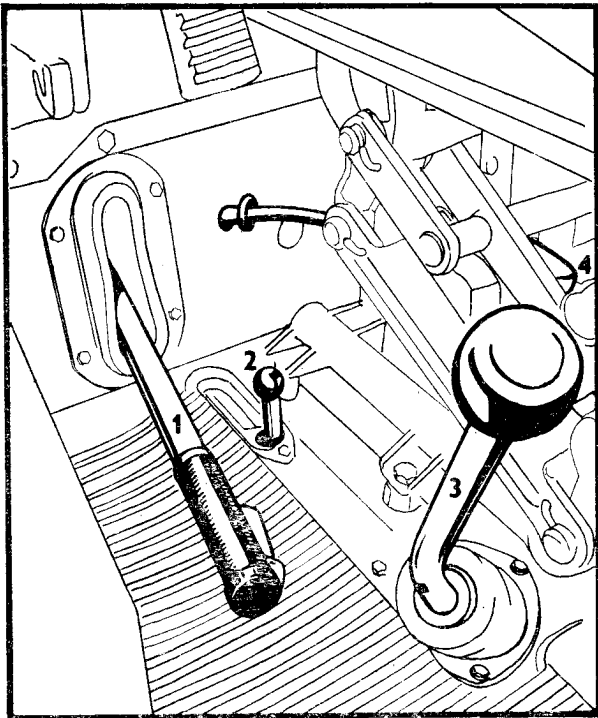


Fig. 4

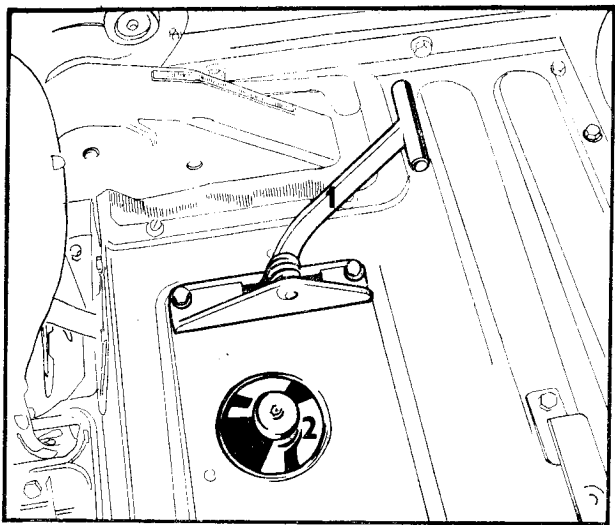


Fig. 5

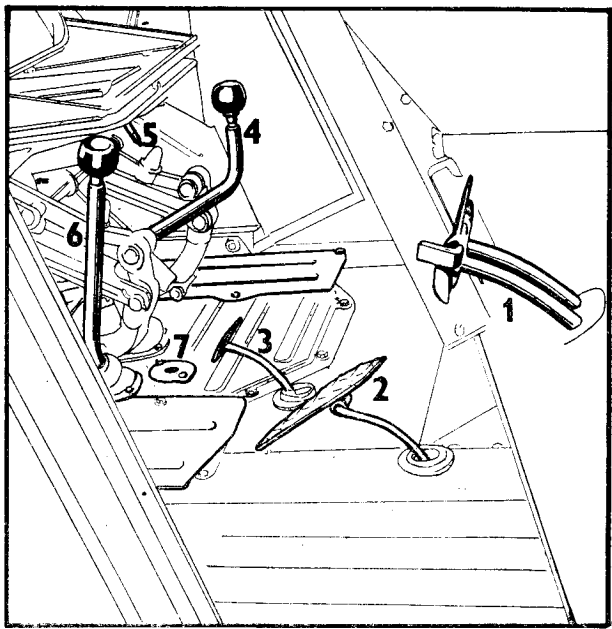


Fig. 6

- Road (travel), reduced speeds and reverse gear I, II, R shifting lever (Fig. 6/4)
- Aerolastic seat air filling valve (Fig. 6/5)
- Inner hydraulic circuit control lever — square-shaped (Fig. 7/1)

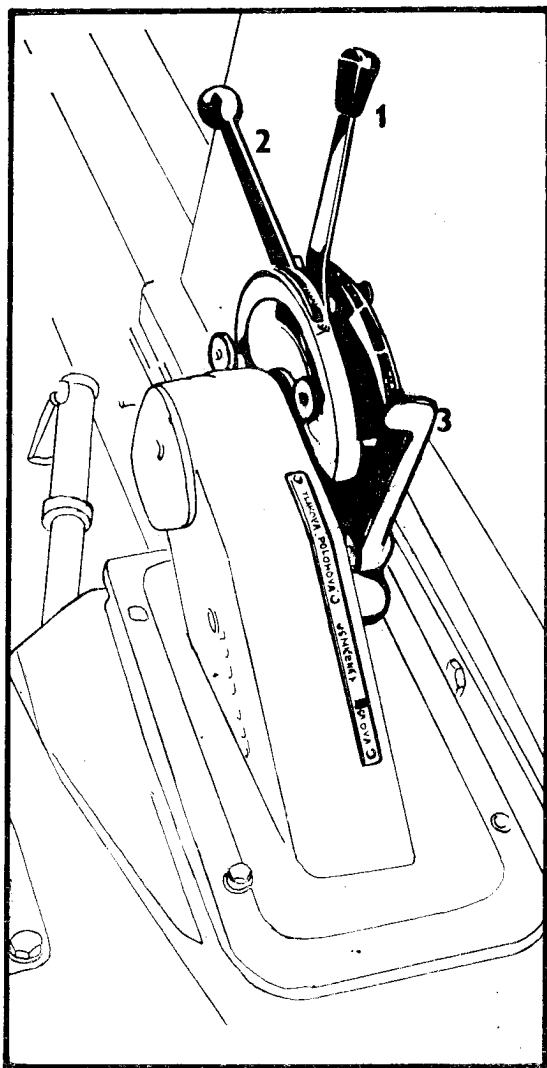


Fig. 7

- Outer hydraulic circuit control lever (Fig. 7/2)
- Hydraulic power-lift system selector (Fig. 7/3)
- Front drive engaging — by pulling out the bowden, the front drive is engaged (Fig. 8/1)

Gear shifting can be carried out at road (travel) and reduced speeds — both when tractor at rest and at travel.

- Hydraulic pump control lever (Fig. 9/1)

The engagement of the hydraulic pump shall be carried out when the engine at rest by unlocking the lever (by pulling up a little the locking pin in the cover) and shifting it in the position „engaged”. In the engaged position (in travel direction) the lever is held by a spring.

- Compressor control lever (Fig. 10/1)

The engagement of the compressor shall be performed while the engine at its minimum idle run by shifting the control lever downwards (to horizontal position).

