



AUTOMOBILE УАЗ-469Б

OPERATING INSTRUCTIONS



AVTOEXPORT · USSR · MOSCOW



UAZ
BELGIUM

IMPORTANT

We ask You to carefully familiarize yourself with the Present Operating Instructions. To ensure trouble-free operation of the automobile, follow the operating and maintenance instructions laid down in this publication.

You may entrust maintenance of your automobile to one of the service stations recommended by the Selling Dealer. The service stations are well stocked with spares, special tools and appliances. All maintenance operations are carried out by experienced specialists.

1. Prepare the new automobile for use. If it has been preserved, depreserve it according to the Section "Depreservation".
2. Check coolant level in the radiator and top up, if required.
3. Check oil level in the engine crankcase, units and mechanisms of the chassis, and fluid level in the brake master cylinder.
4. Check tyre air pressure and tightening of the wheel nuts.
5. Check and, if required, tighten outer bolted joints.
6. After starting from cold, do not rev up the engine. Do not move off until the engine has been warmed up to 60°C. In motion maintain coolant temperature in the engine within 80 and 90°C.
7. Do not fail to drain the coolant through two cocks.
8. Disengage the front axle for driving on dry hard-surface roads. Move off on a horizontal section of the road or on down-grades with the second gear shifted in.
9. Do not drive at a speed exceeding 60 km/h if the front axle is engaged.
10. Shift in the low gear of the transfer case only after engagement of the front axle.
11. Disengage the front wheels for prolonged running on dry hard-surface roads. Never engage the front axle if the front wheels are disengaged.

12. When operating a run-in automobile, do not exceed the maximum travelling speeds, km/h (Table 1):

Table 1

Gearbox	Transfer case	
	direct drive	low gear
Fourth (direct) gear	100	50
Third gear	67	32
Second gear	38	19
First gear	24	12
Reverse	20	10

13. In severe dust conditions to admit air for ventilation, use the dash centre intake and close the swivelling quarter-lights. This should be done to build up excess pressure in the vehicle body and decrease penetration of dust.

14. As efforts are constantly made to improve dependability and performance of the vehicle, some minor changes may not be reflected in the present publication.

We wish you a successful and pleasant run.

SPECIFICATIONS

Payload on all types of road and off-the-road	2 up plus 600 kg or 7 up plus 100 kg
Overall dimensions, mm:	
length	4025
width	1785
height	2015
Wheelbase, mm	2380
Front and rear wheel track, mm	1445
Minimum ground clearance, fully laden, mm	
	220
Gross mass, kg	2300
Gross mass distribution, kg:	
front axle	965
rear axle	1335
Mass in running order, kg	1540
Maximum gross mass of trailer towed on all types of road and off-the-road, kg .	
	750
Maximum speed, fully laden, km/h	100
Minimum turning radius, outer front wheel (relative to centre of turn), m ..	
	6.3
Minimum turning radius, front bumper outer extremity most distant from centre of turn, m	
	6.8
Engine	carburetted, spark-igni- tion
Number of cylinders	4
Arrangement of cylinders	in-row, vertical
Firing order	1-2-4-3

Cylinder bore, mm	92
Piston stroke, mm	92
Displacement, l	2.445
Compression ratio	6.7
Rated power at 4000 rpm (SAE), hp ..	78
Maximum torque at 2200 - 2500 rpm (SAE), kgf.m	17.2
Fuel	gasoline, octane rating 76
Lubrication system	combination, pressure feed and splash
Crankcase ventilation	closed
Cooling system	liquid-type, closed, with forced circulation of coolant
Clutch	dry, single-plate
Gearbox	four speeds and reverse
Gear ratios:	
1st gear	4.124
2nd gear	2.641
3rd gear	1.58
4th gear	1.00
reverse	5.224
Transfer case	two-speed
Gear ratios:	
direct drive	1.00
low gear	1.94
Front and rear driving axles	spiral bevel final drive, gear ratio 5.125
Steering knuckle universal joints ..	constant-velocity
Front wheel alignment:	
camber	1°30'
caster	3°
kingpin inclination	5°30'
Suspension	four longitudinal semi-elliptic springs operating in conjunc- tion with four telescopic hydraulic shock absorbers
Tyres	tubed, six-ply, 215-380 mm (8.40 - 15")
Steering mechanism	hourglass worm with double roller; gear ratio 20.3 (average); worm shaft is connected with steering shaft by universal joint with cross on needle bearings

Brakes:

service	shoe-type, hydraulically operated on all wheels
parking	drum-type, transmission, with internal shoes, mechanically controlled
Electricals	12-V, negative ground-return type
Body	metal, with fabric top and tailgate
Heating	by outside air getting through air intakes and passing through heater radiator
Ventilation	by outside air getting through swivelling quarter-lights in door extensions and vent intakes

Adjustment Data

Valve clearances on cold engine
(15 - 20°C), mm:

exhaust valves of No. 1 and 4 cylinders	0.30 - 0.35
other valves	0.35 - 0.40
Breaker point gap, mm	0.35 - 0.45
Spark plug gap, mm	0.8 ^{+0.15}
Deflection of fan belt under 4 kgf applied midway between pulleys, mm	8 - 14
Clutch pedal free travel, mm	28 - 38
Brake pedal free travel, mm	10 - 16
Front wheel toe-in, mm	1.5 - 3.0
Maximum steering wheel play, deg	10
Tyre air pressure, kgf/cm ² :	
front wheels	1.7 ^{+0.2}
rear wheels	1.9 ^{+0.2}

Note. If the vehicle is constantly operated at full load, keep the tyre pressure in the rear wheels equal to 2.3^{+0.2} kgf/cm².

Filling Capacities, l

Fuel tanks:

right-hand	39
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left-hand	39
Engine cooling system, heater included ..	13
Engine lubrication system, oil filter and cooler included	5.8
Air cleaner	0.15
Gearbox	1.0
Transfer case	0.7
Front and rear axles, each	0.85
Steering gear	0.25
Shock absorbers, each	0.320 ±0.005
Hydraulic brake system	0.52
Windshield washer pump tank	1.5

IDENTIFICATION DATA

The chassis No. (Fig. 1) is indented on the right-hand side member of the frame.

The engine No. (Fig. 2) is indented on the left side of the engine cylinder block.

Fixed on top of the radiator under the hood are two plates, namely, plate 1 (Fig. 3) "Coolant drain caution" and nameplate 2.

All other plates are arranged on the dashboard (Figs 4, 5, 6, 7).

Fig. 1. Location of Chassis Number

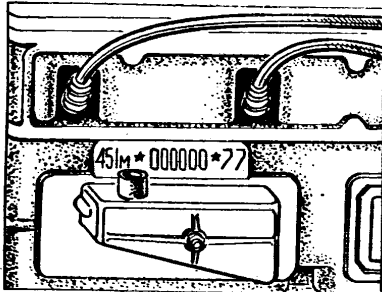
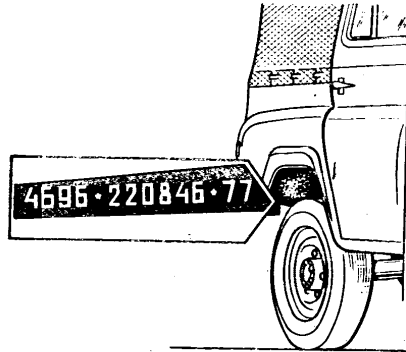
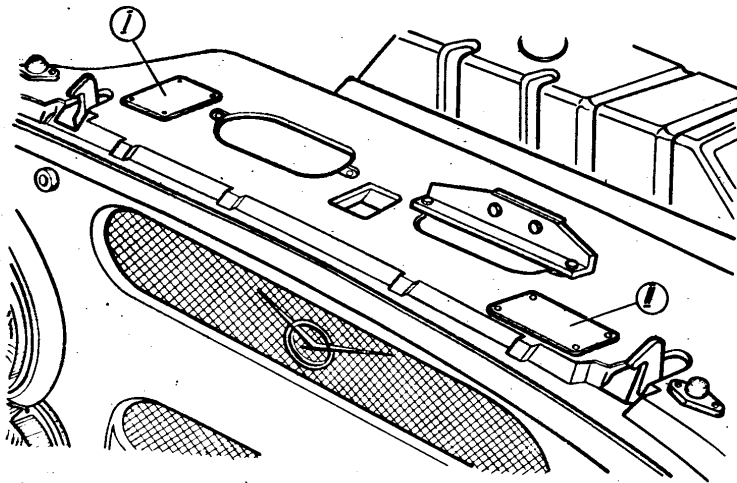


Fig. 2. Location of Engine Number



ПРЕДУПРЕЖДЕНИЕ
 Слив воды из системы охлаждения двигателя производится обязательно через два краника: на радиаторе и на котле пускового подогревателя. При отсутствии котла слив воды производится также через два краника: на радиаторе и на правой стороне двигателя сзади.
 При сливе воды снимать пробку горловины радиатора.

① УЛЬЯНОВСКИЙ АВТОМОБИЛЬНЫЙ ЗАВОД
 ② МОДЕЛЬ УАЗ _____ ③ ГОД ВЫП. 19
 ④ ШАССИ № _____
 ⑤ ДВИГАТЕЛЬ № _____
 ⑥ СДЕЛАНО В СССР

Fig. 3. Location of Plates on Radiator Top:
 I - coolant drain caution

Caution

Drain water from the engine cooling system through two cocks: one on the radiator, the other on the starting preheater boiler. If the starting preheater is not installed, drain water through two cocks also, one on the radiator, the other on the right side of the engine at the rear. When draining the water, do not fail to open the radiator filler cap

II - nameplate:

1 - Automobile Factory of Ulyanovsk; 2 - Model UAZ;
 3 - year of manufacture 19 _____ ; 4 - chassis No.; 5 - engine No.; 6 - made in the USSR

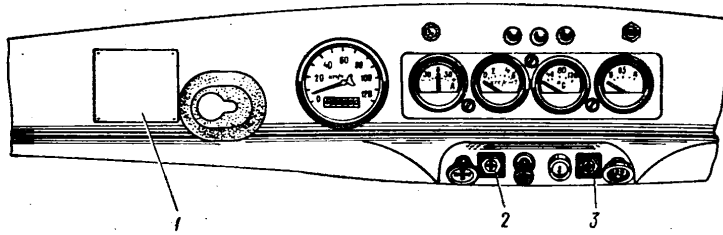


Fig. 4. Location of Plates on Dashboard:
 1 - "Gearshift Lever Positions"; 2 - "Positions of Heater Motor Switch Handle"; 3 - "Positions of Fuel Tank Selector Switch Handle"

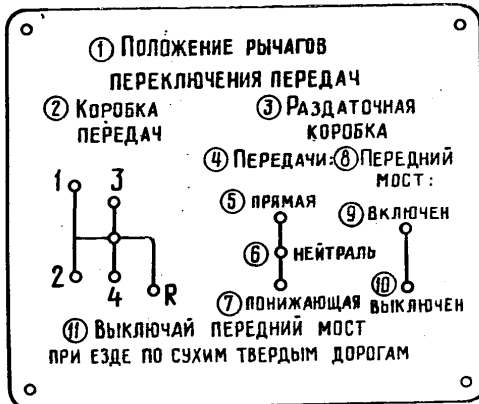


Fig. 5. Plate "Gearshift Lever Positions"

1 - gearshift lever positions; 2 - gearbox; 3 - transfer case; 4 - gears; 5 - direct drive; 6 - neutral; 7 - low gear; 8 - front axle; 9 - engaged; 10 - disengaged; 11 - disengage front axle to drive on dry hard-surface roads

Fig. 6. Plate "Positions of Heater Motor Switch Handle":
 1 - high speed; 2 - low speed

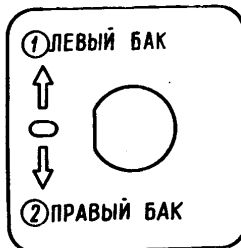
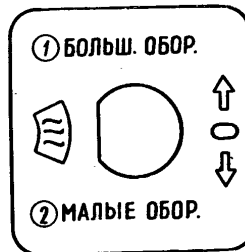


Fig. 7. Plate "Positions of Fuel Tank Selector Switch Handle":
 1 - left-hand tank; 2 - right-hand tank

CONTROLS AND INSTRUMENTS

The location of the controls is shown in Fig. 8, where:

- 1 - steering wheel;
- 2 - horn button;
- 3 - turn indicator switch;
- 4 - inner rear-view mirror;
- 5 - windshield wiper motor switch;
- 6 - instrument panel;
- 7 - sun visor;
- 8 - windshield wiper blade;
- 9 - windshield air nozzle;
- 10 - windshield frame lock;
- 11 - passenger handgrip;
- 12 - light;
- 13 - vent and heater shutter handle. Pull the handle to open the shutter;
- 14 - feet warmer shutters;
- 15 - front axle control lever. Shift the lever forward to engage the front axle and backward to disengage the axle;
- 16 - heater case cover;
- 17 - transfer case control lever. Three positions: forward - direct drive; neutral (middle); rearward - low gear;

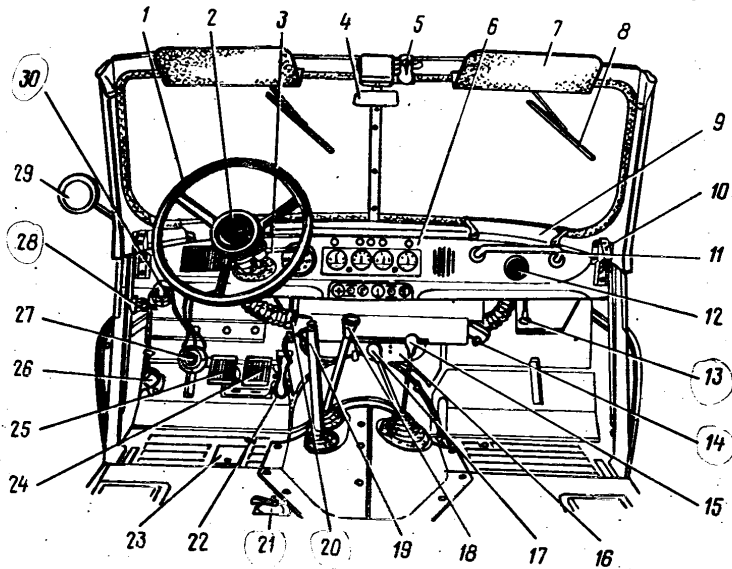


Fig. 8. Controls (see Reference Nos in the Text)

- 18 - gearshift lever; gearshift positions are shown on the lever knob;
- 19 - parking brake lever;
- 20 - body vent flap control handle;
- 21 - fuel tank cock. Three positions: turned to the right - fuel taken from right-hand fuel tank; turned forward - fuel cock closed; turned to the left - fuel taken from left-hand fuel tank;
- 22 - accelerator pedal;
- 23 - brake master cylinder access cover;
- 24 - brake pedal;
- 25 - clutch pedal;
- 26 - foot dimmer switch;
- 27 - windshield washer pedal;
- 28 - radiator shutters control handle. Pull the handle to close the shutters.
- 29 - external rear-view mirror;
- 30 - battery switch (two buttons). Press the larger button to close battery ground circuit and press the smaller button to open the ground circuit.

The instrument panel is shown in Fig. 9, where:

- 1 - speedometer reads driving speed in km/h and odometer incorporated in the speedometer counts total kilometrage. A blue high-beam warning lamp is fitted in the speedometer scale;
- 2 - ammeter reads charging (+) and discharging (-) current of the storage battery;
- 3 - blanking cover;

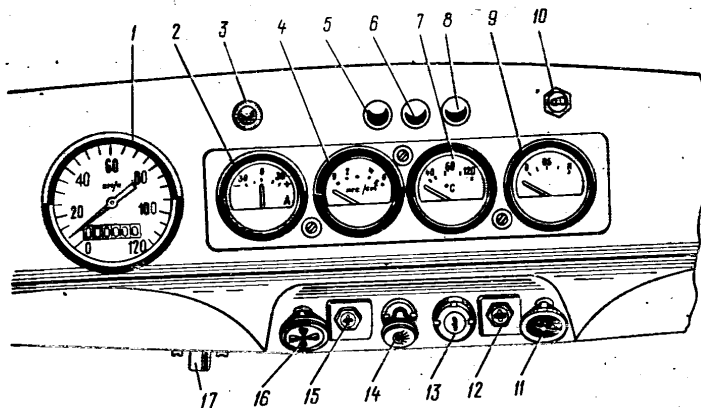


Fig. 9. Instrument Panel (see Reference Nos in the Text)

- 4 - engine oil pressure gauge;
- 5 - engine emergency oil pressure warning lamp (red);
- 6 - turn indicator warning lamp (green);
- 7 - coolant temperature gauge;
- 8 - coolant overheat warning lamp (red) comes on when temperature of coolant in the system rises to 106 - 109°C; its transmitter is found in the radiator upper tank;
- 9 - tank fuel level gauge;
- 10 - cab light switch;
- 11 - carburettor throttle control knob. Pull the knob to open the throttle. With the automobile in motion, the throttle control knob must be completely pushed in.
- 12 - fuel level gauge selector switch. Flip up the switch to read fuel level in the left-hand tank and flip down the switch for the right-hand tank;
- 13 - ignition switch. Positions of the key are shown in Fig. 10;
- 14 - main light switch ПЗ8^х. Three positions: first - all OFF; second - side lights or low beam ON, depending on the position of the foot dimmer switch; third - low or high beam ON, depending on the position of the foot dimmer switch; brightness of instrument panel illumination is controlled by turning the switch knob;
- 15 - body heater fan switch. Flip the switch handle up to make the fan motor run at higher speed and down to make it

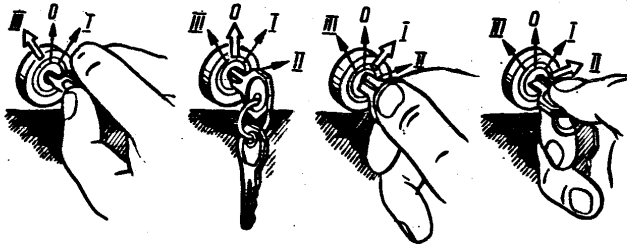


Fig. 10. Positions of Ignition Key:
 O - OFF; I - ignition ON; II - ignition and starter ON;
 III - radio ON (if available)

^хSwitch П305 can be installed. This switch has the following three positions: first - all OFF; second - side lights ON; third - side lights and low or high beam ON, depending on the position of the foot dimmer switch.

operate at lower speed. With the handle in the middle position, the motor is switched OFF.

- 16 - carburettor choke control knob. Pull the knob to close the choke;
 - 17 - lighting circuit thermal breaker button.
- To lock knobs 11 and 16 in position, turn them through 90°.

