

PRESTARTING PROCEDURE

Dealers must give your automobile a Free Service inspection laid down in the service book.

Before driving automobiles from the Manufacturer to Distributors/Dealers, it is necessary to carry out all the operations laid down in the section "Daily Maintenance".

AUTOMOBILE RUNNING-IN

The automobile service life depends to a greater extent on the operating mode during the initial service period. During this period, it is necessary to pay much attention to the special maintenance of the automobile. The running-in kilometrage is equal to 1000 km.

During the running-in period, observe the following rules:

1. Do not overload the automobile.
2. Do not move on hard-surfaced roads (deep mud, sandy soils, steep up-grades etc.)
3. Do not exceed the following speed limits:
in direct gear 45-50 km/h;
in the third gear..... 30 km/h;
in the second gear 20 km/h;
in the first gear 12 km/h.
4. Do not change oils filled in the engine and units at the manufacturing plant.
5. Check the temperature of brake drums and in case of raising the temperature, adjust them in compliance with the instructions laid down in the section "Brakes".
6. Check the temperature of wheel hubs and in case of raising the temperature, loosen the tightness of bearings.
7. Check condition of all attachment. Check the connections of pipes; if oils, fuel, coolant and hydraulic fluids leak, eliminate defects.

STARTING AND SHUTTING DOWN THE ENGINE

Starting the Engine

Before starting the engine, check the coolant level in the engine cooling system, fuel level and oil in the engine crankcase.

Prime the carburettor by means of the fuel pump hand primer.

Starting from Cold at 0 °C and Above.

Shift the gearshift lever in the neutral.

Press the throttle valve control pedal (the accelerator pedal) several times.

Disengage the clutch and switch on the ignition and the starter. Switch on the starter for 5 s maximum. Intervals between starting attempts should be at least 10-15 s.

(It is not recommended to switch on the starter for more than three times in succession, stop starting, check the engine, detect and eliminate defects.)

As soon as the engine is started, immediately release the key. Warm up the engine. The temperature of coolant must be not less than 60 °C.

It is forbidden to increase a crankshaft speed for warming-up the engine.

Starting from Cold at Temperature Below - 20 °C.

Before starting the engine, carry out the following operations:

1. Close the radiator shutter and mount the radiator shell warmth-keeping cover.

2. Using the starting handle, turn over the engine crankshaft for 3-5 times.

3. Pull the choke control knob all the way out (preliminary, the throttle valve control pedal should be pressed).

Carry out the subsequent operations in the order specified for starting the engine at temperatures of 0 °C and above.

After the engine is warmed up, push the choke control knob all the way in.

Starting from Cold at Temperature Below - 20 °C.

Before starting the engine at a low temperature, warm it up (by means of hot water, steam or air etc.).

Before starting the engine, it is recommended to warm up the transistor commutator, for this purpose switch on the ignition, and start the engine in 3 minutes.

Carry out the subsequent operations in the order specified for starting the engine at temperatures of 0 °C to -20 °C.

Starting from Hot.

When starting from hot, do not push the choke valve control knob in, and the throttle valve control pedal is not be sharply

depressed, as it results in overenrichment of the air-fuel mixture, and the engine fails to be started.

To eliminate the overenrichment, blow through the engine cylinders with air for which purpose smoothly depress the throttle valve control pedal up to the toeboard, and immediately turn over the crankshaft by means of the starter for several times.

Shutting down the engine

Before shutting down the engine, let it run for 1-2 minutes at a low crankshaft speed for gradual and uniform cooling and thereafter switch off the ignition.

FEATURES OF DRIVING UNDER DIFFERENT ROAD, METEOROLOGICAL AND CLIMATIC SERVICE CONDITIONS

The operation and service of automobile depends to a greater extent on features of its driving. When driving correct, the automobile could run at a high middle speed and consume not much fuel when overcoming almost impassable sections of roads. **We recommend to shift in the second gear for starting the automobile away from rest on level sections of roads or on down-grades. In other cases, shift in the first gear for starting away from rest. Disengage the clutch when shifting in gears.**

Move the gearshift lever smoothly and without jerks. If a required gear is not shifted before starting the automobile away from rest, release the clutch pedal gently, and then disengage the clutch again and shift in a gear.

Shift in the reverse gear only after a complete stop of the automobile. When operating the automobile, do not keep the foot on the clutch pedal, as it would result in clutch partial disengaging and disk slipping. On slippery roads, drive the automobile evenly, with a low speed.

When braking engine, release completely the accelerator pedal.

Brake the automobile smoothly by depressing the braking pedal slowly. When braking unnecessarily, the tyres are worn quickly, and the fuel consumption is increased. When braking, do not allow slipping the wheels, as it decreases the efficiency of braking (in comparison with braking during rolling) and

increases wear of tyres. Besides, sharply and heavy braking could provoke skidding of the automobile.

When the automobile is to be operated on off-the-road (sand, mud, snow etc.), slippery roads, steep up-grades (more than 15 °C) and on other complicated sections of roads, do not overload the engine. In this case, engage the front axle, and on very complicated sections of roads, shift also the transfer box to a low range. Before engaging the front axle, engage the front wheels. Engage the front axle in motion, and shift the transfer box to low range only after a complete stop of the automobile.

Overcoming Steep Up-Grades and Down-Grades. When driving on roads with steep up-grades and down-grades, a driver should be very intent. Determine preliminarily an up-hill gradient and shift in a required gear which would ensure a required traction force of wheels. When overcoming steep up-grades, shift the transfer box to a low range and the gearbox in the first gear. Overcome up-grades without stopping and turnings, as far as possible. Overcome short up-grades provided with a convenient access and smooth riding surface by speeding up without engaging the transfer box to a low range and by shifting the gearbox in the second or third gears depending on an up-hill gradient. If for some reason, it is impossible to overcome an up-grade, take all precautions and descend slowly by shifting in the reverse gear. Descend little by little, do not speed up the automobile and do not disengage the clutch. When overcoming steep down-grades, take measures to ensure the safety of descending. When overcoming a long down-grade (more than 50 m), determine preliminarily its steepness, shift the gearbox in a required gear and engage the transfer box to a required range. Overcome such down-grades by engine braking.

Overcoming Gutters, Roadside Cuvettes and Ditches. Overcome gutters, roadside cuvettes and ditches at a low speed with the front axle engaged in the direction perpendicular to a down-grade with regard to dimensions of the automobile defining its cross-country capability. Do not overcome an obstacle with a rush, if a frontal impact against wheels could be occurred .

Moving Along Muddy Country Roads and Graded Clay and Gumbo Roads. When moving along clay and gumbo roads after pouring rain, the automobile could slip off the road. Be careful when choosing a direction of motion. Choose relatively level

grounds when moving along rut-roads if possible. It is very difficult to drive the automobile on very wet graded earth roads provided with steep grades and deep cuvetts. On these roads, drive carefully on the crest of the corrugation and at a low speed.

Marsh-Ridden Sections of Roads. Overcome marsh-ridden sections on straight line without sharp turns and stops. Engage the front axle and engage the transfer box to a low range, shift the gearbox in a gear which would provide a required traction force of the driving wheels. Turn smoothly with a great radius, do not decrease a speed. Do not drive on the track paved of an ahead moving automobile.

Sandy Soils. When overcoming sandy soils, drive smoothly without jerks and stops. Turn smoothly and with great radius. Shift in a possible high gear and engage the front axle, overcome sandy drifts and short sandy up-grades in a rush. Do not allow slipping the wheel, determine road conditions preliminarily and shift in a required gear which would provide a required traction force of wheels.

Fording.

Overcome a ford with a great care. The automobile could overcome a ford of a 500 m depth with a hard bottom at a low speed. Before overcoming a ford, check the bottom, make sure that there are no deep pits, big stones, swampy grounds, check the ground where the automobile would enter water and go out of water.