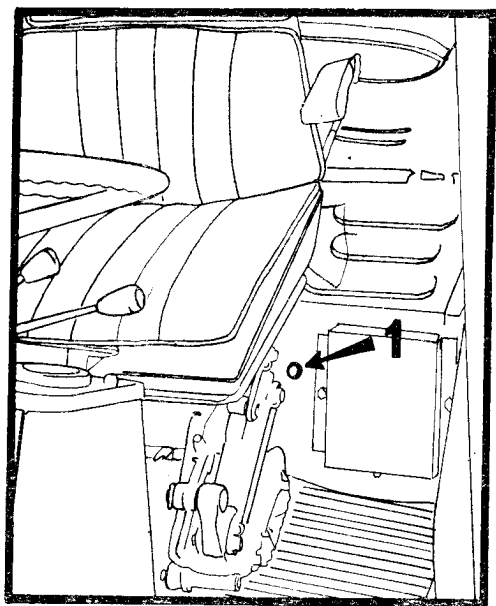


Fig. 8

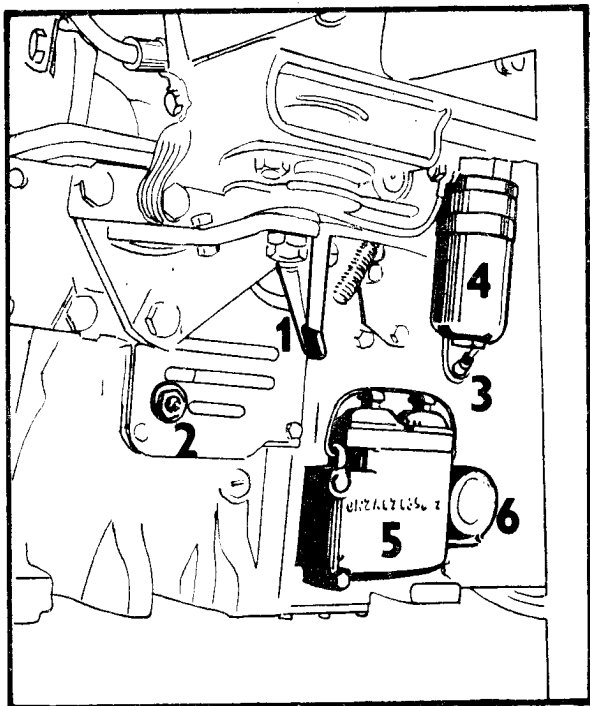


Fig. 9

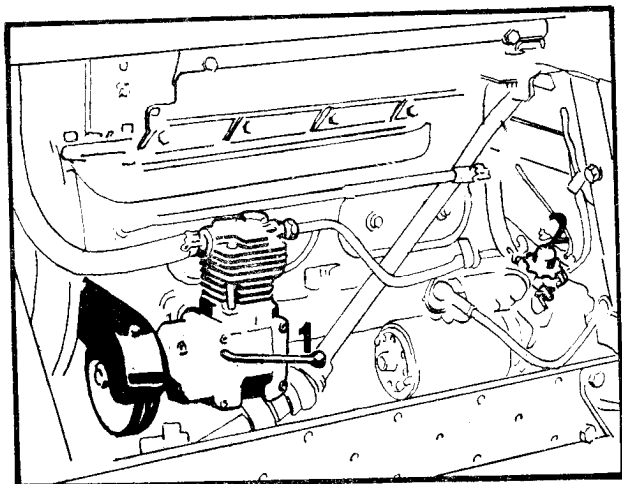


Fig. 10

- Seven-pole plug socket (Fig. 11/1) serves to connect the electrical equipment of the trailer or attached implement
- Air coupling hose (Fig. 11/2) interconnects the air system of the trailer or attached implement
- Quick couplings (Fig. 11/3) serve to attach trailer hydraulic cylinders

FILLING AND DRAINING PLUGS

- Fuel filling plug (Fig. 12/1)
- Cooling liquid (Fig. 12/2) filling plug — on Z 8011, Z 8045 the liquid is poured into an equalizer — up to half the height of this equalizer. On Z 12011, Z 12045 the cooling is poured directly into the radiator.

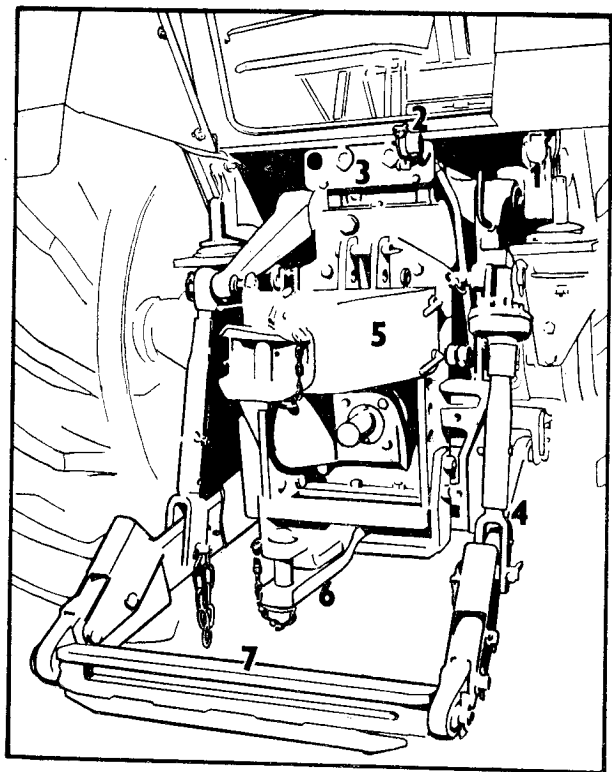


Fig. 11

- Engine oil filling plug (Fig. 13/1)
- Brake fluid tank filling plug (Fig. 13/2)
- Power-assisted oil tank filling plug (Fig. 13/3)
- Injection pump and governor oil filling plug (Fig. 13/4)
- Engine oil level indicator (Fig. 13/5)
- Gearbox and main transmission housing oil filling plug is located underneath the cover on floor (Fig. 6/7) — the plug serves as oil level indicator at the same time
- Rear axle body oil filling plug — the plug serves as oil level indicator at the same time (Fig. 14/1)
- Front wheel reducer oil filling plug on Z 8045 and Z 12045 (Fig. 15/1)
- Front drive axle body filling plug (Fig. 16/3)

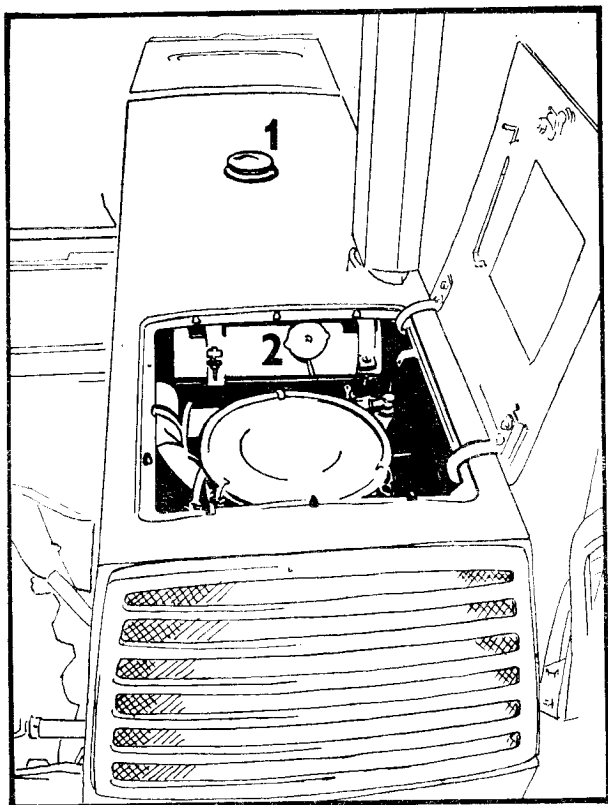


Fig. 12

- Heating system cooling liquid drain plug (Fig. 10/2)
- Engine block cooling liquid drain plug (Fig. 13/6)

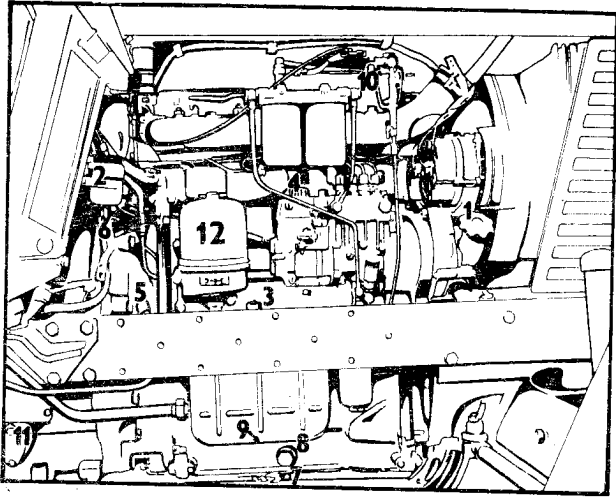


Fig. 13

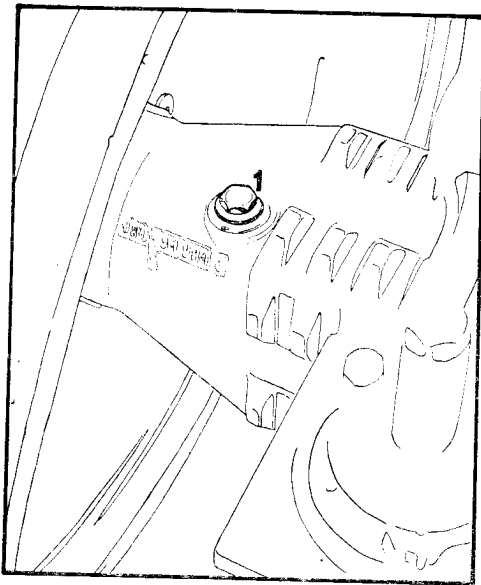


Fig. 14

- Engine pan (tank) water drain plug (Fig. 13/7 - Z 8011).
On Z 12011 exchanger water drain plug is involved.
- Engine pan (tank) oil drain plug — Z 8011, Z 8045
(Fig. 13/8) — Oil tank drain plug on Z 12011 and
Z 12045 is provided in the tank bottom.
- Power-assisted steering tank oil drain plug (Fig. 13/9)
- Fuel delivery tap — horizontal position, i. e. the supply
is closed
 - upward or downward position, i. e. the supply is open (Fig. 13/10)

