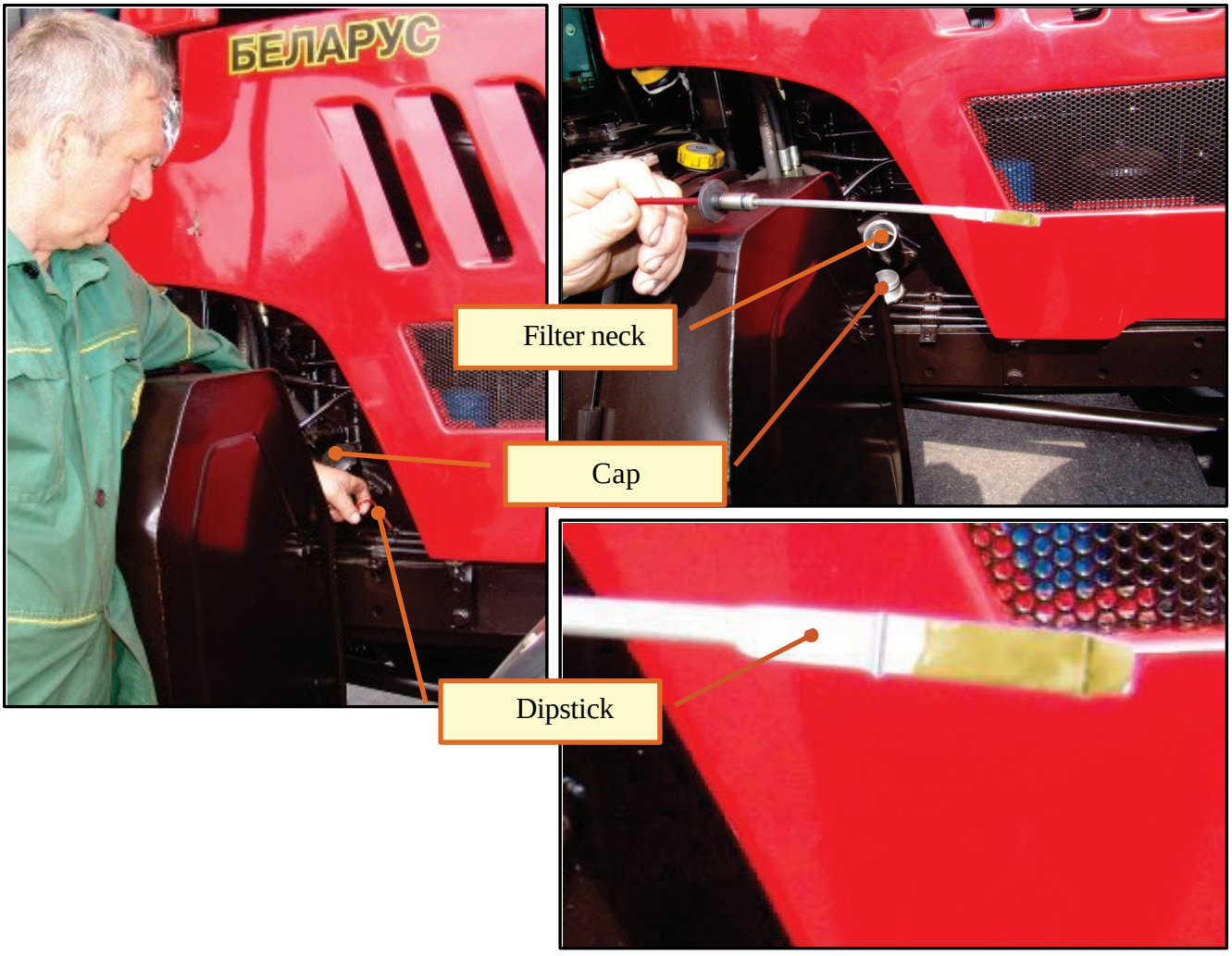
SCHEDULED MAINTENANCE PROCEDURES

After every 10 hours of operation or daily (what comes first)

Procedure 1. Checking the Oil Level in the Engine (pic. 8.2)

Stop the engine, wait for 3...5 minutes and check the oil level. It should be be-tween the top and bottom marks on the dipstick. If necessary, remove the cap of the filler neck and add oil to the top mark of the dipstick.



Picture 8.2

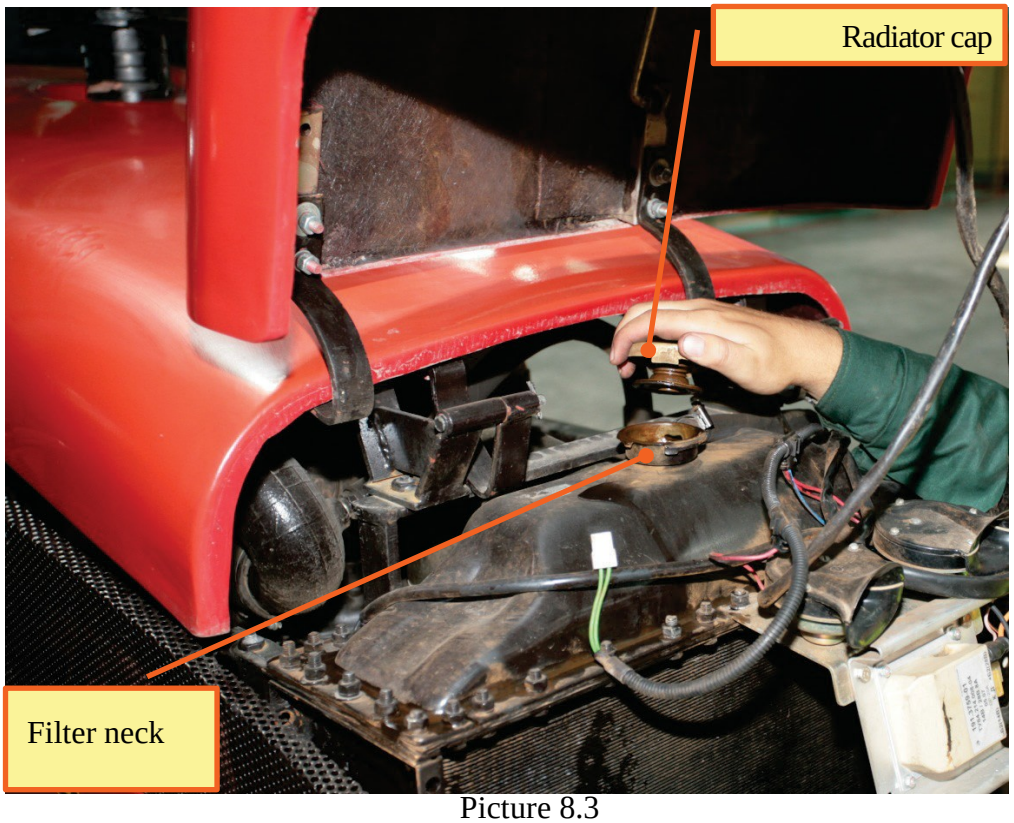
Important! Do not allow engine work with the oil level lower than the low mark of the dipstick

IMPORTANT! Do not fill the oil higher than the maximum tick of the dipstick. Excessive oil will burn out, creating a false impression of a large of oil waste consumption.

Procedure 2. Checking the Coolant Level in the Engine (fig. 8.3)

ATTENTION! DO NOT let the coolant level drop below 40 mm from the upper end-face of the filler neck.

Remove the radiator cap and check the coolant level. It should be level with the upper end-face of the filler neck. Add coolant to the level, if required



Picture 8.3

Important! NEVER fill in the cooling system of the engine with water!

Procedure 3. Checking the Oil Level in the Transmission Housing (Fig 8.4)

Visually check the oil level on the oil-level indicator (1) which is located on the left side of the transmission. The oil level shall be within 10 mm from the mark "П" ("F" – full). If necessary, remove the plug of the oil filler neck and add oil within ± 5 mm from the mark "П".

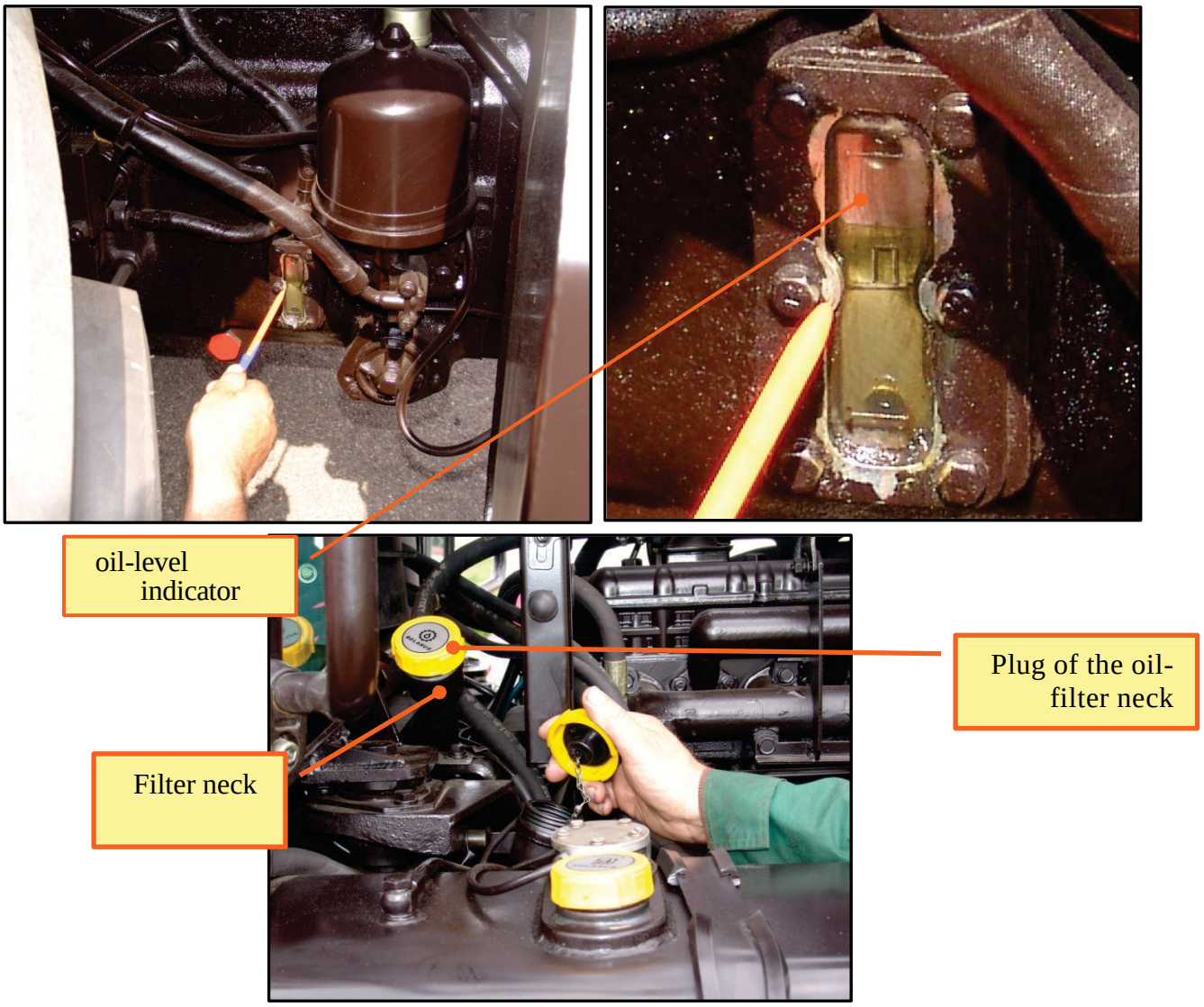


Figure 8.4

Procedure 4. Checking the Oil Level in the HPS Oil Reservoir (fig. 8.5)

Visually check the oil level against the oil-level indicator located on the HPS tank (to the right-hand side on the clutch casing).

The level shall be between «О» and «П» marks of the gauge.

If necessary, add oil. To do this, remove the plug, together with the valve, and add oil up to the mark «П».

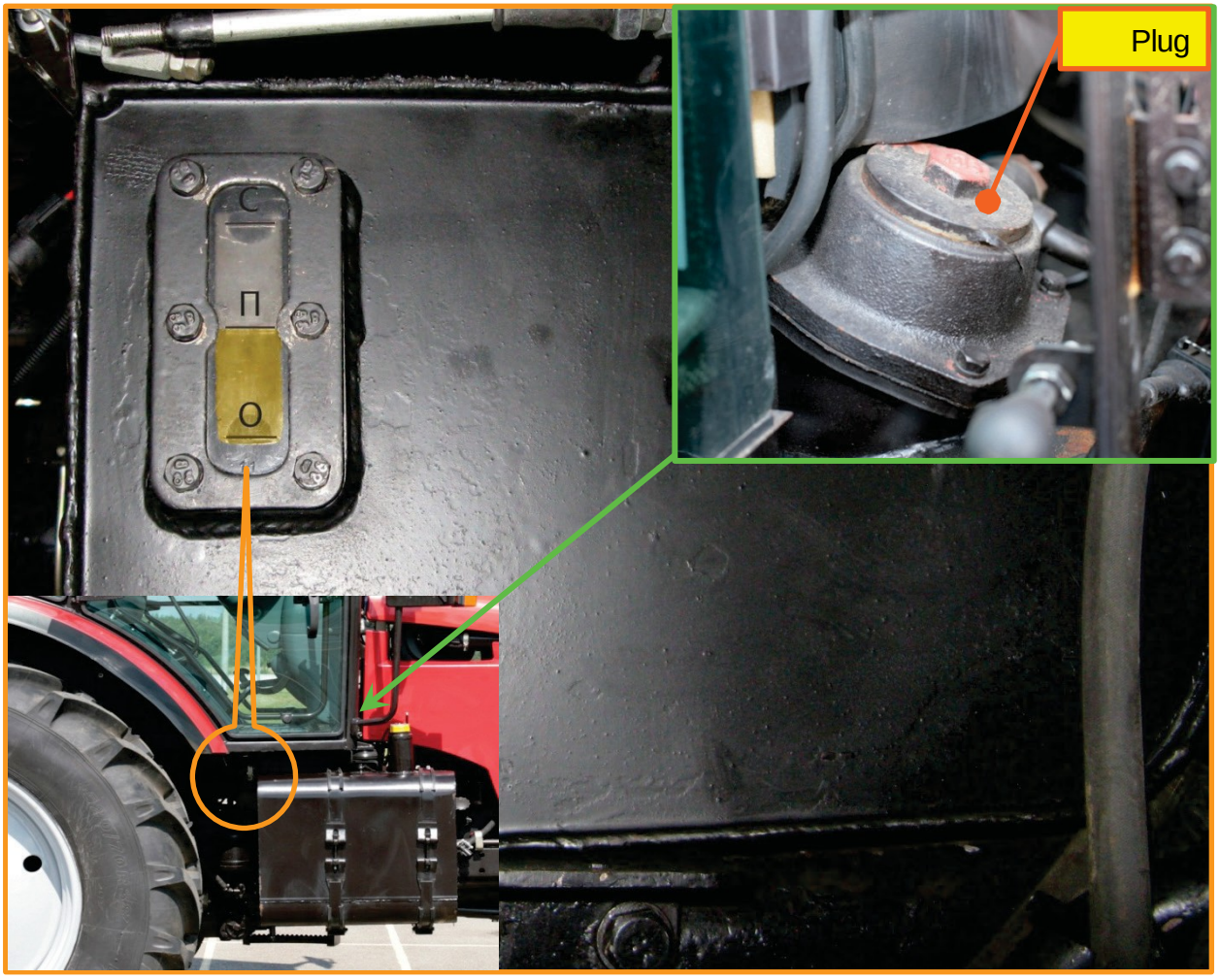


Figure 8.5

Procedure 5. Checking the Oil Level in the RHL Oil Tank (fig. 8.6)

Check oil level in the oil tank against oil-level indicator.

The oil level should be between the marks “O” and “П” (“F” – full) of the oil indicator. If necessary, remove the plug of the oil filler neck and add oil up to the mark “П” of the oil-level indicator.

Note. With the tractor running in combination with agricultural machines which require elevated consumption of oil, replenish the oil up to the mark “C” of the oil-level indicator.

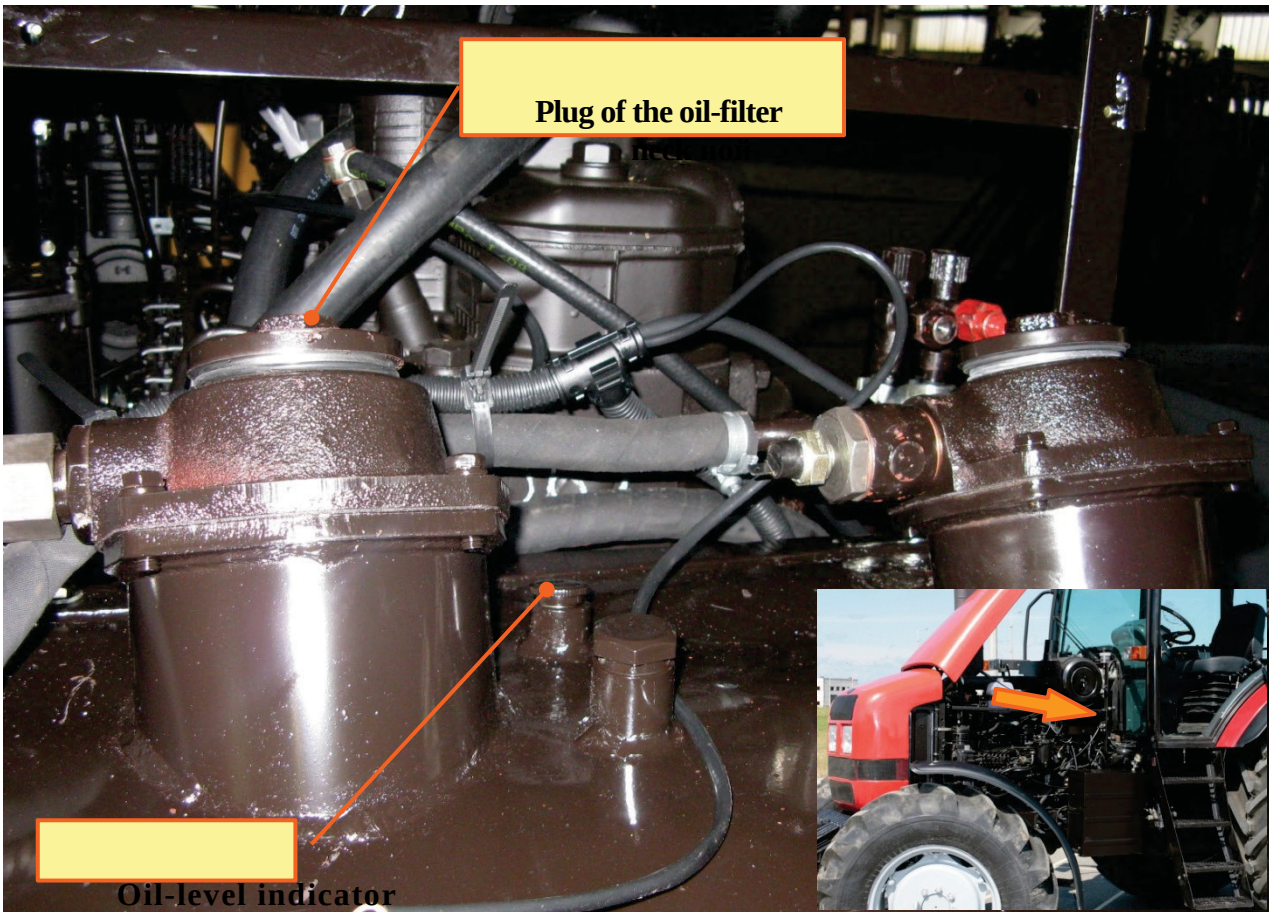


Figure 8.6

Procedure 6. Checking the Brake Liquid Level in the Master Cylinder Tanks of the Hydraulic Actuator of the Clutch and Service Brakes .(fig. 8.7)

Check visually the liquid levels in the reservoir (3) of the master cylinder of the clutch (located on the left side if viewed in the direction of the tractor forward motion, above the hydraulic system oil tank) and in the reservoirs (1, 2) of the master brakes (on the right side in the direction of the tractor motion, over the HPS oil tank). The level should be within marks “min” and “max” on the boxes. If necessary, add the brake fluid to the “max” marks having unscrewed preliminarily the caps (3).

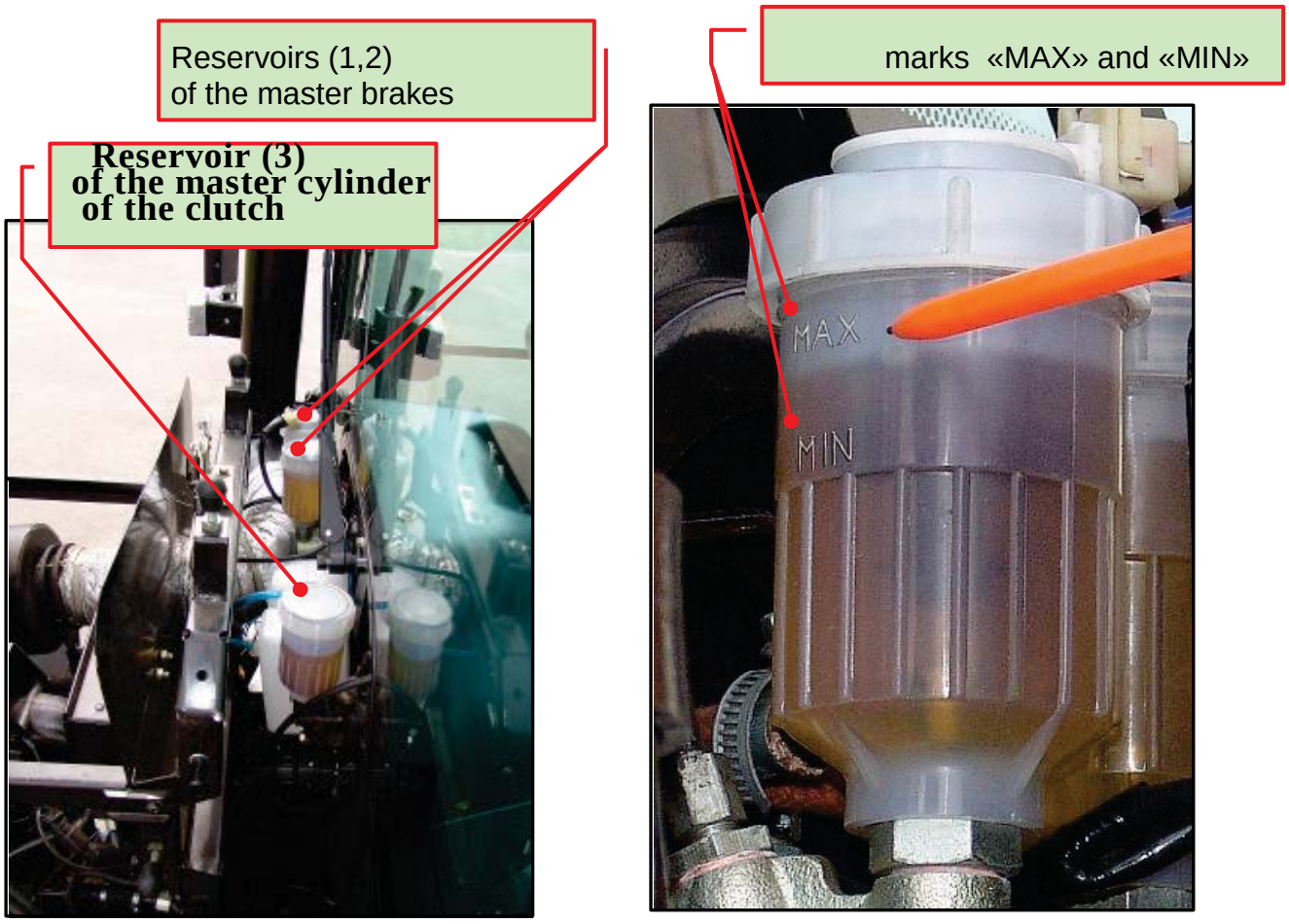


Figure 8.7

Procedure 6a. Checking the Brake Liquid Level in the Compensation Chamber of the Master Cylinder for Controlling the Clutch and Brakes in the Reverse (fig. 8.8)

Remove the rubber covers from the main cylinder necks of the brake and clutch.

ем. Check visually the brake liquid level, which shall be lower 10-15 mm than the higher edge of the neck.

If necessary, remove the boot and add fluid «Neva-M», «DOT3», «DOT4» to the required level.

