TRUCKS ЗИЛ-130 AND ЗИЛ-131

Maintenance Manual

Revision 1 04/03/2008
www.zil131.com

The present Manual covers the intervals and scope of the ЗИЛ-130 and ЗИЛ-131 maintenance, as well as the Process Charts for the most important and complicated jobs.

The Manual is designed for the trucks manufactured till 1970.

If the truck under servicing turns to have some specific design features which call for changes in the adjustment procedure, adjustment data, lubricant grades and lubrication intervals, follow the pertinent instructions of the truck Manufacturer.

Техническое обслуживание
автомобилей ЗИЛ-130 и ЗИЛ-131
Руководство
(на английском языке)
Заказ 13/14582-Р2

INTRODUCTION

This Manual is intended for use as an aid in the organization and accomplishment of maintenance jobs on the ЗИЛ-130 (Fig.1) and ЗИЛ-131 trucks (Figs 2 and 3). It may find its applications in servicing special vehicles built on the basis of the ЗИЛ-130 and ЗИЛ-131 trucks either. If that is the case, the attention should be paid to the design and service peculiarities of such vehicles.

Set forth in the Manual are the procedure and scope for:

- check inspection of the truck prior to leaving the motor pool;
- check inspection of the truck en route (at halts and stops);
- daily maintenance carried out after the work, before parking in the motor pool;
- preventive maintenance No.1 (PM No.1);
- preventive maintenance No.2 (PM No.2).

The intervals between the numbered preventive maintenance services depend upon the truck operating conditions and runs.

The run intervals in kilometers are as follows:

For Truck ЗИЛ-131	PM No.1	PM No.2
When used under different weather conditions of middle climatic zone and when intermittently used for trail-	1000-1200	5000-6000

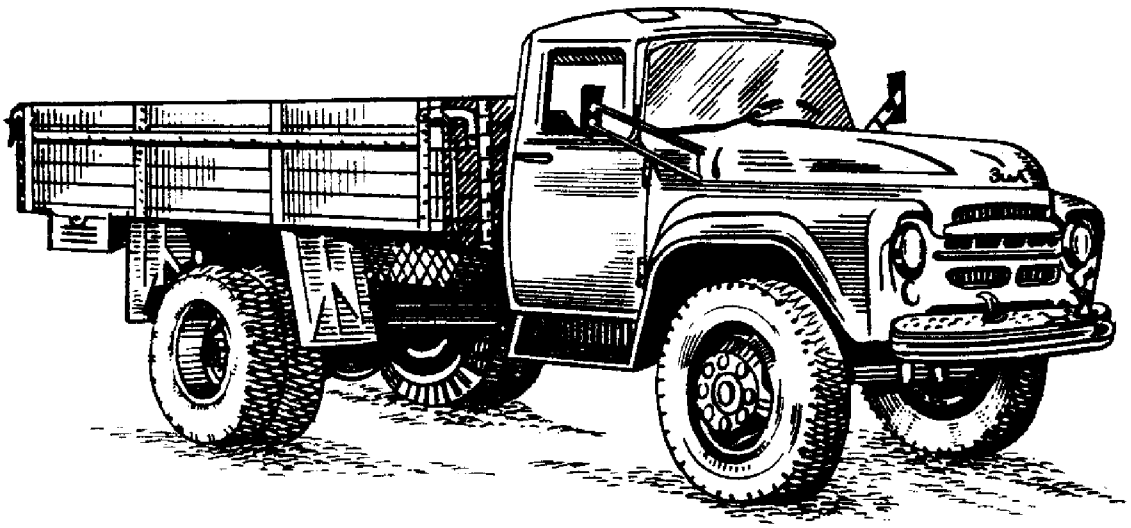


FIG.1. ЗИЛ-130 TRUCK

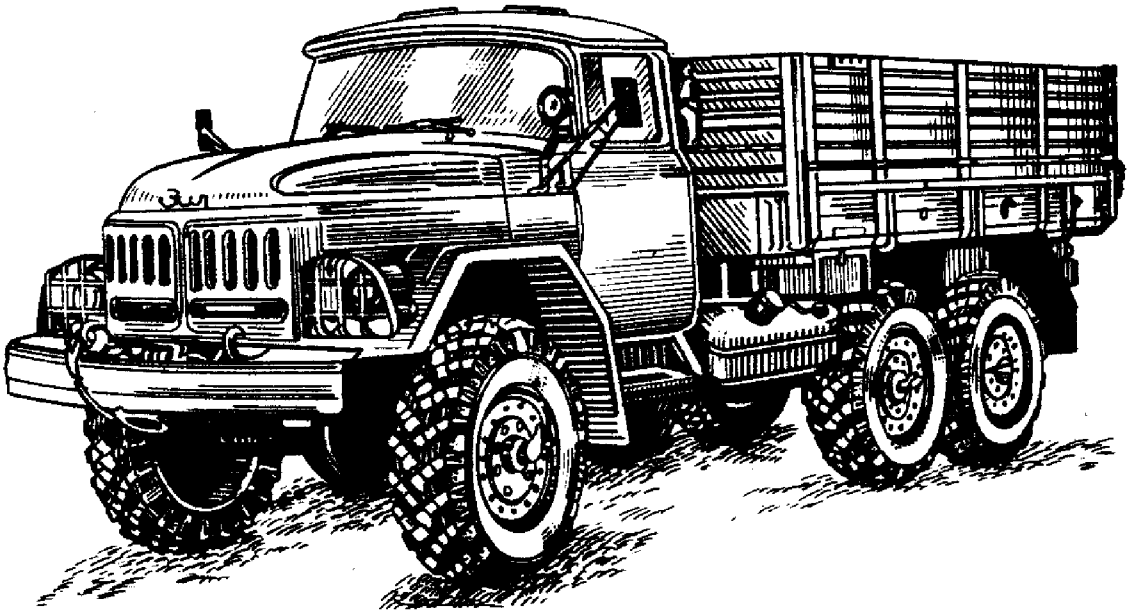


FIG.2. ЗИЛ-131 TRUCK

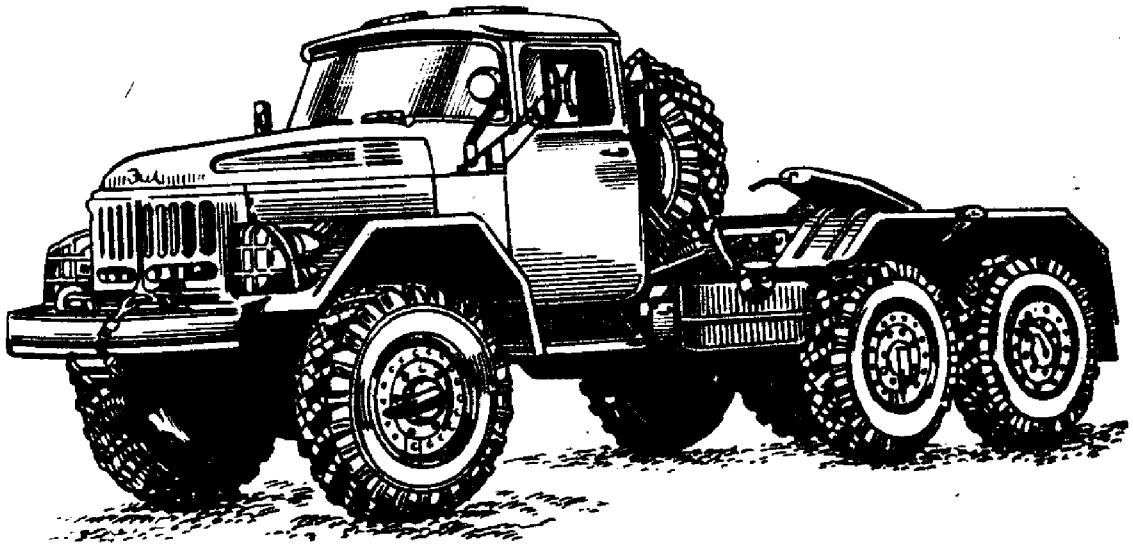


FIG.3. ЗИЛ-131В TRUCK

For Truck ЗИЛ-131	PM No.1	PM No.2
ing operations on composite-type roads including hard-surface roads, earth roads of different conditions and on roadless sections of the ground.		
When used with a trailer on earth roads, including operations in a slush season and when used off roads with overcoming fords and swampy ground, as well as in a sandy desert and mountains.	800-900	4000-4500
For Truck ЗИЛ-130		
When used on asphalt and concrete roads and on other improved hard surfaces in good condition.	2100-2300	8400-9200
When used on crushed stone, gravel, cobble and other paved roads in satisfactory condition, as well as when used under dense city traffic conditions.	1700-1900	6800-7600
When used on earth, mountainous rutty roads with crushed stone, gravel, cobble and other hard surfaces, as well as in conditions involving frequent manoeuvring operations.	1100-1300	5500-6500

In addition to the check inspections and maintenance services the Manual contains the procedure and scope of additional truck maintenance operations carried out on the maintenance days and every six months, as well as additional servicing operations needed for use of trucks in sandy desert localities and mountainous regions.

Both of the truck models have a common list of operations for each type of maintenance, except the particular operations performed on each truck model and specified in the text.

All the operations on the check inspections and daily maintenance are carried out by the driver, the additional operations performed on the maintenance days are carried out by the driver with participation of specialists from the servicing point or repair shop, and the operations by preventive maintenance No.1 and No.2 and additional operations performed every six months - by the personnel of the servicing point and repair shop with participation of the driver.

The Manual also contains the Process Charts for adjustment and servicing of the units and mechanisms of the trucks.

The average labour-consumption rates for the check inspections and maintenance services including all the adjustment operations are as follows:

Maintenance	Labour consumption, min	
	ЗИЛ-130	ЗИЛ-131
Check inspection before driving out of the motor pool	15-20	15-20
Check inspection en route	10	10
Daily maintenance	80	80
Preventive maintenance No.1	5 man-hours	6 man-hours
Additional operations carried out when trucks are used in sandy desert localities	15	15
Preventive maintenance No.2	20 man-hours	27 man-hours
Maintenance carried out on maintenance days	45	45
Additional operations carried out every six months	1.6 man-hours	2 man-hours

Maintenance of the trucks during the running-in periods and when in storage is to be performed in compliance with the Manufacturer's instructions.

CHECK INSPECTION OF THE TRUCK PRIOR TO LEAVING THE MOTOR POOL

Performed by: driver

Operations and Specifications

1. Examine the truck on the outside (the cab, fenders platform, chassis and running gear). Check to see there are no external damages. Clean of dust and mud, if needed, wipe clean the cab glasses, lighting and light warning devices, licence plates and identification signs.

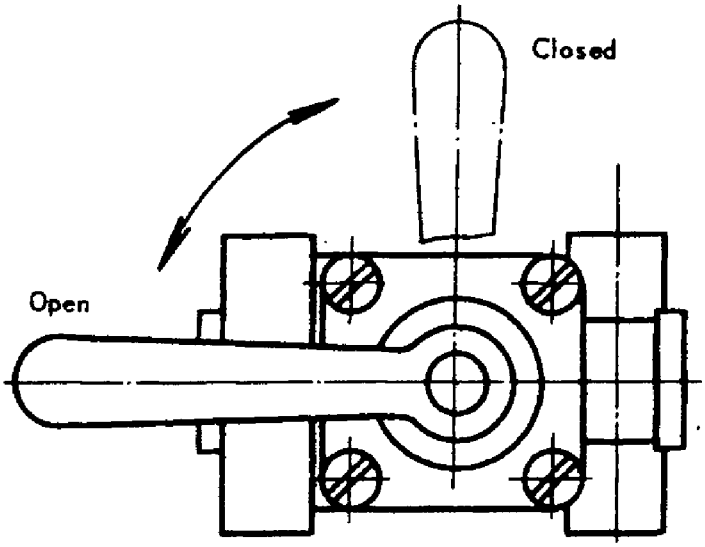


FIG.4. CUT-OFF VALVE

2. Check the locks of cab doors and platform for functioning.

If a trailer is used, check the serviceability of the coupling device, attachment of the emergency chains. Make sure that the cut-off valves on the truck (Fig.4) and the trailer are opened.

3. Check for presence, complete set, and proper stowage and fastening of the driver's tools and the digging tools (Appendix 1).

4. Check all the wheels for attachment and the steering rods for attachment and condition. On the ЗИЛ-131 truck, open the tyre valves.

Check the tyre inflation regulating system by ear for air leaks.

On the ЗИЛ-130 truck, check for pressure in the tyre and inflate, if needed.

The rated tyre pressure is 3.5 kgf/cm^2 for the front wheels and 5 kgf/cm^2 for the rear and spare wheels.

When use is made of the P-type tyres the pressure is 4.5 kgf/cm^2 for the front wheels and 6 kgf/cm^2 for the spare and rear wheels.

5. Check the quantity of fuel in the tanks and fastening of the filler neck caps.

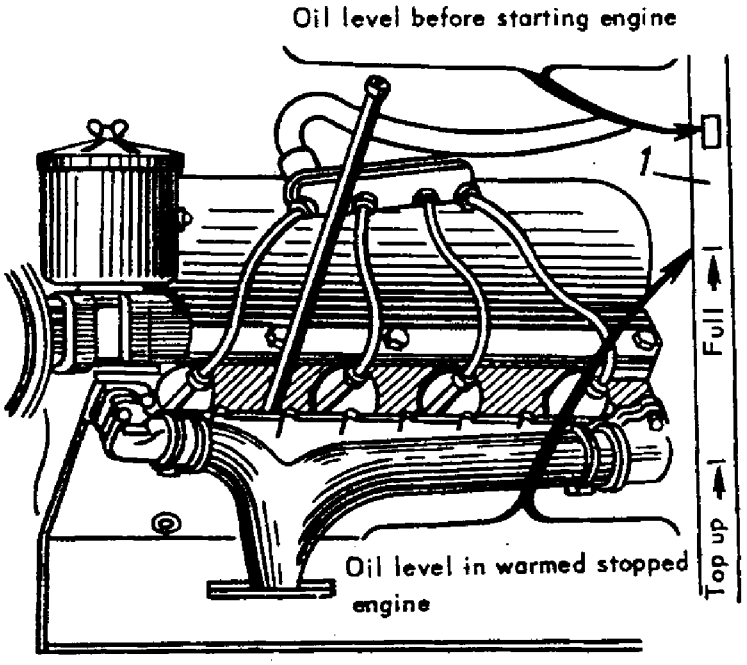


FIG.5. CHECK MARKS ON OIL LEVEL DIPSTICK 1

6. Check the oil level in the engine crankcase (Fig.5). Check the coolant level in the radiator. The coolant level should be 40 to 50 mm below the top edge of the filler neck,

when filled with water, and 80 to 90 mm below it, when antifreeze is used. When an expansion tank is used, the radiator is filled completely and the expansion tank - half its capacity.

Check the tension of the belts (Fig.6) driving the water pump, fan (generator), steering booster pump of the steering gear and the compressor.

7. On the trucks furnished with a winch, check to see if the winch cable is tightly wound on the drum, the cable hook is properly fastened, the drum control lever is in the ENGAGED (ВКЛЮЧЕНО) position and the power take-off lever is in the neutral position and is properly locked.

8. Check the steering wheel for end play and the clutch pedal for free travel. No end play of the steering wheel is tolerable. The free travel of the clutch pedal should be within 35 to 50 mm.

9. Check the hand brake for functioning. The truck should be completely braked after the hand brake lever catch is moved over not more than four to six teeth of the quadrant.

10. When using the truck at low ambient temperatures, take the following steps:

- prepare the starting preheater unit;
- check the fastening of the radiator muff;
- install the storage batteries, tighten the wire terminal clamps and apply a thin coating of solid oil onto them;
- using the crank handle, turn the engine crankshaft several revolutions to check operation of the drives to the water pump, generator, compressor and steering booster pump.

11. On the ЗИЛ-131 truck, close the master switch of the storage battery.

12. Start the engine and warm it up by letting it run at an average speed until the coolant temperature is 60°C. To make the warming-up procedure easier, close the radiator. After the engine has been warmed up listen to its operation

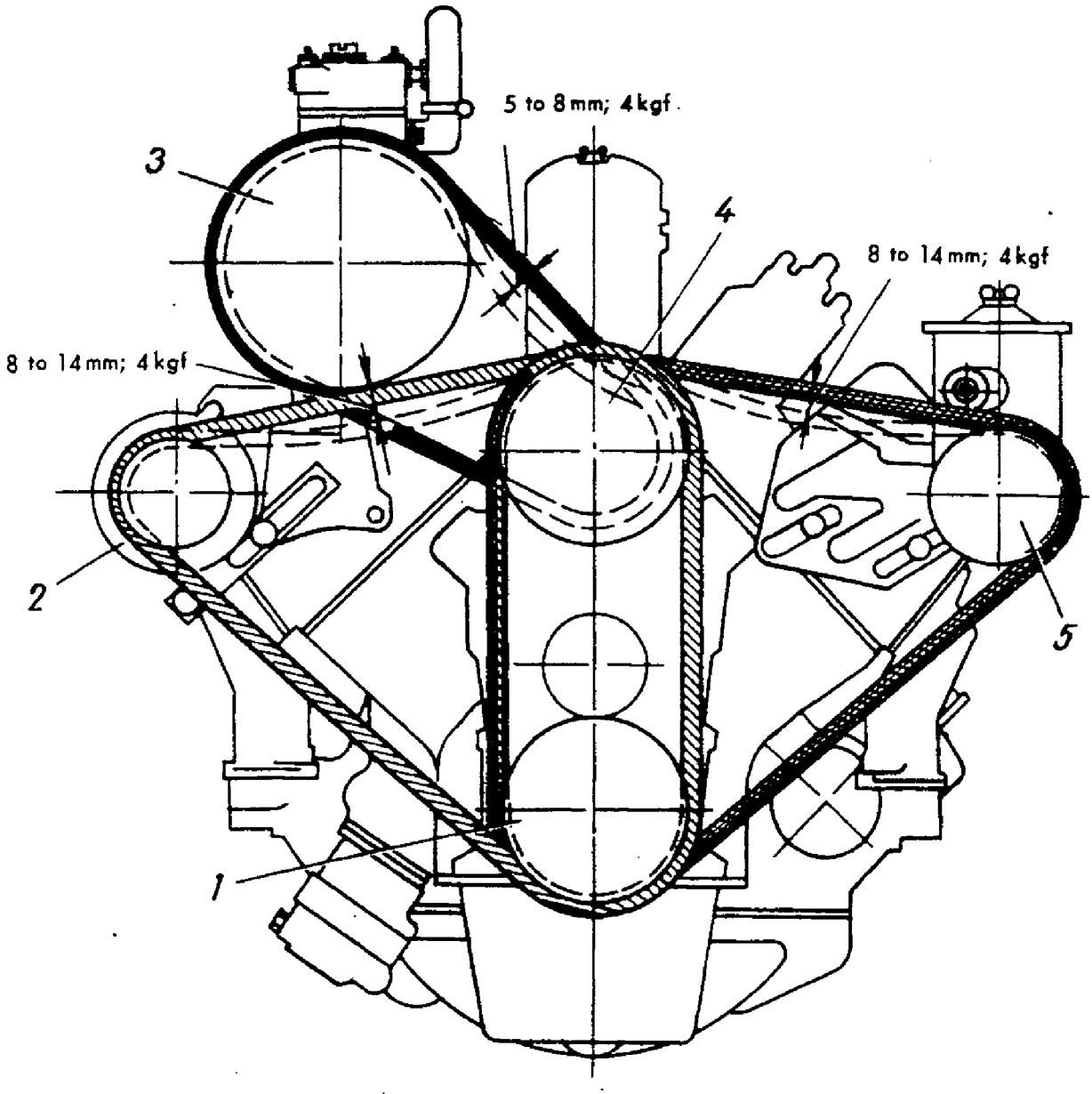


FIG.6. DRIVE BELT TENSION DIAGRAM

1 - crankshaft pulley; 2 - generator pulley; 3 - compressor pulley; 4 - water pump and fan pulley; 5 - steering booster pump pulley

at different speeds, check the functioning of the instruments and the pilot lamps.

The pointer of fuel level gauge 3 (Fig.7) should read the quantity of fuel in the tanks.

When the engine has been warmed up, the pointer of oil pressure gauge 6 should read not less than 1.5 kgf/cm^2 at 1200 rpm and at least 0.5 kgf/cm^2 at 500 rpm when idling.

Coolant temperature gauge 24 should read at least 60°C, when the truck is set into motion.

Tyre inflation pressure gauge 1 of truck ЗИЛ-131 should read (kgf/cm^2) as follows:

	3.5 tons	5 tons
Normal pressure	3	4.2
Minimum pressure	0.5	No reduction is permissible

The air pressure in the spare wheel tyre must be sufficient to prevent the tube from collapsing.

The tyre valve of the spare wheel should be furnished with a core. The other cores should be kept in the SPT&A set. Remove the core, when the spare wheel is installed on the axle.

The air pressure in the brake system should be not less than 4.5 kgf/cm^2 (the upper scale of pressure gauge 7). If that is the case the lower scale should read zero (air pressure in the brake chambers).

With the engine inoperative, sharp depression of the brake pedal should somewhat decrease the pressure in the air bottles (the upper scale of the pressure gauge) and make the pressure in the brake chambers (the lower scale of the pressure gauge) equal to that in the air bottles. After this has happened, the pressure gauge pointers should not move noteably within the time the pedal is depressed. A further decrease of the pressure indicates air leaks in the air brake system.

After the pedal has been sharply released, the time of the pressure drop in the brake chambers (the lower scale of the pressure gauge) should not exceed 2 seconds.

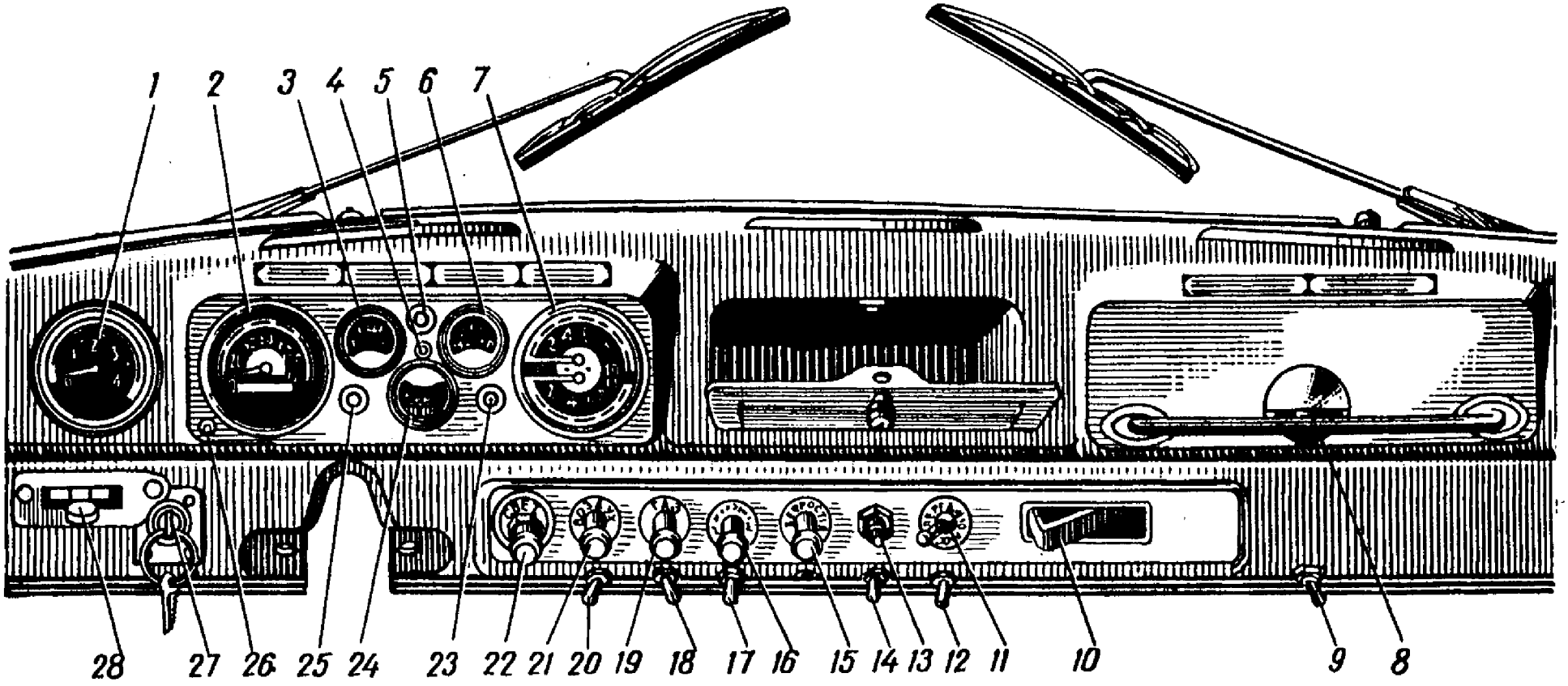


FIG.7. DASHBOARD OF ЗИЛ-131 TRUCK

1 - tyre inflation pressure gauge; 2 - speedometer; 3 - fuel level gauge; 4 - high-beam pilot lamp; 5 - battery charge pilot lamp; 6 - engine lubricating system oil pressure gauge; 7 - pressure gauge (two-pointer) to indicate air pressure in air brake system; 8 - cab illumination light; 9 - cab illumination light switch; 10 - ash tray; 11 - front axle forced engagement switch; 12 - cab heater motor switch; 13 - projector push-button; 14 - swivel lamp switch; 15 - cab heater blind and windshield defroster control knob; 16 - windshield wiper control knob; 17 - fuel level gauge change-over switch; 18 - cab fan switch; 19 - throttle manual control knob; 20 - cab domelight switch; 21 - choke valve control knob; 22 - dimmer control knob; 23 - coolant overheating warning light; 24 - coolant temperature indicator; 25 - turn indicator pilot lamp; 26 - front axle engagement pilot lamp; 27 - ignition and starter switch; 28 - tyre inflation pressure control valve lever

The free travel of the brake pedal end should be within 20 to 30 mm, when the truck is furnished with a single brake valve, and within 40 to 60 mm with a combination brake valve when compressed air is available in the air bottles (in operation it is not adjusted).

Battery charging pilot lamp 5 should go out at 900 to 1000 rpm. Engine overheating warming lamp 23 lights up when the coolant is at 115°C.

13. Check the steering wheel for angular play which should not exceed 15 degrees, while the engine is idling.

14. Stop the engine, listen to the operation of the centrifugal oil filter. A centrifugal filter in good repair continues its spinning at least 2 or 3 minutes.

15. Check the condition of the turn indicators, horns, windshield wipers and the windshield sprinkler.

16. When the trucks are used in mountainous localities, check for presence and condition of the auxiliary braking devices available on the truck.

17. While driving the truck to the inspection point, check the clutch, gear box, transfer case, driving axles, steering gear, brakes and speedometer for functioning.

With a trailer used, check the functioning of the trailer brakes.

CHECK INSPECTION OF THE TRUCK EN ROUTE
(AT HALTS AND STOPS)

Performed by: driver.

Operations and Specifications

1. Immediately after the truck has been stopped check by touch the wheel hubs, brake drums, gear box, transfer case and driving axles for overheating. The heating is normal, if the hand feels no burning effect.

2. Check for leaks of gasoline, oil, coolant and shock-absorber fluid, as well as air leaks from the air brake system.

3. Visually check the truck for condition and attachment of all the wheels and tyres for air pressure seen by their deflection. Remove foreign objects that may have stuck in the tyre tread or between dual tyres.

4. Check the condition of the springs and attachment of the shock absorbers.

5. Wipe clean the cab glasses, head lamps, side lamps, licence plates and identification signs.

6. Check the cargo for proper fastening and stowage and see to it that the cargo body sides are locked.

7. If a trailer is used, take the following steps:

- check the condition of the pintle hook and see to it that the truck-to-trailer coupling is reliable;
- check the trailer wheels and springs for proper attachment, and for air pressure in the wheel tyres;
- check the stowage and fastening of the cargo in the trailer.

8. Check the oil level (Fig.5) in the engine crankcase and coolant level in the radiator. If needed, add the oil and coolant and eliminate faults detected during the inspection.

9. When parked at subzero ambient temperatures, the engine should be regularly heated to 70 to 80°C.

10. When the truck is used in mountains at altitudes of 2000 m and more, increase the spark advance angle, for which purpose, shift the pointer of the upper plate of the octane selector scale one or two divisions towards the "+" mark.

11. Check the condition and fastening of the auxiliary braking devices available on the truck and attachment of the steering rods and brakes.

DAILY MAINTENANCE

Performed by: driver.

Operations and Specifications

1. Immediately after the truck has been stopped, check by touch the wheel hubs, brake drums, gear box, transfer case and driving axles for overheating. The heating is normal, if the hand feels no burning effect.

2. Refill fuel, oil and coolant.

3. Check for leaks of fuel, oil, coolant and shock-absorber fluid at the gaskets, seals and part joints.

4. Clean the truck of dirt and wash it.

Give an internal cleaning to the cab and the cargo body. Wipe clean the cab glasses, head lamps, side lamps and stop lights. Wipe clean the engine and the accessories located on it.

5. When operated in dust laden atmospheres, remove dirt from the breathers of the units.

6. When operated under wet and rainy weather conditions or at low ambient temperatures, drain condensate from the air bottles.

7. Check and adjust, if necessary, the belt tension (Fig.6) of the water pump, fan (generator), steering booster pump and compressor.

8. On the engines with a partial-flow centrifugal oil filter, turn the coarse oil filter handle three or four turns by extension grip 15 (Fig.8).

If the filter handle is hard to turn, remove and wash the filtering element. The filter body is cleaned and washed in the same operation.

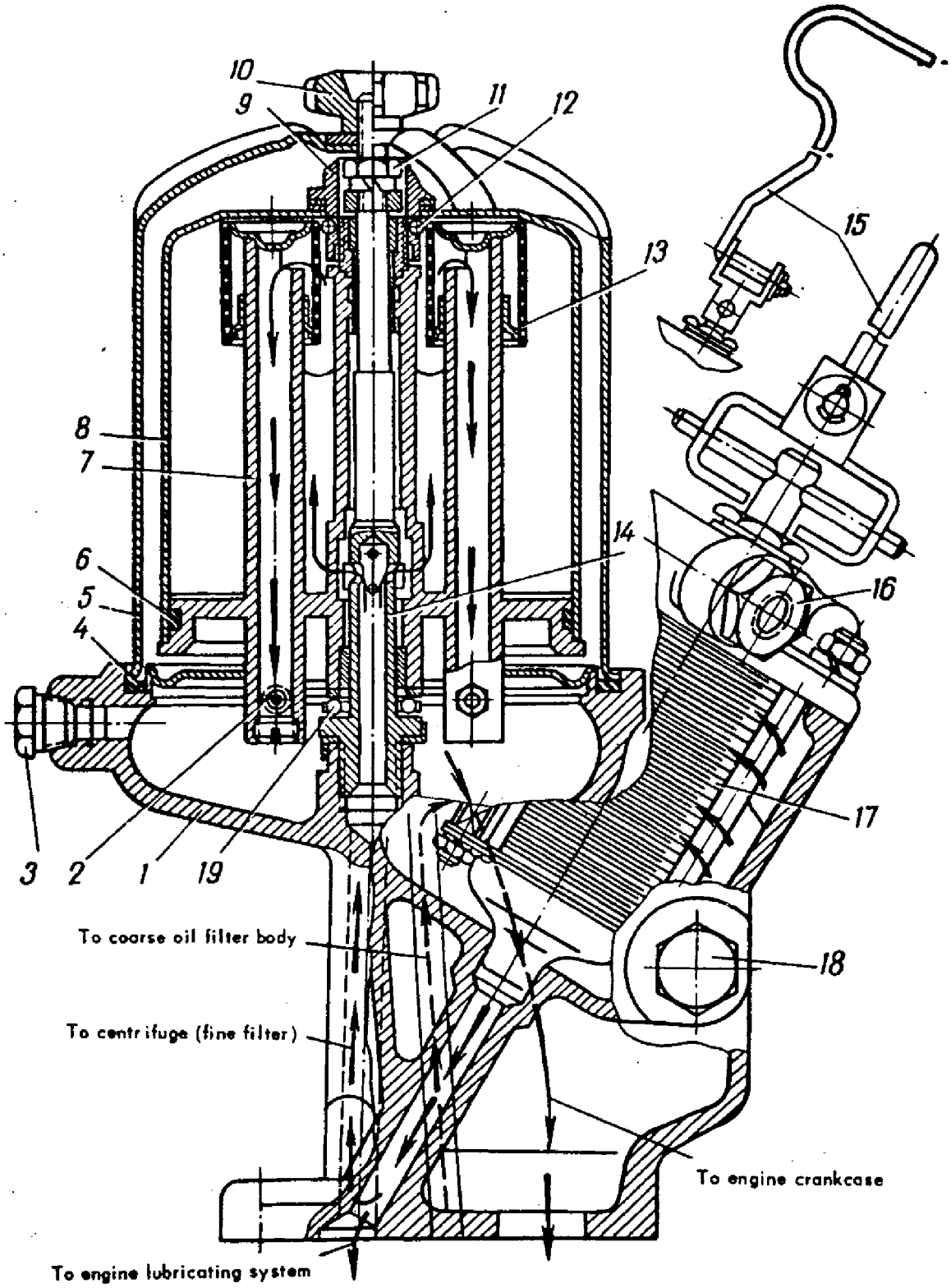


FIG.8. ЗИЛ-131 ENGINE OIL FILTER

1 - oil filters body; 2 - jet of centrifugal fine oil filter (centrifuge); 3 - plug; 4 - bowl gasket; 5 - bowl; 6 - seal ring; 7 - fine (centrifuge) filter body; 8 - body cap; 9 - cap nut; 10 - bowl nut; 11 - center pin nut; 12 - locking ring; 13 - gauze; 14 - center pin; 15 - handle extension grip; 16 - by-pass valve plug; 17 - coarse filter; 18 - drain plug of coarse filter; 19 - thrust bearing

9. When operating the truck in dust laden atmospheres or under snow storm conditions, remove the engine air cleaner and the filter of the oil filler neck, disassemble them and wash their parts in a kerosene bath (see Process Chart No.1).

Change oil in the cleaner and filter bodies. Wet the filtering elements (gauzes) with oil and let the oil flow down.

Reassemble and reinstall the filter and cleaner.

10. Check the attachment of the steering arm, condition of the cotter-pins, tightening of nuts and bolts of the steering rods.

Loose attachments and noticeable plays in the joints of the steering rods are not tolerable.

11. Check the air brake system for airtightness.

12. Check the condition of the springs, shock absorbers, propeller shafts and their flanges, as well as the torque arms of the ЗИЛ-131 truck.

13. Check the presence and tightening of the wheel nuts, remove foreign objects stuck between dual tyres and in the tyre treads, check the air pressure in the tyres and bring it to normal. On the ЗИЛ-131 truck close the tyre valves.

14. When operating with a trailer, check the condition of the pintle hook.

15. Check the stowage of the winch cable, if it was used in the truck trip.

16. When operating under conditions of heavy dirt, daily use grease УС-1 (press-solid oil), press-solid oil, grade "С", or solid oil, grade "С", to lubricate the steering rod ends and spring bolts. Every other day lubricate the universal joints of the propeller shafts driving the axles with the oil used for the gear box.

17. Eliminate the troubles detected en route and in the servicing, stow all the driver's tools in place (Appendix 1).

18. When the truck cannot be parked in a heated garage at subzero ambient temperatures, drain water from the cooling system, for which purpose, perform the following:

- remove the filler cap of the radiator or of the expansion tank;
- open the three cocks (four cocks with an expansion tank available) and let the water flow down completely;
- being sure that the water has been drained completely, close the cock of the cab heater. The other cocks should remain open;
- reinstall the filler cap of the radiator (or of the expansion tank).

19. At ambient temperatures below -15°C, remove the storage battery from the vehicle and keep it in a heated room.

Check the condition of the radiator muff, sealing boots and tarpaulin covers and secure them in place.

20. When the truck is used in sandy desert localities, take the following steps in addition to Paras 1 through 17.

Check the condition and fastening of the dust protecting boots and cups.

Wipe clean and dry the surfaces of storage battery with dry cotton waste and check the battery cells for the electrolyte level. The level should be 10 to 15 mm above the protective shield located above the separators. A lower electrolyte level calls for topping up with distilled water. Check and clean, if needed, the vent holes.

CAUTION! Never top up a battery with electrolyte, except the cases when it is known for sure that the electrolyte has been spilled over. If that is the case, the specific gravity of the electrolyte being added should be the same as that of the electrolyte in the battery.

21. When the truck is operated in mountainous localities of high altitudes, the following steps should be taken in addition to Paras 1 through 17:

- drain water from the cooling system;
- check the condition and fastening of the auxiliary braking devices available on the truck;

- check the electrolyte level in the battery cells (every three days). Clean the vent plug holes.

22. Each time after fording, proceed as follows:

- check the condition of oil in all the units by slightly opening the drain plugs. If water is detected in the oil of any unit, use the first opportunity to change the oil. See to it that this is done at least on the same day;

- the first opportunity should be used (not later than on the same day) to pack all the lubricating cups of the chassis with grease until it is forced out.

PREVENTIVE MAINTENANCE No.1

Performed by: automobile mechanic, electrician, greaser and driver.

Operations and Specifications

Before the truck is forwarded to the servicing point, the driver has to refill the truck and carry out all the operations within the daily maintenance scope.

1. Inspect the truck from outside and check for:

- leakage of oil from the engine gear box, transfer case, driving axles, shock absorbers and hydraulic steering booster;
- leakage of coolant;
- external defects of the body, cab and the fenders.

E n g i n e

2. Check all the engine systems for leaks and the instruments for attachment.

Examine the engine fastening and correct faults, if any.

3. Check the drive belt tension on the water pump (Fig.6), fan (generator), steering booster pump and compressor and adjust, if needed.

4. Examine the radiator, fan and all the pulleys for attachment.

5. Check the condition of the control linkage to the carburettor. Examine the fastening points of the pipelines and the carburettor.

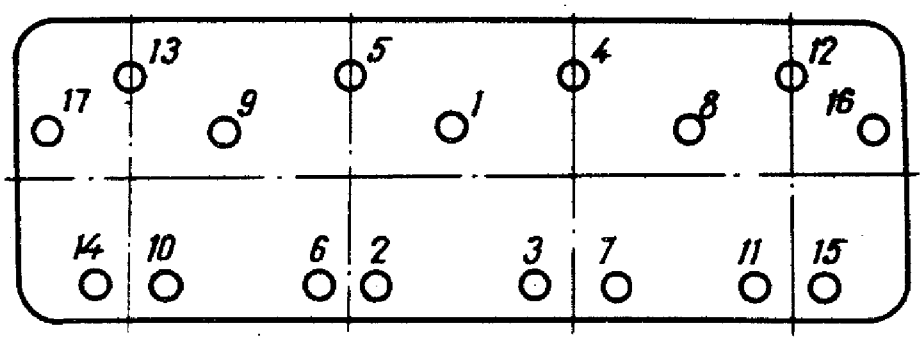


FIG.9. SEQUENCE OF TIGHTENING CYLINDER HEAD BOLTS

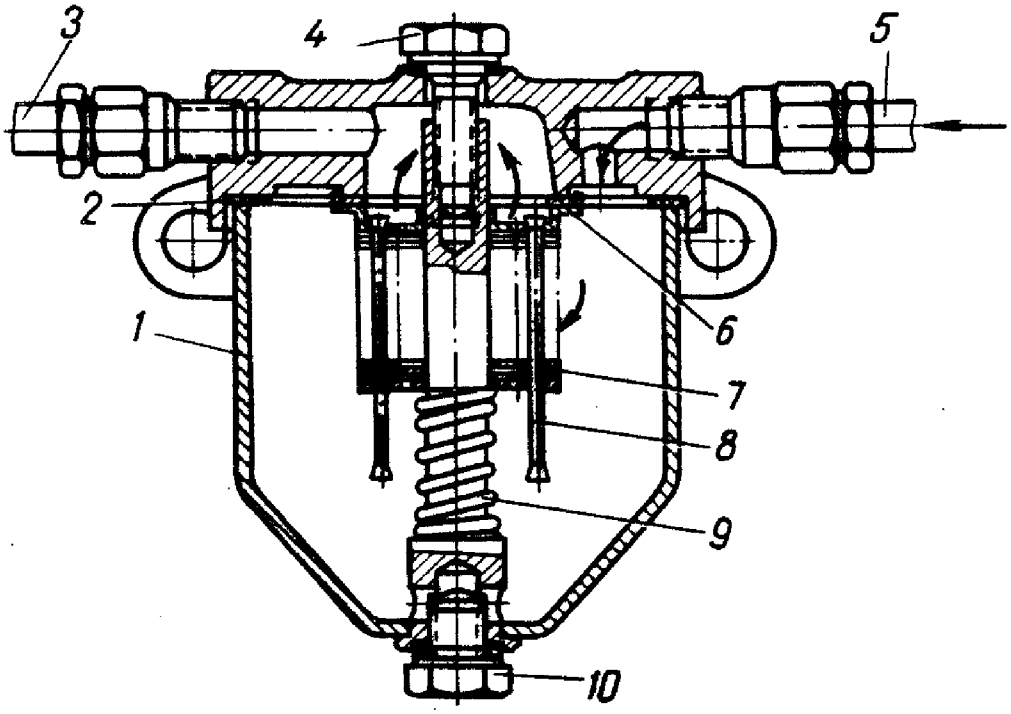


FIG.10. FUEL FILTER-SETTLER

1 - bowl; 2 - paronite gasket; 3 - fuel pipe to fuel pump; 4 - cover bolt; 5 - fuel pipe from fuel tank; 6 - filtering element gasket; 7 - filtering element; 8 - filtering element post; 9 - bowl spring; 10 - drain hole plug

6. On a new truck, when preventive maintenance No.1 is performed for the first time, check the tightness of the bolts (Fig.9) fastening the cylinder block heads and the intake and exhaust manifolds. After that, the bolts should be tightened up only during PM No.2.

