OPEL ASTRA H

SERVICE MANUAL

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OPEL ASTRA H (2004 and 2006 editions)

Issue serial Opel Astra began in February 2004. The car remains front-wheel drive. Campaign was launched in a model with five-door hatchback. Later appears three-door and station wagon version. For the new Opel Astra to develop two new engines, and are taken from the previous most recent engines, thereby obtaining a line of six engines, continues a series Ecotec and meet Euro 4 standards. To start the proposed petrol engines 1.4 TWINPORT (90 hp), 1.6 TWINPORT (105 hp), 1.8 (125 hp) and 2.0 Turbo (170 hp), as well as two diesel engines volume of 1.7 (80 and 100 hp) equipped with a turbo and fuel system type "Common Rail".

From June 2004 to these engines added two turbo unit with a system of "Common Rail" volume of 1.9 liter capacity of 120 and 150 hp These modern diesels on the dynamics are not inferior to their petrol counterparts. For example, aster with a motor of 150 hp zero to 100 km / h in 8.9 seconds. Not all petrol engine has the momentum. Moreover, the Astra engine has a maximum speed of 210 km / hour, and spends 100 km. less than 6 liters of fuel. Among other things, new engines tailored to the mistakes of the past models, they do not require fuel additives and as an option can be supplied with a special filter fuel that does not require any maintenance throughout the lifetime. Naturally, both engines are equipped with the latest models of catalysts, which give almost no way out all the toxic components: CO, HC and even reduce emissions of soot. New diesel engines are manufactured at the plant of the group in Pratola Serra (Italy), and since the spring of 2005 will be released yet, and at the factory in Kaiserslautern (Kaiserslautern).

"The third generation Opel Astra car reflects mainly the emotional side and the direction of the new design style of the company Opel. The exterior design of the car is harmoniously complemented by its inner nature. The lounge is dominated by smooth and free surface. High quality materials used are organically combined with the high level design of the internal finishing the car "- said the head of design department, Martin Smith (Martin Smith). Decorative bend on the hood smoothly inside the passenger compartment of elegantly designed central console. Cabin were increased compared with the previous model Astra. Length increased by approximately 14, the height and width of 2 to 4 centimeters.

1. Operation and maintenance of vehicles

1.1. General

Identification of the vehicle

Typical plate

Fig. **1.1.** **Location type plate**

Typical plaque installed on the frame right front door (see Figure 1.1).

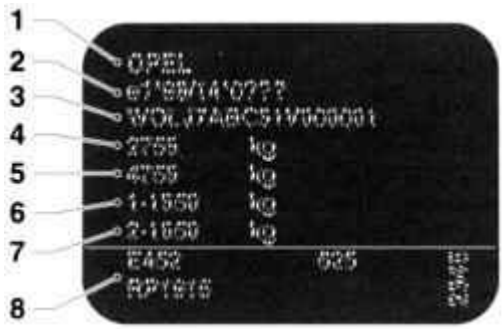


Fig. **1.2.** **Data on the type label: 1 - the country of manufacture; 2 - permit number; 3 - Vehicle identification number 4 - a permissible total weight, 5 - a permissible total weight of the trailer, 6 - the maximum permissible load on the front axle, 7 - maximum permissible load on rear axle, 8 - Individual vehicle data or data specific to the country**

ID

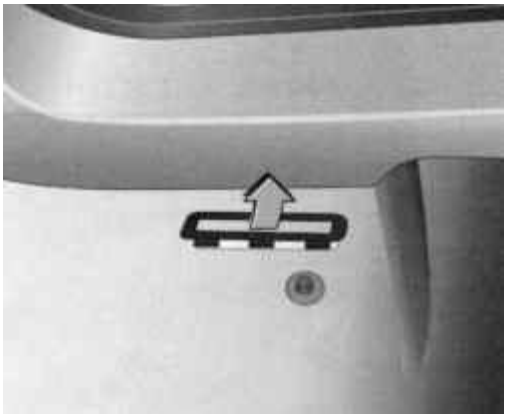


Fig. **1.3.** **ID number, located on the floor of the car**

ID number of the car knocked on the floor on the right side under the cover between the front door and the seat (Figure 1.3).

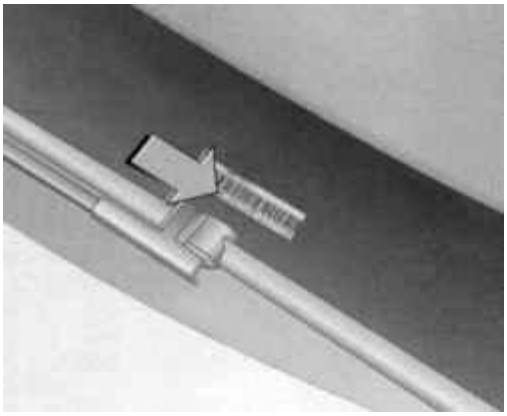


Fig. **1.4.** **ID number, located on the dashboard**

ID number of the car and knocked on the dashboard (see Figure 1.4).