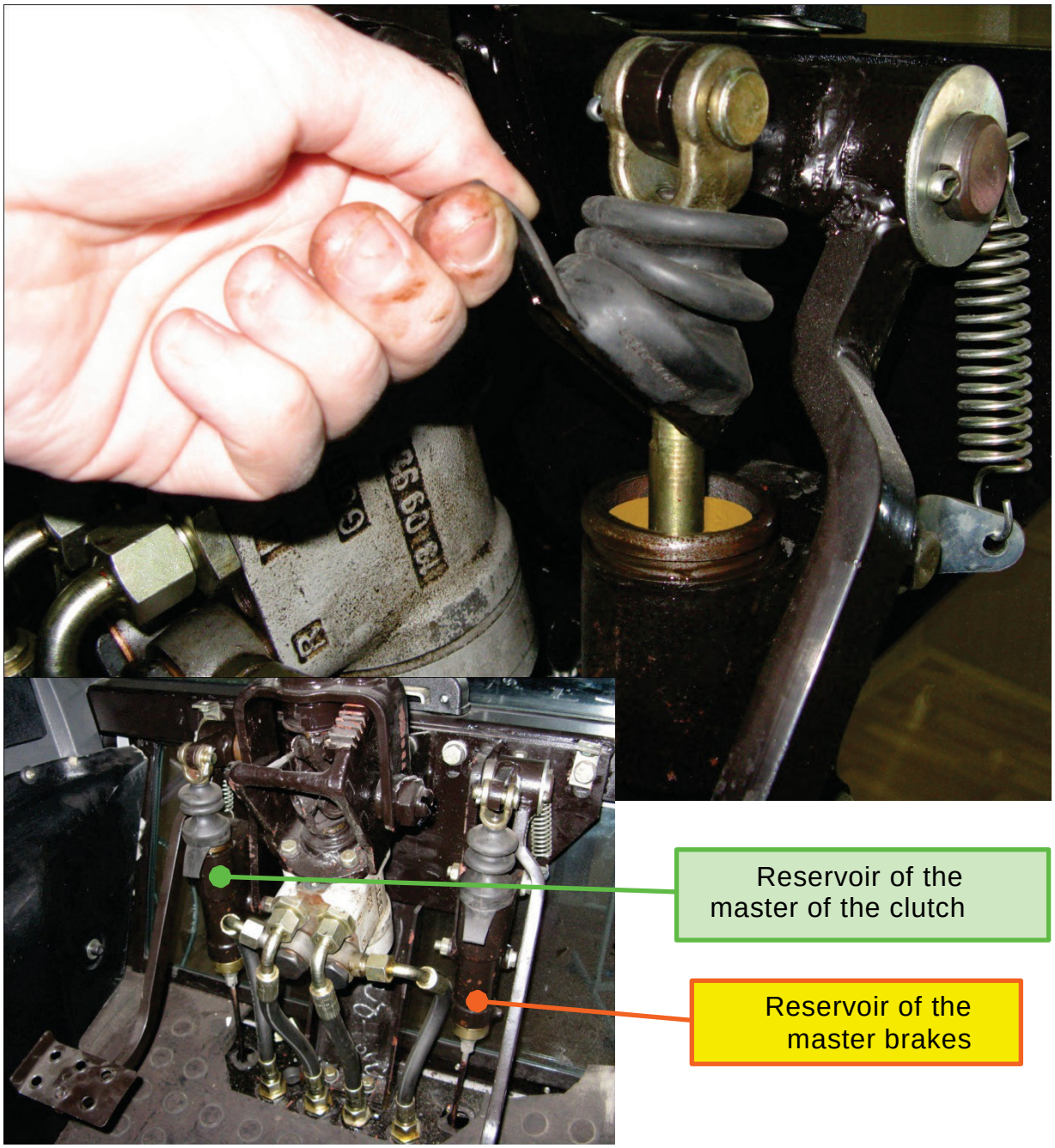


Figure 8.8

Procedure 7. Draining Condensate From the Pneumatic System Receiver (fig. 8.9)

To drain condensate from the receiver, pull the ring to any side if the bottle contains compressed air. Hold the ring in this position till condensate is completely drained.

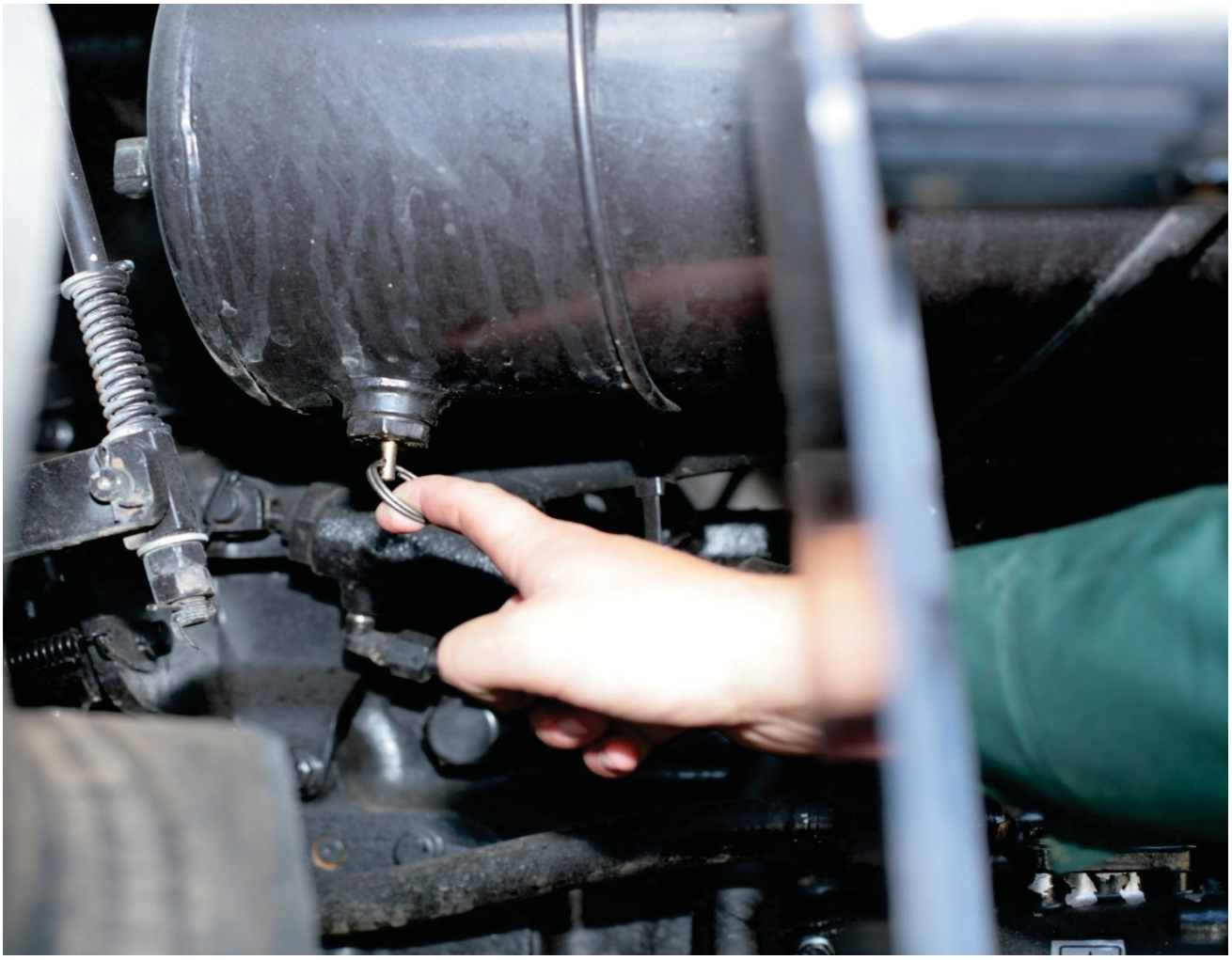


Figure 8.9

Procedure 8. Checking the Operability of the Engine, Steering Control, Brakes, Lighting and Signalling Devices

The engine shall demonstrate the stable run in all duties.
The controls, light and sound signaling systems should be in good order.
The simultaneous operation of the right- and left-hand service brakes shall be ensured.

Procedure 8a*. Checking the Fas-tening of the Air-Conditioner Hoses

The air-conditioner hoses shall be reliably fixed by binding screw clamps. No contact of the hoses with the moving parts of the tractor is allowed.

Procedure 8b*. Checking/Cleaning the Air-Conditioner Condenser

Check the cleanness of the condenser core. If it is clogged, clean the condenser using compressed air. The air flow should be directed in perpendicular to the condenser plane top down with the bonnet opened. The crumpled ribbing shall be straightened by means of a spe-cial comb or plastic (wooden) plate. In case of heavy contamination of the con-denser, flush the latter with hot water under the pressure of 0.15-0.2 MPa and blow it off with compressed air.

Операция 8в*. Procedure 8c*. Checking the Draining Tubes of the Air Conditioner/Cleaning Them from Condensate

The draining tubes coloured blue are located to the right and to the left from the tube of radiators under the ceiling panel. Check the draining tubes and clean them as necessary to prevent their clogging. The sign of a clean draining tube is water dripping when operating the conditioner in hot weather

Procedure 8d. Removing Condensate [illegible] the Radiator of the Charge Air Cooler (CAC) of the Engine (BELARUS-1523.3**

To remove condensate from the reservoirs [illegible] gine CAC, proceed as follows:
- screw out the two plugs (1) in the bot-ton [illegible] cooler (2) and let condensate trickle down;
- screw in the plugs

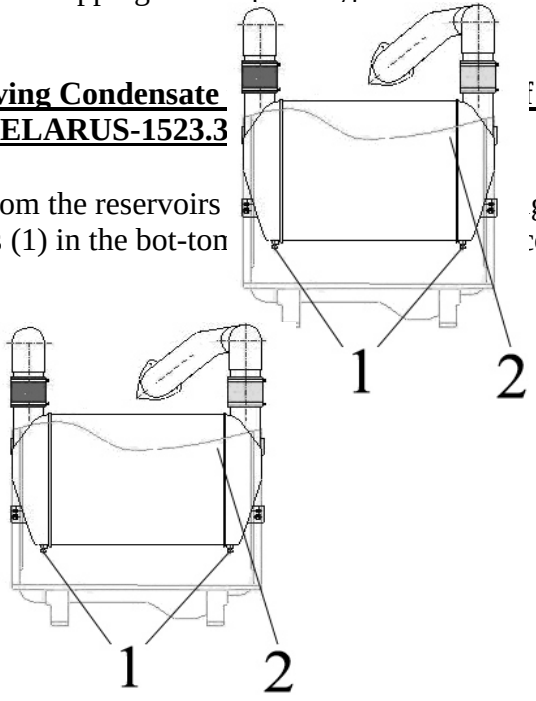


Figure 8.10

Procedure 8e. Cleaning the Radiator of the Charge Air Cooler (CAC) of the Engine (BELARUS-1523.3/1523B.3)

Check the cleanness of the CAC radiator core. If the radiator core is clogged, clean the same by blowing it off with a compressed air flow directed perpendicularly to the radiator plane top down with the bonnet opened.

* If the air conditioner is installed.

** In winter, the procedure shall be performed after every 10 hours of operation, in summer – after every 125 hours of operation.

EVERY 125 HOURS OF OPERATION perform the following procedures plus previous:

Procedure 9. Checking/Adjusting the Tension of the Air-Conditioner Com-pressor Driving Belt (fig 8.11)

The tension of the belt (3) is considered normal, if sagging of its section between the tensioning lever pulley and the compressor pulley" as measured at the middle point would be within 4 to 6 mm when pushing with the force of (39.2±2.0) N.

The tensioning of the belt (3) for driving the air-conditioner compressor (2) should be adjusted by turning the tensioning lever (1) on the rotating axle (A) and threaded connection clamp (Б) in the slot (В) of the plate (Г); the belt sagging when pushing with the force of (39.2+2.0) N applied in perpendicular to the belt section at its middle point shall be within 4 to 6 mm.

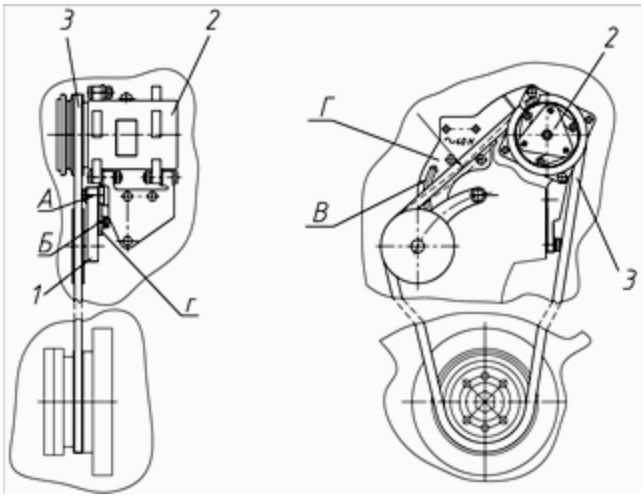


Figure 8.11

Procedure 9a. Greasing the Pivot Points of the HPS Cylinders (fig. 8.12)

Using a lubricating gun, grease the pivots through the lubricating plugs (2) (4 lubricating points)

Figure 8.12

Procedure 10. Greasing the Bearings of the FDA Pivot Supports of the Hub Reduction Gear and the Pivot Centre Bushings (Fig 8.13)

• Gun-grease the lubricators (1) by making 4 to 6 strokes (4 lubricating points). (1) with lubricators «Литол-24» or «Бэхем LCP-GM»

• Gun-grease the lubricator (2) with the above-said lubricant until fresh grease is squeezed through gaps.

3 – pivot centre bushing.

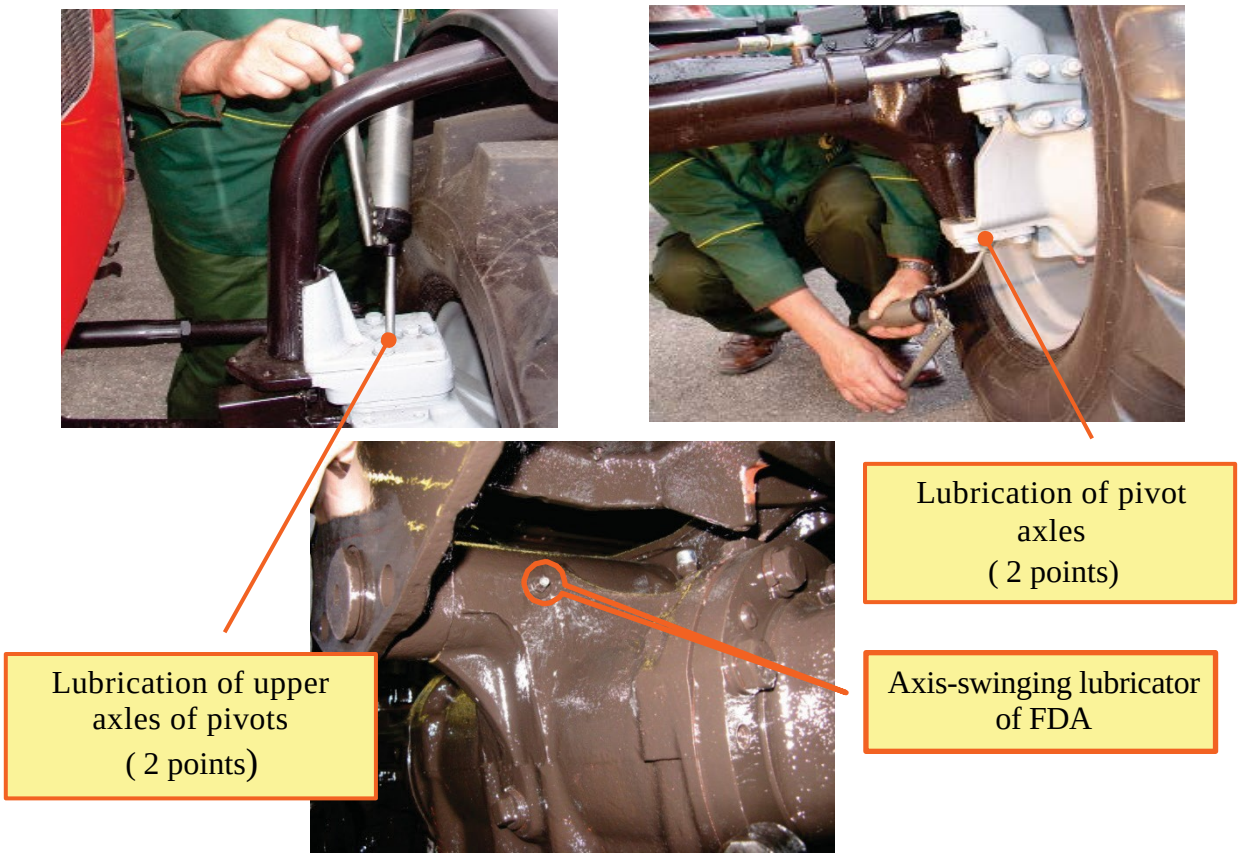


Figure 8.13

Procedure 11. Draining Sediment and Sludge from the Fuel Tanks and the Fuel Coarse Filter (fig. 8.14)

Screw out the plugs and drain sediment and sludge from the fuel tanks and filter, respectively until clear fuel appears. Screw in the plugs.

Figure 8.14

Procedure 12. Checking the Tension of the Alternator Driving Belt (fig. 8.15)

The alternator belt tension is considered to be correct if its sagging at the section between the pulleys of the crankshaft and the alternator is within 29 to 33 mm when pushed with a force of 40 N (4 kgf). To adjust the belt tension, turn the alternator body such as to ensure the required tension. Tighten the plate attachment bolt 11 and nuts 10 of the alternator attachment bolts.

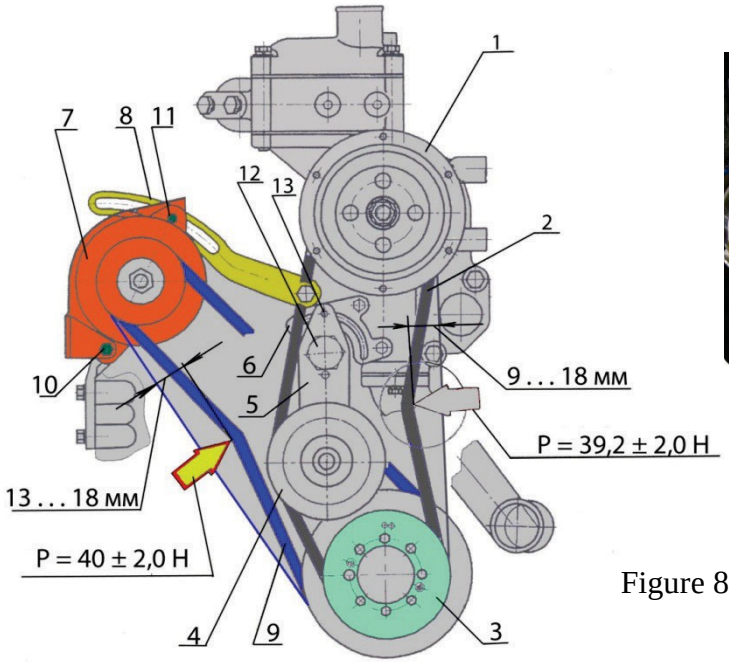


Figure 8.15

1 – water-pump polley; 2 – water-pump drive belt; 3 – crankshaft pulley; 4 – water-pump belt tentioner idle pulley; 5 – lever; 6 – plate; 7 – alternator; 8 – plate; 9 – belt; 10 – bolts; 11 – bolt; 12 –axle; 13 – bolt.

Procedure 13. Checking the Tyre Inflation Pressure (fig. 8.16)

Pressure in the tyres of front and rear wheels shall be within 1,0…1,6 kgf/cm2 (100…160 kPa) and 0,8…1,6 kgf/cm2 (80…160 kPa) respectively, depending on loads. If necessary, bring the pressure to the norm in accordance with a number of loads and pressures

Figure 8.16

Procedure 13a. Checking the Tightening of Fasteners of the Hubs and Wheels (fig. 8.17)

Check the tightening torques and, if necessary, tighten up:

- the bolts (1) of hubs of the rear wheels with the torque of 360…500 N•m;
- the nuts fastening the rear wheels to the hubs – 300…350 N•m;
- the nuts fastening the front wheels to the flanges – 200…250 N•m;

Procedure 14. Adjusting the Clutch Control Mechanism (fig 8.18, 8.19, 8.20, 8.21)

Set the initial position of the pedal (7) by means of the adjusting bolt (3) and fork (5) having kept the dimension "B" Adjust the clearance between the piston lifter (9) and the piston of the master cylinder (10) by means of the fork (5). When doing this, the travel of the pedal (7) from the initial position to the moment of contact of the piston lifter (9) with the piston as measured at the centre of the pedal boot shall correspond to the dimension "B", Tighten the nuts (4, 8) and fix the pin (6) with a cotter pin

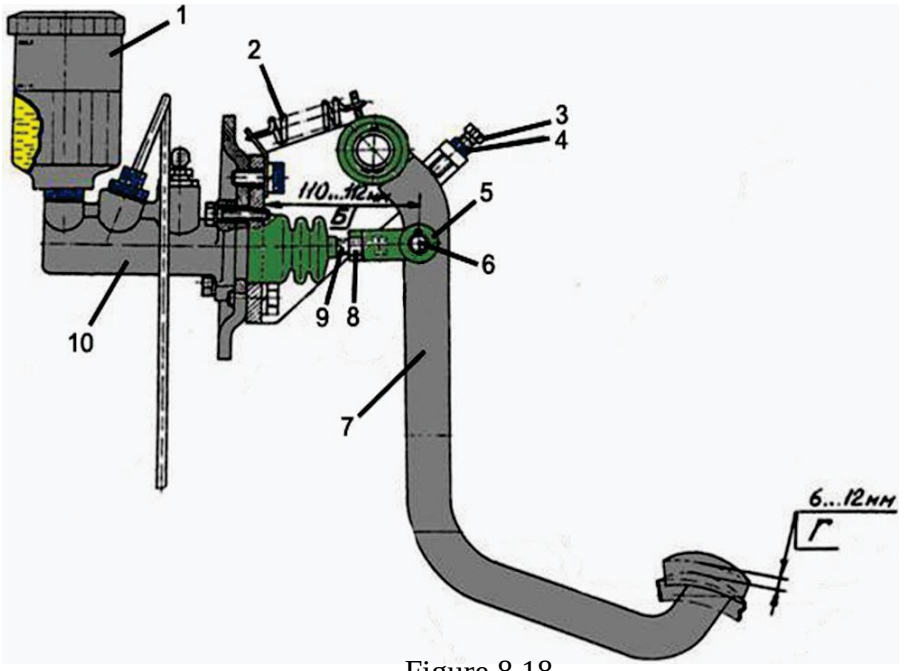


Figure 8.18

Move the cover 13 down to make the lock nut 14 available;
Remove the piston lifter 12;
Unlock the piston lifter 12 of the maim cylinder 19 into the fork 15, having kept F dimension;
Tighten the nut 14 and refit the boot 13;
adjust the free travel of the pedal 20, as measured at the centre of the boot to the dimension F (6…12 мм) by screwing or unscrewing of the bolt 17 for having kept the clearance 1,5…2.0 mm between the piston lifter 12 and the piston of the main cylinder 19;
tighten the locknut 18;

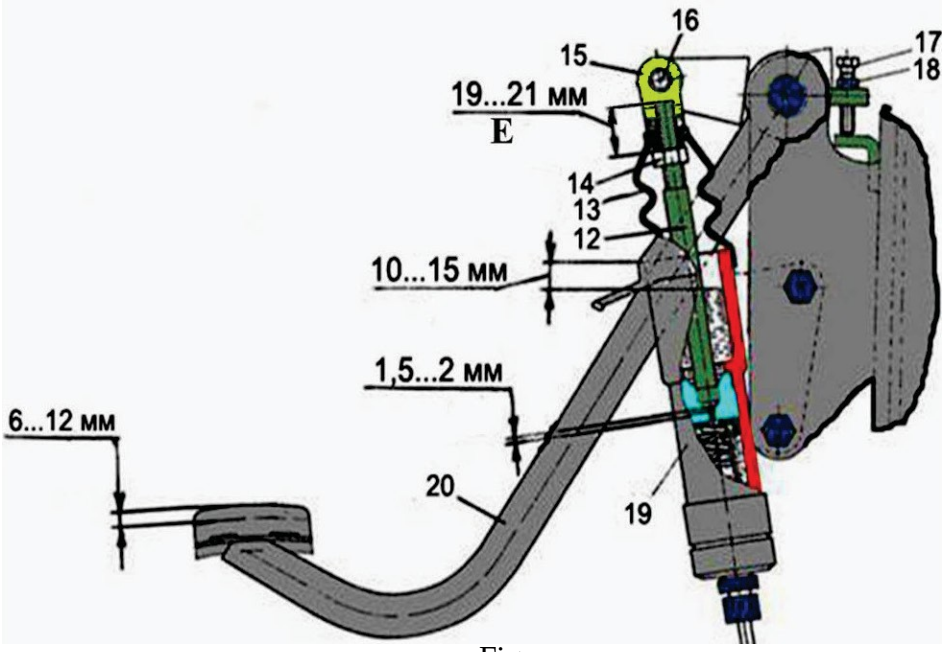


Figure 8.19

Dismantle the master cylinder (30) from the bracket (33) having removed the pin (34);

- Set the piston lifter (31) in the cylinder (30) to the rightmost position until it rests against the cover;
- Move the cylinder (30) until it contacts the piston lifter (32) of the hydraulic booster (39) without effort and align the holes of the support (26) with those of the bracket (33) by turning the support (26) in or out; then screw the support in by 1/2 revolutions and refit the pin (34);
- Tighten the locknut (27) and fix the pin (34) with a cotter pin