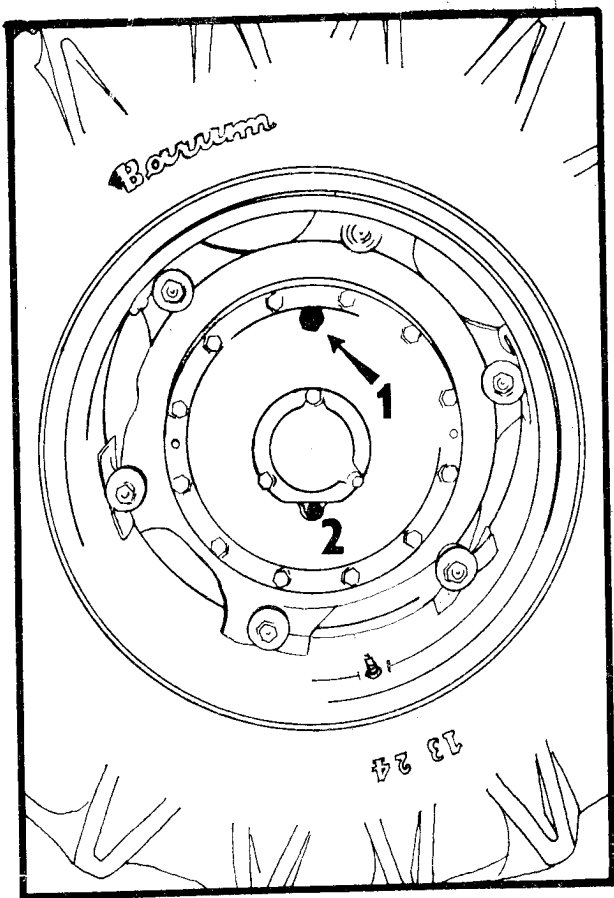


Fig. 15

- Main transmission housing and gearbox oil drain plug (Fig. 17/1)
- Rear axle body oil drain plug is located in the lower part of the body
- Front wheel reducer oil drain plug on Z 8045 and Z 12045 (Fig. 15/1); inspection plug (Fig. 15/2)
- Front drive axle body oil drain plug (Fig. 16/5)

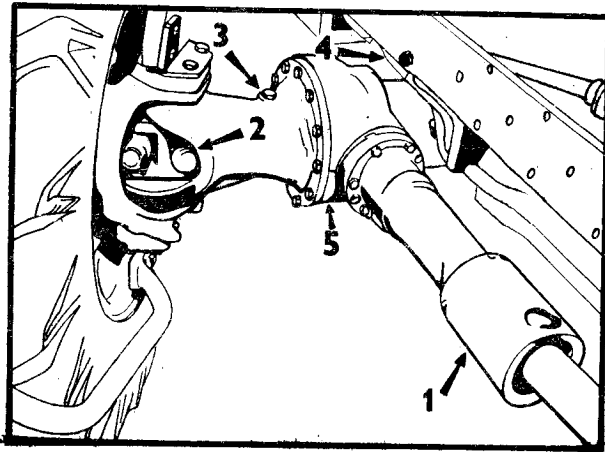


Fig. 16

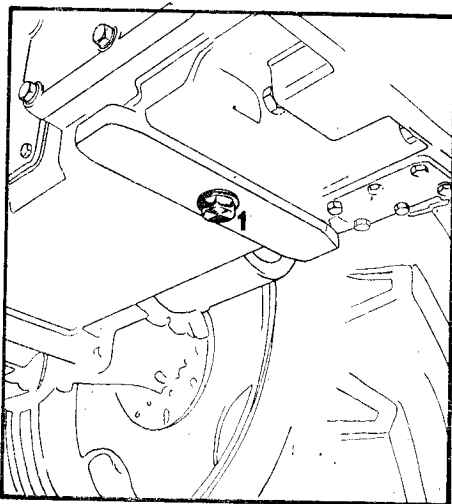


Fig. 17

Bleeding the Fuel System (Fig. 18)

1. Open the fuel tank tap to fill up the precleaner glass tank (Fig. 18/1) with fuel without any air bubbles.
2. Loosen fuel cleaner screw (Fig. 18/2) and operate manually the fuel delivery pump (Fig. 18/3) until fuel free from air bubbles flows out of either cleaner. Tighten the cleaner screw and keep on pumping manually for some time.
3. Loosen the bleeding screw (Fig. 18/4) on the fuel injection pump and pump manually until fuel escapes around screws without air bubbles. Keep on pumping and tighten gradually the bleeding screw of the fuel injection pump. After bleeding has finished, clean the engine from fuel.

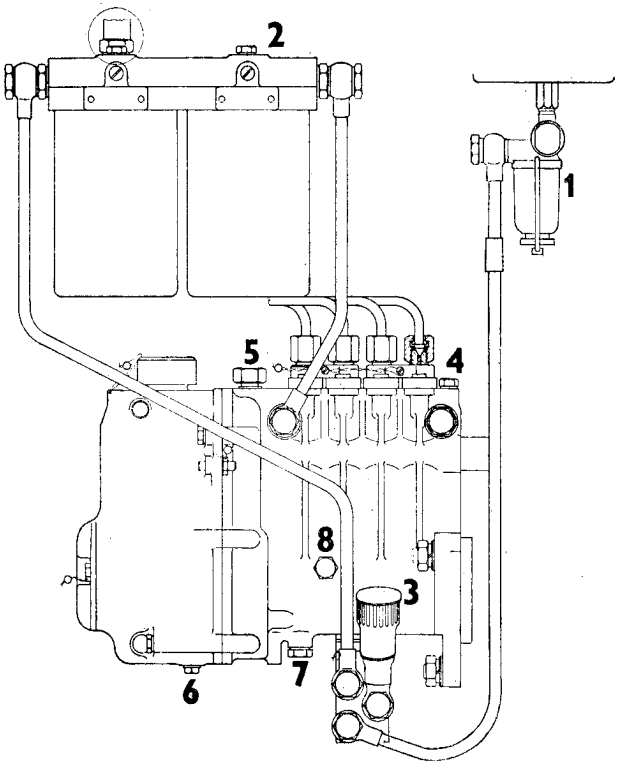


Fig. 18

Operator's Seat Aerolastic

The seat is cushion-type. The pressure in the diaphragm can be increased according to the operator's weight up to the maximum pressure of 0.25 MPa. In its longitudinal axis the seat is adjustable from its central position by 70 to 75 mm forwards or backwards.

Operator's Mate Seat (Fig. 19/4) is placed on LH side behind the operator. It can be tilted towards the mud-guard, if necessary.

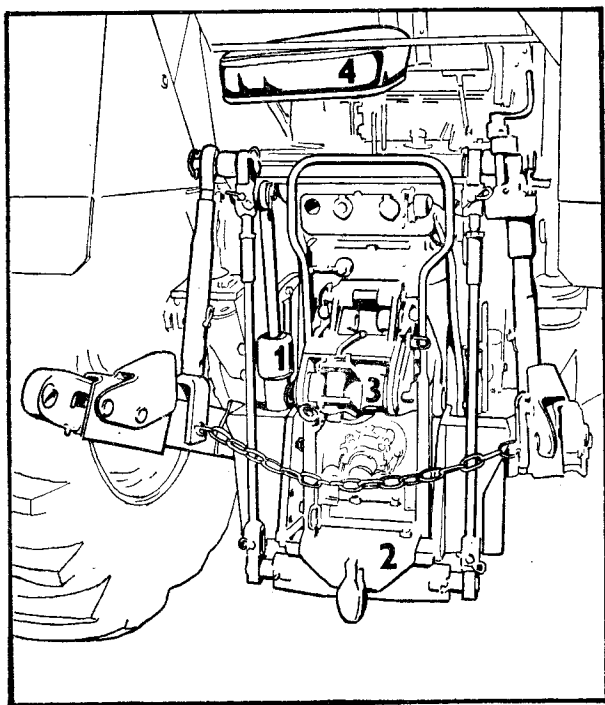


Fig. 19

ELECTRICAL SYSTEM

Storage Battery

Storage batteries are self-charging while tractor at travel. If the electric power consumption exceeds that supplied by alternator, it is necessary to re-charge the battery outside the tractor from time to time. Two sorts of storage batteries are used on tractors:

1. Dry — charged, designated with a green letter „N” pressed into the sealing compound on the surface of the battery.
2. Standard — without any designation.

The „dry — charged” battery differs from the „standard” one in the method of its first charging. Under operational conditions either sort is identical. Another difference between these two sorts of batteries resides. In that the „dry-charged” battery is provided with gaskets underneath cell plugs as soon as in the manufacturer’s workshop. These gaskets may be removed as late as immediately prior to putting the battery into operation.

Hints as to Battery Performance

When handling the battery bear in mind that the electrolyte is an alkali capable of injuring not only your sight, but also your skin etc. Use protective aids when handling the battery.

Remember that upon charging an explosive mixture is formed in the battery which explodes in contact with an open fire. The electrolyte in question is used at a predetermined density of 1.28 to 1.285, i. e. 32° Bé.

Later in operation top up the electrolyte with distilled water only. Refill with electrolyte only when it has evidently been poured out of the cell. Cells shall be refilled with distilled water prior to travel or charging outside the vehicle so as to ensure a proper mixing (with electrolyte). Electrolyte level shall be checked after two weeks in summer and four weeks in winter at the latest and kept maximum 5 mm above the perforated insert.

Caution: Since a change in battery type may occur, always follow the instructions of storage battery manufacturer attached to the tractor.

Starter

The starter maintenance is restricted to regular inspections where the following principles are to be observed:

1. Supply cable terminals shall be well tightened and slightly lubricated with grease in order not to corrode. Defective cables shall be replaced by new ones.
2. Check commutator, carbons and carbon thrust springs once half a year.
3. When a middle repair (MR) is involved, have the starter checked in a specialized service repair shop.