Engine number

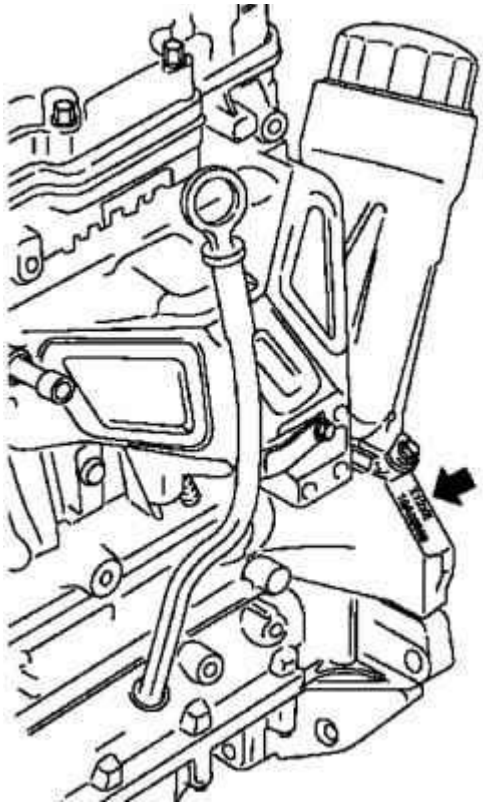


Fig. **1.5.** **Engine number (volume 1.4 l)**

Identification and engine number stamped on the left side of the engine, the crankcase (Fig. 1.5, 1.6, 1.7, 1.8).

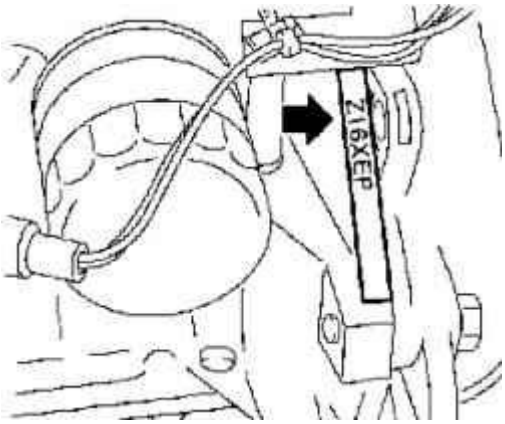


Fig. **1.6.** **Engine number (volume 1.6 l)**

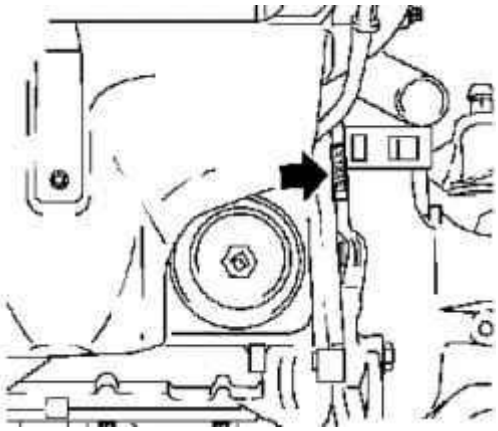


Fig. **1.7.** **Engine number (volume 1.8 l)**

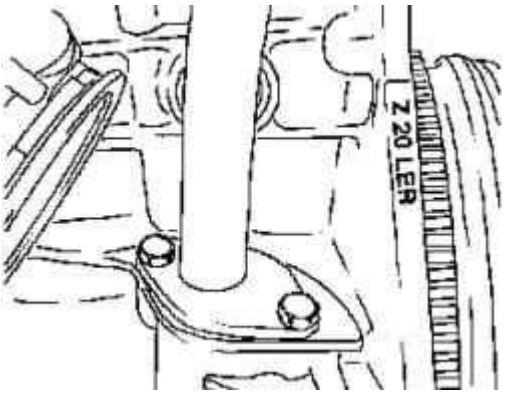


Fig. **1.8.** **Engine number (volume 2.0 l)**

Gas tank components and systems. Recommended maintenance materials.

Fuel consumption, CO

To determine the fuel consumption since 1996, the Instruction 80 / 1268 / EWG with the latest changes in 1999 / 100 / EG.

Instruction takes into account actual traffic conditions: driving in the city is estimated by a factor of approximately 1 / 3, and riding outside the city - by a factor of about 2 / 3 (fuel consumption in town and country). This takes into account cold start and acceleration phase.

In addition, part of the instruction is an indication of CO2 emissions.

From these data can not be concluded how much fuel a vehicle consumes each.

In determining the fuel economy standard for 1999 / 100 / EG takes into account its own weight of car, is also established in this standard. Additional special equipment vehicle may slightly increase the mass and, together with that, fuel consumption and CO2 emissions.

Type, properties and volumes of working fluids

The use of leaded gasoline and the abuse of additives to the fuel can lead to failure of the catalytic converter exhaust gases to meet the requirements exhaust emissions and engine failure. On diesel models in any case, do not use additives for winter operation, increase the fluidity of the fuel. When non-compliance with these requirements in the event of engine failure warranty of the manufacturer of this vehicle do not apply.