RUNNING-IN

The future life of the automobile depends, to a great extent, on its operation during the initial period, when the parts work in and the gaskets and fasteners bed down. The running-in period of this automobile is 1000 km.

During this period observe the following requirements:

1. Do not overload the automobile. Do not drive the automobile with the trailer.
2. Do not exceed the following speed limits:
 - 12 km/h in the first gear
 - 20 km/h in the second gear
 - 30 km/h in the third gear
 - 45 - 50 km/h in the fourth (direct) gear.
3. Do not replace the factory-filled oils in the engine and units.

After the running-in period, do the following:

1. Tighten up the cylinder head attachment nuts.
2. Check and, if necessary, adjust valve clearances.
3. Check attachment of the intake and exhaust manifolds, muffler intake pipe and its suspension, alternator bracket, alternator, starter, carburettor and fuel pump. Tighten up their fasteners, if required.
4. Check the fan V-belt for condition and tension.
5. Check condition of the fuel system devices. Check connections for leakage.
6. Change oil in the engine crankcase. Wash the air cleaner and change oil.
7. Check fuel level in the carburettor float chamber. Check carburettor performance. Adjust slow idling setting of the carburettor.
8. Check the breaker point gap.
9. Check electrolyte level in the storage battery and state of charge. Check wire clamps for reliable contact with the battery terminals.
10. Check headlight aiming and operation of the turn indicators, windshield wipers, lighting and signalling devices.

11. Check attachment of the axle-shaft flanges, hub driving flanges, ball supports, steering knuckle arms, propeller shafts, spring U-bolts, spring pins, shock absorbers and other connections. If necessary, tighten them up. Check the chassis and body units for secure attachment to the frame.

12. Check the ball pin nuts for attachment and cottering; check the steering rods for slack and steering wheel for play. Check attachment of the steering arm and steering gear case.

13. Check free travel of the clutch pedal.

14. Check the hydraulic brake system pipes for condition and leaks. Check fluid level in the brake master cylinder. Check functioning of the service and parking brakes. Check free travel of the brake pedal.

15. Check the tyres for condition and inflation pressure. If steering wheel fight exists, subject the wheel and tyre assemblies to balancing. Check and, if necessary, adjust front wheel toe-in.

16. Change oil in the front and rear axle housings, steering gear case, gearbox and transfer case.

17. Carry out all 2,000 km lubrication services (see the Lubrication Table).

ENGINE

The general views of the engine are given in Figs 11 and 12.

Lubrication System

For the lubrication system diagram refer to Fig. 13.

Oil level in the engine crankcase should be at the "H" mark on oil dipstick 1 (Fig. 14). Check oil level 2 - 3 min after the warmed-up engine has been stopped.

Oil pressure in the lubrication system of a warmed-up engine (oil temperature 80°C) at a slow crankshaft speed (600 rpm) should be:

at least 0.8 kgf/cm², with the oil cooler disconnected;

at least 0.5 kgf/cm², with the oil cooler connected.

At a road speed of 45 km/h, oil pressure should be:

3 to 5 kgf/cm², with the oil cooler disconnected;

2 to 4 kgf/cm², with the oil cooler connected.

When the engine is cold, oil pressure may rise as high as 6.0 kgf/cm². A drop of oil pressure in the lubrication system below the above-mentioned values points to a trouble in the engine.

The emergency oil pressure drop transmitter operates at a pressure of 0.4 - 0.8 kgf/cm².

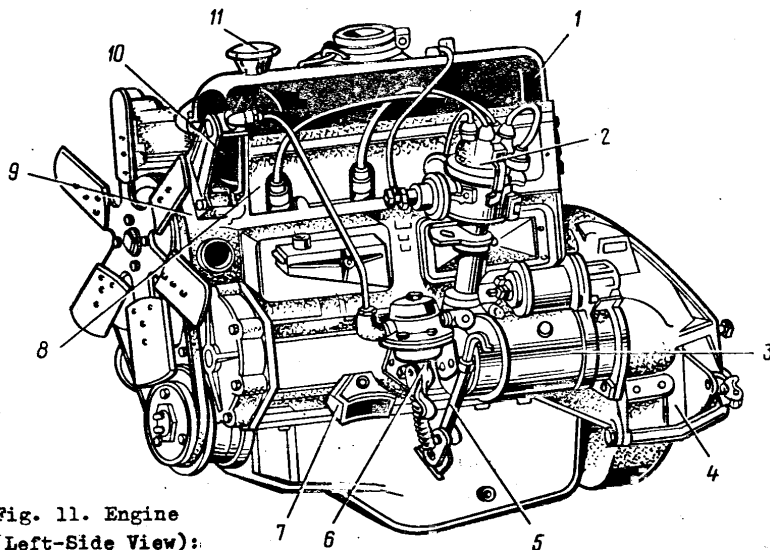
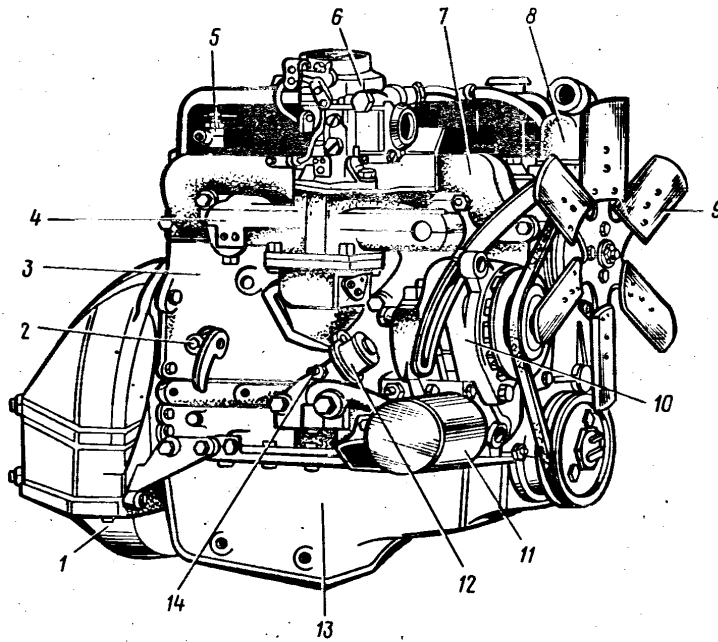


Fig. 11. Engine
(Left-Side View):

1 - rocker cover; 2 - distributor; 3 - starter; 4 - clutch housing; 5 - oil dipstick; 6 - fuel pump; 7 - engine mount bracket; 8 - cylinder head; 9 - water pump; 10 - fine fuel filter; 11 - oil filler cap.



Cut in the oil cooler at ambient temperatures above 20°C.
 . Change oil in the engine crankcase following the directions given in Table 3. In case of an excessive consumption of oil, check the crankcase ventilation system for serviceable condition. Drain waste oil immediately after the run, when the oil is still hot and flows readily.

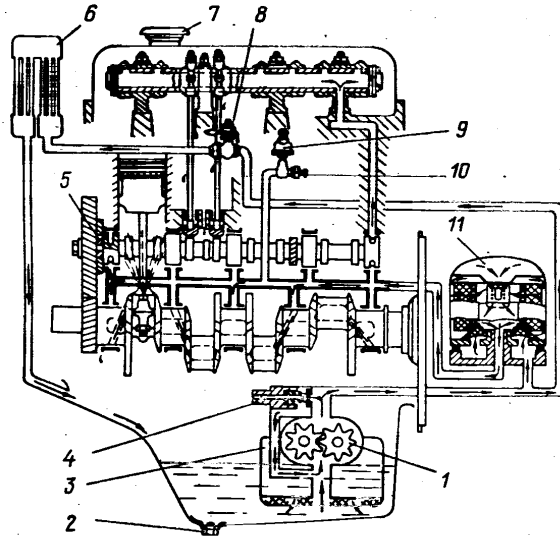


Fig. 13. Engine Lubrication System Diagram:
 1 - oil pump; 2 - oil sump drain plug; 3 - oil intake strainer; 4 - pressure relief valve; 5 - timing gear lubricating hole; 6 - oil cooler; 7 - oil filler cap; 8 - oil cooler cock; 9 - oil pressure transmitter; 10 - emergency oil pressure drop warning lamp transmitter; 11 - oil filter

Fig. 12. Engine (Right-Side View):
 1 - clutch housing (lower part); 2 - cylinder block water drain cock; 3 - cylinder block; 4 - intake manifold; 5 - heater cock; 6 - carburettor; 7 - exhaust manifold; 8 - cooling system outlet connection; 9 - fan; 10 - alternator; 11 - oil filter; 12 - oil pressure transmitter; 13 - oil sump; 14 - emergency oil pressure drop warning lamp transmitter

Bear in mind that if the full-flow oil filter is choked, the by-pass valve opens and passes unfiltered oil into the lubrication system.

The by-pass valve opens at a pressure drop across the filter equal to $0.6 - 0.75 \text{ kgf/cm}^2$. So, be sure to replace the filter in compliance with recommendations of the Lubrication Table. The oil filter is easy to turn out in the counter-clockwise direction (Fig. 15). In stubborn cases, use a special tool consisting of a clamp and a handle. When fitting a new filter, make sure the rubber sealing ring is not damaged, align the filter with the threaded connection and turn it on.

When the ignition is turned on, the emergency oil pressure drop warning lamp may come on, and after the engine has been started and the oil pressure in the system is sufficient to lubricate the parts, the lamp goes off.

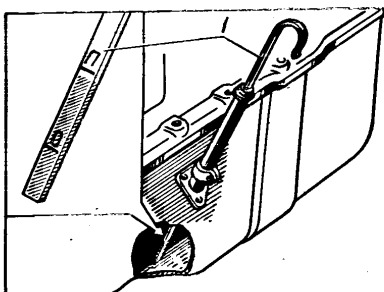


Fig. 14. Checking Oil Level
in Engine Crankcase:
1 - oil dipstick

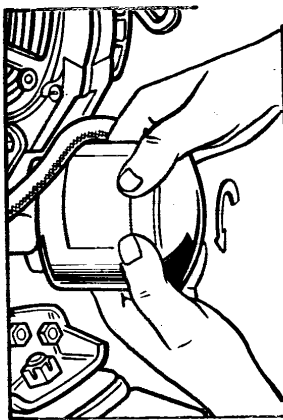


Fig. 15. Removing Oil Filter

Crankcase Ventilation System

To decrease pollution of ambient air (to cut down the amount of hydrocarbons in the exhaust gases), the engine is provided with a closed crankcase ventilation system which operates due to depression built in the cylinders.

Simultaneously the system prevents building-up of excessive pressure in the crankcase, dilution of oil with gasoline and decreases harmful effect of sulphide formed from combustion products on the cylinder surfaces.

The crankcase ventilation system of combination type employs two pipes 2 and 3 (Fig. 16).

Pipe 3 connects the engine crankcase with the carburettor throttle chamber through a 2-mm dia jet arranged below the throttle. Gases are sucked through the jet when the engine is running idle. At other duties the major part of the gases is let out along pipe 2.

To separate drops of oil suspended in crankcase gases, oil separator 1 is installed on the front cover of the tappet box.

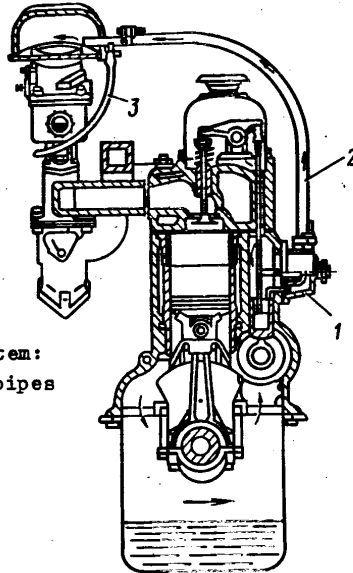


Fig. 16. Crankcase Ventilation System:
1 - oil separator; 2,3 - pipes

Engine Cooling System

The engine cooling system is depicted in Fig. 17.

Recommended for use in the cooling system is a special anti-freeze solution, grade 40 or TOCOX A-40.

Bear in mind that all antifreeze solutions are poisonous.

The amount of antifreeze, grade 40 or TOCOX A-40 should be 5 - 6% less than that of water required to fill the system.

If neither of the recommended antifreezes is available, consult the Selling Dealer who will recommend You another antifreeze.

Never mix the solutions of different grades.

If the coolant level 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 solution diluted with water is higher. Change the coolant in the system at the first opportunity.

Keeping the coolant temperature within 80 and 90°C during the operation of the automobile considerably decreases wear of the engine and cuts down fuel consumption. The recommended temperature is maintained by means of an automatically operated thermostat and the shutters controlled by the driver.

The causes of excessive temperature rise are: coolant level drop in the radiator, weak tension of the fan V-belt or driving with the shutters closed. To tension the fan drive V-belt (Fig. 18), turn the alternator. Normal deflection of the V-belt is 8 to 14 mm at 4 kgf.

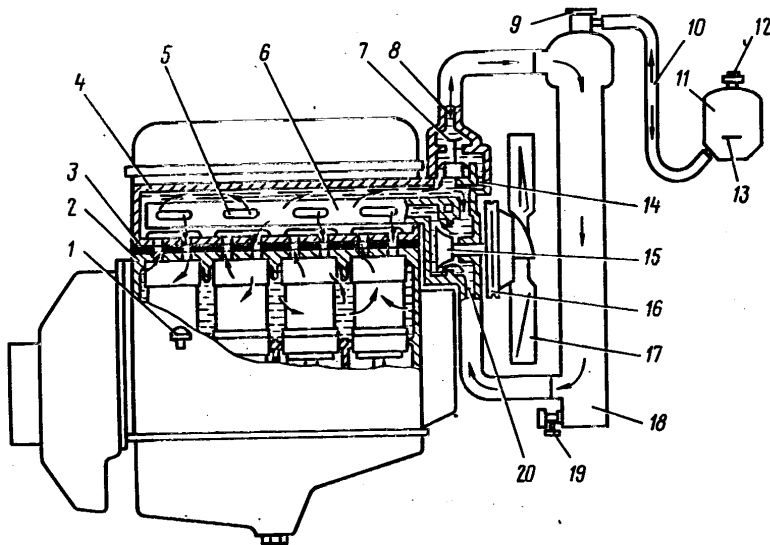


Fig. 17. Engine Cooling System Diagram:

- 1 - cylinder block drain cock; 2 - cylinder block;
- 3 - gasket; 4 - cylinder head; 5 - water manifold opening;
- 6 - water manifold; 7 - thermostat; 8 - outlet connection;
- 9 - plug; 10 - hose to expansion tank; 11st - expansion tank;
- 12 - plug; 13 - minimum level mark; 14 - by-pass;
- 15 - water pump impeller; 16 - pulley; 17 - fan; 18 - radiator;
- 19 - radiator drain cock; 20 - intake connection

*The expansion tank will be installed later, when put into production.

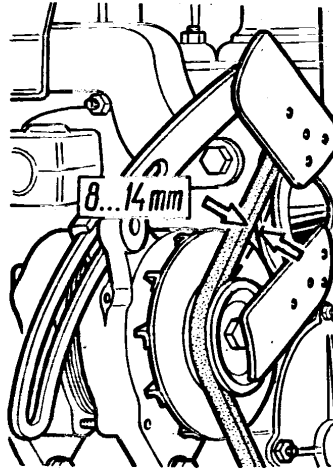


Fig. 18. Checking Fan
Drive V-Belt Tension

Fuel System

The fuel system diagram is shown in Fig. 19.

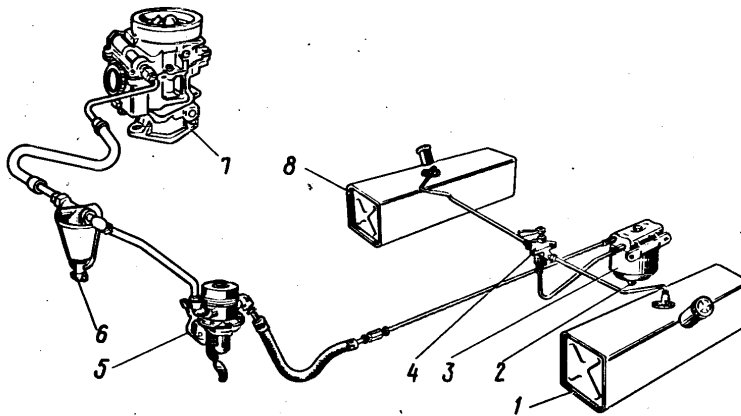


Fig. 19. Engine Fuel System Diagram:
1 - fuel tank (left-hand); 2 - drain hole plug; 3 - filter-
settler; 4 - tank selector cock; 5 - fuel pump; 6 - fine
fuel filter; 7 - carburettor; 8 - fuel tank (right-hand)

Carburettor

The carburettor is operated by means of the pedal connected through a system of rods and levers with the throttle and by means of the throttle and choke control knobs.

When the manual throttle linkage is used and to provide full closing of the choke, release the knobs from the fixed position and then press the pedal to relieve the manual control linkage from excessive stresses.

Check fuel level in the carburettor when the automobile is placed on a level ground and the engine is stopped. Using a hand primer, set the fuel level in the carburettor float chamber within the peephole marks "a" (Fig. 20). If fuel level is out of the recommended limits, remove the carburettor upper body and bend lip 3 (Fig. 21) to set the required level. Check the dimensions shown in Fig. 21 when the upper body is arranged with the float facing up. At the same time bend stop 2 to set 1.2 - 1.5 mm stroke of the fuel feed valve needle. The adjustment done, again check the fuel level and, if necessary, repeat the adjustment operations. Bear in mind that the fuel level rises gradually as the float mechanism wears

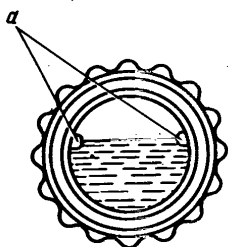


Fig. 20. Carburettor Float Chamber Peephole:
a - fuel level marks

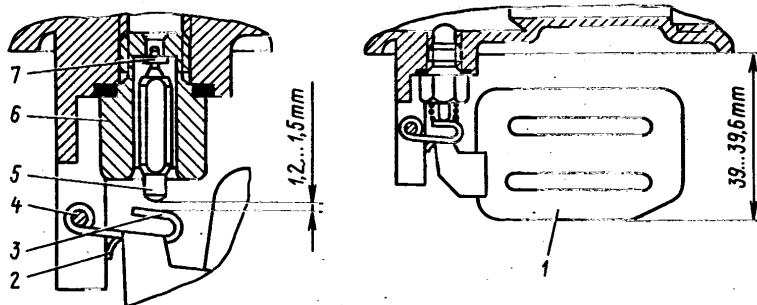


Fig. 21. Carburettor Float and Its Adjustment:
1 - float; 2 - float stop; 3 - level adjustment lip;
4 - pin; 5 - valve needle; 6 - valve body; 7 - valve washer

out in operation, so set the fuel level at the lower limit to keep it within permissible limits for a long time.