To tighten up the cylinder block head bolts, make use of a torque wrench. This operation is performed on a cold engine.

The tightening torque should be within 7 to 9 kgf.m.

When the engine temperature is below -5°C, the bolt tightening torque should be closer to the lower torque limit (7 kgf.m), while at +20 to 25°C, it should be near the upper limit (9 kgf.m).

The nuts holding down the cylinder head should be uniformly tightened to a torque of 0.5 to 0.6 kgf.m.

7. Tighten up the clamps on the exhaust manifold joints.

8. Close the fuel pipeline cock and drain sediment from the fuel filter-settler (Fig.10).

9. Examine all the joints of the exhaust pipes and the muffler. Eliminate exhaust gas leaks, if any. Check the muffler and the exhaust pipes for fastening.

10. Listen to the operation of the engine at different speeds and adjust the carburettor, if needed, to the steady minimum revolutions (see Process Chart No.2).

11. Every other PM No.1, clean the centrifugal oil filter (see Process Chart No.25). With the engine furnished with a full-flow centrifugal filter the latter is cleaned when the engine oil is changed.

If the centrifugal filter fails to spin within 2 to 3 minutes after the engine has been stopped, check it for condition and wash, if needed.

Electrical Equipment

12. Check the storage battery and its seat for fastening and tighten up, if needed.

13. Examine the storage battery, wipe it clean with dry cotton waste and clean the vent plug holes.

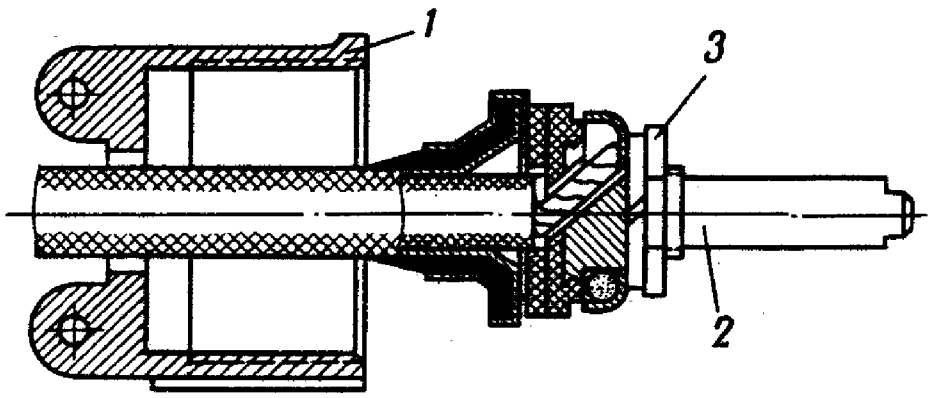


FIG.11. SOCKET PLUG

1 - union nut; 2 - plug; 3 - nut

Check the electrolyte level and gravity. If needed, send the battery for recharging.

Electrolyte Gravity when Bringing Storage Batteries to Working Condition

Climatic zone	Gravity at 15°C, g/cm³	
	prepared for pouring in	at end of 1st charge
Regions with temperatures down to -30°C	1.250	1.270
Regions with temperatures down to -20°C	1.230	1.250
Tropical zones	1.210	1.230

The storage battery is allowed to be discharged by not more than 50 per cent.

Note. A 0.01 g/cm³ decrease in the electrolyte gravity indicates a 5 to 6% discharge of the storage battery.

14. Clean the generator of oil and dirt. Check it for attachment and tightness of the clamping stud nuts. On the ЗИЛ-131 truck check the tightness of nuts 3 (Fig.11) of the contact plugs. To this end, unscrew special union nuts 1 of the connector, remove contact plugs 2 and check the plugs for tightness. If the plugs show rocky motion, tighten nuts 3.

When turning the connector union nuts see to it that the shielded wires are not twisted in the direction of the nut run, otherwise the result will be a damage to the shield braiding and a defective electrical contact between the wire braiding and the truck body. The nuts should be tightened by hand only.

15. Check the tightness of the contact plugs of the generator regulator on the ЗИЛ-131 trucks and the screw terminals of the generator regulator on the ЗИЛ-130 trucks.

16. Check the attachment of the starter and fastening of its terminals. If needed, tighten up loose joints. Do the same with the battery switch.

17. Check the condition of the electric wire insulation and the wires for fastening. Clean the wire terminal surfaces of dirt.

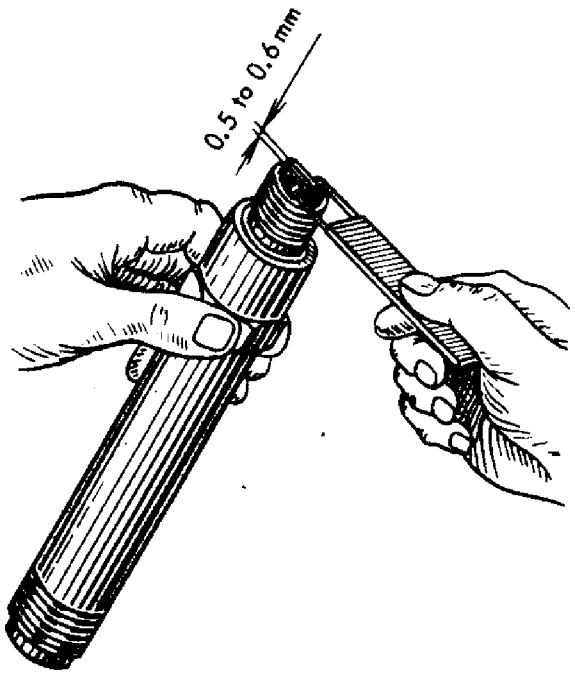


FIG.12. MEASURING SPARK GAP

On the ЗИЛ-131 trucks, check all the connectors of the high-tension shield cables, the low-voltage wire plug connectors as well as the distributor ventilation hoses for tight connections and joints.

18. Examine the head lamps, side lamps, turn indicators, tail lamps, horns and windshield wipers for fastening and condition. Check the windshield wipers for operation.

When replacing bulbs in the head lamps, check the head lamps for aiming.

19. During each PM No.1, screw out the spark plugs, check and adjust the spark gap (Fig.12), clean the insulators of soot and carbon deposit, clean the spark plug removable parts and replace the rubber sealing sleeve if needed. Defective spark plugs should be replaced.

On the trucks with a contact-transistor ignition system the spark gap is increased to 1.0 to 1.1 mm after 1000 to 2000-km run.

Power Transmission

20. Check and adjust, if needed, the free travel of the clutch pedal (see Process Chart No.3). The free travel should be within 35 to 50 mm.

21. Check for attachment of the clutch case, gear box transfer case and the power take-off. Tighten, if needed, to a torque of 8 to 10 kgf·m.

22. Examine the propeller shafts and propeller shaft flanges for condition and attachment. Check to see that the bolts securing the universal joint cross-piece bearings are locked properly. On the ЗИЛ-130 truck, check the bracket of the propeller shaft intermediate support for proper attachment.

23. Clean the vent caps (breathers) of the power transmission units.

Running Gear

24. Examine the frame for condition.

25. Check the U-bolts of the front and rear springs for tightening (to a torque of 25 to 30 kgf·m), the shock absorbers for proper attachment and the rubber buffers of the axles for condition.

26. Tighten the U-bolt nuts and the bolts securing the lugs of the front springs.

To prevent the U-bolts and the spring lugs from damage, do not tighten their nuts more than it is necessary to compress the spring washers.

27. On the ЗИЛ-131 truck, check the tightening of the torque arm pins (to a torque of 35 to 40 kgf·m). Tighten up the clamping studs of the cheeks of the rear equalizing spring hubs (to a torque of 35 to 40 kgf·m) and the bolts holding the bracket of the walking beam shaft (to a minimum torque of 30 kgf·m).

28. Tighten the axle shaft flanges.

29. Check the tightening of the nuts fastening the wheel to the hubs. On the ЗИЛ-131 truck, apart from this, check the tightness of the nuts securing the bead-forming ring.

Steering Gear and Brakes

30. Check the attachment of the steering gear case, steering arm, steering column, steering wheel, steering rods and steering knuckle levers. Tighten up, if needed.

The nuts of the two outer studs holding the steering knuckle lever of the ЗИЛ-131 truck should be tightened each time the front left wheel is removed (to a torque of 16 to 18 kgf/m).

31. Check the steering wheel for angular play (Fig.13) with the steering booster pump operating and the front wheels in the straight-ahead position. If the play exceed 15 degrees and there is no appreciable lost motion in the steering rod joints, adjust the steering gear, following Process Chart No.4.

32. Check the steering wheel for end play (clearance) and tighten nut 1 (Fig.14), if needed.

When disconnected from the universal-joint shaft, the turning torque of steering shaft 2 should lie within 3 to 8 kgf/cm.

Never overtighten nut 1 with subsequent unscrewing it to obtain the needed turning torque of the shaft as the result may be a ruined bearing.

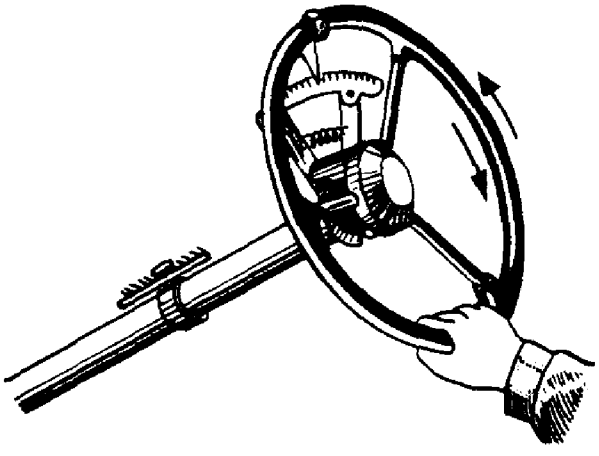


FIG.13. CHECKING STEERING WHEEL ANGULAR PLAY

33. Check the wedges of the steering gear universal-joint shaft for tightness (the torque should be from 1.4 to 1.7 kgf/m).

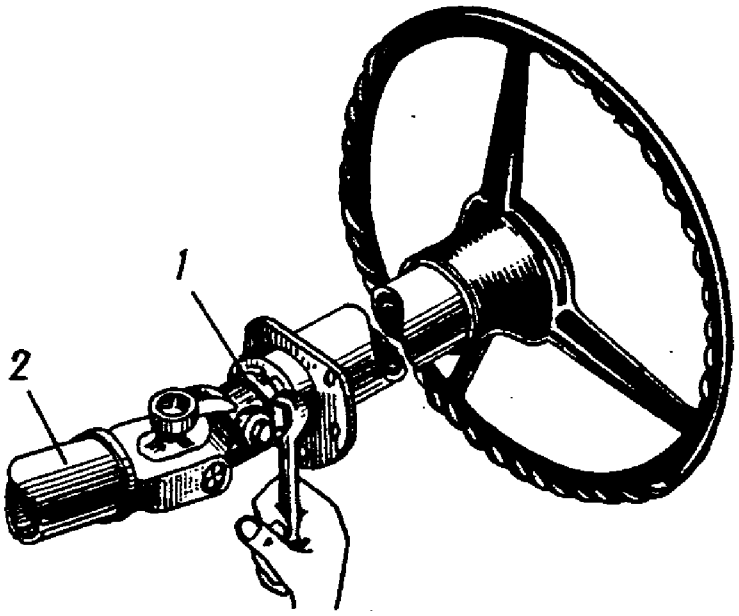


FIG. 14. STEERING WHEEL END PLAY ADJUSTMENT

1 - nut; 2 - universal joint shaft

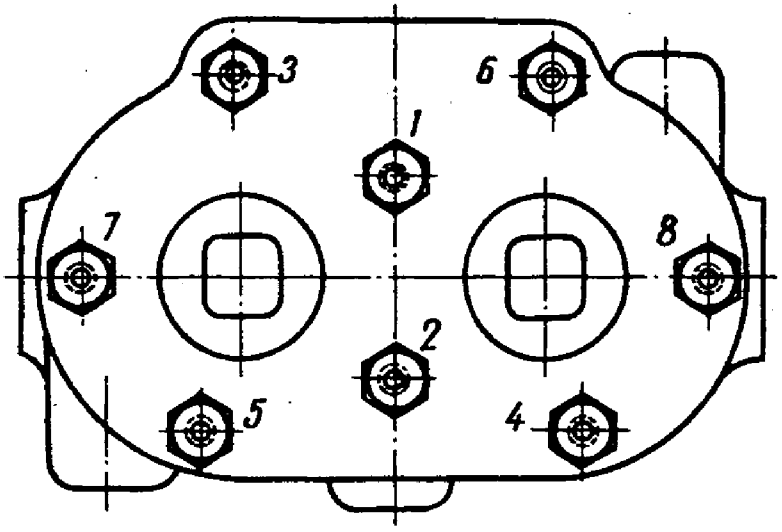


FIG. 15. SEQUENCE OF TIGHTENING NUTS OF COMPRESSOR CYLINDER HEAD STUDS

34. Examine the hoses of the hydraulic steering booster.

35. Check the tightness of the nuts holding the compressor to the engine cylinder head, attachment of the pulley and the tightness of the nuts of the studs securing the compressor cylinder head.

The nuts of the studs holding the cylinder head should be uniformly tightened in two stages, using the sequence shown in Fig.15.

The final tightening torque should lie within 1.2 to 1.7 kgf/m.

36. Check and adjust, if needed, the travel of the brake pedal. If, when completely depressed, the pedal strikes against the floor, adjust the length of rod 2 (Fig.16).

37. Check the hand brake for functioning and fastening of its parts.

The truck should be brought to a complete stop after the hand brake lever latch is moved over four to six teeth of the toothed sector. If needed, adjust the hand brake, following Process Chart No.5.

38. Drain condensate from the air bottles. The air bottles should be drained of condensate only with the compressed air available in the bottles.

39. Check the operation of the safety valve of the air brake system by pulling the valve rod. If the valve releases air when the rod is pulled out and stops to do so, when the rod is released, the valve is in good condition.

40. Check the pins of the brake chamber forked rods for proper locking with cotter-pins and the rods for stroke. If the stroke exceeds 40 mm for the ЗИЛ-131 truck or 35 mm for the ЗИЛ-130, partially adjust the wheel brakes (see Process Chart No.6).

Auxiliary Equipment

41. Check the condition and attachment of the pintle hook assembly.

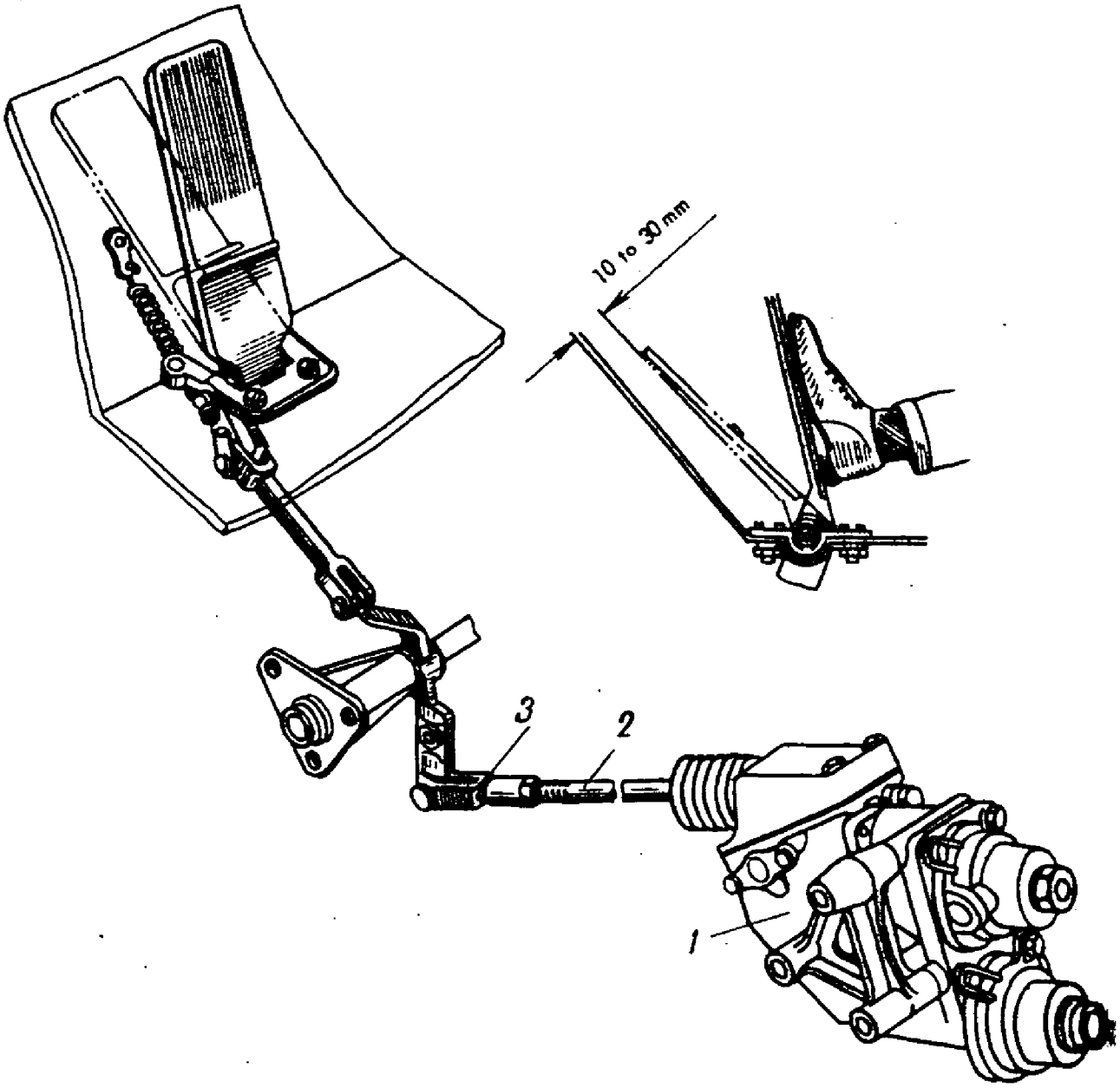


FIG. 16. METHOD OF ADJUSTMENT OF WHEEL AIR BRAKE LINKAGE

1 - two-chamber brake valve; 2 - linkage rod; 3 - rod adjusting fork

42. Check the condition and attachment of the fifth wheel assembly on the ЗИЛ-131В and ЗИЛ-130В1-66 trucks.

43. Check the condition of the winch control mechanism, condition of the winch propeller shaft and its universal joints.

44. Check the condition of the spare wheel hoist.

Cab, Body and Platform

45. Examine the attachment parts of the fenders, radiator shell, footsteps, cab, locks and hood hinges.

46. Tighten up the U-bolts and other bolts fastening the body platform (the fifth wheel assembly in case of bolster-body trucks).

Lubrication of Truck

47. Using УС-1 grease (press-solid oil), GOST 1033-51, press solid "С" oil or solid oil "С", GOST 4366-64 (Fig.17), lubricate the following parts:

- steering rod joints;
- spring bolts;
- expansion camshafts of the wheel brakes;
- king pins of the steering knuckles of ЗИЛ-130 trucks.

The grease should be pressed in until it is forced out of the clearances.

48. Using the automotive transmission oil, grade Т-14Б (with an additive), МРТУ-12Н No.34-63 or ТАп-15В, МРТУ-38-1-185-65 (a substitute is oil ТАп-15, GOST 8412-57) (Fig.18), lubricate:

- the universal joints of the axle drive propeller shafts;
- the universal joints of the winch drive propeller shaft of the ЗИЛ-131 truck;
- the joints of the universal joint shaft of the steering column.

The oil is pumped in until it is forced out of the valves.

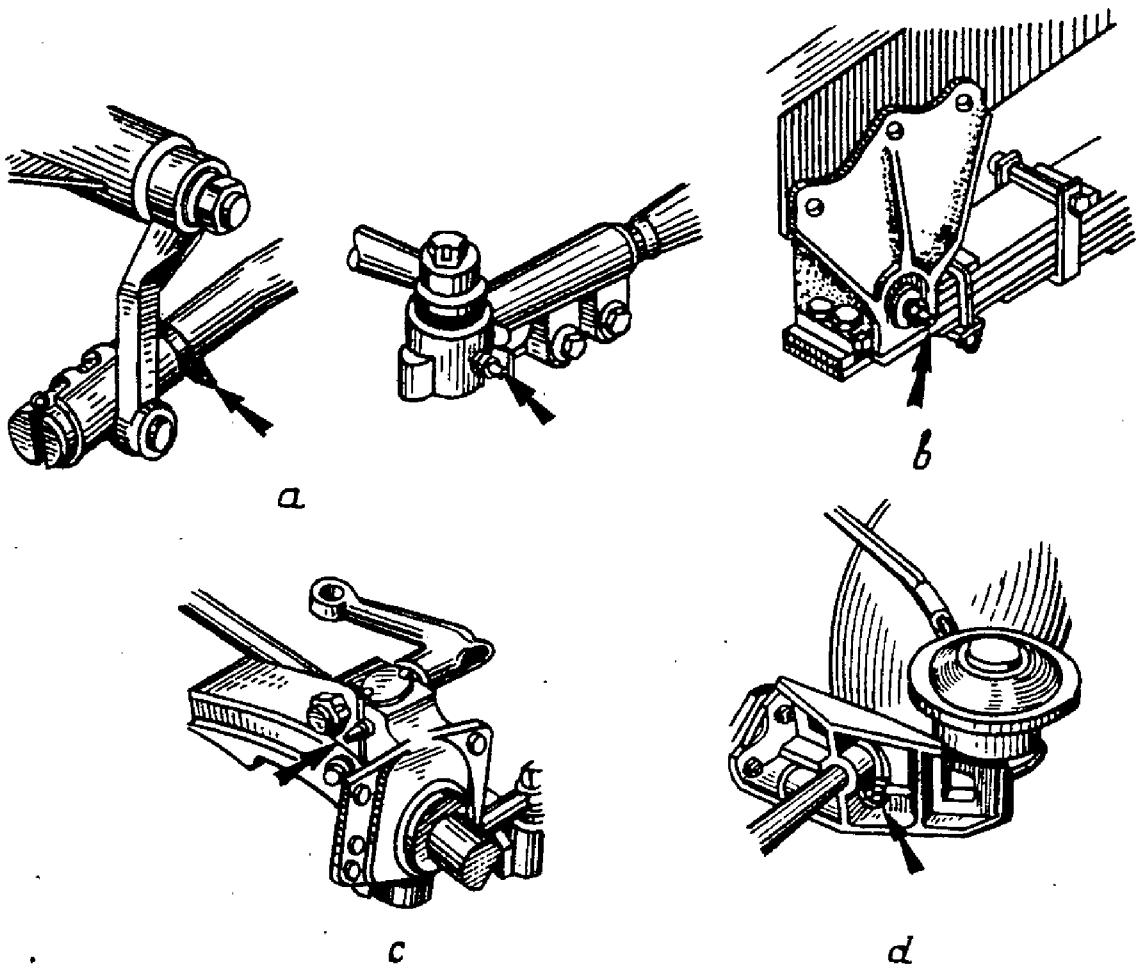


FIG.17. LUBRICATING POINTS FOR УС-1 GREASE (PRESS SOLID OIL), PRESS SOLID OIL "C" OR SOLID OIL "C"

a - steering rod joints; b - spring bolts; c - steering knuckle king pins; d - shafts of wheel brake expansion cams

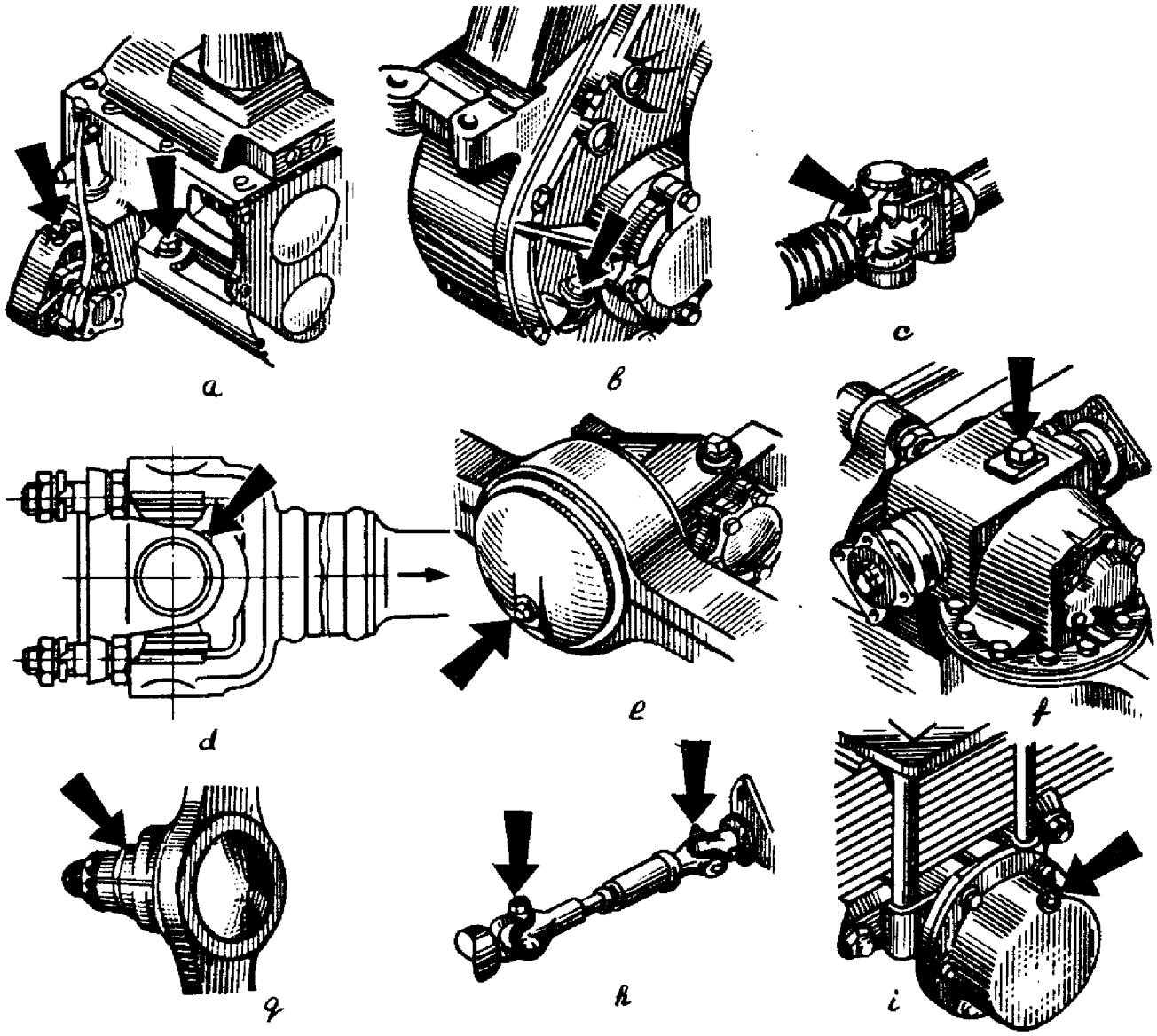


FIG. 18. LUBRICATING POINTS FOR T-14B AUTOMOTIVE TRANSMISSION OIL (WITH ADDITIVE) OR TAп-15B OIL (SUBSTITUTE IS TAп-15 OIL)

a - gearbox case; b - transfer case; c - universal joints of axle drive propeller shafts; d - winch drive propeller shaft universal joints; e - front axle of ЗИЛ-131 truck; f - rear and front-rear axles of ЗИЛ-131 truck; g - rear axle of ЗИЛ-130 truck; h - universal joints of steering column shaft; i - hub of walking beam suspension of ЗИЛ-131 truck

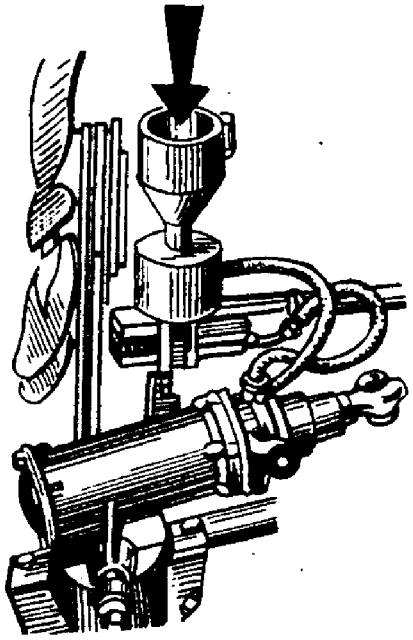


FIG. 19. LUBRICATING POINT FOR "P" OIL USED IN AUTOMOTIVE HYDRAULIC SYSTEMS (SUBSTITUTE IS TURBINE OIL 22 OR INDUSTRIAL OIL 20)

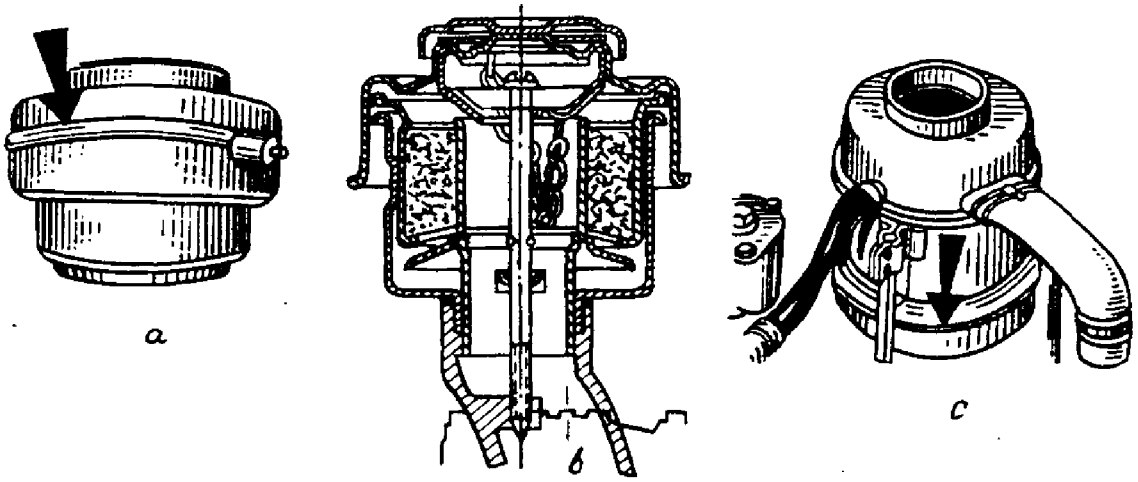


FIG. 20. LUBRICATING POINTS FOR AC-8 OR AC3n-10 OIL

a - air cleaner of ЗИЛ-130 truck; b - air cleaner of ЗИЛ-131 truck; c - air filter of engine crankcase ventilation

Clean the breathers. Where leaks are detected, check the oil level and top up, if needed, with the T-14B automotive transmission oil (with an additive), MPTY-12H No.34-63 or TAп-15B, MPTY-38-1-185-65 (a substitute is oil TAп-15, GOST 8412-57).

49. Check the oil level in the hydraulic steering booster tank (Fig.19) and top up, if needed, with oil, grade P, TY-38-1-110-67 used for the truck hydraulic systems. A substitute is turbine oil 22, GOST 32-53 or industrial oil, grade 20 (spindle oil 3), GOST 1707-51.

When checking the oil level the front wheels should be in the straight-ahead position.

The oil is topped up (with the engine idling) until it appears over the strainer of the filling filter.

50. Remove, wash and fill the engine air cleaners with fresh oil (Fig.20), following Process Chart No.1. The same is done to the filter of the oil filling neck.

Auxiliary Operations Performed when the Truck is Used in Sandy Desert Localities

The servicing operations involving disassembly of some truck units under field conditions should be performed indoors or in tents.

1. Drain from 1 to 2 litres of sediment from the fuel tanks.

2. Remove the filtering element of the fuel filter-settler (Fig.10) and wash it with gasoline. Before the filtering element is reinstalled, clean the internal surfaces of the bowl of dirt.

3. On the ЗИЛ-131 truck, check the functioning of the air valves (Fig.22) of the fuel tanks and wash them, if needed.

Using compressed air, clean the valve pipe and the pipe connecting the fuel tanks.

4. Remove the bowl-settler of the fine fuel filter (Fig.21) and wash the filtering element with gasoline.

5. Remove the gauze fuel filter of the carburettor and wash it with gasoline.

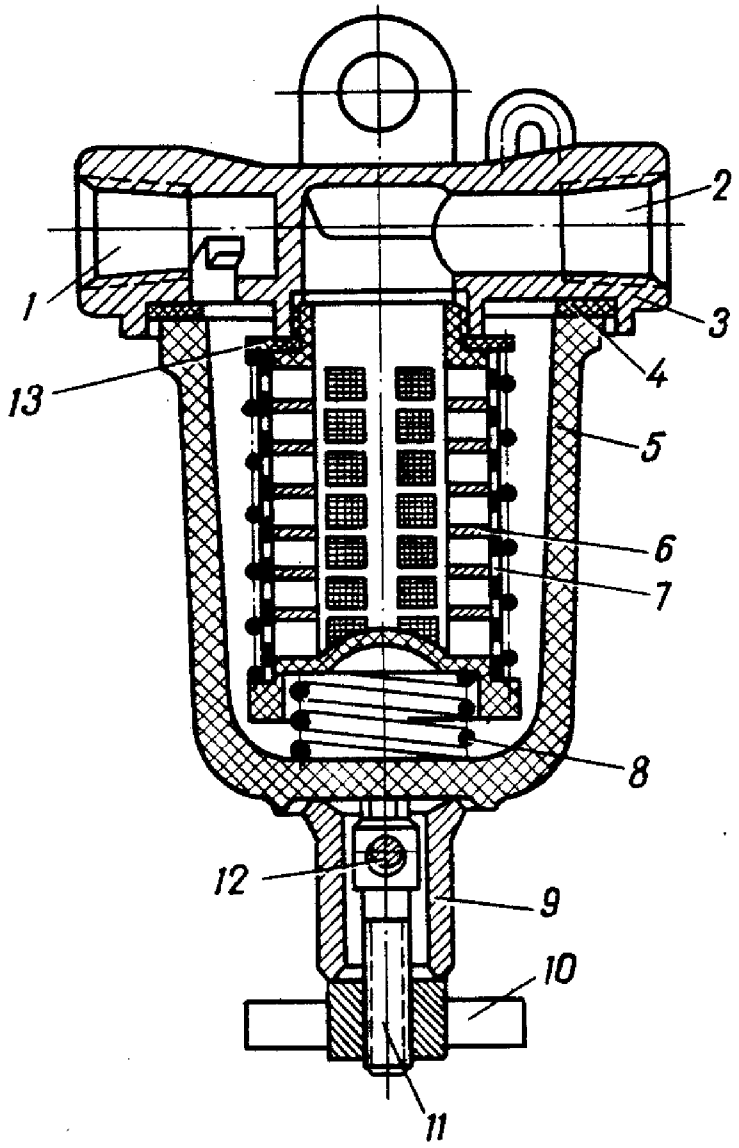


FIG.21. FINE FUEL FILTER

1 - fuel inlet hole; 2 - fuel outlet hole; 3 - filter body; 4 - body gasket; 5 - plastic bowl-settler; 6 - filter carcass; 7 - filtering element (gauze); 8 - spring; 9 - bushing; 10 - nut; 11 - clamping screw; 12 - bail; 13 - filtering element gasket

6. Check the condition and fastening of the dust protecting boots and cups used on the truck.

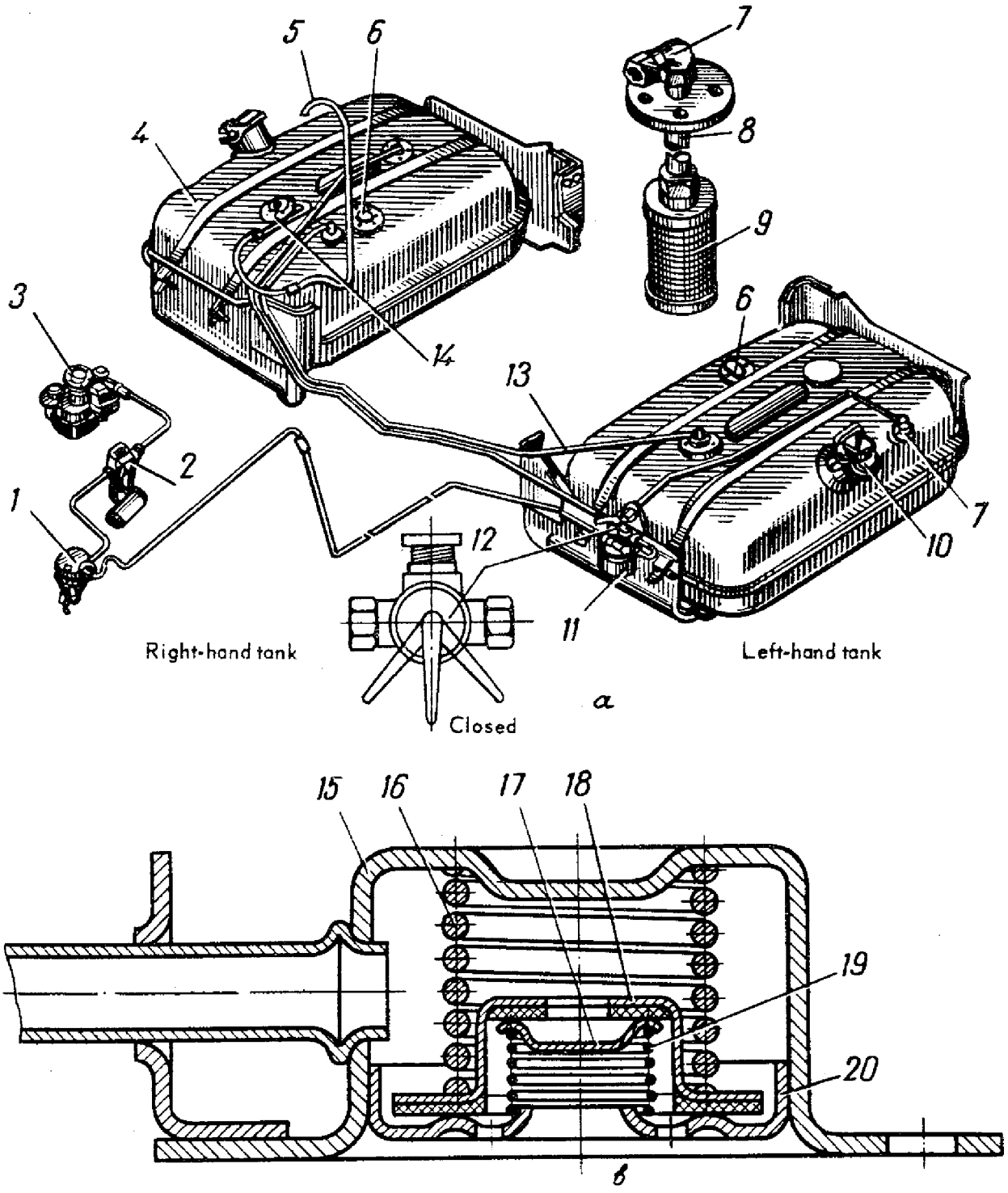


FIG.22. FUEL SYSTEM UNITS

a - fuel feed system diagram; b - valve box of fuel tank; 1 - fuel pump; 2 - fine fuel filter; 3 - carburettor 4 - fuel tank (auxiliary); 5 - air-conducting pipe; 6 - sending unit of fuel level gauge; 7 - elbow fitting; 8 - intake pipe; 9 - gauze filter; 10 - plug; 11 - filler-settler; 12 - valve; 13 - intertank pipe; 14 - tank valve box; 15 - valve body; 16 - inlet valve spring; 17 - inlet valve; 18 - outlet valve; 19 - outlet valve spring; 20 - valve bottom

PREVENTIVE MAINTENANCE No.2

Performed by: automobile mechanic, electrician, greaser and driver.