Recommended fuel

Gasoline engines

Use unleaded gasoline with an octane number not less than 95 (on the research method).

Diesel engine

Use diesel fuel with a cetane number of not less than 50.

Depending on the ambient temperature operate the car on diesel fuel summer or winter varieties.

- At temperatures above -7 ° C - summer grade fuel
- At temperatures below -7 ° C - winter grade of fuel

NOTICE

Do not fill the car with fuel intended for domestic heating boilers, gasoline or any flammable liquids, except for diesel fuel. Using the wrong fuel engine was severely damaged.

Do not fill the car with diesel fuel year-old class, if the ambient temperature is below -7 ° C. When cooling in the summer fuel-intensive fall of wax crystals that clog the fuel filter. This engine can stay or to work intermittently.

In the absence of unleaded fuel grade "super", you can use fuel with octane number 91, to avoid high loads on the engine and full vehicle load and driving in the mountains with a trailer or a high load - while decreasing power and torque of the engine. Regulator detonation, depending on the type of fuel filled (the octane number) automatically adjusts the ignition system.

NOTE

Engines, adjusted at the factory to run on gasoline with an octane number of AI-95 can be freely used and gasoline AI-98, but it will not increase efficiency or improve the performance properties of the car.

Recommendations for the choice of the viscosity of motor oil (petrol engines)

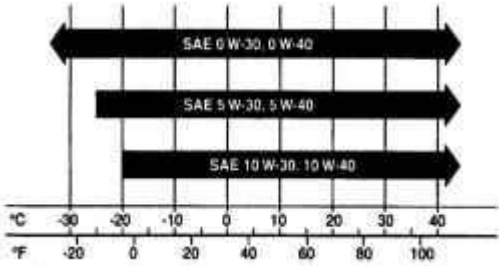


Fig. **1.9.** **Table prevailing ambient temperature in the period until the next replacement of engine oil**

Recommended to use motor oil with a viscosity of 5W-30, in the absence of the oil run out the scheme with the prevailing environmental temperature.

Refrigerant air conditioning systems

Air-conditioning systems at the car is recharged with refrigerant HFC-134a (R-134a) or a similar material operational, fully equivalent to the specified properties. The use of another refrigerant will result in serious damage to the air conditioning system and the need for complete replacement of the system.

Is not recommended to release the refrigerant into the atmosphere. The refrigerant HFC-134a (R-134a) used in cars, no adverse effects on the ozone layer of the atmosphere. However, entering the atmosphere of the refrigerant can be a small contribution to global warming.

Coolant type

Must use only the red (dark orange), not containing silicate antifreeze recommended for use by Opel, with the number 19 40 650 / 09 194 431 on the label. With prolonged use of anti-freeze can change the color to yellow. This does not affect the properties of the coolant, so it can be used until the next scheduled MOT.

NOTICE
Never use a cooling system for antifreeze / antifreeze green-blue color, with the content of silicate. We do not recommend adding any additives to coolant (including the sealing of the system and eliminate small leaks).

Keys, door locks, sunroof, anti-theft system

Switches

Fig. **1.10.** **Folding key with remote uprevleniem**

The car can be equipped with remote control door locks. In this case, the one key for all locks (Figure 1.10).

The key is an integral part of the electronic locking system start-up of the engine. Included with the master key is supplied spare.

It is recommended to keep a spare key in a safe place, such as at home.

Key with folding beard
To expand the key, press the button. In order to lay down a key, press the same button and fix his beard till a key clicks (see Fig. 1.10).

Lock the doors from opening children
Use of blocking children from opening in all cases when they are in the car. Failure to do so can lead to injuries or accidents. Adequately inform their passengers.

Fig. **1.11.** **Locking rear door lock**

In order to lock the door, turn the lever to lock the back door key or a screwdriver from a vertical position to horizontal (Fig. 1.11).

Remote Device

Fig. **1.12.** **Buttons on the remote control door locks**

The device is built into the remote control key (Figure 1.12).
The remote system controls the central locking device, mechanical anti-theft devices and anti-theft alarm.
In addition, in vehicles with electronic control system controls the windows on all doors.
Device remote control has a range of about 3 m. In order to use them, send a remote control device on the car.

NOTE
In the range of the remote system can affect the surrounding environment.

Handle the remote control carefully. Do not expose to moisture and high temperatures, avoid using unnecessarily.

Indication of operation of the device running power for emergency light signal.

Write and call the individual units
car with the remote control device
When locking the car through the remote control device remembers the current settings climate control and lighting dashboard. The settings are stored by different remote control devices, are restored by using the appropriate remote control device.

Malfunction of remote device

If the control of central locking device using remote control devices is not possible, the cause of failure may be as follows:

- Exceeded the operating range of the remote control device;
- Battery voltage of the remote control is too low;
- Multiple, following one after another attempt to use the remote control device outside the range of a vehicle (eg, distance to the vehicle is too high, resulting in a remote control device ceases to be recognized);
- An overload of the central locking device as a result of frequent, repeated exposure (power supply device, briefly suspended);
- Imposition of radio waves due to the presence of external high-power radio.