Note. Use a screwdriver or pliers to bend the lip, never press on the float.

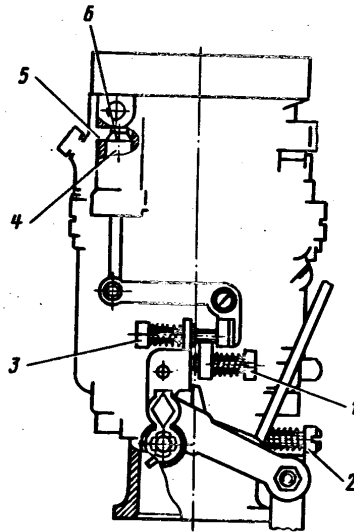
Idling adjustment of the crankshaft should be done when the engine is warmed up and the ignition system is in good repair.

Perform the adjustment proceeding as follows:

1. Set an idling speed to 550 - 600 rpm by means of screw 1 (Fig. 22).
2. Set screw 2 to provide maximum engine speed for the given throttle setting.
3. Finally adjust idling speed of 600 rpm with screw 1.
4. Adjust the linkage of float chamber vent valve 4 by setting screw 3 in a position in which valve edge 6 lines up with lower edge 5 of the slot in the carburettor upper body.

Fig. 22. Carburettor Adjusting Screws:

- 1 - throttle stop screw; 2 - idle fuel screw; 3 - vent valve adjusting screw; 4 - vent valve; 5 - lower edge of carburettor upper body slot; 6 - vent valve edge



Ignition System

To provide trouble-free operation of the ignition system do the following:

1. Keep the distributor clean and dry. Wipe the breaker contact points with chamois leather. If the points are worn or burned, level them up. Check the breaker point gap which should be 0.35 - 0.45 mm with the points fully open (Fig. 23). To perform the adjustment, loosen lockscrew 1 (Fig. 24) and turn adjusting screw 2.

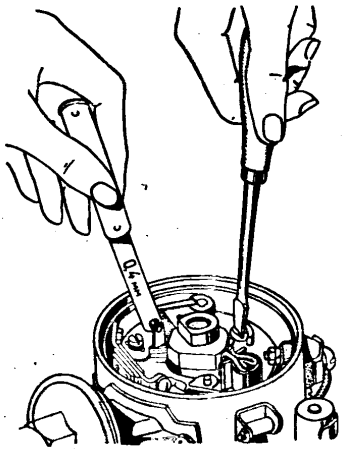


Fig. 23. Adjusting Breaker Point Gap

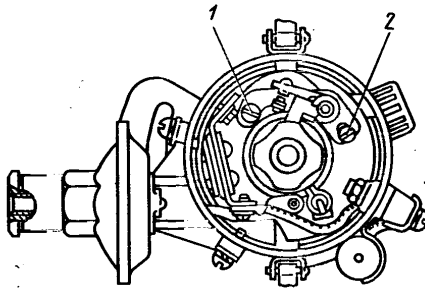


Fig. 24. Distributor:
1 - lock screw; 2 - adjusting screw (eccentric)

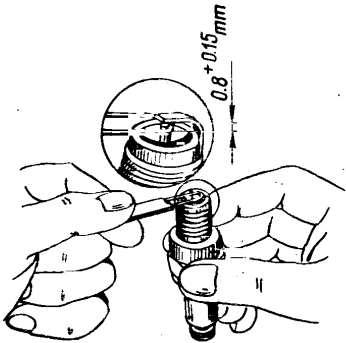


Fig. 25. Checking Spark Plug Gap

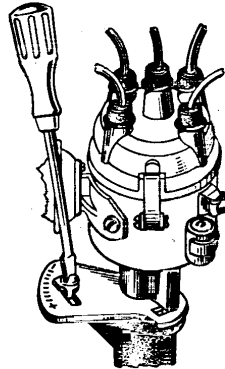


Fig. 26. Adjusting Ignition Timing by Means of Octane Selector

The adjustment done, tighten up the lock screw.

2. Keep the spark plugs clean. Check spark plug gap with a feeler gauge (Fig. 25). The gap should be $0.8^{+0.15}$ mm. Adjust the gap by bending the side electrode.

3. Check the ignition timing and adjust it with the octane selector (Fig. 26) when the engine is warmed up.

The best timing gives the fastest acceleration. Slight transient detonation on acceleration is permissible. If detonation is heavy, decrease ignition advance.

Engine Maintenance

1. Tighten up the cylinder head attachment nuts after the completion of the running-in period, and every 1000 km of run after each cylinder head removal. Tighten the nuts only on a cold engine in two steps, proceeding in the sequence indicated in Fig. 27.

The final tightening torque is 7.3 - 7.8 kgf.m.

2. When necessary, adjust valve-to-rocker clearances. Do it when the engine is cold, proceeding as follows:

- remove the pipe of the vacuum ignition advance mechanism and the hoses of the crankcase ventilation;
- remove the rocker cover taking care not to damage the gasket;
- set the No. 1 cylinder piston at TDC on compression stroke against timing mark 2 (Fig. 28) on the crankshaft pulley and, using a feeler gauge, check the valve clearance between the rockers and the valves of the No. 1 cylinder. If the clearance is wrong, turn off locknut 5 (Fig. 29) of adjusting screw 4 and turning the adjusting screw with a screwdriver, set the clearance by the feeler gauge. Then, holding the adjusting screw with a screwdriver, tighten the locknut and check the clearances;
- having adjusted the clearances in one cylinder, give the crankshaft half a revolution and adjust the clearances in other cylinders according to the firing order.

3. Periodically check fan belt tension (Fig. 18).

4. When summerizing the automobile, flush the engine cooling system with clean water to remove scale and sediments. Flush the

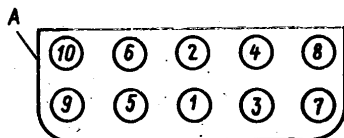


Fig. 27. Sequence of Tightening Cylinder Head Nuts:

A - engine front end

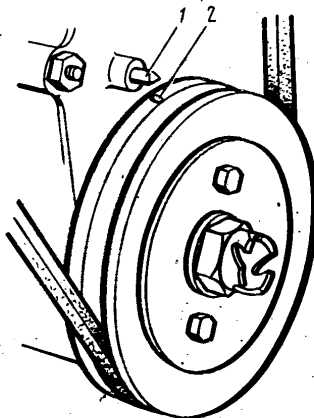


Fig. 28. Setting No. 1 Cylinder Piston at TDC:

1 - timing stud; 2 - timing mark

engine separately from the radiator. Before flushing the engine, take thermostat 7 (Fig. 17) out of the connection. The direction of flushing water flow is shown in Fig. 30.

If scale deposit in the radiator tubes is heavy, do the following:

- remove the radiator from the automobile and fill it with 10% solution of caustic soda heated to 90°C;

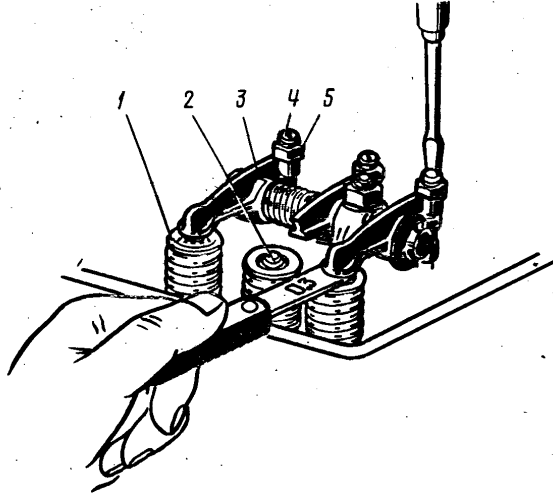


Fig. 29. Adjusting Valve-to-Rocker Clearance:
1 - spring plate; 2 - valve; 3 - rocker arm; 4 - adjusting screw; 5 - locknut

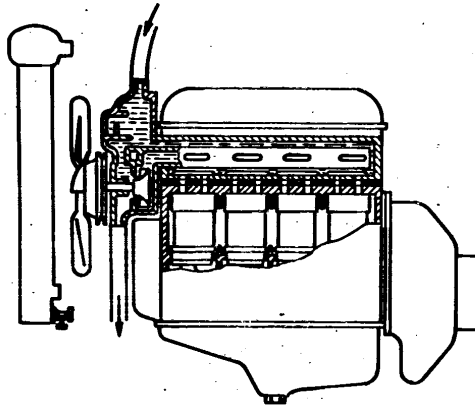


Fig. 30. Flushing Engine Cooling Jacket

- in 30 min drain the solution from the radiator;
- flush the radiator with hot water at a pressure of 0.5 kgf/cm² for 30 - 40 min in the direction opposite to normal circulation (Fig. 31).

5. Replace the oil filter, change oil in the air cleaner and engine crankcase following the directions of Table 3.

6. At the seasonal services, set the mixture heat control valve in the position corresponding to the coming season (Fig. 32).

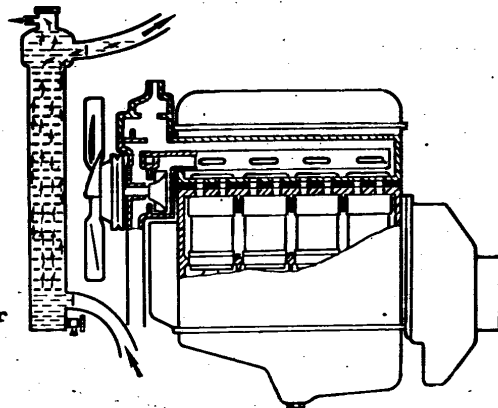


Fig. 31. Flushing Radiator

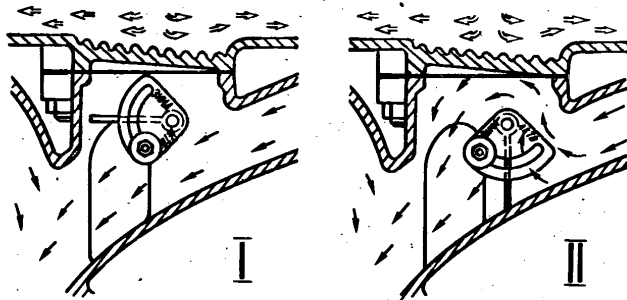


Fig. 32. Mixture Heat Control Valve:
I - heat valve OFF (summer); II - heat valve ON (winter)

Engine Starting, Warming-Up and Stopping

Starting from Cold at 0°C and above

1. Prime the carburettor with the manual fuel primer.
2. Pull choke knob 16 (Fig. 9) 1/4 - 1/2 of the way.
3. Disengage the clutch by fully depressing the clutch pedal.
4. Close the battery switch.

5. Switch on the ignition.

6. Switch on the starter for 5 s maximum. Pause for 10 - 15 s before another starting attempt. The starter should not be operated more than three times in succession.

If the starter is sluggish, use the cranking handle to start the engine.

7. As soon as the engine starts firing, depress the accelerator pedal or pull out the throttle control knob.

8. Warm up the engine at a moderate crankshaft speed until the cooling liquid temperature is at least 60°C. If the throttle control knob has been pulled out, push it all the way in.

If the choke has been used to start the engine, gradually push the choke control knob in as the engine warms up.

Starting from Cold at Temperatures from 0°C down to Minus 15°C

1. Cut off oil cooler 6 (Fig. 13) by turning the handle of cock 8 through 90°.

2. Close the radiator shutters by pulling handle 28 (Fig. 8) all the way out.

3. Crank the engine 3 - 5 turns with the cranking handle.

If the cooling system is not filled with coolant, fill it after the engine has been started.

Then proceed as instructed for starting the engine at temperatures from 0°C and above.

Starting from Cold at Temperatures below Minus 15°C

1. Cut off the oil cooler.

2. Close the radiator shutters.

3. Warm the engine by pouring hot water into the radiator. As the water cools off, drain it from the engine cooling system and then again fill the system with hot water.

Warm the engine until the crankshaft is easy to turn by the cranking handle and compression in the engine cylinders is felt definitely.

4. Turn the fan by hand to free the water pump impeller from possible ice-tacking.

5. Operate the manual fuel primer to fill the carburettor with fuel.

6. Warm the intake manifold with hot water, pouring it in a thin stream to let water transfer heat to the manifold.

7. Pull the choke control knob all the way out; without switching on the ignition and opening the throttle, turn the crankshaft

with the cranking handle 3 to 5 revolutions to the carburettor with prime fuel.

8. Disengage the clutch.

9. Switch on the ignition and start the engine by means of the cranking handle.

10. Fill the cooling system with water or special antifreeze solution, having previously closed the drain cocks and the heater cock. Fill the liquid slowly to let air escape from the system.

Then carry out the operations laid in Paras 6 and 7 under "Starting from Cold at 0°C and above".

Starting from Hot

1. Switch on the ignition.

2. Switch on the starter.

If a warm engine with sound ignition system fails to start two-three times in succession, the cause may be in over-enrichment of the mixture. In such cases, blow out the cylinders with air by gradually pressing the accelerator pedal all way down and cranking the engine a few times with the starter. This done, start the engine in a usual manner.

Stopping the Engine

If the engine operates under a heavy load, before shutting it down, let it operate for 1 - 2 min at a slow crankshaft speed to provide uniform and gradual cooling and then turn off the ignition.

CLUTCH

Keep free travel of the clutch pedal within 28 and 38 mm.

Adjust free travel of the clutch pedal by changing the length of rod 16 (Fig. 33) which is done by turning the nuts, holding the rod to the square head of pin 18, on or off, as required.

Maintenance of the clutch control linkage comes to periodical lubrication of the linkage through two grease fittings 5.

Lubricate clutch release bearing 9 through the grease cup located at the right side of the clutch housing. Access to the grease cup is from underneath the automobile.

Lubricate the clutch following the instructions of Table 3.

GEARBOX

The gearbox (Fig. 34) has four forward gears and one reverse gear. The third and fourth gears are synchromeshed.

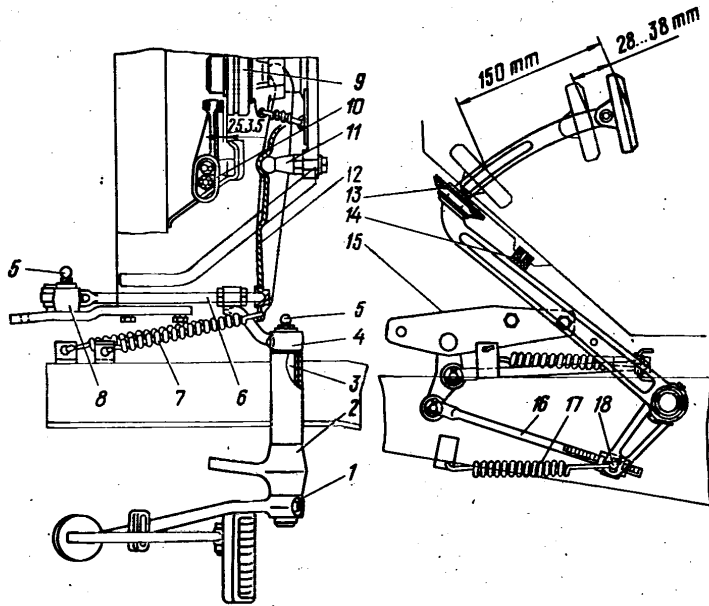
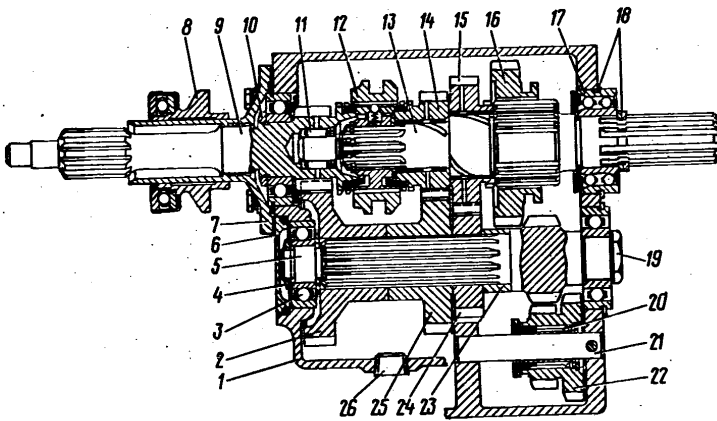


Fig. 33. Clutch Control Linkage:

- 1 - clutch pedal; 2 - brake pedal; 3 - pedal shaft; 4 - operating lever; 5 - grease fitting; 6 - pushrod; 7,17 - retracting springs; 8 - idler lever; 9 - clutch release bearing; 10 - release lever; 11 - ball pin; 12 - clutch release fork; 13 - sealing sleeve; 14 - buffer; 15 - idler lever bracket; 16 - adjusting rod; 18 - square-head pin



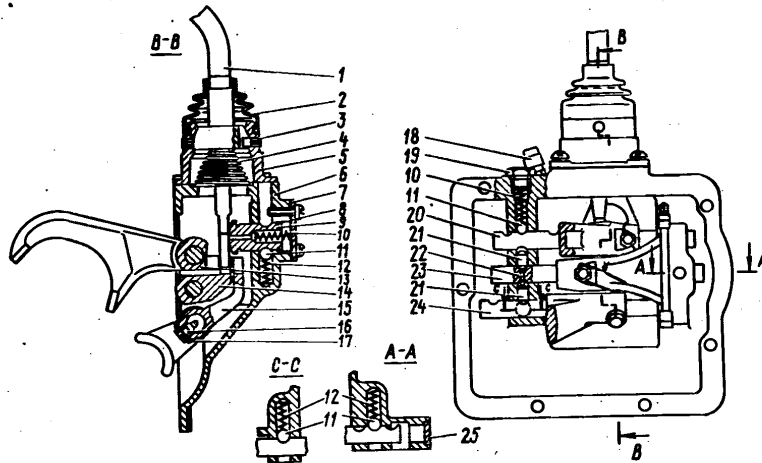


Fig. 35. Gearshift Mechanism:

1 - gearshift lever; 2 - boot; 3 - pin; 4 - lever spring;
 5 - lever support; 6 - gearbox side cover; 7 - latch cover;
 8 - locking ring; 9 - latch; 10 - latch spring; 11 - ball detent;
 12 - detent spring; 13 - first and second gear shifter fork;
 14 - third and fourth gear shifter fork; 15 - reverse
 shifter fork; 16 - screw; 17 - locking wire; 18 -
 pressure relief valve; 19 - plug; 20 - first and second
 gear shifter fork shaft; 21 - plunger; 22 - pin; 23 - third
 and fourth gear shifter fork shaft; 24 - reverse shifter
 fork shaft; 25 - plug

Fig. 34. Gearbox:

1 - case; 2 - countershaft drive gear; 3 - countershaft front
 bearing; 4 - bearing attachment nut; 5 - countershaft;
 6 - bearing cover; 7 - cover; 8 - clutch release sleeve;
 9 - clutch shaft; 10 - special nut; 11 - mainshaft
 front bearing; 12 - synchronizer sleeve; 13 - mainshaft;
 14 - third speed gear; 15 - second speed gear; 16 - first
 speed gear; 17 - mainshaft rear bearing; 18 - lockrings;
 19 - countershaft rear bearing attachment bolt; 20 - reverse
 gear cluster bearing; 21 - reverse gear cluster shaft;
 22 - reverse gear cluster; 23 - spacer; 24 - countershaft
 second speed gear; 25 - countershaft third speed gear;
 26 - drain plug

Gearshifting is effected by lever 1 (Fig. 35) mounted on the top flange of the side cover.