Operations and Specifications

Preventive maintenance No.2 includes all the operations performed during Preventive maintenance No.1 and the following additional operations:

E n g i n e

1. Disassemble the fuel filter-settler (Fig.10) and the fine fuel filter (Fig.21) and wash the filtering elements with gasoline.

When disassembling the filters, take care not to damage the gasket sealing the cover-to-bowl joint.

2. On the ЗИЛ-131 truck, wash the air valves on the fuel tanks and, using compressed air, blow through the valve pipes and tank interconnecting pipe 13 (Fig.22).

3. Remove, clean and wash valve 1 (Fig.23) of the engine crankcase ventilation system.

4. Tighten the bolts and nuts fastening the cylinder block heads of the engine and the intake and exhaust manifolds (Fig.9).

5. Listen to the operation of the valves and adjust, if needed, the clearances between the ends of the valve stems and the rocker surfaces which should be within 0.25 to 0.3 mm for the exhaust and intake valves (see Process Chart No.8).

Every other PM No.2 check the engine cylinders for compression (see Process Chart No.9).

6. Tighten the nuts of bolts 2 (Fig.24) of the engine front (9) and rear (16) engine suspensions and torque arm. The nuts of bolts 9 of the rear engine suspension should be tightened to a torque from 20 to 25 kgf•m, and the nuts of bolts 2 and 16 of the front and rear suspensions, respectively, to a torque of 8 to 10 kgf•m.

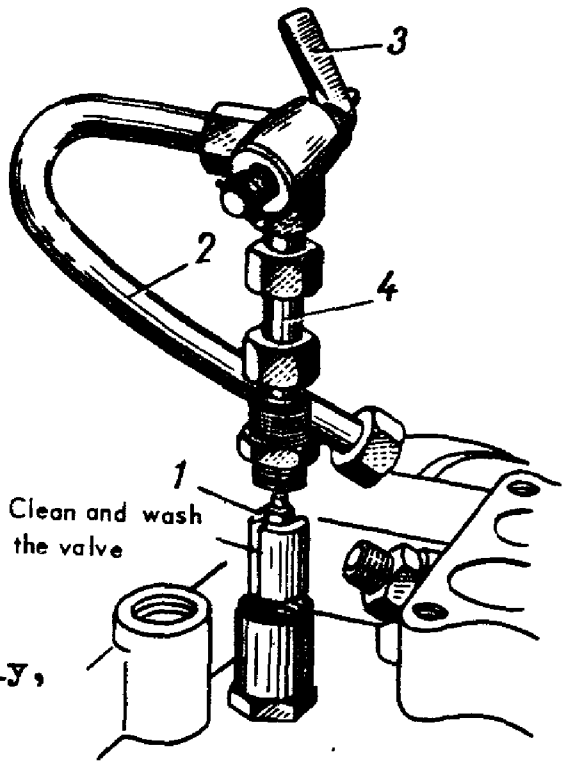


FIG.23. CLEANING AND WASHING CRANKCASE VENTILATION VALVE

1 - crankcase ventilation valve; 2 - pipe; 3 - crankcase ventilation cock; 4 - valve pipe

7. Check the riveted joints of the frame for condition by tapping with a hammer and see that the girder and cross-member flanges have no cracks. Loose rivets should be replaced with bolts.

In addition to the above-mentioned operations, every 35,000 to 50,000-km run the following operations should be performed during PM No.2.

8. Remove the cylinder block heads and remove the carbon deposit from the pistons and the combustion chambers. If needed, lap in the valves. Check to see that the engine intake manifold, ducts of the intake valves and the crankcase ventilation tubes are free from deposits.

9. In case of excessive oil consumption and smoking exhaust, check the condition of the piston rings and replace, if needed. In the same operation, check the condition of the connecting rod bearings and replace, if needed. Tighten the bolts of the main bearing caps.

The tightening torque should be from 7 to 8 kgf•m for the connecting rod bearings and from 12 to 13 kgf m for the main bearings.

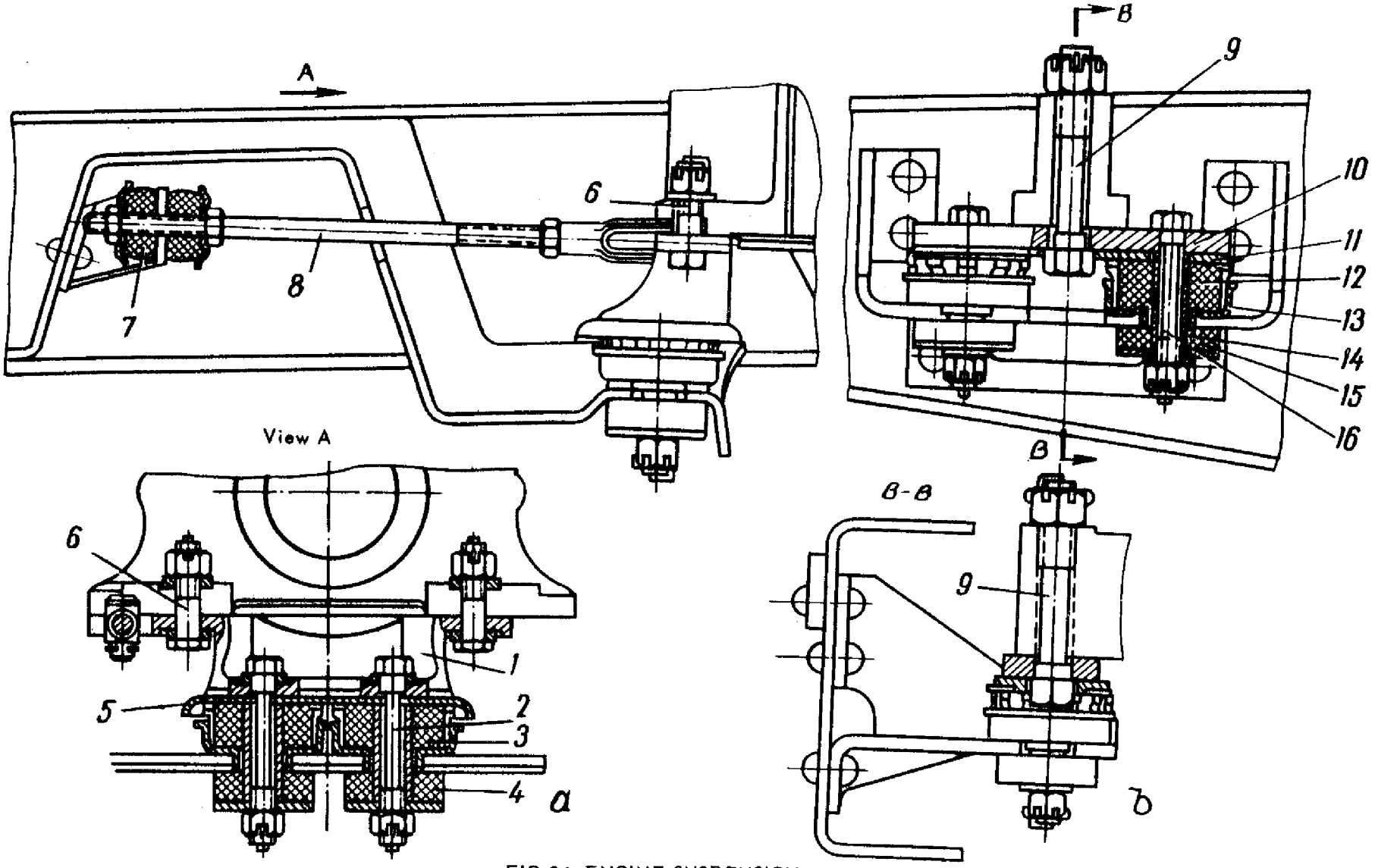


FIG.24. ENGINE SUSPENSION

a - front suspension; b - rear suspension; 1 - bracket of engine front support; 2 - front suspension bolt; 3 and 4 - upper and lower pads of front suspension; 5 - protective cap of upper pads of engine front support; 6 - engine attachment bolt; 7 - rod buffer; 8 - coupling rod; 9 and 16 - rear suspension bolts; 10 - strap of rear support pads; 11 - plate of rear support pads; 12 and 15 - upper and lower pads of rear suspension; 13 - upper pad seat; 14 - pad spacer

10. Disconnect the oil coolers of the engine and the hydraulic steering booster and blow them out with compressed air.

11. If needed, wash the cooling system.

Electrical Equipment

12. Clean the generator of dust and dirt. Examine the brushes and commutator for condition and check the condition of the brush gear. The brush spring load should be not less than 600 g, the brush height - not less than 14 mm. The brush height of the A.C. generator must be not less than 8 mm. Replace the worn brushes. New brushes must be so selected that they are free to slide in the brush holders, lap the surfaces of the brushes to the commutator. After the brushes have been replaced, properly tighten the bolts fastening the brush holders.

Check the condition of the commutator. A dirty commutator should be wiped clean with a cloth soaked in gasoline. Burnt commutators are cleaned with fine sand paper. Do not clean the commutator with emery cloth. If a burnt commutator cannot be cleaned with sand paper turn it on a lathe.

In case of generator failure, check the condition of the rectifier unit. Check with the generator disassembled and its starter winding disconnected.

To check the positive leads of the diodes, connect one wire from the storage battery to the positive bus of the rectifier unit and the other wire (via a pilot lamp) in turn to the diode leads on the rectifier unit.

The negative leads of the diodes are tested by connecting one wire from the storage battery to the negative bus of the rectifier unit and the other wire (via a pilot lamp) in turn to the diode leads of the rectifier unit.

The rectifier diodes in good condition conduct current in one direction only and, thus, the pilot lamp lights up only when the diodes are connected in the conducting direction for each type of the rectifier diodes.

If the lamp lights, when the diodes are in either direction, then the unit diode has an internal short-circuit and, if the lamp remains dark, when the diode is connected in the conducting direction, the rectifier diodes are at fault.

When the truck is equipped with an A.C. generator, the Specifications are as follows:

- the maintenance operations are performed every 25,000 km;
- never disconnect the storage battery, when the engine is running, to avoid damage to the generator diodes and the semiconductor devices of the voltage regulator;
- never close the "+" and "Ш" generator leads;
- never connect to the circuit the battery with wrong polarity (i.e. the positive terminal on the vehicle body) even for a short period of time or make attempts to remagnetize the generator by connecting its "+" terminal to the negative terminal of the storage battery;
- repair, disassembly and reassembly of the generator should be performed in a workshop organized for the purpose and having all the necessary tools and instruments as well as qualified specialists;
- prior to removal of the cover from the slip rings side, first remove the bolts fastening the brush holder and remove it together with the brushes in order to prevent damage to the brushes.

Blow the generator out with compressed air, tighten its fastenings, the nut securing the pulley and the clamping studs.

Check to see the conductors are connected properly to the terminals of the generator, voltage regulator and the storage battery.

On the A.C. generators the wires are connected to the generator terminals or tightened up only when the storage battery is disconnected.

13. Check the ignition system distributor and examine the cams. If needed, wipe the distributor with a cloth

soaked in gasoline. Check to see the arm is free to move, for which purpose, push the arm aside with finger and release it. When released, the arm should rapidly return to its initial position and the contacts must close with a click. The spring load should be within 500 to 650 g.

Check the distributor contacts for cleanliness and, if needed, clean the contact points with a chamois soaked in gasoline. Next, having pulled the arm aside, let the gasoline evaporate and wipe the contacts with clean dry chamois.

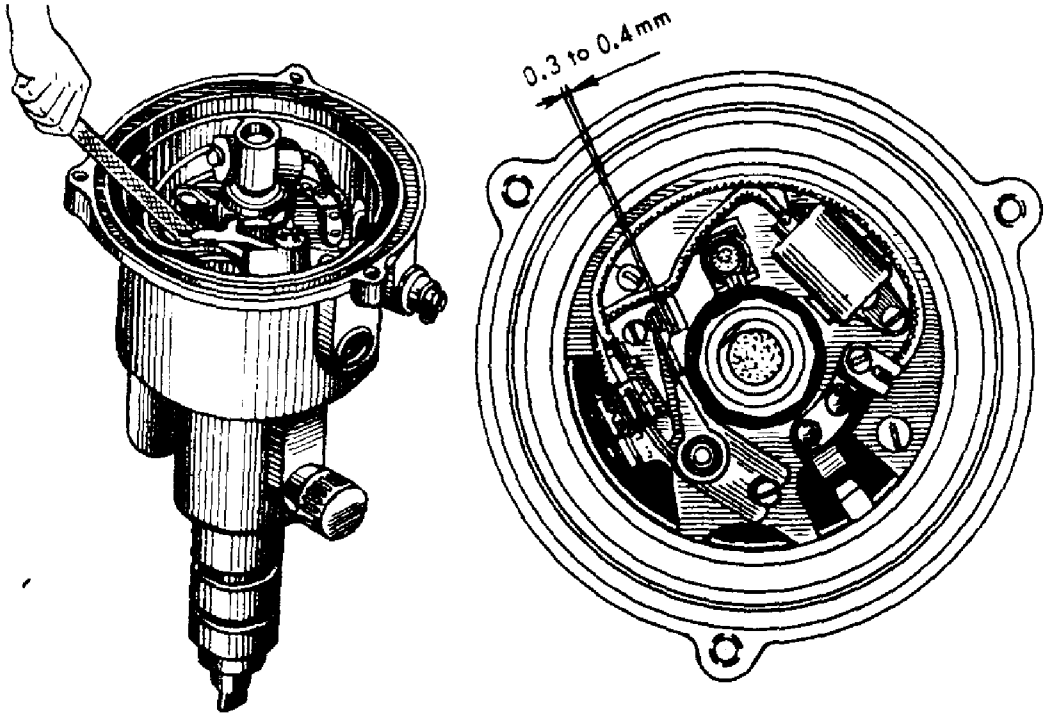


FIG.25. METHOD OF CLEANING CONTACT POINTS AND ADJUSTING CONTACT-BRAKER CLEARANCE

Check the condition of the contact point working surfaces. In case of a big metal transfer from one contact point to the other, clean it with an abrasive plate or fine sand paper. Never use emery cloth, files and other means for this purpose.

If needed, adjust the clearance between the contact points of the contact breaker (Fig.25).

Do not clean the contact points to eliminate the pit (crater) completely, otherwise the contact service life will be reduced.

No contact cleaning operations are needed in the contact-transistor ignition system, its contacts are washed with gasoline every 10,000 to 12,000-km run of the truck.

CAUTION! 1. NEVER leave the ignition circuit switched on, while the engine furnished with a contact-transistor ignition system is inoperative.

2. NEVER remove the bottom plate of the TK102 transistor commutator as it is of a non-detachable construction.

3. With a fully-transistorized ignition system, do not apply a potential of 24 volts to the "+12" terminals of the series resistor.

On the trucks furnished with a full-transistorized ignition system the following operations should be performed every 30,000 km:

- clean the contacts of the distributor cap;

- lubricate the centrifugal automatic spark advance control;

- replace the rubber sealing gaskets.

Every 100,000 km it is allowed to replace not more than two essential parts of the distributor (the distributor cap, rotor or connecting plugs).

14. Check the electrical adjustment of the generator regulator and readjust, if needed.

For the first time this check-up is made during the first PM No.2 and then every third PM No.2 or when the storage battery is charged improperly (see Process Chart No.28).

The generator regulator should be tested on a special test stand in its operating position. It is allowed to test the generator regulator just on the truck, provided the needed equipment is available.

On the vehicles furnished with a Г250-Ж1 A.C. generator, a РР350-А voltage regulator is installed instead of the РР130 generator regulator. When in service, it needs no adjustments. It is forbidden to open it. In case of a fault, the voltage regulator should be replaced.

A solid-state voltage regulator is allowed to be opened and adjusted by a specialist only. This should be done in

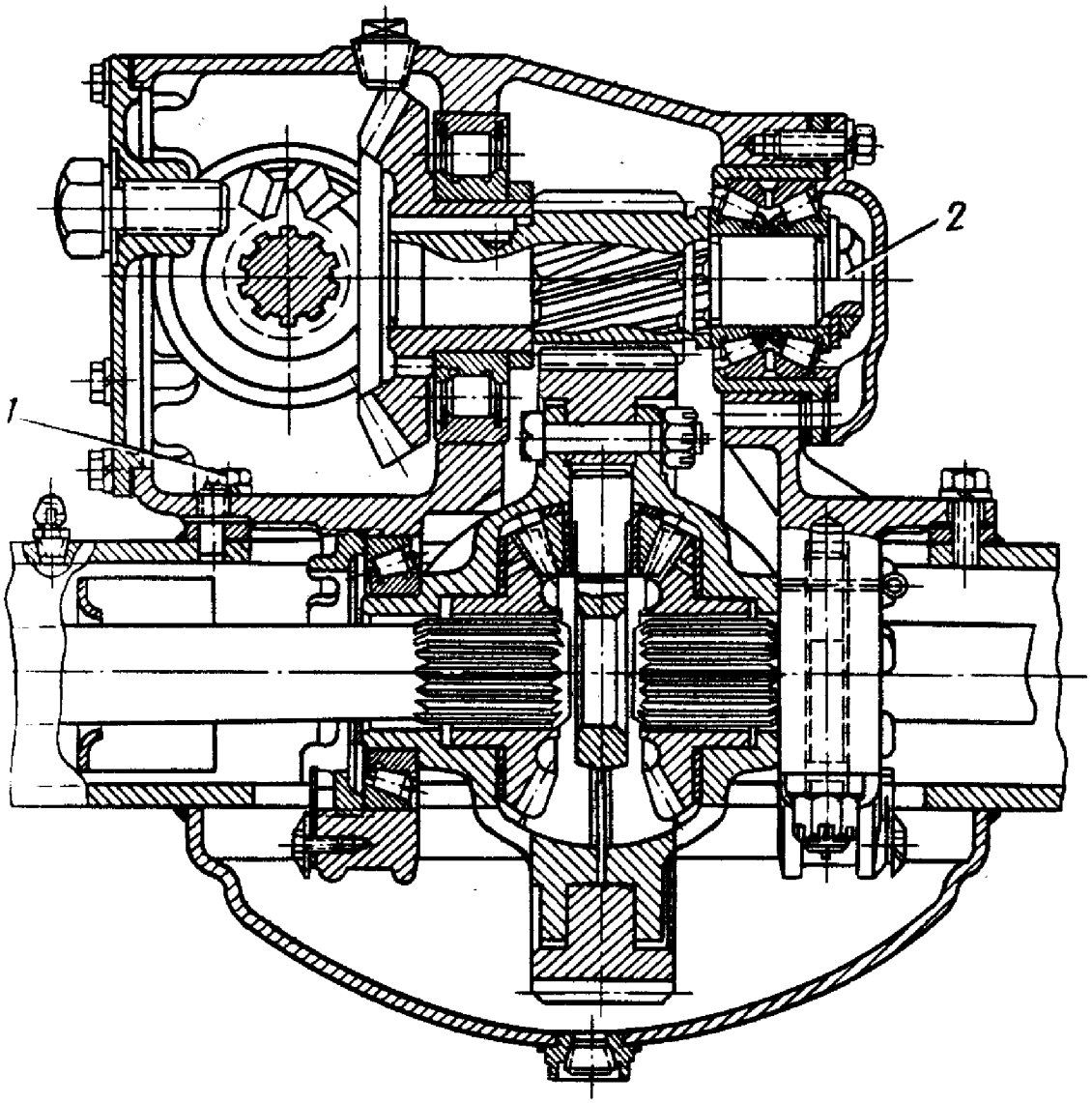


FIG.26. AXLE DRIVE OF ЗИЛ-131 TRUCK

1 - case fastening bolt; 2 - nut securing bearing of driving pinion shaft

a special workshop furnished with appropriate measurement instruments.

15. Check the head lamps for aiming and, if needed, adjust (see Process Chart No.11).

16. On the ЗИЛ-131 truck, the starter is removed and examined after 25,000 km and then every other PM No.2. If needed, eliminate troubles (see Process Chart No.12).

On the ЗИЛ-130 truck this operation is performed every PM No.2.

17. Every 35,000 to 50,000 km during scheduled PM No.2, remove, disassemble and check the generator for the condition of all its units and for its functioning (see Process Chart No.13).

Power Transmission

18. Tighten all the bolts fastening the reduction gears of the driving axles (on the ЗИЛ-131 truck) and two bolts 1 (Fig.26) located inside the casing. The tightening torque should be within 9 to 11 kgf/m.

19. On the ЗИЛ-131 truck during the first PM No.2, check the tightness of nut 2 holding the bearing carrying the shaft of the reduction gear spur gears. Then this check up is performed every fourth PM No.2 (every 24,000 to 36,000 km). The tightening torque is 35 to 40 kgf/m.

20. On the ЗИЛ-130 truck, after 24,000 km of run, check the tightness of the nut holding the flange of the driving bevel gear (torque of 20 to 25 kgf·m) and the nuts holding the differential carrier (torque of 8 to 11 kgf·m).

Every 35,000 to 50,000-km run, during the scheduled PM No.2, the following operation are performed in addition to the above-mentioned operations:

21. Check the engagement of the axle drive gears of the driving axles by a paint-pattern method (Appendix 2).

22. Check and, if needed, adjust the tightness of the bearings carrying bevel gears 18 (Fig.27) and 19 of the axle drives of the driving axles used on the ЗИЛ-131 truck.

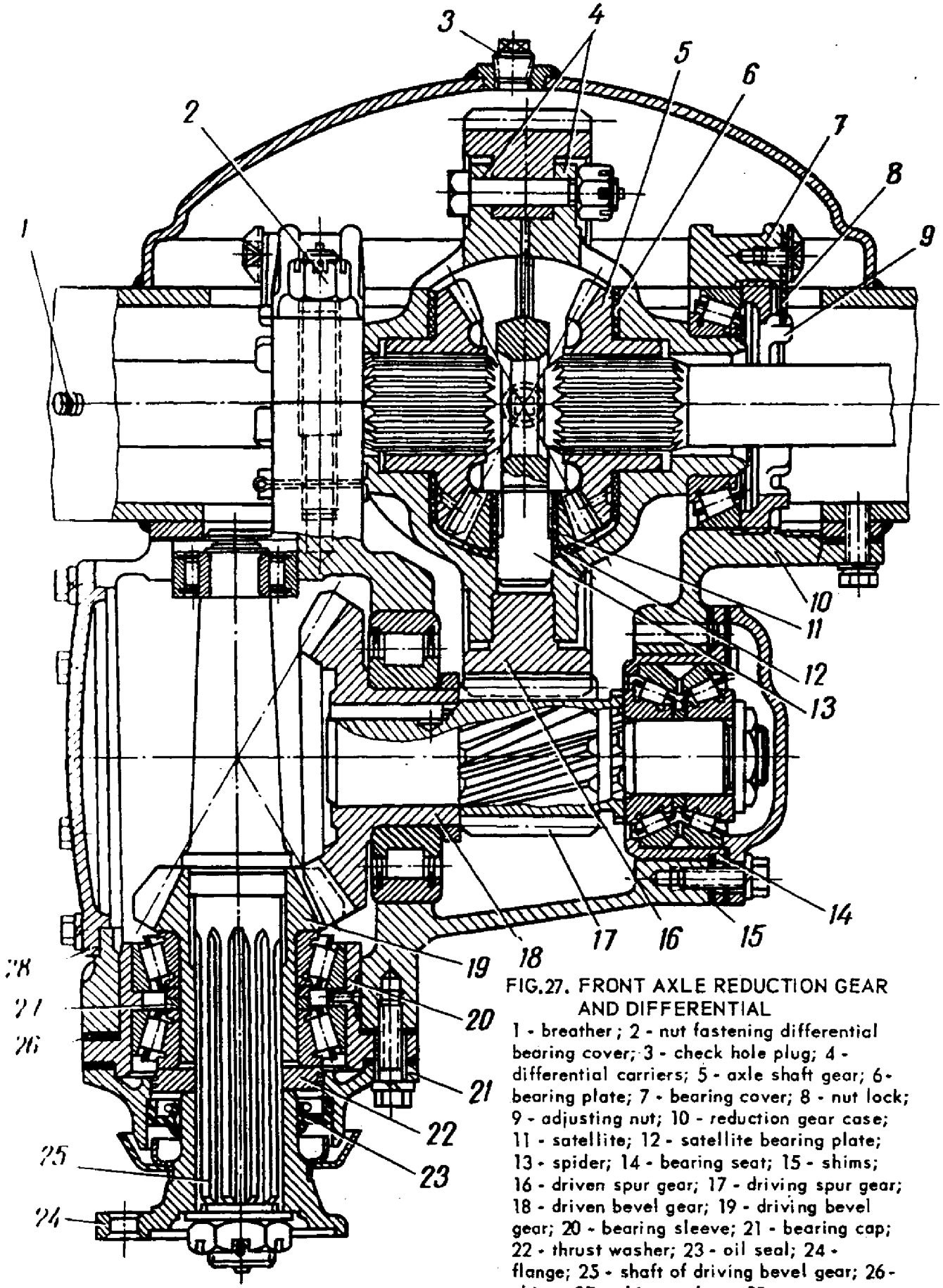


FIG.27. FRONT AXLE REDUCTION GEAR AND DIFFERENTIAL

1 - breather; 2 - nut fastening differential bearing cover; 3 - check hole plug; 4 - differential carriers; 5 - axle shaft gear; 6 - bearing plate; 7 - bearing cover; 8 - nut lock; 9 - adjusting nut; 10 - reduction gear case; 11 - satellite; 12 - satellite bearing plate; 13 - spider; 14 - bearing seat; 15 - shims; 16 - driven spur gear; 17 - driving spur gear; 18 - driven bevel gear; 19 - driving bevel gear; 20 - bearing sleeve; 21 - bearing cap; 22 - thrust washer; 23 - oil seal; 24 - flange; 25 - shaft of driving bevel gear; 26 - shims; 27 - shim washers; 28 - cover

Running Gear

23. Check and,if needed, perform the wheel toe-in adjustments. The toe-in value should be true within 2 to 5 mm on the ЗИЛ-131 truck and within 5 to 8 mm on the ЗИЛ-130 truck (see Process Chart No.14).

24. Using compressed air, clean the pipelines and hoses of the tyre inflation regulating system of ЗИЛ-131 trucks (see Process Chart No.15).

25. In case of noticeable wear of the front wheels change the wheels in compliance with the tyre rotation diagram (Fig.28).

The wheels used on the front axle should be balanced (see Process Chart No.16).

26. Check the shock absorbers, for which purpose, disconnect the lower end of the shock absorber and give it some pumping strokes by hand. A shock absorber in good condition will show smooth pumping action with some resistance. A defective shock absorber will have some free travel or may stick. If needed, remove the shock absorbers and change the fluid (see Process Chart No.17) or replace the shock absorbers. Never top up the fluid.

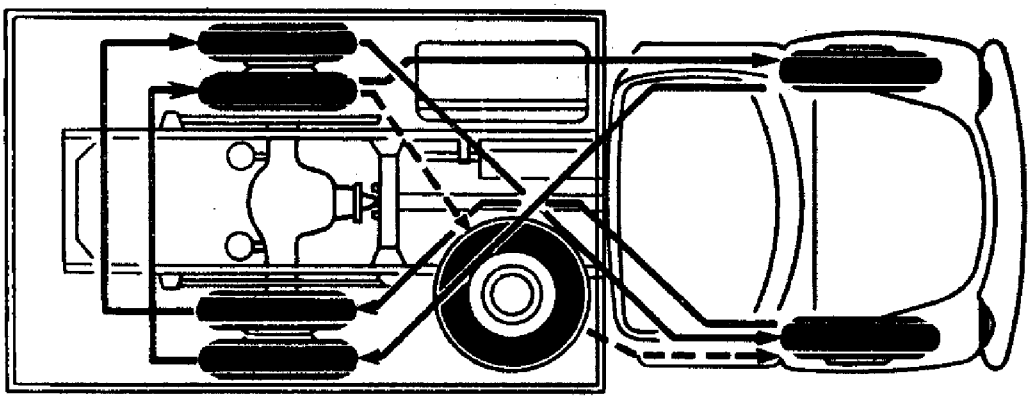
In addition to the above-mentioned operations, every other PM No.2, perform the following operations on the ЗИЛ-131 truck.

27. Check and adjust, if needed, the axial plays in the hub attachment of the walking-beam suspension (see Process Chart No.18).

28. Check and adjust, if needed, the tightness of the bearings carrying the front wheel king pins. In case of roller traces on the outer ring race of the lower bearing, change over the upper and lower bearings (see Process Chart No.19).

Every 35,000 to 50,000-km run perform the following operations on the ЗИЛ-131 truck during the scheduled PM No.2.

29. Check the condition and replace, if needed, the bearings of the front wheel king pins.



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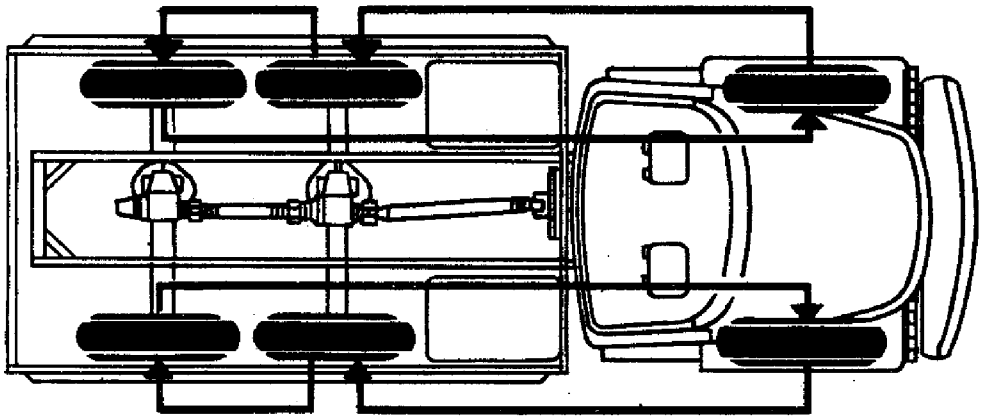

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FIG.28. TYRE ROTATION DIAGRAM

a - ЗИЛ-130 truck; b - ЗИЛ-131 truck

When using adhesive tyres, see to it that they are installed so that their tread pointed patterns face forward (when the tyre is viewed from the top)

30. Remove the wheel steering knuckles, check the seals of the tyre air supply heads and the axle shaft seals for condition, replace grease in them.

Steering Gear and Brakes

31. Wash filters 2 (Fig.29) and 21 of the steering booster pump with gasoline. Use a solvent, if the filters are badly soiled.

32. Check the adjustment and airtightness of the air brake pipelines.

33. Check the attachment and serviceability of the brake chambers.

34. Every other PM No.2, remove the brake drums and check the condition of the shoe linings. Give the wheel brakes partial adjustment. In case of heavily worn friction linings (the distance from the lining surface to the rivet heads is less than 0.5 mm) and drums, replace the linings, and bore the drums. After these operations, perform the complete adjustment of the wheel brakes (see Process Chart No.20) and adjust the tightness of the wheel hub bearings (see Process Charts Nos 21, 22 and 23).

Each time the brake drum is removed, tighten the nuts holding the steering knuckles.

35. After 50,000 to 70,000-km run, remove the brake valve. Disassemble it, wash the friction parts with kerosene, wipe them dry with soft cloth and apply a thin coating of grease, grade 158 МРТУ-12Н No.139-64. A substitute may be the ЦИАТИМ-201 grease, GOST 6267-59.

When the substitute is used, the valve should be coated with the grease every 20,000 to 25,000-km run, but at least every year.

The brake valve should be disassembled, cleaned and adjusted (see Process Chart No.24) by a skilled mechanic in a workshop.

Auxiliary Equipment

36. Check the condition and attachment of the winch.

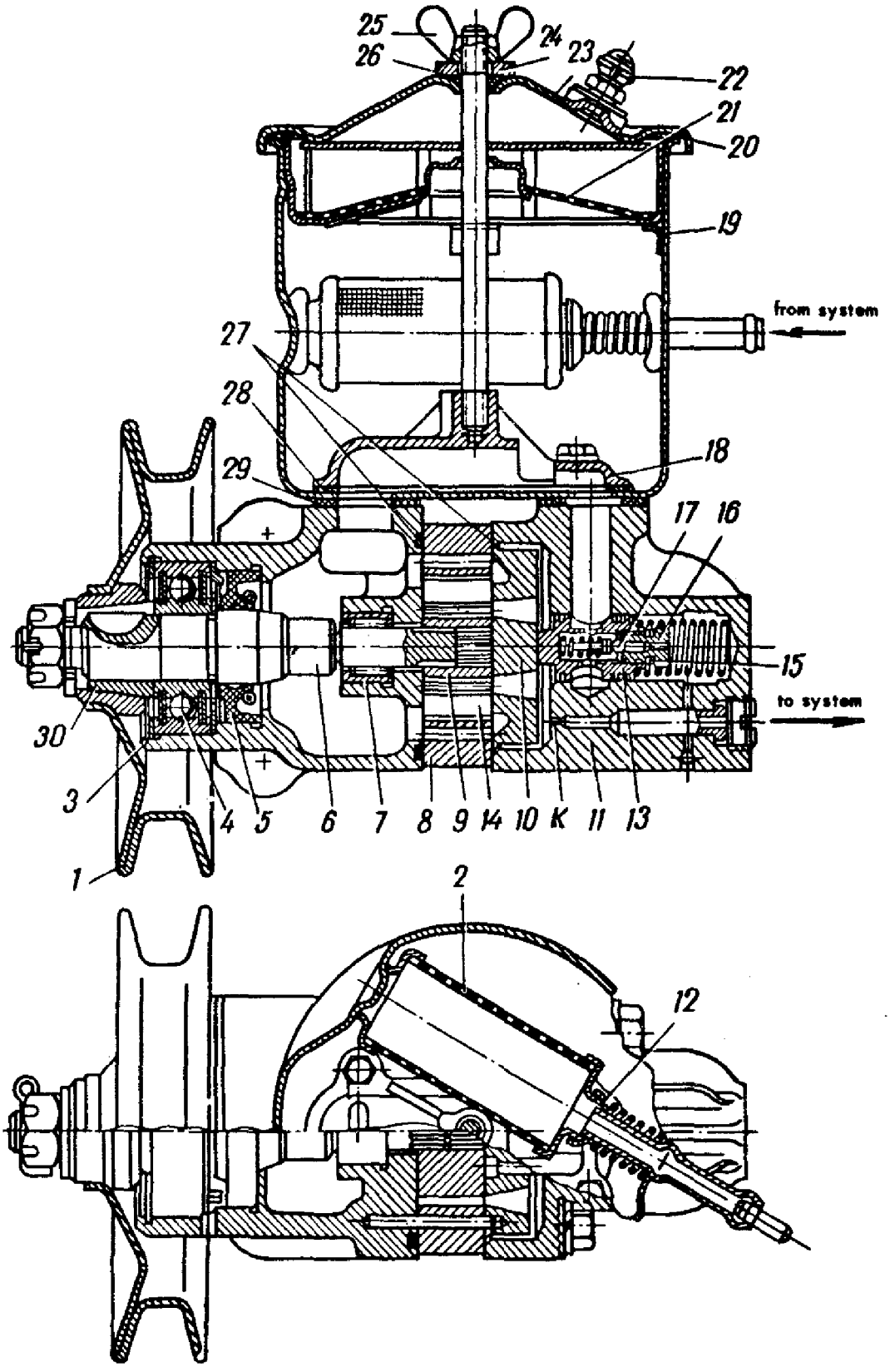


FIG.29. STEERING BOOSTER PUMP

1 - pulley; 2 - gauze filter; 3 - pump body; 4 - front bearing; 5 - oil seal; 6 - pump shaft; 7 rear bearing; 8 - stator; 9 - rotor; 10 - distributing disk; 11 - pump cover; 12 - filter by-pass valve; 13 - by-pass valve; 14 - blade; 15 - shims; 16 - safety valve seat; 17 - safety valve; 18 - manifold; 19 - tank; 20 - pump cover gasket; 21 - strainer; 22 - breather; 23 - tank cap; 24 - washer; 25 - wing nut; 26 - and 27 - sealing rings; 28 - manifold gasket; 29 - tank gasket; 30 - taper bushing

In case of intensive operation with a trailer, every other PM No.2, disassemble the pintle hook assembly and examine its parts. If needed, dress the stop plates of the rubber bumper.

Lubrication

In addition to the lubricating operations of the truck performed during PM No.1, perform the following operations.

37. Using the УС-1 grease (press solid oil), GOST 1033-51, press solid oil "С" or solid oil "С", GOST 4366-64 (Fig.30), grease:

- clutch pedal shaft (bushings);
- clutch release fork (bushings);
- hubs of the winch drum of ЗИЛ-131 truck;
- drive shaft of the winch drum of the ЗИЛ-131 truck;
- guide roller of the winch cable of the ЗИЛ-131 truck;
- pintle hook stem (the above-mentioned points should be packed through the lubricating cups until the fresh grease is forced out);
- release sleeve of winch drum of the ЗИЛ-131 truck.

Give the winch drum shaft a thin coating of grease where it contacts the sleeve by sliding the latter several times from the ENGAGED (ВКЛЮЧЕНО) to the RELEASED (ВЫКЛЮЧЕНО) position.

Every other PM No.2, lubricate the worm gear pairs of the wheel brake adjusting levers (until the fresh grease is forced out).

After 25,000 to 30,000-km run, during the scheduled PM No.2, take out the splined fork, remove the used grease and pack the splines of propeller shafts with fresh grease strictly by weight.

Never add fresh grease through the plug holes without disassembling the shafts and removal of the used lubricant

The splines of the ЗИЛ-131 winch drive shaft are packed until the grease is forced out without disassembling the shaft.

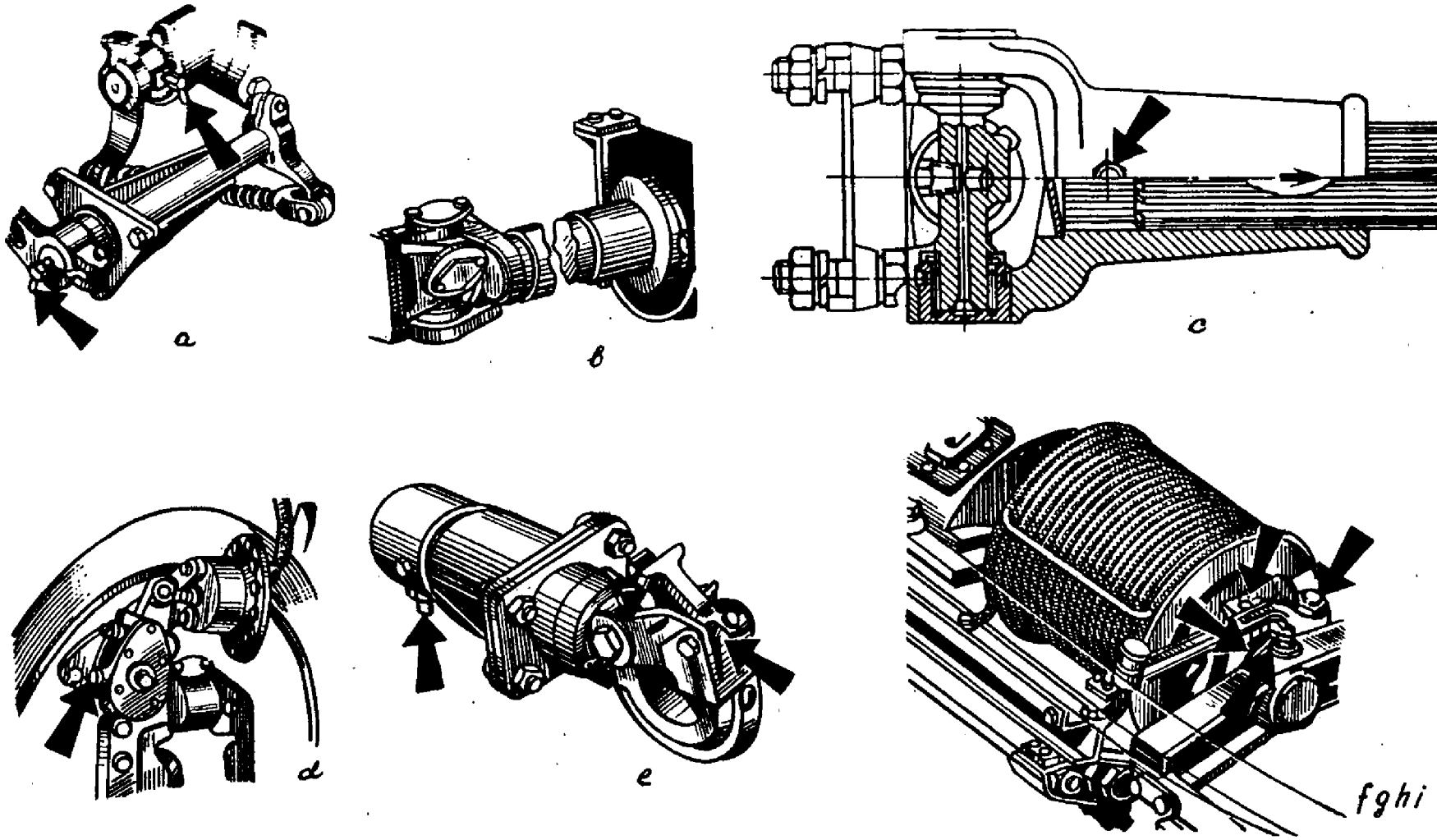


FIG.30. LUBRICATING POINTS FOR УС-1 GREASE, PRESS SOLID OIL "С" OR SOLID OIL "С"

a - shaft and fork of clutch release pedal; b - splines of driving axle propeller shafts; c - splines of propeller shaft of ЗИЛ-131 winch drive; d - worm pairs of wheel brake adjusting levers; e - pintle hook stem; f - winch drum hubs; g - winch drum drive shaft; h - winch drum release sleeve; i - guide roller of winch cable

During the repair operations, coat the parts of the cab window lift mechanism with grease.