Replacing the battery of the remote control

If the operating range of the remote control decreases, replace the battery.

Fig. **1.13.** **Replacing the battery of the remote control**

Open the remote control device (Figure 1.13).

Replace the battery, while adhering to the sequence of assembling parts.

Synchronizing the remote control device

After replacing the battery door to unlock the car the usual way. Insert the key in the ignition, with automatic synchronization occurs remote control device.

Remote door locking device

Fig. **1.14.** **Key lock car doors**

Click on the button of the remote control, as shown in Figure 1.14, with the door locks automatically closed.

Lock with a mechanical protective device

Fig. **1.15.** **Lock the door locks**

All doors must be closed. Not later than 15 seconds after the re-lock, press the remote control device, as shown in Figure 1.15.
Locks all doors locked from the opening.
If the ignition is switched on, you must open and close the driver's door, so the car could again block.

NOTICE
Do not block castles, if there are people in the car. Not be released from inside.

Unlock the door remote device

Fig. **1.16.** **Key to unlock car doors**

Press the remote control device, as shown in Figure 1.16.

Unlocking and locking the door from the inside

In order to lock or unlock the doors from the inside, press the central locking device Located on the middle console of the dashboard (see Figure 1.17).

Fig. **1.17.** **Key unlocking and locking the car doors from inside**

When the key is inserted in the ignition, lock the car can be used only if all doors are closed.

NOTICE
When the mechanical anti-theft device to unlock the door of this key is impossible.

NOTE
When closure of driver's door central locking device does not work.
For locking the door from the inside (for example, to prevent undesirable penetration of the interior strangers), press the central locking device on the middle console.
After unlocking the driver's door in the usual way (using the key) unlocked all the doors.

Locked central door locking device can be opened from the inside by pulling the handle on the inside of the door. Simultaneously unlocked and the central locking device.
Locked doors are automatically unlocked when the accident (in cases of damage to the car, to assist the outside), in addition, the hazard lights. The key in this should be in the ignition.

LED in the key central locking device burns approximately 2 minutes after locking.

Faulty devices or unlock the door lock

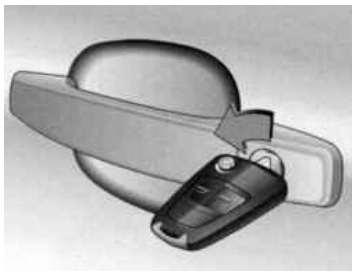


Fig. **1.18.** **Destviya when malfunction unlock doors**

To resolve this issue devices to unlock doors, turn the key in the lock driver's door all the way forward. Then turn it back into the upright position and remove (Figure 1.18).

When you open the driver's door unlocked all the doors. To deactivate the device anti-theft alarm turn on the ignition.

To resolve this issue device locking, front passenger door open, then close the driver's door and press the central locking device on the middle console. Central locking device will be locked all the doors. Close the door front passenger.

Faulty central locking device

Unlock.

Turn the key in the lock driver's door forward until it stops. Turn the key back and remove it. Other doors can be unlocked from the inside by pulling the handles on the inside of the door (it is not possible with earlier engagement of the device). Trunk and cover the fuel tank thus remain locked. to turn off the device anti-theft alarm, turn on the ignition.

Locking.

Fig. **1.19.** **Removal of the central locking device malfunction**

Insert the key into the hole on the inside of the door, above the lock, and cock the lock push up tangible click, then close the door (Fig. 1.19).

Repeat for all other doors. Driver's door can be locked also on the outside with a key. Unlocked the lid of the fuel tank lock is impossible.

Closing and opening windows with remote control

In cars with electronically controlled window box, you can open or close all the doors from the outside.

Fig. **1.20.** **Opening and closing windows from the outside**

To do this, press the corresponding button on the remote control, until all the windows would not open or be closed completely (Figure 1.20).

Overloading power

For too often, repeatedly turned on and off the remote control system power windows central locking device can be briefly interrupted. However, after a while its functions are restored.

Unlocking and locking luggage

Fig. **1.21.** **Lock opening trunk**

In order to unlock the trunk lock, press the appropriate button on the remote control device (Figure 1.21).

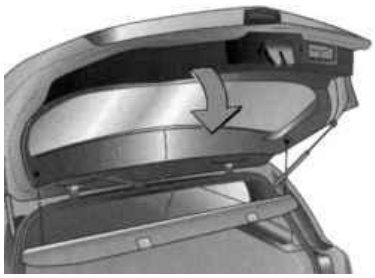
Fig. **1.22.** **Opening trunk**

Trunk unlocked with the central lock and can be opened by pressing the button under the bar for the capture (Figure 1.22).

Fig. **1.23.** **Locking luggage lock**

In order to secure the lock luggage, press the appropriate button on the remote control device (Figure 1.23).

Fig. **1.24.** **Closing the trunk**



To close the trunk, use the handle on the inside of the back of the door (Fig. 1.24).