Move the gearshift lever smoothly, without jerks. Bear in mind that rapid gearshifting, especially from the fourth into the third gear, may cause damage to the synchronizer.

Shift into the first or second gear only after the automobile speed has been reduced considerably. Engage the reverse gear only after a complete stop of the automobile. Bear in mind that the travel of the first gear shifter fork is two and a half times longer than that of the second gear; incomplete engagement of the first gear causes rapid wear of the teeth and failure of the gears.

In operation, check oil level in the gearbox and change the oil at intervals indicated in Table 3. Periodically check all fasteners for reliability. If oil leaks are detected, reveal the cause and eliminate it.

TRANSFER CASE

The transfer case (Fig. 36) has two speeds: direct and low, gear ratios 1.00 and 1.94, respectively.

The transfer case is controlled by two levers of gearshift mechanism (see Fig. 8, Ref. Nos 15 and 17).

The low gear can be engaged only after the front axle has been engaged, as the transfer case gearshift mechanism is provided with an interlock.

Engage the front axle only for driving over heavy terrain (sand, mud, snow, etc.). When the front axle is engaged, gear noise is increased. Driving with the front axle engaged over hard-surface roads causes untimely wear of the transmission and tyres, and fuel consumption is increased.

Engage the low gear in the transfer case when hard pull is required (upgrades, heavy road conditions, etc.). Before engaging the low gear, slow down the automobile speed to 3 - 5 km/h.

Maintenance of the transfer case comes to checking the oil level which should reach the edge of the filler hole, changing the oil at intervals specified in Table 3 and periodically checking the attachments of the transfer case.

If oil leakage is detected, locate and eliminate the cause.

PROPELLER SHAFTS

The propeller shaft drive consists of two open propeller shafts (Figs 37, 38). Each shaft has two universal joints with needle bearings.

Maintenance of the propeller shafts comes to periodically

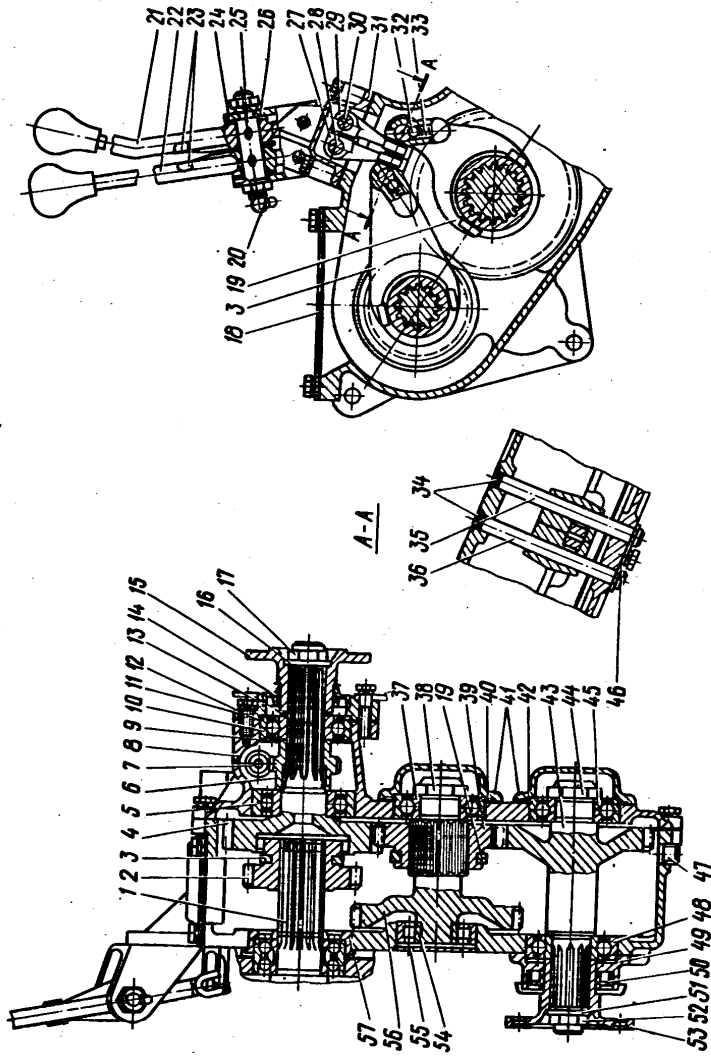


Fig. 36. Transfer Case:

- 1 - Gearbox mainshaft;
- 2 - low speed clutch gear;
- 3 - direct and low gear shifter fork;
- 4 - rear axle drive shaft;
- 5, 10 - rear axle drive shaft bearings;
- 6 - speedometer pinion;
- 7 - speedometer driven gear;

8 - housing cover; 9 - oil slinger; 11 - cover; 12, 40, 42 - thrust rings; 13 - thrust washer; 14, 50 - oil seals; 15, 53 - flanges; 16, 51 - washers; 17, 38, 44, 52 - nuts; 18 - cover; 19 - front axle shifter fork; 20 - grease fittings; 21 - front axle control lever; 22 - direct drive and low gear shifter lever; 23 - lever return springs; 24 - washer; 25 - lever shaft; 26 - bracket; 27 - direct drive and low gear shift arm; 28 - direct drive and low gear shifter fork shaft; 29 - front axle shift arm; 30 - front axle shifter fork shaft; 31 - shift mechanism cover; 32 - detent ball; 33 - detent spring; 34 - plugs; 35 - front axle shifter fork shaft; 36 - direct drive and low gear shifter fork shaft; 37, 54 - countershaft bearings; 39 - front axle clutch gear; 41 - bearing covers; 43 - front axle drive shaft; 45, 48 - front axle drive shaft bearings; 46 - lock plate; 47 - drain plug; 49 - cover; 55 - plug; 56 - countershaft; 57 - bearing thrust cup

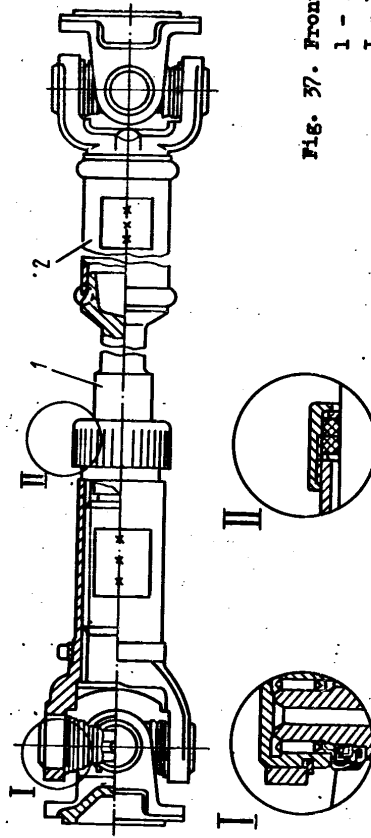


Fig. 37. Front Propeller Shaft:

- 1 - solid shaft; 2 - propeller shaft tube
- I - bearing; II - splined joint seal

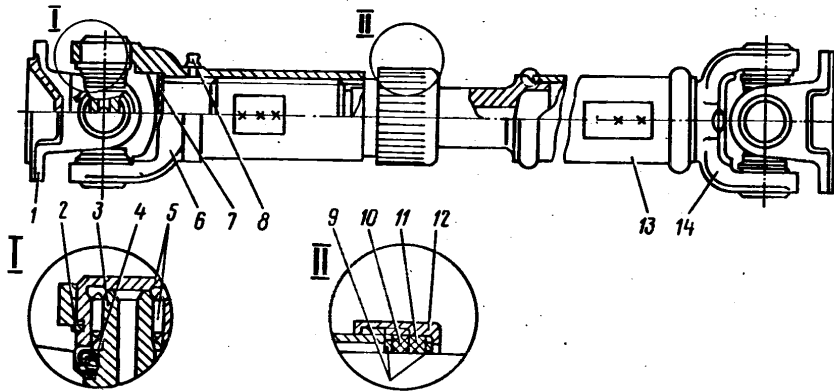


Fig. 38. Rear Propeller Shaft:

1 - flange; 2 - lockring; 3 - cross; 4 - oil seal; 5 - needle bearing; 6 - slip yoke; 7 - plug; 8 - grease fitting; 9 - steel split rings; 10 - rubber ring; 11 - felt ring; 12 - retainer; 13 - propeller shaft tube; 14 - universal joint yoke

I - bearing; II - splined joint seal

checking and tightening the bolts holding the flanges, cleaning the shafts from dirt, lubricating the universal joints and splined connections in full compliance with Table 3.

Use a special tip to be fitted on the grease gun to lubricate the propeller shafts. The tip is found in the driver's tools kit.

REAR AXLE

The rear axle (Fig. 39) has a final drive consisting of a pair of spiral bevel gears.

The rear axle housing split in the vertical plane consists of two halves bolted together. The differential is bevel, with four pinions. Replaceable thrust washers are installed under the axle-shaft gears.

Maintenance of the axle comes to checking the oil level which should reach the filler hole edge and replacing the oil in full compliance with the Lubrication Table, tightening the loose connections, periodically cleaning the hole of safety valve 1 and adjusting the bearings, if such a necessity arises.

Axial play of the drive pinion is not tolerable. If play is detected, tighten up nut 7 applying a torque of 17 - 21 kgf.m. If play persists (for instance the shims are worn down because of

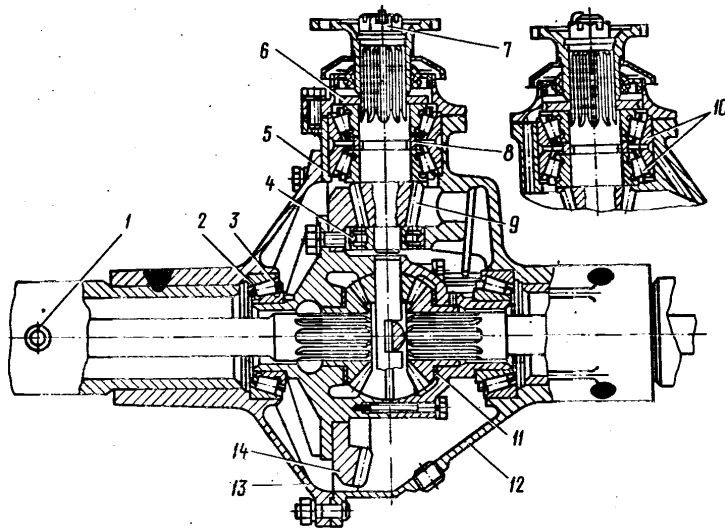


Fig. 39. Rear Axle:

- 1 - safety valve; 2 - differential bearing; 3 - shims;
- 4 - drive pinion rear bearing; 5 - adjusting ring; 6 - oil slinger ring; 7 - nut; 8 - shims; 9 - drive pinion;
- 10 - front bearing; 11 - thrust washer; 12 - housing;
- 13 - housing cover; 14 - ring gear

long operation of the bearing with the nut loose), then replace shims 8 and adjust the tension of front bearing 10.

To eliminate axial play of the ring gear install shims 3 of equal thickness at the left and right sides of the differential case, thus providing the turning of the ring gear with a certain effort.

To remove drive pinion 9 detach cover 13 from axle housing 12 and take out the differential with ring gear assembly 14. When reassembling the axle, first install drive pinion 9 complete with the bearing, then the differential complete with the ring gear.

FRONT AXLE

The final drive and differential of the front axle are similar in construction to those of the rear axle. All maintenance instructions laid above for the rear axle apply to the front axle as well.

Maintenance of the steering knuckles should be carried out additionally.

The construction of the steering knuckle is shown in Fig. 40.

In operation check for up and down (vertical) play of kingpins 3 (Fig. 41). If play is detected, remove the required number of shims 2 from the top and bottom. To preserve axial alignment, remove the same number of the upper and lower shims.

When inspecting the front axle steering knuckles, pay attention to the condition of adjusting bolt 27 (Fig. 40) and steering stop 28. Make sure they are locked reliably.

The front axle has a wheel disengagement arrangement.

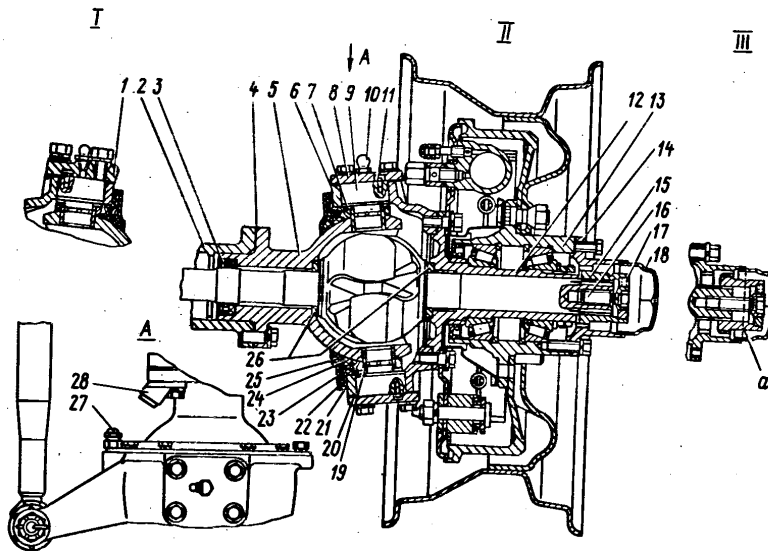


Fig. 40. Steering Knuckle:

I - right-hand steering knuckle; II - left-hand steering knuckle; III - front wheels disengaged; a - circular groove;

1 - steering knuckle lever; 2 - axle-shaft housing; 3 - oil seal; 4 - gasket; 5 - bell housing; 6 - steering knuckle housing; 7 - thrust washer; 8 - cover; 9 - kingpin; 10 - grease fitting; 11 - lock pin; 12 - spindle; 13 - wheel hub; 14 - driving flange; 15 - coupling; 16 - coupling bolt; 17 - detent ball; 18 - cap; 19 - kingpin bushing; 20 - gasket; 21 - oil seal inner ring; 22 - baffle ring; 23 - outer ring; 24 - inner sealing ring; 25 - outer sealing ring; 26 - thrust washers; 27 - steering lock angle adjusting screw; 28 - steering stop

To disengage the wheels, remove cap 18 and, turning out bolt 16, set coupling 15 in a position where circular groove "a" on the surface of coupling 15 is in plane with the end face of flange 14 (see Fig. 40, View III). Having installed coupling 15 in the required position, turn on the cap.

Engage the wheels by turning bolt 16 to stop. Carry out engagement and disengagement operations on both wheels.

Do not engage the front axle when the front wheels are disengaged.

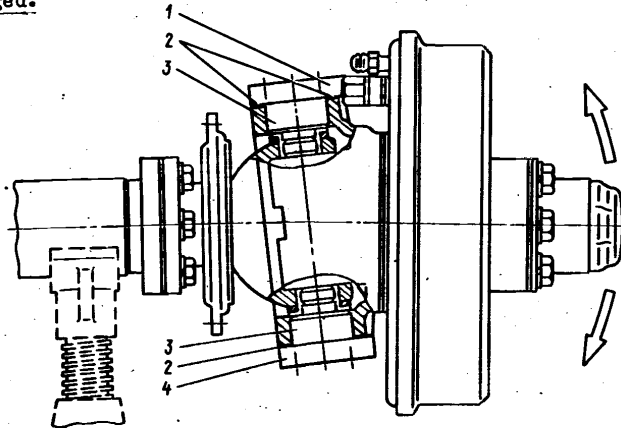


Fig. 41. Checking Kingpin Tightening:

1 - upper cover; 2 - shims; 3 - kingpin; 4 - lower cover

TOWING GEAR

The automobile is furnished with a double-action enclosed towing gear which permits operation of the automobile together with a trailer. The towing gear is furnished with a resilient element which cushions impact loads.

Some automobiles can be furnished with a rigid towing gear which permits only short-time operation with the trailer.

SUSPENSION

The suspension of the automobile consists of four semi-elliptic springs operating in conjunction with four telescopic hydraulic shock absorbers (Figs 42, 43).

The rear spring can be composed of seven or nine leaves.

Maintenance of the springs comes to checking and tightening all the connections and lubricating the leaves in full compliance

with Table 3. To lubricate the springs, remove them from the automobile, disassemble, wash in kerosene, dry and lubricate each leaf separately.

If knocks or squeaks are heard in the spring eyes, replace the bushings or increase the interference in the bushings by placing a rubber ring between them.