Cut the radiator shutter if it is available.

Overcome a ford slowly, do not make water surface choppy in front of the automobile, shift the gearbox in the first or second gears, engage the front axle and engage the transfer box to a low range.

Avoid manoeuvring and turning sharply.

After fording, as soon as possible but not later than on this day, check oil in all assemblies, change oil in an assembly where water is detected. If oil color is changed, it means that there is some water in oil. Lubricate all chassis grease nipples till fresh grease would be appeared. After fording, engage the clutch partly several times and brake partly several times for drying the clutch facings and brake shoe linings. If the engine is stopped when fording, try to crank up the engine by means of the starter two-three times.

If the engine is not started, the automobile is to be immediately evacuated out of water by all means. If some water is penetrated to the assemblies of the automobile, it is not recommended to run the automobile under its own power. Tow the automobile and carry out the required maintenance.

Snowy Surfaces

The automobile could move along snowy surfaces of 350 mm depth. Turn the automobile in the same manner, as when moving on swampy grounds. When driving on quick snow, do the same, as when driving on sandy surface.

MAINTENANCE OF THE AUTOMOBILE

Intervals and scope of automobile servicing are laid down in the Service Book.

The indications of this section allow both maintenance of the automobile and adjustment of its units to be well carried out. This section indicates also operations which should be carried out in intervals between servicing terms according to the Coupons.

DAILY MAINTENANCE

1. Visually check the automobile for completeness of sets, check the body, glasses, rear view mirrors, licence plates, body coating, door locks, frame, springs, shock absorbers, wheels and tyres for proper condition. Eliminate detected faults.

Inspect the automobile to make sure there are no fuel, coolant, oil and brake fluid leaks. To this end, inspect the parking place.

Eliminate detected faults.

2. Fill up to normal coolant, oil, fuel and brake fluid.

3. Check functioning of lighting devices, signalling devices, windshield wiper. Eliminate defects.

4. Check functioning of the steering gear, brakes. Eliminate defects.

5. If the automobile is not kept in a garage, and is to be stored in cold weather, drain water from cooling system after each run.

6. Fill up the windshield washer reservoir. Use water for filling-up in summer.

7. If the automobile was operated on extremely dusty roads, as well as after fording and negotiation of natural road sections and off-road sections covered with mud, wash the filter element of the air cleaner or replace it.

SEASONAL MAINTENANCE

The seasonal maintenance is carried out twice a year (in the spring and autumn) and, if possible, is combined with the next maintenance according to Coupons of Servicing Book.

Before the Summer Season of Operation

1. Connect the air hose to the air cleaner union and set the manifold heat control valve in the "summer" position.
2. Drain the fuel tanks.
3. Remove the heater and windshield wiper motors, check the conditions of the commutator and brushes, wash and lubricate the bearings.
4. Switch on the windshield wiper for 15-20 min; the blades should be swung out of the way.

Before the Winter Season of Operation

1. Disconnect the air hose from the air cleaner union and set the manifold heat control valve in the "winter" position.
2. Wash the fuel tanks and fuel filters.
3. Check coolant specific gravity in the engine cooling system, and if required, fill up to normal.
4. Flush the cooling system once in three years or after 60 000 km of run, drain coolant and refill the cooling system with fresh coolant.
5. Check the heating and body ventilation system for proper functioning.
6. Check the shutters for proper functioning.
7. Flush or replace the air cleaner of the vacuum brake booster.
8. Switch on the windshield wiper for 15-20 min; the blades should be swung out of the way.

ENGINE

The automobile is equipped with the four-cylinder engine with upper valve arrangement which is shown in Fig. 20, 21.

Check and, if required, tighten the engine mounting (Fig.22). Tighten the engine mounting bolt nuts until distance sleeves touch the washers.

Tighten the cylinder head fastening nuts after completion of the automobile running-in period and every 1 000 km of run each time when removing the cylinder head.

Tighten the nuts only on a cold engine. Tighten the nuts in two steps in the sequence illustrated in Fig. 23: the first step -

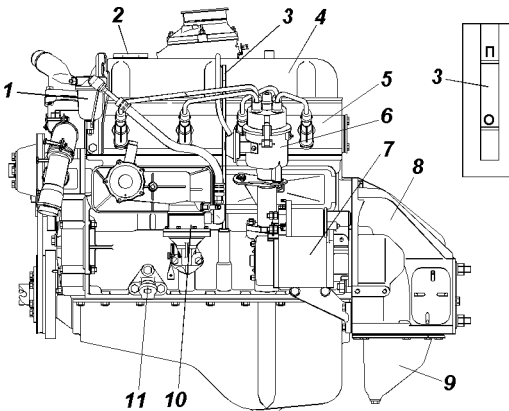


Fig. 20. Engine
(l.h. view):

1 -fine fuel filter; 2 -oil filler cap ; 3 - oil dipstick; 4 -rocker arm cover; 5 -cylinder head; 6 -ignition-distributor; 7 -starter; 8 -clutch housing; 9 -clutch housing (lower part); 10 - fuel pump; 11 -engine mounting bracket

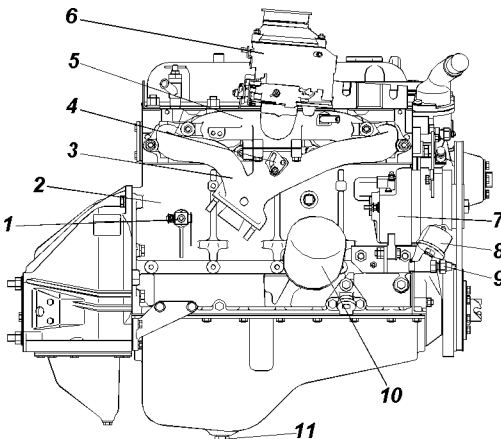


Fig. 21. Engine
(r.h. view):

1 -cylinder block drain cock; 2 -cylinder block; 3 -inlet manifold; 4 -inlet manifold damper; 5 -inlet manifold; 6 -carburettor; 7 -alternator; 8 -oil pressure transmitter; 9 -low oil pressure warning lamp transmitter; 10 -oil filter; 11 -oil sump drain plug

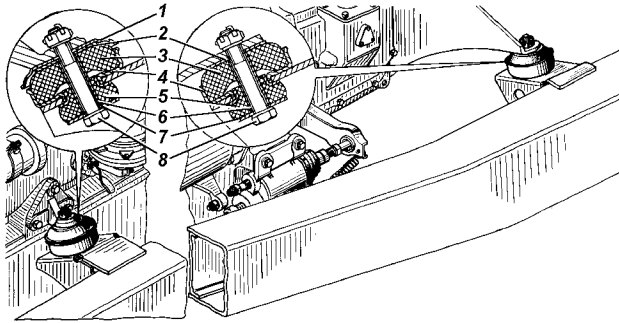


Fig. 22. Engine Mounting:

1 -protective cover; 2 -washer; 3 -upper pad; 4 -seat; 5 -lower pad; 6 -distance sleeve; 7 -washer; 8 -bolt

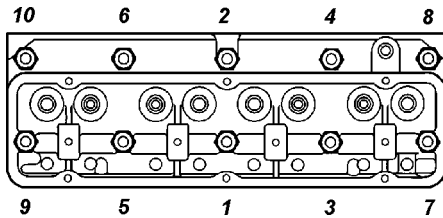


Fig. 23. Sequence of Tightening Cylinder Head Nuts

preliminarily with a less force, the second one - finally; the final tightening torque should be equal to $90-94 \text{ N} \cdot \text{m}$ ($9.0 - 9.4 \text{ kgf} \cdot \text{m}$).

As required, clean carbon deposit off the cylinder head, piston crowns and inlet valves.