NOTICE
Do not go with fully or partially open rear door, for example, the transport of bulky cargo, as well as in the salon will be exposed to toxic exhaust gases.
Mounting accessories on the back of the door increases its mass. As a result, the excessive weight of the rear door is not kept in the open position.

Alarm
The unit antitheft alarm controls:
- Doors, trunk, hood;
- Lounge car;
- The slope of the vehicle, such as when lifting;
- The ignition.

Fig. **1.25.** **The inclusion of anti-theft alarm**

In order for anti-theft system has joined, should be closed all doors, windows, sunroof and hood. Not later than 15 seconds after locking the re-press the corresponding key remote control device (Figure 1.25).
If the ignition is switched on, you must open and close the driver's door to be able to activate the device anti-theft alarm.

Without the inclusion of control functions and tilt the car interior
Close the trunk and hood.
Click on the button the console on the roof (Figure 1.26).

Fig. **1.26.** **Key partial disabling anti-theft system**

Close the door.
The device anti-theft alarm. After about 10 with the device (without the control cabin and the inclination of the car) is activated. LED on the center console will flash to turn off the device.

Fig. **1.27.** **Deactivating the partial deactivation of anti-theft system**

To disable the partial deactivation of anti-theft system, click the corresponding button on the remote control or turn on the ignition (Figure 1.27).
When a failure of the remote control, open the car key. Turn the key in the lock all the way forward, return it to vertical position and remove.
If you open the driver's door of alarm, disable the device anti-theft alarm, switched on the ignition.

NOTE
When the device anti-theft alarms might trigger a sound (beep) alarm or light (emergency light signaling).

Opening and closing the hood

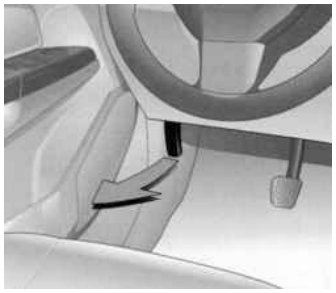


Fig. **1.28.** **Handle opening hood**

To open the hood, pull the handle to unlock the hood from the driver's espoused under the dashboard (see Figure 1.28).
Castle is unlocked, and the hood will open slightly. Return the handle to its original position.

Fig. **1.29.** **Opening bonnet**

At the bottom of the hood latch handle is - then it up and open the hood (Fig. 1.29).

NOTE
Be careful: the mud or snow, located on the hood, when opened, can fall on the windscreen and clog the air intake.

Hood is automatically kept in the open position. To close the hood, pull it down and give it slammed shut.
Check the fixation of the hood, pulling it over the front edge. If the hood is not, repeat the previous operation.

Power windows

Electronic control window
Electronic control window work when the ignition key.
In addition, the functions of windows continue to work within 5 minutes after the ignition is turned off and within 5 minutes when you turn the ignition key to position 1.
When you open the driver's door using the function becomes impossible.

Central Control Panel window

Fig. **1.30.** **Opening bonnet**

Central Control Panel window is located on the driver's door (Fig. 1.30).

The front keys are designed to control the glass on the doors of the driver and front passenger. Rear keys open and close the glass rear door. Additional control buttons are located on the front passenger door and rear door panels.

For the gradual movement of the glass, briefly press the forward or backward. To automatically open or close hold the keys pressed so far as is necessary.

Safety function

In the case of resistance during the automatic closing of glass above the middle of the window movement immediately stopped and the window re-opens.

If tugogo progress, for example due to the presence of frost, repeatedly press the key corresponding to the window until it closes.

Lock opening rear windows

To lock, press the switch  between the rear buttons on the handle of the driver's door (Fig. 1.31).

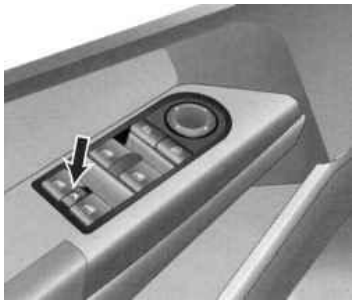


Fig. **1.31.** **Key lock rear windows**

If you press the switch forward (see red box) - glass rear doors are blocked.

If you press the switch back (see green box) - glass rear door unlocked.

Faulty windows

If the automatic opening and closing windows is not possible, an electronic management system windows must be activated. To do this, close the doors, turn on the ignition and open the windows. Then close the window and hold not less than 5 seconds.

NOTE
The procedure is repeated for each window separately.

Panoramic glass

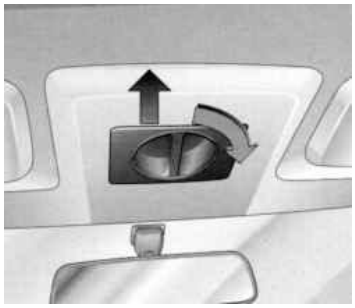


Fig. **1.32.** **Opening panoramic glass**

To open the panoramic windows, turn the knob to the right and slide back into the right position lining the ceiling (Figure 1.32).

Fig. **1.33.** **Closing the panoramic glass**

To open the panoramic glass roof sheeting move forward from any position behind. In its most forward position lining locks (Figure 1.33).