Alternator

There is practically no maintenance of alternators in operation. It is, however, necessary to observe the following instructions:

1. The battery shall always be connected by its minus pole to the earth, by its plus pole to the alternator outlet.
2. If you replace a part of the charging circuit — disconnect the battery.
3. Never short-circuit (nor at high speed) any alternator or governor terminal during operation.
4. It is not allowed to disconnect the battery under operational conditions.
5. Upon welding with electric arc on tractor disconnect all wires from the alternator and protect the wire „plus B" against a short-circuit.
6. It is not allowed to excite the alternator by using a source outside the alternator mains — such a regulating relay.
7. Replace at once a burned charging pilot lamp or a correct alternator excitation may not be ensured. When replacing use a pilot lamp having the same input.
8. Take care of a perfect electrical connection on connecting terminals and of a perfect earthing of both the alternator and the governor.
9. When washing and cleaning the tractor with oil, prevent water or oil penetration into the alternator.

Voltage Regulator

It is a vibration device operating when connected to alternator only. In case of any defect, do not disassemble it.

Storage Battery Switch (Fig. 4/4)

It serves as a short-time battery connection to 24 V on starting the tractors Z 12011 and Z 12045.

Preparing Tractor to Travel

Prior to start operating with the tractor check daily:

1. State of the steering system — if steering rods and linkage are in order, bolts and nuts tightened well, oil level in the tank O. K., power-assisted steering all right, toe-in correct.
2. Water amount in the radiator.
3. Fuel amount in the tank.
4. Brake fluid amount.
5. Oil amount.
6. Tightening of important joints (particularly discs, rims and the like).
7. Function of brakes — whether a resistance is felt when depressing latched or dislatched pedals.
8. State of electrical system — check lights, trafficators
9. Pressure in tyres.
10. After having started travelling check the efficiency of both the hand and foot brakes. Brake pedals should be latched.
11. When using the tractor for transport, check the tension of compressor drive V-belts.

Note: When checking refill immediately the necessary fillings to the predetermined amount. In the manufacturer's workshop the brake fluid tank is filled with the brake fluid SYNTOL HD 190 - green.

Starting the Engine

Before starting the engine make sure that the transmission gear lever (including preselection lever) as well as those of auxiliary drives are in their neutral positions and that the parking brake is on.

- Insert the ignition key in the circuit switch in the 0-position (the key is fully inserted).
- Depress the clutch pedal, shift the multiplier lever to the position „turtle" and shift the PTO shaft lever to neutral position.
- Open the throttle to its maximum.
- Press the starter button.

Caution: Do not start longer than 5 seconds.

If the engine fails to start immediately for the first time, repeat starting after 30 seconds only, particularly in winter. When the engine begins to stop, never use the starter to aid starting. Wait till the engine completely stops.

Starting the Engine in Winter

In cold weather it is advisable to preheat the engine with hot water so that lukewarm water flows out through the drain tap in the crankcase as well as from the bottom cover hole. To permanent temperature of -5°C standard engine Diesel oil 4 and the oil SAE 20 may be used, at permanently lower temperatures than -5°C it is necessary to use special winter Diesel oil 22 and the oil SAE 10 W/30. After the engine starts running, have it run at higher rpm and covered radiator (with its shutter) until the temperature rises to 50°C .

Tractor Starts Travelling

If your tractor is equipped with air-pressure brakes, wait until the air pressure on the air pressure gauge is minimum 0.45 MPa.

1. By means of the preselecting lever (preselector) located in front of the seat in the middle choose road speeds - II or reduced - I or reverse ones - R.
2. Reduce engine rpm to idling and depress the clutch pedal to its full travel.

Caution: Do not reduce the idling rpm below 600 to 700 rpm according to the speed indicator on the dashboard. When loading the engine to 300 rpm you run a risk of changing engine sense of rotation.

3. Engage the first speed gear by means of a control lever located beside the RH side of the operator's seat. If you do not succeed in engaging the first speed gear immediately, loosen the clutch a little and after the synchronizing brake stops braking, depress again the clutch and engage the first speed gear.
4. Let up slowly the clutch pedal, simultaneously depressing the accelerator pedal clutch increasing engine rpm.
5. When changing lower speeds to higher ones (e. g. the 2nd speed to the 3rd one) first depress the clutch pedal till it stops, simultaneously disengaging the gear shifting lever and shifting it to its neutral position. Wait a moment and finish shifting-in the desired speed gear engaging slowly the clutch. When shifting the gear with a double declutching of the clutch pedal, it is necessary to declutch the clutch pedal only for a short time and to finish the shifting of gear immediately. Gear shifting should be carried out smoothly and noiselessly.

if the tractor stands in a plane, release the hand brake, then slowly declutch the clutch pedal and increase engine rpm in such a way that the tractor starts to travel smoothly. If it stands on a slope, release the hand brake, simultaneously declutching the clutch pedal and increasing engine rpm.

6. Engaging the front drive of tractors Z 8045 and Z 12045 is carried out from the operator's seat by pulling the push button of distributor tie rod as far as the stop (stroke length is approx. 15 mm).

Engaging push button is placed in the oblique floor wall on the operator's LH side. Engaging may be carried out even while tractor at rest but the engaging of the front drive takes place as late as after the engine has been started until a necessary oil pressure is produced in the hydraulic circuit.

Running-in the New Tractor or the Tractor after its Complete Overhaul

1. Do not load the tractor nor engage any auxilliary drives for approx. 10 performance hours.
2. Do not load the tractor more than to its half output and do not have the engine run at its full rpm for the next 20 performance hours approximately. Use such implements only which do not overload the tractor (e. g. sowing machines, harrows, drags etc.).
3. For the next 20 performance hours (i. e. up to 50 engine hours) do not load the tractor more than to its $\frac{3}{4}$ output. Do not use hydraulic systems during the running-in period, i. e. up to 50 engine hours.

After first 50 performance hours of the tractor change oil in the engine and injection pump and clean the rotor of the centrifugal oil cleaner. At the same time clean the oil fine cleaner of the gearbox hydraulic circuit and the coarse cleaner of the hydraulic pump suction. In tractor engines Z 12011 and Z 12045 drain oil from engine oil exchanger.

After first 200 engine hours change oil in the gearbox and clean the fine cleaner of the gearbox hydraulic circuit and the coarse cleaner of the hydraulic pump section. Change oil in half-axes, reducers and the front drive axle housing and set up engine valve plays (0.3 mm) after tightening the cylinder head gasket by the tightening moment of 170 to 190 Nm.

TRACTOR HYDRAULIC SYSTEM

The hydraulic pump is located in the LH side of tractor intermediate housing and its control is carried out by means of a control lever (Fig. 9/1). The tractor Z 12011 and Z 12045 is also equipped with a single piston pump fitted in the hydraulic power-lift circuit. This pump is permanently engaged, its revolutions being identical with those of the PTO shaft (540 or 1000 rpm). Piston pump suction is connected to the discharge pipe of the gearbox oil radiator, delivery is led to the throttle valve fitted in the hydraulic mechanism housing.

By means of the selector control lever (Fig. 7/3) the following controls may be selected:

a) position control

With position control engaged, the attached implement is automatically held in the predetermined position with respect to tractor,

b) draft control

With draft control engaged, the attached implement is automatically held in the position corresponding to a constant, preselected traction efficiency in the bottom drawbars of the three-point linkage,

c) mixed control

With mixed control engaged, a combination of position and draft control is effected,

d) pressure control (not fitted at present)

With pressure control engaged, agricultural implement or trailer are lightened by a permanent selected force.

The inner circuit control lever (Fig. 7/1) controls:

a) raising and lowering implements

b) setting-up the height of the three-point linkage for position control

c) setting-up the traction force for draft or mixed control

d) setting-up the pressure magnitude of hydraulic cylinders for pressure control

e) setting-up the so-called floating position (which allows the implement to run on its own wheels).

The outer circuit control lever (Fig. 7/2) controls the supply of pressure oil to outer circuit outlets provided with quick couplings and back to the tractor. Then the following positions can be selected:

a) raising (single- or double-acting cylinder)

b) stop position

- c) floating position
- d) forced lowering (double-acting cylinder)

Control lever labels designate the above mentioned functions of individual positions.

Additional Cylinder of Hydraulic System (Fig. 19/1)

An additional cylinder of hydraulic system is fitted on tractors Z 8045, Z 12011 and Z 12045. It is used to increase the raising force of the hydraulic system.

Gearbox Oil Radiator for Tractors Z 12011 and Z 12045

It is placed in front of the water radiator and serves to cool the gearbox oil. In the cooling circuit a safety valve is provided which is set up the pressure of 0.5 to 0.7 MPa.

BRAKES

Foot brakes are controlled hydraulically by two pedals (Fig. 6/1). After unlatching the pedals, the LH or RH one can brake the LH or RH wheel separately. When driving the tractor on a road, pedals shall be latched. The hand brake serves to keep standing the tractor. It is put into operation by moving the control lever (Fig. 4/1) upwards (towards the operator).

Unbraking the tractor is carried out by releasing the control lever in such a way that it is moved upwards (towards the operator) and upon a simultaneous squeezing returned to its lower position.

Differential Lock

If one of the rear wheels slips in the terrain, apply the differential lock (Fig. 6/3). The differential lock takes the differential out of operation — both rear wheels have the same rpm (revolutions) but just when the pedal is depressed. The front drive axle differential is not provided with a lock.