38. Using grease 1-13c, ВТУ НП5-58 or grease ЯНЗ-2, GOST 9432-60 (Fig.31), lubricate the following parts:

- the distributor drive shaft. Turn the lubrication fitting cap 1/2 to 1 revolution. Add fresh grease, if needed;

- the intermediate support bearing of the ЗИЛ-130 propeller shaft. The grease is packed in until it is forced out of the check hole.

Every other PM No.2, pack with grease the bearings of the wheel hubs. The grease should be uniformly distributed through the whole internal spacing between the rollers and cage of the bearing, as well as in the hub pockets between the bearings.

During the fourth PM No.2, grease the bearings of the water pump through the lubrication fitting. The grease is packed in until it is forced out of the check hole, prior to greasing, remove the plug. On the ЗИЛ-131 truck the fan bearings are greased in addition.

39. Check the oil levels in the gear box, driving axles transfer case, and the hub of the walking-beam suspension of the ЗИЛ-131 truck (Fig.18a,b,c,d,e and f). If needed, top up the oil to the check plug hole. Special dipstick 5 is used to check the oil level in the front rear and rear driving axles on truck ЗИЛ-131 (Fig.32).

40. During the sixth PM No.2, drain the used oil from the gear box, driving axles, transfer case and power take-of Clean the magnets of the drain plugs, wash the casings with industrial oil, grade 12 or 20, GOST 17707-51. Fill in fresh oil.

When the ТАп-15 oil substitute is used, change the oil every other PM No.2.

41. Change the oil in the engine crankcase (Fig.33) (АС-8 oil, GOST 10541-63 or АСЗп-10 oil, МРТУ 12Н No.32-63). On the ЗИЛ-130 truck, used under heavy dust conditions, the oil is changed every PM No.1.

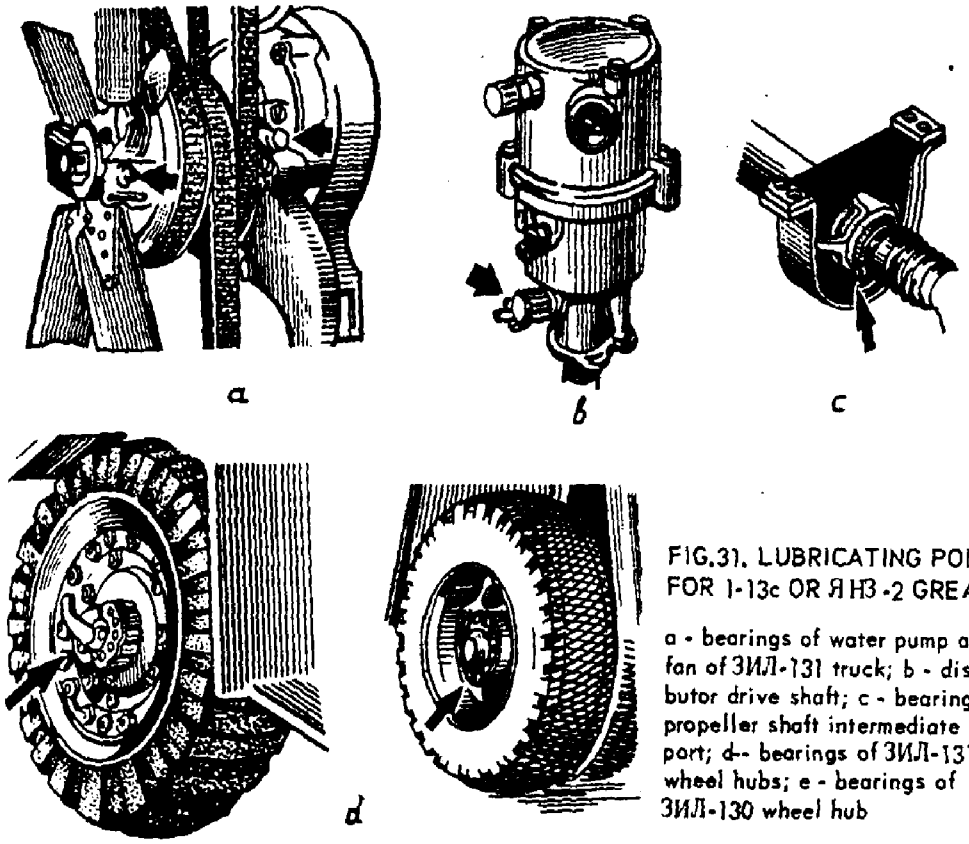


FIG.31. LUBRICATING POINTS FOR 1-13c OR ЯНЗ-2 GREASE

a - bearings of water pump and fan of ЗИЛ-131 truck; b - distributor drive shaft; c - bearing of propeller shaft intermediate support; d-- bearings of ЗИЛ-131 wheel hubs; e - bearings of ЗИЛ-130 wheel hub

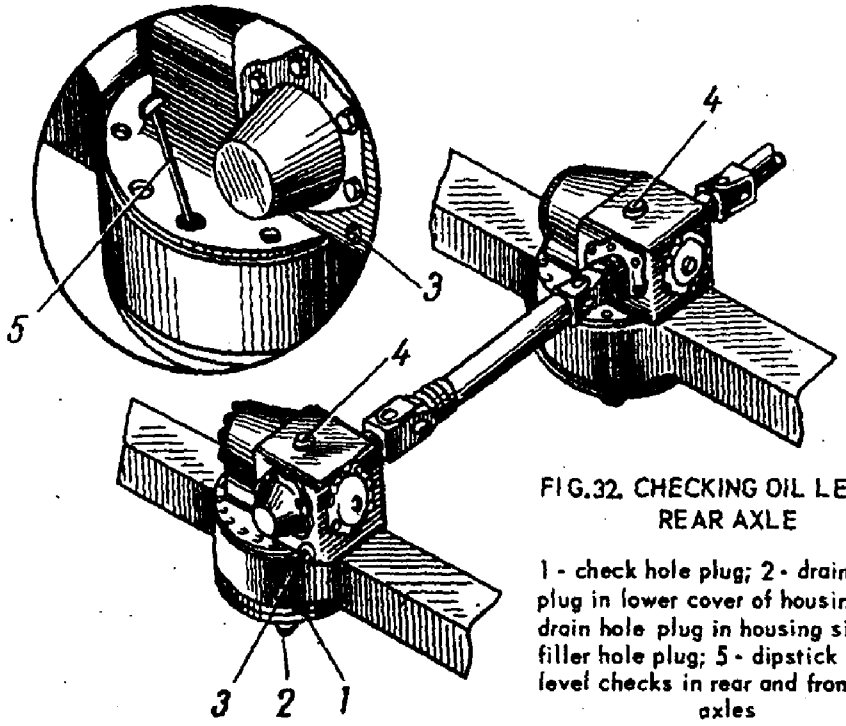


FIG.32. CHECKING OIL LEVEL IN REAR AXLE

1 - check hole plug; 2 - drain hole plug in lower cover of housing; 3 - drain hole plug in housing side; 4 - filler hole plug; 5 - dipstick for oil level checks in rear and front-rear axles

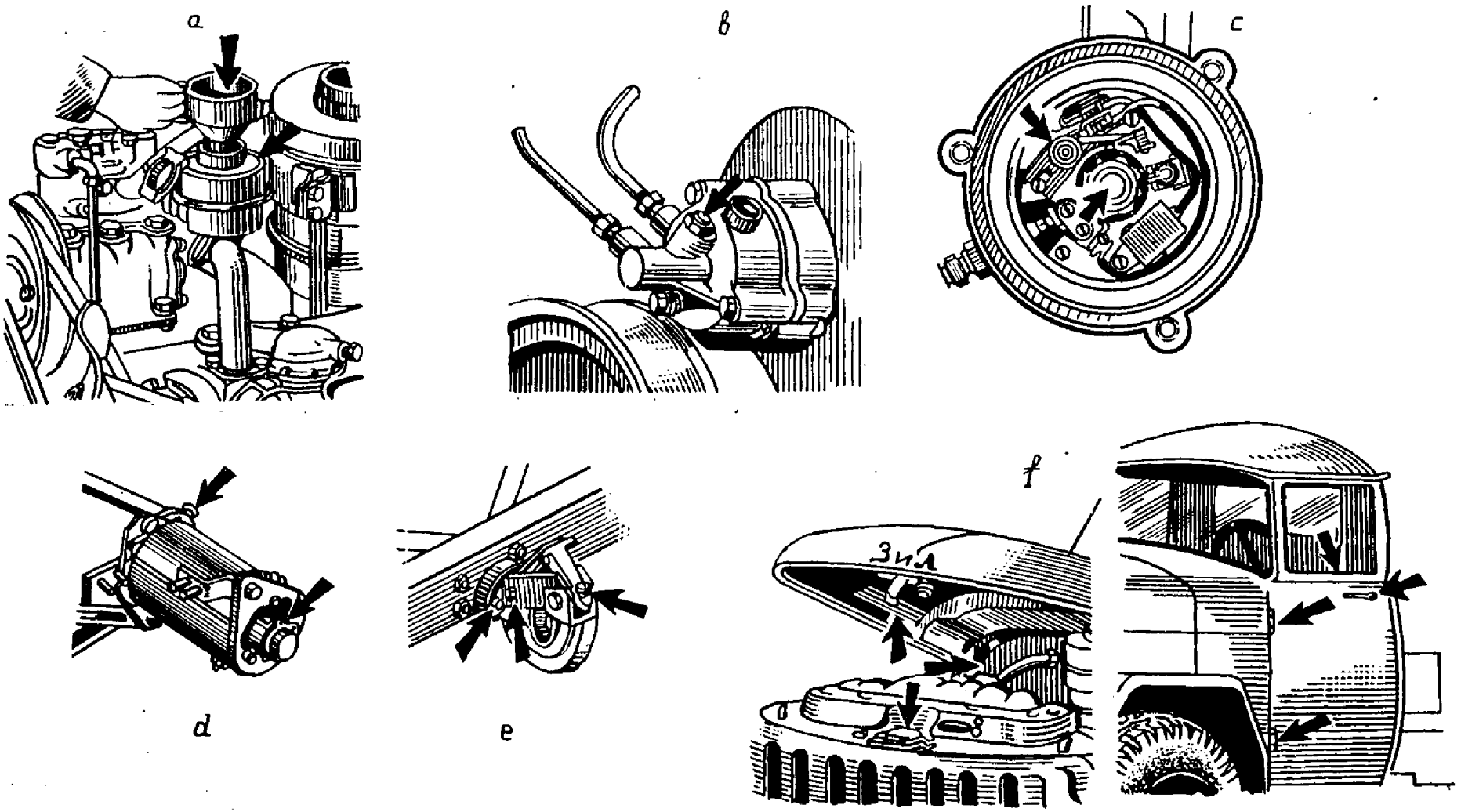


FIG.33. LUBRICATING POINTS FOR AC-8 OR AC-10 GREASE

a - filling oil in engine crankcase; b - maximum speed limiter sending unit; c - cam bushing, breaker arm pin and cam wick; d - generator bearings from drive side (on ЗИЛ-130 truck), bearings from the commutator side to be lubricated with ЦИАТИМ-201 grease; e - detent and latch pin of pintle hook; f - cab door hinges, cab door locks, hood lock and all hinged joints of rods and levers

When changing oil, clean the inner surface of centrifugal fine oil filter cover of dirt. Wash the cover and the gauzes with gasoline or kerosene (see Process Chart No.25).

Give the handle of the coarse oil filter several turns and drain the sediment from the filter bowl. If the handle stuck and fails to be moved with hand, wash it with kerosene.

Using the engine oil, lubricate the following:

- the sending unit of the maximum speed limiter is lubricated by depressing the oiler nipple ball with the oil can spout;

- the bushing of the contact breaker cam and the wick oiling the cam (two or three drops of oil). Do not soak the wick on the ЗИЛ-131 truck as it is permanently impregnated for the whole service life of the contact breaker;

- the axle pin of the contact breaker lever (one drop of oil);

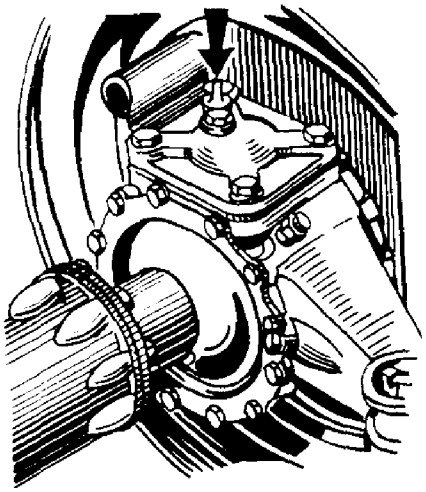


FIG.34. LUBRICATING POINT FOR AM LUBRICANT USED IN FRONT AXLE SHAFT JOINT AND KING PIN BEARINGS OF ЗИЛ-131 TRUCK

- the bearings of the ЗИЛ-130 generator on the drive side (three to five drops of oil injected from an oil can); the generator bearings on the commutator side are lubricated with grease ЦИАТИМ-201, GOST 6267-59 every 35,000 to 40,000 km of the ЗИЛ-130 truck run;

- the detent and catch pin of the pintle hook;

- the cab door hinges, hood lock, platform hinges and all the hinged joints of rods and levers;

- the shaft of the winch drum release fork.

42. Add the AM grease, GOST 5730-51 (Fig.34) into the front wheel ball support through the lubrication fitting until the grease is forced out of the check hole, prior to lubricating, remove the plug.

Every other PM No.2, disassemble the joint, remove the used grease and pack with fresh lubricant.

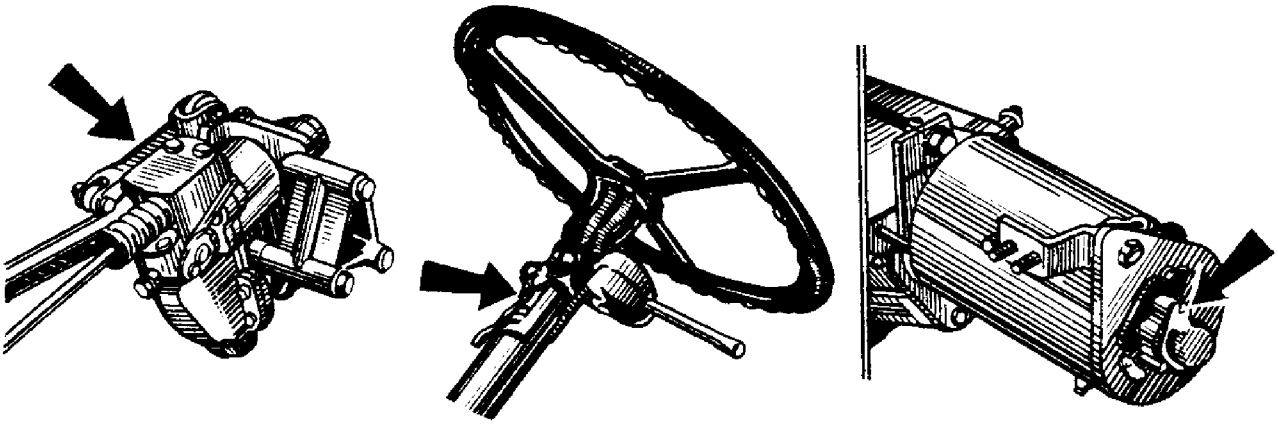


FIG.35. LUBRICATING POINTS FOR 158 OR ЦИАТИМ-201 GREASE

a - brake valve; b - rubber roller and locking clamp of turn indicator; c - commutator side generator bearings of ЗИЛ-130 truck

43. During repair operations, use the УСсА graphite lubricant, GOST 3333-55 to lubricate the spring leaves and the contact ring of the horn.

44. Every 50,000 to 70,000-km run after disassembly, coat the friction surfaces of the brake valve with grease 158 МРТУ 12Н No.139-64 or ЦИАТИМ-201 GOST 6267-59 (Fig.35).

When performing the PM No.2 operations, coat the rubber roller and the lock clamp of the turn indicator lever with grease 158 or ЦИАТИМ-201. To this end, remove the turn indicator cover.

45. By giving the vehicle a 2 to 3-km run, check the operation of the engine, power transmission units, steering gear and brakes.

46. Eliminate defects detected during the tests.

MAINTENANCE CARRIED OUT ON MAINTENANCE DAYS

Performed by: driver.

Operations and Specifications

1. Tidy up the parking place and clean the truck on the outside. Check to see the truck is stable on the trestles used to unload the tyres and springs.

2. Check for leaks of gasoline, oil and coolant.

3. Check the level and gravity of the electrolyte in the storage battery, wipe clean the battery surfaces, clean the vent plug holes, fasten the battery and the wire terminals and coat the terminal posts with the УН or УС-1 grease.

The electrolyte gravity of completely charged batteries under different climatic conditions should meet the Requirements given on page 24.

4. Check the condition and operation of the lighting devices, black-out devices, turn-indicator lights and stop lights.

5. Check the tyres for air pressure and inflate, if needed.

The tyres of the ЗИЛ-131 truck can be inflated from an external source of compressed air without starting the engine, for which purpose, proceed as follows:

- open the tyre valves;
- set the tyre pressure control valve in the INFLATION (ПОДКАЧКА) position;
- connect the air hose of the external source of compressed air to the drain cock of the right-hand front air bottle;

- check the tyre pressure using the pressure gauge.

6. Correct the faults detected during the servicing operations, if any.

7. Check for presence, condition and stowage of the SPT&A set.

8. Check the condition of the paintwork and apply touch-up painting, if needed.

9. Check the condition and fastening of the canvas cover and tent on the truck. Recondition them, if needed.

AUXILIARY OPERATIONS CARRIED OUT EVERY SIX MONTHS

(During scheduled PM No.2)

1. Check the carburettor (see Process Chart No.26) and remove sediments from the venturi, jets and the throttle chamber. Check all the gaskets for condition and replace faulty ones.

Check the fuel level in the float chamber.

After the carburettor has been reinstalled, adjust the choke valve and idling speed (see Process Chart No.2).

2. Clean the drain holes in the cab doors (Fig.36).

3. Disassemble the splined joint of the steering gear universal joint shaft, remove the used lubricant and coat the splines with the 1-13c or ЯНЗ-2 grease, GOST 9432-60.

4. Change the oil in the reduction gear of the ЗИЛ-131 truck winch. To this end, use the T-14Б oil (with an additive), MPTУ-12H No.34-63 or the ТАп-15В oil, MPTУ 38-1-185-65(a substitute is the special oil used in the gear boxes and steering system, GOST 4002-53).

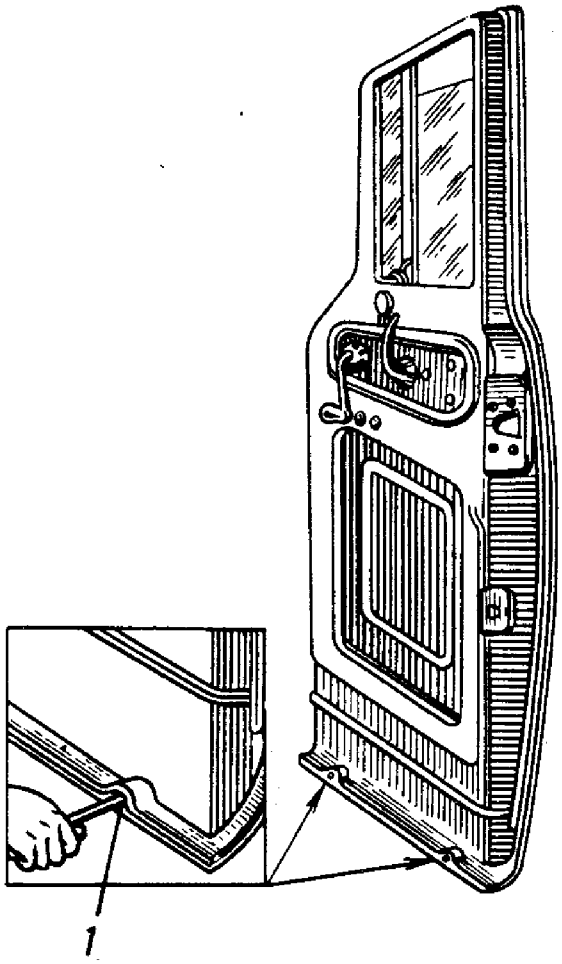


FIG.36. CLEANING METHOD FOR DRAIN HOLE S 1 IN CAB DOORS

5. Unwind the winch cable. Clean and coat it with the УС-1 grease (press-solid oil), and tightly wind it on the drum.

6. Change the oil in the hydraulic steering booster and in the steering gear. Fill the tank with the turbine oil, grade 22, GOST 32-53 or industrial oil, grade 20, GOST 1707-51 (see Process Chart No.27).

When the P grade oil is used in the hydraulic steering booster, the oil is not to be changed in operation. It is changed during repair.

PROCESS CHART No.1

WASHING BDM-3 AIR CLEANER

Performed by: driver.

Tools: wrenches 10, 12, 14 and 17 mm, small screwdriver.

Time required: 36 minutes.

Operations and Specifications

1. Loosen the coupling bolts of brackets 10 (Fig.37) of the air cleaner.

2. Loosen the clamps of the branch pipes supplying air to the carburettor and compressor and remove the clamps.

3. Remove the goffered rubber branch pipe.

4. Remove the air cleaner.

5. Release lever 6 and remove cable 4 securing oil bath 16.

6. Remove the oil bath with deflector 15 from the cleaner bowl.

7. Remove throttling guide 12.

8. Drain the used oil from the oil bath.

9. Wash the oil bath, deflector, throttling guide and the foam and oil arresting packing (filtering element) in kerosene and blow out with compressed air.

10. Install the deflector in the oil bath and fill the bath with oil to the check mark. A larger amount of oil will find its way to the engine cylinder during operation, which is intolerable.

11. Wet the filtering element and the throttling guide with oil and let it flow down.

12. Assemble the throttling guide with the oil bath and the deflector, attach to the cleaner bowl and secure it by means of cable 4.

13. Install the air cleaner on the engine, secure it in place and connect the removed branch pipes.

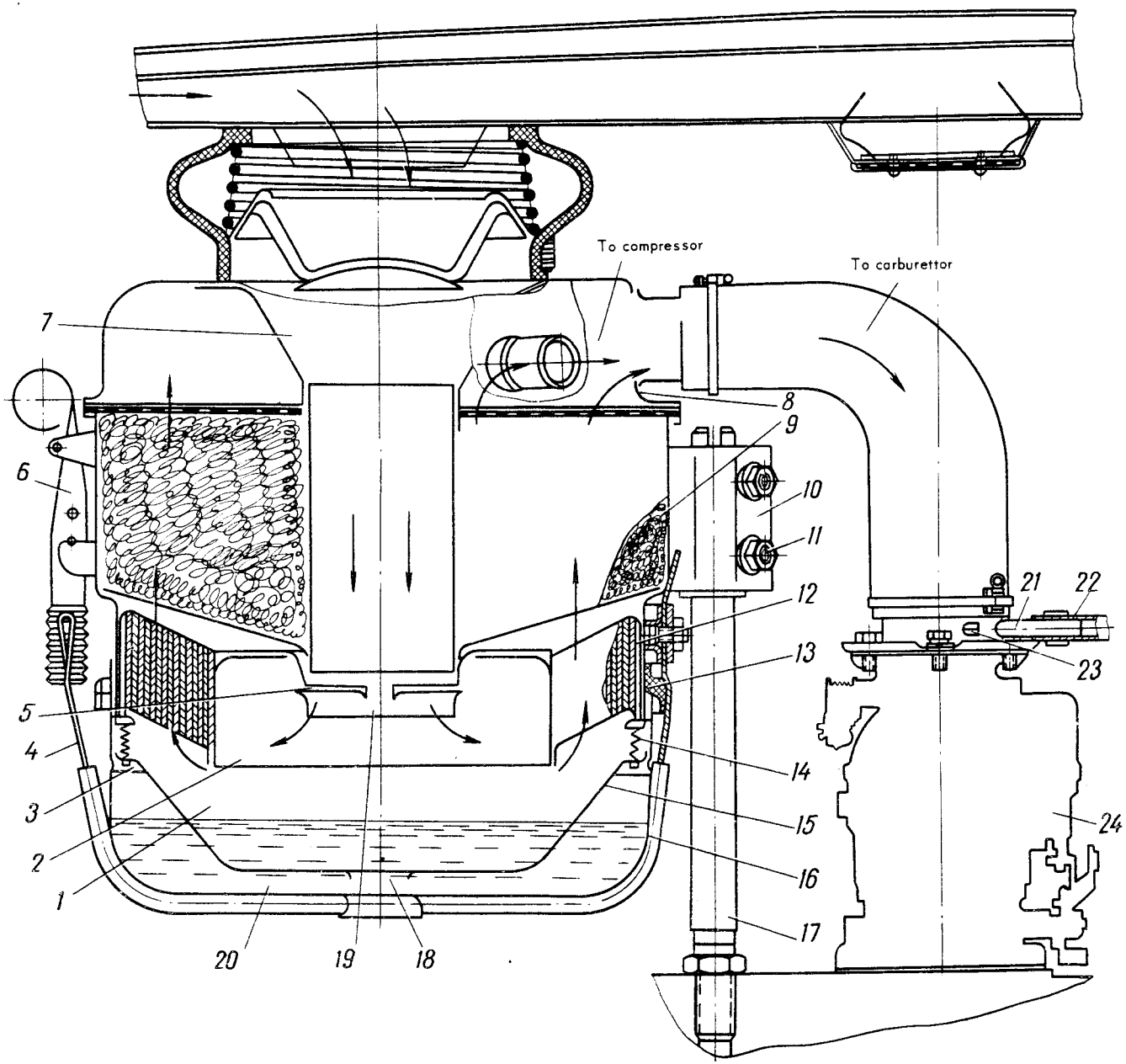


FIG.37. ПВМ-3 AIR CLEANER

1 - space above deflector; 2 - space above oil surface; 3 - openings; 4 - cable; 5 - port; 6 - lever; 7 - center tube; 8 - body; 9 - oil and foam arresting packing; 10 - bracket; 11 - post fastening bolt; 12 - throttling guide; 13 - rubber gasket; 14 - spring; 15 - deflector; 16 - oil bath; 17 - post; 18 - center hole; 19 - ejector; 20 - oil bath chamber; 21 - inlet pipe of ignition distributor ventilation; 22 - rubber hose; 23 - outlet pipe of ignition distributor ventilation; 24 - carburettor

PROCESS CHART No.2

ADJUSTING K-88A CARBURETTOR TO MINIMUM ENGINE SPEED

Performed by: automobile mechanic.

Tools: small screwdriver.

Time required: 8 minutes.

Operations and Specifications

1. Completely turn in idle adjusting screws 1 (Fig.38), than turn each of them back three revolutions.

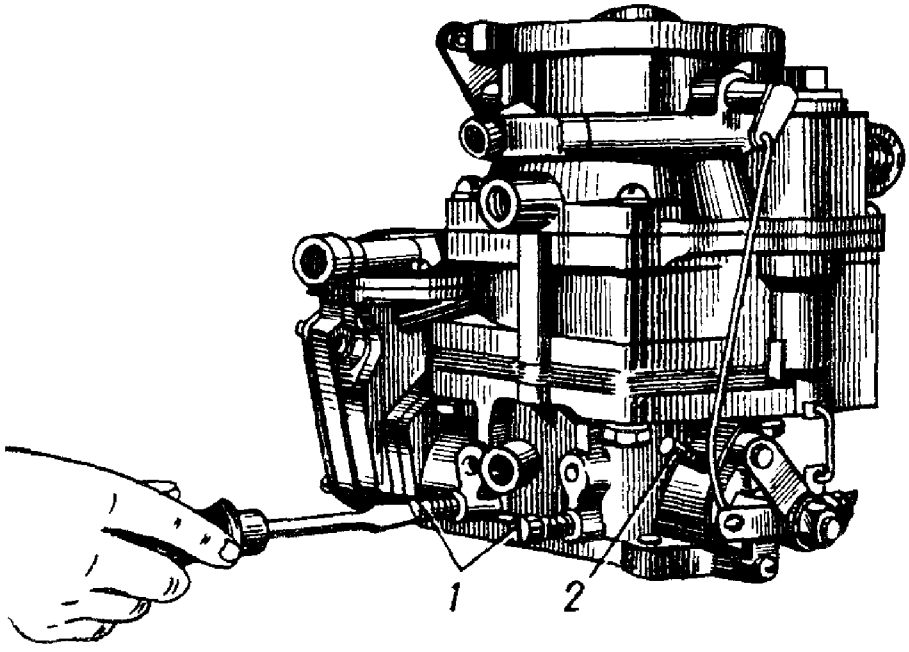


FIG.38. CARBURETTOR IDLE SPEED ADJUSTMENT

1 - idle speed adjusting screws; 2 - stop screw

2. Start the engine.

3. Set stop screw 2 so as to make the engine evenly run at a low speed.

4. Turn in one of screws 1 each time through 1/4th of a revolution until the engine begins to hesitate due to a lean mixture, than turn it back half a revolution.

5. Do the same to the other idle adjusting screw.

6. Turn throttle adjustment stop screw 2 back until the engine speed is reduced to 400 to 500 rpm. This done, attempt to turn in screws 1 again (in turn) to make the mixture leaner. Do not attempt to obtain a too low idling speed.

7. Check the adjustment results, for which purpose, depress the accelerator pedal and immediately release it sharply. If the engine stalls, increase the engine speed by screwing in the throttle stop screw.

The carburettor adjustments should be done on an engine warmed up to its coolant temperature of 80 to 90°C with its ignition system properly set, valve and rocker clearances and spark gaps normal.

PROCESS CHART No.3

ADJUSTMENT OF CLUTCH PEDAL FREE TRAVEL

Performed by: automobile mechanic and driver.
Tools: wrenches 19 and 30 mm, scale.
Time required: 5 minutes.

Operations and Specifications

1. Unscrew lock nut 2 (Fig.39).

2. Adjust the free travel of the clutch pedal by turning spherical adjusting nut 1. To decrease the free travel of the pedal, the adjusting nut is screwed on rod 5, while unscrewing the nut increases the free travel of the clutch pedal.

3. Tighten up the lock nut.

4. After the adjustment, start the engine and check the clutch for proper functioning.

A clutch in good adjustment should not slip when engaged and should completely disengage when the pedal is depressed (should not drag). The free travel of the pedal should be within 35 to 50 mm.

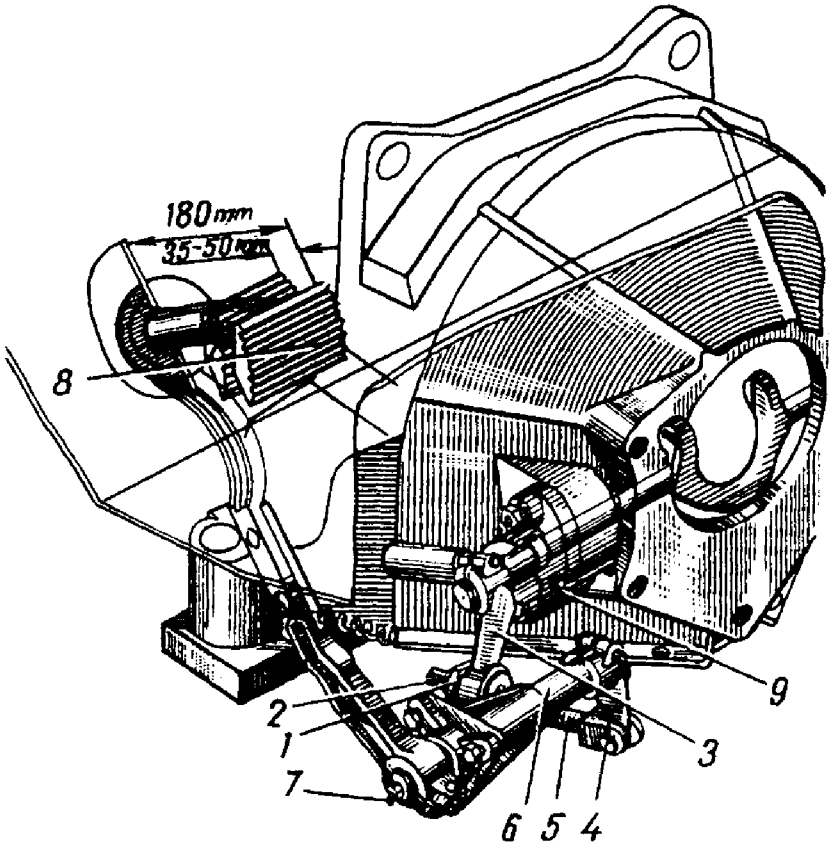


FIG. 39. CLUTCH CONTROL LINKAGE

1 - ball-shaped nut; 2 - locknut; 3 - clutch release fork; 4 - clutch pedal shaft lever; 5 - clutch release rod; 6 - clutch pedal shaft; 7 - lubrication fitting of clutch pedal shaft bushings; 8 - clutch pedal; 9 - lubrication fitting of clutch release fork bushings

PROCESS CHART No.4

CHECKING AND ADJUSTING STEERING GEAR

Performed by: automobile mechanic.

Tools: spring dynamometer, wrenches 9, 11, 17 and 19 mm.

Time required: 18 minutes.

Operations and Specifications

1. Disconnect the drag link from the steering arm.

2. Using the spring dynamometer hooked by the steering wheel rim, take measurement of the effort applied to the steering wheel in the following three positions:

- the steering wheel is turned more than two revolutions from the center position, the effort applied to the wheel rim being from 0.55 to 1.35 kg;

- the steering wheel is turned 3/4 to 1 revolution from the center position, the effort applied to the wheel rim being not more than 2.3 kg;

- the steering wheel passes the center position, the effort applied to the steering wheel rim being 0.8 to 1.25 kg greater than that in the second test position, but should not exceed 2.8 kg.

3. If these requirements are not met by the measurements, the steering gear needs adjustments.

The adjustment should be started with setting the third position effort by turning adjusting screw 30 (Fig.40).

Turning the screw clockwise increases the wheel rim effort and vice versa.

Improper efforts in the first and second positions are because of improper pre-load of ball nut 8 of the steering

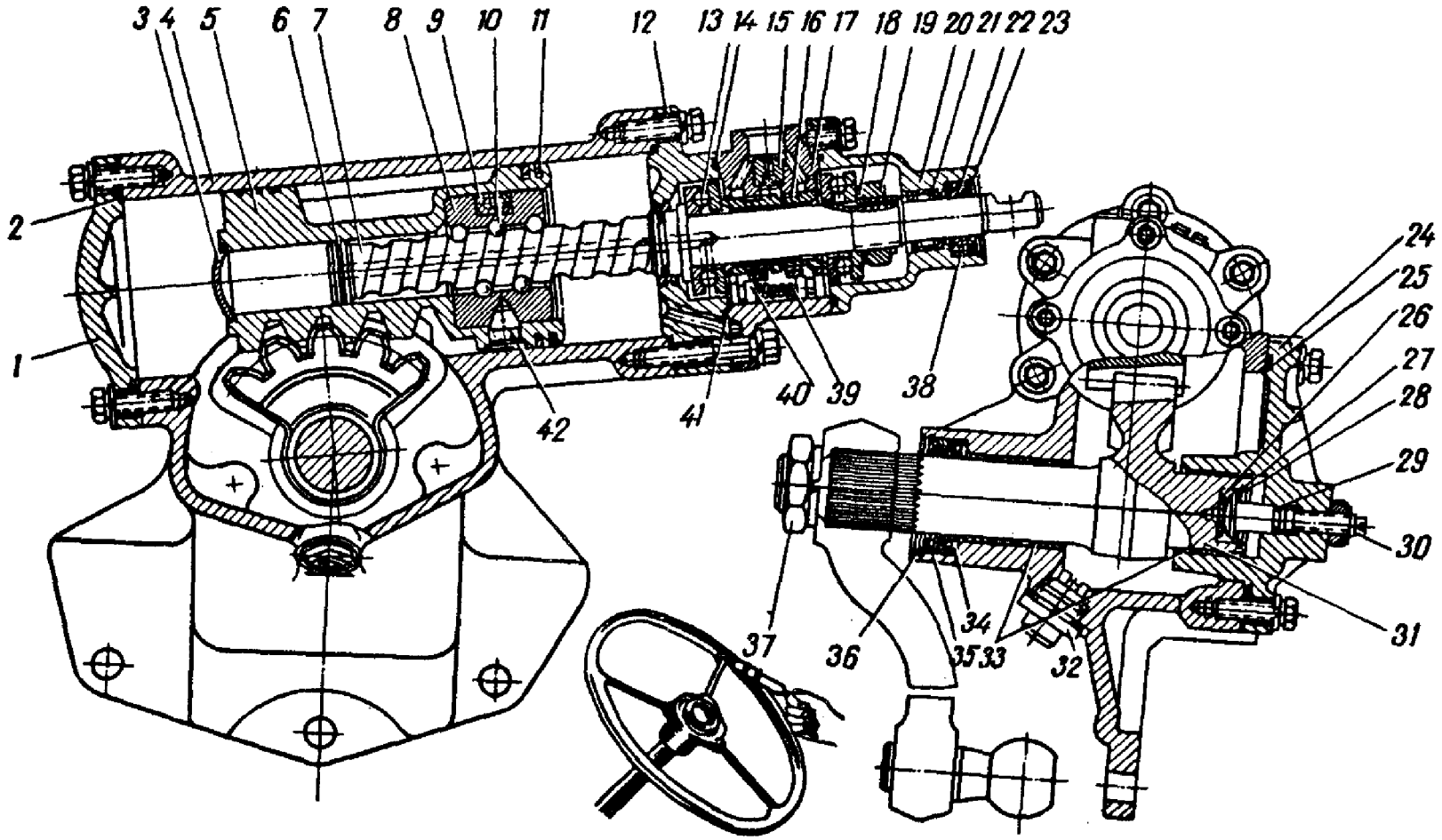


FIG.40. STEERING GEAR

1 - lower cap; 2, 14, 25, 29 and 41 - sealing rings; 3 - blanking plug; 4 - steering gear case; 5 - piston-rack; 6 - split rubber sealing ring; 7 - steering gear screw; 8 - ball nut; 9 - duct; 10 - ball; 11 - piston ring; 12 - intermediate plate; 13 - thrust ball bearing; 15 - ball valve; 16 - slide valve; 17 - return valve body; 18 - spring washer; 19 - adjusting nut; 20 - upper cap; 21 - needle bearing; 22 and 35 - oil seal thrust rings; 23 - outer sealing cup; 24 - side cover; 26 - thrust washer; 27 - shim; 28 - locking ring; 30 - adjusting screw; 31 - steering arm shaft; 32 - magnetic drain plug; 33 - steering arm shaft bushing; 34 and 38 - oil seals; 36 - rubber cup; 37 - steering arm shaft nut; 39 - reactive spring; 40 - reactive plunger; 42 - setting screw

gear, wear of the rolling surface of the ball nut or screw 7, or jammed balls. More than that, an improper effort in the first position is also due to an improper pre-load of thrust bearings 13.

To check and adjust the effort in the first and second positions, disassemble the steering gear, check the rolling surfaces for condition and adjust or replace the defective parts.

Disassembling and reassembling of the steering gear should be performed by skilled mechanics under conditions of complete cleanliness.

PROCESS CHART No.5

ADJUSTMENT OF HAND BRAKE

Performed by: automobile mechanic and driver.
Tools: wrenches 14 and 17 mm, combination pliers.
Time required: 13 minutes.