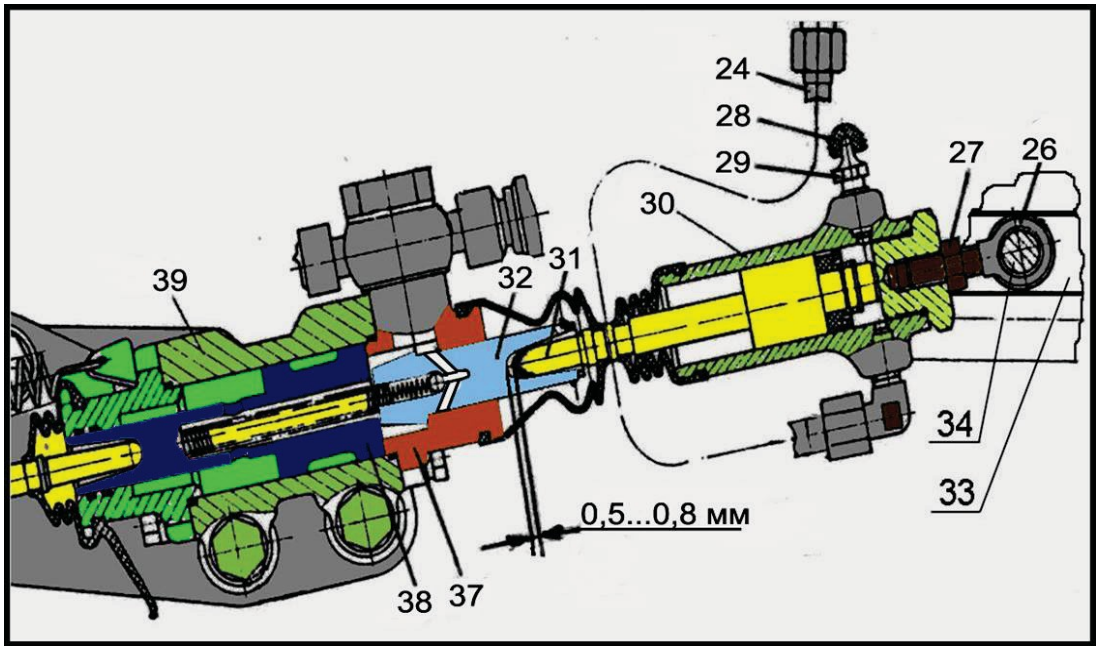
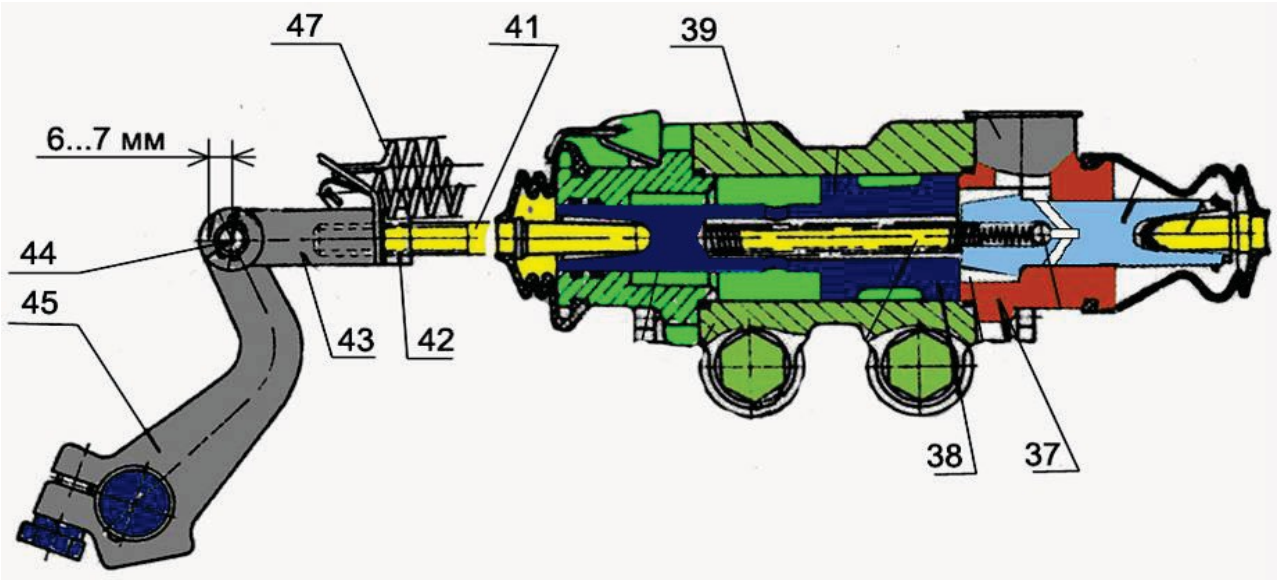


Figure 8.20

- Remove the two release springs (47);
- Disconnect the rod (41) from the lever (45) having removed the pin (44);
- Unlock the fork (43);
- Move the rod (41) to the right until the piston (38) of the hydraulic booster (39) rests against the cover (37), turn the lever (45) counter-clockwise until the release bearing rests against the release levers and align the holes of the lever with those of the fork by rotating the fork (43); then turn the fork in by 5...5.5 revolutions (dimension “L”) and connect the same with the lever by means of the pin (44);
- tighten the nut (42), fix the pin (44) with a cotter pin and refit the two release springs (47).

Bleed air from the hydraulic clutch control system.



Procedure 15. Checking the Engine Air Cleaner (fig. 8.22)

Check the condition of the paper filter elements (PFE) for paper rupture and correct insertion.

To check the basic filtering element (BFE), proceed as follows:

- screw out the butterfly nut and re-move the sump;
- screw out the butterfly nut and re-move the BFE;
- check the monitor filtering element (MFE) for contamination without withdrawing it from the housing.

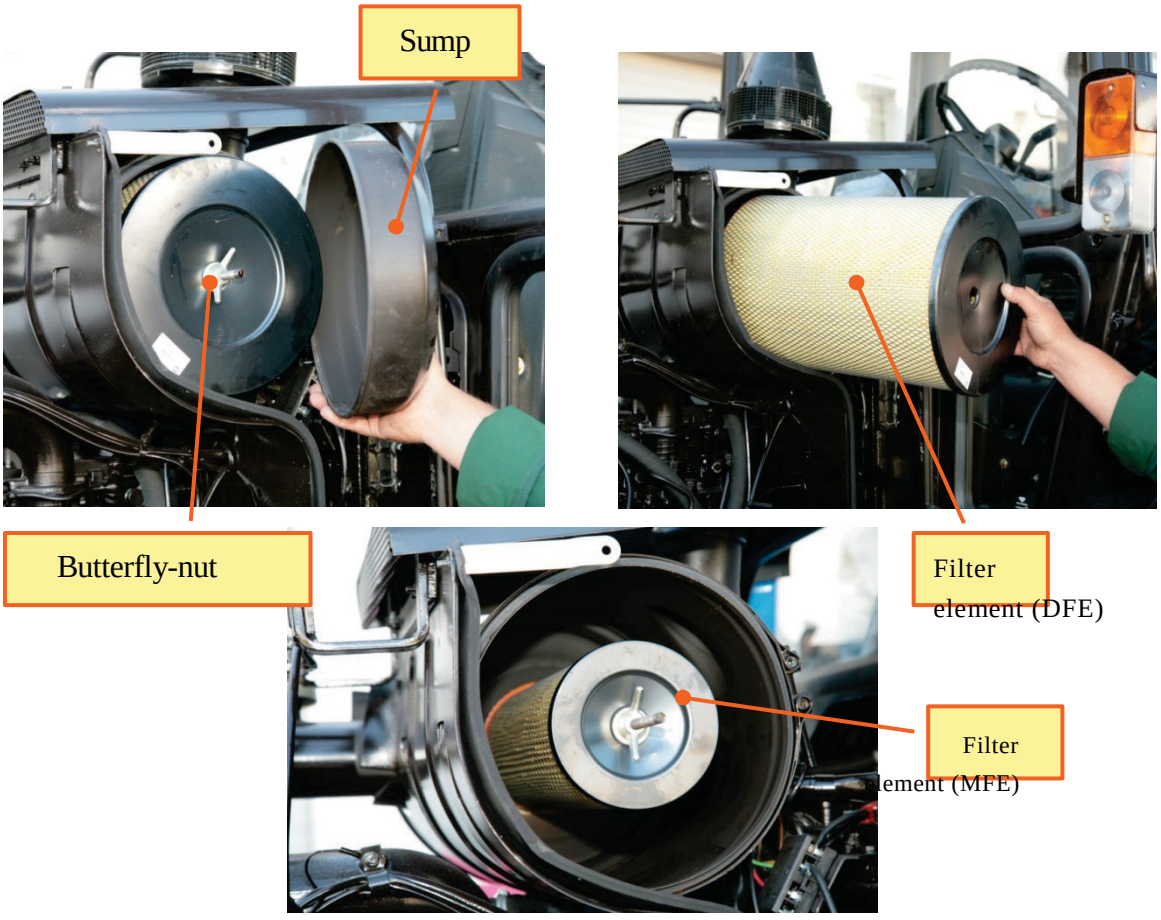


Figure 8.22

Attention! It is not recommended to take the filter element from out of the housing

Note: Under heavy dust-laden conditions, this procedure should be performed every 20 hours of the engine operation.

Procedure 15a. Clean the Filter of the Cab Ventilation and Heating System (fig. 8.23)

> **Note:** Under the conditions of high moisture of the environment, do not switch off the fan before cleaning the filters, because it is difficult to remove dust from the moist paper Filtering element.

Lift up the panel of the cab. Turn out two screws with plastic heads under the projecting edge of the cab.

Remove the panel and remove the filter. Shake dust out of the filter by slight tapping so that not to damage the paper filtering element

Clean the filter using compressed air under the pressure of not more than 0.1 MPa. The hose nozzle shall be held at the distance of not less than 300 mm from the filter to prevent the damage of the paper filtering element. It is necessary to direct the air flow through the filter in the direction opposite to the normal air flowing shown by the arrows marked on the filter.

> **ATTENTION!** Be careful not to damage the filter

> **ПРИМЕЧАНИЕ:** If the tractor is operated under the heavy dustiness conditions, make the cleaning of the filter less frequently.

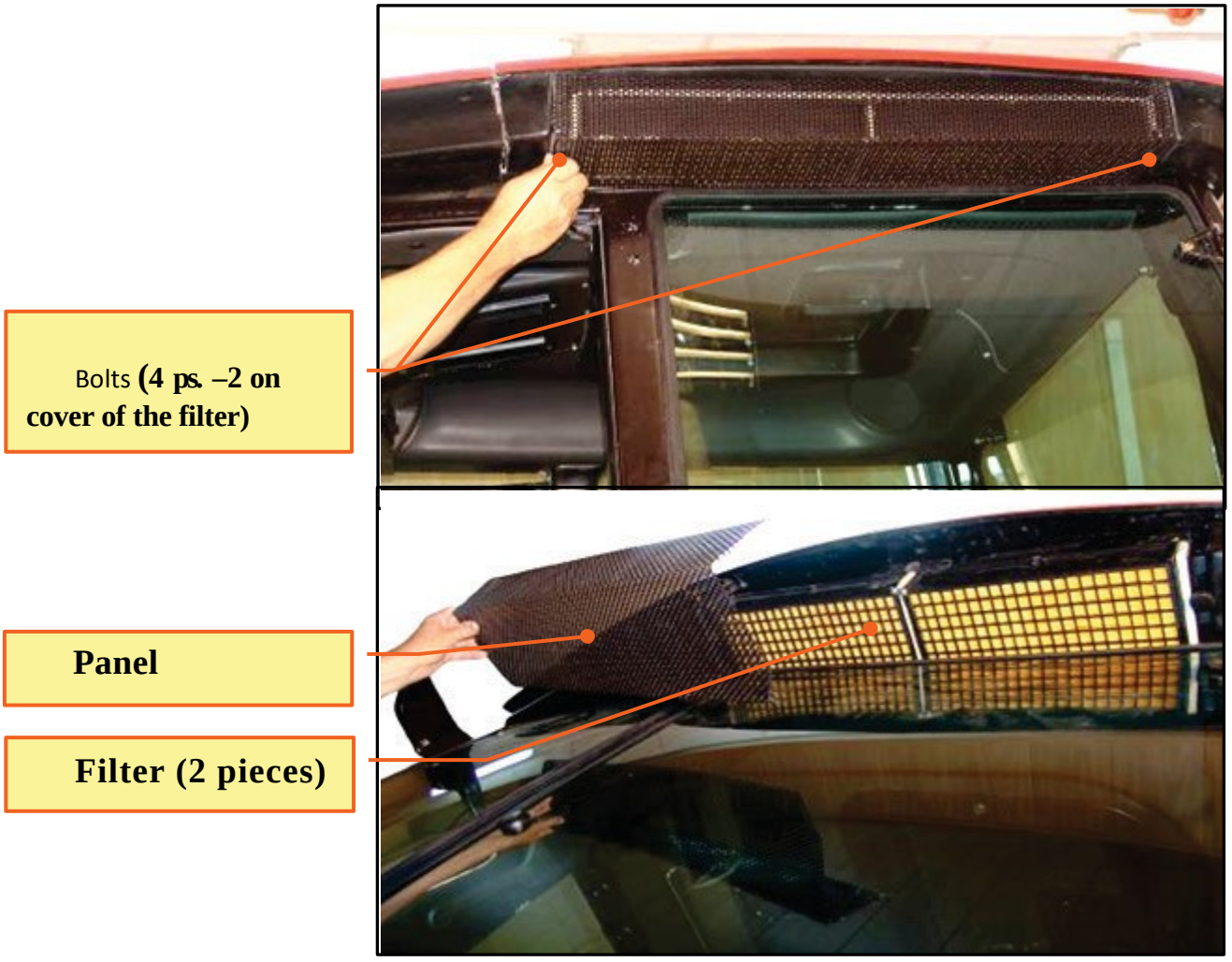


Figure 8.23

AFTER EVERY 250 HOURS OF OPERATION, perform the previous maintenance procedures plus the followings

Procedure 16. Greasing the Clutch Re-lease Bearing (fig. 8.24)

- Screw out the plug (1) on the left side of the clutch housing.
- Make four to six strokes of “Litol-24” lubricator through the pressure lubricator.

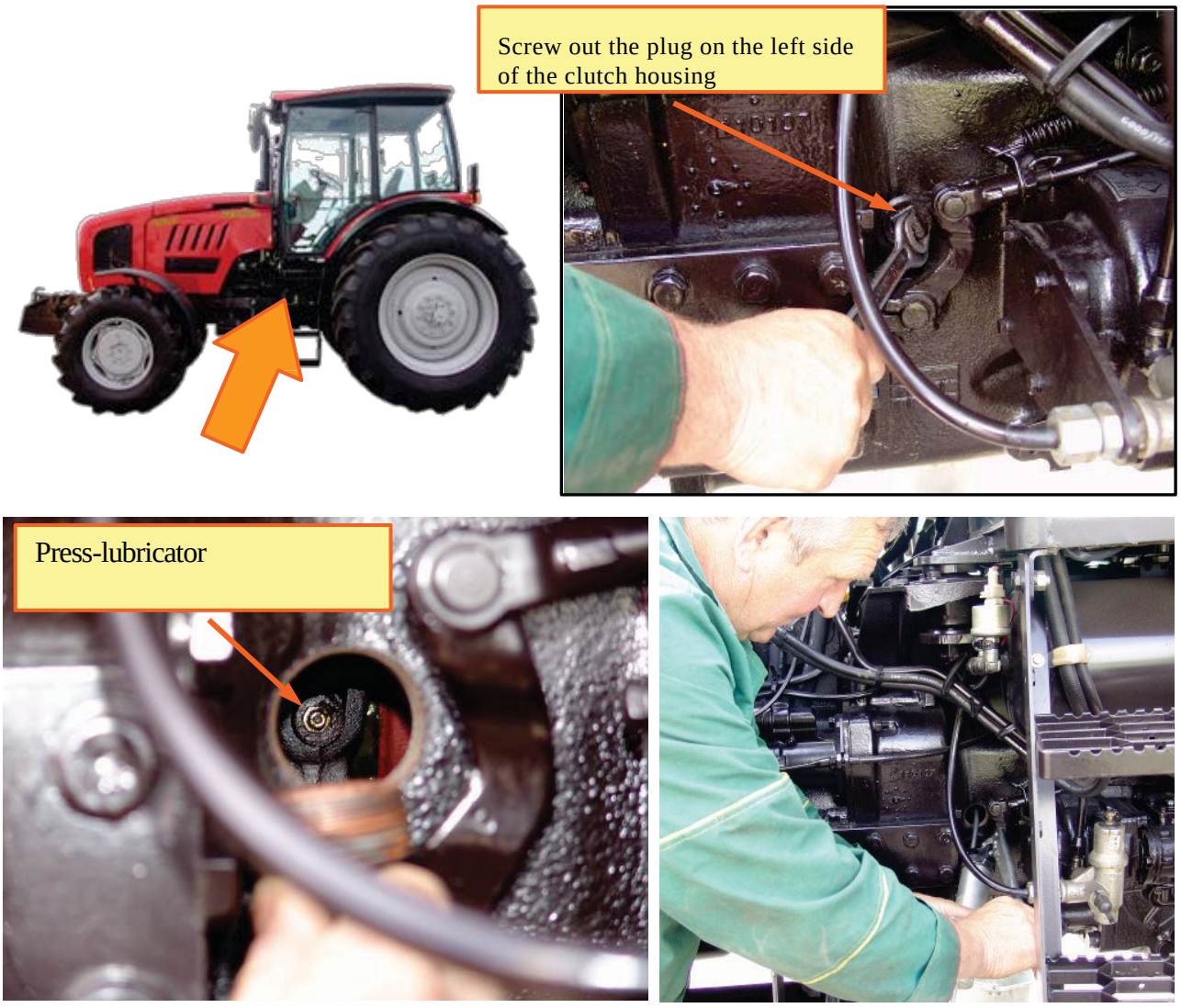


Figure 8.24

Note: Do not inflate the excess lubrication, because it will be accumulated inside the clutch housing and can get to the surfaces of dry friction.

Procedures 17, 18. Cleaning the Rotors of the Centrifugal Oil Filters of the Engine and Gear-Box, Respectively (fig.8.25)

Screw out the nut (22) and remove the cap (21). Remove the sleeve (10) by means of a wrench and screwdriver. Remove the cover (15), impeller (9) and screen (14). Wash the screen (14) in diesel fuel. Remove the layer of sediment from the inner walls of the sleeve (10).

Grease the O-ring with the oil. During assembly align the marks on the sleeve and rotor housing. Tighten the nut (22) with applying torque of 35 to 50 Nm

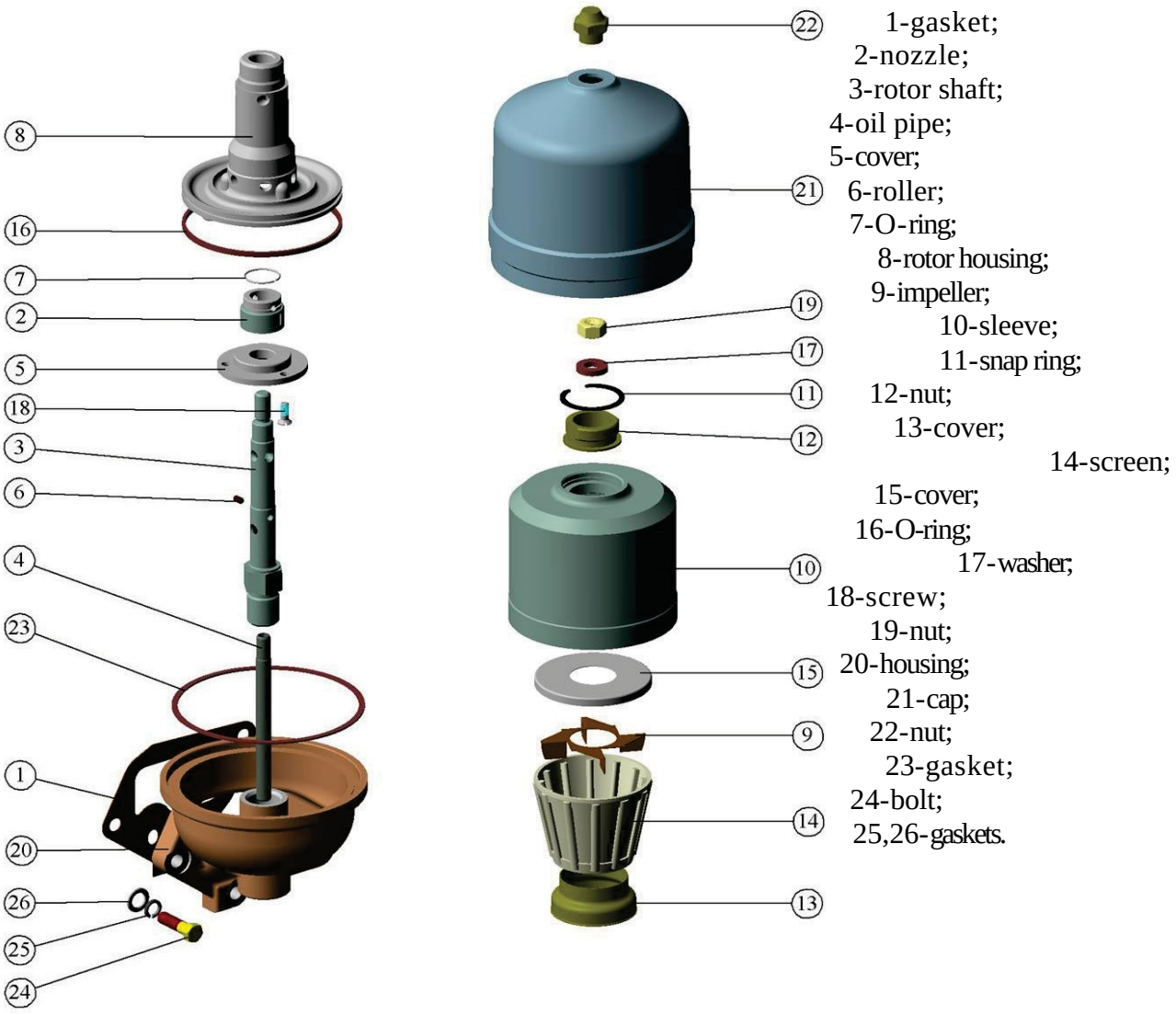


Figure 8.25

Note: The engine and gear-box filters are considered to be operating properly, if a light noise of rotating rotors can be heard for 30...60 seconds after the warmed up engine has been stopped.

Procedure 19. Washing the Screen Filter in the Gear-Box Hydraulic System (fig. 8.26)

Screw out the cover of the screen filter and take the filter assembly by the cramp.

Disassemble the filter by screwing off in turn the locknut and the cramp together with the stud . Remove the plate , spring , piston , O- ring and filter elements . Wash all the elements in diesel fuel to remove dirt completely. Reassemble the filter in the reverse order of operations; pay special attention to fitting rings on both sides of the set of filter elements

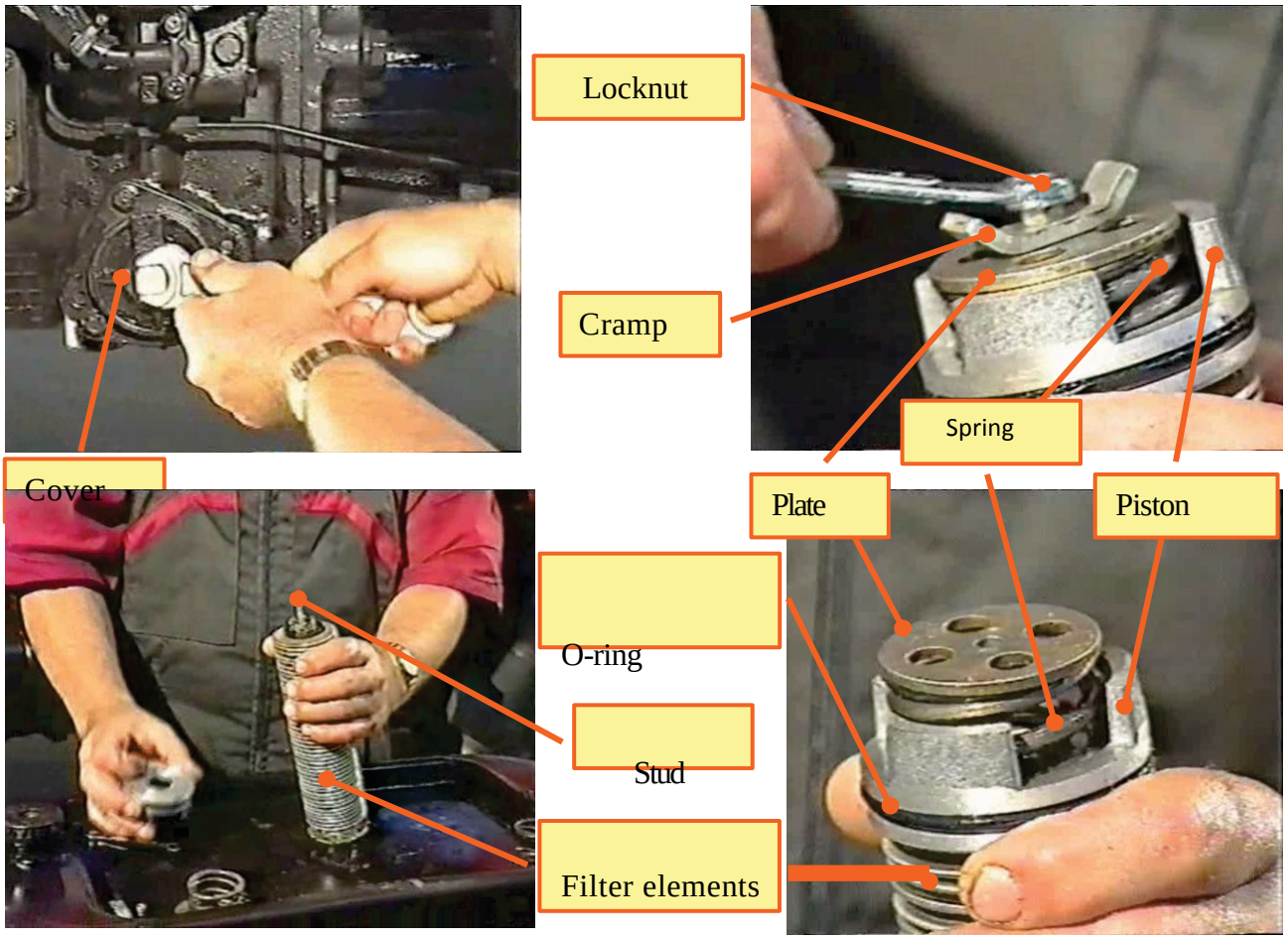


Figure 8.26

Note: Make sure that O-rings are fixed from both sides of filter elements package

Note: Screw butterfly nut until the drawing the plate with the end of the piston

Procedure 20. Changing Oil in the Engine Crankcase (fig. 8.27)

Warm up the engine to normal operating temperature (at least 70°C).