Maintenance of the shock absorbers comes to periodical check-

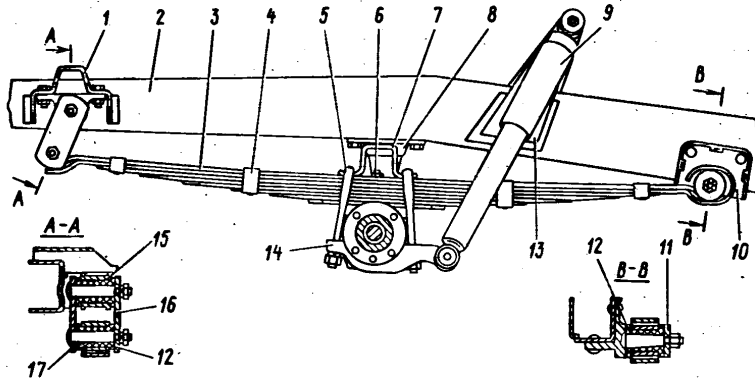


Fig. 42. Front Suspension:

- 1 - hanger support; 2 - frame; 3 - spring; 4 - clip;
- 5 - U-bolt; 6 - center bolt; 7 - upper plate; 8 - bumper;
- 9 - shock absorber; 10 - hanger; 11 - washer; 12 - rubber bush; 13 - shock absorber upper bracket; 14 - spring plate;
- 15 - hanger; 16 - shackle outer link; 17 - shackle inner link

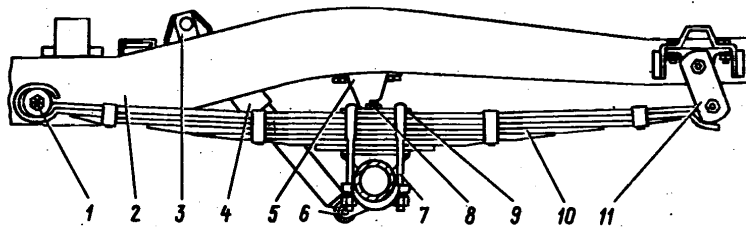


Fig. 43. Rear Suspension:

- 1 - spring eye pin; 2 - frame; 3 - shock absorber upper bracket;
- 4 - shock absorber; 5 - bumper; 6 - spring plate; 7 - U-bolt;
- 8 - center bolt; 9 - upper plate; 10 - spring; 11 - shackle link

ing for fluid leaks, for reliable attachment and correct functioning, and also to replacing the fluid in compliance with the Lubrication Table.

In operation the shock absorbers require no special adjustment.

If fluid leaks past the rod oil seals and sealing rings of the reservoir, tighten up nut 18 (Fig. 44). If leakage still persists, remove the shock absorber, disassemble it, inspect the sealing rings and the hole in the rod guide bushing.

If the rod oil seal, rod guide bushing, reservoir sealing rings and other parts are worn on the inner diameter, replace them. Install rubber oil seal 15 with its inscription "HM3" towards the piston. When installing the oil seal, coat the inner surfaces coming in contact with the rod with grease ЛИТОЛ-24.

Disassemble and assemble the shock absorbers only when necessary and under repair shop conditions.

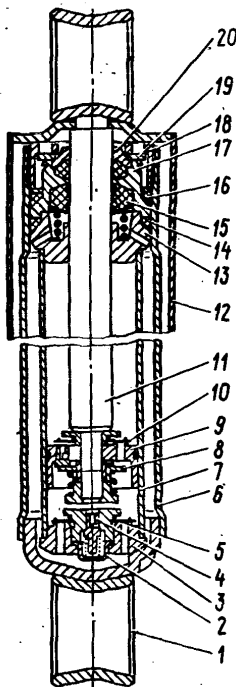


Fig. 44. Shock Absorber:

1 - eye; 2 - compression valve stop; 3 - compression valve body; 4 - compression valve; 5 - intake valve; 6 - reservoir; 7 - cylinder; 8 - rebound valve; 9 - piston; 10 - by-pass valve; 11 - rod; 12 - dust shield; 13 - rod guide bushing; 14 - lower sealing ring; 15 - rod lower oil seal; 16 - upper sealing ring; 17 - oil seal retainer; 18 - reservoir nut; 19 - fibre washer; 20 - oil seal cap

TYRES

Periodically check the condition of the tyres and tyre air pressure and when necessary, rotate the tyres (Fig. 45).

Periodically check and, if necessary, subject the wheel and tyre assembly to balancing.

Maintain the normal air pressure in the tyres of the front and rear wheels as different radius of rolling makes it difficult to disengage and engage the front axle.

In case of non-uniform wear of the front wheel tyres, check and adjust wheel toe-in (Fig. 46).

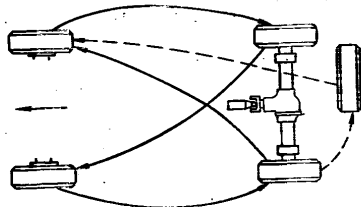


Fig. 45. Tyre Rotation Diagram

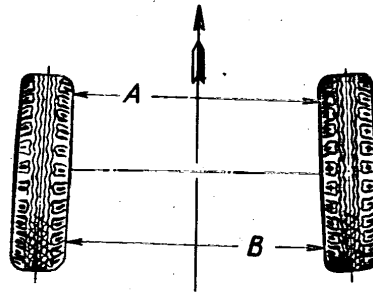


Fig. 46. Checking Wheel Toe-In

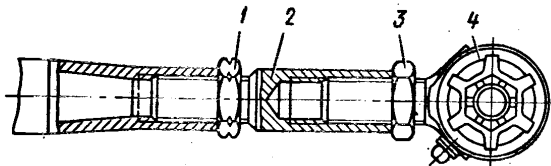


Fig. 47. Steering Tie-Rod End:

1 - left-hand thread locknut; 2 - adjuster; 3 - right-hand thread locknut; 4 - rod end

Toe-in at the normal tyre pressure should be such that size "A" taken at the front on the centre line of the tyre side surface should be 1.5 - 3.0 mm less than size "B" taken at the rear.

Adjust wheel toe-in by changing the length of the steering tie-rod. Before the adjustment, check for clearances in the steering rod joints and hub bearings; then back off locknuts 1 and 3 (Fig. 47) with the right-hand and left-hand threads and, turning adjuster 2, set the required toe-in. The adjustment done, tighten up the locknuts with a torque of 10.5 - 13 kgf.m.

ADJUSTMENT OF WHEEL BEARINGS

Carefully adjust wheel bearings 2 in hubs 1 (Fig. 48). If the bearings are loose, they might get damaged in motion due to destruc-

tive pounding. If the bearings are overtightened, they will overheat and grease will flow out, as a result the bearings will fail.

To adjust the bearings, proceed as follows:

1. Jack up the wheel whose bearings are to be adjusted.
2. Take out axle-shaft 5 of the rear axle (remove the hub driving flange and front axle wheel disengagement coupling) by turning in two puller bolts.
3. Bend back the tab of lockwasher 7, turn off locknut 6 and remove the lockwasher.
4. Back off the bearing adjusting nut $1/6$ to $1/3$ turn (1 - 2 flats).
5. Rotate the wheel by hand to check it for easy turning. If the wheel binds, eliminate the cause (rubbing of the drum against the shoes, etc).
6. Tighten the hub bearing adjusting nut by means of a wrench and a tommy bar 300 - 350 mm long, by hand, until the wheel is difficult to rotate (Fig. 49). When tightening the nut, press on the tommy bar smoothly, without jerks and simultaneously turn the wheel to make the rollers occupy a correct position on the bearing races.

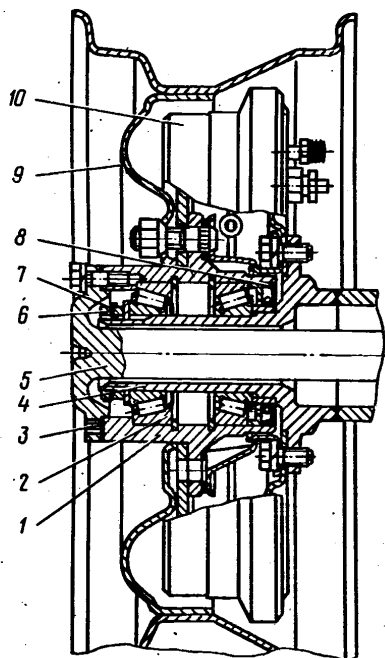


Fig. 48. Rear Wheel Hub:
1 - hub; 2 - bearing; 3 - gasket; 4 - spindle; 5 - axle shaft; 6 - locknut; 7 - lockwasher; 8 - oil seal; 9 - wheel disk; 10 - brake drum

7. Back off the nut $1/4 - 1/3$ turn (1.5 - 2 flats) and install the lockwasher. Tighten the locknut and lock the nut and locknut by bending the tabs of the lock washer onto the flats of the nuts (Fig. 50). If the tab of the lockwasher has even a slight crack, replace the lockwasher, otherwise the tab might break off and the nuts will work loose or tight which will cause damage to the bearings.

Fig. 49. Adjusting Hub Bearings

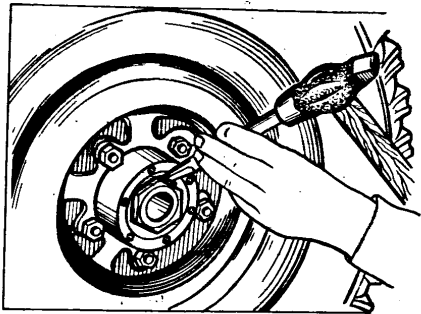
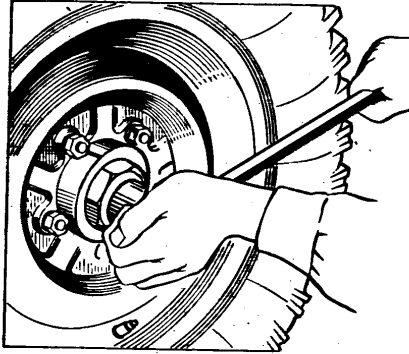


Fig. 50. Locking Hub Bearing Nuts

8. Check adjustment of the bearings.

If the adjustment is correct, the wheel should rotate freely, without binding, noticeable play or shake.

After a road test, check the wheel hubs for heating. If the hub overheats, back off the nut $1/6$ turn, observing the sequence and the rules laid above.

STEERING

The working pair of the steering mechanism is made so that, with the wheels in the straight-ahead position, the clearance in meshing is practically zero. As the wheels are turned in either side, the clearance increases gradually and reaches its maximum

value in the extreme positions. The steering mechanism is considered normally adjusted if the steering wheel play, with the wheels in the straight-ahead position, does not exceed 10° which corresponds to 40 mm, as measured on the wheel rim.

If steering wheel play exceeds the indicated value, prior to adjusting the steering mechanism, make sure the case attachment bolts are tightened up and joints of the steering linkage are in good condition.

Start the adjustment from checking worm bearings 8 and 14 (Fig. 51) for play. If no axial play of the worm is detected, adjust only the roller-to-worm meshing.

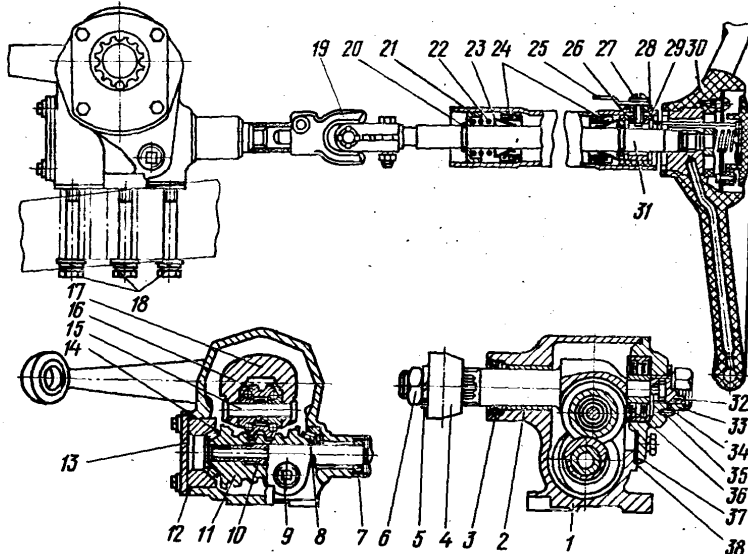


Fig. 51. Steering Gear:

- 1 - steering gear case; 2 - bushing; 3 - oil seal;
- 4 - steering arm; 5 - washer; 6 - nut; 7 - oil seal;
- 8, 14 - worm bearings; 9 - plug; 10 - steering gear shaft;
- 11 - worm; 12 - gasket; 13 - case lower cover; 15 - roller pin; 16 - steering arm shaft roller with bearing; 17 - steering arm shaft; 18 - bolts; 19 - universal joint;
- 20 - locking; 21 - protective washer; 22 - spring;
- 23 - spacer; 24 - bearings; 25 - horn wire; 26 - slip ring; 27 - screw; 28, 29 - plastic bushings; 30 - steering wheel; 31 - wheel shaft; 32 - adjusting screw; 33 - nut;
- 34 - lockwasher; 35 - pin; 36 - steering arm shaft bearing;
- 37 - case side cover; 38 - gasket

Adjust tightening of the worm bearings by means of shims installed between the case and lower cover of the case, with the steering mechanism removed. If tightening of the worm roller bearings is correct, the effort required to turn the steering wheel should be within 0.22 and 0.45 kgf, with the steering arm shaft not installed.

Adjust meshing of the roller and the worm without removing the steering mechanism from the automobile (having disconnected the steering arm rod) by shifting the steering arm shaft using adjusting screw 32 on the side cover of the case. The adjustment done, the steering wheel should be free to turn from the middle position (corresponding to the straight-ahead motion) at an effort of 0.9 - 1.6 kgf applied to the steering wheel.

The steering worm shaft is connected with the steering gear shaft by a universal joint with a cross on needle bearings. The bearings are held in the yokes by stop-punching the edge of the seat.

The steering gear shaft turns in the steering column tube on two ball bearings. Axial travel of the shaft is compensated by a spring placed between the distance bushing of the lower bearing and the shield.

The shield and distance bushing of the upper bearing are held on the shaft by lockrings fitted in the shaft grooves.

In the top portion of the steering column a slip ring is installed to which a horn wire is connected by a screw. The screw and the slip ring are insulated from the "ground" by plastic bushings.

All joints of the steering linkage are spring-loaded and they require no adjustment in operation.

Periodically check tightening of the stop nuts of the steering rod ends and prevent play in the taper connections of the levers and pins.

When servicing the automobile, pay attention to the condition of attachments of the bearings in the steering joint yokes.

If radial play in the joint is detected (axial travel of the cross in the bearings), stop-punch the bearings in the yokes additionally. Be careful not to mutilate the bearing cup.

The bearings of the cross are packed during assembly with grease ЛитоЛ-24 and need no replenishment in service.

If fight on the wheel is felt or in case of non-uniform wear of the tyres, check and, if necessary, perform balancing of the wheel and tyre assembly.

In case of heavy bumps in the front wheels, thoroughly inspect all outer parts of the front axle, steering rods and steering mechanism.

BRAKES
Service Brakes

All wheels of the automobile are equipped with hydraulically operated shoe brakes.

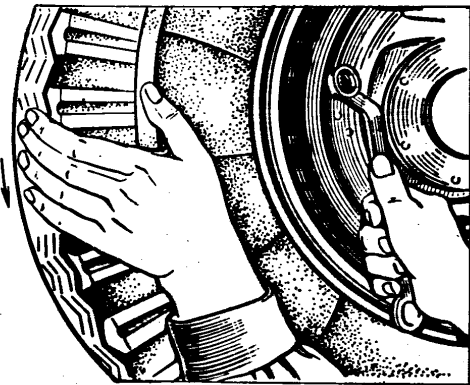
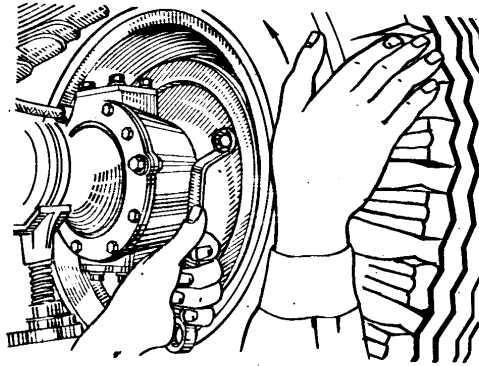
As the friction linings of the shoes and the brake drums wear, the clearances between them increase and free travel of the brake pedal becomes longer.

To restore normal clearance and decrease the brake pedal travel, adjust the brakes by means of adjusting cams.

The adjustment procedure is the following:

1. Jack up the axle at the side of the wheel whose brake is to be adjusted.
2. Rotating the wheel, gradually turn the adjusting cam until the wheel is braked (Figs 52, 53).
3. Gradually back off the cam turning the wheel, until the wheel rotates freely, and the drum does not rub against the shoes.

**Fig. 52. Adjusting
Shoe-to-Brake Drum Clearances of Front Wheel**



**Fig. 53. Adjusting
Shoe-to-Brake Drum
Clearances of Rear
Wheel**

4. Proceeding in the similar manner, adjust the clearances between the shoes and the drums of all other brakes.

When adjusting the brakes of the front wheels and the front shoes of the rear wheel brakes, turn the wheel forward.

When adjusting the rear shoes of the rear wheel brakes, turn the wheel backwards.

To decrease the clearances, turn the cams in the direction of wheel rotation, to increase the clearances, turn the cams in the opposite direction.

5. Make a road test to check the brakes for uniform application. If necessary, readjust the brakes.

Adjustment of the brake pedal free travel is made by setting the correct clearance between pushrod 19 (Fig. 54) and piston 17

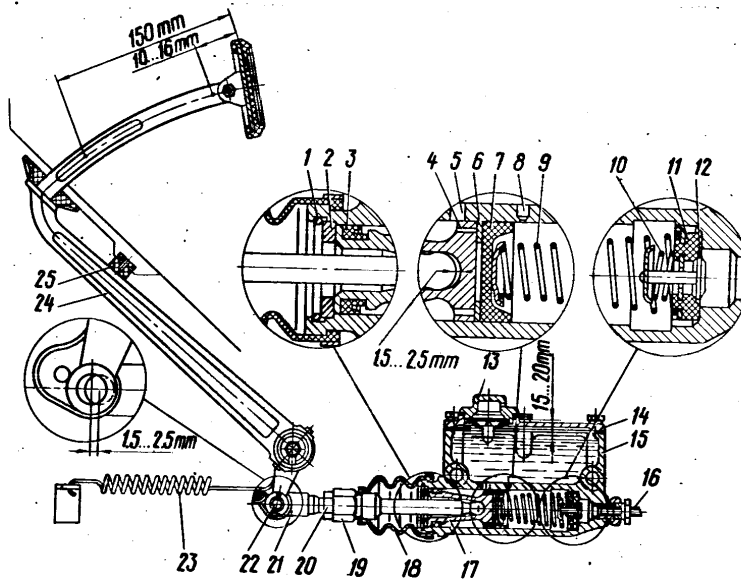


Fig. 54. Brake Master Cylinder and Its Linkage:

- 1 - lockring; 2 - thrust washer; 3 - outer sealing cup;
- 4 - piston hole; 5 - by-pass hole; 6 - washer; 7 - inner sealing cup; 8 - compensating hole; 9 - return spring;
- 10 - outlet valve spring; 11 - inlet valve; 12 - outlet valve;
- 13 - filler cap; 14 - fluid reservoir cover;
- 15 - brake master cylinder fluid reservoir; 16 - connecting pipe;
- 17 - piston; 18 - boot; 19 - pushrod; 20 - locknut;
- 21 - pushrod fork; 22 - fork pin; 23 - pedal retracting spring;
- 24 - brake pedal; 25 - brake pedal rubber stop

of the brake master cylinder. The clearance should be equal to 1.5 - 2.5 mm which corresponds to 10 - 16 mm of brake pedal free travel.