Operations and Specifications

An increased travel of the hand brake lever indicates an excessive clearance between the shoes and the drum and calls for hand brake adjustment.

The adjustment should be performed on a cold brake as follows.

1. Unscrew locknut 32 (Fig.41) of linkage rod clevis 22 on the 3MM-131 truck and lock nut 20 (Fig.42) of the linkage rod on the 3MM-130 truck.

2. Shift the hand brake lever in the extreme forward position.

3. Disconnect rod clevis 23 (Fig.41) and clevis 19 (Fig.42) from the hand brake lever.

4. Shift the hand brake lever through three teeth of the toothed sector.

5. Press the adjusting lever by hand so as to make the shoes contact the brake drum.

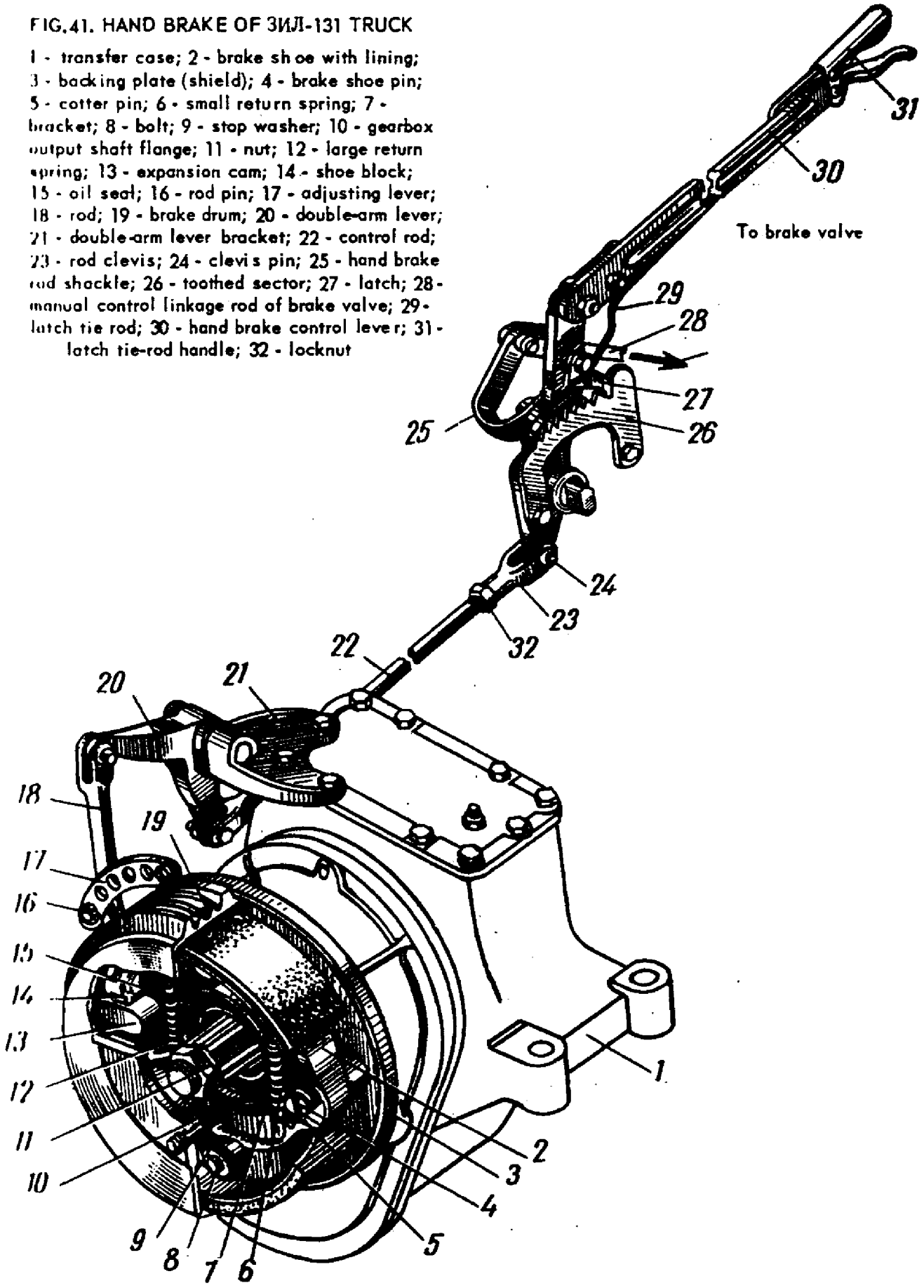
6. Changing the rod length by screwing on or off the clevis, align the clevis hole with the hole of the hand brake lever.

7. Connect the clevis to the lever.

8. Check the adjustment for proper quality, for which purpose, first set the lever in the initial position and then

FIG.41. HAND BRAKE OF ЗИЛ-131 TRUCK

1 - transfer case; 2 - brake shoe with lining; 3 - backing plate (shield); 4 - brake shoe pin; 5 - cotter pin; 6 - small return spring; 7 - bracket; 8 - bolt; 9 - stop washer; 10 - gearbox output shaft flange; 11 - nut; 12 - large return spring; 13 - expansion cam; 14 - shoe block; 15 - oil seal; 16 - rod pin; 17 - adjusting lever; 18 - rod; 19 - brake drum; 20 - double-arm lever; 21 - double-arm lever bracket; 22 - control rod; 23 - rod clevis; 24 - clevis pin; 25 - hand brake rod shackle; 26 - toothed sector; 27 - latch; 28 - manual control linkage rod of brake valve; 29 - latch tie rod; 30 - hand brake control lever; 31 - latch tie-rod handle; 32 - locknut



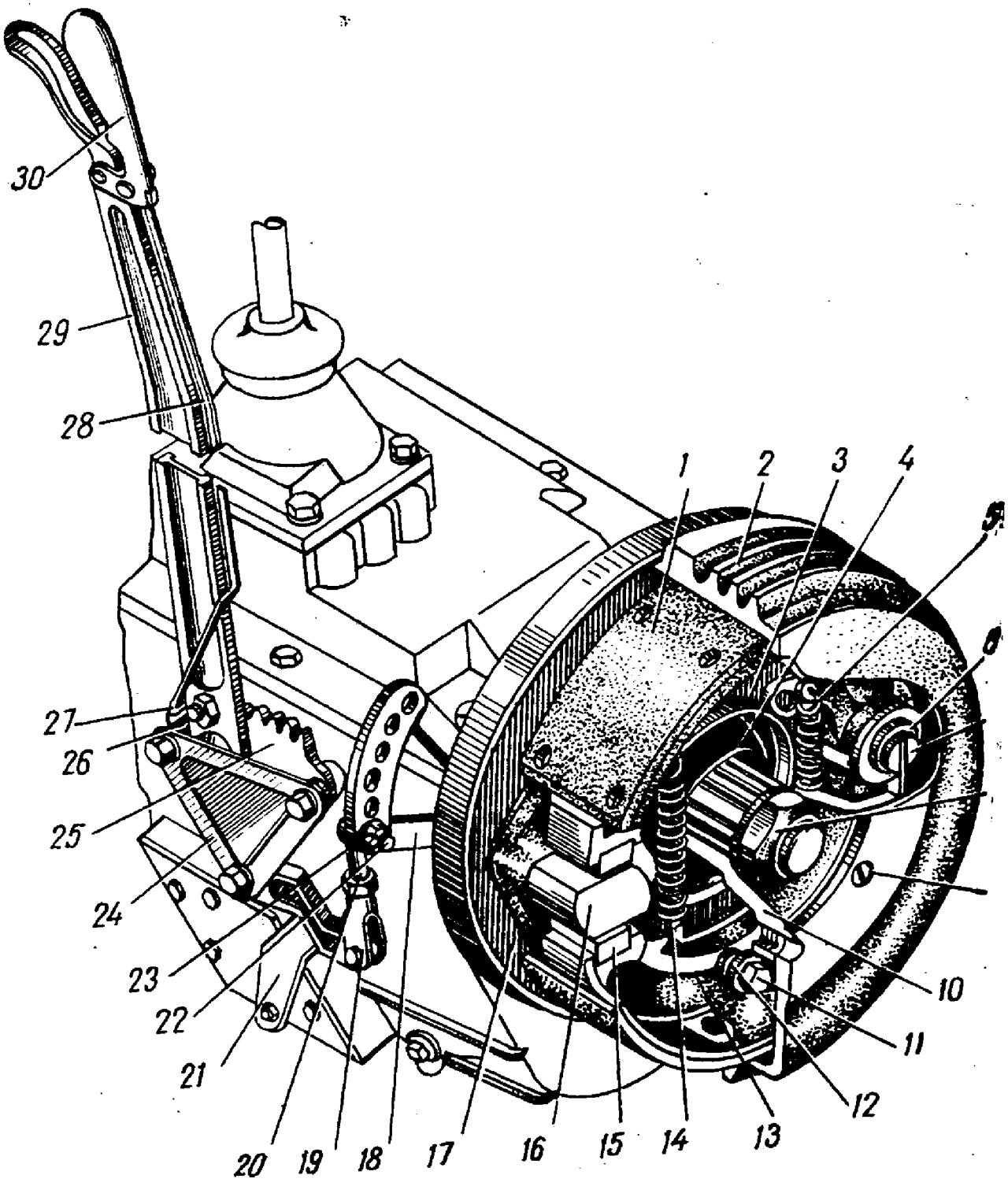


FIG.42. HAND BRAKE OF ЗИЛ-130 TRUCK

1 - friction lining; 2 - drum; 3 - bracket; 4 - bracket oil seal; 5 - small return spring of shoes; 6 - shoe axle cotter pin; 7 - shoe axle; 8 - flange fastening nut; 9 - screw; 10 - flange of gearbox output shaft; 11 - adjusting screw; 12 - washer; 13 - brake shoe; 14 - large return spring of shoes; 15 - shoe block; 16 - expansion cam; 17 - backing plate; 18 - adjusting lever; 19 - clevis; 20 - linkage rod; 21 - bracket for manual control linkage rod of two-chamber brake valve; 22 - pin; 23 - nut; 24 - lever plate; 25 - toothed sector; 26 - toothed sector spacer; 27 - latch; 28 - latch rod; 29 - hand brake control lever; 30 - latch rod handle

in the braked position. In doing so, the lever should move through four to six teeth of the toothed sector (four to six clicks).

9. Using a cotter-pin, lock clevis pin 24 (Fig.41) and tighten the lock nut of the rod clevis.

If a fully shortened rod fails to engage the brake, when the stop latch is clicked through four to six teeth, reinstall clevis pin 16 (Fig.41) and clevis pin 22 (Fig.42) of the rod in the next hole of adjusting lever 17 (Fig.41) and lever 18 (Fig.42) of the brake and lock with a cotter-pin.

This done, adjust the brake as described in Paras 1 through 9.

PROCESS CHART No.6

PARTIAL ADJUSTMENT OF WHEEL BRAKES

Performed by: automobile mechanic and driver.

Tools: wrench 12 mm, jack.

Time required: 5 min for 3MM-130 truck and 8 min for 3MM-131 truck.

Operations and Specifications

1. Jack up the wheel to be adjusted and check to see whether it is free to rotate.

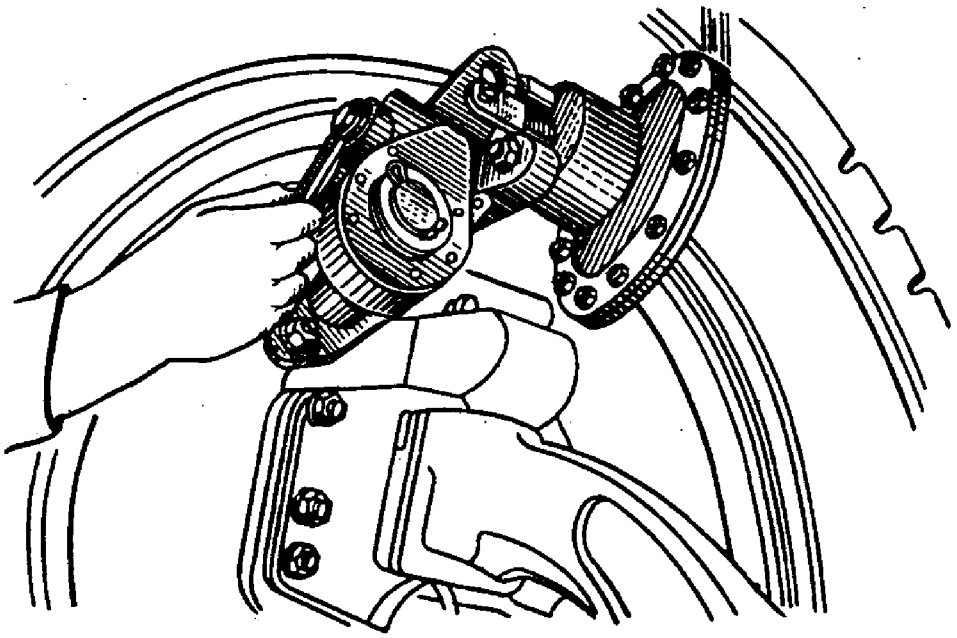


FIG.43. ADJUSTING WHEEL BRAKE BY WORM OF BRAKE CHAMBER

2. Turn the brake chamber worm (Fig.43) counterclockwise until the wheel rotated by hand is braked.

3. Turn the brake chamber worm clockwise to make the wheel free to rotate from a hand shock.

4. Check the wheel brake for functioning. A spinning wheel should become sharply braked, when the pedal is depressed. The travel of the brake chamber rods should be from 15 to 25 mm for the front wheels and from 20 to 30 mm for the rear wheels on the ЗИЛ-130 truck and from 15 to 25 mm for all the wheels on the ЗИЛ-131 truck.

It is a good practice in the brake adjustments to obtain a rod travel close to the smaller limit.

5. Jack down the wheel and remove the jack.

The brake adjustment is performed at a pressure of not less than 6 kgf/cm^2 in the brake actuating system.

PROCESS CHART No.7

STARTING ENGINE WITH PREHEATER

Performed by: driver.

Time required:from 20 to 25 min.

Operations and Specifications

1. Prepare water to fill the cooling system.

2. Close the radiator shutters and open the hood.

3. Turn off the oil cooler and put the muff on the radiator.

4. Open the radiator caps and the filler funnel cap, close the cock of the heater boiler and the preheater pipe cock. If the cocks are frozen, close them when preheating the engine after the water starts to flow out of them. The drain cock of the radiator must be left opened.

5. Check tank 1 (Fig.44) for presence of fuel and fill, if needed (capacity of tank is 2 litres).

6. Fill the preheater boiler with 1.5 litres of water through funnel 3.

7. Open cock 24 of the tank.

8. Set switch 21 in position II for 15 to 20 sec to switch on the fan and the solenoid valve. As this happens the asbestos lining becomes wetted with gasoline. At very low temperatures increase this time to 60 sec.

9. Set switch 21 in the "0" position and switch on glow plug 11 by switch 20. The gasoline will be ignited and a "pop" will be heard. After the "pop", set switch 21 in the position II. After an even operation has been obtained, switch off the glow plug by releasing switch 20.

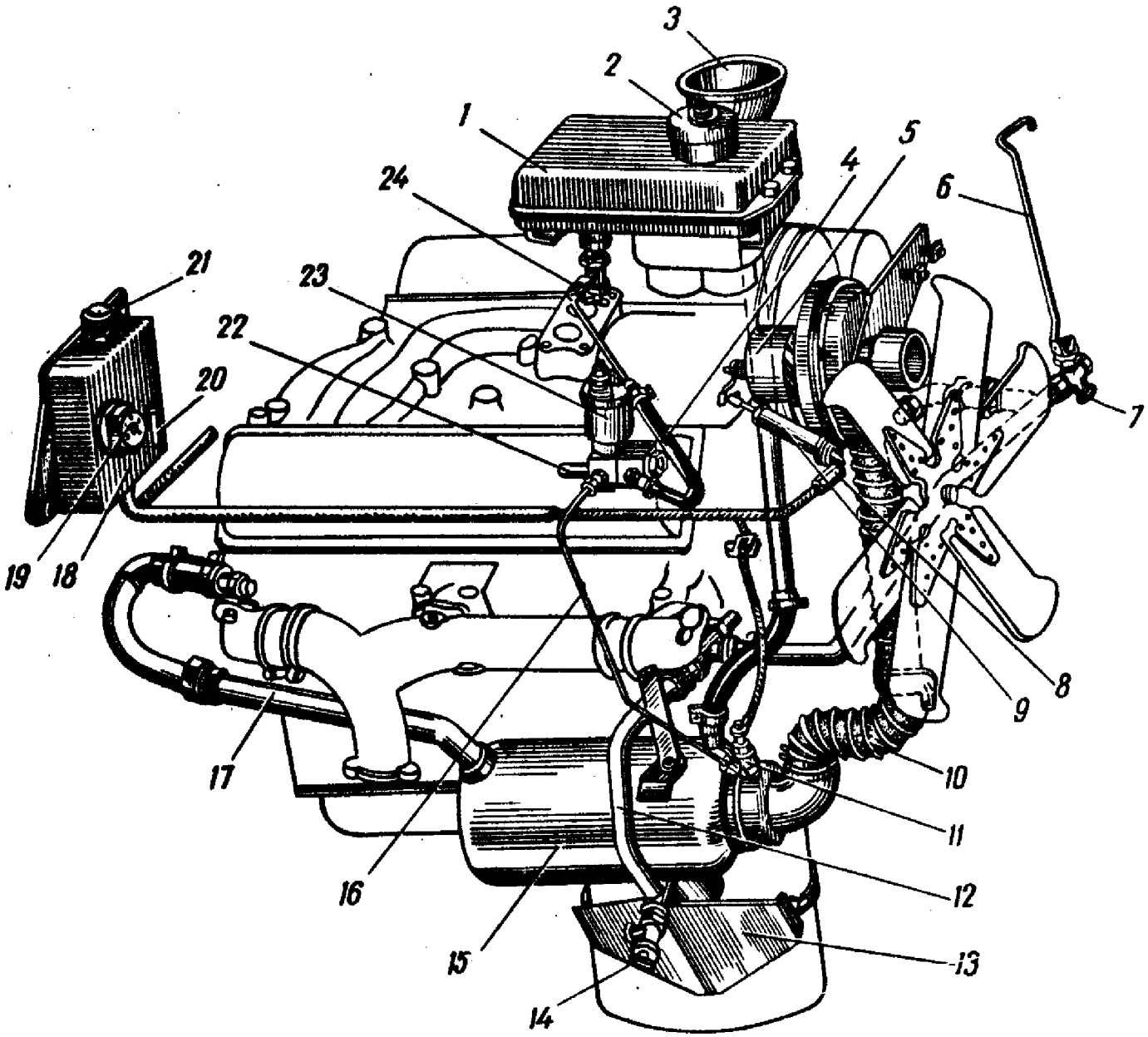


FIG.44. PREHEATER

1 - fuel tank; 2 - tank filler cap; 3 - filling funnel; 4 - fuel filter pipe; 5 - electric motor with fan; 6 - cock control grip; 7 - pipe drain cock; 8 - wire connector; 9 - capacitor; 10 - air supply hose; 11 - glow plug; 12 - engine-to-boiler discharge pipe; 13 - tray; 14 - boiler drain cock; 15 - preheater boiler; 16 - pipe from solenoid valve; 17 - boiler-to-engine supply pipe; 18 - control panel; 19 - monitoring filament; 20 - glow-plug switch; 21 - switch; 22 - adjusting needle; 23 - solenoid valve; 24 - cock

10. One to two minutes after the preheater has been started, pour 6 to 8 litres of water through the boiler funnel, close the funnel cap and continue to heat the engine.

11. When steam appears from the radiator filler neck, give the crankshaft a few revolutions with the crank handle.

12. Switch off the preheater by setting switch 21 in the position I (boiler blowing) and close cock 24 of the tank.

Fifty to sixty seconds after the burning noise in the boiler has ceased, stop the fan by setting switch 21 in the "O" position.

13. Switch on the ignition and start the engine by means of the starter. If the engine fails to start, pull out the control knob of the carburettor choke valve about 1/4th of its travel and switch on the starter again.

14. After the engine has been started, push the control knob of air choke valve into the initial position and depress the accelerator control pedal about 1/2nd of its travel.

15. Close the radiator drain cock.

16. While heating the engine at a medium speed, fully refill the engine with water through the filler neck and close it with the cap.

17. Pour water in the radiator to fill the cooling system. If a condensation tank is available fill it with 2 litres of water.

18. After the engine has been heated to 60 to 70°C, the truck may be set into motion.

If the preheater has failed to start on the first t trial, repeat the starting procedure. In doing so, see to it that the water in pipes 12 and 17 is not frozen (to be checked by touch). With frozen water in the pipes, melt it by repeatedly switching on the preheater for 1 to 2 min at 2 to 4 min intervals and fanning air into the preheater boiler during the intervals.

When antifreeze is used as a coolant, the engine is prepared for starting as stated above, except Paras 1, 4, 6, 10 and 16.

PROCESS CHART No.8

CHECKING AND ADJUSTING CLEARANCES BETWEEN VALVE STEM ENDS AND ROCKERS

Performed by: automobile mechanic and driver.

Tools: wrenches 14,17,19 and 22 mm; socket wrenches 14 and 17 mm; spark-plug wrench, 22 mm; scale, 500 mm; small screwdriver; feeler gauge.

Time required: 40 minutes.

Operations and Specifications

1. Remove the belt from the steering booster pump drive.

2. Shift the steering booster pump.

3. Disconnect the spark-plug wires from the terminals on the cylinder head covers. On the ЗИЛ-131 truck, the wires are disconnected together with the wire harness.

4. Remove the high-tension wire from the spark plug of the 1st cylinder and screw the spark plug out.

5. On the ЗИЛ-131 truck, remove the air cleaner.

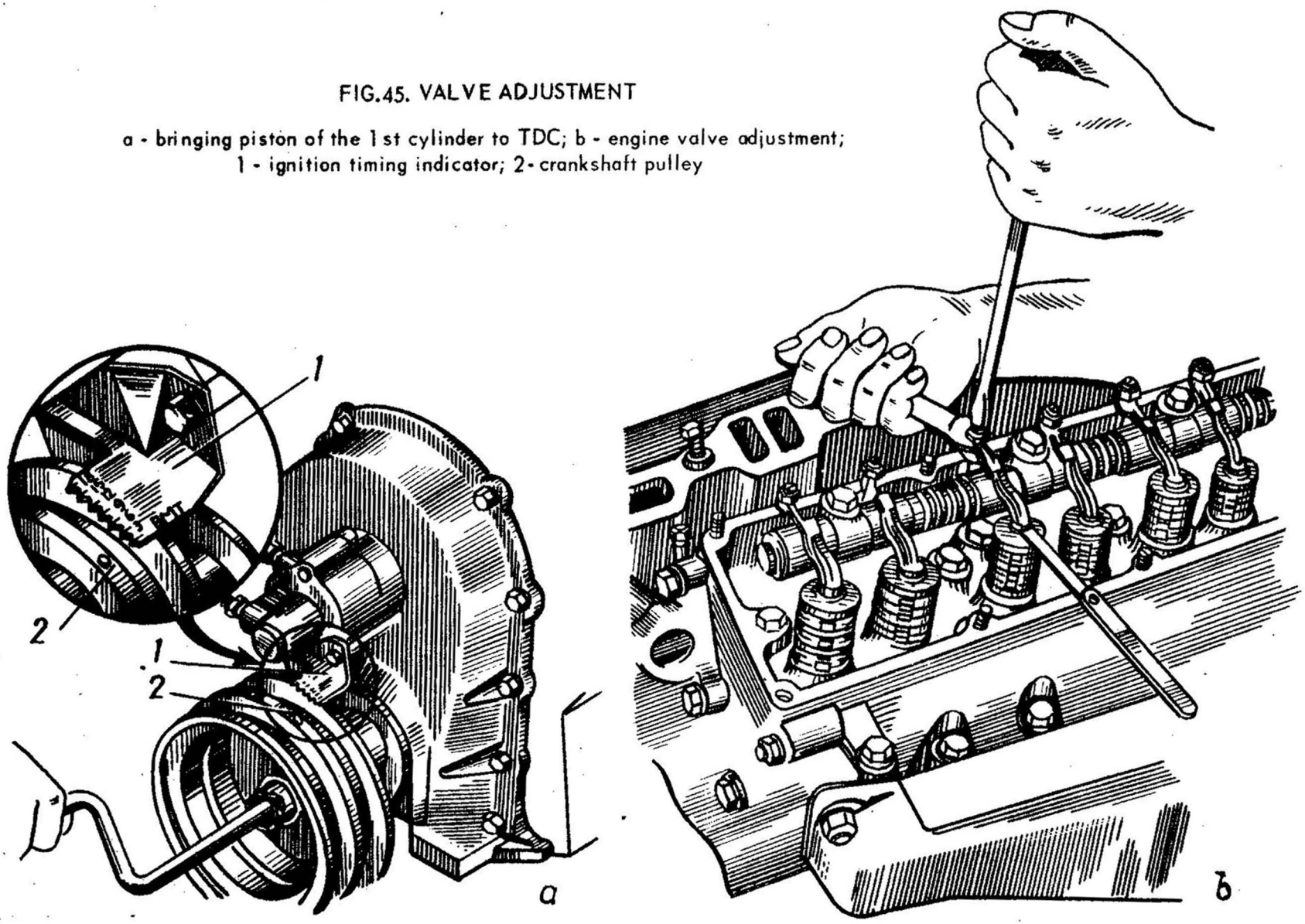
6. Unscrew the nuts of the studs holding the cylinder valve covers and remove the covers with the gaskets.

7. Set the piston of the 1st cylinder in the TDC on the compression stroke. To this end, close the spark-plug hole with the thumb and crank the engine until air is forced from under the thumb. Then, cranking the engine, align the drilled mark on pulley 2 (Fig.45) of the crankshaft with mark ВМТ (TDC) on ignition setting indicator 1 located on the sending unit of the maximum speed limiter.

8. Check the clearance between the valve stem ends and the rockers of the following valves:

FIG.45. VALVE ADJUSTMENT

a - bringing piston of the 1st cylinder to TDC; b - engine valve adjustment;
1 - ignition timing indicator; 2 - crankshaft pulley



- intake and exhaust valves of the 1st cylinder;
- exhaust valve of the 2nd cylinder;
- intake valve of the 3rd cylinder;
- exhaust valves of the 4th and 5th cylinders;
- intake valves of the 7th and 8th cylinders.

9. Give the crankshaft a complete (360-degrees) revolution and check the clearances of the remaining valves:
- intake valve of the 2nd cylinder;
- exhaust valve of the 3rd cylinder;
- intake valves of the 4th and 5th cylinders;
- exhaust and intake valves of the 6th cylinder;
- exhaust valves of the 7th and 8th cylinders.

The clearance should be from 0.25 to 0.30 mm. An 0.25-mm feeler gauge should freely go through, while an 0.30-mm feeler gauge must "bind".

The valve clearance should be tested and adjusted on a cold engine. The numbers of cylinders are shown on the intake manifold.

10. If needed, adjust the valve clearance, for which purpose, proceed as follows:
- holding the adjusting screw with a screwdriver, slacken the screw lock nut;
- by turning the adjusting screw with a screwdriver, set the needed clearance;
- holding the screw with a screwdriver, tighten the lock nut with a wrench.

11. Reinstall the spark plugs and connect the high-tension wires.

12. Start the engine and listen to its operation. The engine must operate without valve knocks, popping-back and back shots.

13. Stop the engine, install the cylinder head covers with gaskets and secure them in position.

14. Fit the belt on the pulley of the hydraulic steering booster, adjust the belt tension and tighten the nuts of the studs securing the bracket. The belt middle sag under a load of 4 kg should lie within 10 to 15 mm.

15. Insert the spark-plug wires into their clamps. On the ЗИЛ-131 truck, install and fasten the wire harness.

16. On the ЗИЛ-131 truck, install the air cleaner.

To adjust the clearances between the valve stem ends and rockers, proceed as follows:

- set the piston of the 1st cylinder in the TDC on compression stroke;
- adjust the valve clearance of the 1st cylinder;
- adjust the valve clearances turning the crankshaft each time through 90 degrees, following the firing order.

PROCESS CHART No.9

CHECKING COMPRESSION IN ENGINE CYLINDERS

Performed by: automobile mechanic and driver.

Tools: wrenches, 17 and 19 mm; spark plug wrench; compression gauge, ranged up to 10 kgf/cm^2.

Time required: 43 min.

Operations and Specifications

1. Heat the engine to 80 to 90°C.
2. Disconnect the wires from the spark plugs.
3. Slacken the steering booster pump case and move the pump case to the cylinder block.
4. Screw all the spark plugs out.
5. Fully open the throttle and choke valves of the carburettor.
6. Insert the rubber tip of the compression gauge in the spark-plug hole of the 1st cylinder and press it tightly.
7. Crank the engine several revolutions with the starter to let the compression gauge read the maximum pressure in the cylinder.
8. Record the compression gauge reading.
9. Bleed air from the compression gauge body.
10. Take the compression measurements on the other cylinders, following the procedure in Paras 6 through 9.

The compression in the engine cylinders should be within 7.5 to 8.5 kgf/cm^2. The minimum tolerable pressure is 6.3 kgf/cm^2. The pressure difference in all the cylinders should not exceed 0.7 to 1.0 kgf/cm^2. In case of a greater difference, pour 20 to 25 cm^3 of fresh oil into the cylinder

with insufficient compression and check it for compression once more. A greater reading of the compression gauge indicates an air leakage through the piston rings.

The same compression after filling the cylinder with the oil indicates that the valves do not fit their seats tightly.

11. Screw in all the spark plugs and connect their wires following the firing order of the engine.

12. Fit the belt driving the hydraulic steering booster.

PROCESS CHART No.10

SETTING IGNITION AFTER REMOVING DISTRIBUTOR FROM ENGINE

Performed by: automobile mechanic and driver.

Tools: wrenches, 6, 10 and 12 mm; socket wrenches, 14 and 17 mm; spark plug wrench, 22 mm with tommy bar, and crank handle.

Time required: 19 min.

Operations and Specifications

1. Set the piston of the 1st cylinder in the TDC on compression stroke (see Process Chart No.8, Para.7).

2. Align slot 1 (Fig.46) on the distributor drive shaft assembly in parallel to mark lines 3 found on the upper flange of the distributor drive body.

3. Insert the distributor drive into the seat in the cylinder block, having first aligned the holes in the lower flange of the distributor drive body with the holes for its attachment in the cylinder block.

4. Check the distributor drive body for proper installation. With the drive body in a correct position, the slot on the distributor drive body should be parallel with the axis connecting the holes in the drive upper flange and should be displaced to the front part of the engine. The parallel alignment should be true within ±15 degrees.

If the distributor drive body fails to seat properly (which indicates that the lug on the distributor drive shaft is not lined up with the slot on the oil pump shaft), crank the engine two revolutions, simultaneously slightly depressing the distributor body.

5. Fasten the distributor drive body.

6. Crank the engine so that at the end of the second revolution the drilled mark on the pulley is aligned with the 9° mark on the ignition timing indicator.

7. Slacken the bolt holding the octane selector plate to the distributor and insert the distributor in the drive seat so that the octane selector faces up. In this case, the rotor electrode will be against the 1st cylinder terminal on the distributor cap.

8. Cut in the ignition and turn the body counterclockwise until a spark jumps between the end of the center wire, running from the ignition coil, and the ground (the wire end-to-ground clearance being from 2 to 3 mm).

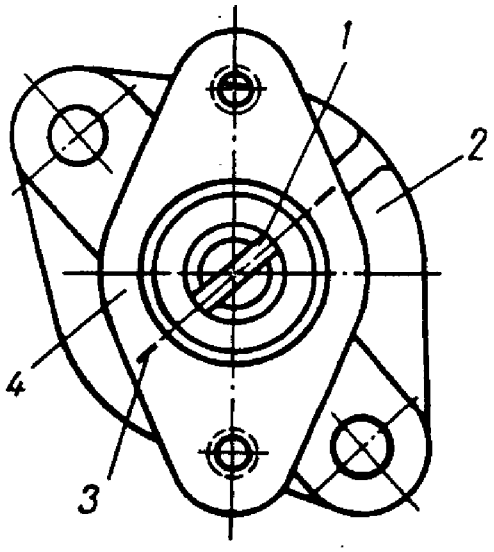


FIG.46. IGNITION DISTRIBUTOR DRIVE SETTING

1 - slot on the distributor drive shaft; 2 - body lower flange; 3 - marks on the body upper flange; 4 - body upper flange

9. Tighten the bolt holding the octane selector to the distributor.

10. Insert the high-tension wire in the distributor cap sockets, following the engine firing order, which is 1-5-4-2-6-3-7-8.

Prior to the ignition setting, check the spark gap between the breaker contact points and adjust, if needed.

11. Align the pointer of the upper plate of octane selector with the "0" mark on the lower plate and secure the distributor body in this position.

If the distributor was removed without dismantling the drive body, the ignition timing is performed only by the operations given in Paras. 7 through 10.

12. Check the ignition setting, for which purpose, proceed as follows:

- heat the engine to bring its coolant temperature to 80 to 95°C;

- speed up the truck on a straight even road to a set speed of 30 km/h;

- sharply depress the accelerator pedal as far as it will go and hold it in this position until the vehicle speed grows to 60 km/h. In doing so, listen to the operation of the engine. If a light pinking noise is heard which disappears at 40 to 45 km/h., the ignition setting is correct.

In case of heavy pinking noise, retard the ignition. To this end, displace the upper plate pointer towards mark "-" by turning the nuts of the octane selector.

When no pinking is heard, advance the ignition, for which purpose, displace the upper plate pointer towards mark "+" by turning the nuts of the octane selector.

When the ignition system is shielded against radio interference, see to it that the joints are properly sealed.

When screwing in the bolts holding the shielding cover, do not overtighten the bolts, otherwise the result may be a stripped thread or damaged bolt head. Do not overtighten the connector contacts and high-tension leads. When screwing on the nuts of the low-voltage wire connectors, hold the clamp of the braiding to prevent it from twisting.

PROCESS CHART No.11

AIMING HEAD LAMPS

Performed by: electrician and driver.

Tools and appliances: screwdriver, optical aiming device for head lamps 3-6.

Time required: 10 min.

Operations and Specifications

1. Install the vehicle on a level ground.

2. Assemble base bar 5 (Fig.47) and place it on the ground along the vehicle, under it (the middle of the bar on the level of the front buffer).

3. Orientate the optical camera 3 to the ground surface. To this end, set the optical camera on the bar at the front buffer level so that its lens faces the vehicle with the axis of the camera hole for installation of the camera on the bar, square with the bar axis, and zero level 4.

4. Install guide rods 6 on the bar and place on the optical camera. The guide rods should be in a common plane, the camera lens being aimed towards the rods.

5. Install the assembled aiming device so that guide rods 6 rest between head lamp lens 2 and head lamp rim 1 at the level of its axis on the rim inner side.

6. Remove the protective cap of the lens and open the cover of optical camera 3, and displacing the bar upwards or downwards, set level bubble 4 to zero mark.

7. Switch on the high beam and check the position of the hot spot on the screen of the optical camera.

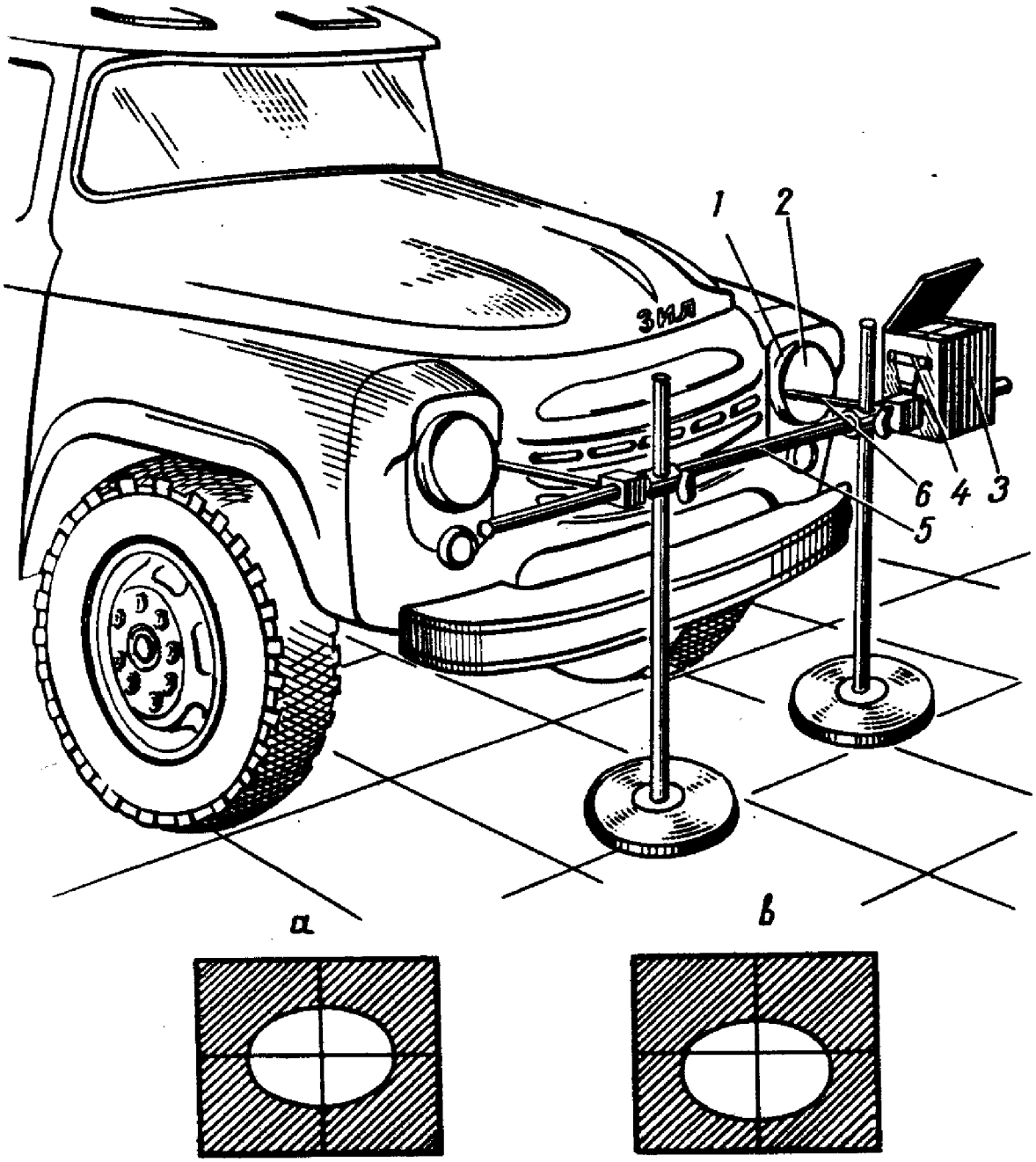


FIG.47. HEAD LAMP AIMING

a - high-beam hot spot; b - low-beam hot spot; 1 - head lamp rim; 2 - head lamp lens; 3 - optic camera; 4 - level; 5 - base bar; 6 - guide rod

With the head lamps in a correct position the center of the hot spot should align with the center of the cross (Fig.47,a) on the screen.

8. Switch on the low beam. The hot spot should displace below the horizontal axis of the screen (Fig.47,b).

If the head lamps are in a wrong position, adjust them.

9. Reinstall optical camera 3 on the other end of bar 5 and perform the operations mentioned in Paras 7 and 8.

10. To aim the head lamp light beam remove rim 1 and, using the adjusting screws, align the hot spot center with the cross center on the screen.

11. Disassemble the aiming device and stow it in the box.

PROCESS CHART No.12

CHECKING STARTER ON 3MJ-131 TRUCK

Performed by: electrician.

Tools: wrenches, 8, 10, 14 and 17 mm; screwdriver; bath with water; compressor and metallic rule.

Time required: 25 min.

Operations and Specifications

1. Remove the left-hand mud shield.

2. Disconnect the electric wires from the starter.

3. Remove the starter.

4. Swing aside the clamp holding cap 18 (Fig.48). Remove the protective cap by tapping it with a hammer through a copper plate held against the cap bead.

5. Check commutator 15 for the condition of its working surface. The commutator working surface should be smooth without burns. If it is dirty or burnt, clean it with a clean cloth soaked in gasoline. If it remains burnt, the commutator should be cleaned with a strip of fine sand paper. If the defect still remains, the starter should be disassembled to recondition the commutator by turning on a lathe.

The starter should be disassembled in a special workshop furnished with all the necessary tools and gauges and only after the guaranteed service time.

6. Check the position of brushes 17 in the brush holders. The brushes must move freely in their holders and be free from excessive wear. If the height of the brushes at the point of the spring contact is of 6 to 7 mm, replace the brushes.

7. Check and tighten, if needed, the screws holding the lugs of the pigtails.

8. Blow out the starter with dry compressed air to clean it of dust and dirt.

9. Replace rubber sealing rings 19 of the cap and give them a thin coating of brake fluid to make the cap mounting easier. After the cap has been reinstalled, check the starter for airtightness.