Caution: Never apply the differential lock when driving the tractor in a curve.

Front Axle

Extensions with wheels may be sprung or unsprung, the change of front wheel track being possible. The tractors Z 8045 and Z 12045 are provided with unsprung exten-

sions, the front wheel tract remaining unchanged. Individual tracks are referred to in technical data on the tractor in the foregoing part of this Manual. A basic wheel track is always adjusted in the manufacturer's works.

Any change of the wheel track shall be carried out as follows:

1. Put a jack underneath the front axle.
2. Unscrew two nuts (Fig. 20/1) of front axle extension bolts and pull them out.
3. Unscrew two bolts from the RH and LH interconnecting rod of the steering system and pull them out (Fig. 20/2).
4. Pull out extensions up to the required wheel track and lock them again by bolts and nuts.
5. Screw and lock bolts on RH and LH interconnecting rod of the steering system.
6. Check front wheel toe-in.

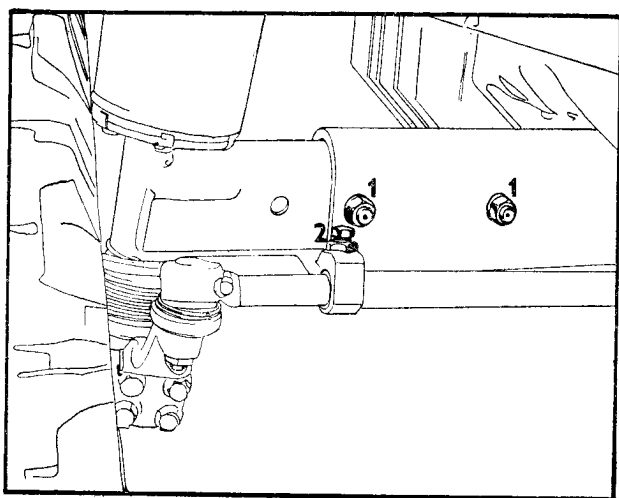


Fig. 20

Front Wheel Toe-in

It is measured on front wheel rims and is $6 \begin{smallmatrix} +6 \\ -4 \end{smallmatrix}$ mm on tractors Z 8011 and Z 12011. The front wheel toe-out on tractors Z 8045 and Z 12045 is 12 to 15 mm. The wheel position shall be set up in such a way that the turning radius of the LH and RH wheel is always identical.

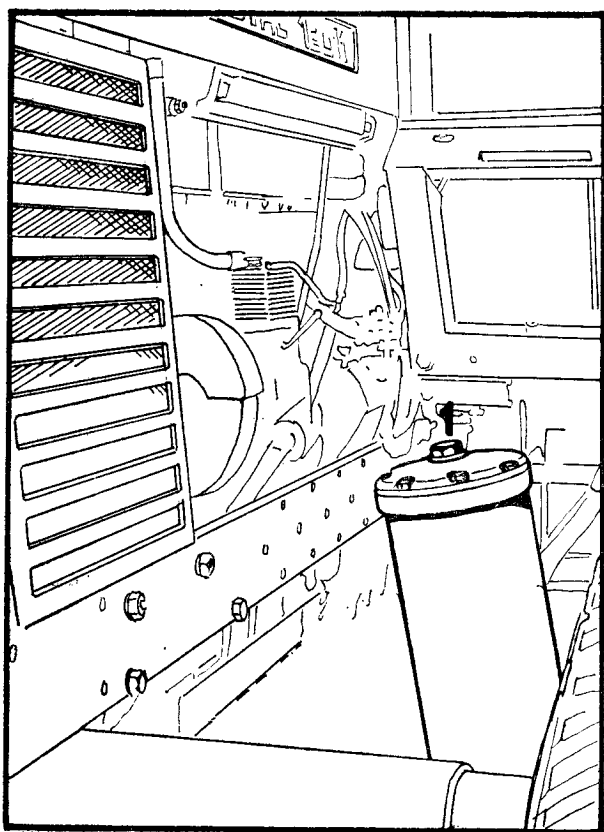


Fig. 21

A modification of the sprung extension in a solid one (blocking) can be carried out very simply when replacing the stop I by the stop II by means of a jig and a screw (Fig. 21/1).

Caution: When dismantling the sprung extension it is always necessary, for safety reasons, to use the jig being included as tractor accessories in the tool box.

Tractors Z 8045 and Z 12045 are provided with a bevel drive pinion located in the front axle body from where the drive is led through dual joints via planet gears (placed in tractor front wheels) to the tractor front wheels.

Bevel drive pinion reduction gear is 2.83, that of planet reduction 5.18.

Rear Wheels

The rear wheel track can be adjusted.

Individual tracks are included in tractor technical data in the foregoing part of this Manual.

Tyre Inflating

On tractors equipped only with air compressing device for tyre inflating without air tank it is necessary to disengage the compressor immediately after tyre inflating, otherwise a defect could occur.

On tyre inflating the wing nut on tyre inflator is unscrewed and a tyre inflating hose fitted instead. After inflating it is necessary to screw on the wing nut again.

Tyre size	Inflating in kPa	Carrying capacity of 1 tyre in kg	Kind of work
7.50-20	250	850	For transport
	300	1700	For work with front loader at max. travel speed up to 6 km/h
11,2/10-24	170	1005	For transport and field labour
14,9/13-24	140	1440	For transport and field labour
13,6/12-36	100	1260	For field labour
	140	1550	For transport
16,9/14-34	80	1600	For field labour without ballast weights
	100	1750	For field labour
	150	2270	For transport
18,4/15-34	140	2565	For transport

The carrying capacity of rear tyres can be increased by 20 % at the maximum working speed up to 20 km/h (permissible pressure forces of the axle must not, however, be exceeded).

Filling the Rear Tyres with Water

An increase in the adhesion and traction power of the tractor can be obtained by filling-up the tyre inner tubes with water (in winter with antifreeze). Although it is possible to fill the tyres with water by means of an ordinary valve, the tyre inner tubes are, in spite of it, provided with

a special valve with which the tyres can be filled quickly and comfortably. It is not allowed to fill the front tyres 14.9/13-24 with water.

Filling procedure:

To fill the tyres use a vessel or a gravity tank. Ease the tyre by means of a lifting jack and turn the valve upwards. Deflate air completely. Slip the hose of the fluid on the water valve and repump it. Inflate the tyres to the specified pressure.

Procedure for draining water from tyres:

Caution: Water squirts out when the air part of the water valve is unscrewed. When draining, an under-pressure may be produced in the tyre and it is therefore advisable to turn the wheel slightly from time to time to get the valve to the upper position. Screw the water valve body on the lower part of the inner tube valve and the air part of the inner tube valve on the body. Inflate the tyre with air until water ceases to flow out of the pipe. After having drained the inner tube unscrew the water valve.

Rims

Rims for front and rear wheels are of the type Wide Base. When replacing the tyres it is necessary to use the same tyre size make Barum. On foreign tyres only those having rolling radii corresponding to our specified sizes may be used.

Caution: From the point of view of an excessive wear of front tyres it is not advisable to drive the tractors Z 8045 and Z 12045 on a rigid pavement (transport on road etc.). The front tyres of the tractors Z 8045 and Z 12045 are mounted in such a way that their marking corresponds.

SUSPENSIONS

Hitch for a double-axle trailer (Fig. 19/3)

The hitch fork is vertically adjustable in two positions:

- a) lower position — basic
- b) upper position — in which operations with articulated shaft can be carried out.

When operating with the three-point linkage and the implement of 460 mm high stand, the frame carrying hitch

fork is tilted around the main pin. The trailer eye is hung up in the fork of the hitch and is interconnected by a pin, being locked automatically with a lock on its lower end.

Three-Point Linkage (Fig. 11/4)

The three-point linkage consists of lower links, vertical links, upper links and two stops with wedges limiting side swings of the lower links. Each of the lower links is provided with two holes interconnecting vertical links. Vertical links are hinged on outer pins of lifting arms. They may continuously modify their length. The upper link of the three-point linkage is fixed by means of a pin in one of the three holes of the hitch bracket for a double-axle trailer or a multi-stage hitch.

Multistage Hitch (Fig. 11/5)

It serves to attach the trailer and the implement. It is vertically adjustable in four positions. Permissible vertical static load is 10 kN.

Hitch for Single-axle Trailers (Fig. 19/2)

It serves to attach a single-axle trailer to the tractor. The hitch with trailer beam is lifted by means of a lifting mechanism and links until the hangers skip in the hitch arms. The control of the hitch is carried out by means of a control lever (Fig. 5/1). When decoupling the trailer, the hitch shall be lifted a little by means of the lifting mechanism and hangers swung away by a hand lever in such a way that the hitch could be lowered. Maximum permissible vertical static load of the single-axle trailer hitch is 15 kN or 18 kN unless ballast weights are mounted on the rear wheels.