- Place the tractor on a flat level ground, stop the engine and apply the brake.
- Remove the oil filler neck cap and screw out the drain plug. Drain oil in a container suitable for oil storage.
- Refit the drain plug and pour fresh clean engine oil through the oil filler neck up to the mark of the oil dip-stick.
- Refit the filler neck cap .
- Start the engine and let it run for 1-2 minutes

.• Check oil level with the dipstick, as described under Procedure 1.

- If necessary, add oil to the level.

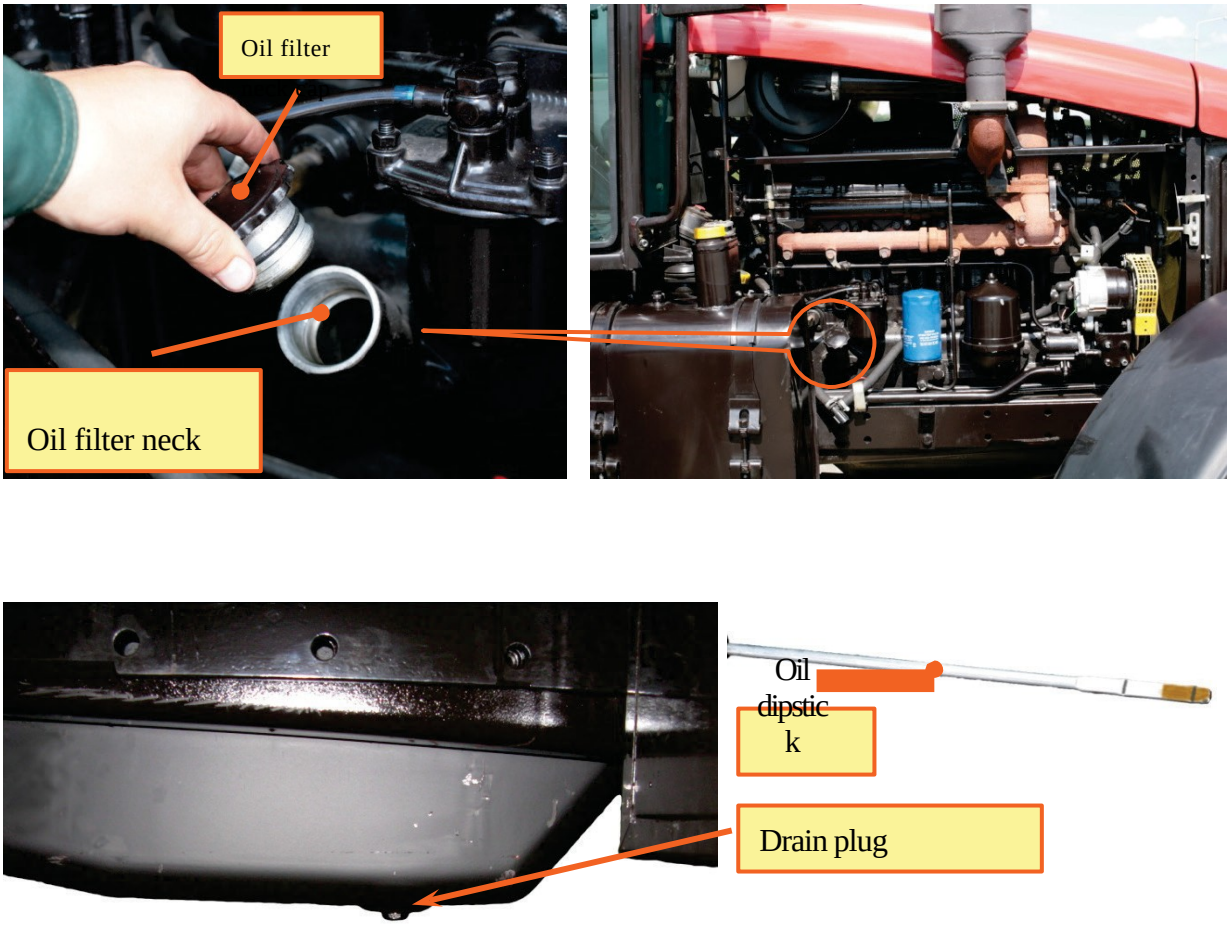


Figure 8.27

Procedure 21. Changing the PFE of the Engine Oil Filter (to be performed simultaneously with changing oil in the crankcase): (Fig 8.28)

Screw out the cap shell (1) in until with the paper filter element (5) as assembly.

Screw out the nut (12) and remove the bottom (11) together with gaskets (2) and (13).

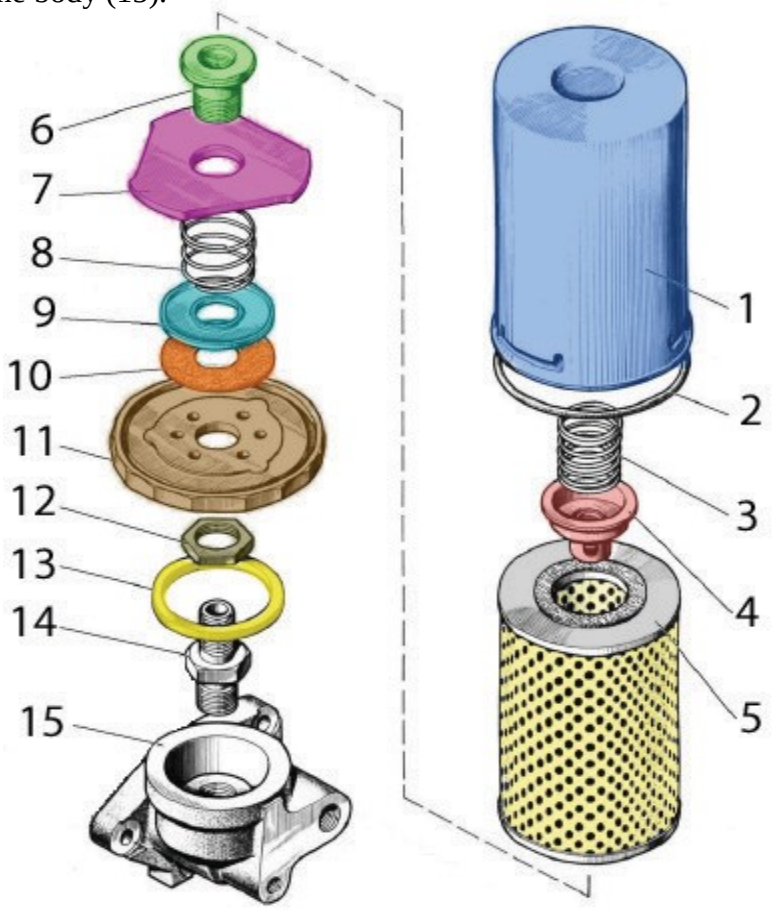
Press the clamp (7) inside the cap (1) to the distance of 3 to 4 mm, and then turn it in such a way as to align the bosses of the clamp with the slots in the cap (1).

Remove the clamp, PFE (5), bypass valve (4), spring (3).

Wash all the parts in diesel fuel.

Install a new filter element, following the above operations in the reverse order. If required, replace the gaskets (2) and (13). Tighten the nut (12) with applying the torque 30…40 N·m. Grease the gasket (13) with oil.

Screw in the assembled filter additionally on 3/4 revolutions after the gasket (13) comes in contact with the body (15).



1-cap;
2-O-ring;
3-Spring;
4-by-pass valve;
5-paper filter element;
6-fitting;
7-clamp;
8-spring;
9-washer;
10-valve;
11-botton;
12-nut;
13-gasket;
14-fitting;
15-body.

Figure 8.28

ATTENTION! Screw in the filter exclusively by hand effort, holding it by the filter cap (1).

Procedure 23. Checking Oil Level in the Front PTO Reduction Gear-Box (if installed) (fig.8.29)

Screw out the plug (1) of the check-and-filler hole (on the right side of the reduction gear-box). The oil level shall be up to the threaded hole for the plug

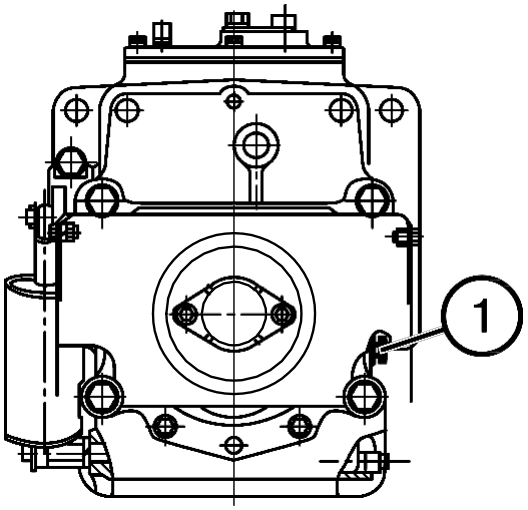


Figure 8.29

Procedure 24. Checking the Front Wheels for Toe-In

(fig. 8.30)

The front-wheel toe-in shall be within 0 to 8 mm

If the toe-in figure exceeds the specified limits, proceed with adjustment operations, as follows:

- Loosen the locknuts (1) and (3) of the steering link tube (2).
- Set the required amount of toe-in by rotating the tube in either direction.
- Tighten the locknuts (1) and (3) with applying a torque of 100...140 N•m.

Note: The toe-in is defying as the difference between the measurement of B-A

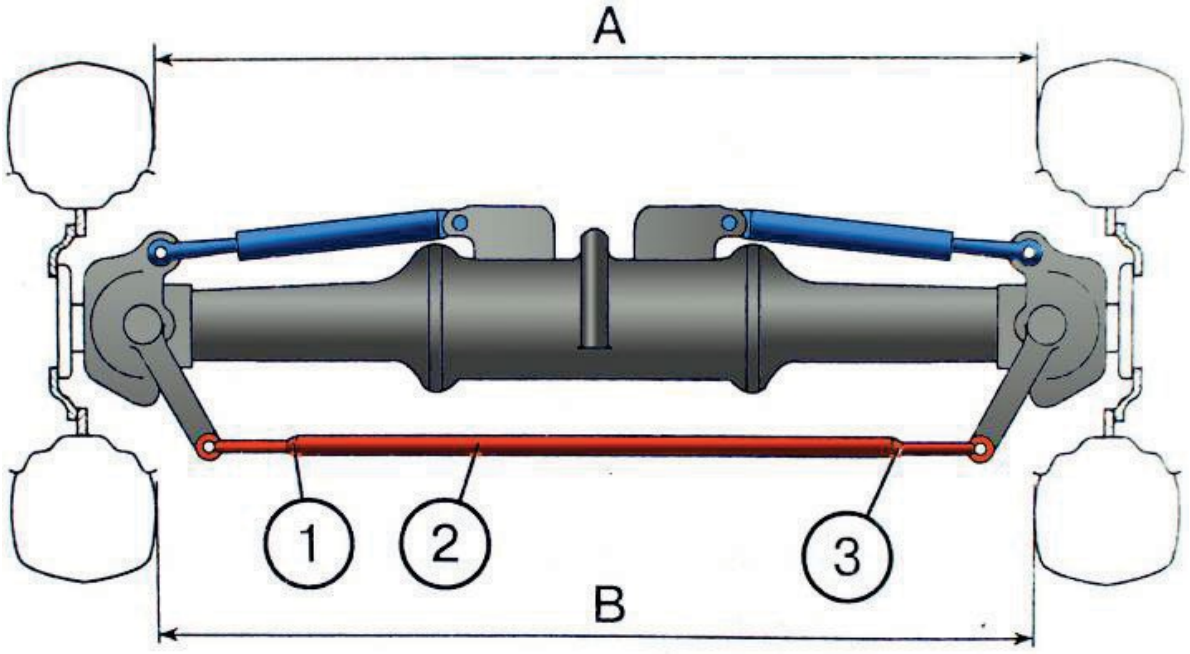


Figure 8.30

Procedure 25. Checking the Oil Level in the Final Drive and Hub Reduction Gear Housings (fig. 8.31)

Check the oil level:

- In the hub reduction gear-box casings (left- and right-hand). Add oil, if required, to the level of the check-and-filler hole stopped with the plug.
- In the final drive of the FDA with removable housings. Add oil, if required, up to the level of the check-and-filler hole stopped with the plug.

Grades of oils to be used:

Transmission oils Тап-15В, ТСп-15К, ТСп-10 or ТАД-17 or its analogues

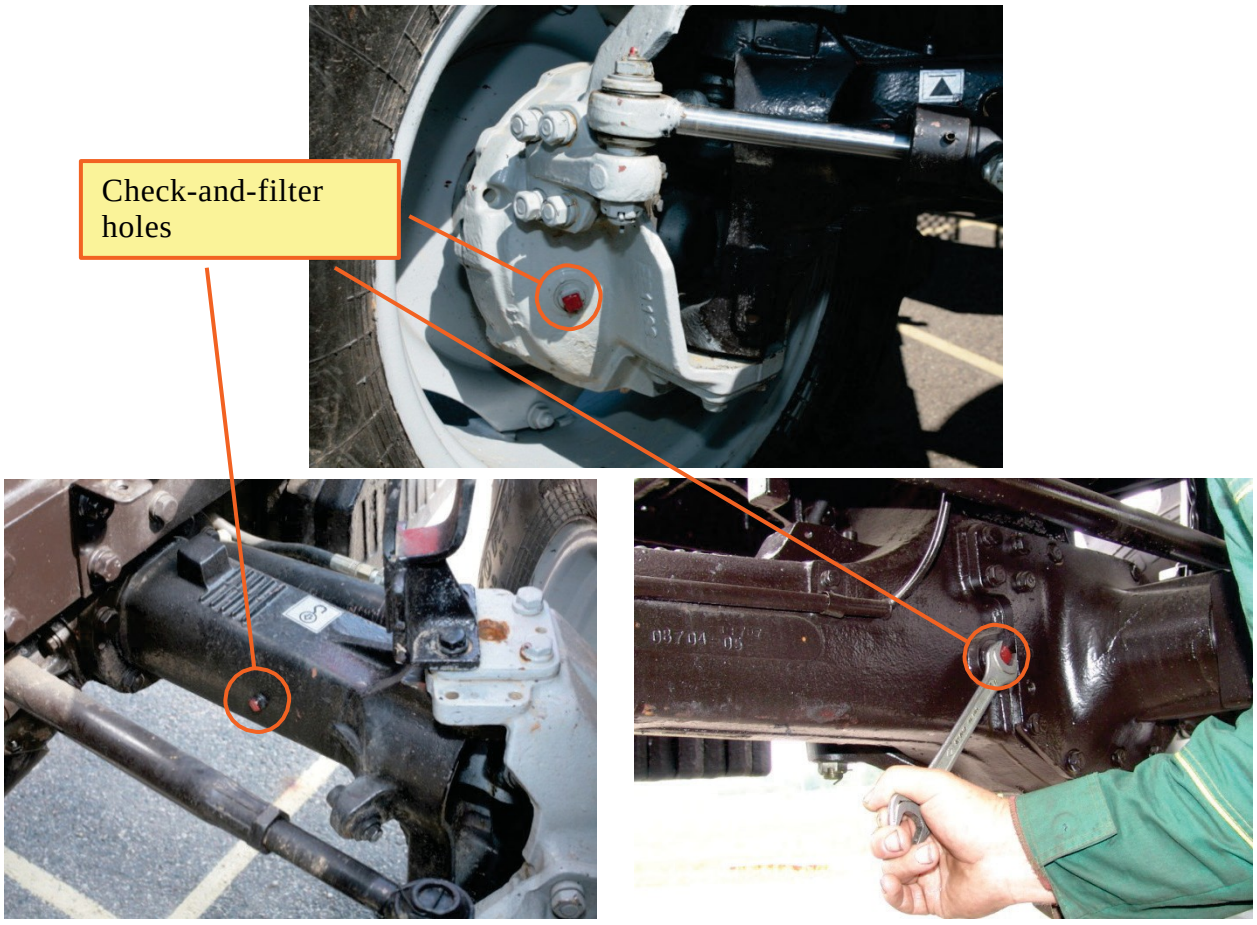


Figure 8.31

Procedure 26. Turbocharger (fig. 8.32)

Check the fasteners of the turbocharger (1), outlet ducts (3) and the exhaust pipe (2) bracket for tightness. Tighten up with applying a torque of 35...40 N•m, if required.

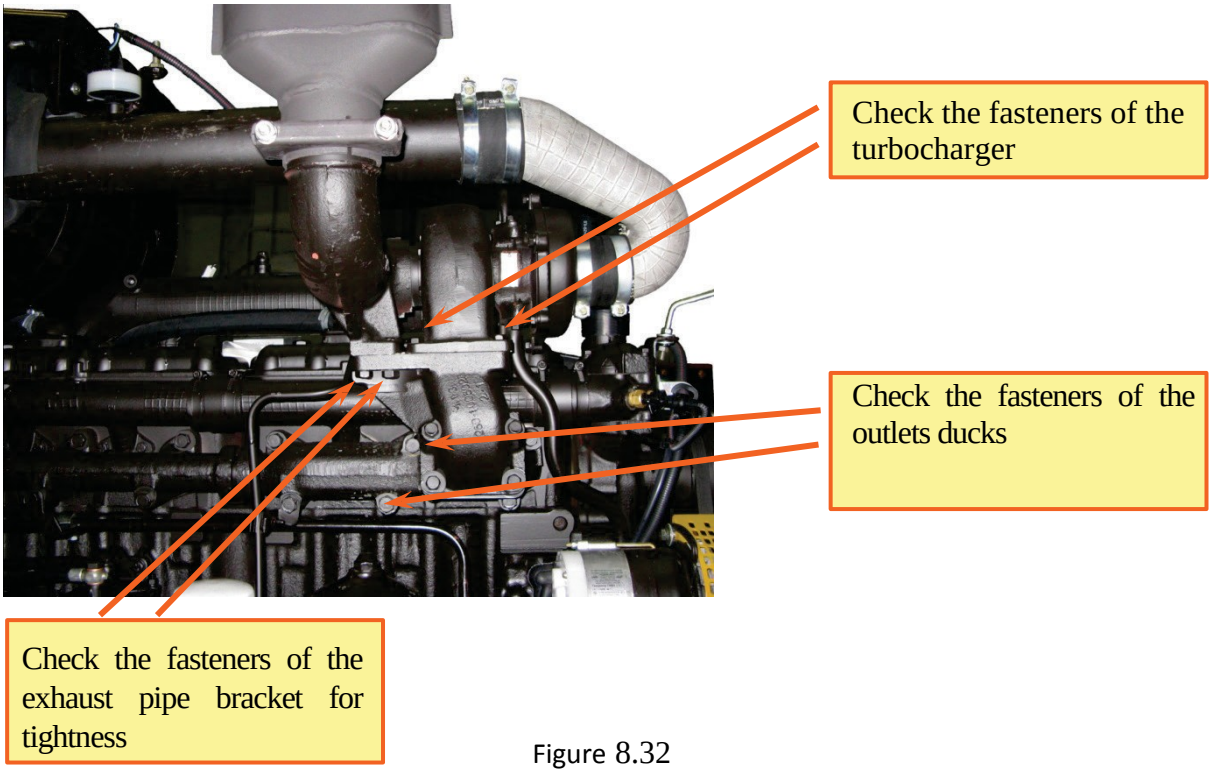


Figure 8.32

AFTER EVERY 250 HOURS OF OP-ERATION, perform the previous maintenance procedures plus the followings:

Procedure 27. Checking the clearances between the valves and the rocker arms (fig. 8.33)

> **Note:** The clearances should be checked on a cold engine, having checked preliminarily the cylinder head bolts tightening (Procedure 37).

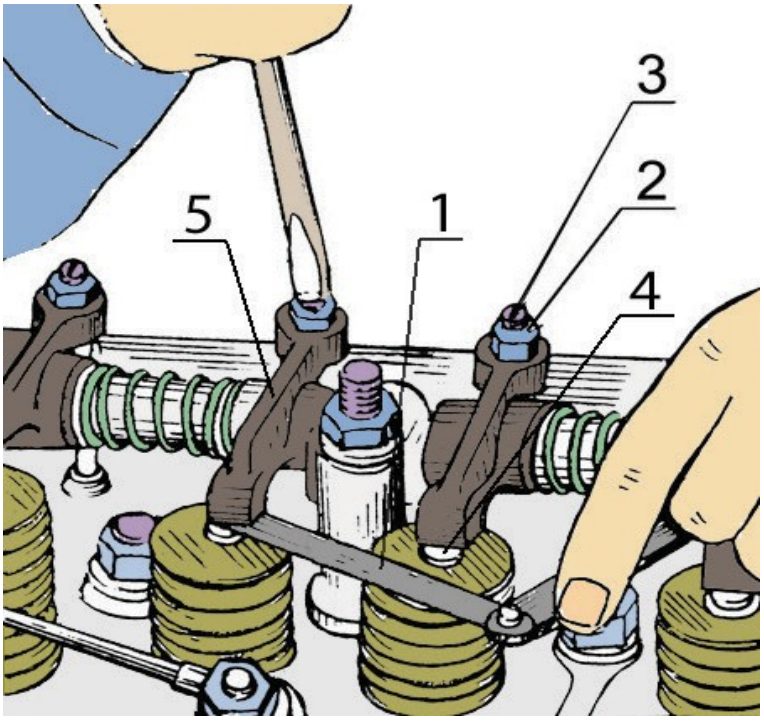
- Remove the covers of the cylinder heads.
- Check the tightening of the bolts and nuts which fasten the rocker-arm shaft brackets (60...90 N•m).
- Turn the crankshaft until the piston of the first cylinder comes to a valve lap position (where the inlet valve starts to open, while the outlet valve completes the closure).
- Adjust clearances in 3, 5, 7, 10, 11 and 12 valves (to be counted from the fan).

> **ATTENTION!** The clearances between the end-faces of the valve stems (2) and the rocking arm heads (3) shall be 0.25...0.30 mm for the inlet valves and 0.40...0.45 mm for the outlet valves.

- Turn the crankshaft through 360°, first having set the valve lap in the sixth cylinder; then, adjust the clearances in valve Nos. 1, 2, 4, 6, 8 and 9.

To adjust the clearance, slacken the locknut (2) of the adjusting screw (3) and set the required clearance against a clearance gauge (1) by means of a wrench and driver. After setting the clearance, tighten the locknut and re-check the clearance using the gauge.

- On completion of the adjustment job, refit all the parts removed.



1-clearance gauge;
2-locknut;
3-adjusting nut;
4-valve stems;
5-rocker arm.

Figure 8.33

Procedure 28. Draining Sediment and Sludge from the Fuel Fine Filter (fig. 8.34)

• Turn out the air-bleeding plug which is located on the filter housing by 2...3 revolutions.

• First, screw out the sediment and sludge draining plug on one shell which is located at the bottom, and drain the sediment until a clear jet of fuel appears. Then, screw out the plug on the second shell and drain the sludge. Screw in the plugs.

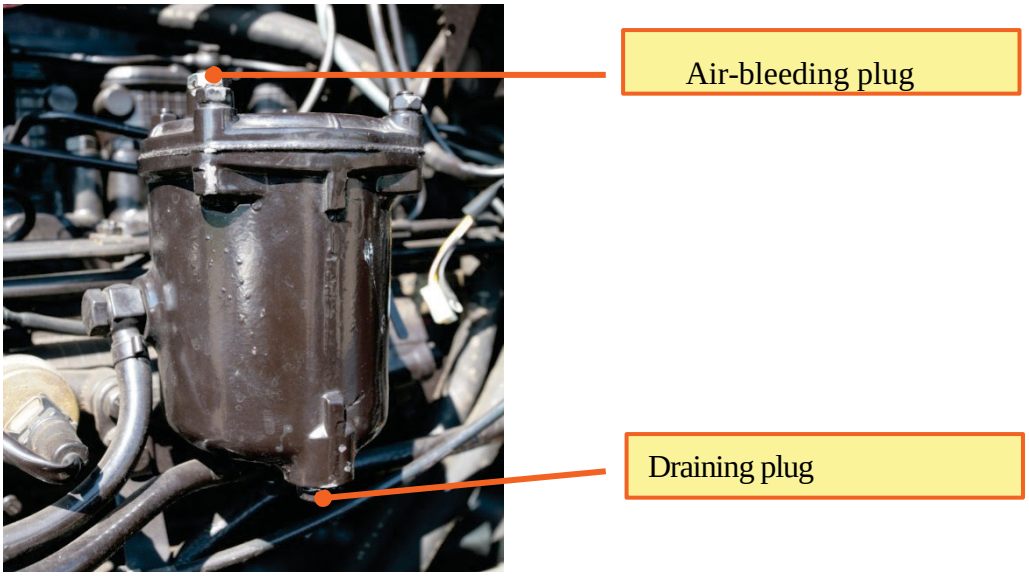


Figure 8.34

Procedure 29 Checking the Steering Controls for Play (fig. 8.35)

If the steering wheel play exceeds 25°, take up looseness in the steering trapezoid pivots, tighten the nuts of the steering knuckle arms, and eliminate plays in the steering column and steering gear.

Figure 8.35

Procedure 30. Checking the Clearances in the Bearings (Flanges) of the Front Wheels)
(fig. 8.36)

Check the taper roller bearings (3) of the flange (2) and adjust them as required by means of the nut to a no-gap condition. Tighten up the nut so that the gap is taken up completely, then prick-punch the nut in two slots in the flange (2).