10. Using clean engine oil, coat shaft 10 of the starter drive (the surfaces over which the drive slides).

11. When disassembling the starter, check for:

- condition of solenoid switch contacts 1 and 2. Burnt contacts should be cleaned with sand paper. Heavily worn contact bolts should be turned over (through 180 degrees);

- end play of starter armature 14, which should not exceed 1.0 mm. The end play is adjusted by placing shims on the armature shaft journal from the drive side;

- drive pinion stroke, the clearance between the pinion and thrust ring 7 should be within 2.5±1 mm with the switch plunger fully pulled in and the end play taken up.

To adjust the pinion stroke, proceed as follows:

- remove the jumper connecting the starter frame with the starter solenoid switch;

- unscrew the four screws and remove the solenoid switch together with the plunger and the shackle from the starter;

- when the clearance between the pinion and thrust ring 7 is excessive, turn in the plunger adjusting screw of the swich to adjust the clearance. While adjusting, keep in mind that one revolution of the adjusting screw moves the pinion along the starter armature axis by 1.7 mm;

- move lever 5 towards frame 12 so as to let the switch shackle pin fit the slot in the lever end, reinstall the solenoid switch and turn in the four screws;

- reinstall and tighten the jumper;

- measure the clearance between the pinion and thrust ring 7.

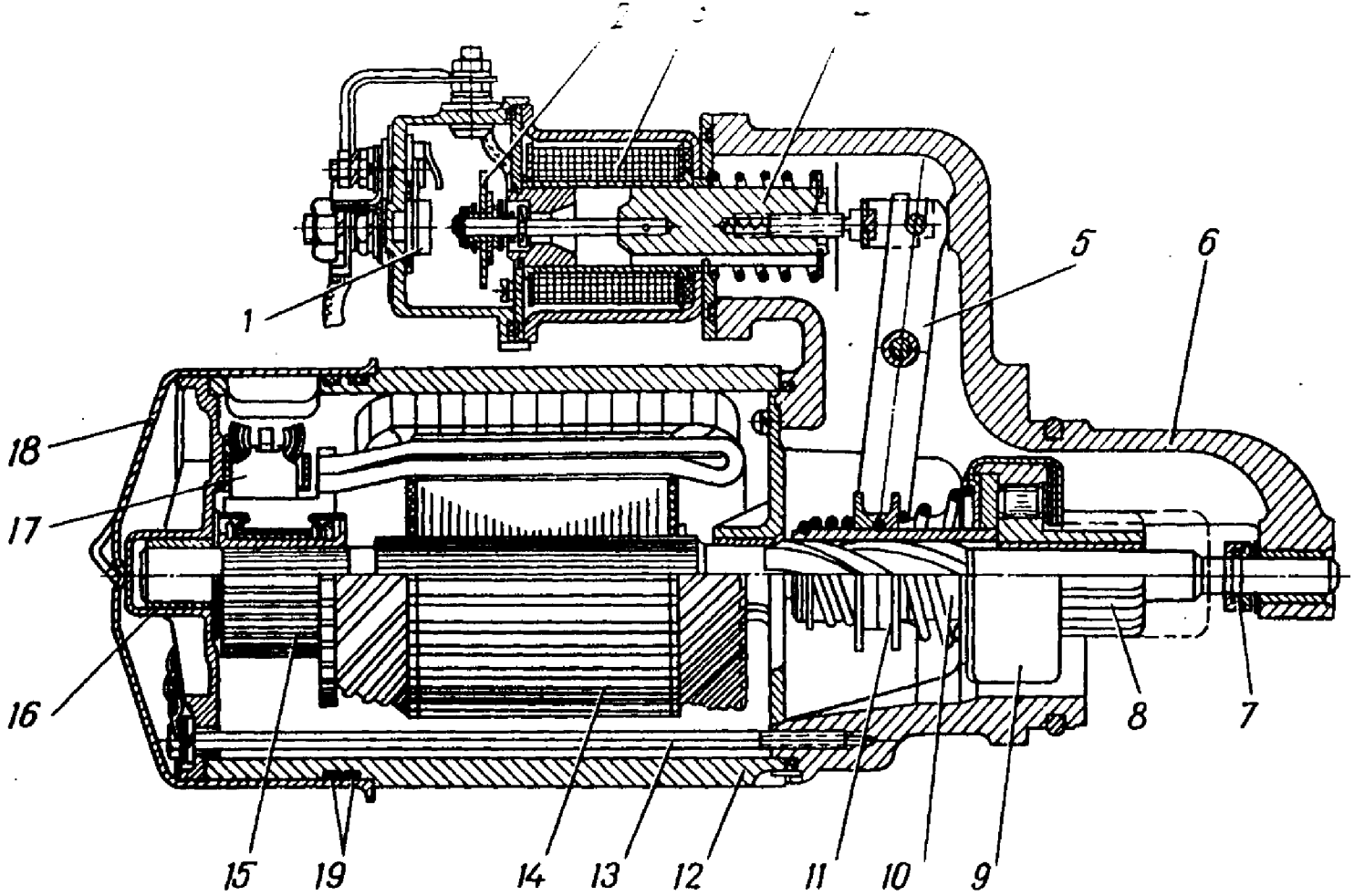


FIG.48. STARTER

1 and 2 - stationary and moving contacts of solenoid switch; 3 - solenoid switch coil; 4 - solenoid switch plunger; 5 - starter engagement lever; 6 - drive side cap; 7 - thrust ring; 8 - drive pinion; 9 -overrunning clutch; 10 - drive shaft; 11 - shift sleeve; 12 - starter frame; 13 - coupling stud; 14 - starter armature; 15 - commutator; 16 - commutator side end shield; 17 - starter brush; 18 - protective cap; 19 - rubber seal ring

The measurements are taken as follows. Connect the positive terminal of the storage battery to the solenoid switch coil terminal and its negative terminal to the starter frame. In this case, the relay plunger will be pulled in with pushing out the drive pinion. This movement is used to measure the clearance, the end play of the pinion being taken up by slightly pushing the pinion towards the commutator. After the reassembly, check the starter for no-load operation and for the braking torque. The no-load current consumption should not exceed 80 A and the armature speed should be not less than 3500 rpm. At a braking torque of 3 kgf·m, the current consumption should not exceed 650 amperes.

When overhauling the starter, replace all the rubber sealing rings (each starter is supplied with two sets of rubber sealing rings).

To make the rubber ring fitting easier, slightly coat the rings with clean motor oil.

After reassembly, the ЗИЛ-131 starter should be tested for airtightness, for which purpose, the starter is immersed in fresh water of room temperature so that the water layer over the starter is not more than 50 mm. Build up a 0.1 to 0.2 kgf/cm^2 pressure inside the starter.

The starter is given a five-minute testing after the above-mentioned pressure has been built up. No water inleaks through the drive side cap are tolerable. To this end, use is made of a special sealing cap.

The starter is considered passed the test for hermetic sealing, if within the last 3 minutes there is no regular emission of air bubbles visible at one and the same point of the starter or the solenoid switch.

PROCESS CHART No.13

CLEANING AND CHECKING GENERATOR

Performed by: electrician.

Tools: wrenches, 12, 14, 17 and 19 mm; small screwdriver, 500-mm scale; dynamometer.

Time required: 25 min and 14 min for testing by the 3-5 device.

Operations and Specifications

1. Disconnect the wires from the generator, loosen the generator strip, remove the belt from the pulley, unscrew the mounting bolts and remove the generator.

2. Clean the external surfaces of oil, dust and dirt.

3. Remove screw 17 (Fig.49) securing protective band 16 of the generator and remove the band.

4. Check the condition of brushes 15, brush holders 14 and commutator 3. The brushes should freely move in the holders, fit the commutator with the whole surface and should have no chipping. The height of the brushes should be at least 14 mm. The brush spring load should not be less than 600 g. The commutator working surface should be smooth, slightly darkened and without traces of burning. A burnt commutator should be wiped with a clean cloth soaked in gasoline or cleaned with the C-80 or C-100 sand paper.

If sand-papering fails to clean the commutator, than in addition to Paras.1 through 4, perform the following operations:

- disassemble the generator;
- turn the commutator on a lathe to obtain a clean and smooth surface;

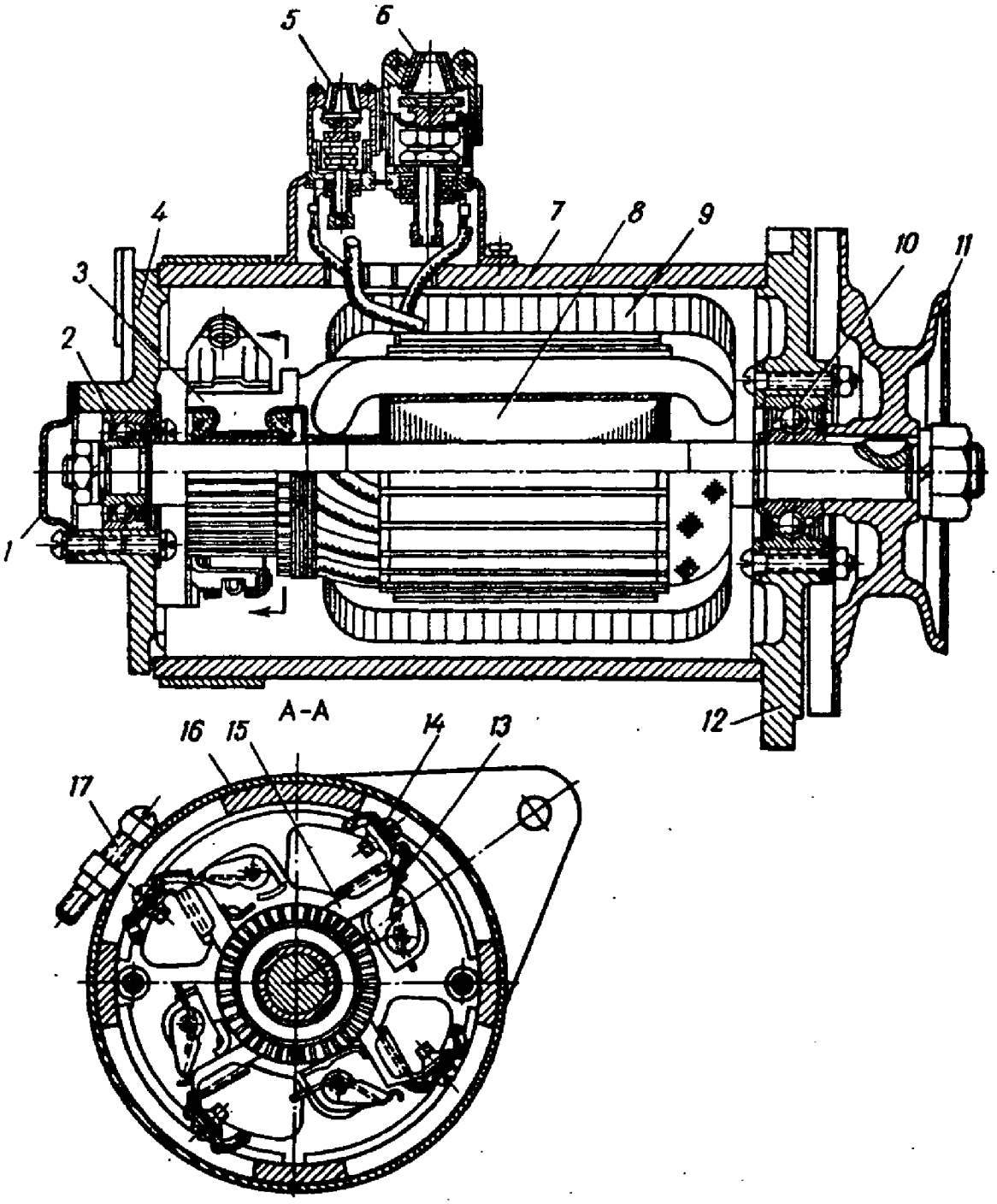


FIG. 49. Г51 GENERATOR

1 - bearing cap; 2 - commutator side bearing; 3 - commutator; 4 - commutator side end shield; 5 - shunt coil output shielded terminal Ш; 6 - armature coil output terminal Я; 7 - generator frame; 8 - armature; 9 - field coil; 10 - drive side bearing; 11 - pulley with blower; 12 - drive side end shield; 13 - brush holder spring; 14 - brush holder; 15 - brush; 16 - protective band; 17 - protective band screw

- undercut commutator 3, i.e. cut the mica insulation to a depth of 0.8 mm;

- remove burrs with fine sand paper;

- place end plate 4 on the armature shaft 8 from the commutator side;

- insert between brush 15 and commutator 3 a sand-paper strip of a width equal to the commutator length and of a length not less than half of the commutator circumference;

- lower brush 15 and, by pulling the sand-paper strip in the direction opposite to armature 8 rotation, lap brush 15 to commutator 3.

5. Remove dust and dirt accumulated on end plate 4 from the commutator side and on brush holders 14.

6. Reinstall protective band 16 of the generator and fasten it.

7. Reinstall the generator, connect the wires and test the generator for operation as an electric motor (device НИИАТ Э-5).

8. Tension the generator drive belt and check the generator operation for the initial current generation and for full current generation by device НИИАТ Э-5.

PROCESS CHART No.14

CHECKING AND ADJUSTING FRONT WHEEL TOE-IN

Performed by: automobile mechanic.

Tools: pipe wrench; wrenches, 17, 19 and 22 mm; socket wrench, 24x30 mm; combination pliers and a gauge for toe-in checking.

Time required: 25 min.

Operations and Specifications

1. Set the front wheel in a straight-ahead position.

2. Check the tyre pressure and inflate, if needed.

3. Install the toe-in gauge in front of the front axle at the height of the wheel axis, having pressed the gauge tips against the tyre side wall near the wheel bead.

4. Move the vehicle forward until the gauge is at the same height behind the front axle and determine the toe-in of the front wheels. Adjust, if needed.

5. The adjusting procedure is as follows. Slacken the nuts of the clamping bolts of the tie-rod ends. On the ЗИЛ-131 truck, disconnect the left-hand and right-hand tie-rod ends from the steering knuckle arms.

6. By turning the tie rod on the ЗИЛ-130 truck or the rod end on the ЗИЛ-131 truck in either direction, adjust the toe-in of the front wheels so that the extreme front distance between the front wheels is 5 to 8 mm less than that at the extreme rear for the ЗИЛ-130 truck and 2 to 5 mm - for the ЗИЛ-131 vehicle.

After adjusting the rod length on the ЗИЛ-131 truck, connect the rod end to the steering arm by means of pin.

7. Tighten and cotter the nuts of the clamping bolts of the tie-rod ends and cotter the nuts of the steering arm pins.

PROCESS CHART No.15

CLEANING PIPELINES AND HOSES OF TYRE INFLATION REGULATING SYSTEM WITH COMPRESSED AIR

Performed by: driver.

Tools: wrenches, 19 and 22 mm; special wrench for tyre valves; rubber cap of brake cylinder of the Ural-375 or ГАЗ-66 vehicle.

Time required: 22 min.

Operations and Specifications

1. Start the engine and build up the pressure in the air bottles.

2. Open the drain cocks of the air bottles, drain the condensate and close the cocks.

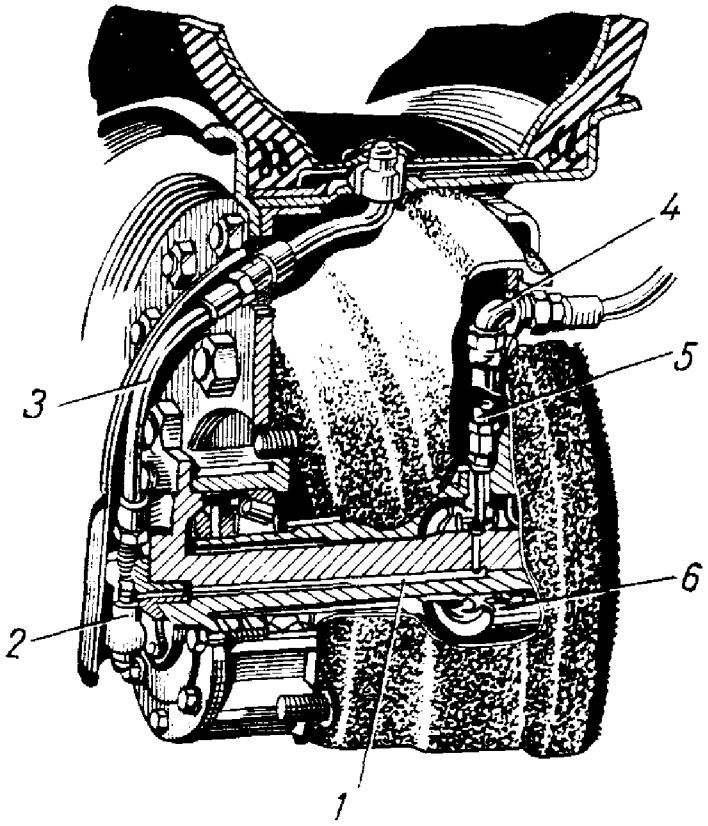


FIG.50. AIR SUPPLY TO WHEEL TYRE THROUGH AXLE SHAFT

1 - air passage; 2 - tyre valve; 3 - pipe supplying air to tube valve; 4 - elbow fitting; 5 - hose supplying air to axle shaft; 6 - air supply head

3. Bring the pressure in the air bottles to 7 kgf/cm^2.

4. Close tyre valves 2 (Fig.50).

5. Remove the protective casings of the pipes delivering air to the wheel tyres.

6. Set the tyre inflation pressure control valve in the INFLATION (ПОДКАЧКА) position.

7. Disconnect pipe 3 supplying air to the tube valve and close the valve by screwing on a rubber cap. To keep air in the tube, use may be made of a rubber cap for the bypass valve of the working brake cylinder of Ural-375 or ГАЗ-66 vehicle.

8. Open tyre valve 2 and blow the pipelines with air.

9. Close tyre valve 2.

10. Remove the rubber cap and connect pipe 3 supplying air to the tube valve.

11. Repeat the operations given in Paras 7 through 10 for all the wheels.

12. Install the protective casings of the pipes supplying air to the wheel tyres.

13. Inflate the tyres to the rated pressure.

With the system in good condition, the drop of air pressure in cold tyres should not exceed 0.5 kgf/cm^2 per 6 hours of parking time with the inflation pressure control valve closed and the wheel tyre valves opened.

PROCESS CHART No.16

BALANCING WHEEL ON ЗИЛ-131 TRUCK

Performed by: automobile mechanic.

Tools: wrenches, 14, 17, 19 and 22 mm; wrench with a tommy bar for wheel nuts; wrench for tyre valves; jack; dynamometer; range 0-10 kgf and appliance for wheel balancing.

Time required: 30 min.

Operations and Specifications

1. Close tyre valves 6 (Fig.55) on all the wheels.
2. Slacken nuts 36 holding the wheel under balancing.
3. Jack up the wheel under balancing.
4. Remove the protective casing 4 of air pipe 10 running from the tyre valve to the tube valve.
5. Disconnect air pipe 10 running to the tube valve.
6. Unscrew nuts 36 and remove the wheel under balancing.
7. Install the wheel on the appliance and tighten the fastening nuts.

The appliance is a wheel hub freely rotating on a journal secured to a bed.

For balancing, the wheel should be complete with the tyre, connecting hose and the protective casing of the hose.

8. Check to see that the wheel is free to rotate from a hand push.
9. Check the wheel out-of-balance (Fig.51), for which purpose:

- push the wheel with the hand to make it rotate and determine the heaviest point of the wheel (repeat two or three times);

- using chalk, mark the side ring fastening bolt which is in the heaviest place of the wheel (Pos.1);

- turn the wheel through 90 degrees (Pos.2);

- holding the wheel against turning with the dynamometer hooked on the marked bolt, take up its reading;

- measure distance "a" from the wheel center to the center of the marked bolt;

- multiply the dynamometer readings in kgf by the measured distance "a" in cm. This will give us the wheel out-of-balance in kgf·cm.

10. Install a needed number of balancing weights on the side ring bolts located in the lightest place of the wheel (Fig.52).

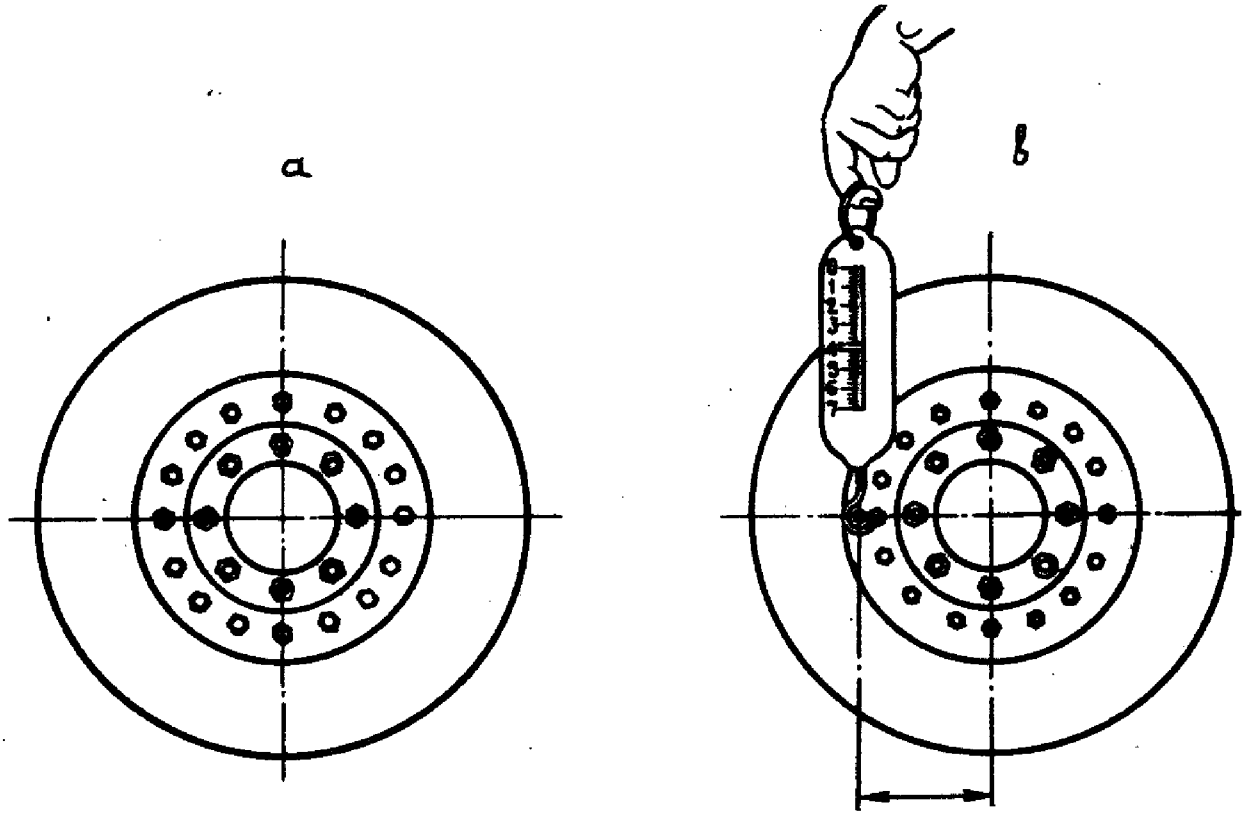


FIG.51. WHEEL BALANCING CHECK

a - position 1; b - position 2

Out-of-balance of wheel complete with tyre, kgf/cm	Total number of balancing weights	
	small	big
4 - 12	1	-
12 - 20	2	-
20 - 27.7	3	-
27.7 - 35.7	4	-
35.7 - 43.5	-	2
43.5 - 50	6	-
50 - 58	2	2

The weights should be secured in place with standard nuts M18x1.5, 14 mm in height. It is allowed to use the nuts removed from the wheel, provided these are used with their ball shaped surfaces outwards. The wheel should be balanced within 4 kgf·cm.

11. Remove the wheel from the appliance and reinstall it on the vehicle.

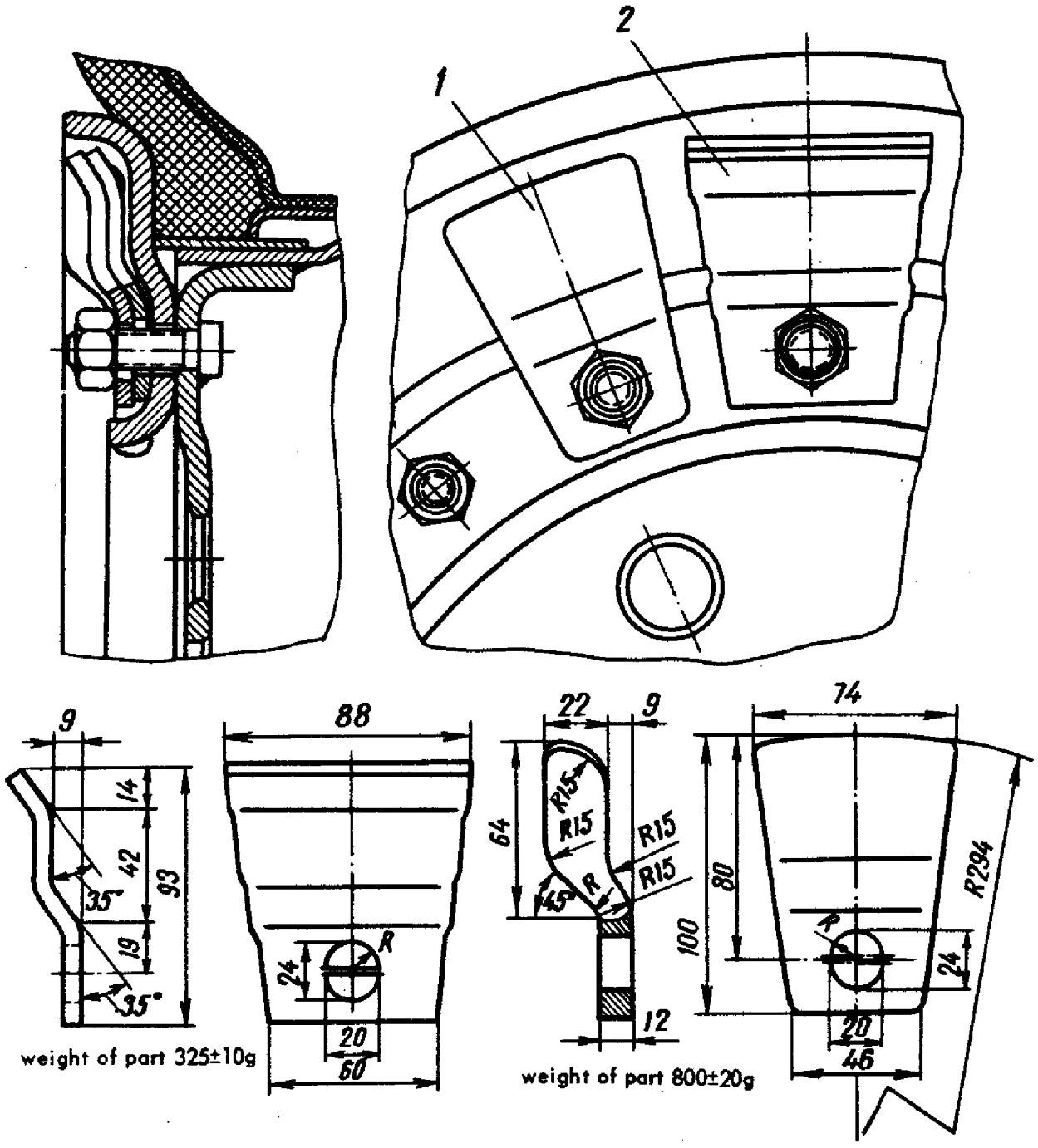


FIG.52. FITTING BALANCING WEIGHTS AND THEIR SIZES

1 - big weight; 2 - small weight

PROCESS CHART No.17

CHANGING FLUID IN SHOCK ABSORBER

Performed by: automobile mechanic.

Tools: wrench, 19 mm; wrench for the nut of the shock-absorber reservoir; mug and tray.

Time required: 20 min.

Operations and Specifications

1. Remove the shock absorber from the vehicle and wipe it clean with a cotton waste.

2. Place the shock absorber in a vertical position and clamp it in a vice by its lower mounting eye.

3. Withdraw rod 4 (Fig.53) with piston 22 to the extreme upper position and, using a special wrench, unscrew nut 10 of the shock-absorber reservoir.

4. Remove the shock absorber from the vice, remove rod 4 together with piston 22 and the seals and drain out the used fluid.

5. Remove working cylinder 3 with the compression valve. Wash all the assemblies with clean gasoline and let them dry.

6. Clamp the shock-absorber reservoir by its mounting eye in a vertical position in a vice.

7. Insert working cylinder 3 with the compression valve into the reservoir.

8. Fill the shock absorber with fresh shock-absorber fluid in an amount of 0.355 kg for the ЗИЛ-130 truck and of 0.450 kg for the ЗИЛ-131 vehicle.

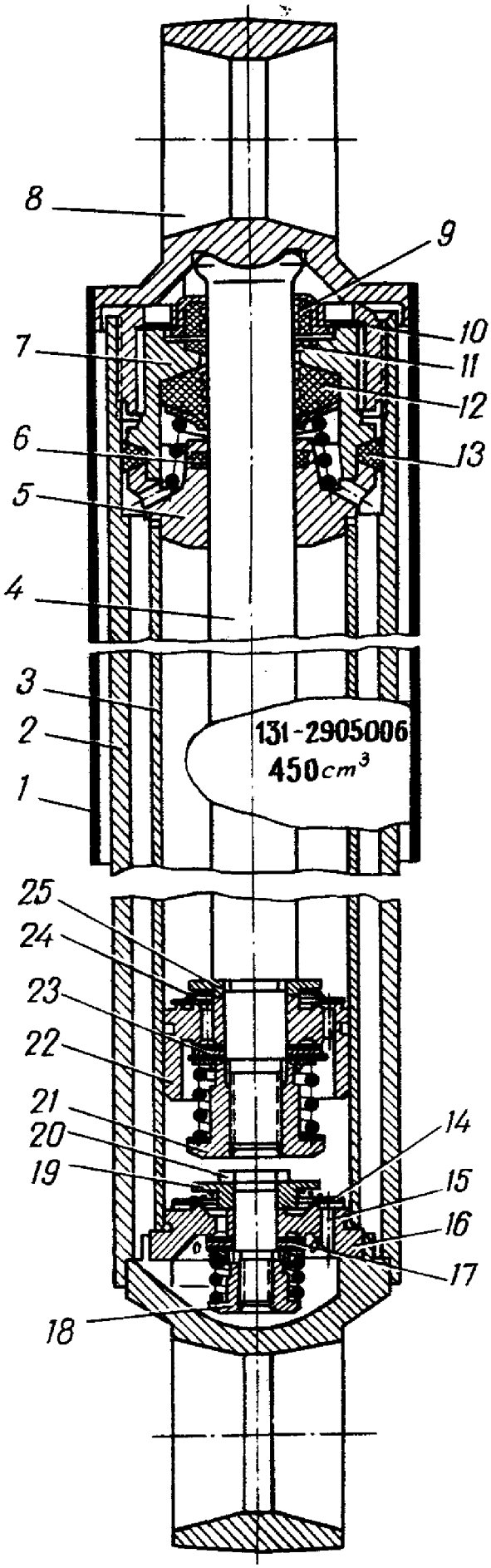


FIG. 53. FRONT SUSPENSION SHOCK ABSORBER

1 - casing; 2 - reservoir; 3 - working cylinder; 4 - rod; 5 - rod guide; 6 - rod guide oil seal; 7 - oil seal retainer; 8 - mounting eye; 9 - upper oil seal; 10 - reservoir nut; 11 - felt seal of rod; 12 - rubber seal of rod; 13 - oil seal of reservoir nut; 14 - by-pass valve plate; 15 - compression valve passage; 16 - compression valve body; 17 - rebound valve plate; 18 - compression valve nut; 19 - stop head of inlet valve; 20 - compression valve rod; 21 - rebound valve nut; 22 - piston; 23 - rebound valve disk; 24 - by-pass valve spring; 25 - by-pass valve stop head

The fluid should be poured into working cylinder 3. After filling the cylinder completely, the fluid will spill partially into the reservoir chamber.

9. Taking care not to spill the fluid from the shock absorber, insert rod 4 with the piston and seals in working cylinder 3. Set right ring rubber seal 13 of the reservoir, fit it accurately in position and tighten casing nut 10 with the special wrench as far as it will go.

Reinstall the shock absorber on the vehicle.

When replacing seals 12 of the rod, remember that the seal has a BOTTOM (НИЗ) mark which shows its correct position in the shock absorber.

This position secures proper functioning of the oil deflecting grooves of the seal.

PROCESS CHART No.18

ADJUSTMENT OF END PLAY IN ATTACHMENT OF WALKING BEAM SUSPENSION HUB OF ЗИЛ-131 TRUCK

Performed by: driver.

Tools and appliances: wrenches, 14, 17, 19 and 22 mm; wrench for U-bolt nuts; wrench with tommy bar for wheel nuts; socket wrench, 12 mm; pan for draining oil; two jacks; metal support, 105 cm in height; screwdriver and large tyre-mounting tool.

Time required: 130 min.

Operations and Specifications

1. Close the tyre valves of all the wheels.

2. Slacken the nuts securing the front rear and rear wheels of the truck.

3. Lift the rear part of the truck frame so as to unload the springs.

4. Remove the protective casing of the pipes supplying air to the tyres of the front rear and rear wheels.

5. Disconnect the air pipes from the tube valves.

6. Unscrew the nuts holding the wheels of the front rear and rear axles and remove the wheels from the side on which the adjustments are to be performed.

7. Slacken the nuts of coupling studs 5 (Fig.54) of hub 11 cheeks of the walking beam suspension three to four revolutions.

8. Unscrew the nuts of U-bolts 4 holding the rear spring and remove the spring.

9. Place the oil pan under hub 11.

Unscrew oil drain plug 25, slacken the bolts of hub cap 8 and drain the oil out of hub 11.

10. Unscrew the bolts fastening hub cap 8, remove the cap and the gasket.

11. Slacken coupling bolt 7, tighten up slit nut 9 and retighten coupling bolt 7 to a torque of 8 to 10 kgf·m.

12. Check hub 11 for rotation. After the adjustment, the hub should freely rotate on the axle without end play.

13. Reinstall the gasket and hub cap 8, secure it with the bolts and screw in oil drain plug 25.

14. Unscrew filler hole plug 6 and fill the hub with transmission oil.

15. Install the spring and secure it in position.

16. Install the wheels and secure them with the nuts.

17. Connect the air supply pipe to the tyre and reinstall the protective casing of the air supply pipe.

18. Open the tyre valves on all the wheels and inflate the wheels as required.

19. Lower the rear part of the vehicle frame and tighten up the wheel nuts.

PROCESS CHART No.19

ADJUSTING KING PIN BEARINGS OF ЗИЛ-131 TRUCK FRONT AXLE

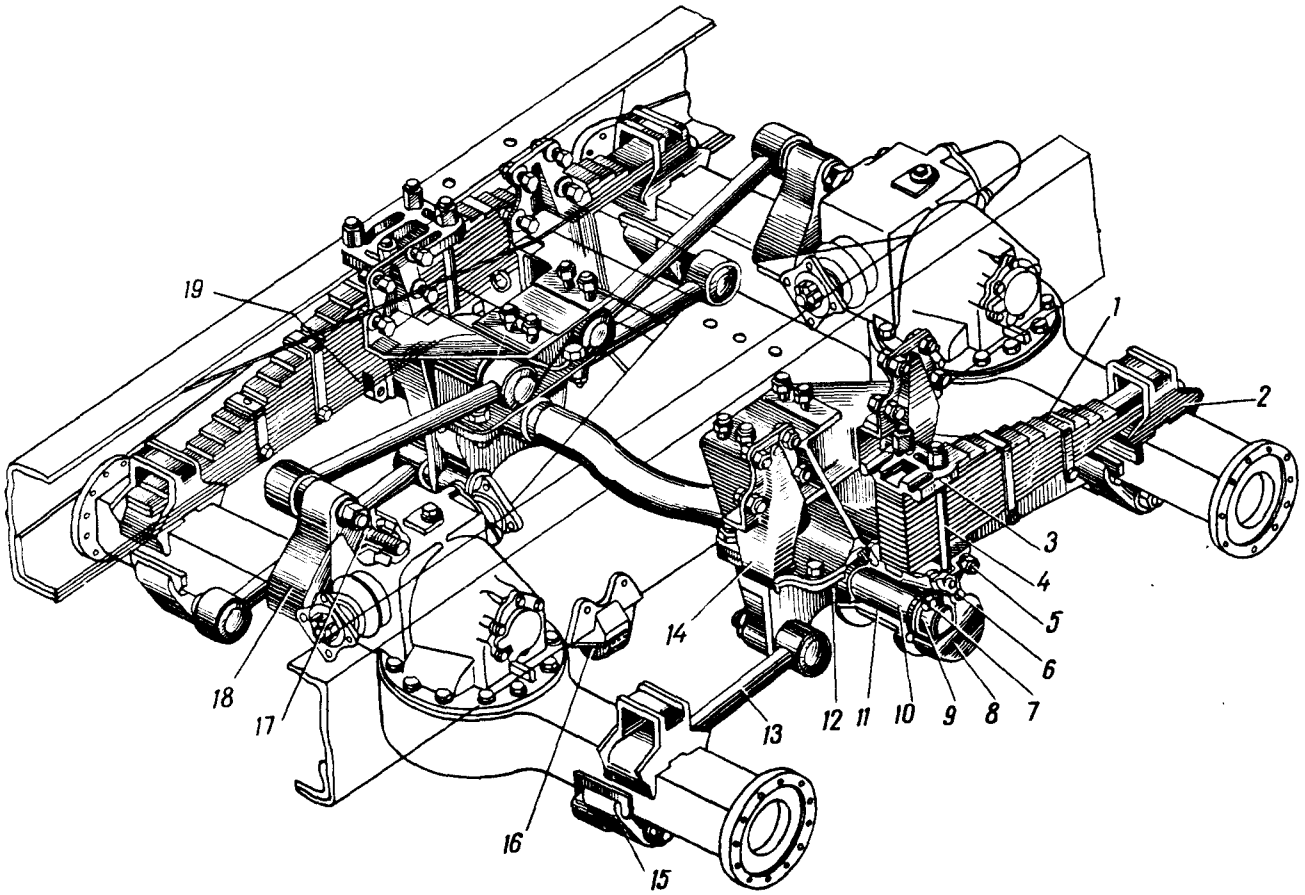
Performed by: automobile mechanic and driver.

Tools and appliances: wrenches 14, 17, 19, 22 and 24 mm; socket, 24 mm, with tommy bar; socket, 19 mm, with crank; wrench with tommy bar for wheel nuts; wrench with tommy bar for wheel hub nuts; wrench for tyre valves; box wrench, 32 mm; dynamometer, range 0 to 10 kgf; two metal supports 55 cm in height; two jacks with a tommy bar.

Time required: 80 min.

Operations and Specifications

1. Close tyre valves 6 (Fig.55) on all the wheels.
2. Slacken the nuts holding the front wheels.
3. Jack up the frame front part and use the supports to unload the wheels.
4. Remove protective casing 4 of pipe 10 supplying air to the tube valve.
5. Disconnect pipe 10.
6. Remove axle shaft flange 2 together with pipe 10.
7. Unscrew the nuts and remove the wheel from the side on which the adjustment is to be performed.
8. Unscrew nut 7 of the wheel hub and remove lock washer 9.
9. Unscrew adjusting nut 8 holding the wheel bearings.
10. Remove wheel hub 1 together with the brake drum.
11. Disconnect the hoses supplying air to the brake chamber on the frame and to the wheel tyre near the backing plate.