Adjust free travel of the brake pedal, proceeding as follows:

1. Set the brake pedal until it fits tightly against stop 25.
2. Screw fork 21 into pushrod 19 of the brake master cylinder so that with piston 17 in the extreme forward position the axis of the fork hole is 1.5 - 2.5 mm short of the axis of the hole in the pedal.
3. Fix the fork with locknut 20 in this position.
4. Align the holes of the fork and pedal, insert pin 22 and cotter it up.

Fill the brake system with the brake fluid in full compliance with Table 2.

To fill the brake system, proceed as follows:

1. Check all connections of the brake hydraulic system for tightness and all flexible rubber hoses for condition.
2. Remove access cover 23 (Fig. 8) of the brake master cylinder from the floor.

Turn out filler cap 13 (Fig. 54) of the brake master cylinder and fill the cylinder with brake fluid.

3. Remove the rubber cap from the bleeder valve of the right-hand rear wheel cylinder and put on a bleeder hose.

Dip the other end of the hose into a glass vessel of at least 0.5 l capacity, half-filled with brake fluid (Fig. 55).

4. Give the bleeder valve 1/2 - 3/4 turn out and then press the brake pedal several times. Press the pedal rapidly and release it slowly.

Pump fluid through the brake master cylinder until no more air bubbles appear from the hose dipped into the fluid in the vessel.

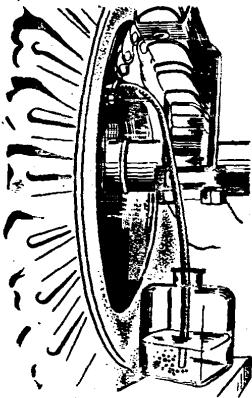


Fig. 55. Bleeding Brake System

When bleeding the brakes, add fluid into the brake master cylinder to prevent "dry bottom" and penetration of air into the system.

5. Depress the brake pedal, remove the hose and tightly turn the cap onto the wheel brake cylinder bleeder valve. Tightly close the bleeder valve.

6. Bleed the brakes in the following sequence: rear right, front right, front left and rear left.

On the front wheel brakes, bleed first the lower and then the upper cylinder.

7. Having bled all the brakes, add fluid into the brake master cylinder to 15 - 20 mm below the upper edge of filler hole. Clean the vent hole in the filler cap and tightly turn on the cap.

8. Check functioning of the brakes on the road. If the brakes are adjusted correctly, a complete braking action will take place within 1/2 and 2/3 of the pedal stroke after which the foot should feel a "hard" pedal.

Parking Brake

The parking brake is designed to brake the automobile at halts and on slopes. Besides, the parking brake can be used in emergency, when the service (hydraulic) brakes fail.

Adjust the parking brake when the travel of the brake lever exceeds half of the maximum travel and full braking is not obtained.

An increased brake lever travel results from:

excessive clearances between the brake shoes and the drum - in this case the clearance should be adjusted;

excessive slack in the parking brake control linkage - in this case the length of the rod should be adjusted.

To adjust the brake shoe clearance, turn in screw 7 on the brake anchor plate to stop (Fig. 56) and then back it off 4 - 6 clicks (1/3 - 1/2 turn) until the drum is free to turn without rubbing against the shoes.

Adjust the length of rod 3 as follows:

- turn off locknut 2 of adjusting fork 1, uncotter and take out the pin which connects fork 1 and control lever 6;

- eliminate all clearances in the control linkage by turning adjusting fork 1 to make lever 6 come in contact with housing 10 of the expander balls;

- screw out adjusting fork 1.5 - 2 turns, align the holes in the fork and lever, insert the pin, cotter it up and tighten locknut 2.

With a correctly adjusted parking brake the automobile is braked when the brake lever pawl is in the third or fourth notch of the quadrant.

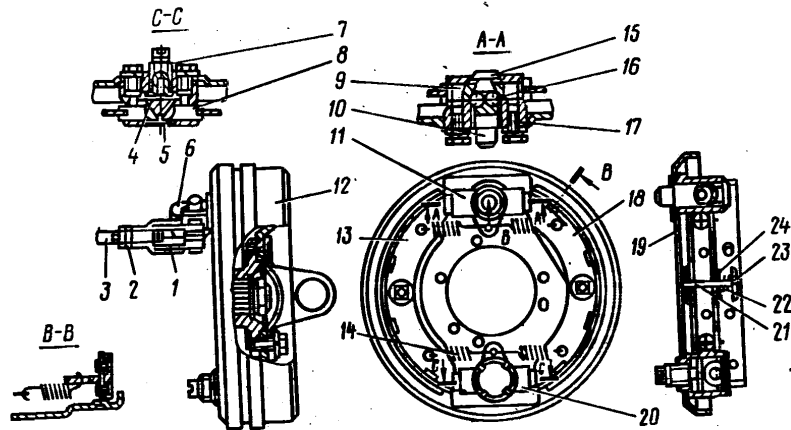


Fig. 56. Parking Brake:

- 1 - adjusting fork; 2 - nut and locknut; 3 - control rod;
 4 - expander; 5 - plug; 6 - drive lever; 7 - adjusting
 screw; 8 - shoe abutment; 9 - expander pusher; 10 - ball
 housing; 11 - expander housing; 12 - brake drum;
 13, 18 - brake shoes; 14 - shoe retracting spring; 15 -
 cap; 16 - expander ball; 17 - bolt; 19 - brake anchor
 plate; 20 - adjuster housing; 21 - rod; 22 - spring;
 23, 24 - spring retainers

ELECTRICAL EQUIPMENT

The electrical equipment (Fig. 57) of the automobile is of negative ground-return type. Rated voltage is 12 V.

An alternator is provided with a built-in rectifier. To maintain the alternator voltage within the required limits a transistor voltage regulator is used. At a medium engine speed the voltage across the plus terminal of the alternator should be 13.2 - 14.5 V.

Main operating instructions of the alternator:

1. Never connect, even for a moment, the "III" terminals of the alternator and voltage regulator to the "ground" and the terminal "III" with the plus terminal of the voltage regulator, as this will inevitably cause damage to the voltage regulator.

2. Do not start the engine with the wire disconnected from the plus terminal of the alternator as this will cause impermissible voltage rise on the rectifier.

3. Never check the alternator and voltage regulator with a megger or a test lamp supplied from a source of voltage higher than 36 V, if the semiconductor devices of the alternator and voltage regulator have not been disconnected.

4. When washing the automobile, be careful to prevent water from getting onto the alternator and voltage regulator.

Carry out servicing and maintain the storage battery in good condition, following the instructions contained in the appended storage battery service manual.

Regularly check the battery for reliable attachment on the automobile. Keep the battery clean and charged.

If a long standstill is expected, disconnect the battery by its switch.

Starter

The starter used in the automobile employs a solenoid switch. A wiring diagram of the starter is shown in Fig. 58.

The starter is switched on by the ignition switch. With the ignition key turned to position II (Fig. 10), current is fed to the starter auxiliary relay which cuts in the solenoid switch.

Do not operate the starter for more than 5 s. If a first starting attempt is a failure, re-engage the starter in 10 - 15 s and not more than three times in succession.

Maintenance of the starter:

1. Check condition of the terminals. Keep them clean and properly tightened.
2. Remove the cover band, inspect the commutator and, if necessary, eliminate the defects.
3. Remove the cover of the starter auxiliary relay, inspect and if necessary, clean the contact surfaces, then blow out the starter with compressed air.
4. Tighten up, if necessary, through bolts of the starter.
5. Check attachment of the starter to the clutch housing.

Before removing the starter for servicing, do not fail to open the battery switch.

If the starter needs adjustment, remove it from the engine. The starter drive pinion, when disengaged, should be 34 mm from the mounting surface of the starter flange (Fig. 59).

Check the full travel of the pinion with the solenoid switch cut in: the distance between the pinion face and the stop should be 4 ± 1 mm. Adjust the clearance by turning the eccentric pin of the shift lever. The adjustment done, tighten the pin nut.

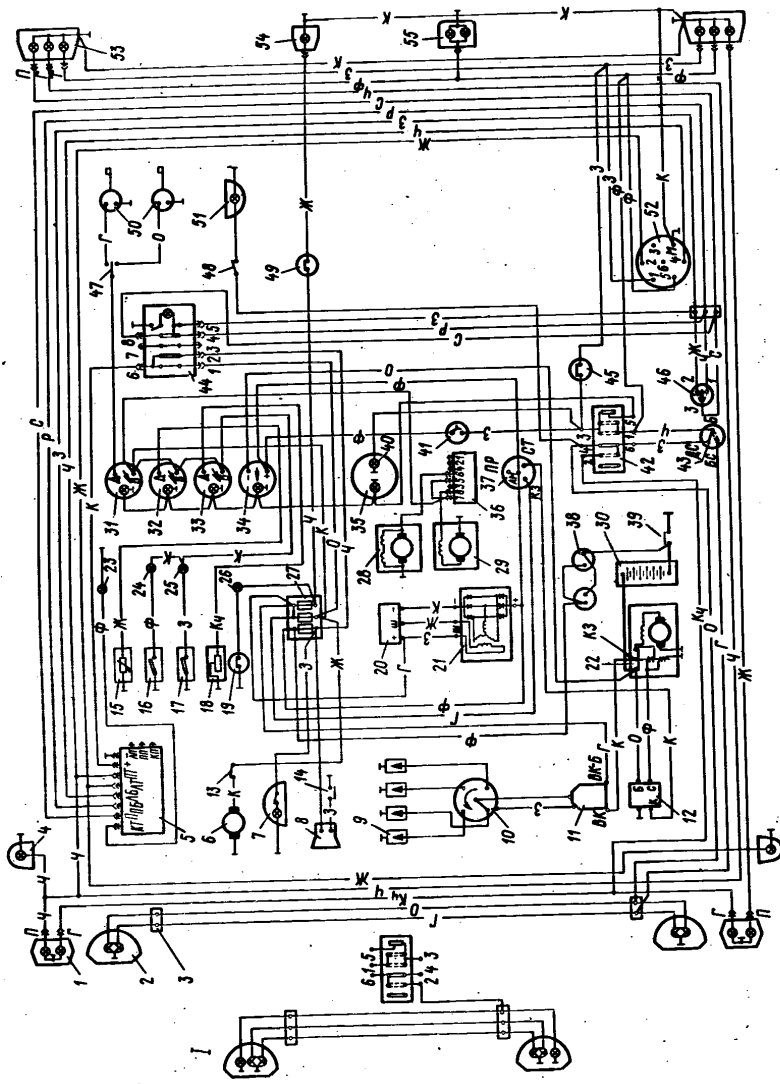


Fig. 57. Wiring Diagram:

1 - side light; 2 - headlight; 3 - terminal strip; 4 - turn indicator side repeater flasher; 5 - turn indicator flasher unit; 6 - motor; 7 - hood lamp; 8 - horn; 9 - spark plug; 10 - distributor; 11 - ignition coil; 12 - starter relay; 13 - switch; 14 - horn button; 15 - cylinder block water temperature transmitter; 16 - radiator water temperature warning lamp transmitter; 17 - emergency oil pressure drop transmitter; 18 - oil pressure transmitter; 19^{xx} - brake hydraulic system warning lamp switch; 20 - voltage regulator; 21 - alternator; 22 - starter; 23 - turn indicator warning lamp; 24 - water temperature warning lamp; 25 - oil pressure warning lamp; 26^x - brake hydraulic system warning lamp; 27 - fuse unit; 28^{xx} - windshield washer motor; 29^{xx} - windshield wiper motor; 30 - storage battery; 31 - fuel level gauge; 32 - water temperature gauge; 33 - oil pressure gauge; 34 - ammeter; 35 - speedometer; 36^{xx} - windshield wiper and washer switch; 37 - ignition switch; 38 - connector sockets; 39 - battery switch; 40 - high beam warning lamp; 41 - thermal circuit breaker; 42 - main light switch; 43 - foot dimmer switch; 44^{xx} - distress light switch; 45^{xx} - stop light switch; 46 - turn indicator switch; 47 - fuel tank selector switch; 48 - cab light switch; 49 - backing light switch; 50 - fuel level transmitters; 51 - cab light; 52 - trailer connector socket; 53 - rear light; 54 - backing light; 55 - licence plate light

I - hookup for headlights with asymmetric beam light unit

Wire Colour Code:

Ø - violet; K - yellow; 3 - green; K - red; Γ - blue; 4 - black; P - pink; K4 - brown; O - orange; O - gray.

^xInstalled when split brake system is used.

^{xx}Will be installed later, when put into production.

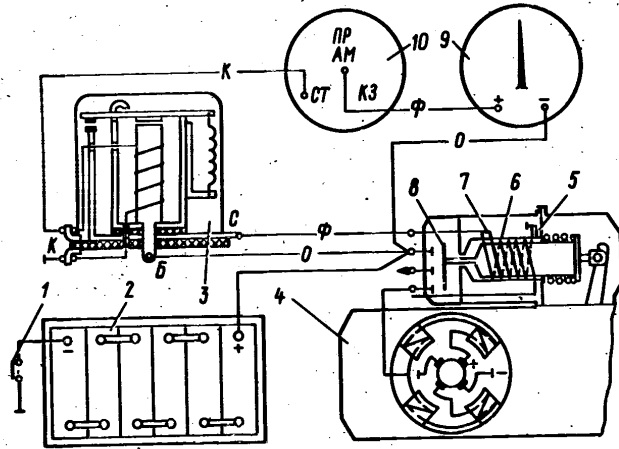


Fig. 58. Starter Wiring Diagram:

- 1 - battery switch; 2 - storage battery; 3 - starter auxiliary relay; 4 - starter; 5 - starter solenoid switch;
- 6 - hold-in winding; 7 - pull-in winding; 8 - contact disk;
- 9 - ammeter; 10 - ignition switch

Wire Colour Code:

φ - violet; 0 - orange; K - red

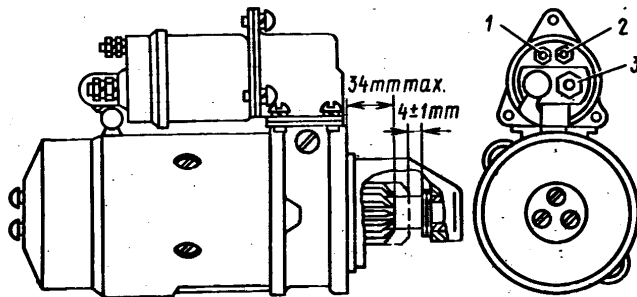


Fig. 59. Position of Starter Drive Pinion:

- 1 - solenoid switch winding output terminal; 2 - ignition coil terminal; 3 - storage battery terminal

Headlights

The headlights (Fig. 60) have semi-detachable light unit with a two-filament bulb.

Aim the headlights with a symmetric-beam light unit by placing an unladen automobile at a distance of 7.5 m from the aiming screen and switch on the high beam.

Remove the headlight mouldings and adjust each headlight beam with its screws. The position of the light spots is shown in Fig. 61.

Aim the headlights with an asymmetric - beam light unit by placing an unladen automobile at a distance of 10 m from the aiming screen (Fig. 62) and switch on the lower beam.

When the bulb is to be replaced, remove the headlight mouldings, back off three screws and take out the light unit.

Although the light unit is properly sealed, dust penetrates inside the unit affecting lighting intensity. To remove dust, wash the light unit with clean water, using cotton wool and let it dry at room temperature.

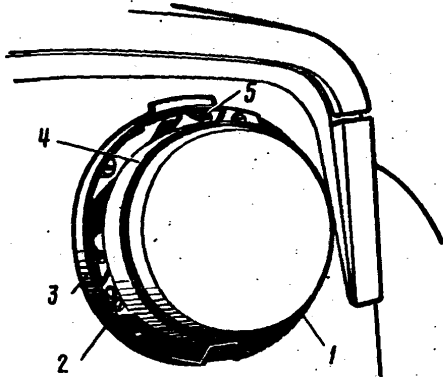
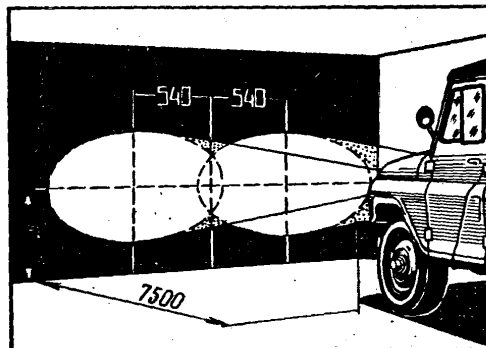


Fig. 60. Headlight:
1 - light unit; 2 - moulding
attachment screw; 3, 5 - ad-
justing screws; 4 - moulding

Fig. 61. Aiming Screen
for Headlights with Sym-
metric Beam Light Unit:
H - headlight centre-
-to-ground distance



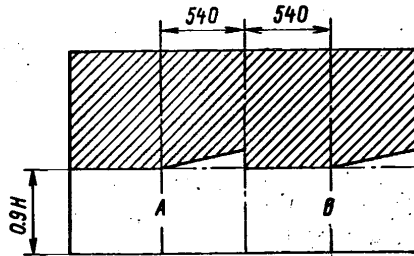


Fig. 62. Aiming Screen for Headlights with Asymmetric Beam
Light Unit:
A - left-hand headlight; B - right-hand headlight; H - head-
light centre-to-ground distance

Side Lights and Turn Indicators

The upper section of the front side light serves as the front turn indicator. The lens of the turn indicator is of orange colour. Fitted in the section is a bulb and a chromium-plated reflector.

To replace bulb 1 (Fig. 63) of the side light and bulb 2 of the turn indicator, turn out three screws 5 and remove lens 4.

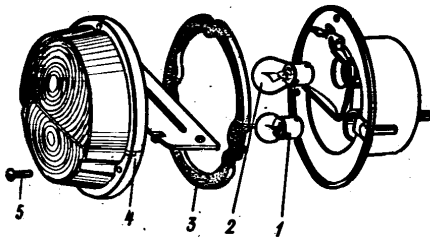


Fig. 63. Side Light:
1 - side light bulb; 2 - turn
indicator bulb; 3 - rubber
seal; 4 - lens; 5 - screw

Used as the rear turn indicator is a section of the rear light with an orange lens. The section houses a bulb and a chromium-plated reflector.