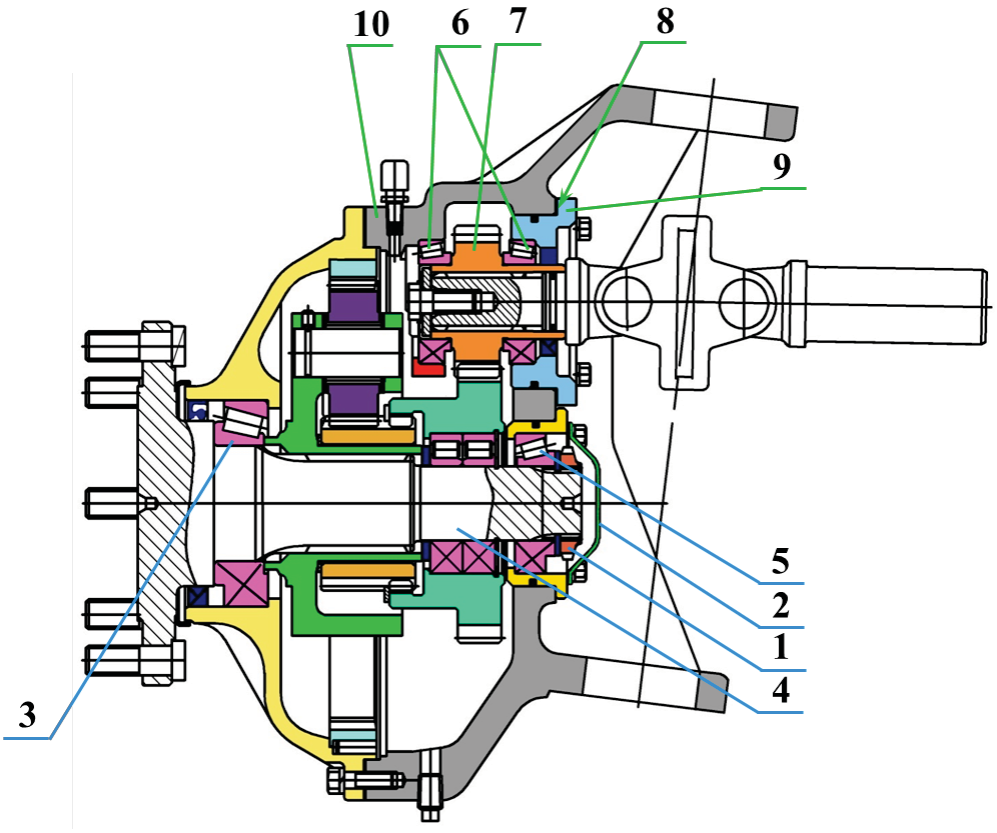


Figure 8.36

Procedure 31. Adjusting the Travel of the Brake Pedals and Parking Brake Lever

(fig. 8.37, 8.38)

Adjusting «wet» brakes: pedals travel 100…120 mm at a force (300±30) H at one pedal. Adjusting by the bolts (25).

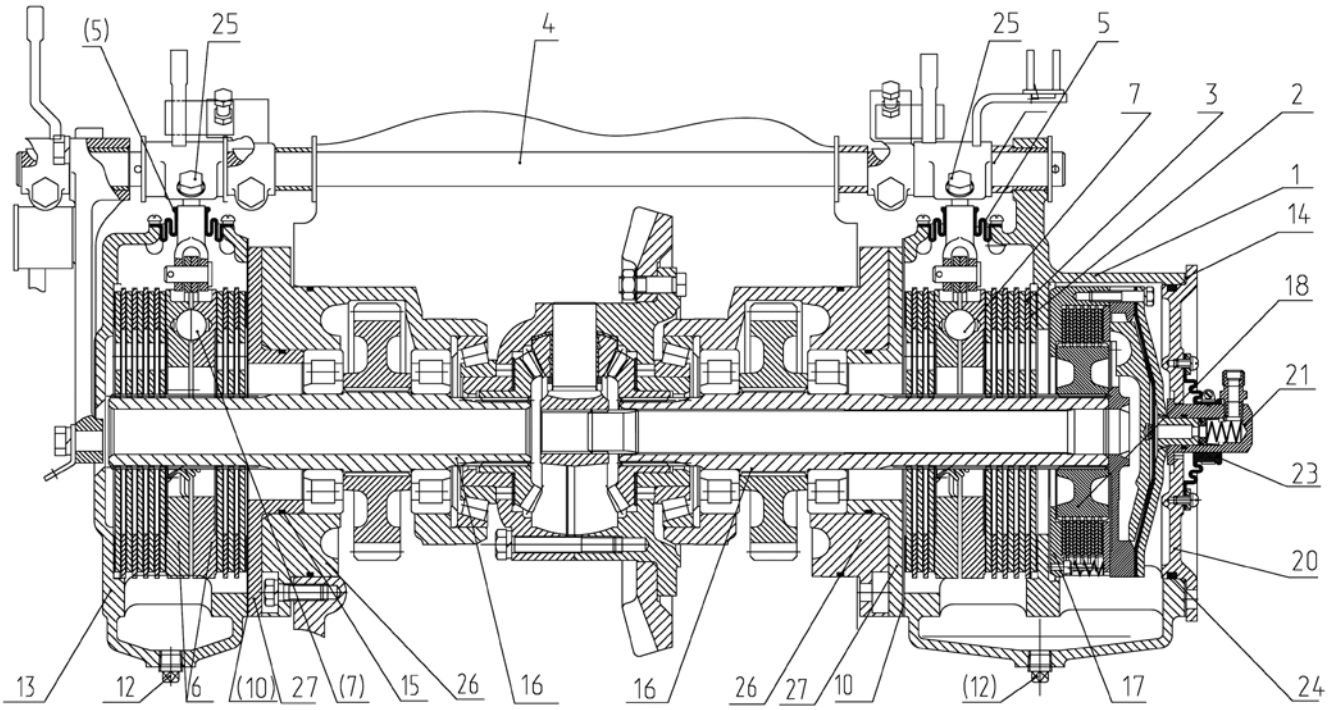


Figure 8.37

To adjust the service brakes of the tractors without reversible control post, proceed as follows:

1. Set the pedal pads (8, 9) in one plane making use of the thrust adjusting bolts (5) for the purpose by screwing them in to about 20 ±3 mm. Lock the nuts (4).

2. Adjust the free play of the pedals (8, 9) to within 4…8 mm. To do this, proceed as follows:

2.1. Uncotter and remove pins (6) and disconnect forks (3) from the stems of pedals (8, 9).

2.2.Turn out the lock-nuts (7) several turns and, by screwing the forks (3) in or out, shorten or lengthen, respectively, the hydraulic cylinder (1, 2) rods, to meet the required free play of the pedals.

2.3.Lock nuts (7) fitted on pins (6) and cotter-pin them. The pedal free play of 4…8 mm corresponds to a 0.6...1.3 mm clearance between the piston and the pusher in each master hydraulic cylinder.

2.4. The pedals should not be in contact with whatever components of the cab. The position of pedal pads as to height is be adjusted, if required, by bolts (5) and by changing the length of the hydraulic cylinder rods; provided the pedal free play is maintained within 4…8 mm.

3. Ensure the length of each service hydraulic cylinder (1, 14) to be (207 ± 2) mm, if measured from the cylinder attachment point to the axis of pin which connects the levers (5, 9) with the forks (3, 12), respectively, with the piston of the working cylinder fully drawn in.

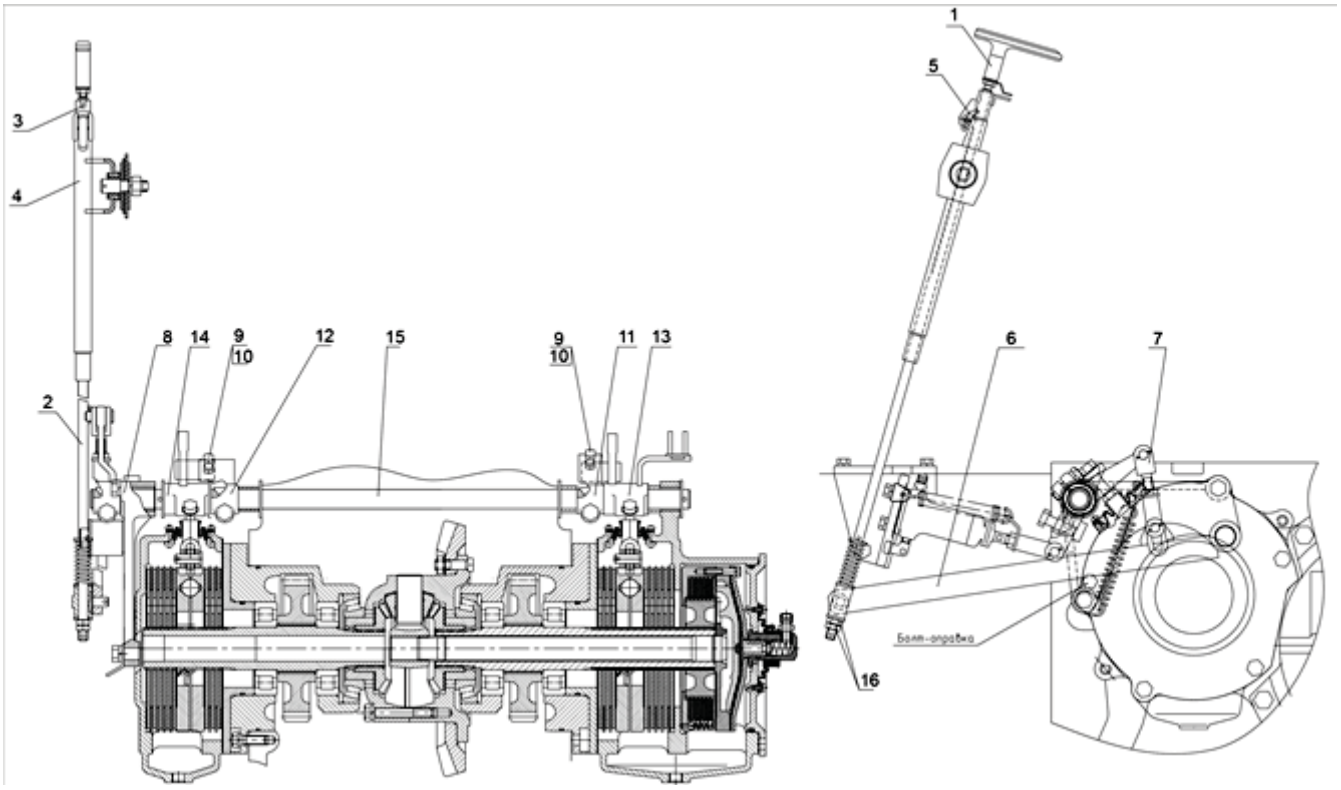


Figure 8.38

Procedure 32. Servicing the Storage Batteries

(fig. 8.39)

> **WARNING!** The batteries contains the sulfuric acid which causes severe burns on the skin. Beware of getting acid on hands, eyes and clothing. In case of contact acid in the outer parts of the body wash them with abundant stream of clear water. If swallowed – drink plenty of water or milk.
> After contact with mucous eyes – flush it with plenty of water for 15 minutes and then seek medical help. Do not allow sparks or flames in the area of the electrolyte - this can cause an explosion. Charge the battery in a ventilated room.
> When servicing batteries wear protective goggles and gloves.

Check the electrolyte level (it should be higher than the edges of the separators 10 ... 15 mm, ie correspond to the upper mark on the battery case). If necessary, top up with distilled water (refilling the electrolyte is not recommended);

• Check the tightness of the electrolyte, with a decrease in density of 0.03 g/cm3, the battery must be recharged.

It is not recommended to measure the density of the electrolyte immediately after topping up with distilled water, because indications would not be true;

• Wipe the battery with 10% solution of baking soda and then wash with water;
• Grease the terminals of two lead wires with a thin layer of petroleum jelly and squeeze;
• The battery must be properly fixed on the tractor;
• If there are vent holes in the plugs, clean it.

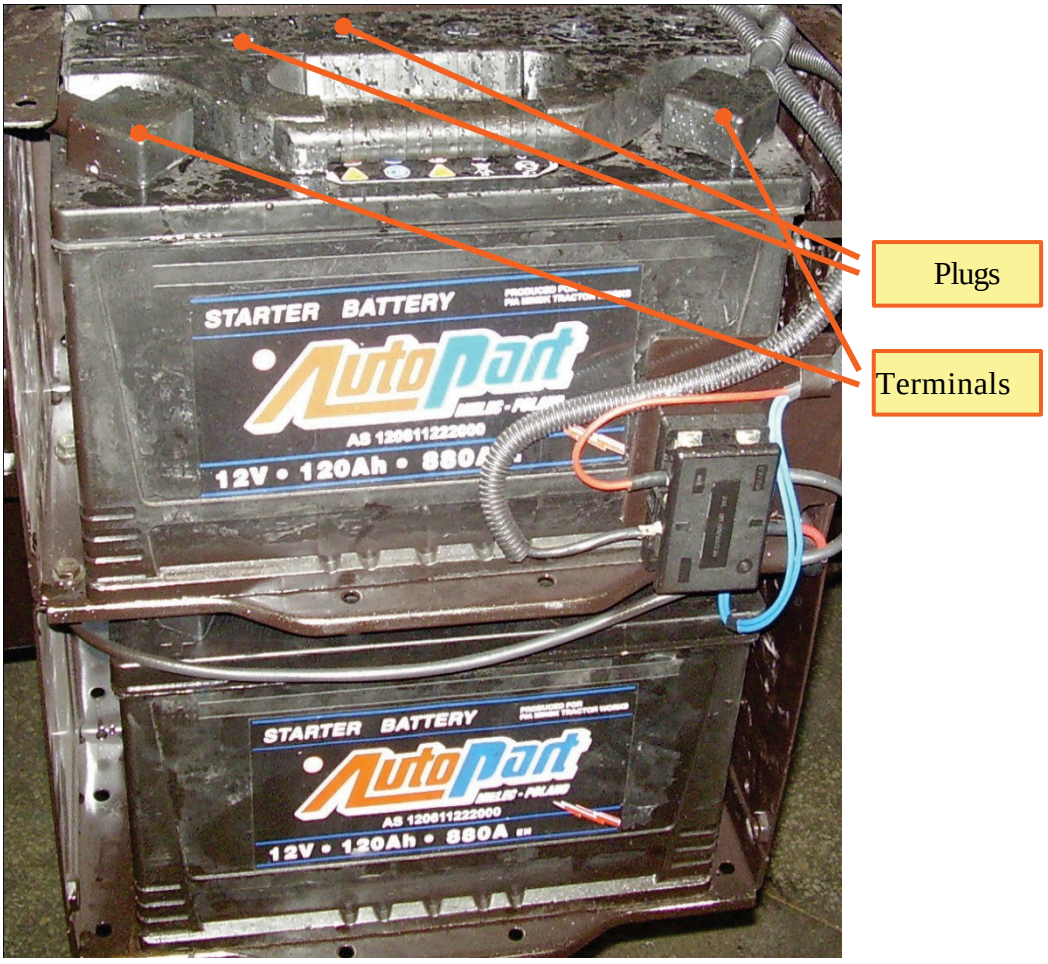


Figure 8.39

Procedure 33. Changing the Replaceable Filter Element in the Hydraulic System Oil Tank (fig. 8.40)

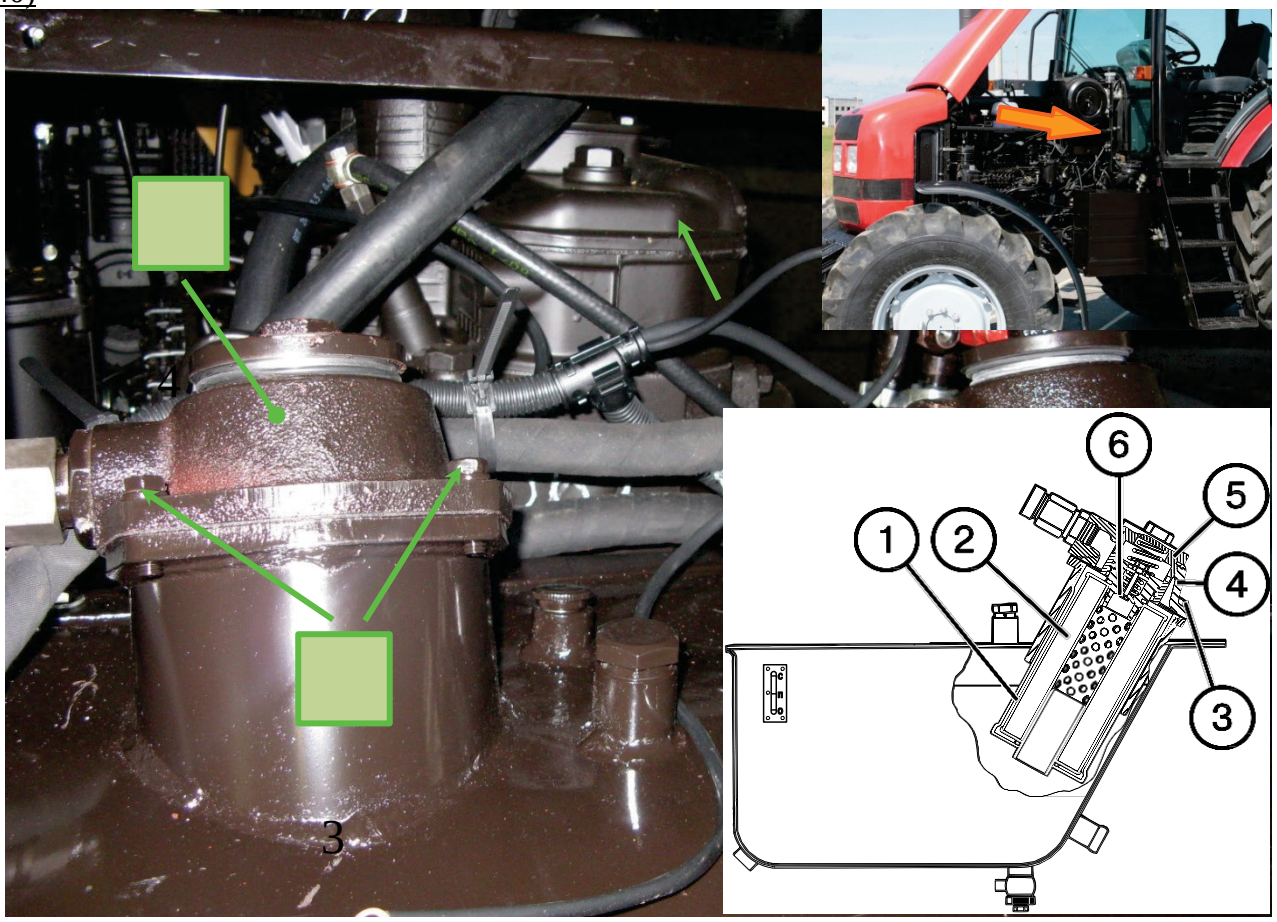


Figure 8.40

Screw out the bolts (3) fixing the cap (4) and remove the cap assembled with the valve (5) and valve (6);

- Remove the filter element (2);
- Clean the inner chamber of the barrel (1);
- Install a new filter element, refit the cap assembly (4)) and tighten the bolts (3).

Note: The next replacements of the filters make after every 1000 hours of work работы simultaneously with the oil replacement in the Steering System tank.

Procedure 33. Replacement of the Filter Element of the HPS Oil Tank (fig. 8.41)

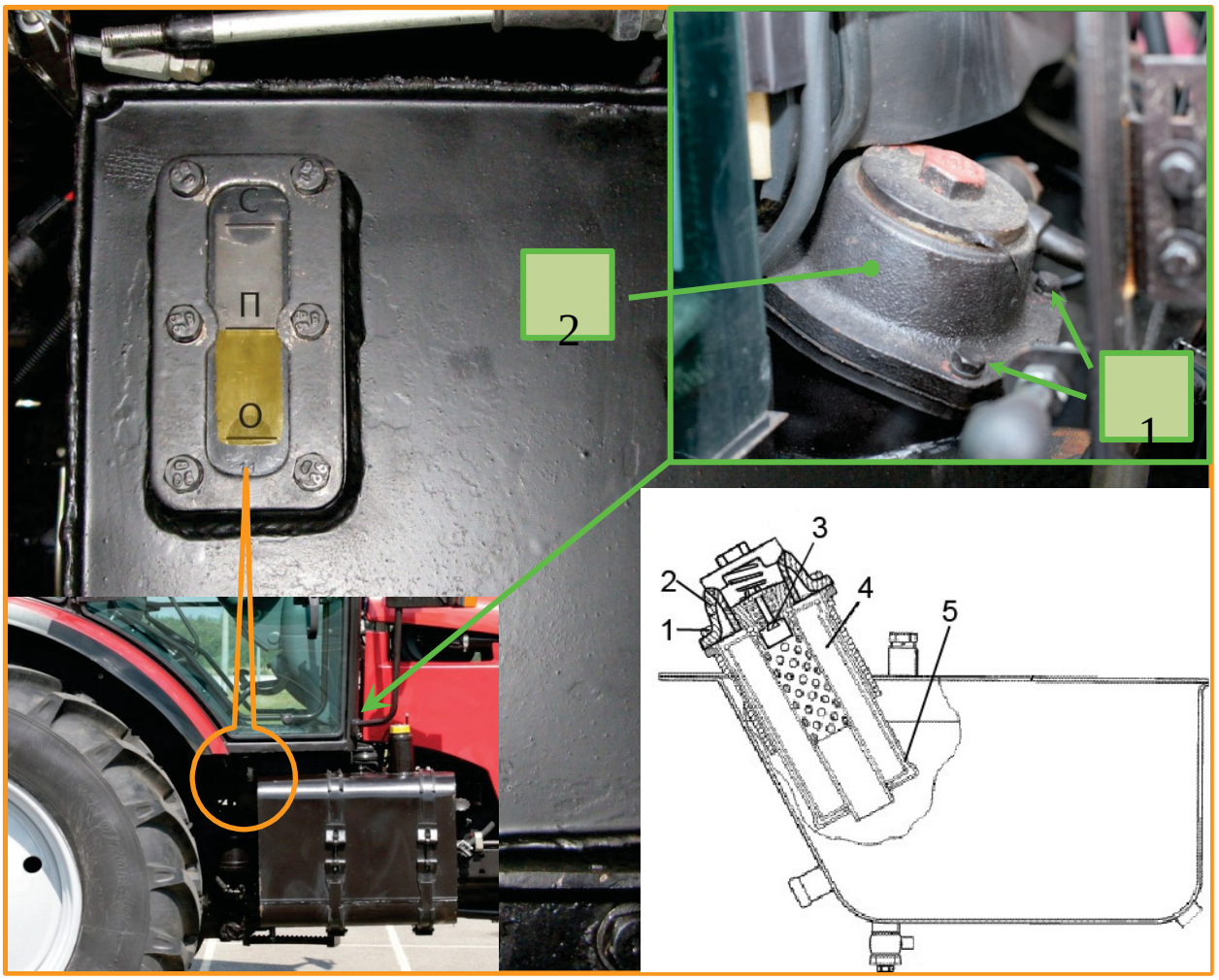


Figure 8.41

Screw out bolts (1) fixing the cap (2) and remove the cap assembled with the plug (3) and valve ;

- Take the filter element (4) out;
- Очистите внутреннюю полость стакана (5);
- Clean the inner chamber of the barrel, refit the cap assembly (2) and tighten the bolts (1).

Procedure 35. Checking the Alternator Fastening Bolts for Proper Tightening (fig. 8.42)

Clean the alternator from dust and dirt. Check the fastening bolts for tightness and reliable fixation of the electric wiring terminals.

Figure 8.42

Procedure 36. Check the Plays in the Steering Link Joints (in case of installation of the FDA with two hydraulic cylinders of the HPS) (fig. 8.43)

- With the engine running, turn the steering wheel in both directions for checking the free travel and play in the joints of the steering link .
- Should there be any plays in the joints, proceed as follows:
- Remove the locking wire;
- Screw in the threaded plug to eliminate the clearance in the articulated joint;
- Lock the plug with wire

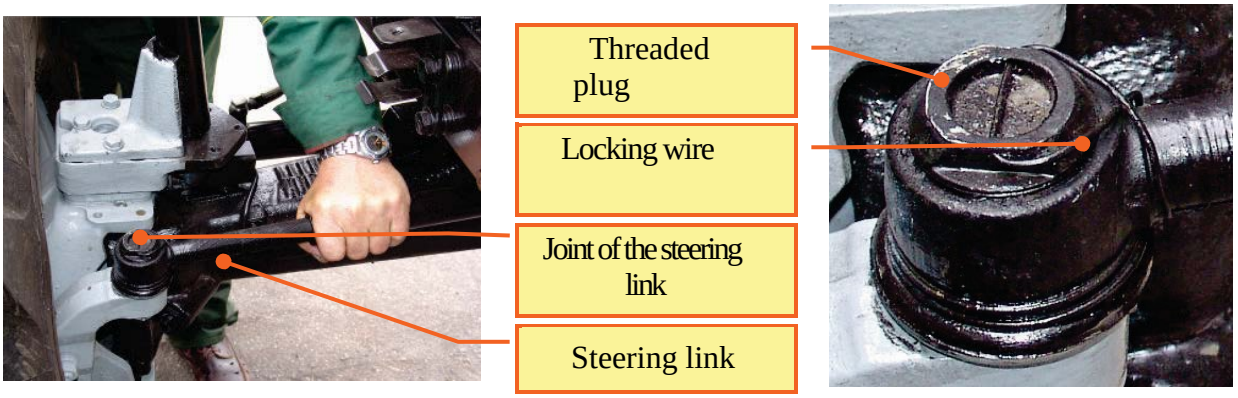


Figure 8.43

Note: If the Play in the Steering Link Joints cannot be eliminated with the tightening of the threaded connections, disassemble the joint and replace worn parts.

Procedure 37. Checking the Joints of the Air Cleaner and the Engine Intake Duct for Tightness (fig. 8.44)

- Remove the monocyclon, start the engine;
- Set a medium rotational speed of idling;
- Block the intake pipe of the air cleaner. The engine shall stall in this case;
- If the engine is still running, locate and remove leaks in the air cleaner and intake duct joints.