Swinging Drawbar (Fig. 11/6)

The swinging drawbar can be horizontally adjusted in five positions and locked by two bolts in the bracket bar. It can be also adjusted in four positions vertically. When using an articulated shaft, a free space is assured only when the fork is in its lowermost position. The distance between the fork pin of the drawbar and the end of the PTO shaft for 540 rpm is set up to 355 ± 10 mm. When working with the PTO shaft for 1000 rpm, it is necessary to adjust the drawbar to the distance of 400 ± 10 mm. Permissible vertical static load of the swinging drawbar is maximum 4,905 kN.

Drawbar (Fig. 11/7)

The drawbar is fixed in ball joints of three-point linkage lower links. It is hydraulically vertically adjustable by means of the lifting mechanism within the whole stroke of the three-point linkage. In addition to it on Z 8011 (which is not provided with an additional hydraulic cylinder) it may be mechanically locked in four positions by means of special struts locking the arms of the lifting mechanism. In this case the hydraulic pump should be disengaged.

Caution: When working with drawbar it is necessary to take off the multistage hitch carrier together with the fork.

Rear PTO for 540 and 1000 RPM (Fig. 22/1)

It consists of four parts. The first part is housed in an intermediate housing containing gears for 540 and 1000

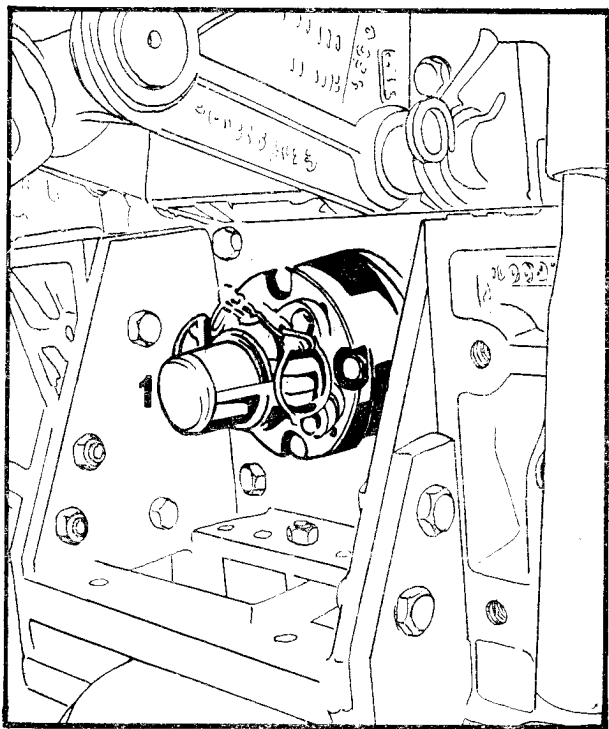


Fig. 22

rpm. The drive by independent revolutions of the PTO is firmly joined with the engine. The shifting of these independent revolutions of the PTO shaft is carried out when the engine does not run only. An end piece for 540 rpm is six-spline, for 1000 rpm twenty-one-spline. When fitting one end piece on the PTO end (for respective rpm number), the other end piece is fitted in the hole on the clutch housing RH side (Fig. 13/11). In the case that no end piece may be put in the hole of the clutch housing, a spring shifts the fork in such a position in which the PTO has 540 rpm. The shifting lever of dependent and independent revolutions of PTO is illustrated in Fig. 4/2. The shifting of drives shall be carried out at very low engine revolutions, the clutch of the PTO being disengaged. Dependent revolutions should be shifted with engine clutch disengaged. The clutch and brake of the PTO are controlled hydraulically by pressure oil by means of a control lever located underneath the steering wheel (Fig. 1/12).

Caution: The allowed power transmission of the PTO shaft end piece for 540 rpm is only to a 50 hp output (36.75 kW), of that for 1000 rpm only to an 89 hp output (66 kW).

Torque Multiplier

It is in principle a planet gear reducer enabling the change of the speed under the load to carry out, i. e. without interrupting the transmitted engine power on the tractor rear wheels. Its engaging and disengaging is carried out by means of a control lever (Fig. 1/11). The ratio of the reduced transmission is 1:1.34.

Pneumatic Brakes

The pneumatic equipment consists of the compressor, pressure equalizer, tyre inflator with safety valve, pressure air container, brake valve, air pressure gauge, brake valve control being carried out by brake pedal as well as by hand brake, coupling head and connecting pipes. The brake valve leverage controlled by the hand brake control lever is set up in such a way so as to brake the trailer simultaneously with the tractor. The mechanical connection of tractor foot brakes with trailer pneumatic brakes should be set up in such a way that the trailer pneumatic brakes might act approximately 0.2 second earlier than the tractor

brakes. The working pressure of the braking system is set up to 0.6 MPa. Attaching the trailer to the tractor should be carried out with the tractor immobilized by a hand brake so that the relief valve is not under pressure. When travelling the air pressure gauge shall be followed; the air pressure must not drop below 0.58 MPa, otherwise a defect may occur which is to be immediately removed.

CAB

The frame of the cab is fixed to the self-carrying floor. The cab is fully glazed all around its periphery with safety glass. It is provided with an efficient heating system having the output of 2600 W. The amount of supplied warm air can be regulated by means of a flap valve so that a part of the warm air is delivered onto the front window or on the operator's legs. The circulation of air in the cab in summer is ensured by removable side windows, removable rear bottom window or by lifting the roof. In order to increase the ventilation of the cab, a heating system fan may be used; in this case the hot water supply to the heating system radiator must be closed. Also the door may be half-open when driving the tractor and locked by pawl in this position. The cab is provided with two driving mirrors, both front and rear windscreen wipers as well as with an inner illumination.

Caution: A repaired accident-damaged cab (or considerably corroded cab) must not be fitted on the tractor for safety reasons.

Front Mudguards

They may be fitted on all tractor types. On Z 8011 and Z 12011 they cannot be fitted if the wheel track is 1350 mm only (in this case the wheel track shall be adjusted).

Searchlight for Night Ploughing

It is fitted on the RH rear mudguard and its switching on is carried out by a switch (Fig. 2/1).

Ballast Weights

Front ballast weights serve to increase the load of the tractor. They can be placed in front of the radiator on the frame (Fig. 23/1), under the frame (Fig. 23/2) or on the front hitch (Fig. 23/3).

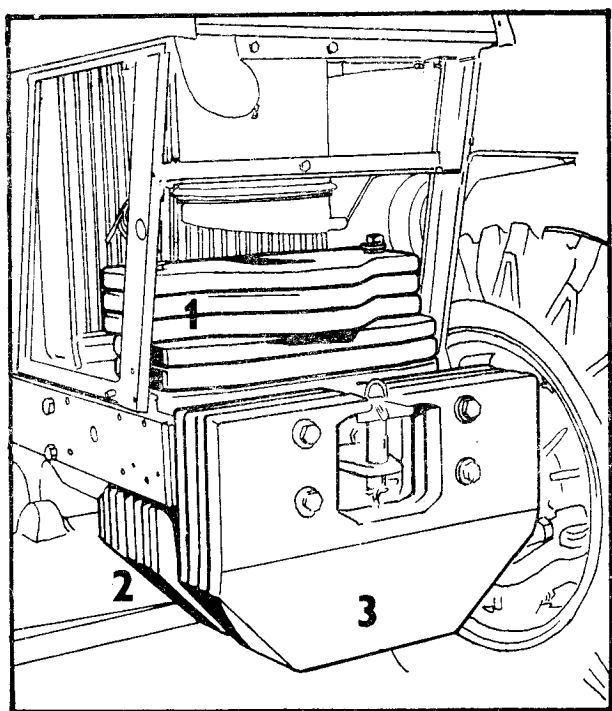


Fig. 23

Rear ballast weights are fixed to the rear half-axes by bolts. The number of individual ballast weights may be changed.

Performance of the Tractor under Special Conditions

When driving the tractor in tropics observe the following principles:

1. Never use (draw) the radiator shutter.
2. Check daily the amount of water in radiator as well as the seat packing of the overpressure plug. The temperature of the cooling water may increase up to 105°C but for a short time only. Above 106°C the overpressure plug gets opened — the loss of overpressure results in a loss of cooling water as well.
3. Clean daily the air deaner if you work in humid and dusty surroundings.
4. Check daily the amount of electrolyte in the battery.

MAINTENANCE OF THE TRACTOR

Survey of individual operations of the technical maintenance.

Daily attendance (to be carried out after 8 to 10 engine hours).

1. Clean the tractor and the implement.
2. Refill the amount of fuel and check the fuel system for its leakproofness.
3. Check the amount of cooling fluid and the watertightness of the cooling system.
4. Check the amount of oil and the oil system for its leakproofness.
5. Check the amount of impurities in the air cleaner or carry out necessary attendance of the air cleaner according to the attached instructions. When fitting a wet air cleaner having an oil filling, also carry out the maintenance according to the attached instructions.
6. Check the function of both the foot and hand brakes and the air pressure. Check if the brake pneumatic system is leakproof and if braking efficiency of tractor with trailer is in order.
7. Check the state of the electrical system — the function of lights, trafficators etc. When starting the engine check it for its regular running, charging function as well as engine lubricating oil pressure.
8. Check the air pressure in front and rear tyres.
9. Check the tightness of hydraulic brakes, drain oil from tyre inflator.
10. Check the tightening of bolts and nuts on steering rods and levers as well as of front and rear wheel discs.
11. Check the tension of water pump compressor V-belts, fan and alternator.
12. Check the tightness of the joints in the power-assisted steering circuit.
13. Before travelling with trailers or attached implements check the state of the hitch, links and locking pins.