Valve gear. Adjust the valve-to-rocker clearances on a cold engine using the following sequence:

- remove the vacuum governor hose;
- remove the rocker cover;

- using mark (Fig. 24) on the crankshaft pulley, set the piston of No.1 cylinder at the TDC on the compression stroke and check the clearance between the rockers and valves of No.1, 2, 4, 6 with the feeler gauge. In the case of an incorrect clearance, screw out lock nut (Fig. 25) of adjusting screw and rotating the letter with a screwdriver, set a required clearance by means of the feeler gauge. Then, holding the adjusting screw with the screwdriver, tighten the lock nut and check the clearance for correct setting;

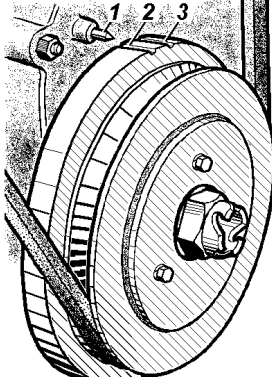


Fig. 24. Timing Marks on Crankshaft Pulley:

- 1 -index pointer; 2 -mark for setting TDC;
- 3 -mark for ignition timing

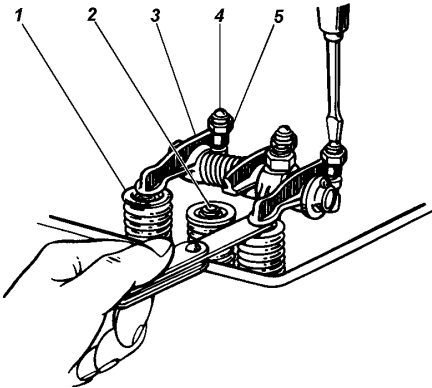


Fig. 25. Adjusting Clearance between Rocker Arm and Valve:

- 1 -valve spring retainer; 2 - valve; 3 -rocker; 4 -adjusting screw; 5 -lock nut

- having adjusted the clearances of one cylinder, turn the crankshaft through half a turn and adjust the clearances on other cylinders (3, 5, 7, 8).

The valve-to-rocker clearances on a cold engine (15-20 °C) for the exhaust valves of No.1 and No.4 cylinders (valves 1 and 8) should be equal to 0.30 - 0.35 mm, and for other valves - 0.35 - 0.40 mm.

Maintenance of the Lubrication System

For cooling oil in the engine lubrication system, an oil cooler is provided. It is recommended to cut in the cooler by opening the cock 7 (Fig. 26) at an ambient temperature above +20 °C. But when riding on heavy roads (with heavy load and at a high engine crankshaft speed), also cut in the cooler depending on an ambient temperature.

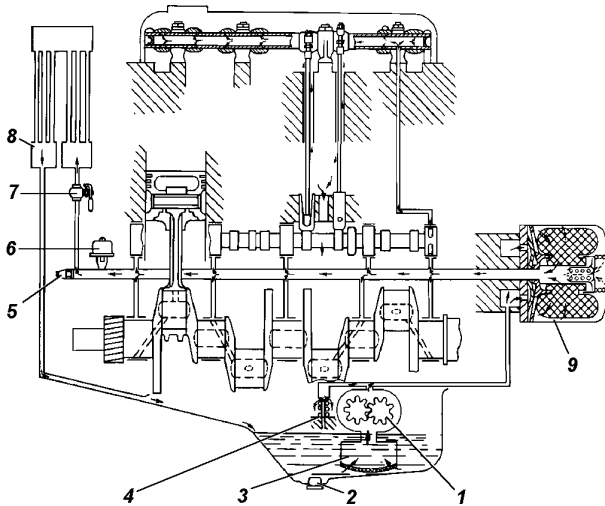


Fig. 26. Engine Lubrication Diagram:

1-oil pump; 2 -oil sump drain plug; 3 -oil intake strainer; 4-pressure relief valve; 5 -low oil pressure warning lamp transmitter; 6 -oil pressure gauge transmitter; 7 -oil cooler cock; 8 -oil cooler; 9 -full-flow oil filter

The level of oil in the engine crankcase should be in register with the mark "II" on oil dipstick 3 (Fig. 20). Measure the oil level 2-3 min after shutting down a warmed-up engine.

Drain oil from the engine crankcase right after the end of the trip when the oil is still hot. This insures rapid and complete drainage of oil.

For removing the oil filter 10 (Fig. 21), rotate it counter-clockwise. When installing a new filter, make sure, that the rubber sealing ring is in serviceable condition, lubricate it with motor oil, and screw in the filter by hand till the sealing ring would contact with the cylinder block surface, then draw up tight the filter through 3/4 of turn. Make sure, that there is no leakage of oil.

Oil pressure in the lubrication system of a warmed-up engine of a new automobile at a speed of 60 km/h in direct gear and when the oil cooler cock is open should be at least 343 kPa (3.5 kgf/cm²). Oil pressure in a cold engine can be increased to 588 kPa (6kgf/cm²), and on a hot summer day it could be dropped to 294 kPa (3kgf/cm²). Stop running the engine, when oil pressure is dropped to 118 kPa (1.2kgf/cm²).

When driving the automobile, watch the functioning of the oil pressure transmitters. The low oil pressure warning transmitter must operate at an oil pressure drop in the system down to 39-78 kPa (0.4-0.8 kgf/cm²).

The low oil pressure warning lamp may light when the hot engine is running at an idling speed, but the lamp must go out immediately with an increasing crankshaft speed.

Immediately stop running the engine if some faults in the engine lubrication system are detected.

Maintenance of the Crankcase Ventilation System

For flushing and cleaning, remove the vacuum regulator from the engine and disassemble it. Clean the pipelines (Fig. 27), the calibrated orifice "b" (Fig. 28) and flush the parts of the vacuum regulator.

Check tightness between the case and cover plate when assembling the vacuum regulator.

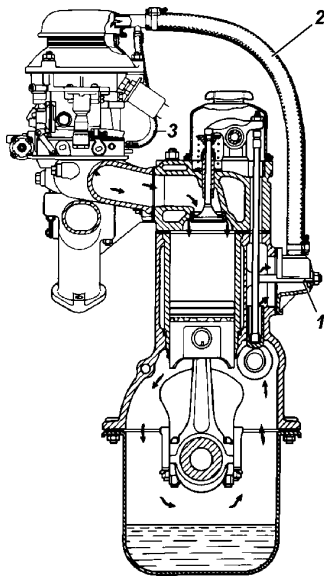


Fig. 27. Crankcase Ventilation:
1 -oil baffle; 2,3 -pipes

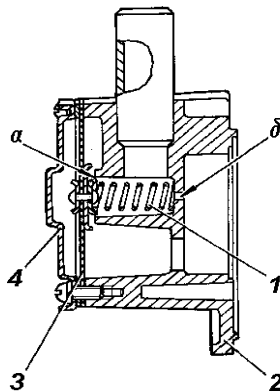


Fig. 28. Vacuum Regulator:
a -valve seat; b-orifice
1 -spring; 2 -body; 3 -diaphragm;
4 -cover

Maintenance of the Fuel System

Fuel tanks. To wash the fuel tanks, remove them from the automobile. Flush the fuel tanks with clean gasoline.

Fuel filter-settler. Periodically drain sediment and water through the drain hole stopped with a plug 8 (Fig. 29).

To remove the filter element for washing, unscrew the unions 2 and bolts 4. Do not disassemble the filter element. After washing, blow out the filter element with compressed air at a pressure not in excess of 98 kPa (1kgf/cm²).

Fuel pump. Periodically check the fuel pump through the inspection hole "a" (Fig. 30) for leakage of fuel. Leakage of fuel indicates, that the diaphragm is faulty.

Periodically check the attachment of the pump to the engine and the connections of the pipelines for tightness. Flush the gauze strainer and remove dirt from the upper casing.

Fine fuel filter 1 (refer to Fig. 20) Periodically disassemble the fine fuel filter for flushing the bowl and filter element.