Figure 8.44

Procedure 38. Checking the Pneumatic System for Leak-Tightness

The air pressure drop in the pneumatic system shall not exceed 200 kPa for the period of 30 minutes with the brake controls in a released state and compressor switched OFF.
The air pressure in the bottle, which is maintained by a regulator, shall be within 600...850 kPa.

Procedure 39. Checking the Bolts of Clamps of the CAC Air Ducts for Tightening

Check, and tighten as necessary the bolts of clamps of the CAC air ducts. The torque of tightening of the bolts of clamps of the CAC air ducts shall be 10 to 15 Нм.

Procedure 40. Changing Oil in Oil Tank of the RHL Hydraulic System (fig. 8.45)

At a working temperature of oil in the oil tank of the hydraulic system:

screw out the filler neck plug;

screw out the drain plug and drain oil from the oil tank into a vessel prepared in advance;;

screw in the plug), pour fresh oil up (BechemStaroil №32, ADDINOL Hydravliko HLP 32, ТНК Гидравлик HLP 32, ИГП 18 in winter and МГЕ-46В – in summer) until the mark «П»(“F” – full) on the dipstick, refit the plug back to its place.

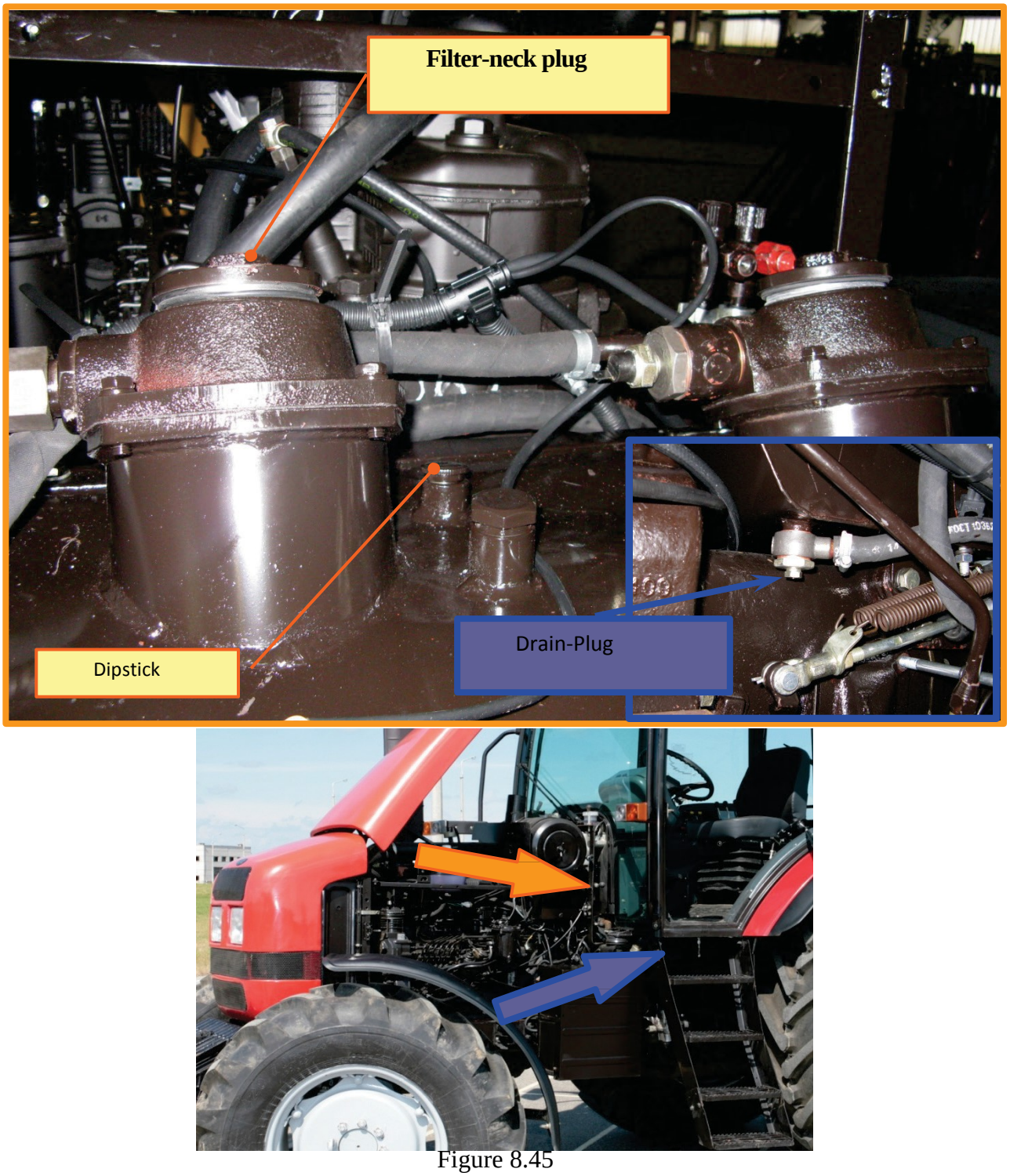


Figure 8.45

Procedure 41. Checking the Play and Preload in:

1. Bearings of the Hub Reduction gear Driving Pinion (3): (fig.8.46)

Check and adjust as necessary the bearings (2) of the driving pinion (3) to a gap or Preload of not more than 0.05 mm. The adjustment shall be carried out with the help of slit shims (4), to be inserted between the bearing cage (6) and the housing (5).

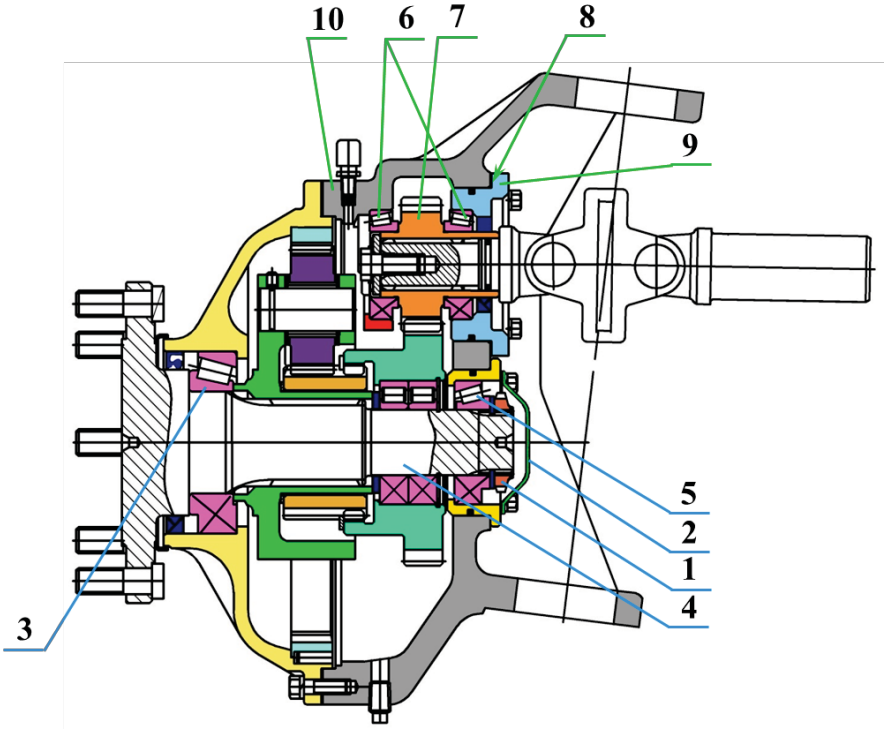


Figure 8.46

2. Bearings of Pivot Axle (3): (fig.8.47)

The preload in the bearings shall be such as to allow a knuckle turn effort of within 60...80 N to be applied to the flange (5). If necessary, perform adjustment as follows:

- screw out the four bolts (2) and screw in instead two dismantling bolts into the specially drilled auxiliary holes of the axle (3);
- remove the required number of shims (4) on both sides;
- screw out the dismantling bolts and tighten the bolts (2) with applying a torque of 120...140 N•m.

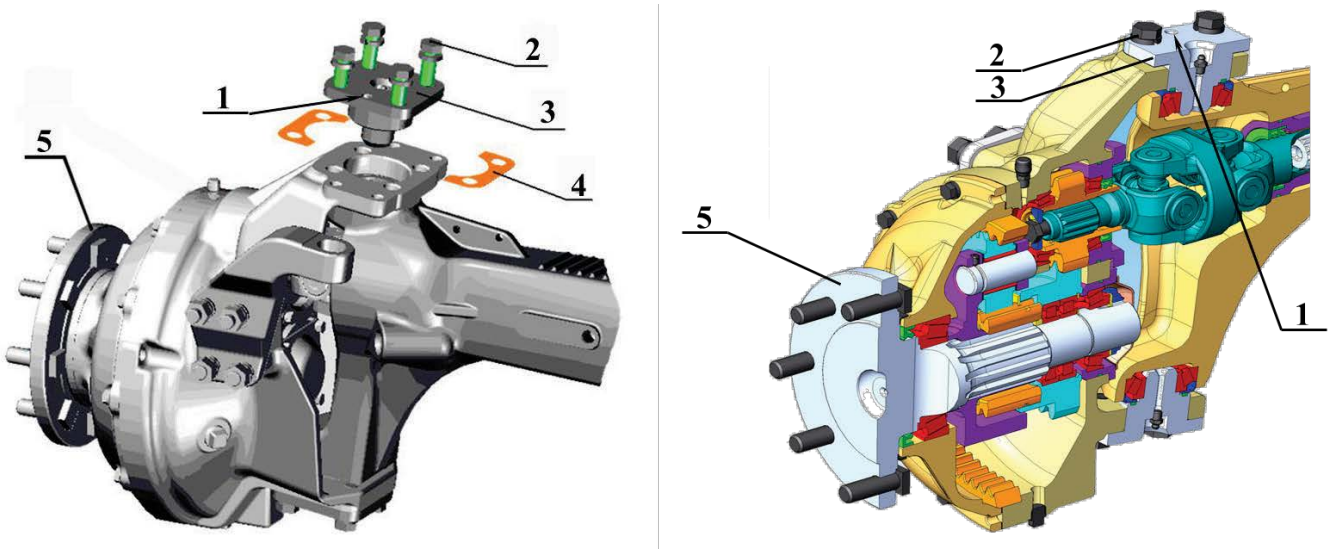


Figure 8.47

Procedure 41a*. Replacement of the Drying Filter

ATTENTION: For replacing the drying filter, it is necessary to contact the specialized service station. The replacement can be only performed with the use of special equipment.

* The procedure shall be performed after every 800 hours or once a year

AFTER EVERY 1000 HOURS OF OP-ERATION perform the previous maintenance procedures plus the followings:

Procedure 42. Checking the Bolts Fastening Two Engine Cylinder Head for Proper Tightening (fig.8.48)

The bolts should be tightened on a warmed-up engine in the following sequence:

- Remove the hoods and covers of the cylinder heads;
- Remove the rocking arm shafts with the rocking arms and brackets;
- Check the tightening torque of all the bolts by means of a dynamometric wrench in the sequence shown in Fig. on the right (for the sake of simplicity, only one cylinder head is shown). The torque should be within 190...210 N•m (19...21 kgf•m) limits.

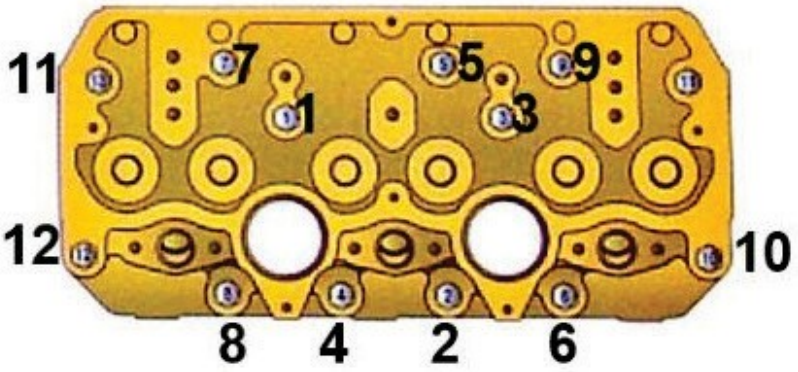


Figure 8.48

Note: Before tightening the bolts loosen them for one sixth turnover.

On finishing the tightening operation, refit the rocking arm shaft; check and re-adjust as necessary the valve-to-arm clearances (refer to Procedure 27).

ATTENTION! Make the first check of the bolts tightening after the running of the tractor

Procedure 42a. Changing the Brake Fluid in the Clutch and Brake Actuators

Clutch Actuator: (fig. 8.49)

- Remove the protective cap (28) (see Section “Construction and Operation”, figure in item “Clutch Actuator”) and draw a rubber hose onto the head of the bypass valve (29) having put another end of the hose into a vessel;
- Turn the valve (29) by one revolution;
- Step on the clutch pedal for forward motion several times, until the brake fluid is removed completely from the system;
- Step on the clutch pedal for reverse motion several times, until the brake fluid is removed completely from the system;
- Pour fresh brake fluid and bleed air from the hydraulic clutch control system for the forward and reverse motion (see Section “Construction and Operation”, item “Bleeding the air from the hydraulic clutch control system”).

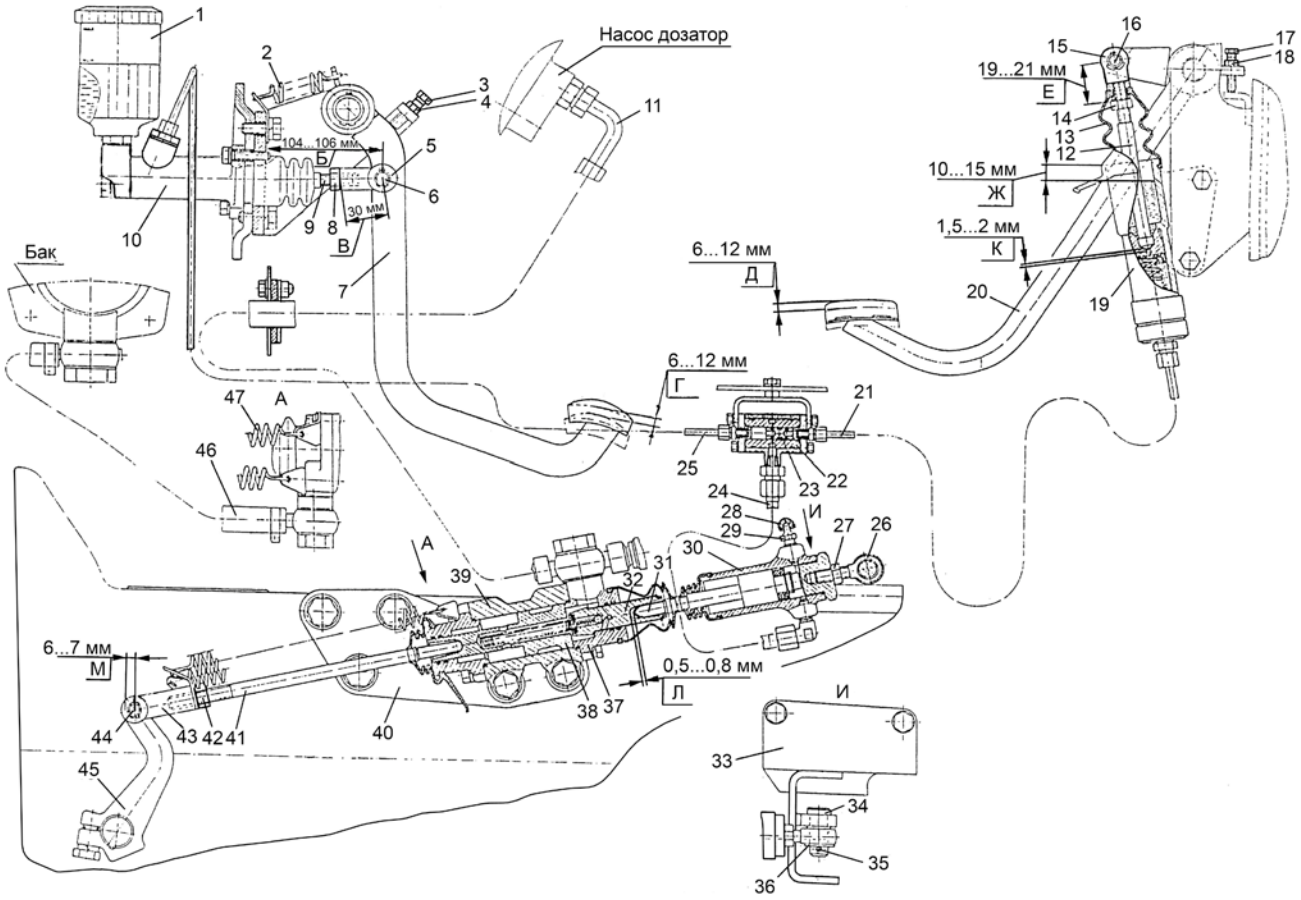


Figure 8.49

Brake actuator: (fig. 8.50)

- Remove the protective cap and draw a rubber hose onto the head of the bypass valve of one of the service brake cylinders 16, 19 (see Section “Construction and Operation”, item “Hydraulic Brake Actuator of the BELARUS-1523B/1523B.3 Tractor) having put another end of the hose into a vessel;
- Turn out the bypass valve by one revolution;
- Step on the interlocked brake pedals (5, 6) for forward motion several times, until the brake fluid is removed completely from the system;
- Step on the reverse pedal (2) of the master brake cylinder of reverse (3) for reverse motion several times, until the brake fluid is removed completely from the system;
- Repeat the above procedure for the second service brake cylinder.
- Pour fresh brake fluid and bleed air from the hydraulic brake actuator system for the forward and reverse motion.

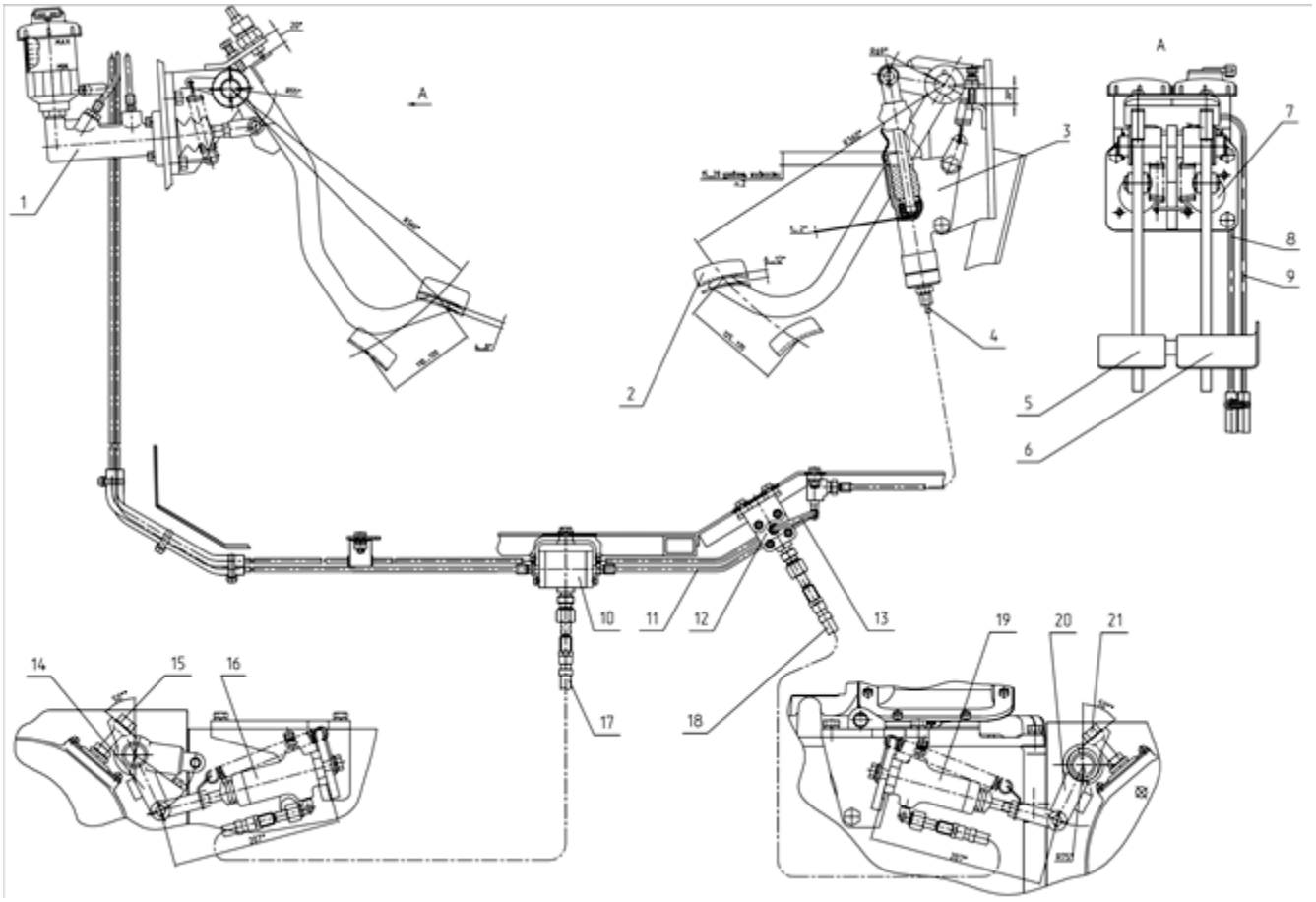


Figure 8.50

Procedure 43. Checking the External Bolted Joints for Proper Tightening

Check the tightening of and tighten as required the external bolted joints of the tractor, front and rear wheels; front mud-guards brackets; front beam of the semi-frame; the joints between the engine and the clutch housing; between the clutch housing and the speed gear-box; between the speed gear-box and the rear axle housing; between the rear axle housing and the top cover; between the front and rear supports of the cab; the nuts of the front driving axle; the bolts of the universal-joint flanges; the bolts of the axle-shaft housings and the bolts of the haul-and-draw coupler.

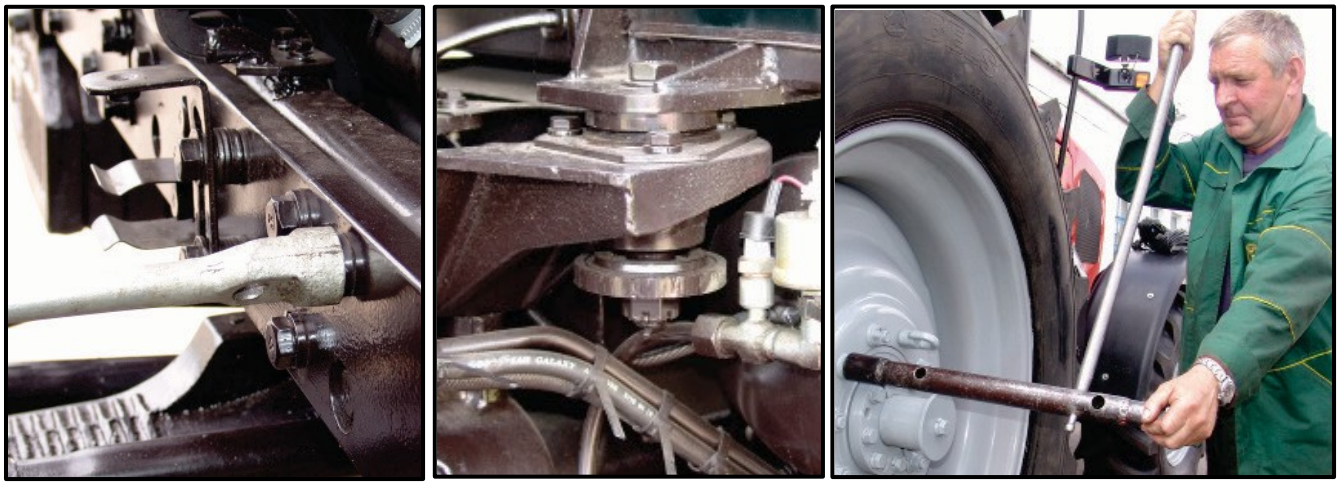
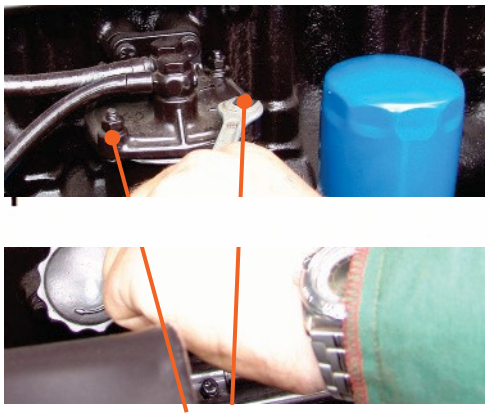


Figure 8.51

Procedure 44. Cleaning the Fuel Coarse Filter.(fig.8.52)

Clean the external surface of the filter, screw out the nuts (1) fastening the cup; remove the cup (3) and screw off the deflector (2) with the screen. Remove the deflector.

- Wash the deflector together with the screen (2), the scatterer and the inner chamber of the cup (3) in diesel fuel.
- Reassemble the filter in the reverse order and prime the fuel system (refer to Procedure 48 below).



Nuts

Figure 8.52

Bleed air from the fuel system (fig 8.53)

– screw out the plug (4) by 2…3 revolutions for bleeding air from the fuel pump (3);

– screw out the plug (1) on the housing of the fuel fine filter (2) by 2…3 revolutions;

– bleed air from the fuel system by means of the hand booster pump (5) with screwing in consequently the plug (4) on the fuel fine plug and then the plug (1) on the fuel pump when fuel without air bubbles will appear. Screw on the handle of the hand booster pump.