Technical Inspection 1 (TI 1)

This inspection shall be carried out each 100 engine hours.

14. Carry out daily attendance (see item 1 to 13).

15. Carry out operations according to the Lubrication Chart (see Annex).
16. Clean (drain) fuel top sedimentation vessel.
17. Check electrolyte level in the storage battery.
18. Check the setting-up of clutch free travel.
19. Check the setting-up of gearbox synchronizing brake.
20. Check if bolts connecting the front axle bracket with the engine are tightened well.
21. Lubricate water pump by turning the lubricating nipple by one turn.

Technical Inspection 2 (TI 2)

This inspection shall be carried out each 200 engine hours.

22. Carry out all operations of TI 1.
23. Clean rotor of the centrifugal oil cleaner.
24. Change oil in engine housing and injection pump body as well as in governor.
25. Inspect hydraulic circuit fine oil filter.
26. Inspect play in front wheel bearings and set up their correct play, if necessary.
27. Inspect coarse filter in hydraulic pump suction line and clean it, if necessary.
28. When working in dusty surroundings clean filtering cartridge of the heating system fan.
29. Check toe-in of front wheels and set it up, if necessary
30. Clean fuel filter cartridges.
31. After 400 engine hours change the paper cartridge of the dry air cleaner and clean the sediments in the cleaner. The cleaner with oil filling shall be cleaned according to the attached instructions.
32. Check, clean and set up injection valves, if necessary.
33. Lubricate king pins of tractor connecting shaft on Z 8045 and Z 12045.
34. Carry out lubrication according to the Lubrication Chart (see Annex).

Technical Inspection 3 (TI 3)

This inspection is carried out each 600 engine hours.

35. Carry out all operations of TI 2.
36. Replace felt cartridge of fuel filter.

37. Check/set up the play between the drum and the brake band of the torque multiplier.
38. Check storage battery for its state of charging.
39. Check/set up tractor foot and hand brake.
40. Lubricate electromotor bearings of the heating system fan.
41. Check the tightening of bolts fixing the cab to the floor.
42. Carry out lubrication of the tractor according to the Lubrication Chart (see Annex).

Technical Inspection 4 (TI 4)

This inspection is carried out each 1200 engine hours.

43. Carry out operations of TI 3.
44. Tighten cylinder bolt heads and check and set up the valve play of the engine.
45. Clean fine oil filter, filling sieve as well as magnetic plug of the power-assisted steering circuit.
46. Replace the inlet and delivery valves in the compressor.
47. Carry out operations according to the Lubricating Chart (see Annex).

Middle Repair (MR)

The middle repair of tractors is carried out each 2400 engine hours.

48. Carry out all operations of TI 4.
49. Grind engine valves (prior to fitting cylinder heads on the engine tighten head stud bolts).
50. Clean and rinse engine cooling system.
51. Check or have the alternator, starter and voltage regulator repaired.
52. Drain mud from fuel tank.
53. Check the pins and the diaphragm of the operator's.
54. Lubricate flexible rods of the heating system control.
55. Lubricate the door and back window pins, the door locks and the lifting mechanism of the roof.
56. Check or replace rubber hoses for water delivery.
57. Check silentblocks underneath tank and bonnet — replace defective ones.

58. Check floor silentblocks — replace defective ones.
59. Check the pressure of quick couplings at 2000 engine rpm.
60. Check the function of hydraulic power-lift system.
61. Check the arrestment of the outer circuit lever in floating position.
62. Check brake plates or replace, if necessary.
63. Change brake fluid and rinse the braking system.
64. Replace sealing rings of brake cylinders.
65. Check the clutch plate lining for wear. If the plate thickness is less than 6 mm, replace the plate.

Complete Overhaul (CO)

The overhaul of the tractor shall be carried out each 4800 to 6000 engine hours.

- a) If the reliability of the tractor is broken and its technical condition endangers a safe operation.
- b) If most tractor groups require an overhaul.
- c) If a further operation of the tractor is not economic.

Description of Technical Maintenance Operations

- As to 11. The tension of the V-belts shall be such to allow a maximum sag of 5 to 10 mm at the longest part of the fan belt under the pressure of the thumb and max. 15 mm at the compressor belt.
- As to 17. Prior to checking electrolyte level in batteries, it is necessary to unscrew two bolts M 8 on battery cover on the cab floor and to remove the cover. For the maintenance of the battery see the chapter on Electroinstallation and instructions given by the battery manufacturer.
- As to 18. The setting-up of the clutch pedal free travel is carried out by means of a two-sided nut on the tie rod leading to the clutch disengaging shaft. The correct free travel of the clutch pedal shall be 35 to 40 mm. A distance of 3 mm between adjusting screws and the disengaging bearing corresponds to this clutch pedal free travel. If the play is higher, tighten the nut and vice versa.
- As to 19. A correct setting-up of the gearbox brake is carried out when it begins to act 35 mm before the

end of the clutch pedal stroke. A screw M 10 of the carrier fixed on the clutch pedal shaft is used to set up the play in question. An increase of the force on the clutch pedal reveals the start of brake acting.

As to 23. Unscrew the nut (Fig. 13/12) from the centrifugal oil filter cover, remove the cover and take out the filter rotor and disassemble it. Remove all sediments by means of a scraper. When re-assembling the filter, it is necessary to set up gauge marks of the cover not to disturb the dynamic balance. For that reason it is not possible to interchange the upper and lower part of the rotor with that of another rotor.

As to 24. After finishing the travel, change oil in the engine as long as the oil is warm. Unscrew the plug first on the bottom cover of the engine housing. Prior to fitting this plug, clean it.

Lubricating the Injection System (Fig. 18)

The filling of oil in the fuel pump housing and in the governor shall be carried out through the plug (Fig. 18/5). The oil level in the housing is given by the screw (Fig. 18/8). Drain plug in the bottom of the pump (Fig. 18/7) serves for draining the old oil, in the case of the governor the plug in its bottom (Fig. 18/6). Engine oil is used to lubricate the pump and the governor. Whenever the engine oil is changed, also change the oil in the injection system. Before taking the tractor out of operation for a longer time, it is necessary to drain the oil from the injection system irrespective of the number of kilometres or engine hours.

As to 32. A defect of choking injection nozzle hole can be removed in such a way that the injector is taken out, the nut unscrewed by means of wrench 20, the nozzle taken out and cleaned from carbon with a needle for nozzle cleaning. When re-assembling it is necessary to care of the marks stamped on the injector body and nozzle which determine their mutual position. A defect of the injector may be found out in the following way:

1. Set up the engine run to minimum revolutions (rpm).

2. Loosen the injector nut. If the engine revolutions drop, the injector is O. K. If the revolutions remain unchanged, the injector is defective. The injection pressure is 160 ± 3 atm (15.7 MPa).

As to 37. A correct play between the brake band and the drum shall be 0.25 to 0.30 mm. The play is set up by three screws M 10 on LH, RH as well as on the top part of the gearbox which, following a uniform tightening or loosening, adjust a uniform band play around the whole drum periphery.

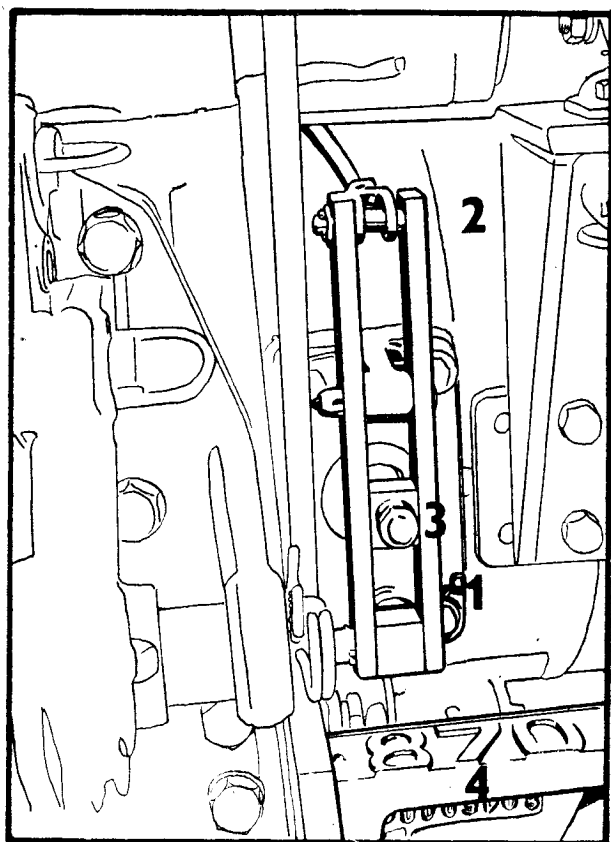


Fig. 24

Screw M 16×1.5 is located on the gearbox LH side (Fig. 9/3) and serves to set up the play. The setting-up of the play is carried out as follows:

1. If there is oil in the gearbox, stand the tractor up the hill (minimum 10°) and shift the shifting lever to neutral. Brake the tractor by hand brake and lock the rear wheels by wedges.
2. Unscrew carefully four bolts on bottom cover (Fig. 9/6), take out the brake cylinder spring, and screw on the cover with its gasket.
3. Tighten slightly the bolt M 16×1.5 to stop and then loosen it by 1.5 turn and lock it by means of locking nuts.
4. Tighten slightly three bolts M 10 on LH, RH and top part of the gearbox to stop and then loosen them by $\frac{1}{4}$ turn. The bolts are to be locked immediately by nuts.
5. Check by hand whether the drum rotates.