Carburettor. The carburettor K-151B is installed on the engine 4178, and the carburettor K151E is installed on the engine 4218. The carburetors are identical in design, except for some jets. The main jets are indicated in the Appendix 3.

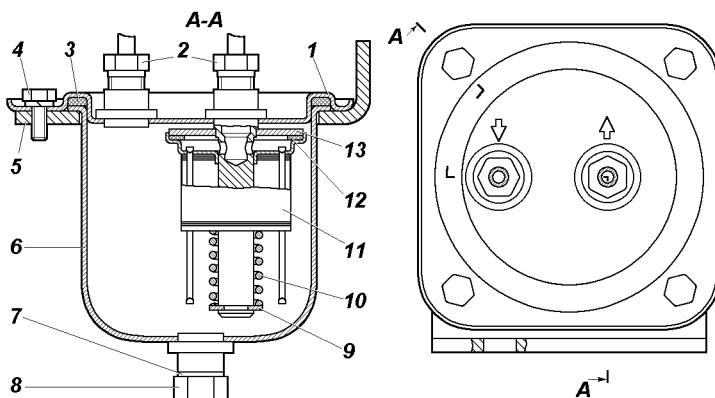


Fig. 29. Fuel Filter-Settler:

1 -cover; 2 -pipe unions; 3, 7, 12 -gasket; 4 -bolt; 5 -bracket; 6 -settler body; 8 -drain plug; 9, 13 -washer; 10 -spring; 11 -filter element

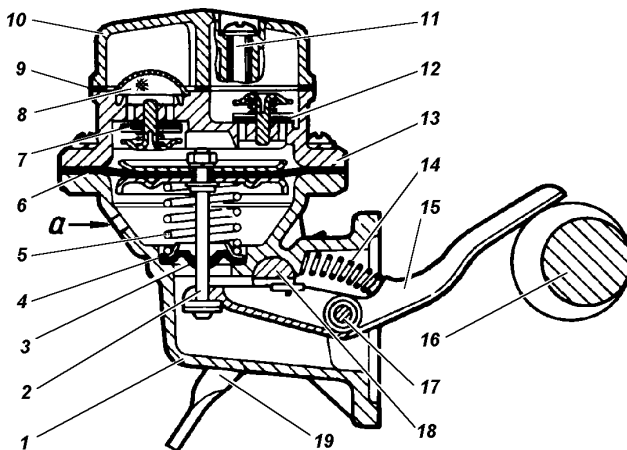


Fig. 30. Fuel Pumps of B9B type*:

a -inspection hole

1 - casing; 2 - pull rod; 3 - seal; 4 - washer; 5, 14 -springs; 6 - diaphragm; 7 - discharge valve; 8 - gauze strainer; 9 - gasket; 10 - cover; 11 - screw; 12 - exhaust valve; 13 - upper casing; 15 - rocker arm; 16 - camshaft eccentric; 17 - rocker arm shaft; 18 - hand primer lever shaft; 19 - hand primer lever

* The pumps 2105-1106010-50 or 900-1106010 could be also installed

Maintenance of the carburettor includes periodic checks and adjustment of fuel level in the float chamber, adjustment of the crankshaft slow idling setting, check of the acceleration pump and economizer for functioning, cleaning, blowing and washing of the carburettor parts to remove gum residue, capacity checks of jets.

Check fuel level in the carburettor with the automobile placed on a level ground and the engine stopped.

The fuel level in the carburettor float chamber should be within 20-23 mm from joint plane of the float chamber. Adjust the fuel level by bending lip 3 (Fig. 31). The float should be in the horizontal position. The valve 5 stroke is adjusted by means of the lip 2 and should be 1.5 - 2.0 mm.

Slow idling speed of the crankshaft at $700-750 \text{ min}^{-1}$ is to be adjusted by means of the screw 1 (Fig. 32) when the engine is warmed up. The screw 2 is used for adjusting the CO content.

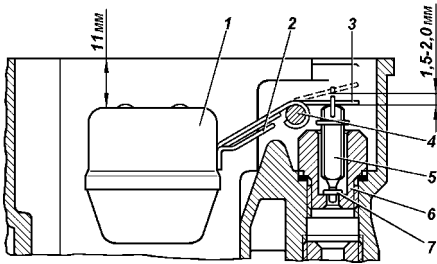


Fig. 31. Carburettor Float and Its Adjustment:

- 1 -float; 2 -fuel valve adjustment lip; 3 -level adjustment lip; 4 -pin; 5 -valve needle; 6 -valve body; 7 -valve washer

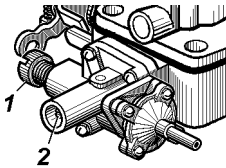


Fig. 32. Carburettor (fragment):

- 1 -idle speed adjustment screw; 2 -idle mixture adjustment screw

After adjustment done, place on the adjustment screw a new cap, that the content of mixture could be only leaning (by screwing in the cap). It recommended to adjust the screw 2 only by special tools for analysing of exhaust gases.

Air cleaner. When the automobile is to be operated under very dusty conditions, carry out the maintenance of the air cleaner in the intervals between servicing according to Coupons.

Do not clean the filter element more than 15 times. For cleaning, use the following ways: wash the filter element with water adding syntetic washing agent and then rinse it, wring gently out and dry; blow it out or clean by shaking off.

For replacing or cleaning the filter element, proceed as follows: loosen bolts 8 (Fig.33) and yoke 2; shift clamps 9; take away cover 6 with filter element 5; take away yoke 10 and filter element from frame. Assembly the air cleaner in the reverse sequence.

Never use the air cleaner with defective muff 1.

Replace the filter element when bursting or burning the filter element, every 100 000 km of run, after maximum permissible procedures of cleaning.

Flush the gauze 4 of the flame trap with one of the dissolvents: kerosene, turpentine, white spirit.

Inlet manifold. During seasonal maintenance, set the manifold heat-control valve (Fig. 34) to the position corresponding to the coming season of the year.

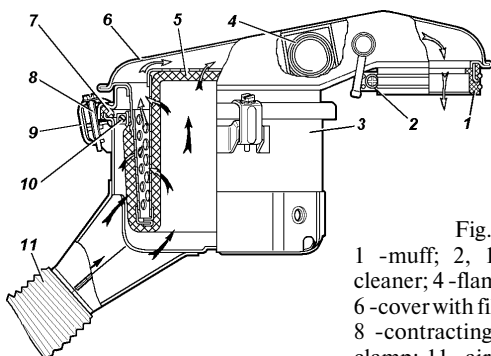


Fig. 33. Air Cleaner:
 1 -muff; 2, 10 -yokes; 3 -body of air cleaner; 4 -flame damper; 5 -filter element; 6 -cover with filter element frame; 7 -sealer; 8 -contracting bolt; 9 -cover attachment clamp; 11 -air intake hose

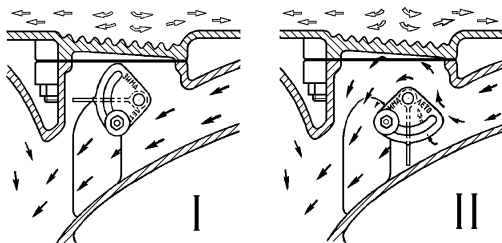


Fig. 34. Manifold Heat Control Valve:
 I -heat control valve OFF (summer);
 II -heat control valve ON (winter)

Accelerator pedal. While in service, it may become necessary to adjust the carburettor throttle full opening and readjust the accelerator pedal position. If the pedal is pressed all the way down and the throttle is not fully open, shorten the pedal rod rotating adjusting sleeve 3 (Fig. 35). Shorten it to such a length that full opening of the carburettor throttle is ensured but compensating spring at the same time is not completely compressed.

When released, the accelerator pedal should be at a distance of 80-95 mm from the toeboard. If the threaded portion length of the accelerator pedal rod is not sufficient for the adjustment, change the length of rod screwing it out of the rod end.