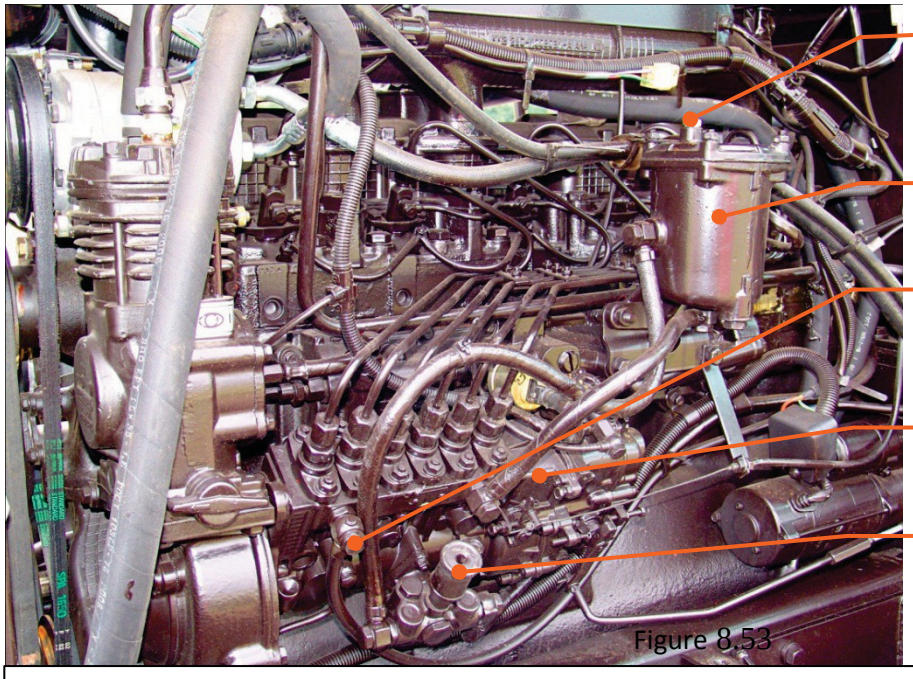


Figure 8.53

Note: If the start of the engine is difficult, loosen alternately the union nut of each injector fuel line, scrolling the crankshaft simultaneously to remove the air from the lines. Scroll through the crankshaft for 10 ... 15 for each line and tighten the cap nut, not stopping scrolling. If there are interruptions, release and tighten each nut with the engine running.

Procedure 45. Washing the Turbo-charger (fig. 8.54)

Dismount the turbocharger from the engine and, without disassembling it, immerse it into kerosene or diesel fuel; then blow through it with compressed air, dry and reinstall it on the engine.

Figure 8.54

Procedure 46. Changing Oil in the Transmission Housing
(fig. 8.55)

1. Run the tractor and warm up oil in the transmission.
2. Remove the filler neck plug (2) located on the on the right side of the clutch housing.
3. Screw out the drain plugs (1) of the transmission and the plugs (3) of the axle-shaft housings.
4. Discharge oil from the transmission into a special vessel for collection and storage of waste oils.
5. Refit the drain plugs back in place and fill in fresh oil up to the mark “П” (“Full”) against the oil-level indicator (refer to Procedure. 3). Refit the plug (2).
6. Run the tractor for 5...10 minutes and check the oil level. Add oil to the level, if necessary.

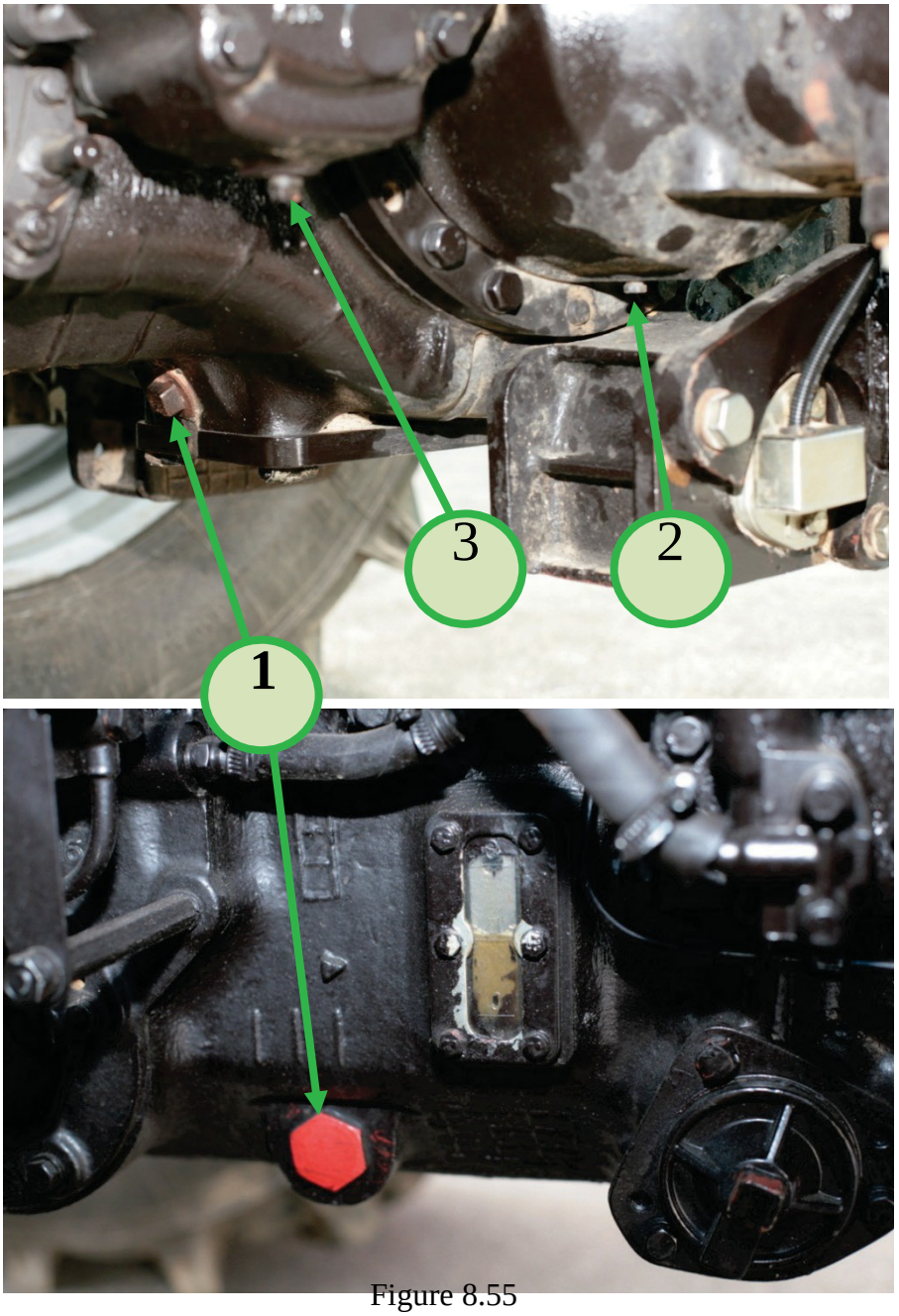


Figure 8.55

Procedure 47. Changing Oil in the HPS Oil Tank (fig. 8.56)

At the working temperature of oil in the oil tank, proceed as follows:

- screw out the filler neck plug (2);
- screw out the plug and discharge the oil into a special vessel prepared beforehand;
- screw in the plug , fill in fresh oil up to the mark “C” against the oil-level indicator; place the plug (2) back in place.

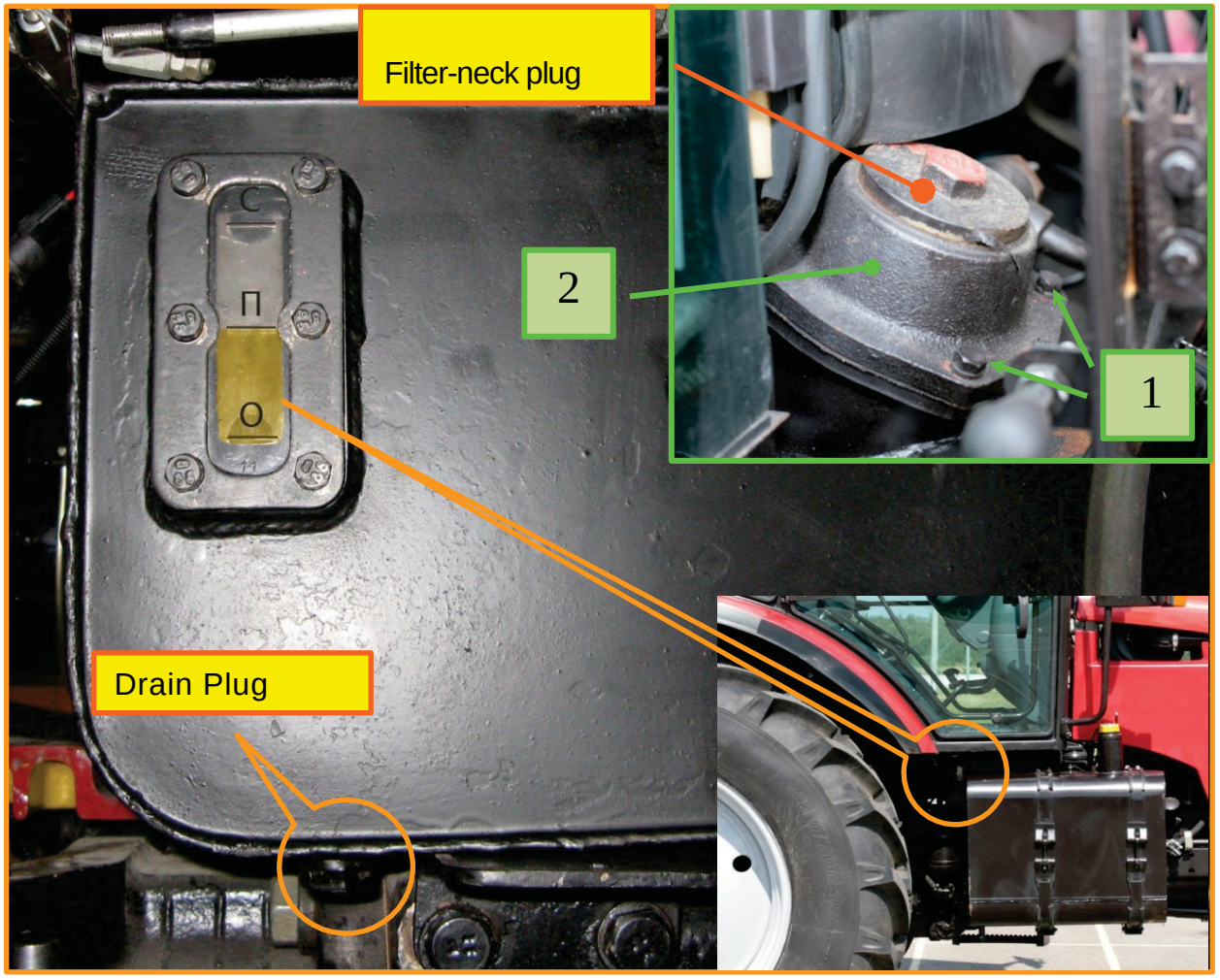
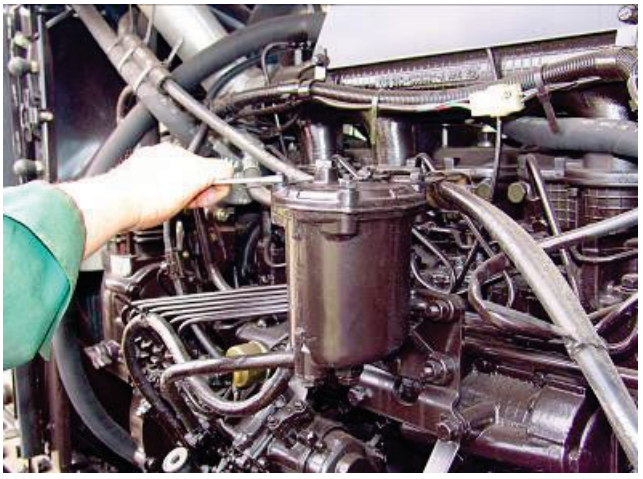
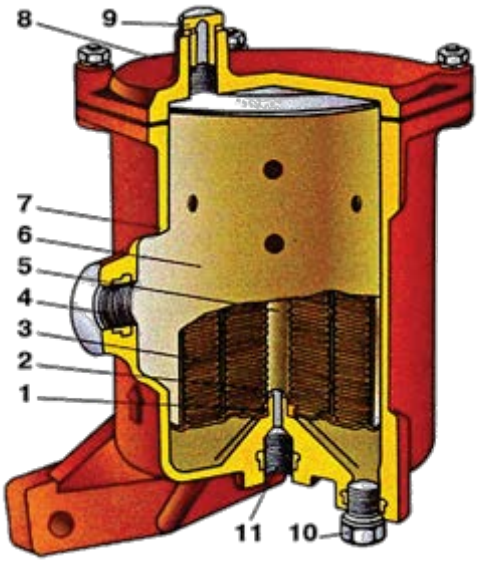


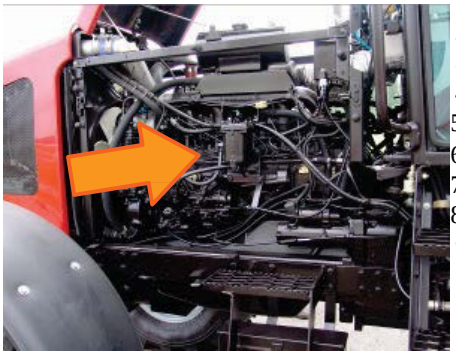
Figure 8.56

Procedure 48. Changing the Filter Element in the Fuel Fine Filter (fig. 8.57)

Screw out the plug (10) and drain the sludge.
Screw out four nuts and remove the cap 8.
Put out filter from the housing and remove the filter element (6).
Clean the housing and cap with the clean diesel fuel.
Set the new filter 6.
Check the cap gasket and change it if necessary
Set the cap 8 and tighten four nuts.
Tighten the plug 10.
Remove the air from the fuel system







1-gasket of the filter;
2-second stage fuel filter element (paper);
3- first stage fuel filter element (paper);
4- threaded hole for connecting pipe supplying raw fuel;
5-reservoir of the refined fuel;
6-filter element;
7-filter housing;
8-filter cap;
9- Throttling plug to release an air;
10-plug for draining of the sludge fuel;
11- threaded hole for connecting pipe for drainage refined fuel.

Figure 8.57

Procedure 49. Checking the alternator (fig. 8.58)

Remove the driving belt from the alternator pulley and check the easiness of rotation and the presence of plays in the rotor bearings. Should there be any plays and jamming of the rotor, dismantle the alternator and send it to the workshop for repair.

Figure 8.58

Procedure 50. Changing Oil in the FDA Hub Reduction Gear-Box and Final Drive (fig. 8.59)

- Run the tractor for some time and warm up oil in the FDA housings.
- Place the tractor on a flat level ground. Stop the engine. Set the parking brake and wedge the wheels on both sides.
- Remove the check-and-filler plugs and the drain plugs. Discharge the oil in a special vessel for collection and storage of waste oils. Be sure to dispose of the oil in the established manner.
- Refit the drain plugs and затяните их.
- Fill in the housings with fresh transmission oil to the lower edge of the check-and-filler necks.
- Refit and tighten the plugs.

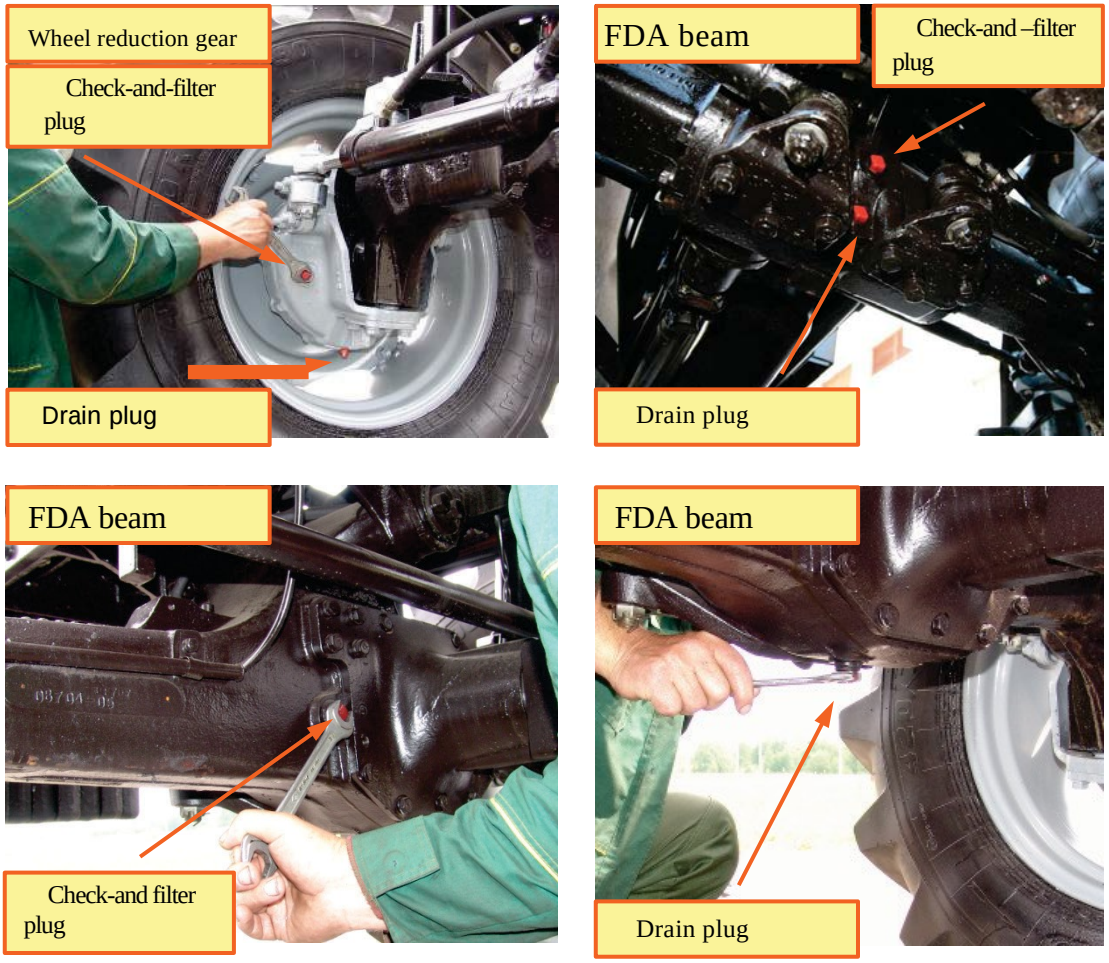


Figure 8.59

Note: The oil should be also changed when performing the seasonal maintenance.

Procedure 51. Changing Oil in the Front PTO Reduction Gear-Box (if installed) (fig. 8.60)

Screw out the plug (2) and discharge waste oil. Fill the reduction gear-box with fresh oil up to the level of the check-and-filler hole (1) (the capacity of the reduction gear-box is 3.3 l).

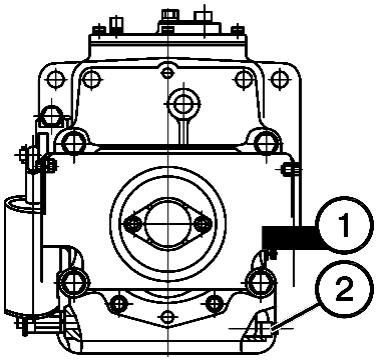


Figure 8.60

Procedure 52. Checking the Condition of the Brakes

Check the condition of brakes parts by way of their dismantling. Clean the casings from the wear and tear products, replace worn-out parts, if required, and adjust the service and parking brake control mechanism.

No scoring of the working surfaces of the pressure disks is allowed.

Procedure 53. Greasing the Bushings of the Turn Shaft of the Rear (Front) Hitch Linkage and of the Hauling Mechanism (fig. 8.61)

Clean two lubricators located on the bosses of the rear axle cover as well as the lubricator of the towbar from dirt. Gun-grease the same till fresh grease appears from gaps.

Figure 8.61

Procedure 54. Servicing the Engine Air-Cleaner
(fig 8.62)

To perform the servicing, proceed as follows:

- Remove the monocyclon ; clean the screen, swirler, and ejection slits from dust and dirt.
- Screw out the butterfly nut and remove the pan .
- Remove the basic filter element. Pay special attention on the state of the monitor filter element

> **ATTENTION!** Dirt and soiling of the MFE is indicative of damaged BFE (rupture of the paper shutter, unglued bottoms).

> **Note: clogging of CFE points at damaging of MFE (breakout of paper shutter, gluing-off the bottoms)**

If BFE is intact, blow it with compressed air, first from the inside and then on the outside to remove dust completely.

> **ATTENTION!** To avoid rupture of the paper shutter, the compressed air pressure shall not exceed 0.2...0.3 MPa.

The stream of air direct under the angle to the surface of MFE. Do not allow soiling or damage of MFE.

> **ATTENTION!** **NEVER** blow BFE through with exhaust gases, **NOR** wash it in diesel fuel.

Clean the delivery pipe, the inner surface of the housing and the pan from dust and dirt.

- Check the condition of the O-rings.
- Make sure that the BFE is installed properly in the housing; tighten the butterfly nut by hand.
- Perform Procedure 37 on the check of the air-cleaner and the intake duct leak-tightness.

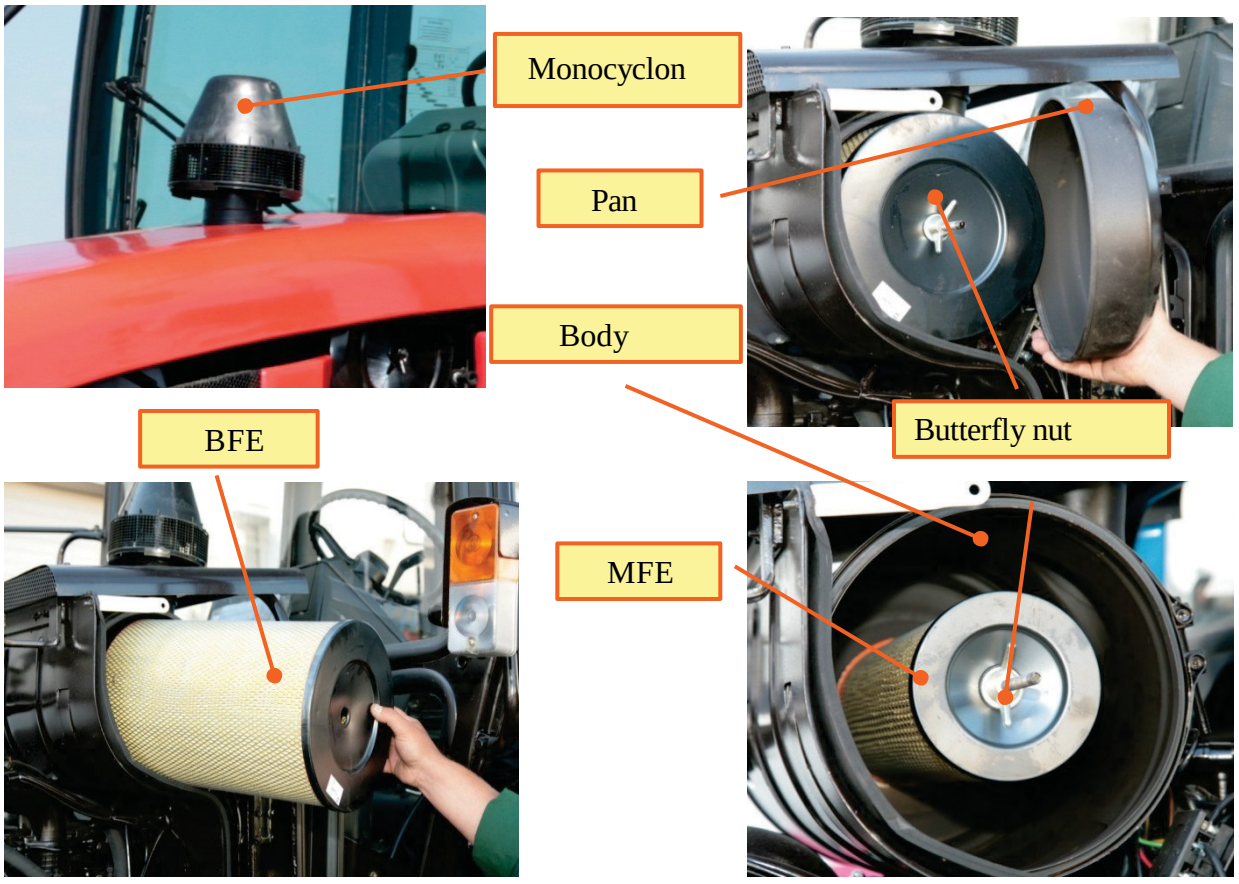


Figure 8.62

Procedure 55. Checking the Steering Link Joints for Play (fig. 8.63)

With the engine running, turn the steering wheel in both directions for checking the free travel and play in the joints of the steering link

Should there be any plays in the joints, proceed as follows:

- Remove the locking wire ;
- Screw in the threaded plug to eliminate the clearance in the articulated joint;

Lock the plug with wire

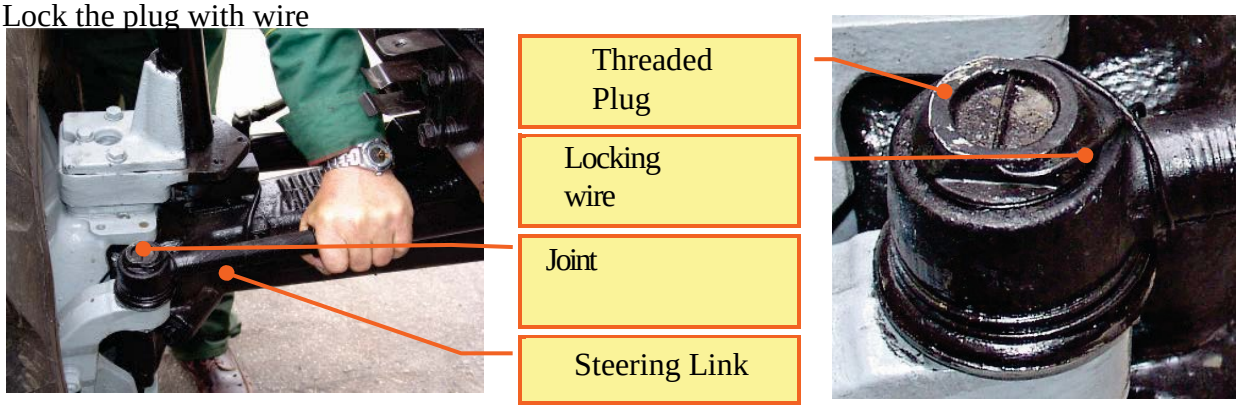


Figure 8.63

Note: If it is impossible to eliminate the play in the joints, disassemble the joint and replace the worn-out parts.