As to 39, The setting-up shall be carried out after the counter-nuts on brake tie rods have been loosened (Fig. 24/3). The tightening of nuts until a sensible resistance shall be set up by play. Set the hand brake control lever in such a way that the catch locks the brake in the ratchet fifth tooth from the bottom position and adjust the play of tie rods in oval holes by turning the tie rod by means of a wrench (Fig. 24/2).

Lock this position with a counternut. Both levers of hand brake compensator shall be set up in the same position. No play is permissible in this position. Loosen ball nuts (Fig. 24/3) by $2\frac{1}{2}$ turns and lock them with counternuts in this position. When checking hydraulic brakes take care that no fluid escapes from the pipe couplings or brake cylinder. The play between the piston rod and the master cylinder piston shall be 1 mm, which corresponds to the dead travel of the pedal (i. e. approx. 6 cm stroke). Check the function and efficiency of brakes. With latched pedals both wheels must be braked simultaneously. Check the braking of individual wheels (by means of one pedal) at reduced speed up about 10 km/h.

Bleeding the Brake System

Put a rubber hose on the bleeding screw (Fig. 24/1) and immerse its other end in a transparent vessel filled with brake fluid. The level in this auxiliary tank must be higher than the bleeding screw. Loosen the bleeding screw by about 2 turns and depress quickly the respective unlatched brake pedal. Keep on depressing until only brake fluid without air bubbles flows from the hose into the bowl. Then tighten the bleeding screw. Repeat this procedure with the other brake cylinder, too. If you change the brake fluid, be always sure to carry out bleeding of the whole brake system.

As to 44. The play between the inlet and exhaust valve is 0.3 mm. The setting-up is to be carried in the following way:

When disassembling the fuel tank, unscrew the valve cover nuts and take out the cover. Crank the engine until either valve on the cylinder, where the measuring is carried out, is closed. Check the play between rocker arm bearing surface and valve stem by means of a feeler gauge. Adjust the specified play by adjusting screw after having loosened the nuts. By tightening the screw the play is reduced, by loosening increased. After adjusting, tighten with a locking nut.

Note: Before setting-up the valves, tighten the cylinder head screw by torque 17 to 19 kpm (170 to 190 Nm). The valve play shall be set up and measured on a cold engine only.

As to 45. If the power-assisted steering is disassembled or repaired it is necessary to deaerate the hydraulic circuit. This deaeration is carried out while the engine is running, by repeatedly turning the steering wheel from one to the other extreme position. The dead travel of the steering wheel may be max. 20° when the power-assisted steering pump does not work. When the engine and thus also the pump are working the permissible play on the steering wheel periphery is 32 mm at about 2000 rpm.

COMMON DEFECTS AND THEIR REMEDY

Engine Defects

Impossible to start the engine

Cause :

Remedy :

Discharged storage battery

Recharge the storage battery

Fuel injection pump:

a) Fuel tap is closed

Open the fuel tap

b) Fuel system bled insufficiently

Bleed fuel system

c) Fuel filters are contaminated

Clean fuel filters

d) Fuel supply regulation has not been set for full delivery

Set for full fuel delivery

Engine runs irregularly

a) Air in the fuel line

Loosen the cap nuts on injectors and crank the engine until oil flows out without air bubbles

b) Choked injector nozzle

Check and clean

c) Impurity in delivery valve seat

Remove and clean

Engine output is insufficient

a) Seized or choked nozzle

Inspect and replace the nozzle, if necessary

b) Injectors are not properly adjusted

Have them adjusted in a specialized service repair shop

c) Injectors pump is not adjusted correctly

Have injection pump adjusted in a specialized service repair shop

d) Fuel injection start is adjusted incorrectly

Adjust fuel injection start to $24^\circ + 2$ before TDC

e) Insufficient compression pressure in cylinders which may be caused by:

1. Untight valve

Regrind valves in their seats

2. Incorrectly adjusted valve play

Adjust the correct valve play

Cause :

Remedy :

- | | |
|---|---|
| 3. Defective gasket between the cylinder head and the crankcase | Replace the gasket |
| 4. Loosened cylinder head stud bolts | Tighten to specified torque |
| 5. Baked piston rings | Loosen rings and clean grooves in pistons |

Engine gets overheated

- | | |
|---|------------------------|
| a) Little water in the radiator | Refill the radiator |
| b) V-belt of the water pump is slack | Stretch out the V-belt |
| c) Radiator clogged with water incrustation | Clean the radiator |

Defects of Electrical System and its Accessories

Insufficiently charged battery

Cause :

Remedy :

- | | |
|--|---|
| a) Alternator drive belt spins | Stretch the belt to obtain a correct sag |
| b) Defective battery | Have it repaired in a specialized service repair shop |
| c) Voltage regulating relay is set up to low voltage | Have it repaired in a specialized service repair shop |
| d) Defective alternator | Have it repaired in a specialized service repair shop |

Excessively charged storage battery

Defective alternator

Have it repaired in a specialized service repair shop

Starter does not work

- | | |
|-----------------------------------|--------------------------|
| a) Connecting cables are loosened | Tighten them |
| b) Worn carbon brushes | Replace them by new ones |

Cause :

- c) Brush spring is broken
- d) Commutator is soiled
- e) Defect in the electro-magnetic coil

Remedy :

- Replace it by a new one
- Clean it
- Have it repaired in a specialized service repair shop

Slow run of the starter motor

Insufficiently charged battery

Recharge the storage battery

Defects of Hydraulic Brakes

Travel of brake pedals is too long

Cause :

- a) Insufficient amount of brake fluid
- b) Incorrectly set up brakes

Remedy :

- Refill the brake fluid tank
- Set up the brakes

Travel of brake pedals is too long and the pedals spring when depressed

Air in braking system

Bleed the brake system

Defects of Power-Assisted Steering

Bad function of power-assisted system

Cause :

Insufficient amount of oil in tank

Remedy :

Refill and bleed

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LUBRICATION CHART

Lubrication point	Operation / No. of lubrication points	Sort summer — winter
Daily after 8 to 10 engine hours		
Engine	Inspection/1	SAE 30 — SAE 10 W/30
Air cleaner (oil)	Inspection/1	SAE 30 — SAE 10 W/30
Brake fluid tank	Inspection/1	HD 190
TI 1 — each 100 engine hours		
Engine	Inspection/1	SAE 30 — SAE 10 W/30
Gearbox, main transmission housing	Inspection/1	SAE 80
Air cleaner (oil)	Replacement/1	SAE 30 — SAE 10 W/30
Front drive axle housing	Inspection/1	SAE 80
Reduction gears in wheels	Inspection/2	SAE 80
Rear wheel end gears	Inspection/2	SAE 80
Water pump	Turn by 1 turn	LITOL 24
Injection pump	Inspection/1	SAE 30 — SAE 10 W/30
Clutch release bearing	Lubrication/1	SAE 30 — SAE 10 W/30
Front axle bracket	Lubrication/2	LITOL 24
Front wheel extension bushings	Lubrication/2	LITOL 24
Steering ball pins	Lubrication/4	LITOL 24
Power-assisted steering tank	Inspection/1	OL N2
Three-point linkage strut	Lubrication/1	LITOL 24
Pedals	Lubrication/3	LITOL 24
TI 2 — each 200 engine hours		
Engine, injection pump	Change/1	SAE 30 — SAE 10 W/30
Cardan shaft king pins	Lubrication/2	LITOL 24
TI 3 — each 600 engine hours		
Front wheel hubs	Refilling/2	NH2, LITOL 24
Water pump	Refilling/1	LITOL 24
Compressor tightening pulley bearings	Refilling/1	NH2, LITOL 24
Joints of steering telescopic shaft	Refilling/2	NH2, LITOL 24
Cab door pins	Lubrication/4	SAE 80
Front drive axle dual joint bearings	Refilling/2	NH2, LITOL 24
Heating system fan bearings	Refilling/2	NH2, LITOL 24
TI 4 — each 1200 engine hours		
Gearbox, main transmission housing	Change/1	SAE 80
Rear wheel end gears	Change/2	SAE 80
Power-assisted steering tank	Change/Rinsing/1	OL N2
Front drive axle differential and reduction gears	Change/1	SAE 80
Reduction gears in front wheel	Change/2	SAE 80

Note: Amounts of fillings are given in Technical Data — in the introductory part of this Manual.

The oil SAE 20 W/30 can be used all the year round instead of the oils SAE 30 and SAE 10 W/30.