As required, lubricate the carburettor manual control linkage with lubricating grease. Before lubrication, remove it from the automobile and take off old grease.

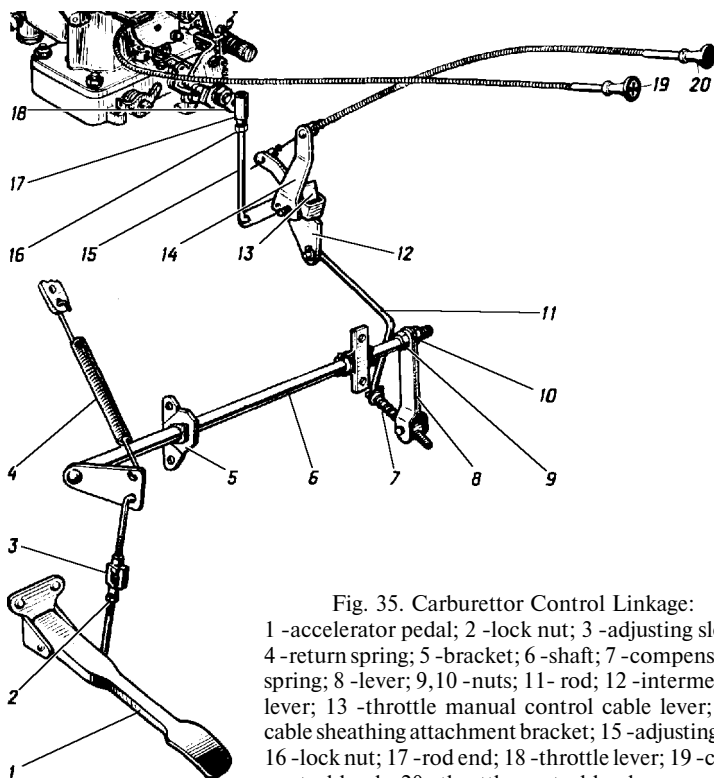


Fig. 35. Carburettor Control Linkage:
 1 -accelerator pedal; 2 -lock nut; 3 -adjusting sleeve;
 4 -return spring; 5 -bracket; 6 -shaft; 7 -compensating
 spring; 8 -lever; 9,10 -nuts; 11 -rod; 12 -intermediate
 lever; 13 -throttle manual control cable lever; 14 -
 cable sheathing attachment bracket; 15 -adjusting rod;
 16 -lock nut; 17 -rod end; 18 -throttle lever; 19 -choke
 control knob; 20 -throttle control knob

Maintenance of the Engine Cooling System

The engine cooling system (Fig. 36) is filled with coolant simultaneously with the heating system.

Low-freezing fluid ОЖ-40 "Лена" or ТОСОЛ-А40М is used as a coolant.

At ambient air temperatures below -40°C , fill the system with low-freezing fluid ОЖ-65 "Лена" or ТОСОЛ-А65М.

If the above-mentioned grades of coolant are not available, You may use other coolant recommended by the automobile dealer.

Bear in the mind that antifreeze is poisonous.

The coolant level should be 30-40 mm above the MIN level mark inscribed on the expansion tank.

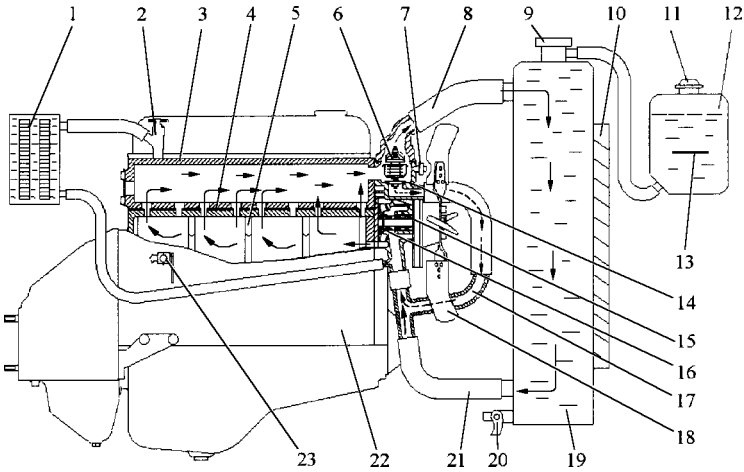


Fig. 36. Cooling System Diagram:

1 -heater radiator; 2 -heater cock; 3 -cylinder block head; 4 - gasket; 5 -coolant channels between cylinders; 6 -two-valves thermostat; 7 -coolant temperature gauge transmitter; 8 -outlet pipe; 9 -filler neck; 10 -shutters; 11 -filler cap; 12 - expansion tank; 13 - MINIMUM level mark; 14 -thermostat body; 15 - pump; 16 -impeller; 17 -connection; 18 -fan; 19 -radiator; 20 -radiator drain cock; 21 -intake pipe; 22 -cylinder block; 23 -cylinder block drain cock

Never mix the coolants of different grades. If the level of special fluid in the system has dropped and fluid of the same grade is not available, top up the system with clean soft rainy, snow or boiled water.

Bear in mind that the freezing point of the antifreeze diluted with water is higher. Fill the system with antifreeze of appropriate grade at the first opportunity.

If the special coolant is not available, it is permissible to use clean soft water. In this case, at the ambient temperature below 0 °C proceed as follows:

- disconnect the hose from the expansion tank and lower it to carry off steam from the radiator;
- when parking, drain coolant from the engine cooling system and heating system.

Keeping the coolant temperature in a range of 80 to 90 °C during operation of the automobile considerably decreases wear of the engine and cuts down fuel consumption. The recommended temperature is maintained by means of an automati-

cally operated thermostat and the shutters controlled by the driver.

In cold weather, we recommend to encase the cooling system for warmth-keeping.

The coolant temperature gauge located on the instrument panel controls the temperature of coolant.

Besides this, the lamp with red light filter warns of coolant overheating. The lamp goes on at the coolant temperature between 91 and 98°C for automobiles operating in regions with temperate climate, and at the coolant temperature between 102 and 109 °C for automobiles operating in regions with tropical climate. When lighting the coolant temperature overheating warning lamp, immediately determine and eliminate the cause of overheating.

The rise of the coolant temperature may be caused by the drop of coolant level in the radiator, loose tension of the fan belt, faulty fan drive coupling, by movement of the automobile with the closed shutters and with the closed valve of warmth-keeping boot.

Adjust deflection of the fan belt (Fig. 37) by turning the alternator. Normal deflection of the belt equals 8-14 mm with an effort of 4 kgf (37 N) applied to it.

When using water as a coolant, periodically remove from the cooling system scale and dirt by flushing them with a fast jet of clean water. Flush the engine separately from the radiator so that rust, scale and sediment from the engine cooling jacket do not clog the radiator (Fig. 38). Prior to flushing the engine, remove the thermostat.

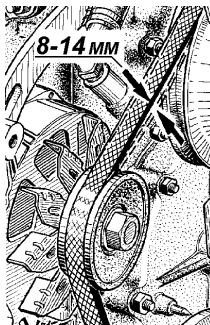


Fig. 37. Checking Fan Belt Tension

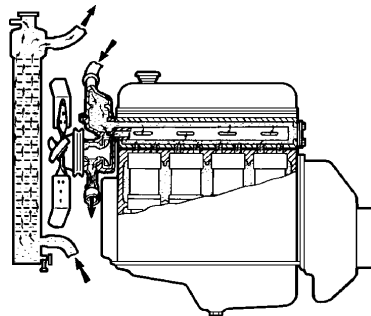


Fig. 38. Flushing Cooling System

Drain coolant from the cooling system through two cocks. One of them is arranged on the radiator lower reservoir, the other on the cylinder block. When draining the coolant, remove the radiator cap and open the cock.

Notes.