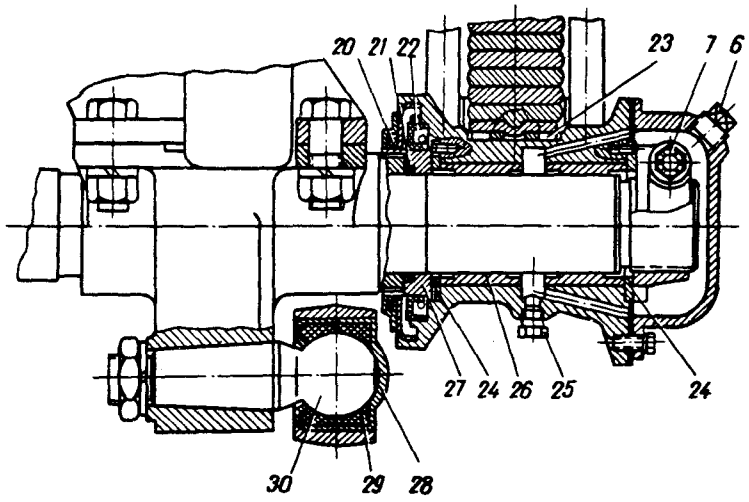


FIG.54. REAR SUSPENSION

1 - spring; 2 - rear spring support; 3 - spring strap; 4 - U-bolt; 5 - coupling stud; 6 - oil filler plug; 7 - coupling bolt; 8 - hub cap; 9 - split nut; 10 - walking-beam suspension axle; 11 - hub; 12 - bracket of walking-beam suspension axle; 13 - torque arm; 14 - bracket for attachment of rear suspension to frame; 15 and 18 - lower and upper torque levers; 16 - rubber bumper; 17 - bolt to force out pins of torque arms; 19 - rebound spring leaf; 20 and 21 - seal rings; 22 - self-adjusting oil seal; 23 - support bracket strap; 24 - thrust washers; 25 - oil drain hole plug; 26 - hub bearing; 27 - thrust ring; 28 . insert holder; 29 - ball-end-pin insert; 30 - ball-end pin

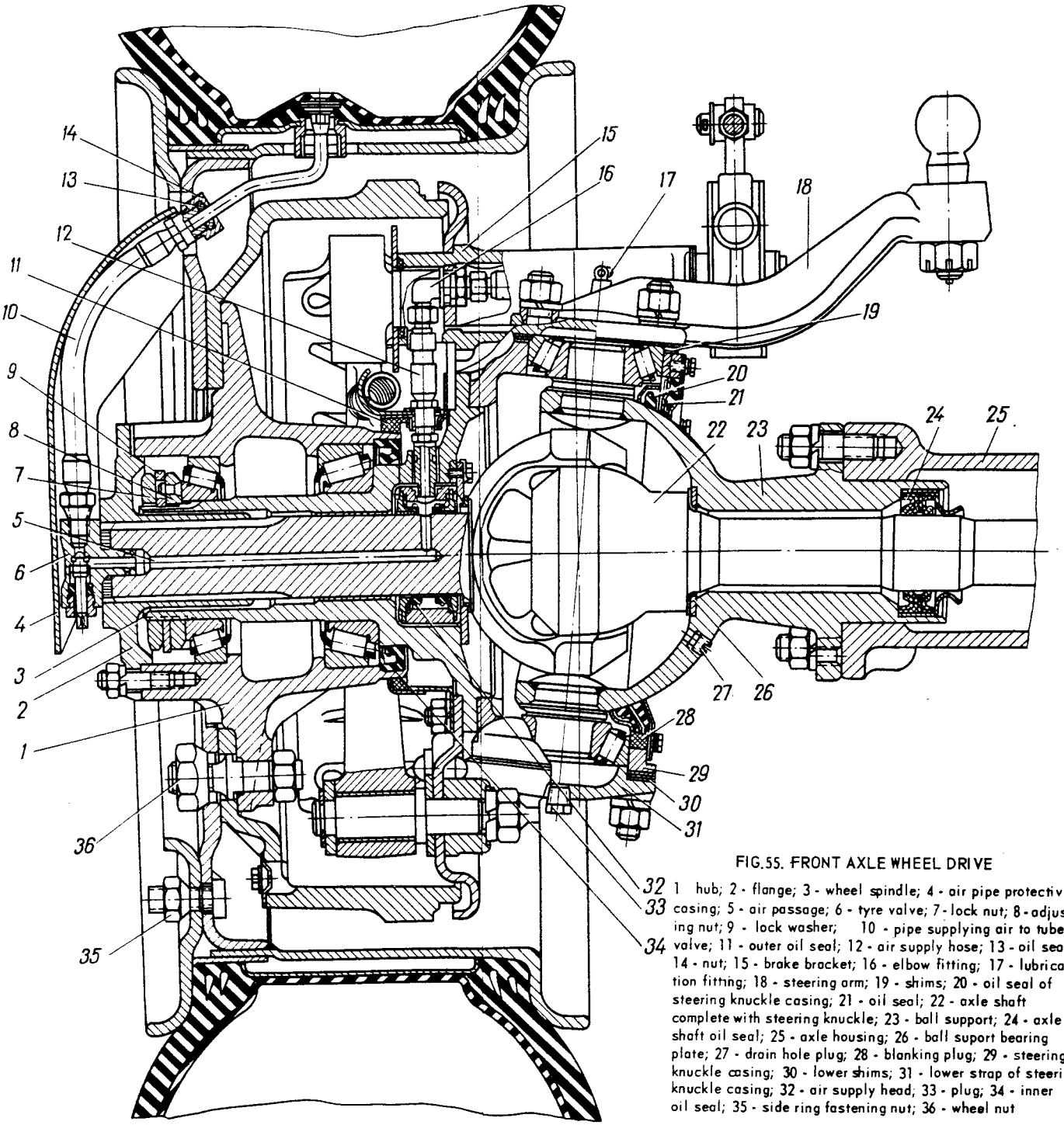


FIG.55. FRONT AXLE WHEEL DRIVE

1 hub; 2 - flange; 3 - wheel spindle; 4 - air pipe protective casing; 5 - air passage; 6 - tyre valve; 7 - lock nut; 8 - adjusting nut; 9 - lock washer; 10 - pipe supplying air to tube valve; 11 - outer oil seal; 12 - air supply hose; 13 - oil seal; 14 - nut; 15 - brake bracket; 16 - elbow fitting; 17 - lubrication fitting; 18 - steering arm; 19 - shims; 20 - oil seal of steering knuckle casing; 21 - oil seal; 22 - axle shaft complete with steering knuckle; 23 - ball support; 24 - axle shaft oil seal; 25 - axle housing; 26 - ball suport bearing plate; 27 - drain hole plug; 28 - blanking plug; 29 - steering knuckle casing; 30 - lower shims; 31 - lower strap of steering knuckle casing; 32 - air supply head; 33 - plug; 34 - inner oil seal; 35 - side ring fastening nut; 36 - wheel nut

12. Remove the return spring of the brake shoes and spread apart the brake shoes.

13. Disconnect the pipe supplying air to the air head.

14. Unscrew the fastening nuts and remove the backing plate together with the brake chamber.

15. Remove the wheel steering knuckle.

16. Withdraw the axle shaft.

17. Fully tighten the nuts holding upper and lower straps 31 of the steering knuckle casing.

18. Remove the tie rod.

19. Remove oil seal 21 of steering knuckle casing 29.

20. Check the end play of the bearings, for which purpose:

- unscrew plug 33 in lower strap 31 of the steering knuckle casing;

- install a dial indicator on strap 31 so that its post touches the end face of king pin;

- using a jack or a lever, make a trial to displace steering knuckle casing 29 upwards.

The dial indicator pointer will read the end play in the bearings.

21. Remove lower 31 and upper straps of steering knuckle casing 29 and examine the bearings.

22. Remove the required number of shims 30 from under lower strap 31, since the wear of the lower bearing is usually greater.

23. If the disassembly shows that the wear of the bearings is about the same, an equal number of shims should be removed from under the lower and upper straps.

24. In case of a heavily worn lower bearing of the king pin, interchange the upper and lower bearings and remove the shims from under the upper strap.

25. When installing new bearings, measure their mounting height from the supporting end face of the outer ring to the supporting end face of the inner ring. The total thickness of the shim stack installed from the side of the bigger bearing should be greater by the difference between the mounting heights of the bearings.

26. Reinstall upper and lower straps 31 of the steering knuckle casing and fully tighten their nuts.

27. Check the effort needed to turn the knuckle. The effort applied to the steering arm hole should be within 2 to 2.4 kgf.

28. After the final adjustment of new bearings has been completed, each of the shim stacks should include at least ten shims 0.1 mm thick. Two shims 0.05 mm thick each and 0.1 mm shim should be included into the shim stack from the steering knuckle casing side, while the other thin shims - from the strap side to obtain an oil-tight joint.

29. To assemble, reverse the disassembly procedure.

30. The wheel hub bearings are to be adjusted in compliance with Process Chart No.23.

PROCESS CHART No.20

FULL ADJUSTMENT OF WHEEL BRAKES

Performed by: driver.

Tools: wrench, 11 mm; socket wrench, 32 mm; combination pliers; feeler gauge No.6; jack with tommy bar; wrench for tyre valves, and scale.

Time required: 10 min.

Operations and Specifications

1. Slacken the nuts holding the brake-shoe pins and bring the eccentric pins together by turning the pins to make their marks face each other. The marks (lines) are made on the external end faces of the pins. The end faces protrude above the nuts.

Slacken the nuts holding the bracket of the expansion cam. On the rear axle of ЗИЛ-130 truck also slacken the bolts holding the expansion cam bracket to the axle housing, having first removed the fenders.

2. Inject compressed air into the brake chamber at a pressure of 1 to 1.5 kgf/cm^2 by depressing the brake pedal, if the compressed air is available in the system, or use compressed air produced by another compressor.

If compressed air is not available, remove the pin of brake chamber rod and, depressing the adjusting lever in the direction the brake chamber rod travels during braking, press the shoes against the brake drum.

By turning the eccentric in either direction, make the shoes concentric with the brake drum to ensure their tight contact with the drum. The tight contact between the shoes

and the drum is checked with a feeler gauge through the aperture in the brake drum at a distance of 20 to 30 mm from the external ends of the linings. A 0.1 mm feeler gauge should not go through the whole width of the lining.

3. Without stopping the compressed air delivery to the brake chamber and, when compressed air is not available, without releasing the adjusting lever and with holding the brake shoe pins against rotation, reliably tighten the nuts of the pins and the nuts of the bolts holding the expansion cam bracket to the brake backing plate.

4. Stop the compressed air delivery and, when compressed air is not available, release the adjusting lever and connect the brake chamber rod.

5. Turn the worm shaft of the adjusting lever so that the travel of the brake chamber rods is from 15 to 25 mm for the ЗИЛ-131 truck and the front wheel brakes of the ЗИЛ-130 vehicle, and from 20 to 30 mm for the rear wheel brakes of the ЗИЛ-130 truck.

Check to see that the brake chamber rods move without jamming, when the compressed air is supplied and shut-off.

6. Check to see that the brake drums rotate freely, when the brake pedal is released. The clearance between the brake drum and the shoes should be about 0.4 mm near the expansion cam and about 0.2 mm near the brake shoe pins.

PROCESS CHART No.21

ADJUSTING FRONT WHEEL HUB BEARINGS ON 3MJ-130 TRUCK

Performed by: driver.

Tools: socket wrench, 12 mm; socket wrench with tommy bar for front wheel hub nuts; jack with tommy bar, and screwdriver.

Time required: 9 min.

Operations and Specifications

1. Unscrew the bolts holding hub cap 2 (Fig.56) and remove the cap.

2. Bend off tab washer 4 and unscrew lock nut 3.

3. Remove tab washer 4 and lock washer 5.

4. Slacken nut 6 for holding and adjusting the wheel bearings through 1/3rd to 1/2nd of a revolution.

5. Jack up the wheel under adjustment and check to see whether it is free to rotate from a hand push.

6. Tighten wheel bearing tightening and adjusting nut 6 so that the wheel rotates with some difficulty and then back off the nut about 1/6th of a revolution to align its lock pin with the nearest hole in lock washer 5. The wheel should freely rotate without noticeable end play. While tightening the nut, give the wheel rotation motion.

7. Install tab washer 4, screw on and tighten snug lock nut 3 and bend the tab of washer 4 on lock nut 3.

8. Install wheel hub cap 2 and secure it.

9. Lower the wheel and remove the jack.

10. Check the bearings for proper adjustment by running the truck.

Overheating of the hubs checked by touch indicates overtightened bearings. If that is the case, repeat the adjustment procedure.

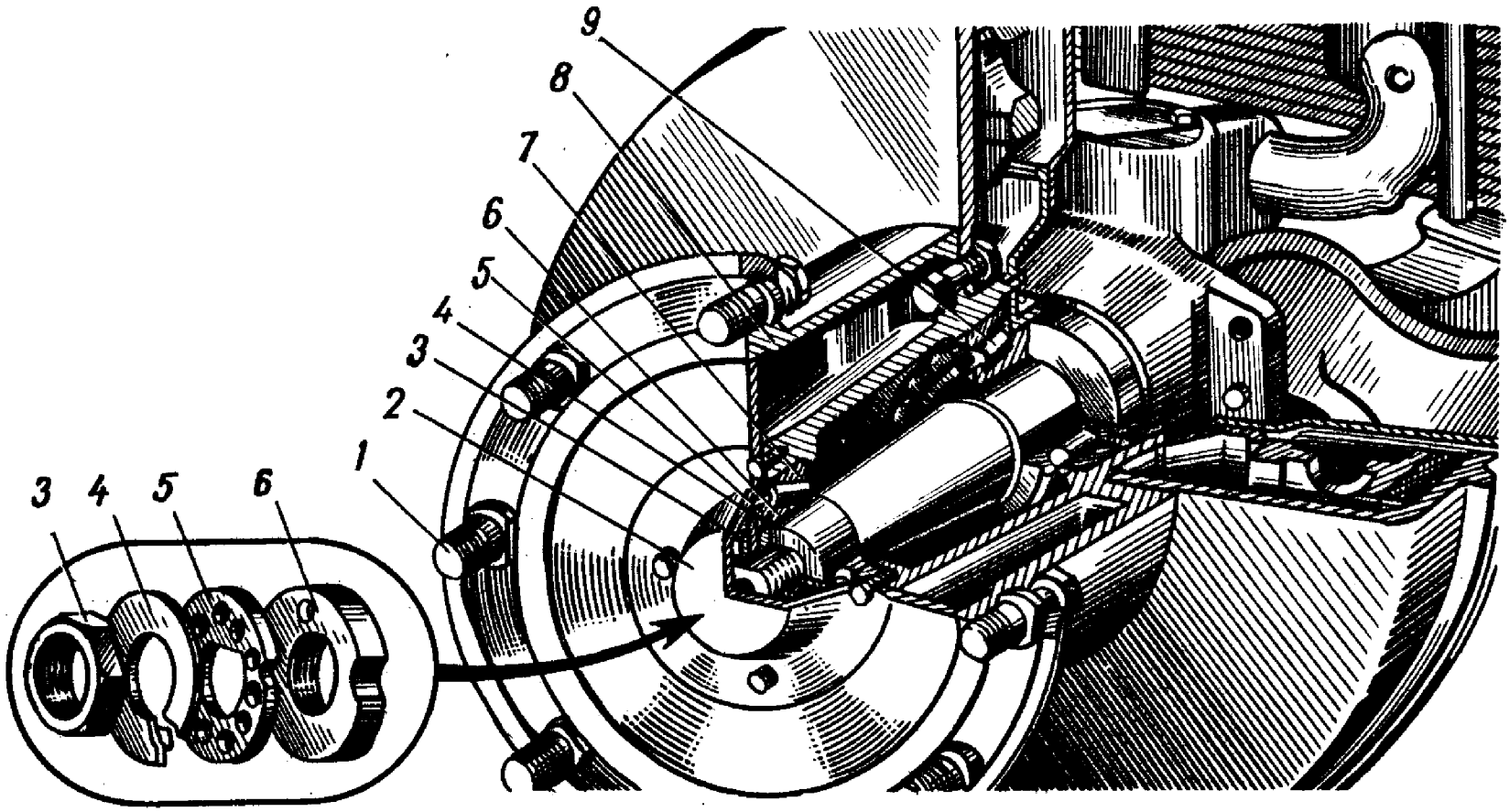


FIG.56. FRONT WHEEL HUB OF ЗИЛ-130 TRUCK

1 - wheel disk fastening stud; 2 - hub cap; 3 - lock nut; 4 and 5 - tab and lock washers; 6 - wheel bearing adjusting and fastening nut; 7 - hub outer bearing; 8 - front wheel hub; 9 - hub inner bearing

PROCESS CHART No.22

ADJUSTING REAR WHEEL HUB BEARINGS ON ЗИЛ-130 TRUCK

Performed by: automobile mechanic.

Tools: wrench, 24 mm; socket wrench with tommy bar for rear wheel hubs and jack with tommy bar.

Time required: 24 min.

Operations and Specifications

1. Unscrew nuts 1 (Fig.57) holding the axle shaft flange.

2. Jack up the wheel under adjustment and remove the axle shaft.

3. Unscrew lock nut 2.

4. Remove lock washer 3, outer seal 4 of the hub and outer seal retainer 5.

5. Slacken fastening and adjusting nut 6 of the wheel bearings through 1/3rd to 1/2nd of a revolution and check that the wheel is free to rotate from a hand push.

6. Tighten wheel bearing fastening and adjusting nut 6 so that the wheel rotates with difficulty. Then, back off the nut about 1/6th of a revolution to align with the nearest hole in lock washer 3. The wheel should freely rotate without noticeable end play. When tightening the nut, give the wheel rotation motion.

7. Remove lock washer 3.

8. Install outer seal retainer 5 and outer seal 4.

9. Install lock washer 3.

10. Screw on and tighten lock nut 2 as far as it will go.

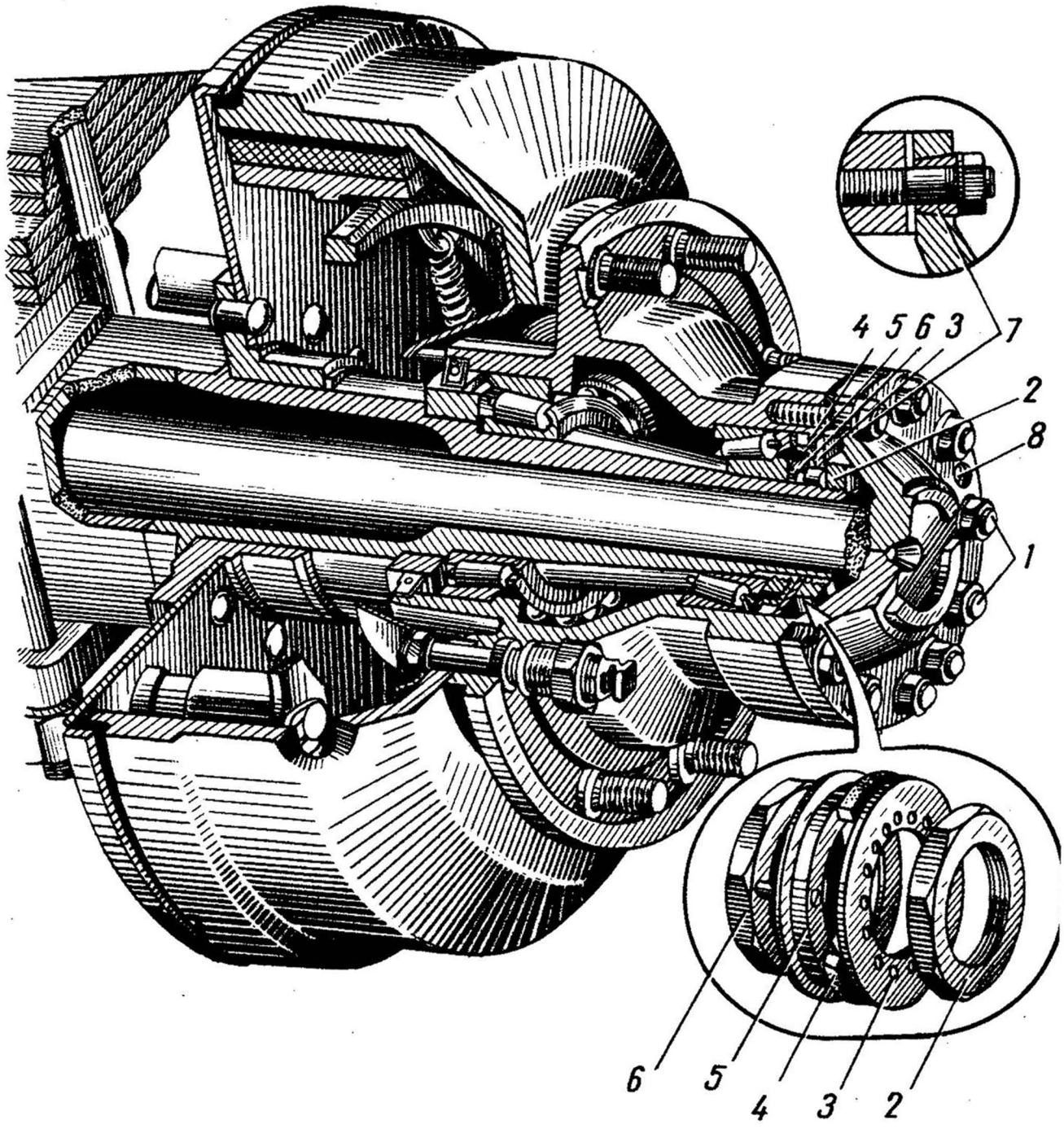


FIG.57. REAR WHEEL HUB OF ЗИЛ-130 TRUCK

1 - axle shaft flange fastening nut; 2 - lock hut; 3 - lock washer; 4 - outer oil seal; 5 - outer seal retainer; 6 - wheel bearing adjusting and fastening nut; 7 - stud taper bushing; 8 - hole for axle shaft remover bolt

11. Install the axle shaft and tighten nuts 1 holding it in position.

12. Jack down the wheel and remove the jack.

13. Check the wheels for proper adjustment by running the truck.

Overheating of the hub, checked by touch, indicates overtightened bearings. If that is the case, repeat the adjustment operations.

PROCESS CHART No.23

ADJUSTING WHEEL HUB BEARINGS ON ЗИЛ-131 TRUCK

Performed by: automobile mechanic.

Tools: wrenches, 17, 19 and 19 mm; box wrench, 19 mm; socket wrench with tommy bar for the hub nuts; jack and wrench for tyre valves.

Time required: 20 min.

Operations and Specifications

1. Close tyre valves 6 (Fig.55) of all the wheels.
2. Jack up the wheel to be adjusted.
3. Remove protective casing 4 of air supply pipe 10 running from the tyre valve to the tube valve.
4. Disconnect air pipe 10 from the tube valve.
5. Remove the axle shaft flange (axle shaft) together with the air pipe.
6. Rotating the wheel with the hand, make sure that the brake drum rotates without jamming and striking against the brake shoe linings.
7. Unscrew lock nut 7 holding the wheel hub and remove lock washer 9.
8. Rotating the wheel by the hand, tighten adjusting nut 8 of the bearings until the beginning of braking. Then, slacken the nut about 1/6th of a revolution to align the lock pin of adjusting nut 8 with the nearest hole in lock washer 9. The wheel should freely rotate without noticeable end play.
9. Install lock washer 9 and screw on lock nut 7.
10. Install flange 2 of the axle shaft (axle shaft).
11. Connect the air supply pipe to the tube valve.

12. Install the protective casing of the air supply pipe connecting the tyre valve and the tube valve.

13. Open the tyre valves of all the wheels and inflate the tyres as required.

14. Jack down the wheel and remove the jack.

15. Check the bearings for proper adjustment by running the truck.

Overheating of the hub, checked by touch, indicates overtightened bearings. If that is the case, repeat the adjustment operations.

PROCESS CHART No.24

ADJUSTING BRAKE VALVE

Performed by: automobile mechanic.

Tools: wrenches, 10, 12, 14, 17, 19 and 27 mm; pliers; screwdriver; air pressure gauge, range 0-10 kgf/cm^2; depth gauge; special wrench for lock nut, and special wrench for rod guide.

Time required: 90 min.

Operations and Specifications

Adjustment of Inlet Valve Opening

1. Disconnect the air pipe from the valve.

2. Unscrew the connection fitting from plug 16 (Fig.58).

3. Fully depress the brake pedal or pull large lever 4 of the brake valve (if the valve is removed from the vehicle). Then, using a rule or a depth gauge, measure the travel of inlet valve 15 which in case of full stroke of large lever 4 should be within 2.5 to 3 mm.

After the adjustment, there should be not less than one shim under the valve seats.

Adjustment of Air Pressure in Trailer Pipelines

1. Start the engine and bring the pressure in the air bottles to 7 kgf/cm^2. In doing so, the tyre pressure control cock lever should be in the neutral position. If the cock has been removed from the vehicle, connect it to an external source of compressed air with a pressure of 7 kgf/cm^2

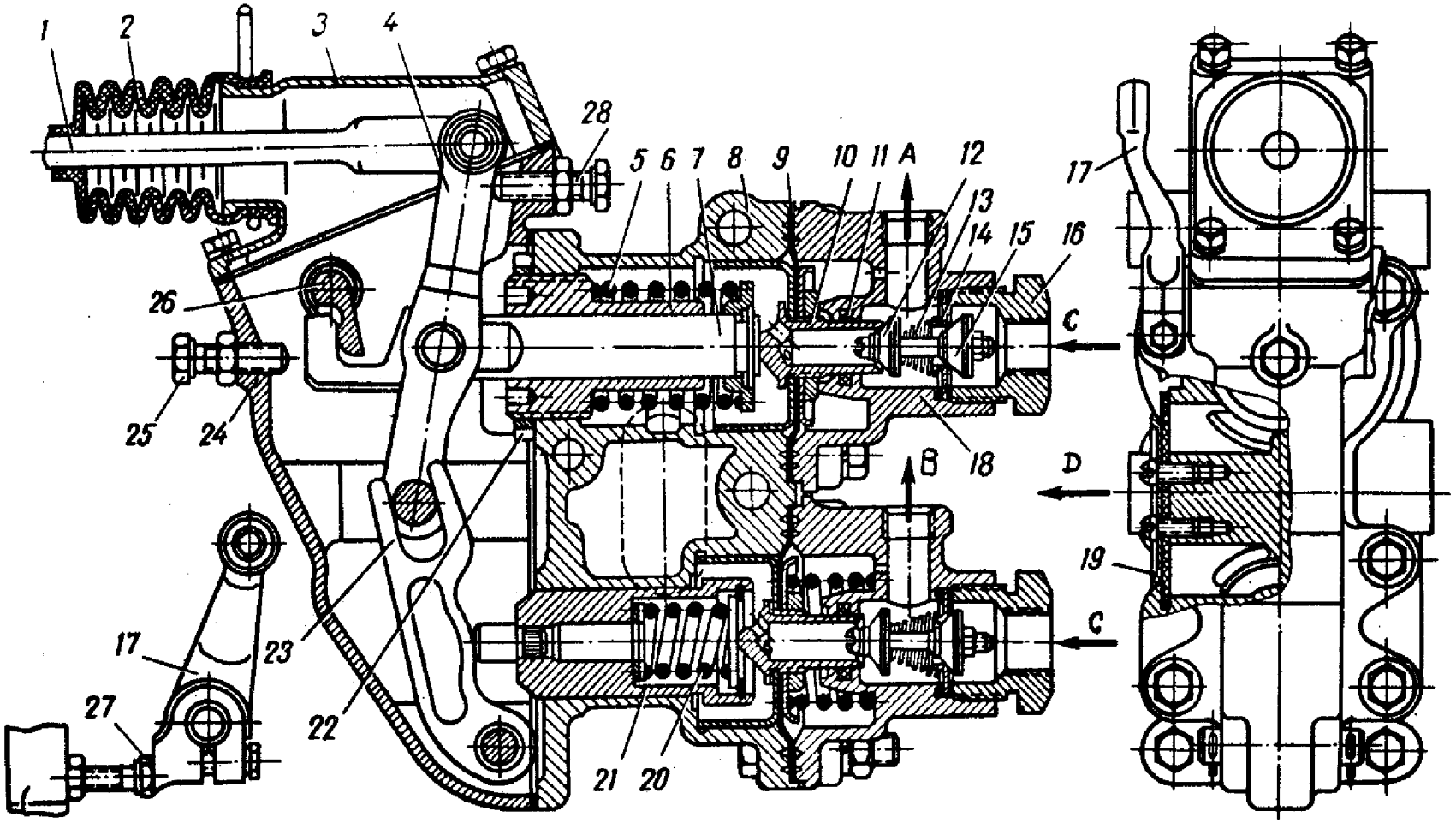


FIG. 58. BRAKE VALVE

Arrows show air flow direction: A - to trailer brake system; B - to brake chambers of truck; C - from air bottle; D - to atmosphere.
1 - brake valve control linkage rod; 2 - boot; 3 - lever housing cover; 4 - large lever; 5 - trailer chamber balancing spring; 6 - rod guide; 7 - rod; 8 - body; 9 - diaphragm with guide cup; 10 - outlet valve seat; 11 - sealing ring; 12 - outlet valve; 13 - valve return spring; 14 - inlet valve seat; 15 - inlet valve; 16 - plug; 17 - hand control lever; 18 - cap; 19 - outlet opening valve; 20 - truck brake chamber balancing spring; 21 - balancing spring sleeve; 22 - lock nut; 23 - small lever; 24 - lever housing; 25 - rod stop bolt; 26 - hand braking lever shaft; 27 - hand control lever stop bolt; 28 - adjusting bolt

2. Stop the engine.

3. Connect the pressure gauge to the air drive head of the trailer air brake system.

4. Open the cut-off valve of the trailer air brake system.

5. Take the pressure gauge readings. With the valve in good adjustment, the pressure should be within 4.8 to 5.3 kgf/cm^2. If not so, adjust the valve as follows:

- disconnect rod 1 of the brake valve and the rod of lever 17 of the manual brake control linkage;
- remove cover 3 of the lever housing;
- uncotter and remove the clevis pin of large lever 4 and rod 1 of the brake valve linkage;
- remove housing 24 of the brake valve levers;
- slacken lock nut 22 of the guide rod;
- by turning guide 6 of rod 7, adjust the pressure of the air delivered to the trailer brake system within the limits of 4.8 to 5.3 kgf/cm^2. Screwing the guide in increases the pressure.

Tighten lock nut 22 and assemble the valve control linkage, paying special attention to the position of the gasket used under levers housing cover 3.

Adjusting Free Travel of Levers

(To be performed without air supply to the brake valve)

1. The free travel of large lever 4 that causes no displacement of the diaphragm should be within 1 to 2 mm. The free travel is adjusted by adjusting bolt 28, locked by nut.

2. The free travel of brake valve manual control linkage lever 17 that causes no movement of the diaphragm should be from 1 to 2 mm.

The free travel is adjusted by bolt 27. After the adjustment is completed, tighten the lock nut of bolt 27.

3. The working stroke of rod 7 of the trailer brake chamber should be 5 mm. The rod stroke is adjusted by bolt 25. After the adjustment is over, tighten the lock nut.

PROCESS CHART No.25

CLEANING CENTRIFUGAL OIL FILTER

Performed by: driver.

Tools: wrenches, 10, 14 and 22 mm; spark plug wrench; large drift.

Time required: 10 min.

Operations and Specifications

1. Unscrew wing nut 1 (Fig.59) of the bowl and remove bowl 2.

2. Unscrew plug 3 and insert the large drift to hold the body against rotation.

3. Unscrew nut 4 of the cap by the spark plug wrench, remove cap 5 together with nut 4.

4. Clean cap 5 of dirt.

5. After cleaning wash cap 5 with gasoline or kerosene.

6. Remove the gauze filters (the gauze on the full-flow centrifugal oil filter) from the oil ducts supplying oil to the jets, wash the gauzes with gasoline or kerosene and blow out with compressed air.

When the gauzes are badly sludged and cannot be cleaned or when damaged, replace the gauzes.

7. Wash bowl 2.

8. Clean the bowl gasket of dirt.

9. To assemble, reverse the disassembly procedure.

Prior to installation of the bowl, check the centrifugal filter for free spinning from a hand push. When the centrifugal bowl spinning is unsatisfactory, take the following steps in addition to the operations given in Paras 1 through 8.

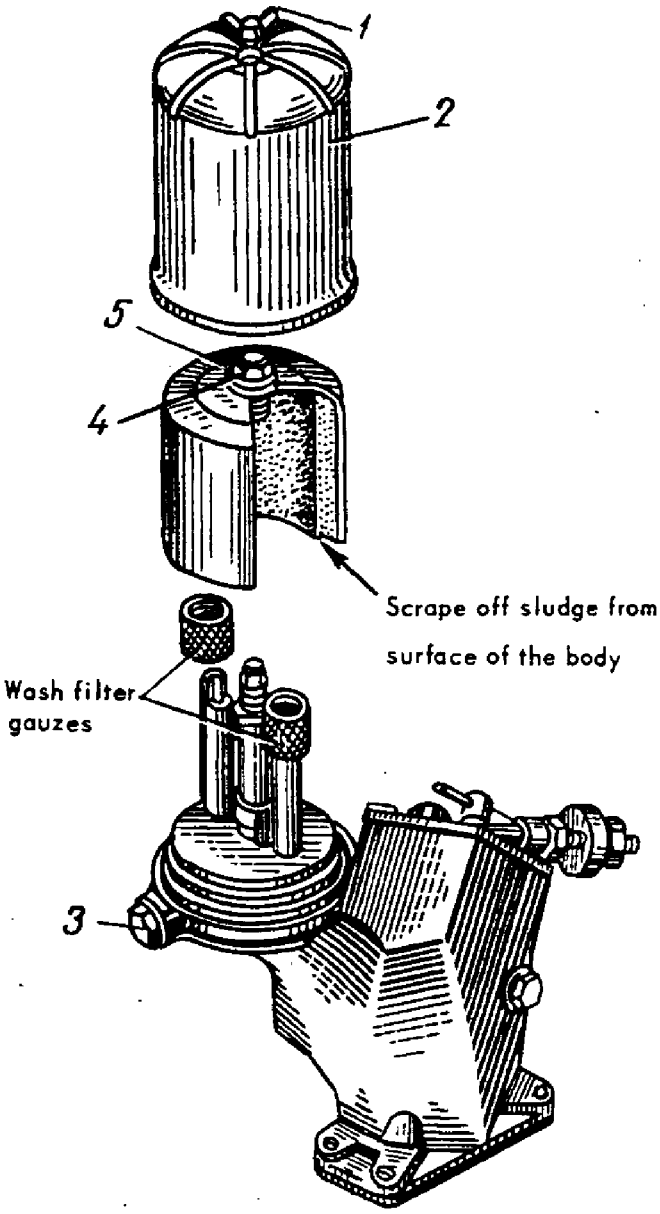


FIG.59. CLEANING AND WASHING FINE OIL FILTER

1 - bowl nut; 2 - bowl; 3 - plug; 4 - cap nut; 5 - body cap

10. Unscrew the axle nut. Remove the washers and the body from the axle and check the condition of the axle-bushing assembly.

11. Wash the bushings with gasoline or kerosene.

12. Clean the calibrated orifices of the jets.

13. Reassemble the filter in the reverse order.

CAUTION! 1. When assembling, see to it that the gauze filter (on a full-flow centrifugal filter) is concentrically fitted on the body shoulder.

2. Do not unscrew the axle nut and remove the centrifugal filter body from the axle to clean of sludge in order to prevent damage to the sliding bearings of the centrifugal filter body.

3. When removing the body from the axle, take care to prevent the thrust ring of the ball bearing from falling into the filter body.

4. When reassembling, the wing nut of the bowl must be tightened by hand only.

PROCESS CHART No.26

CHECKING CARBURETTOR

Performed by: automobile mechanic.

Tools: wrenches, 10, 12, 14 and 17 mm; screwdriver and combination pliers.

Time required: 65 min.

Operations and Specifications

1. Remove the air supply branch pipe from the carburettor (remove the air cleaner on the ЗИЛ-130 truck).

2. Disconnect the throttle valve control rod, the cable of the choke and throttle valves, two pipes of the maximum speed limiter and the gasoline pipe from the carburettor.

3. Remove the carburettor from the engine.

4. Remove the air horn body from the carburettor and wash it with clear gasoline or acetone.

5. Unscrew the carburettor filter plug, withdraw the filtering gauze and wash it.

6. Unscrew the body of needle valve 2 (Fig.60) of the float chamber and test it for airtightness on a special vacuum tester (Fig.61). In this case, the water level in check tube 2 should not drop at a vacuum equal to 1 m H_2O.

The needle valve can be tested for airtightness on the tester for carburettors and fuel pumps, Model 577 of the Kiev GARO plant.

7. Check the economizer valve for airtightness by the method given in Para.6.

8. Install the needle valve body in place and adjust the height of the needle valve by means of shims 4 (Fig.60). The height should be within 13.5 to 13.8 mm.

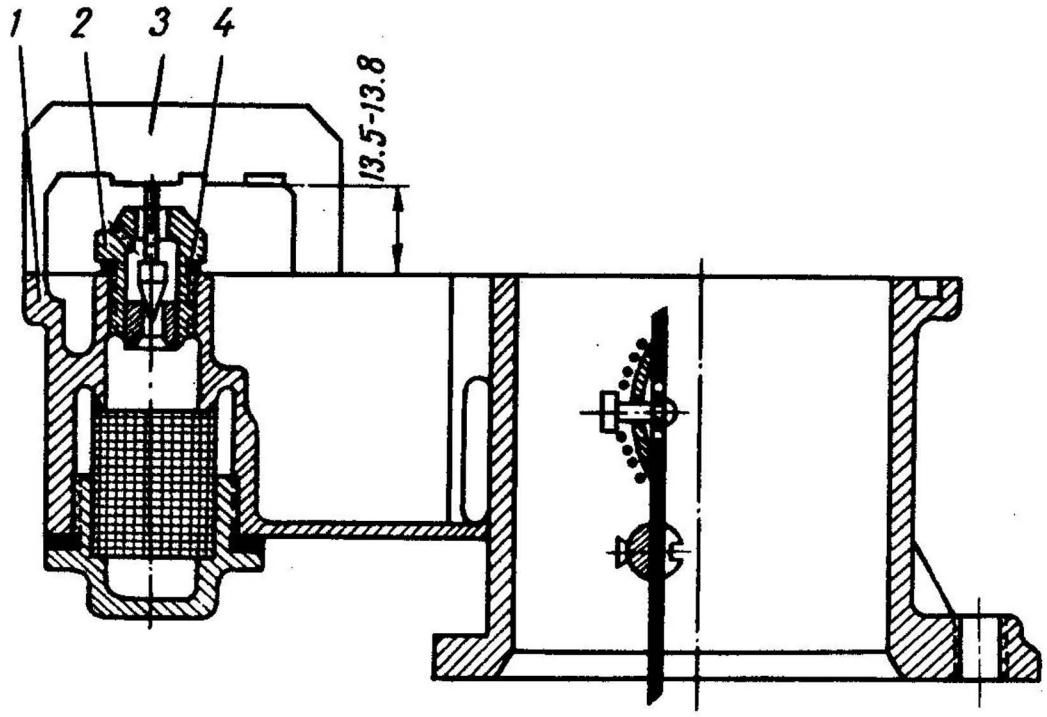


FIG.60. NEEDLE VALVE ADJUSTMENT CHECK

1 - body; 2 - valve; 3 - gauge; 4 - shims

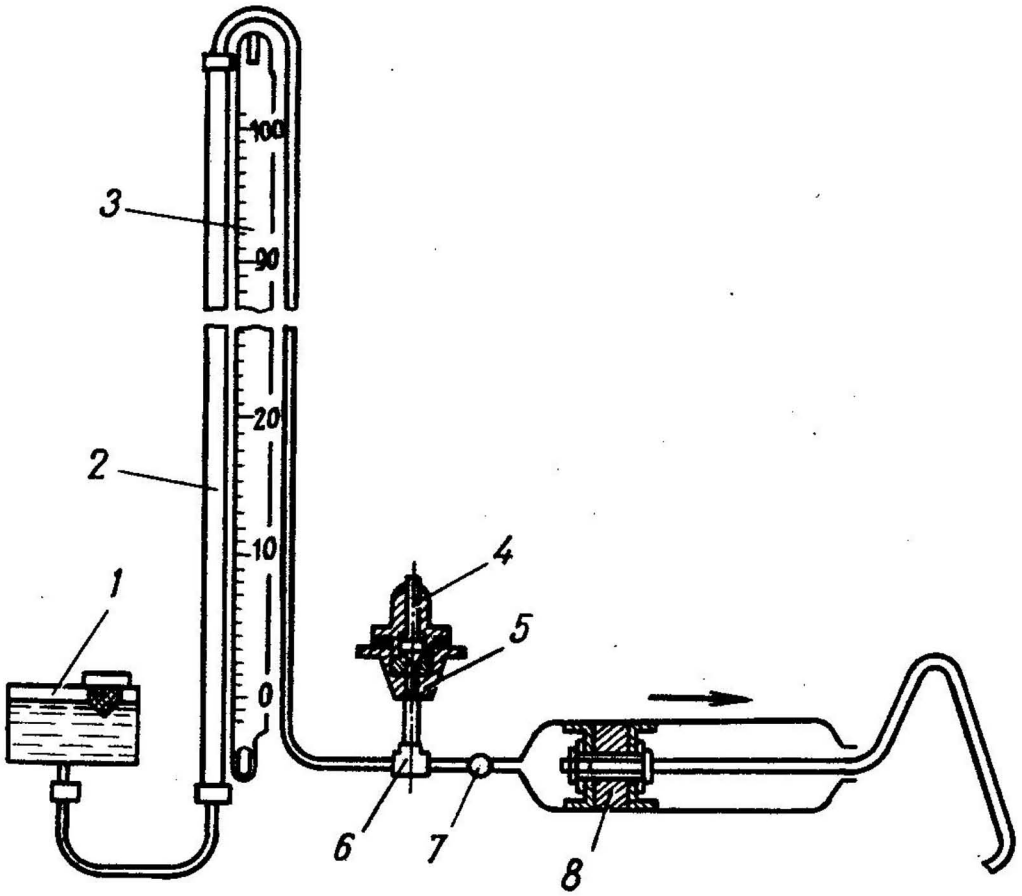


FIG.61. NEEDLE VALVE AIRTIGHTNESS TESTER

1 - tank; 2 - check tube; 3 - scale; 4 - needle valve; 5 - body; 6 - T-piece ing; 7 - valve; 8 - piston

9. Remove the float and check it for airtightness in a water bath heated to 80°C. If no air bubbles come from the float within 30 seconds, the float is in good condition. Defective float is corrected by soldering. After soldering the float is tested for airtightness and weight. A float complete with its lever should weigh from 19.2 to 20.2 g.