AFTER EVERY 2000 HOURS OF OPERATION perform the previous maintenance procedures plus the followings:

Procedure 56. Checking the Fuel Injection Equipment
(fig. 8.64)

To check the injectors for injection pressure, dismantle them from the engine by carrying out the following operations:

- screw out the coupling nuts (6) of the unions of the fuel pump and the injectors;
- remove the high-pressure pipes (4);
- remove the bolts (1) of the unions from each injector together with their sealing washers and remove the draining pipeline (3);
- screw out bolts (2) which fix the injectors and remove the injectors (5);
- send the injectors to a specialized workshop or your dealer for checking.

NOTE: The injection pressure should be within 22...23 MPa.* The atomization should be in the form of a mist, without continuous jets and/or drips.

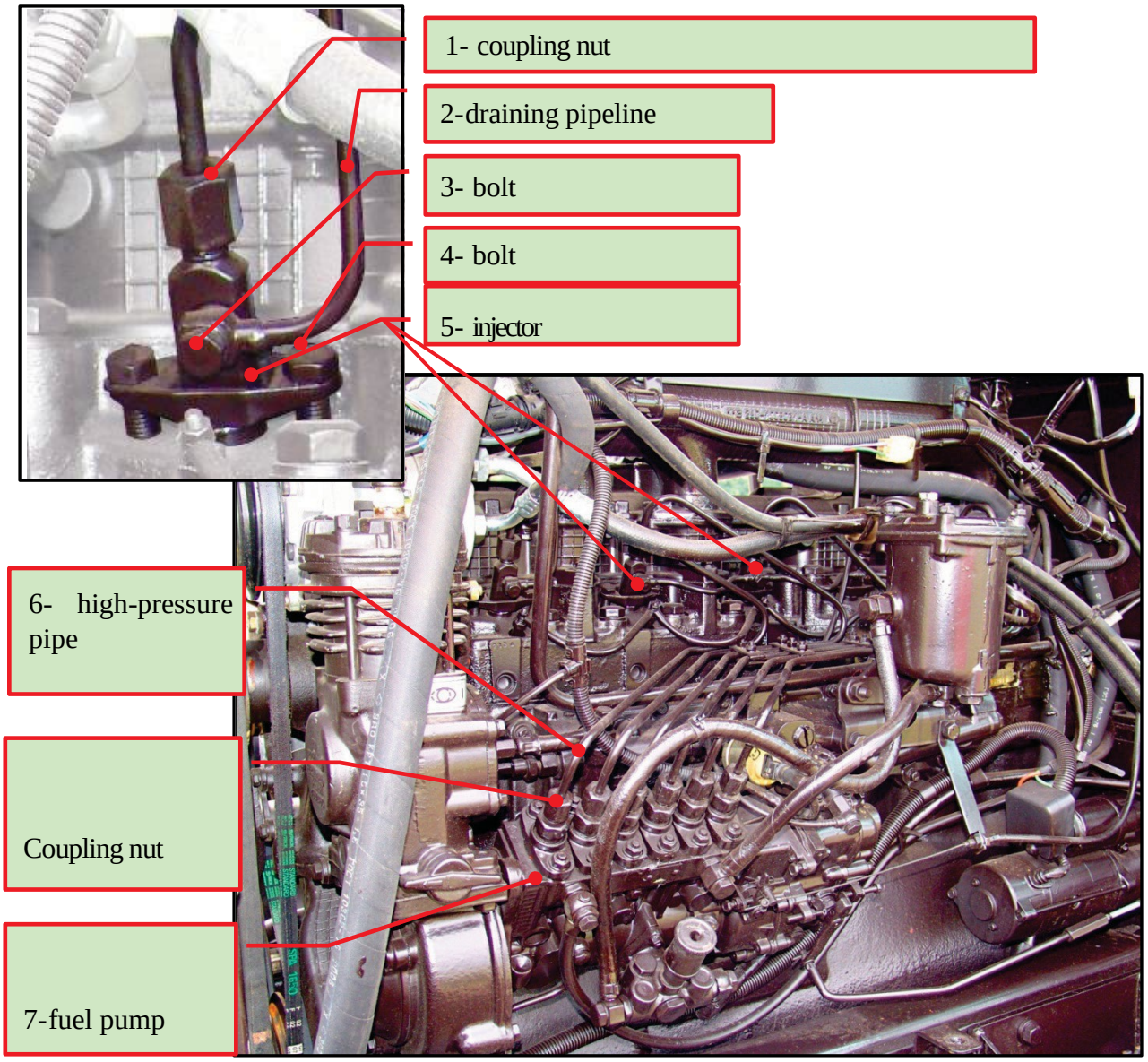


Figure 8.64

Procedure 57. Checking the Technical Condition of the Starter (fig. 8.65)

Turn out the screws (1) and remove the cap (2). Check the condition of the commutator (3), brush fittings, and easiness of movement of the brushes (5) in the brush-holders, and the pressure of the springs (4) on the brushes.

The commutator working surface shall be clean. The brush pressure shall be within 750...1000 gf.

If excessive wear and/or commutator scorching are detected, send it to a workshop for repair.

Check the condition of the contacts of an electromagnetic relay. If there is a scorching, clean up the bolts with fine sandpaper.

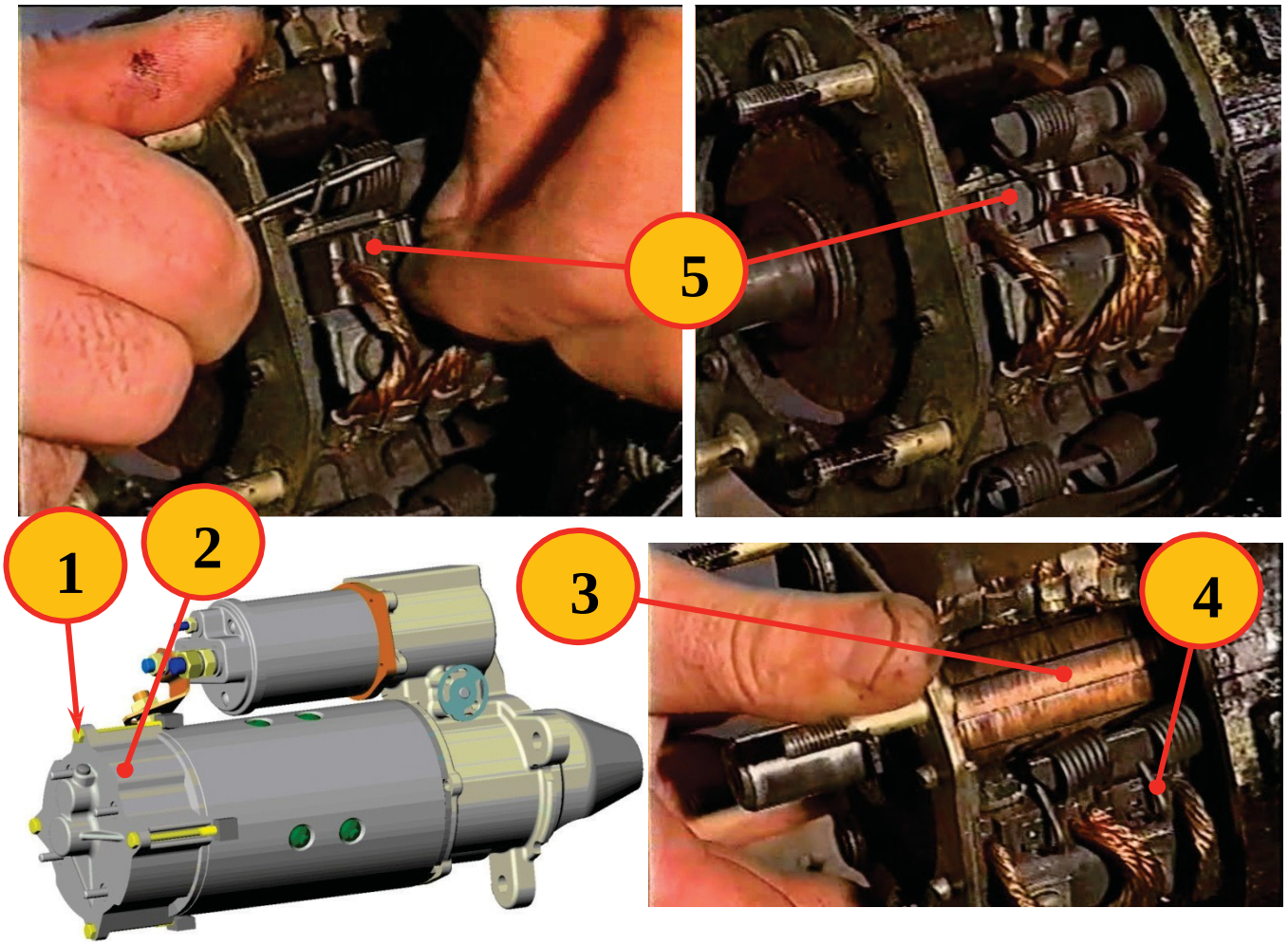


Figure 8.65

Procedure 58. Washing the Engine Breathers (fig.8.66)

- Remove the cases of the breathers 1.
- Remove the breathers from their cases.
- Wash the breathers in diesel fuel and blow them through with compressed air.
- Reassemble the breathers and refit them.

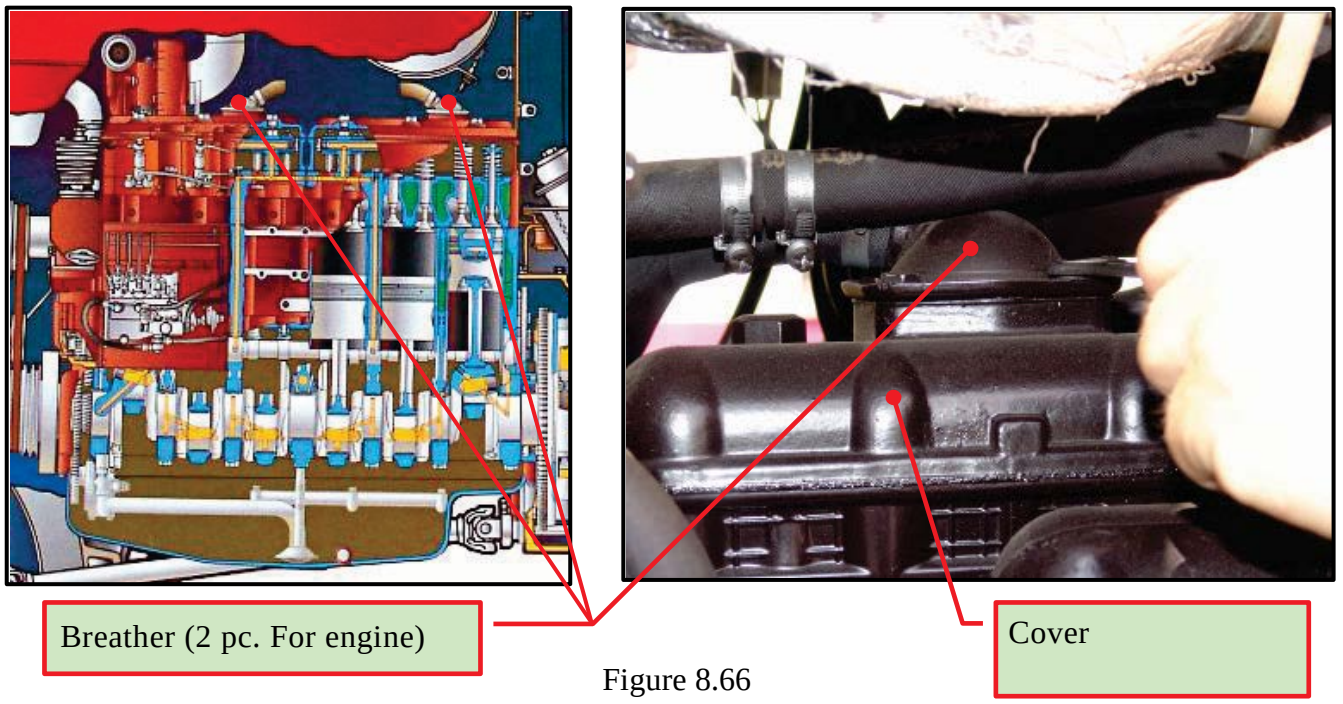


Figure 8.66

Procedure 59. Flushing the Engine Cooling System

- Prepare a solution of sodium hydroxide (50...60 g of sodium hydroxide per one litre of water);

- Add 2 litres of kerosene into the aqueous solution and fill the cooling system with this solution;
- Start the engine and let it run for 8...10 hours;
- Discharge the solution into a suitable container, flush the system with clean water and fill with coolant, as described in this Manual

MAINTENANCE TO BE PERFORMED AS REQUIRED

If the oil pressure in the lubrication system is below 0.28 MPa on a warmed-up engine and at the rated speed of the crankshaft, stop the engine, locate and remove the trouble. Check the oil pipelines for leak-tightness and the safety valve of the oil paper filter for operability. One of the ways for increasing the pressure is slight adjustment of the filter at a specialized workshop.

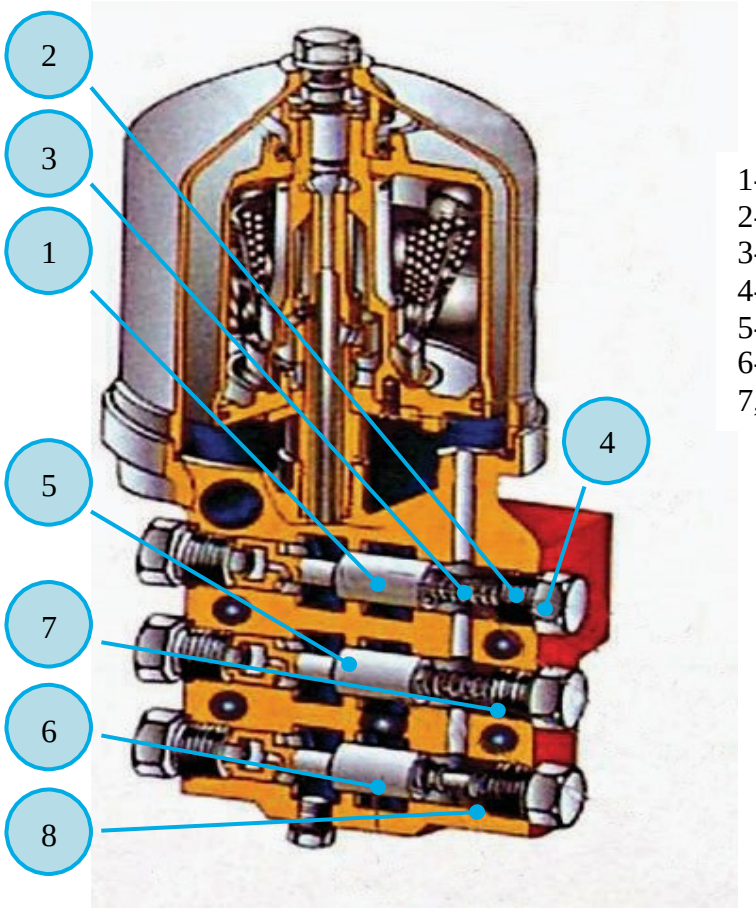
Procedure 61. Adjusting the Gear-Box Centrifugal Oil Filter

(fig. 8.67)

Valve (1) maintains oil pressure on the GB hydraulic system to within 0.9...1.0 MPa – for the GB 16Fx8R;

0.9…1.1 MPa – for the 24Fx12R.

If pressure drops below this limit, adjust the valve by inserting additional shims (2) between the spring (3) and the plug (4).



1-valve;
2-shims;
3-spring;
4-plug;
5-valve;
6-valve;
7,8-shims.

Figure 8.67

IMPORTANT! If the pressure drops below 0.7 MPa, stop the tractor and seek help of a technician

The valve (5) maintains oil pressure upstream of the centrifuge rotor. It shall be 0.75 MPa.

The lubrication valve (6) is adjusted to within 0.15...0.25 MPa and maintains oil pressure in the GB lubrication system. The valve is adjusted by insertion of shims (7) и (8)

Procedure 62. Adjusting the Front Wheels Toe-In
(fig. 8.68)

Toe-in of front-wheels shall be (0…8) mm.
Adjustment make as follows:
Loose the locknuts 1,3.
Set required toe-in by the steering link (2) tube rotation.
Tighten locknuts 1,3.
Note:
Toe-in defines as the difference between B-A measurements

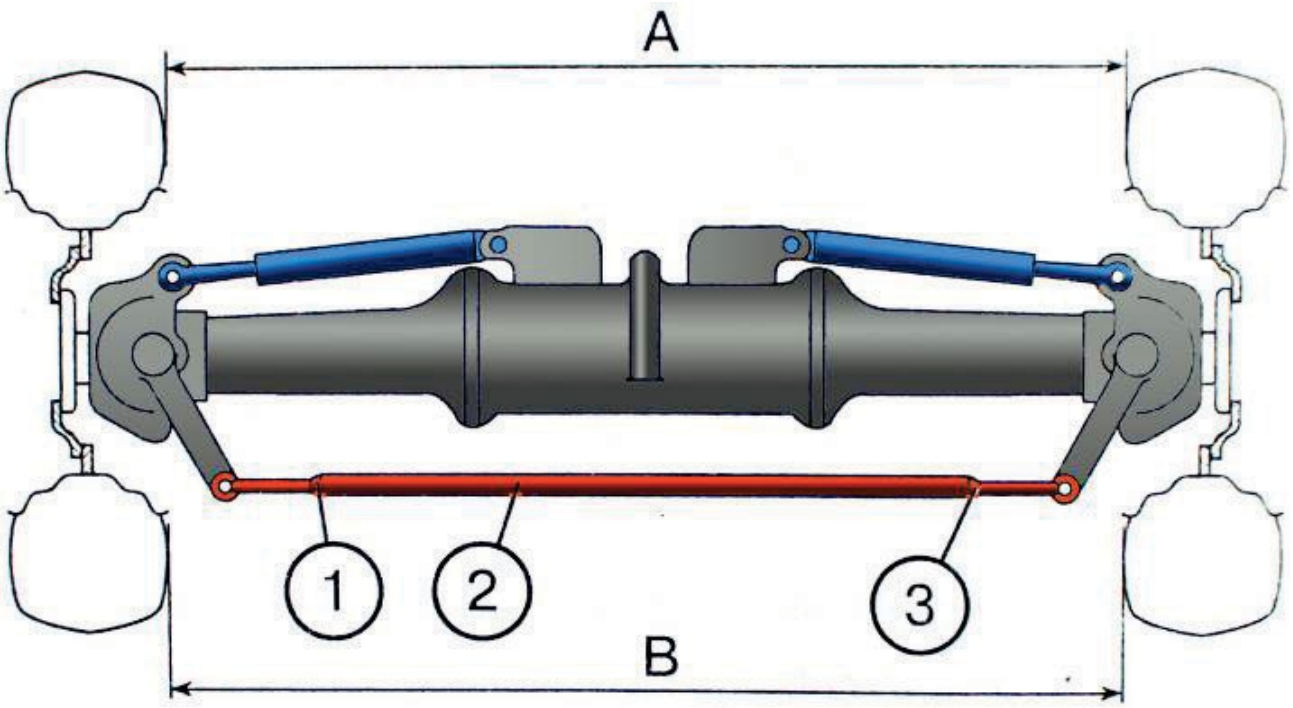


Figure 8.68

Procedure 63. Aiming External Side Headlights (fig. 8.69)

- Mark out a screen, as shown in the Figure.
- Measure the distance between the headlight centres and the height of their location above the floor immediately on the tractor, the tyre pressure shall correspond to the recommended norms. Mark the headlight centre lines A-A, B-B_1, E-E_1.
- Place the tractor on a flat level ground at exactly right angle to the screen, with the front headlight lenses 15 m away therefrom. At the same time, be sure that the tractor's line of longitudinal symmetry would intersect with the screen at the line O-O_1.
- Turn on the headlights in low beam and, first, adjust the position of one headlight (block the other headlight with a dark tissue), then, the other, having loosened them on the bracket.
- The headlight is considered as correctly adjusted, if the light spot centre line D-D is at half distance from the reference surface to headlights centre-line A-A (h/2).

Peculiarities of adjustment of the built-in headlights

- Place the tractor at the distance of 10 m from the screen to the headlight lenses.
- Perform all the operations for marking-out the screen as described above.
- The headlight beam is aimed correctly, if the location of the light spots of both headlights corresponds to the position shown in the above Figure, and the light spot centreline D-D is below the headlight centreline A-A by 150 mm

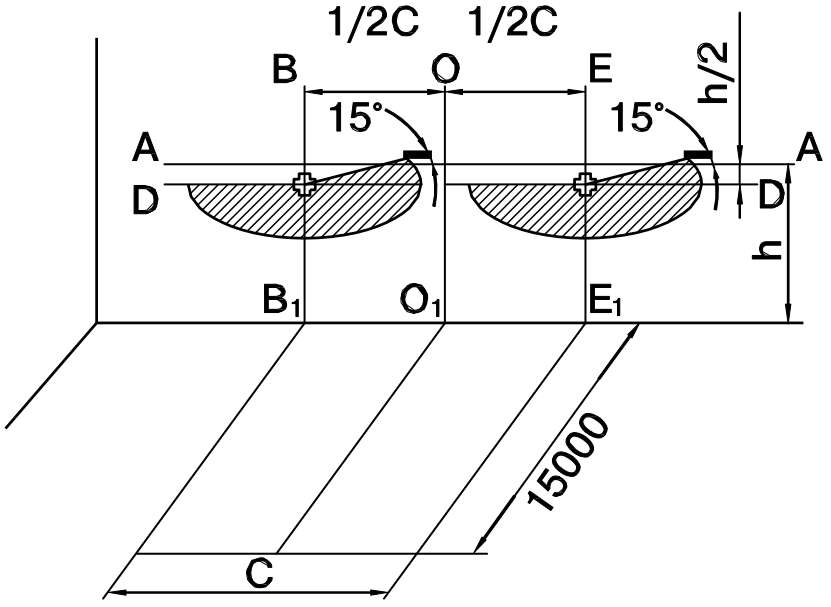


Figure 8.69

Screen marking-out and adjustment of headlights:

A-A	–	headlight centre line;
D-D	–	centre line of light spots;
O-O_1	–	line of symmetry of the screen;
B-B_1	–	vertical axis of a light spot from the left-hand headlight;
E-E_1	–	vertical axis of a light spot from the right-hand headlight;
C	–	distance between headlight centres;
h	–	distance from the floor to side headlight centre line.

9 TRACTOR STORAGE

Prior to putting the tractor for long-term storage, perform the following operations:

- Clean the tractor.
- Place the tractor under a shed or indoors.
- Gun-grease all the lubrication points:

— FDA;
— HPS;
— Clutch;
— RHL.

- Drain coolant from the engine cooling system.
- Drain oil from the engine crankcase and fuel pump body; clean the rotor of the centrifugal oil filter.
- Drain oil from the power transmission housings, HLL and HPS oil tanks the FDA hub reduction gear boxes and final drive casings. Then, refill with fresh clean oil with AKOP-1 additive.
- Fill in the engine crankcase, fuel pump body with preservation oil K-17, State Standard (ГОСТ) 10877-76 or fresh dehydrated oil with 5% AKOP-1, State Standard (ГОСТ) 15171-78 additive. Prior to using the AKOP-1 additive, mix thoroughly the engine oil and the additive.
- Start the engine and let it run for 15...30 s at low rotational speed.
- Stop the engine and drain the preservation oil from the engine crankcase and the fuel pump body.
- Discharge sediments and sludge from the fuel coarse and fine filters.
- Remove and charge storage batteries, then, put them in store in dry well-ventilated premises, with temperature of 15..20°C. Check the storage batteries once a month and recharge them, if required.
- Lower the RHL linkage to its bottom position.
- Slacken tension of the alternator and fan driving belts.
- Cover the exhaust pipe and monocyclon openings with a jacket.
- Place the tractor onto stands to relieve the front and rear tyres. Reduce the pressure in the tyres down to 70% of the normal operating value.
- During the period of storage, turn the engine crankshaft by several revolutions at least once a month.

To remove the tractor from a long-term storage, perform the following operations:

- Remove the tractor from stands and bring the pressure in the tyres to its normal value.
- Fill up fuel tanks.
- Fill in the engine with coolant and oil. Check the oil level in all the tanks/bottles to be filled up.
- Re-install fully charged storage batteries back on the tractor.
- Remove the jacket from the exhaust pipe and the monocyclon.
- Start the engine and carry out the functional checks on all the tractor instruments, controls and systems.
- Check the lighting and audible signalling devices for proper functioning.
- Run the tractor without loading to determine whether it operates properly.