1. On some automobiles, the engines 4178 are installed, with feeding coolant to cylinder head completed with the pump of the cooling system in which design the ball bearings are applied.

2. On some automobiles, the visco coupling of the fan drive is installed, its purpose is to reduce fuel consumption, fan noise. It also reduces the time required for cold engine warm up and maintains the engine efficient operating condition. Keep the outer surface of the coupling clean.

Maintenance of the Ignition System (Fig. 39)

If the transistor switch or the coil of the magnetic pulse distributor stator failed en route, change over to operation with the emergency vibrator for which purpose, disconnect the wire from the terminal K3 of the transistor switch and connect it to the terminal of the emergency vibrator.

Service life of the emergency vibrator is limited to 30 h, therefore switch it into operation only in emergency cases and replace a faulty unit at the first opportunity.

Simultaneously, when switching into emergency operation, switch off the system of idling-speed economizer for which purpose, connect by means of one of the hoses unions 1 and 2 (Fig. 40) of the carburettor between themselves missing the electromagnetic valve. Otherwise, the engine could be stopped when the throttle pedal is released fully.

After restoring the contactless ignition system (replacing of the magnetic pulse distributor or transistor switch), restore the previous connections of the carburettor.

Maintenance of the system consists in setting the ignition timing, regularly cleaning the rotor and cover of the magnetic pulse distributor, high-voltage part of the ignition coil and spark plugs, in timely lubricating the magnetic pulse distributor. and checking spark gap.

Check spark plug gap with a feeler gauge (Fig. 41). The gap should be equal to $0.8^{+0.15}$ mm. Adjust the gap by bending the side electrode.

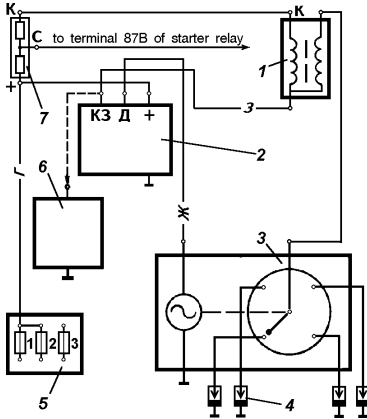


Fig. 39. Diagram of Transistor Ignition System:

- 1 -ignition coil; 2 -transistor switch;
- 3 -pickup-distributor; 4 -spark plug;
- 5 -fuse unit; 6 -emergency vibrator;
- 7-series resistor

Wire Color Code:

Г -blue; К -red; Ж -yellow; 3 -green

Fig. 40. Carburettor Mixing Chambers Housing:

- 1 -economizer union;
- 2 -sole-noid valve vacuum supply union;
- 3 -union for vacuum supply to vacuum spark advance control

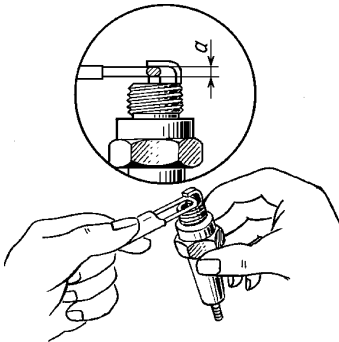
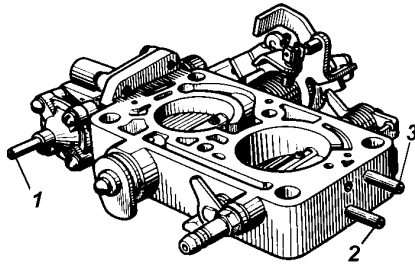


Fig. 41. Checking Spark Gap
a -gap

For setting the ignition timing, proceed as follows:

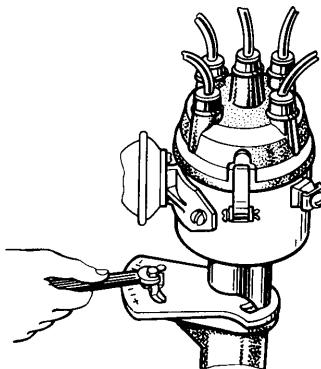
1. Set the piston of No. 1 cylinder at the TDC on the compression stroke until the timing hole on the crankshaft pulley gets in register with the timing pointer on the timing gear cover.

2. Remove the cap from the magnetic pickup.
3. Make sure that the contact segment of the runner is set against the cap terminal marked with numeral "1".
4. Loosen the bolt with the indicator, clamp the octane selector plate to the drive body so that the indicator is in register with the middle division mark of the octane selector scales, and tighten the bolt.
5. Loosen the bolt securing the octane selector plate to the magnetic pickup and distributor unit body (Fig. 42).
6. Holding the runner and forcing it clockwise (to take up the backlash in the drive), carefully turn the distributor body until the red mark on the rotor is aligned with the index pointer on the stator. Using the bolt, secure the octane selector plate to the distributor body.
7. Reinstall the cap of the magnetic pickup and distributor unit and check to see that the ignition wires running to the spark plugs are set correctly in compliance with the engine firing order (1-2-4-3), counting counterclockwise.

Each time after setting the timing, check for correct spark timing by listening to the running engine, with the automobile in motion. To this end, warm the engine up to a temperature of 80 °C and while moving in the direct gear on a level road at a speed of 40 km/h, accelerate the automobile by sharply depressing the accelerator pedal. If a light and short-time detonation is heard before a speed of 55-60 km/h is reached, it means that the ignition timing is set correctly.

In case of a heavy detonation, turn the magnetic pickup and distributor unit body counterclockwise through 0.5-1.0 division

Fig. 42. Adjusting Octane Selector Setting



on the octane selector scale. Each division of the scale corresponds to a change of the ignition timing by 4° in the degrees of the crankshaft angle. If the detonation was not heard at all, increase the ignition advance angle by turning the body of the magnetic pickup and distributor unit clockwise.

Note. To prevent the surface sparkover and burning through of the magnetic pickup and distributor unit cap, see that the shoes of the high-tension wires are completely seated in the cap terminal sockets. Never switch on the ignition if moisture is detected on the cap. Keep the plastic parts (cap, runner, low-tension terminal, sockets, etc.) clean.

Forbidden to keep the ignition on when the engine is not operating, and to disconnect the storage battery when the engine is operating.

TRANSMISSION

Maintenance of the Clutch

The automobile is equipped with a dry single-plate clutch (Fig. 43) provided with the pressure plate 4 with the cover plate 20, pressure springs 19 and release levers 11 in assy, driven disk 3 with linings and torsional vibration damper in assy.

Some automobiles are equipped with a dry single-plate clutch provided with the central pressure spring of the diaphragm type. The clutch consists of the pressure plate with the cover plate and of the pressure disk diaphragm spring which tabs function as release levers; driven plate with linings and torsional vibration dampers.

A grease cup for the clutch release bearing identifies visually the clutch type. The clutch with the pressure springs and release levers is provided with the grease cup to be found on the right-hand side of the engine (in motion). The clutch with the central diaphragm pressure spring is not provided with a grease cup.

Maintenance of the clutch consists in cleaning of dirt, tightening the bolt joints, adjusting and lubricating the clutch release bearing.

The clutch release bearing with the central diaphragm spring needs no grease.

Periodically drain condensate from the clutch housing unscrewing the plug 22 (Fig. 43).