NOTE
You move the ceiling sheathing fold sun visors up.

Sunroof

Fig. **1.34.** **Keys hatch on the roof**

Luc control keys on the console on the roof (Figure 1.34).
For the gradual movement of the hatch, press the button briefly. To automatically open or close hold them pressed.
Lifting the hatch.
In the closed hatch, press , Hatch rear its rear.
Opening the hatch.
In the raised position to re-press , The hatch is fully open.
Closing the hatch.
Press . Because of the open hatch closed, for security reasons do not reach 20 cm to the end. to completely close it, hold the key pressed.

Sun blinds
Sun blinds designed to ensure that the sun's rays do not penetrate into the salon with a closed sliding hatch.
When you open the hatch opens and sun blinds.
Opening curtains.
Press , Shutter is fully open.
Closing the curtain.
Press , Shutter is fully closed.
From the open position shutter is closed for security reasons, do not reach 20 cm to the end. For a complete closing of the shutter, press and hold .

NOTE
With the luggage on the roof, to avoid damage, make sure you have enough space to move the sliding hatch.

If a sliding sunroof and sun blinds do not work, you must activate the electronic system.
To do this, turn on the ignition, close the sliding hatch and hold down at least 10 seconds.
Close the sun blinds and hold down at least 10 seconds.

1.2. Controls and combination devices

Combination of devices and light detectors

Failure tell-tale oil level

Failure tell-tale oil pressure in the engine. This alarm warns the driver of low pressure in the lubricating system of engine.

Indicator lights up when you turn the ignition switch in position «ON» («Ignition included) and goes out after starting the engine.

NOTICE
Do not work the engine when the oil pressure drop detectors. This can lead to engine failure. Need to check serviceability of sensors, pressure drop of oil in the engine every time you turn the ignition. In case of sensors fail, you will not receive a timely message about the fall of oil pressure and engine may be damaged. If the indicator does not light up when you turn the ignition, do not run the engine. Refer to the service station official Opel dealer for inspection and repair signaling.
If the indicator light up on the run the car, follow these steps.
1. Observing precautions immediately turn over to the side or to the edge of the roadway and stop on a horizontal platform.
2. Stop the engine and wait 5 minutes, to glass in motor oil sump.
3. Check the oil level in the engine. If the oil level is below normal, top up the oil and bring its level back to normal.

Control lamp sensors malfunction of the braking system / indicator applying the parking brake

Indicator lights up when the parking brake, if the ignition switch is in position «START» («starter) or« ON »(« Ignition inclusive). Indicator goes out with complete exclusion of the parking brake.

Fig. **1.37. Control lamp sensors malfunction of the braking system / indicator applying the parking brake**

Failure tell-tale levels of brake fluid

If the alarm continues to burn after a full off the parking brake, a possible cause of a malfunction of the braking system.

Observing precautions immediately turn over to the side or to the edge of the roadway and stop.

You may notice that the brake pedal or turn increased (pedal dropped to the floor). In both cases, the vehicle braking distance increases.

Check the brake fluid. If necessary, top up the brake fluid and bringing its level to normal. After topping up the brake fluid, check whether the burn continues to alarm.

If the alarm continues to burn or there are signs of malfunction of the braking system, further movement of the car is prohibited.

NOTE
The need for topping up the brake fluid can sometimes be a consequence of its leakage. Therefore, immediately refer to the service station official Opel dealer to check the functioning of the braking system, even if the indicator is not lit.

NOTICE
It is dangerous to operate the vehicle, if the fire alarm malfunction of the braking system. This indicates that the braking system of your car can not work or refuse at any time. If the alarm continues to burn, then after checking off the parking brake should immediately check the status of the braking system.

NOTE
On vehicles with Easytronic transmission in nezatyanutom parking brake indicator light flashes for a few seconds after the ignition is turned off.

Alarm stoppers locks belt / cignalizator airbag system

Stoppers locks of safety belts, along with systems airbags are controlled by electronic system, and indication of their operation is carried out by an indicator on the dashboard. When you turn the ignition indicator lights up for about 4 seconds. If it does not burn, does not go out at 4 with lights or in traffic, so there was fault in the system of locks stoppers belts or airbags systems. Stoppers locks belts or air-bags may fail during an accident.

Airbag systems, together with a system of identification of employment and lockable seat belt locks are controlled by electronic system, which is an indicator of the alarm on the dashboard. When you turn the ignition indicator light is about 4 seconds. If he does not light up or do not go out after 4 s, or burns on the road, so there was fault in the systems of airbags, seat recognition system of employment or pinning system locks of safety belts. The systems can fail in a traffic accident.

Fig. **1.38. Alarm stoppers locks belt / cignalizator airbag system**

NOTICE
It is strictly forbidden to interfere in the construction of their own system of airbags or seatbelt pretensioners. All work on the maintenance and repair of these systems must be carried out at the service station official dealer Opel. Self-repair, maintenance or intervention in the design of a danger. Bag or seat belt retractors may accidentally trigger or lead to failure. This can lead to serious injuries of people.