Besides, fitted on the body are side turn indicator repeater flashers with orange lenses.

The turn indicators are switched on by hand. They are switched out automatically when the steering wheel is turned in the opposite direction.

A 2 - 2.5 mm clearance must be provided between the rubber roller of the turn indicator switch and the steering wheel hub with the lever in the neutral position.

Change over from one position to another smoothly, without jerks and strokes. Take measures to prevent lubricants, water or contaminants from getting onto the rubber roller.

The headlights, side lights, rear lights, backing lights, licence plate light and instrument illumination lamps are protected by thermal push-button circuit breakers. All other devices are protected by three fuses.

Maintenance of Instruments

1. When removing the coolant temperature transmitter, oil pressure and fuel level transmitters either insulate the ends of the wires or switch off the battery by its switch to prevent short circuits.

2. Prevent coolant level drop in the radiator upper tank as this might cause overheating and failure of the transmitter.

3. Lubricate the flexible shaft of the speedometer drive from the transfer case side with grease ЛИТОМ-24. For this purpose, remove the flexible shaft from the automobile, pull out the cable and wash the cable and its casing in gasoline. Simultaneously lubricate the speedometer with petroleum jelly through the hole in the tail-piece plug.

BODY

The body of the automobile is all-metal open type with removable tarpaulin top. It has four doors and a tailgate. The automobile is intended for carrying people and cargoes.

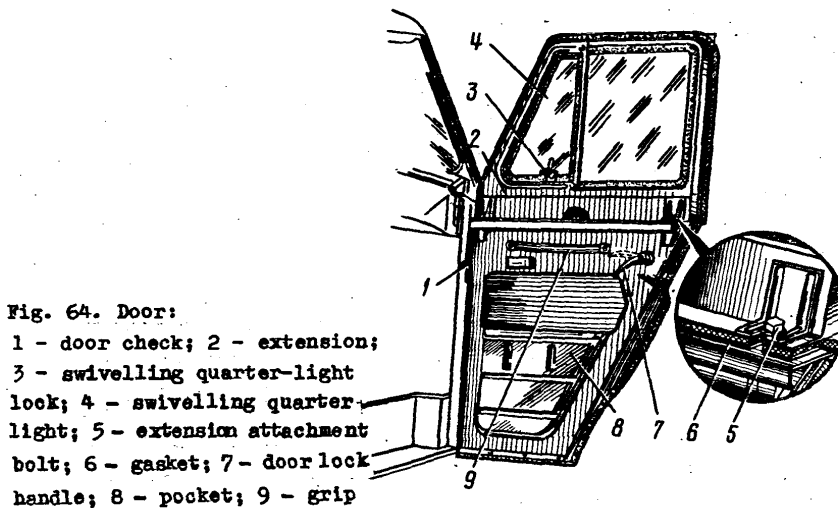


Fig. 65. Location of Access Covers and Plugs on Body Floor:

1 - pedal gate plate; 2 - access cover to brake master cylinder filler cap; 3 - access covers to fuel tank filler pipes and transmitters; 4 - access cover to gearbox and transfer case; 5 - plug of drain hole in body floor

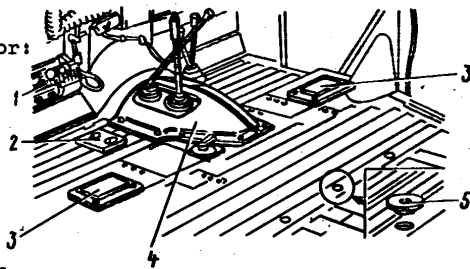


Fig. 66. Fuel Tank Filler Neck:

1 - tank cap; 2 - access cover

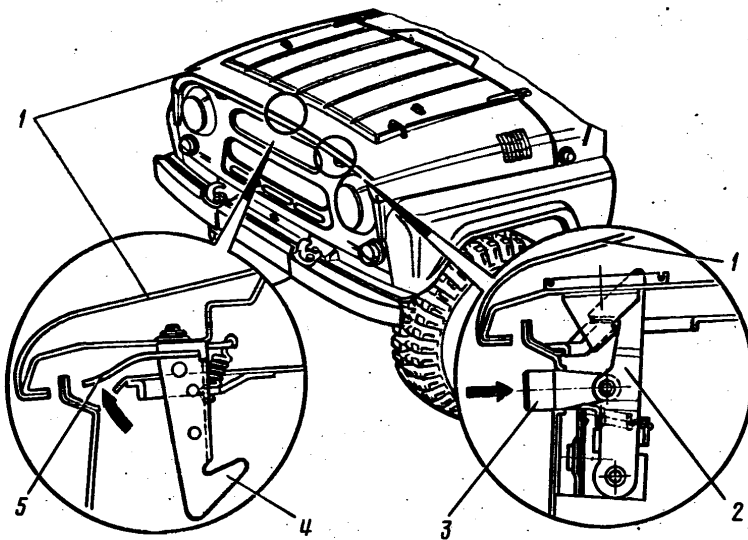
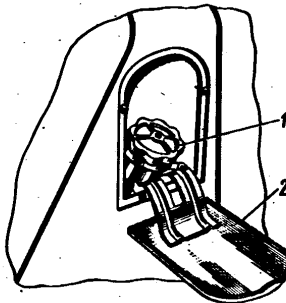


Fig. 67. Hood Lock and Safety Catch:

1 - hood; 2 - hood lock hook; 3 - hood lock button; 4 - hood safety catch; 5 - safety catch lever

The front and rear doors at one side of the body (Fig. 64) are interchangeable. Holes (Fig. 65) made in the body floor and closed by covers provide access to the gearbox, transfer case, parking brake, service brake master cylinder filler cap, transmitters and fuel tank filler pipes. Control pedals pass also through the holes in the floor. The access hole covers are sealed by rubber strips and secured to the floor by bolts.

In the centre pillars of the body hatches with covers 2 (Fig. 66) are made to provide access to the fuel tank filler caps. The access covers are held in the open or closed positions by springs. Tools cases are arranged in the rear part of the automobile body.

To open the hood, depress two buttons 3 (Fig. 67) and the hood will rise and then press lever 5 to disengage safety catch 4 of the hood. The hood can be set in one of the two positions (Fig. 68) to provide easy access to the engine.

The windshield frame is hinge-connected to the body. The windshield can be tilted onto the hood (with the tarpaulin top removed) and strapped down (Fig. 69).

When raised, the windshield frame is held by the locks on the dashboard.

The tailgate in the opened flat position can be used to carry long cargoes. In this case the spare wheel together with its bracket 2 (Fig. 70) should be removed and stowed in the body.

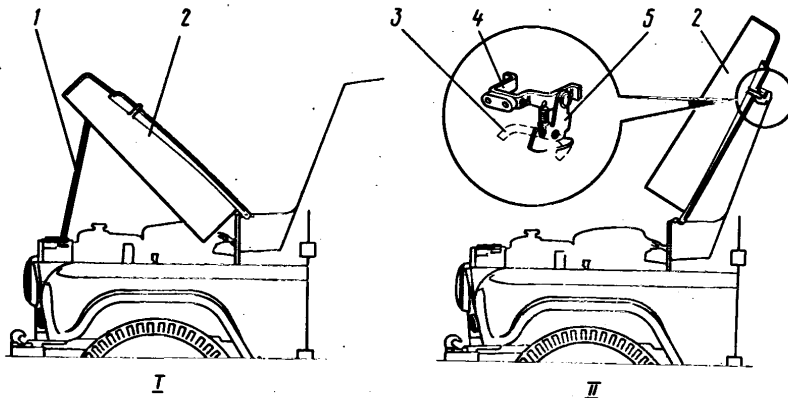


Fig. 68. Hood in Open Position:

I - propped up; II - latched to windshield frame

1 - hood prop; 2 - hood; 3 - hood retainer yoke; 4 - retainer bracket; 5 - retainer latch

The front seats (Fig. 71) are interchangeable. Each is held to the body floor by three bolts and can be adjusted to suit the stature of the driver and passenger.

The backrests of the front seats can be set in one of the two positions to suit the stature of the driver and passenger. Avoid

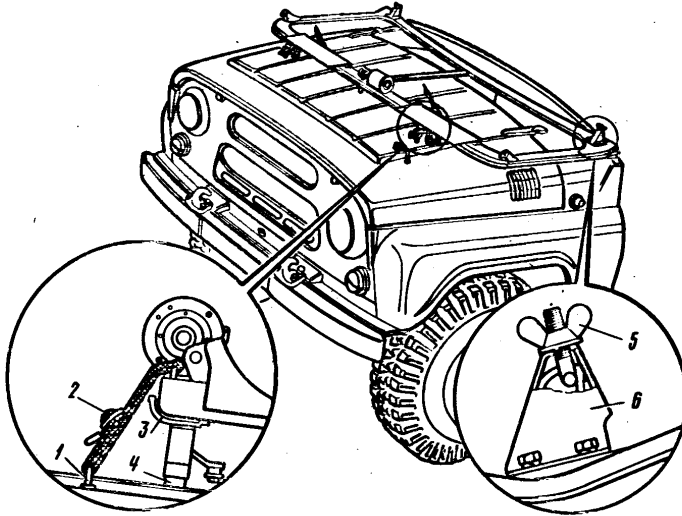


Fig. 69. Windshield Strapped Down on Hood:

- 1 - yoke on hood; 2 - frame strap; 3 - windshield frame;
4 - rubber buffer; 5 - wing nut; 6 - windshield frame bracket

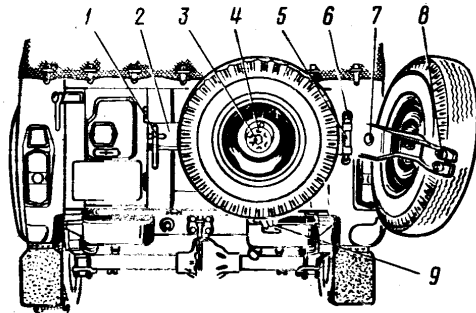


Fig. 70. Spare Wheel Attachment:

- 1 - hinged bracket latch; 2 - hinged bracket; 3 - bolt;
4 - pressure plate; 5 - hinged bracket pin; 6 - fixed hinge;
7, 8 - buffers; 9 - support

setting both seats and backrests in the rearmost position as this will hamper folding the triple seat.

The triple seat is of the folding type, with two separate backrests. To fold the seat, press backrests 1 (Fig. 72) to the cushions and fix them by straps 3 in this position, then turn the seat on pins 5 of the legs and tilt it forward. Such a position of

Fig. 71. Front Seat:

1 - seat; 2 - front attachment bolt;
3 - rear attachment bolt; 4 - backrest
rake adjusting bolt

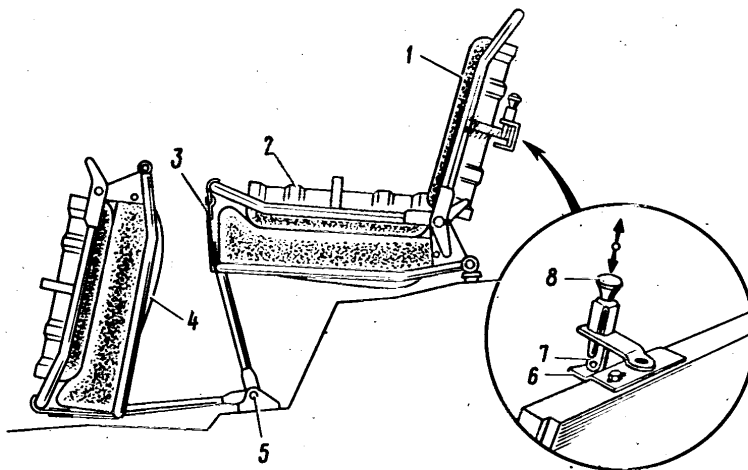
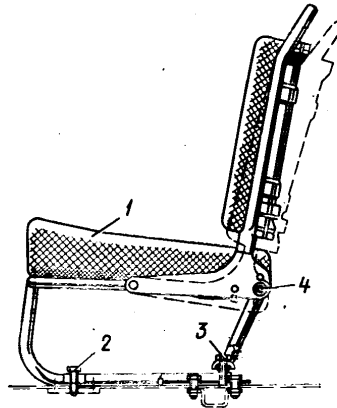


Fig. 72. Triple Seat;

1 - backrest in erect position; 2 - backrest in folded position; 3 - backrest-to-cushion attachment strap; 4 - seat in tilted position; 5 - seat frame leg pin; 6 - backrest side lock bracket; 7 - stop; 8 - lock knob

the seat increases the load space in the body. The triple seat in the non-folded position is locked on the body sides by knobs 8.

The single rear seats can be hinged up and strapped in position (Fig. 73). When unfolded, the seats are locked by pins in rubber sockets.

The automobile is provided with a detachable tarpaulin top fixed on a separable metal frame (Fig. 74).

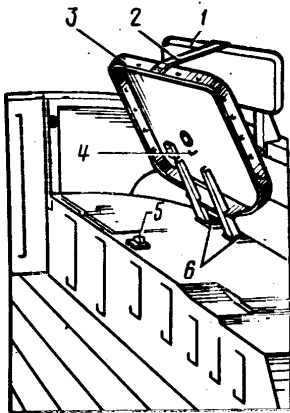


Fig. 73. Single Seat:
1 - seat backrest; 2 - cushion attachment strap; 3 - seat cushion; 4 - cushion lock pin; 5 - cushion lock socket; 6 - cushion pivots

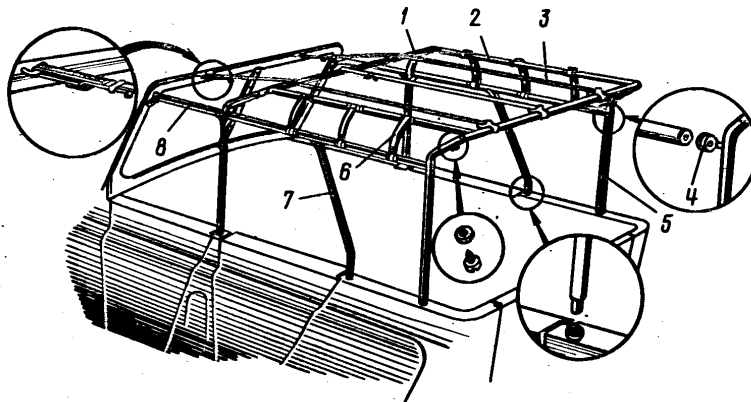


Fig. 74. Tarpaulin Frame:
1 - front hoopstick; 2 - brace; 3 - straps; 4 - rubber bushing; 5 - rear hoopstick; 6 - brace springs; 7 - strut; 8 - front brace

Disassembly of Tarpaulin Top

1. Unfasten the tarpaulin in the rear part of the body and at the sides and then take it off the yokes.
2. Turn out the extreme bolts on the windshield frame which hold the metal hold-downs of the tarpaulin, then back off the rest of the bolts and remove the metal hold-downs.
3. Open the doors and release the tarpaulin.
4. Remove the tarpaulin from the windshield frame bolts and hooks of the front hoopstick. Remove the tarpaulin from the frame and put it in a clean place.
5. Secure the hold-downs of the tarpaulin by turning the bolts on the windshield frame.
6. Unfasten and remove the straps of the frame.
7. Remove the brace springs of the frame.
8. Remove the hoopstick braces.
9. Remove the struts of the frame.
10. Remove the hoopsticks from the sockets.

Body Heating and Ventilation

The automobile body is heated by the air getting inside through

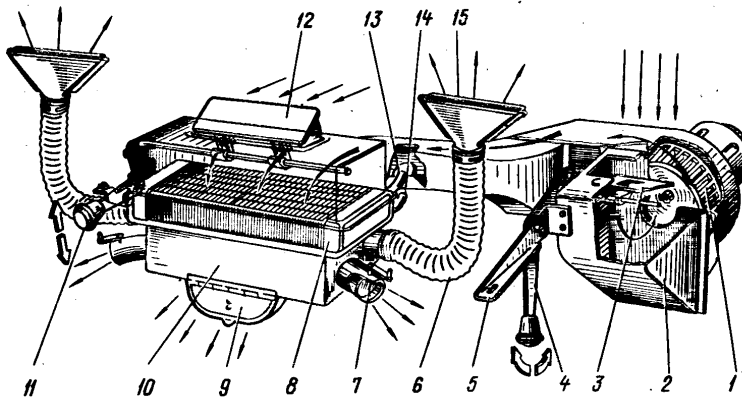


Fig. 75. Body Heating and Windshield Demister System:
1 - fan; 2 - intake case; 3 - intake case cover; 4 - cover control handle; 5 - handle attachment bracket; 6 - windshield demister air hose; 7 - passenger's feet warmer shutter (left shutter - for driver); 8 - heater radiator; 9 - heater case cover; 10 - heater case; 11 - air intake control handle; 12 - air intake cover; 13 - radiator water outlet pipe; 14 - radiator water inlet pipe; 15 - windshield defrosting air nozzle

the dash centre intake (on-the-go) or through the dash right-side intake (at standstill). The air passes through heater radiator 8 (Fig. 75) connected to the engine cooling system. The intake covers are operated by handles 4 and 11.

Warm air is directed to demist the windshield and to heat the driver's and passenger's feet through the heater case connections provided with shutters 7, and into the body when cover 9 is open.

To deliver hot water into the heater radiator, open the cock on the engine cylinder head.

The heater operates normally at the cooling liquid temperature in the engine cooling system not below 80°C.

Ventilation is effected through the dash intakes and swivelling quarter-lights of the door extensions. To make the ventilation more effective in summer time, use the heater fan. When the weather is hot, the door extensions can be removed and stowed in the body.

When driving along dusty roads, open air intake 12 to let air into the body which builds up excess pressure and reduces penetration of dust inside the body, but close the swivelling quarter-lights of the doors.

Windshield Washer

A special windshield washer provided in the automobile serves to improve cleaning the windshield by the windshield wiper. The windshield washer consists of pedal-operated diaphragm-type pump 1 (Fig. 76), rubber hoses 2, two nozzles 3 and tank 4 (fitted under the hood). When the pedal is depressed, water (or special fluid) from the tank is delivered onto the windshield under the wiper blades. The direction and strength of the stream are adjusted by turning the nozzle head and screw. The fluid should be filtered to prevent clogging of the nozzles.