Maintenance of the clutch control linkage amounts to

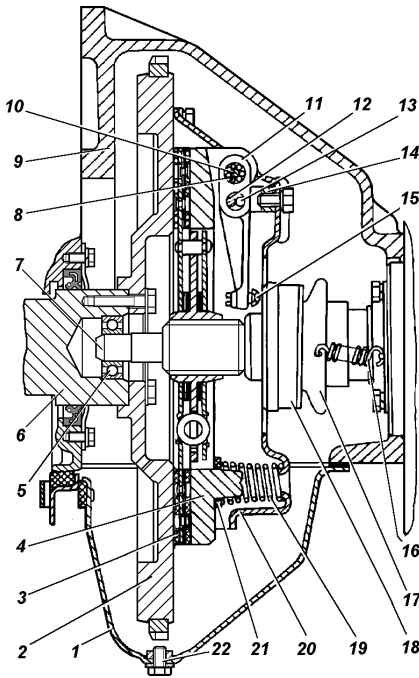


Fig. 43. Clutch:

- 1 -clutch housing lower part;
- 2 -flywheel; 3 -driven disk; 4 - pressure plate; 5 - front bearing;
- 6 -crankshaft; 7 -input shaft; 8 - needle bearing; 9 -clutch housing;
- 10 -release lever pin; 11 - release lever; 12 -release pin; 13 -release roller; 14 -release lever fork; 15 -adjusting screw; 16 -retracting spring; 17 -clutch release sleeve; 18 -clutch release bearing; 19 -pressure spring; 20 -clutch housing; 21 -heat insulating washer; 22 -plug

adjustment of the pedal free travel, to periodical checks on the level of fluid in the reservoir of the clutch hydraulic system master cylinder and to bleeding the hydraulic system if required*.

The level of fluid should be 15-20 mm below the upper edge of the reservoir.

Perform adjustment of the clutch release pedal by changing the length of the master cylinder pushrod 5 (Fig. 44).

Perform adjustment of the pedal free travel (35-55 mm) by changing the length of the slave cylinder 25 pushrod 31.

The clutch with the central diaphragm spring needs no adjustment of free travel. The free travel (5-30 mm) is maintained by the clutch design.

* All the operations of bleeding the clutch hydraulic system are similar to operations of bleeding the hydraulic brake system (refer to section "Maintenance of the Service Brakes")

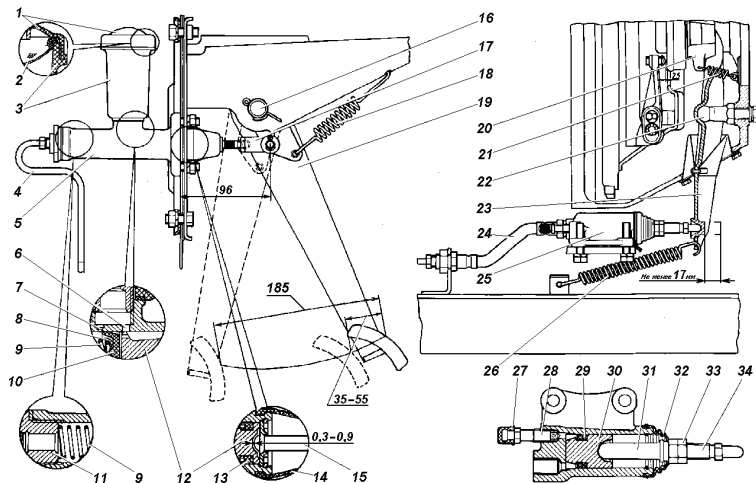


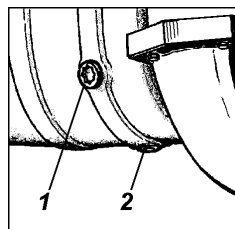
Fig. 44. Clutch Control Linkage with Pressure Springs and Release Levers:
 1 -cover; 2 -filter gauze; 3 -reservoir; 4 -hydraulic pipe; 5 -master cylinder; 6 -bypass hole; 7 -compensating hole; 8 -washer; 9,18,21,26 -springs; 10 -cup; 11 -union; 12 -master cylinder piston; 13 -collar; 14 -boot; 15 -master cylinder pushrod; 16 -pedal shaft; 17 -fork; 19 -pedal; 20 -muff; 22 -ball support; 23 -clutch release fork; 24 -hydraulic hose; 25 -operating cylinder; 27 -cap; 28 -bleeder valve; 29 -collar; 30 -slave cylinder piston; 31 -pushrod; 32 -boot; 33 -lock nut; 34 -pushrod screw-in part;

Maintenance of the Gearbox

Maintenance of the transmission consists in checking the oil level (Fig. 45), in changing the oil at established intervals specified in Lubrication Table and in periodically checking the joints for proper fastening.

In case of oil leakage, find out its cause and replace faulty parts (gaskets, collars).

Fig. 45. Gearbox Plugs:
 1 -filler hole plug;
 2 -drain hole plug



Maintenance of the Transfer Box

Maintenance of the transfer box in service comes to checking the oil level and changing oil at intervals specified in Lubrication Table, and also to checking periodically all attachment parts.

When changing or refilling oil in the transfer box, check simultaneously the level of oil in the gearbox. The level of oil should reach the lower edge of the check holes 1 (Fig. 45, 46).

During operation of the automobile, the level of oil in the gearbox could be lowered to 8 mm relatively the lower edge of the check hole 1 (Fig. 45), and simultaneously it could be raised in the transfer box. Levelling of the oil levels is not obligatory.

Lubricate the shaft of the control levers through the grease fitting. The access to it is from below.

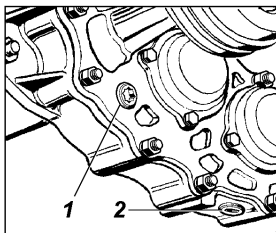


Fig. 46. Transfer Box Plugs:

1 -filler hole plug; 2 -drain hole plug

Maintenance of the Propeller Shafts

Periodically check tightening of the bolts attaching the propeller shaft flanges, periodically lubricate them, clean the propeller shafts of dirt.

Lubricate the splined joint through the grease fitting 1 (Fig. 47) screwed in the slip yoke, and the needle bearings are lubricated through the grease fittings 2 on the centre cross.

Lubricate the needle bearings until grease is shows up from under the working edges of the centre cross seals.

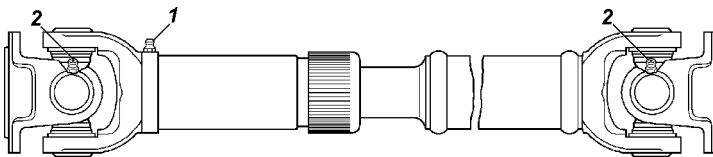


Fig. 47. Rear Propeller Shaft:

1 -grease fitting for lubricating of splined joints; 2 -grease fitting for lubricating of joint needle bearings

Apply grease according to the directions of Lubrication Table.

Do not apply too much grease to the splined joint as it would bleed through the splined joint and that would provoke the preliminary failure of the seals and could force the plug of the slip yoke.

Use a special tip to be fitted on the grease gun to lubricate the propeller shaft. The tip is available in the driver's tool kit.

Maintenance of the Rear Axle

Maintenance of the rear axle comes to maintaining the level of oil in the housing and its timely changing, checking the condition of the seals. Periodically clean the safety valve 1 (Fig. 48), tighten up all fastening parts.

Apply grease according to the directions of Lubrication Table.

Check the oil level which should reach the edge of the filler hole.

Drain oil through the hole at the bottom of the housing by screwing out the filler plug.

Check also the level and change oil in the hub drive housings when the axles are provided with the hub drives.

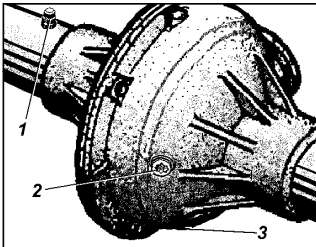


Fig. 48. Rear Axle:
1 -safety valve; 2 -filler hole plug;
3 -drain hole plug

Maintenance of the Front Axle

All the directions on maintenance of the rear axle are valid for the front axle.

Maintenance of the steering knuckles should be carried out additionally.

Lubricate the steering knuckle kingpins through the grease fitting 10, 5 (Fig. 49, 50) according to directions of Lubrication Table.

When inspecting the steering knuckles of the front axle, check to be sure that the adjusting bolts 27, the steering stop 28 are in serviceable condition and are reliably locked with the nut.