Electronic alarm system dynamic stability

ESR system if necessary, improves the stability of the vehicle and prevents stalling of the driving wheels regardless of the condition of pavement and tire in any road conditions. If you notice the danger of skidding vehicle (insufficient or too dramatic impact on the government) engine power is reduced (changing the engine noise) and individual wheels purposefully disinhibited. Thus significantly improving the stability of the car, especially in the snow and ice, as well as on wet or slippery road.

Indicator is lit after ignition for a few seconds. After that the system is ready to work. Blinking during movement indicates actuation system. Engine power is somewhat reduced (changing the engine noise), and the car automatically slows down.

If the indicator is lit during motion - means the system is off or malfunctioning. You can continue to travel, but the sustainability of progress may deteriorate depending on the condition of the road. Turn the ESR system or fix the problem.

Fig. **1.39.** **Electronic alarm system dynamic stability**

Interactive Dynamic Driving System (IDS + - Interactive Driving System)

IDS + system combines sensors and control devices of electronic stabilization program (ESR), Antilock braking system (ABS) and electronic dynamic control shock absorbers (CDC). This achieves a pronounced dynamics of the movement while improving safety.

(CDC – Continuous Damping Control) Electronic dynamic control shock absorbers (CDC - Continuous Damping Control)

CDC coordinates the system stiffness of the suspension of the car with traffic conditions and characteristics of road surface.

The system continuously monitors the movement of the wheels and the car and immediately change the rigidity of each shock absorber. This ensures optimum alignment of the chassis with traffic conditions and the properties of road surface.

When the sport mode suspension control system adjusts for a more sporty driving style (more "stiff" suspension).

Light and sound detectors-belt safety

Safety belt reminder alarm fire if ignition switch is turned to position «ON» («Ignition inclusive) and the driver's belt is not fastened.

Alarm car door closure

Indicator lights up when one of the doors (including rear luggage compartment door) is open or not closed tightly.

Battery discharge indicator

Indicator lights up when you turn the ignition switch in position «ON» («Ignition included) and goes out after starting the engine.

If the indicator light up on the run the car - this is a malfunction of the electric generator or the power system. Observing precautions immediately turn over to the side or to the edge of the roadway and stop.

NOTICE
If the light is the battery level indicator, then further movement of the car is prohibited, because in this case, the engine can suddenly die out.

Failure tell-tale levels of coolant

If the indicator light up when the engine is running, stop and turn off the engine. Too high temperature of the coolant is hazardous and can cause damage to the powertrain. Check the coolant and top up if necessary.

Detector electronics of the vehicle (engine and gearbox)

Indicator lights for a few seconds after ignition.
Illuminated sensors with the engine running indicates a malfunction in the electronic system of the engine or gearbox. Electronic switches to emergency mode. This can increase fuel consumption and can deteriorate driving characteristics. In some cases the problem can be eliminated by turning off and restart the engine. If the indicator lights when the engine is running, you should seek help at the service station.
Short-term single lamp ignition signaling does not matter.
Illuminated sensors can also indicate the presence of water in diesel fuel filter, while at the service of information indicating the display the corresponding text message. In this case, check the fuel filter on the presence of residual water.
Flashing signaling device when the ignition is a malfunction in the system start the engine block. In this case, start the engine is impossible.
Under these conditions, the system checks whether you can crank the engine used by the key. Start the engine is possible, if the key is recognized by the system as "permitted". Verification is carried out using the built-in key transponder.
Electronic lock engine start automatically after extracting the key from the ignition.
Try again to turn off and turn on the ignition.
If the indicator continues to flash, try to start the engine, spare keys, or ask for help at service stations.

NOTE
Detector can also be illuminated in case of failure of transmission Easytronic. For serious faults on the transmission indicator extra icon appears – – .

Continue the movement is possible, if only the indicator lights . This is not to switch to manual mode.
If the indicator gear icon appears in addition – – , Continued travel is impossible.
Eliminate the problem or ask for help at service stations.

Fig. **1.40.** **Detector electronics of the vehicle (engine and gearbox)**

Interruption of power

Alarm will also burn if there are problems with power supply.

NOTICE
When a discharged battery and included the transfer clutch is not dropped. Driving a car is impossible.
In the case of discharge of the battery, follow the procedure support the launch.

If the cause of eating disorders is not in a discharged battery, you should ask for help at service stations. In case if you want to move the car from the flow of a moving vehicle, the clutch can be turned off in the manner described below.

1. Tighten the parking brake and turn off the ignition.
2. Open the hood.
3. Clear Easytronic transmission in the cover (see Figure 1.41) that after removing the cover in the hole did not hit the dirt.

Fig. **1.41. Removing the automatic transmission Easytronic**

4. To release the lid, turning it, and pull up (Figure 1.41).
5. Use a screwdriver to turn located under the cover mounting screw to the right to tangible resistance. Now the clutch disconnected.

Do not rotate further, overcoming resistance not to damage the transmission Easytronic.

6. Replace the lid clean. The lid should be fully fit to the body.

NOTICE

Towing the car and crank the engine with the clutch disconnected in this manner is forbidden, but may move the car for short distances. Immediately call for help at service stations.