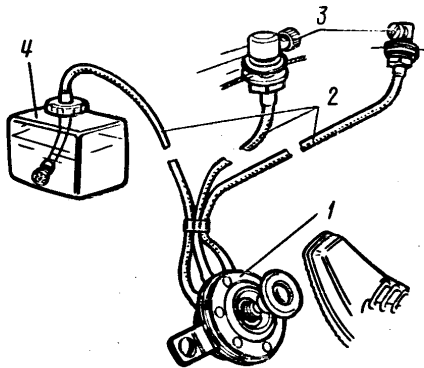


Fig. 76. Windshield Washer;
1 - pump; 2 - hoses; 3 - nozzles;
4 - tank

MAINTENANCE

Maintenance services are subdivided into:

- daily maintenance;
- post running-in maintenance;
- 2000, 4000, 8000 and 16,000-km maintenance;
- seasonal maintenance.

Daily Maintenance

Before the run do the following:

1. Check amount of fuel in the fuel tank, level of coolant in the radiator, oil level in the engine crankcase and condition of tyres.
2. Inspect the automobile to make sure there is no fuel, coolant, oil and brake fluid leaks.
3. Check functioning of the steering gear, brakes, lights, windshield wiper and signalling devices.
4. If the automobile was operated on dusty roads, negotiated a ford or sections of the road coated with fluid mud, wash the air cleaner and change oil in the cleaner.

Post-Running-In Maintenance (refer to Section "Running-In")

Every 2,000 km

1. Check condition and tension of the fan V-belt.
2. Check electrolyte level in the storage battery; check wire clamps for reliable contact with the battery terminals.
3. Check condition of the tyres and tyre air pressure.
4. Carry out all 2,000-km lubrication services (see the Lubrication Table).
5. Make a trial run to check functioning of the brakes, steering gear, lighting and signalling devices.

Every 4,000 km

1. Carry out all operations given under 2,000-km maintenance.
2. Check free travel of the clutch and brake pedals.

3. Check steering wheel play, condition of the steering rod joints, steering column universal joint and attachment of the universal joint yokes.
4. Check hydraulic brake system connections for condition and leakage.
5. Carry out all 2,000 and 4,000-km lubrication services (see the Lubrication Table).

Every 8,000 km

1. Carry out all operations given under 4,000-km maintenance.
2. Check all connections of the cooling system for leakage and water pump for condition.
3. Check condition of the propeller shafts.
4. Check the steering knuckle kingpins and wheel hub bearings for play.
5. Check attachment of the axle-shaft flanges and hub driving flanges.
6. Check balancing of the wheel and tyre assemblies. In case of non-uniform wear, check and, if necessary, adjust wheel toe-in.
7. Inspect the front and rear axles to reveal misalignment and check condition of the frame by inspection.
8. Remove the brake drums, clean the brakes, check condition of the brake shoes and attachment of the brake anchor plates.
Check functioning of the service and parking brakes.
9. Check condition, tightening and cottering of the steering rod ball pin nuts, check for play in the steering rods and steering mechanism, attachment of the steering knuckle lever, steering arm and steering gear case.
10. Clean the spark plugs and check the spark plug gap.
11. Check the breaker point gap.
12. Check aiming of the headlights and functioning of the turn indicators and windshield washer pump.
13. Check state of charge of the storage battery.
14. Carry out all 2,000, 4,000 and 8,000-km lubrication services (see the Lubrication Table).

Every 16,000 km

1. Carry out all operations given under 8,000 km maintenance.
2. Check compression in the engine cylinders.
3. Check operation of the engine valves and, if necessary, lap the valves. Adjust valve-to-rocker clearances.

4. Check functioning of the radiator filler cap valves and attachment of the radiator.
5. Remove and clean the fine fuel filter; blow the filter element with compressed air.
6. Remove and clean the carburettor. Check fuel level in the float chamber and functioning of the carburettor.
7. Clear the hoses and wash the parts of the crankcase closed ventilation system with kerosene.
8. Check fuel pipe and tank connections for leakage. Drain sediment from the fuel tanks and wash the fuel filter-settler.
9. Check the bearings of the final drive pinion for play. If necessary, adjust them.
10. Tighten up the propeller shaft flange nuts.
11. Check attachment of the chassis and body units to the frame. Check the gearbox and transfer case for reliable attachment.
12. Check attachment of the steering knuckle lever, the spring U-bolts, spring pins, shock absorbers, and other joints.
13. Check the worm bearings for axial play, if necessary, adjust the bearings.
14. Check condition of the distributor, operation of the centrifugal and vacuum ignition advance mechanisms, breaker point gap and ignition timing.
15. Check functioning of the voltage regulator and ignition coil.
16. Check condition of the commutators and brushes of the alternator and starter, clean them and blow out with compressed air.
17. Carry out all 2,000, 4,000, 8,000 and 16,000 km lubrication services (see the Lubrication Table).

Seasonal Maintenance

(to be carried out once a year, together with current scheduled maintenance)

1. Remove the starter and check condition of the commutator and brushes, blow them out with compressed air. When reassembling, lubricate the bearings and journals with engine oil.
2. Remove the fuel pump, disassemble it, clean and check the condition of the parts. After the reassembly, check the pump on a special stand.
3. Remove the parking brake drum. Check the brake shoe linings for wear. Remove, disassemble, wash and lubricate the expander and adjuster mechanisms.
4. Flush the cooling system to remove scale and sediment.

5. Set the mixture heat control valve (Fig. 32) to position SUMMER (ЛЕТО) or WINTER (ЗИМА) depending on the coming season.

6. Check and if necessary replace the alternator bearings, if the rotor binds or abnormal noise is heard.

LUBRICATION

Long and trouble-free operation of the automobile depends, to a great extent, on correct and timely lubrication. For lubricating materials recommended for use in the YA3-469E automobile, refer to Table 2.

Lubrication points on the chassis and engine are shown in Fig. 77. Carry out lubrication services together with a scheduled maintenance. The following designations are used in the Lubrication Table (Table 3):

"+" - lubricate at every maintenance.

"++" - lubricate at every other maintenance.

In lubrication, observe the following requirements:

1. Clean the grease fittings and plugs from dirt.
2. After the lubrication, wipe off lubricant appearing on the part surfaces.
3. Change oil when the units are hot.
4. If waste oil is contaminated or metal particles are detected in oil, wash with kerosene the gearbox, transfer case, front and rear axle housings before filling in fresh oil.

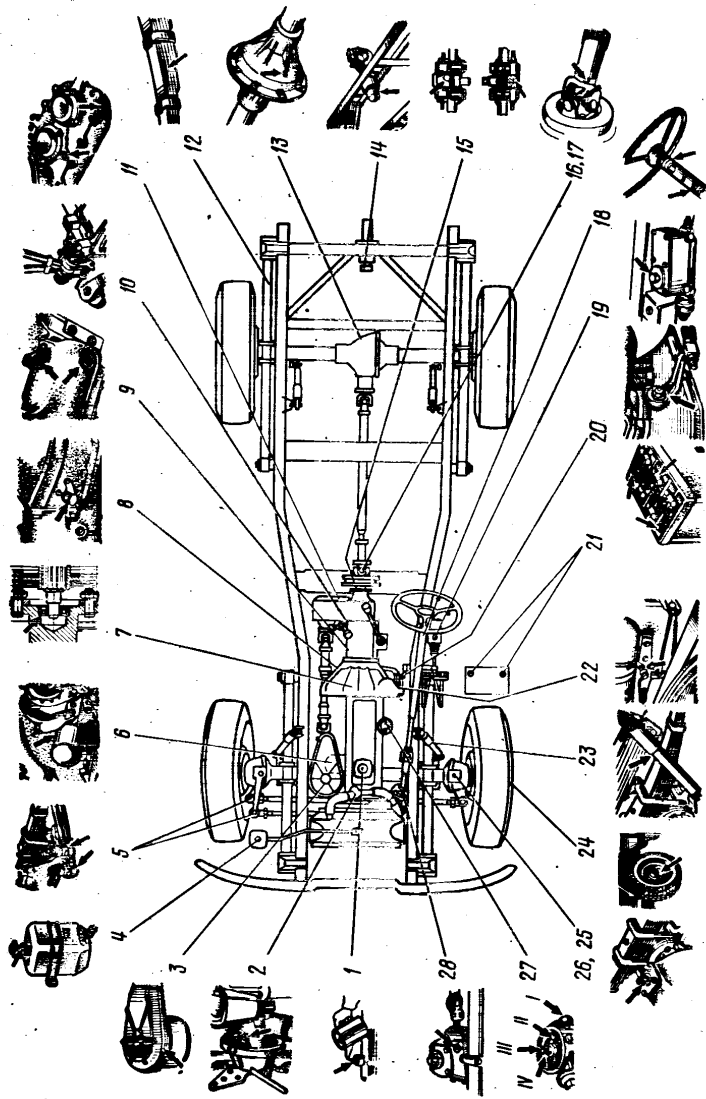


Fig. 77. Lubrication Chart

Table 2
 Lubricants and Fluids for Use in SA3-469B Automobile

Name	SAE Equivalent			
	Summer		Winter	
	above 30°C	from 0 to 30°C	from 0 down to minus 10°C	from minus 10 to minus 30°C
All year round: engine oil MB ₁ or M ₆₃ /10B (AE-AC3n-10B)	SAE 40 or 20W/40	SAE 30 or 10W/30	SAE 20 or 10W/30	SAE 10W or SAE 5W/20
Automobile transmission oil TAn-15B. Winter (air temperatures below minus 20°C) automobile transmission oil TC-10-OTH Grease JMTOM-24	SAE 140	SAE 90		SAE 80
Shock absorber fluid AW-12T or spindle oil A)	Chassis grease or multipurpose grease			
Corrosion preventive grease HBK	Shock absorber oil			
Hydraulic brake fluid ECK	Petrolatum			
Graphite grease JGCa	Hydraulic brake fluid SAE 70 RI			
	Graphite grease			

Table 3

Lubrication Table

Ref. No. in Fig. 77	Name of unit	Number of lubri- cation points	Lubricant or fluid	Lubrication interval, km				Lubrication instructions
				2,000	4,000	8,000	16,000	
1	Engine crankcase	1	All year round: Engine oil MB1 or M6a/10B (MB-AC3n-10B)					Every day check oil level in crankcase. If necessary, top up to upper mark on dipstick. Change oil
2	Water pump bearings	1	Grease LITON-24		+			Lubricate through grease fitting until grease shows up through check hole. Wipe off excess grease
3	Carburettor cleaner	1	Engine oil			+		Wash and refill when changing oil in engine crankcase. Under severely dusty conditions or after fording or driving on roads covered with fluid mud, change oil in air cleaner every day

Table 3, continued

Ref. No. in Fig. 77	Name of unit	Number of lubrication points	Lubricant or fluid	Lubrication interval, km			Lubrication instructions
				2,000	4,000	8,000 16,000	
4	Cooling system	1	Special cooling liquid-antifreeze A40 or TOCOX A-40. Water is allowed for use				Every day check coolant level in expansion tank. When necessary, top up. Change coolant at least once in two years
5	Steering rod joints	4	Grease ЛИТОЛ-24		+		Lubricate through grease fittings
6	Engine oil filter	1					Replace filter when changing oil in engine crankcase
7	Clutch pilot bearing	1	Grease ЛИТОЛ-24				Add Grease each time when removing gearbox
8	Clutch release bearing	1	Grease ЛИТОЛ-24		+		Pack grease cup to capacity and press out Grease into bearing
9	Gearbox	1	Automobile transmission oil ТМ-15В.		+		Check oil level. Change oil (simulta-

10	Shaft of transfer case control levers	1	At temperatures below minus 20°C, use automobile transmission oil TC-10-OTM Grease JETROL-24	+			neously with changing oil in transfer case)
11	Transfer case	1	Automobile transmission oil TAN-15B. At temperatures below minus 20°C, use automobile transmission oil TC-10-OTM	+		+	Lubricate through grease fitting Check oil level. Change oil (simultaneously with changing oil in gearbox)
12	Front and rear springs (leaves)	4	Graphite Grease YCaA				Lubricate as required
13	Housings of front and rear axles	2	Automobile transmission oil TAN-15B. At temperatures below minus 20°C, use automobile transmission oil TC-10-OTM	+		+	Check oil level. Change oil
14	Towing gear	1	Grease JETROL-24				Lubricate, when required, through grease fitting until grease shows up

Table 3, continued

Ref. No. in Fig. 77	Name of unit	Number of lubrication points	Lubricant or fluid	Lubrication interval, km			Lubrication instructions
				2,000	4,000	8,000 16,000	
15	Parking brake expander and adjuster	2	Grease LITOL-24				Clean from dirt and lubricate, as necessary
16, 17	Front and rear propeller shafts: - splines - joints	2 4	Grease LITOL-24 Grease LITOL-24		+		Grease-gun through grease fittings (3-5 shots of gun without forcing grease out) Force grease through grease fittings until it shows from under all working edges of cross oil seals
18	Steering wheel shaft bearings	2	Grease LITOL-24				Lubricate as required
19	Brake master cylinder	1	Brake fluid BOK. At ambient temperatures		+		Check brake fluid level which should be

20	Clutch and brake pedal shaft	1	below minus 25°C, dilute brake fluid with alcohol, 1:1 ratio				15 - 20 mm below filler hole edge. When necessary, top up. Change brake fluid
21	Storage battery	2	Grease ЛИТОЛ-24 Corrosion preventive grease ИКК	+	+	+	Lubricate through grease fitting Coat battery terminals with grease. Clean from oxides and lubricate non-contact surfaces of terminals and cell connectors
22	Intermediate lever shaft of clutch release linkage	1	Grease ЛИТОЛ-24			+	Lubricate through grease fitting
23	Front and rear shock absorbers	4	Shock absorber fluid АХ-12Н or spindle oil АУ				Change fluid as required. It is not recommended to add fluid into shock absorbers
24	Front and rear wheel hub bearings	4	Grease ЛИТОЛ-24			+	Wash bearings and hubs with kerosene, pack grease into cages with rollers and into hub space

Table 3, continued

Ref. No. in Fig. 27	Name of unit	Number of lubri- cation points	Lubricant or fluid	Lubrication interval, km			Lubrication instructions
				2,000	4,000	8,000 16,000	
25, 26	Front axle steering knuckles: - steering knuckle universal joints - steering knuckle kingpins	2 2	 Grease LITON-24 Grease LITON-24				between bearing races. Grease layer in hubs should be 10 - 15 mm thick
27	Distributor: I - drive shaft II - cam wick III - ara axle IV - cam bush	1 1 1 1	 Grease LITON-24 Engine oil Engine oil Engine oil		+		Wash joints and pack 500 g of grease into each joint. Lubricate through grease fittings
					+		Turn cap of grease cup half a revolu- tion 1 - 2 drops of oil 1 - 2 drops of oil 4 - 5 drops of oil (before lubricating,

28	Steering gear case	1	Automobile transmission oil TAN-15B. At air temperatures below minus 20°C, use automobile transmission oil TC-10-OTM						remove rotor and oil seal)
									Change oil

Mechanism and Hardware of Body

	Door hinges	8	Grease JKTOM-24						Lubricate through grease fittings, as required
	Door and hood locks, safety catch	7	Grease JKTOM-24				+		Lubricate
	Door lock bolts, sockets and striker plates, hinges of door checks	8	Graphite grease YCCA				+		Lubricate
	Joints of windshield wiper linkage	4	Engine oil						3 - 4 drops of oil, as required

Table 3, continued

Ref. No. in FIG. 77	Name of unit	Number of lubri- cation points	Lubricant or fluid	Lubrication interval, km				Lubrication instructions
				2,000	4,000	8,000	16,000	
	Bearings of wind- shield wiper and heater motors, and speedometer flex- ible shaft	2 in each	Grease JETROL-24				+	Apply thin layer of Grease, as required
	Rubber weather strips and door tenons		Graphite powder				+	Powder

PRESERVATION

If upon receipt the automobile is to be out of operation for a long period, it should be subjected to preservation.

Preparing for Preservation

1. Carry out the scheduled maintenance.
2. Wash the automobile and wipe it dry. Restore paint coating at the places where it has been damaged.
3. To save the cylinders from rusting, warm the engine to a temperature not below 50°C and fill 30 - 50 g of oil heated to 70 - 80°C into the engine through the spark plug holes. For uniform distribution of oil over the surfaces of the cylinders, crank the engine with the cranking handle 15 - 20 times and then turn in the spark plugs.
4. Clean all non-painted outer metal surfaces of the automobile and non-painted surfaces of the hinge joints (hinges and locks of the doors, carburettor control linkage, parking brake linkage and other units) and the spark plugs and coat them with grease IIRK.
5. Coat the springs with graphite grease.
6. Remove the wheels from the automobile, clean the disks from dirt and restore damaged paint coating. Clean the tyres, wash them and wipe dry, inflate the tyres to the normal pressure.
7. Prepare the storage battery for storage proceeding as indicated in the instructions for the lead-acid storage batteries.
8. Stop the slots of the air cleaner and exhaust pipe of the muffler with oiled paper.
9. Drain coolant from the cooling system and windshield washer tank.
10. Loosen the tension of the fan drive V-belt.
11. Wrap the control levers at the places where they get into the covers with insulating tape to seal the gearbox and transfer case. Wrap with insulating tape the safety valves of the rear axle.
12. Stop the clearances between the brake drums and the anchor plates with oiled paper.
13. Shield the tyres and other rubber parts from direct sun rays.

Do not keep chemically aggressive substances such as acids, alkalis, and others in one location with the automobile.

Maintenance in Storage

Once a month, check specific gravity of the electrolyte in the storage battery.

Once every six months, do the following:

1. Thoroughly inspect the automobile from the outside.
2. Clean the surfaces affected by corrosion and restore paint coating on the surfaces.
3. Turn the steering wheel 2 - 3 times in both directions.
4. Check the service and parking brakes, clutch, choke and throttle linkages, and accelerator foot and manual linkages.
5. Check fluid level in the brake master cylinder. Top up the cylinder, if required.
6. Inspect the distributor and, if necessary, lubricate all its metal parts.
7. Inspect all electrical devices.
8. Check condition of the tyres and all other rubber parts.
9. Eliminate the defects detected during the inspection.

DEPRESERVATION

1. Wash the parts with kerosene or clear gasoline to remove preservative compound. Remove preservative compound from the parts which might get in contact with the rubber parts. Thoroughly wash the spark plugs in clear gasoline.
2. Check oil level in the engine crankcase and drain excess oil.

CONVERSION OF NON-SPECIFIED UNITS OF MEASUREMENT INTO SI UNITS

$$1 \text{ r/min} = \frac{1}{60} \text{ s}^{-1} = 0.016 \text{ s}^{-1}$$

$$1 \text{ kgf} = 9.8 \text{ N}$$

$$1 \text{ kgf/cm}^2 = 98 \text{ kPa}$$

$$1 \text{ hp} = 735.5 \text{ W}$$

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