The front driving axle is provided with a device for disengagement of the front wheels (Fig. 49 III, 50 III).

For disengaging the front wheels, remove hub cap 18, 16 (Fig. 49, 50) and by screwing out bolt 16, 17 set coupling in position in which a circular indicating groove "a" on the surface of coupling is arranged in one plane with the face of flange 14, 13 (Fig. 49, 50, view III). Having set coupling in a required position, screw on hub cap.

For engaging the wheels, screw in bolt 16, 17 as far as it will go. Be sure to engage and disengage both front wheels.

Some automobiles could be equipped with a sleeve for disengagement of the front wheels, shown in Fig. 49 IV, 50 IV. For disengaging the wheels, turn the disk of the sleeve counter-clockwise as far as it will go arranging in one plane the mark "6" with the figures "4x2". For engaging the wheels, turn the disk of the sleeve clockwise as far as it will go arranging in one plane the mark with the figures "4x4".

Never engage the front axle when the front wheels are disengaged.

CHASSIS

Towing Hook

The towing hook is intended for towing a trailer or an automobile by means of flexible coupling, and also it allows a short-time operation by means of rigid coupling. Towing of a trailer on a broken ground is not allowed.

The hook is provided with a catch 3 (Fig. 51) which closes the mouth of hook and is locked in the closed position by means of the pawl under the action of the spring.

The pawl in the catch is closed by a cotter 4 to avoid spontaneous uncoupling.

Maintenance of the towing hook comes to periodically cleaning of dirt, checking it for reliable attachment to the rear cross-member and lubricating according to the directions of Lubrication Table.

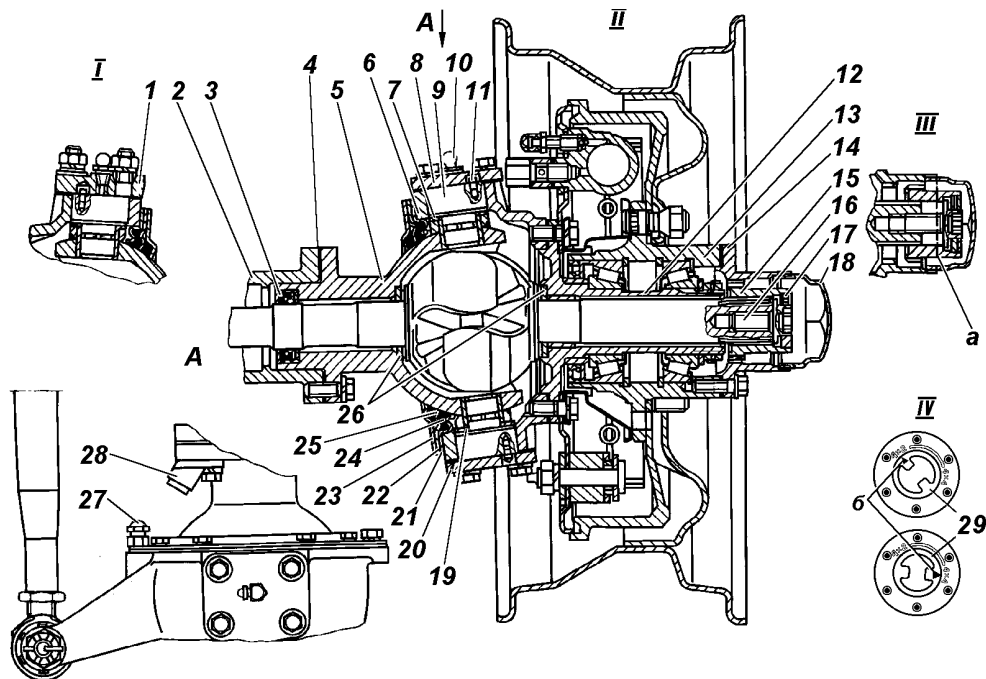


Fig. 49. Steering Knuckle:
 a -indicating groove; 6 -indica-
 tor;
 I -right-hand steering knuckle;
 II -left-hand steering knuckle;
 III -wheels disengaging sleeve;
 IV -wheels disengaging sleeve;
 1 -steering knuckle arm; 2 -axle
 shaft housing; 3 -seal; 4,20 -
 gaskets; 5 -ball support; 6 -
 steering knuckle housing; 7 -
 thrust washer; 8 -cover plate;
 9 -kingpin; 10 -grease fitting;
 11 -lock pin; 12 -journal; 13 -
 wheel hub; 14 -driving flange;
 15 -coupling; 16 -coupling bolt;
 17 -lock bolt; 18 -protective
 cover; 19 -kingpin bushing;
 21 -inner casing; 22 -ring-baf-
 fler; 23 -outer casing; 24 -
 rubber sealing ring; 25 -felt seal-
 ing ring; 26 -thrust washers;
 27 -steering stop bolt; 28 -
 steering stop; 29 -coupling disk

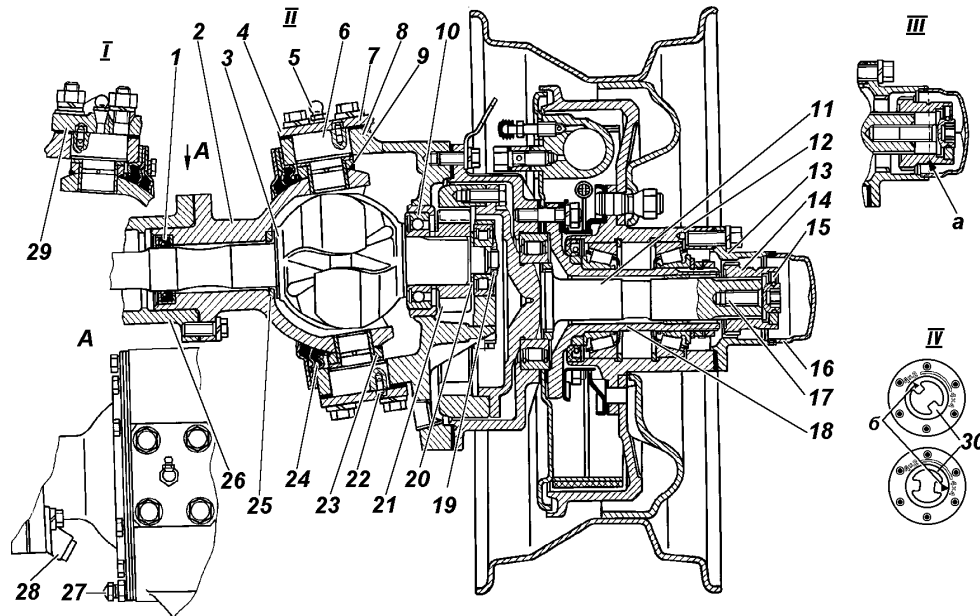


Fig. 50. Axle Steering Knuckle with Hub Drive:

a -indicating groove;
 6 -indicator;
 I -right-hand steering knuckle;
 II -left-hand steering knuckle;
 III -wheels disengaging sleeve;
 IV -wheels disengaging sleeve;
 1 -seal; 2 -ball support;

3 -steering knuckle joint; 4 -gasket; 5 -grease fitting; 6 -kingpin; 7 -cover plate; 8 -steering knuckle housing; 9 -kingpin bushing; 10 -bearing; 11 -driven shaft of hub drive; 12 -hub; 13 -driving flange; 14 -coupling; 15 -locker ball; 16 -protective cap; 17 -coupling bolt; 18 -journal; 19 -locking nut; 20,23 -thrust washers; 21 -hub drive pinion; 22 -lock pin; 24 -rubber sealing ring; 25 -thrust washer; 26 -axle shaft housing; 27 -steering locking angle adjusting bolt; 28 - steering stop; 29 -steering knuckle arm; 30 -coupling disk