10. Clean all the parts of the carburettor of dirt and sludge, wash them with clear gasoline or acetone and blow through with compressed air.

11. Reassemble the carburettor, install it in place and connect the pipes and rods.

12. Using the priming lever, fill the float chamber of the carburettor.

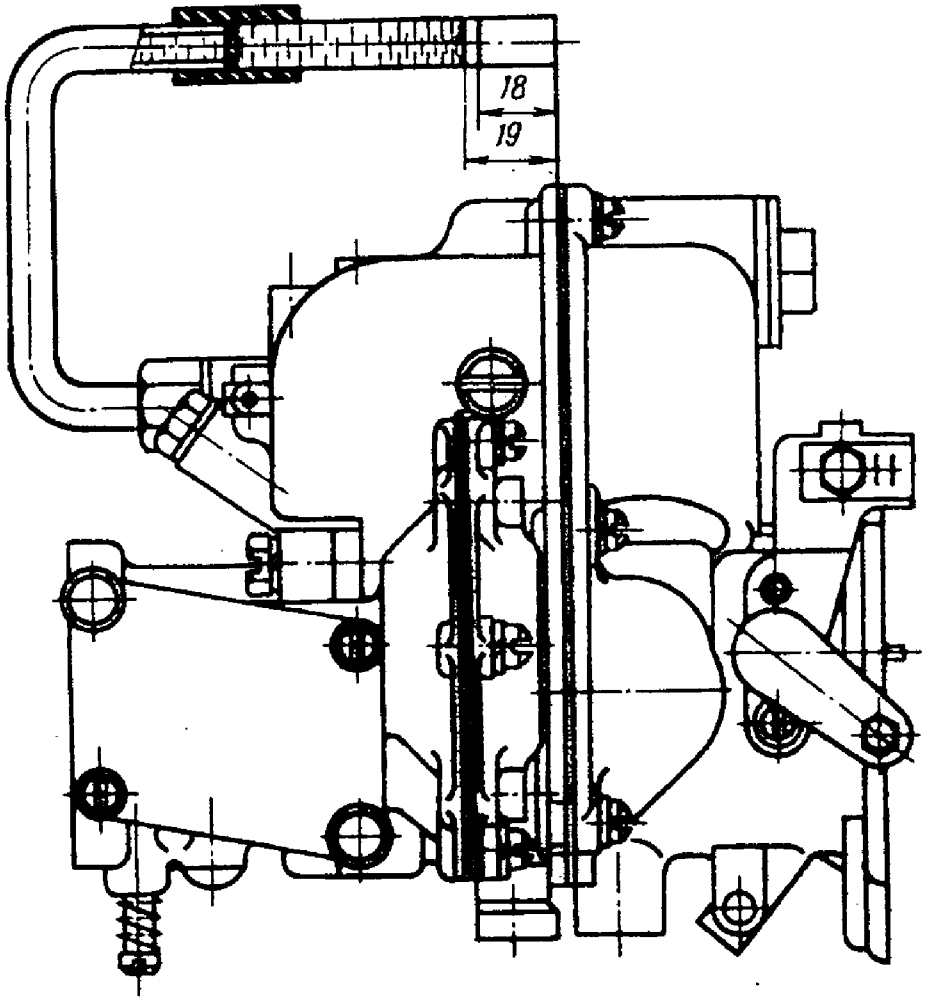


FIG. 62. CHECKING FUEL LEVEL IN CARBURETTOR FLOAT CHAMBER WITH THE AID OF GLASS TUBE

13. Start the engine.

14. Check the fuel level in the float chamber, for which purpose, unscrew the level check plug and observe the fuel level. With the carburettor in good adjustment, the fuel level will be seen and the fuel will not flow out. The fuel level should be 18 to 19 mm beneath the upper split plane of the carburettor.

15. If not so, adjust the fuel level by bending the float bracket.

The fuel level can be checked by means of a special gauge (Fig.62) which represents a glass pipe with rubber hose and adapter connections. To check the level, screw in the gauge connection instead of the plug closing the passage of the mechanical economizer.

PROCESS CHART No. 27

CHANGING OIL IN HYDRAULIC STEERING BOOSTER

Performed by: greaser.

Tools: wrenches, 17 and 19 mm; funnel with double strainer.

Time required: 10 min.

Operations and Specifications

1. Disconnect the drag link.

2. Turn the steering wheel to the left as far as it will go.

3. Unscrew the magnetic drain plug from the steering gear case and drain the oil out.

The oil is considered drained, if there is no leakage out of the drain hole.

4. Wash the hydraulic steering booster system, for which purpose, proceed as follows:

- using cotton waste, clean the steering booster pump tank of remaining used oil;

- wash the washer, rubber seal of the tank cap and the magnetic drain plug of the steering gear case, having cleaned them of dirt. Remove and wash the gauzes of the pump filters and reinstall them in place;

- using the funnel with double strainer, pour 1 litre of fresh oil in the steering booster pump tank and drain it out through the drain hole of the steering gear case. In doing so, turn the steering wheel from the left to the right extreme position.

5. Fill the case with fresh oil, for which purpose, proceed as follows:

- screw the magnetic drain plug in the drain hole of the steering gear case;

- pour not less than 2.5 kg of oil in the hydraulic steering booster tank. To this end, turn the steering wheel to the left as far as it will go and pour the oil in until it is seen above the gauze of the filling filter. Then, turning the steering wheel to the right and to the left as far as it will go, fill in the remaining oil;

- start the engine, set the idling speed and, turning the steering wheel from the left to the right as far as it will go and holding it in the extreme positions from 2 to 3 seconds with an effort of 10 kgf, replenish the oil until it is seen above the filter gauze (it is not required to cover the gauze completely). The filling operation is considered completed, when no air comes out of the system (in the form of bubbles) through the oil in the pump tank;

- stop the engine, reinstall the tank cap with the sealing gasket, rubber seal ring, cap fastening pins and washer and screw on the wing nut. The latter is tightened only by hand. In case of oil leakage at the tank cap, check for proper position of the cap gasket. Replace the gasket, if damaged.

6. Connect the drag link and grease the hinged joint.

PROCESS CHART No.28

CHECKING AND ADJUSTING GENERATOR REGULATOR

Performed by: electrician.

Tools and appliances: voltmeter, range of 30 volts; accuracy grade 0.5; ammeter, A.C., 50-0-50 scale range; accuracy grade not less than 1.5; tachometer 5000 rpm range and small screwdriver.

Time required: 30 min.

Operations and Specifications

Checking and Adjusting the Cut-Out Relay (Fig.63)

1. Connect the storage battery.

2. Disconnect the wire running to the Б terminal of the generator regulator and connect the ammeter between this wire and the terminal.

3. Connect the voltmeter between the Я terminal and the ground of the generator regulator.

4. Start the engine.

5. By increasing the speed of the generator armature, determine the voltage at which the contacts of the cut-out relay close.

The cut-out relay should cut in at 12.2 to 13.2 volts.

CAUTION! 1. If during an increase in the generator speed the voltmeter ceases to inscrease its readings and the relay fails to cut in, first check and adjust the voltage under regulation.

2. To connect the instruments to the Я and Б terminals of the generator regulator on the

ЗИЛ-131 truck, unscrew the nut, withdraw the plug, connect the instrument wire to it and insert the plug into the receptacle of the generator regulator so that the instrument wire is not in contact with the ground.

6. If the cut-in voltage of the cut-out relay is beyond the above-mentioned limits by more than 0.5 V, adjust the relay by reducing the spring tension at an increased voltage or decreasing the spring tension at a low cut-in voltage of the cut-out relay.

Perform the spring tension adjustment by bending the angle piece on the ЗИЛ-130 truck and by an adjusting nut on the ЗИЛ-131 vehicle. After the adjustment, the cut-out relay should be again tested for its electrical characteristics.

Checking and Adjusting Voltage Regulators
(Fig.64)

1. Disconnect the wire running to the Б terminal of the generator regulator and connect the ammeter between this wire and the terminal.

2. Connect the voltmeter between the Б terminal and the ground.

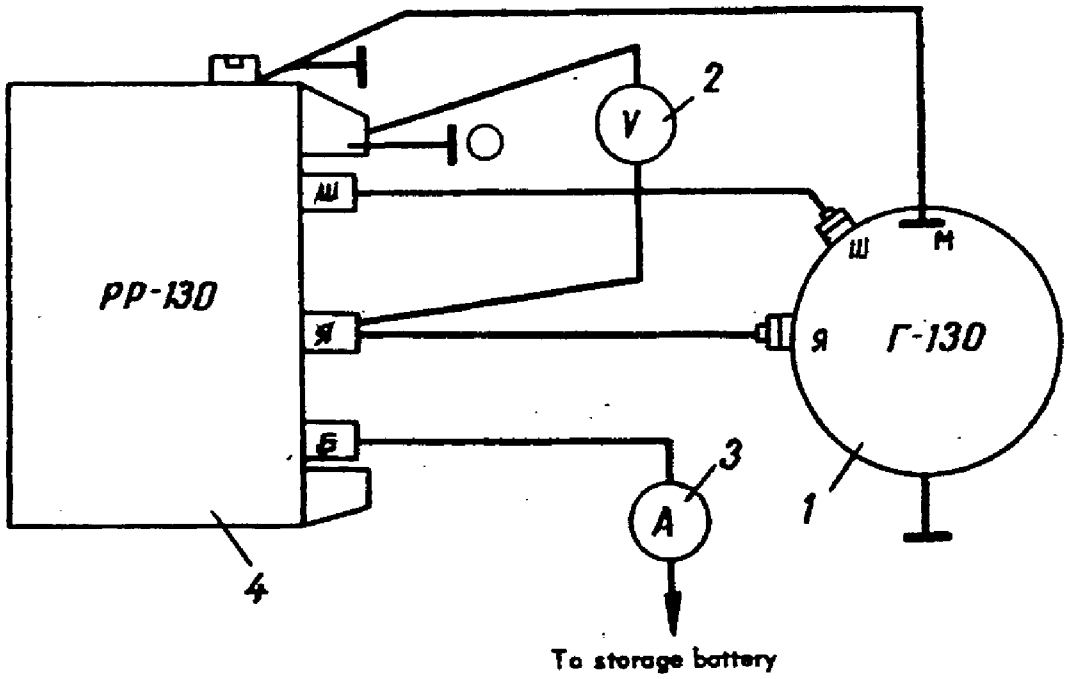
3. Start the engine and set its speed above the speed at which the cut-out relay cuts in.

4. Set the generator speed to about 3000 rpm for the ЗИЛ-131 truck and to 3500 rpm for the ЗИЛ-130 truck.

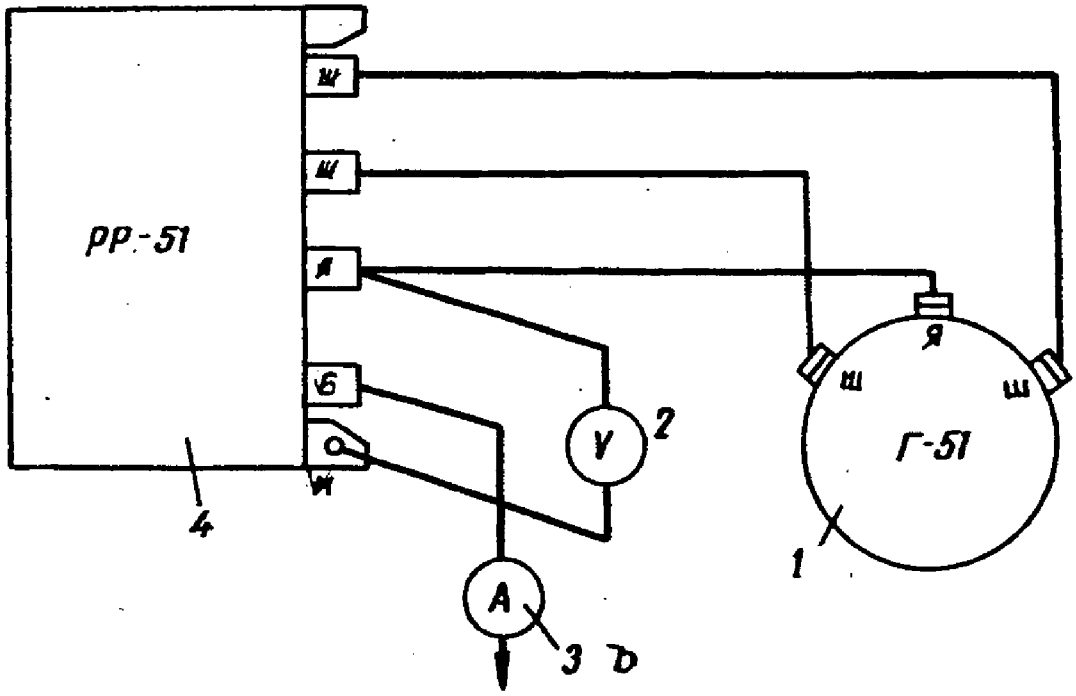
5. Connect loads to the Б terminal or use a load rheostat to create a load of 18 A for the ЗИЛ-131 truck and of 14 A for the ЗИЛ-130 truck.

6. Using the voltmeter, check the voltage being regulated. The voltage under regulation should be from 13.8 to 15.0 V for the ЗИЛ-131 truck and from 13.8 to 14.8 for the ЗИЛ-130 truck.

If the voltage under regulation is by more than 0.5 V greater than the above-mentioned limits, decrease the tension of the armature spring.



а



b

FIG.63. CUT-OUT RELAY TESTING DIAGRAM

a - on ЗИЛ-130 truck; b - on ЗИЛ-131 truck; 1 - generator; 2 - voltmeter; 3 - ammeter; 4 - generator regulator

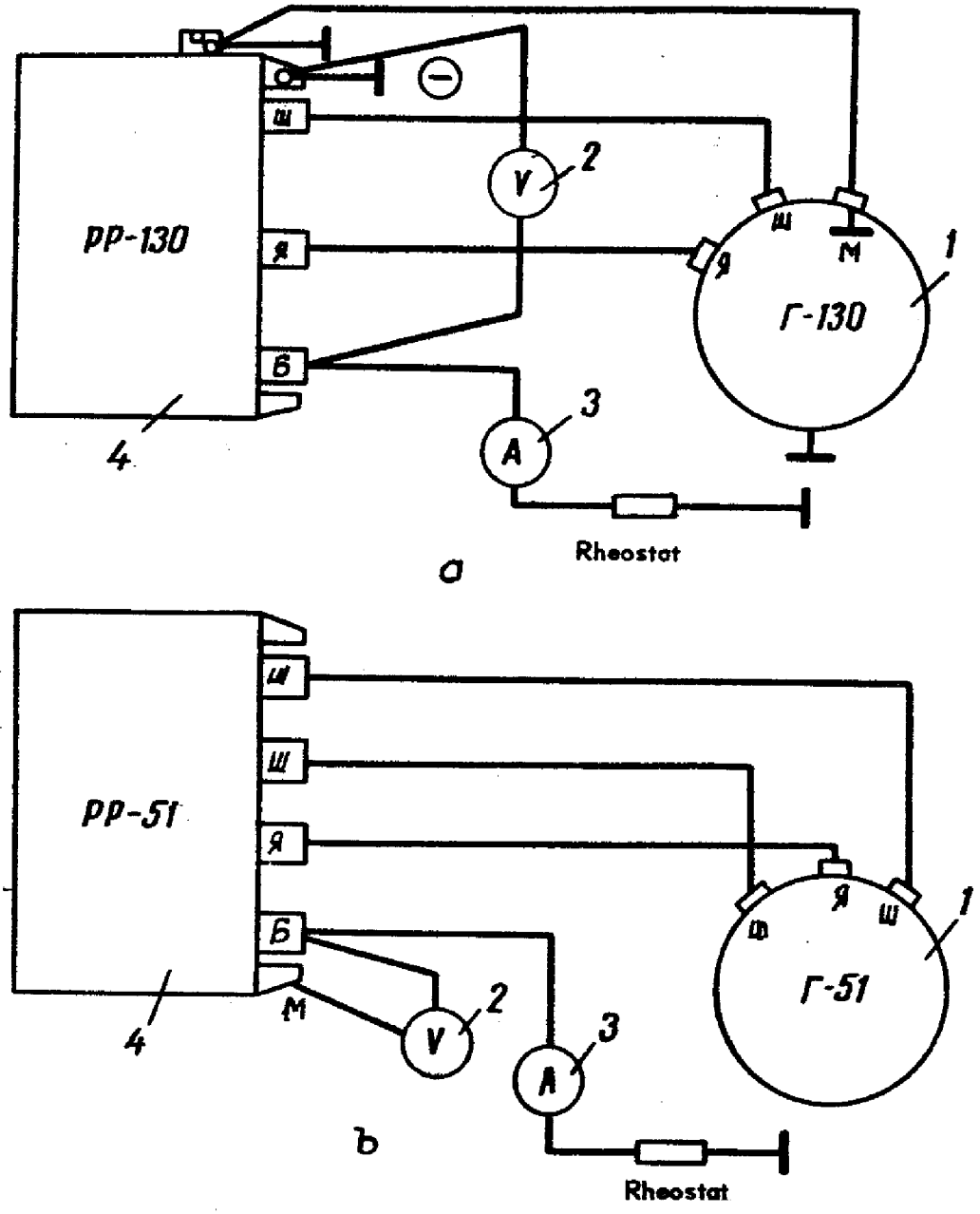


FIG.64. CURRENT REGULATOR AND VOLTAGE REGULATOR TESTING DIAGRAM

a - on ЗИЛ-130 truck; b - on ЗИЛ-131 truck; 1 - generator; 2 - voltmeter; 3 - ammeter; 4 - generator regulator

If the voltage being regulated is less than the voltage at which the cut-out relay cuts in, increase the tension of the voltage regulator spring.

Checking and Adjusting Current Regulator (Fig. 64)

1. Connect the instruments as during testing the voltage regulator.

2. Start the engine.

3. Bring the generator speed to 3000 rpm for the ЗИЛ-131 truck and to 3500 rpm for the ЗИЛ-130 truck.

4. Gradually increasing the load by the rheostat, observe when the ammeter pointer stops.

5. Check the readings of the ammeter.

The maximum current limit should be from 33.0 to 37.0 A for the ЗИЛ-131 truck and from 26.5 to 29.5 for the ЗИЛ-130 truck.

If the current value is beyond these limits, adjust the current regulator by changing the tension of the armature spring. To increase the current, the spring tension should be increased and vice versa.

When adjusting the components of the generator regulator, see to it that the locking lug of the angle piece fits the cut in the adjusting nut.

LAYOUT AND FASTENING OF TOOLS AND ACCESSORIES ON ЗИЛ-130 AND ЗИЛ-131 TRUCKS

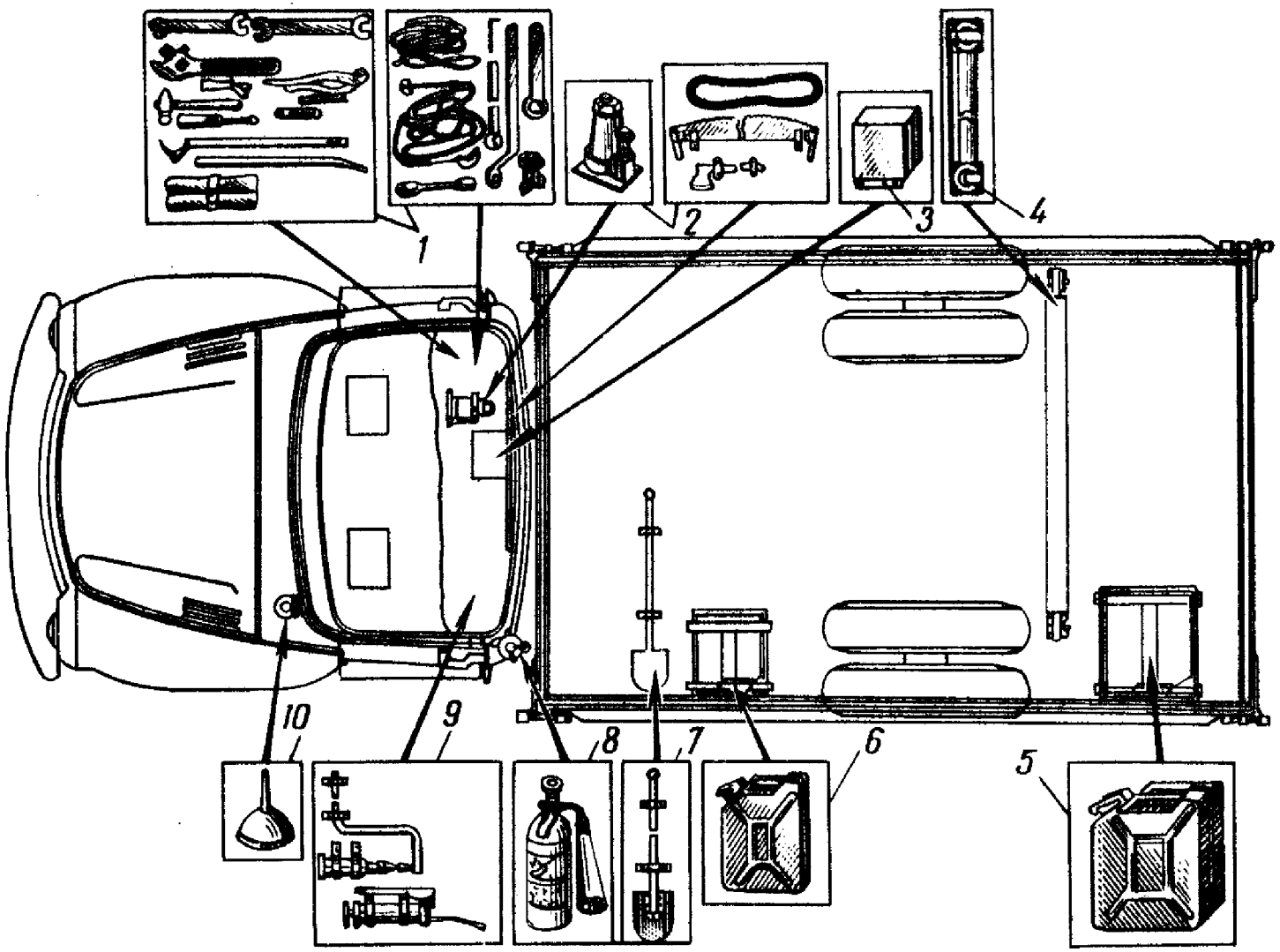


FIG. 65. LAYOUT AND FASTENING OF TOOLS AND ACCESSORIES ON ЗИЛ-130 TRUCK

1 - tools kit stowed under passenger's seat; 2 - attachment (under passenger's seat) of jack, saw and spare belts (on cab wall, behind passenger's seat back); 3 - box tools kit; 4 - tow bar attachment; 5 - canister attachment; 6 - fuel canister attachment; 7 - spade attachment; 8 - fire extinguisher attachment; 9 - attachment of crank, oil gun and grease gun; 10 - oiler attachment

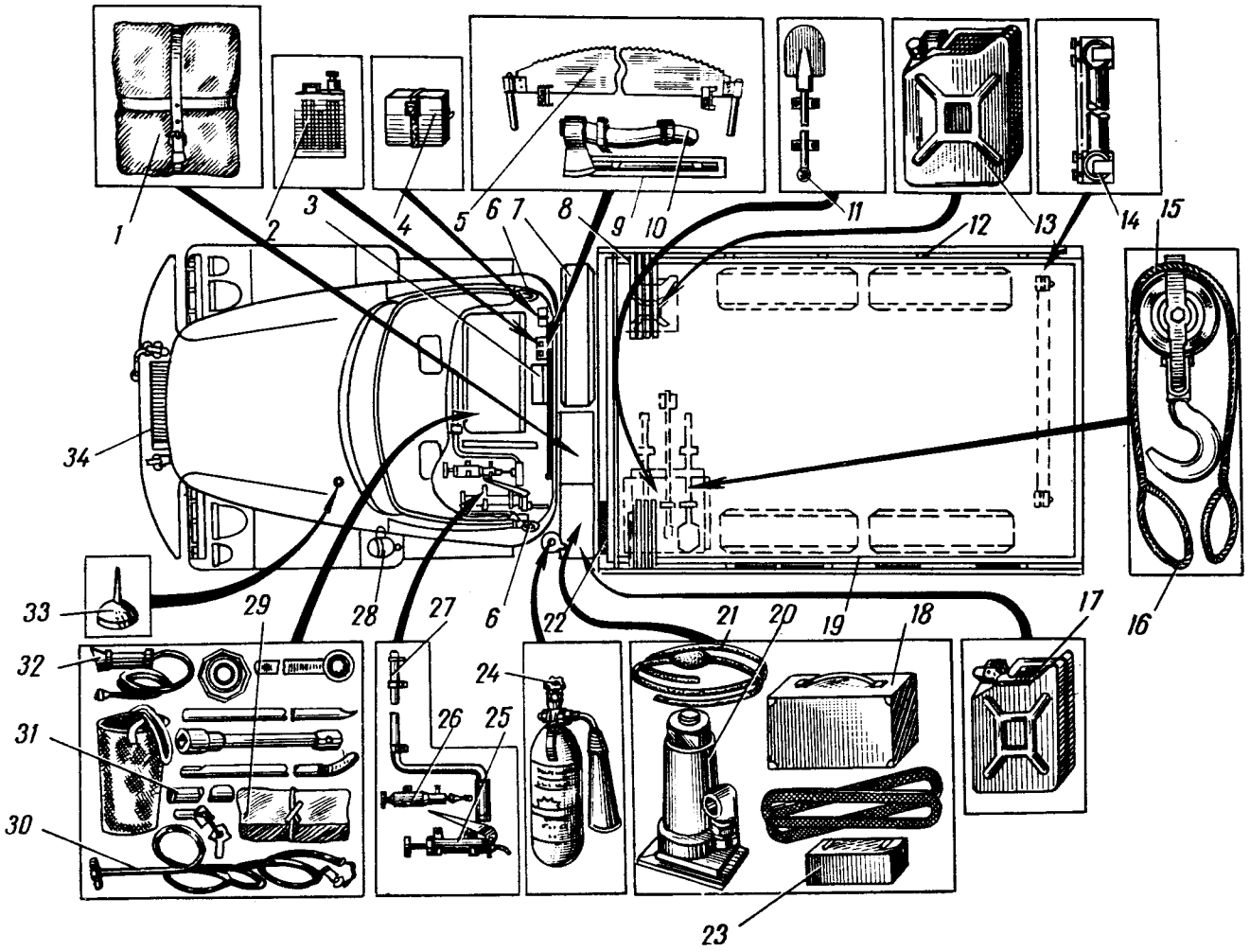
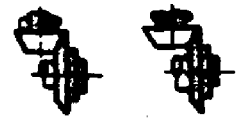


FIG.66. LAYOUT AND FASTENING OF TOOLS AND ACCESSORIES ON ЗИЛ-131 TRUCK

1 - platform tent (in a box between cab and platform); 2 - drinking water tank (behind passenger's seat); 3 - gas mask seat; 4 - first-aid kit (behind passenger's seat); 5 - saw attachment (on cab wall behind seats); 6 - attachment of clamps and bearing plates (at seat sides in cab corners); 7 - spare wheel; 8 - attachment of tent bows (in special sockets in front part of platform); 9 - attachment of windshield central bar and weather rubber strip (on cab wall behind seats); 10 - ax attachment (on cab wall behind seats); 11 - spade attachment (under platform); 12 - attachment of auxiliary seat back (right-hand side); 13 - attachment of tank (canister) for special fluid; 14 - towing bar attachment (under platform); 15 - winch pulley block with hook (in the tool box under platform); 16 - towing cable (in tool box under platform); 17 - attachment of spare oil tank (in box between cab and platform); 18 - stowage of night vision device (in box between cab and platform); 19 - attachment of auxiliary seat (on the left-hand side); 20 - hydraulic jack attachment (in box between cab and platform); 21 - fuel hand-operated pump (in box between cab and the platform); 22 - bow braces attachment (on front wall of platform); 23 - attachment of box with a set small parts (in box between cab and platform); 24 - fire extinguisher attachment; 25 - plunger grease gun attachment; 26 - lubricating gun attachment; 27 - crank handle fastening; 28 - swivel lamp; 29 - tool bag; 30 - tyre inflation hose; 31 - antifreeze draining hose; 32 - inspection lamp; 33 - drop oiler; 34 - winch

ADJUSTING TOOTH CONTACT PATTERNS OF AXLE DRIVE BEVEL GEARS

Position of contact pattern on driven gear	Methods to obtain correct meshing	Gear displacement direction
Forward motion / Rearward motion		
		
	Correct contact of spiral bevel gears	
	Move the driven gear to the driving pinion. If the result is a too small backlash, move the driving pinion somewhat out	
	Move the driven gear somewhat out of the driving pinion. If the result is an excessive backlash, move the driving pinion to the driven gear	
	Move the driving pinion more to the driven gear. If the backlash is too small, move the driven gear somewhat out of the driving pinion	
	Move the driving pinion somewhat out of the driving pinion. If the backlash is too large, move the driven gear to the driving pinion	

Note. When the driven gear moves, hold it with the hand.

Fig. No.	Description of unit or mechanism	Number of lubricating points		Amount of lubricant, litres	
		ЗИЛ-131	ЗИЛ-130	ЗИЛ-131	ЗИЛ-130
1	2	3	4	5	6
	Lubricate with AC-8 Oil, GOST 10541-63				
5	Engine crankcase	1	1	9.5	8.0 or 8.5 with oil cooler in use. With partial-flow centrifugal oil filter 8.5 and 9.0, respectively
20a, b	Engine air cleaner	1	1	3.2	0.63

ЗИЛ-130 AND ЗИЛ-131 TRUCKS

Type of maintenance				Additional instructions
Daily maintenance	PM No.1	PM No.2	Additional operations performed every 6 months	
7	8	9	10	11
or АСЗп-10 Oil, МРТУ-12Н No.32 - 63				
Check oil level and replenish, if needed	-	Change oil	-	Check oil level before each run
-	Change oil		-	Wash bath and filtering element with gasoline or kerosene. Fill with fresh oil. When truck is used in dust laden atmosphere, wash filter

1	2	3	4	5	6
20,c	Air filter of crankcase ventilation	1	1	0.07	0.11
33,b	Maximum speed limiter sending unit	1	1	Several drops	
33,c	Ignition distributor:				
	Cam bushing	1	1	2 to 3 drops	
	Arm pin	1	1	1 to 2 drops	
	Cam wick	-	1	1 to 2 drops	
33,e	Pintle hook detent and latch pin	2	2	As required	
33,f	Cab door hinges	4	4	Same	
33,f	Cab door locks	2	2	Same	
33,f	Hood lock	1	1	Same	
	Platform side hinges	3	3	Same	
	Hood hinges	2	2	As required	
	All hinged joints of rods and levers	-	-	-	
	Lubricate with T-145 Automotive Transmission Oil MPTY 38-1-185-65. The Substitute is TAn-15				
18,a	Gear box case	1	1	5.1 or 6.7 with the power take-off	

7	8	9	10	11
-			-	and change oil every other day
-		Change oil	-	Same
-		Use drop oiler by depressing ball with oiler spout	-	-
-	-	Use drop oiler	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	-
-	-	Same	-	Lubricate in case of creak noise or during repair
(with Additive), MPTY-12H No.34-63 or TAn-15B Oil, Oil, GOST 8412-57				
5.1	Check oil level and replenish, if needed	Change oil during the the 6th PM No.2	-	When TAn-15 substitute is used, change oil every other PM No.2

1	2	3	4	5	6
18,b	Transfer case	1	-	3.3	-
18,e,f,g	Driving axle housings	3	1	5.0 in each	4.5
18,c	Universal joints of axle drive propeller shafts	8	3	0.3	As required
18,d	Universal joints of winch drive propeller shafts	-	3	0.03	-
18,h	Universal joints of steering column propeller shaft	2	2	As required	
18,i	Walking beam suspension hubs	2	-	0.0325 each	-
30,f	Winch reduction gear	1	-	2.4	-

7	8	9	10	11
-	Check oil level and replenish, is needed	Change oil during the 6th PM No. 2	-	When TAn-15 substitute is used, change oil every other PM No. 2
-	Same	Same	-	Same
-	Pack with grease through the lubrication fitting until grease is forced out of valve		-	When truck is used in sandy localities and on dirty roads, lubricate every other day
	Same		-	Same
-	Same		-	Same
-		Change oil		Change oil every other PM No. 2. Fill up to check hole level
-	-		Change oil	Check oil level after 15 to 20 recovery operations. When water and dirt get into oil, change regardless of service period

1	2	3	4	5	6
		Lubricate with YC-1 Grease (Press Solid or Solid Oil, Grade "C",			
30,a	Clutch release fork	2	2	As required	
30,a	Clutch pedal shaft	1	1	Same	
30,b	Splines of propeller shafts:				
	Main shaft	1	1	0.24	0.20
	Front and rear axle shafts	1	-	0.24	-
	Front-rear axle shaft	1	-	0.46	-
30,c	Winch propeller shaft splines	1	-	As required	-
17,a	Steering rod hinged joints	4	4	As required	
17,b	Spring bolts	2	4	As required	

7	8	9	10	11
Oil), GOST 1033-51, Press Solid Oil, Grade "C" GOST 4366-64				
-	-	Pack in until grease is forced out of clearances	-	-
-	-	Same	-	-
-	-	Remove splined yoke, remove used grease and pack with fresh grease	-	Grease every 4th PM No. 2 on ЗИЛ-131 and every 3rd PM No.2 on ЗИЛ-130 truck
-	-		-	
-	-		-	
-	-	Pack in through lubrication fitting until grease is forced out	-	
-	Pack in until grease is forced out	-	-	When truck is used in sandy localities and on very dirty roads, grease every day
-	Pack in through lubrication fitting until	-	-	Same

1	2	3	4	5	6
17,c	Steering knuckle king pins	-	4	As required	
30,d	Worm gear of wheel brake adjusting levers	6	4	0.045kg in each	0.045kg in each
17,d	Expansion cam shafts of wheel brakes	6	4	As required	
30,e	Pintle hook stem	2	2	Same	
-	Window raiser parts	2	2	Same	
30,f	Winch drum hubs	2	-	Same	

7	8	9	10	11
	grease is forced out			
-	Same	-	-	When truck is used in sandy localities and on very dirty roads, grease every day
-	-	Pack in until grease is forced out through the clearances	-	Grease every 2nd PM No. 2. Before packing, replace lever plug with lubrication fitting
-	Pack in until grease is forced out through the clearances	-	-	-
-	Same	Pack in until grease is forced out through the clearances	-	On ЗИЛ-130 truck used with trailer, grease every PM No.1
-	-	-	-	Grease during repair
-	-	Pack in until grease is forced out through the clearances	-	Grease regardless of whether it was used or not

1	2	3	4	5	6
30,g	Winch drum drive shaft	2	-	As required	-
30,h	Release sleeve of winch drum	1	-	Same	-
30,i	Guide roller of winch cable	2	-	Same	-
		Lubricate with 1-13c Grease BTY			
31,a	Bearings of water pump	1	1	0.095kg	0.215kg
31,a	Bearings of fan	1	-	0.025kg	-
31,b	Distributor drive shaft	1	1	As required	

7	8	9	10	11
-	-	Pack in until grease is forced out through the clearances	-	Grease regardless of whether it was used or not
-	-	Apply thin coating to winch drum shaft where it is mated with the sleeve, shifting sleeve from ENGAGED (ВКЛЮЧЕНО) to RELEASED (ВЫКЛЮЧЕНО) position	-	Same
-	-	Pack in until fresh grease is forced out	-	Same
НП No.5 - 58 ЯНЗ-2 Grease, GOST 9432-60				
-	-	Pack in until fresh grease is forced out of check hole	-	Grease every 4th PM No.2. Before greasing unscrew check plug
-	-	Grease through lubrication fitting	-	Grease every 4th PM No.2
-		Turn the cap of grease cup 0.5 to 1 revolution	-	-

1	2	3	4	5	6
31,c	Bearing of propeller shaft intermediate support	-	1	-	0.04 kg
	Splines of steering column universal joint shaft	1	1	18 to 20 g	
31,d, e	Bearings of wheel hubs	6	4	0.8 kg in each hub	0.5 kg in each hub of front axle and 1.0 kg in each hub of rear axle
	Lubricate with Automotive Grease Used				
34	Axle shaft joints and king pin bearings	2	-	1.3kg in each	

7	8	9	10	11
-	Pack in until fresh grease is forced out of check hole	-	-	Grease every other PM No. 1
-	-	-	Disassemble shaft, remove used grease and pack with fresh grease	Grease every year (in autumn)
-	-	Pack grease between rollers and cage and in hub pockets	-	Grease every 2nd PM No.2
for Front Driving Axles, Grade AM, GOST 5730-51				
		Pack in until fresh grease is forced out of check hole	-	Change grease when disassembling the joint every other PM No.2

1	2 *	3	4	5	6
	Lubricate with Graphite Grease, Grade УСс-А,				
-	Spring leaves	4	4	1.0 kg	1.0 kg
-	Horn contact ring	1	1	0.001 kg	
	Lubricate with Grease 158, МРТУ 12Н GOST				
35,c	Generator bearings	-	2	-	0.003 to 0.004 kg
35,a	Brake valve	1	1	As required	
35,b	Rubber roller and locking clamp of turn indicator lever	1	1	As required	

7	8	9	10	11
GOST 3333-55				
-	-	-	-	Grease during repair operations
-	-	-	-	Same
No.139 - 64 or Grease ЦИАТИМ-201, 6267-59				
-	-	-	-	Grease at 75,000-km intervals. Disassemble generator, remove used grease and pack fresh grease
-	-	-	-	Grease valve working surfaces at 35,000 to 50,000-km intervals. If use is made of ЦИАТИМ-201 grease, apply lubricant every 20,000 to 25,000 km of run
-	-	Remove turn indicator cover and coat roller and clamp	-	-

1	2	3	4	5	6
	Lubricate with Oil, Grade "P", Employed in is Turbine Oil 22, GOST 32-53 or Industrial				
19	Hydraulic booster and steering gear	1	1	3.2	2.75
	Lubricate with Spindle Oil, Grade AV GOST 1642-50, and 50% of Turbine Oil 22, GOST 32-53 or				
-	Telescopic shock absorbers	2	2	0.45 in each	0.355 in each

7	8	9	10	11
Hydraulic Systems TU-38-1-110-67 (Substitute Oil 20, (Spindle Oil 3), GOST 1707-51				
-	Check oil level and replenish, if needed	-	Change oil	When "P"-grade oil is used, no oil change is required. Substitute must be changed twice a year
Mixture of 50% of Transformer Oil, GOST 10121-62 AK-12T Shock-Absorber Fluid, MPTU 38-1-165-65				
-	-	-	-	Change oil every 35,000 to 50,000 km, but at least every year. Do not replenish oil

CAPACITIES, lit

Description	Truck model	
	ЗИЛ-130	ЗИЛ-131
Fuel tanks:		
Main fuel tank	170	170
Auxiliary fuel tank	-	170
Engine lubricating system:		
with oil cooler	9.0	9.5
without oil cooler	8.5	-
Engine cooling system:		
with heater and preheater	29	29
without heater and preheater	26	26
Engine air cleaner	0.63	3.2
Air filter of engine crankcase ventilation	0.11	0.11
Gear box case:		
without power take-off	5.1	5.1
with power take-off	6.7	6.7
Transfer case	-	3.3
Driving axle housings:		
front axle	-	5
front-rear axle	-	5
rear axle	4.5	5
Hydraulic steering booster and steering gear case	2.8	3.2
Walking beam hubs	-	0.325 each
Telescopic shock absorbers	0.355 each	0.45 each

C O N T E N T S