Signaling an interactive dynamic system driving

IDS + electronic alarm system, dynamic control dampers burns about 10 seconds after opening the driver's door. Burning it in motion indicates a system malfunction. For safety switches on a more rigid chassis tuning. Eliminate the problem.

Fig. **1.42. Signaling an interactive dynamic system driving**

Mode «SPORT»

Fig. **1.43. Key activate «SPORT»**

To activate this mode, press the corresponding button, located on the center console (Figure 1.43).
In sports mode while moving the parameters of the suspension, steering, engine intake, as well as the switching point automatic gearbox and Easytronic.
Suspension and steering are becoming more stringent and provide improved contact with the road. The engine responds rapidly to movements of the accelerator pedal.
The box and Easytronic automatic transmission reduces switching time and switching itself occurs at a higher speed (if not included speed controller).

When enabled on cars with Easytronic gearbox or automatic transmission indicator lights .
When the winter mode (on vehicles with Easytronic gearbox or automatic transmission) mode «SPORT» inclusion impossible.
To stop the regime again, briefly press or turn off the ignition. LED in the button goes off.
Long press to disconnect the ESP, the regime «SPORT» will remain engaged.

IDS + signaling mode «SPORT»

IDS+ This indicator is lit after opening the driver's door about 10 seconds. Illuminated during movement indicates a fault in the system. Eliminate the problem.

Alarm activate outdoor lighting

Indicator lights when the exterior lighting.

Alarm indicator main beam

Indicator lights when the beam and emit a light signal.

The inclusion of outdoor lighting

To activate outdoor lighting, turn the switch to the appropriate position.

0 the off position.
position "parking light".
position "beam, the light".

Provisions **0** and also includes rear lights and license plate lights.

If the car installed fluorescent lights, then when you turn the ignition switch and position light or **0** «AUTO» included the parking light. With the engine switched-beam headlamps.
Headlights daylight turned off when you turn off the ignition.

Fig. **1.44.** **Control panel exterior lighting**

Dip headlamp

Install light switch in position «AUTO». When the engine is running short-range light will be activated automatically depending on the outdoor light.

Outdoor lighting is turned off when you turn off the ignition.

Fig. **1.45.** **Position switch in the mode dip headlamp**

NOTICE
For security light switch should always keep in position «AUTO».

Inclusion of fog lamps

Fog lights are included only when the ignition and lighting.

Fig. **1.46.** **Keys include fog lamps**

Rear fog

Rear fog lights are included only when the ignition and near or parking light.

Rear fog lights on the car while driving with the trailer disconnected.

Reversing Lamps

They burn when the ignition key and switch on the reverse.

Alarm "parking pilot"

If the indicator is lit - this indicates a system failure. Eliminate the problem or refer to the service station.

Flashing sensors indicate contamination sensors, or the presence of these ice or snow. Sensors must be undamaged and free from dirt, snow and ice.

In addition, there may be interference in the system due to external sources of ultrasound (eg, jack hammers, garbage trucks). After the interference of the system again works properly.

Fig. **1.47.** **Alarm "parking pilot"**

System "parking pilot"

"Parking Pilot" makes parking so that it measures the distance from the vehicle to an obstacle behind him and beeps in the car. The system determines the distance from the four sensors in the rear bumper.

Inclusion of

When the ignition system of parking pilot turned on automatically when going backwards.

On the operational readiness signal LED on the ignition key.

If the car approaches the obstacle behind you in the cabin is distributed periodic beep. With a decrease in the distance interval between the signals becomes shorter. At a distance of less than 30 cm signal becomes continuous.

Under special circumstances (various reflecting surfaces of objects or clothing, as well as extraneous sound sources), the system does not react to obstacles. For this reason, availability of parking pilot does not relieve the driver from the duty of care, for example when reversing.

Shutting down the system

After turning off the rear of the system is automatically disabled.

If the system must be turned off when the back of the course, should press P , The LED in the button goes off.

To activate the system to re-press P .

Fig. **1.48.** **Sensors "parking pilot"**

Fig. **1.49. Key to enable or disable the system**

Index fuel level

Fig. **1.50. Index fuel level**

Index fuel level shows the approximate amount of available fuel in the tank (Fig. 1.50). Timely directly charge the fuel tank. Make sure that the amount of fuel in the tank is at least a quarter of total capacity. If you turn on the alarm minimum level of fuel in the tank or the arrow pointer stands at about 0, immediately tuck the fuel tank.

Alarm indicator main beam

Indicator is lit when the beam and emit a light signal.

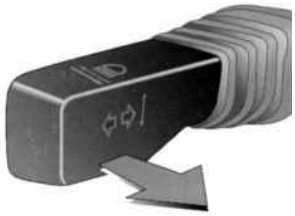
Mode switching between near and distant light

Fig. **1.51. Turning on the "Far / Middle" in the headlights**

To switch to high beam, move the lever forward. To switch to beam back the lever to its original position (Figure 1.51).

When the high beam indicator light is blue .

Fig. **1.52.** **Filing light signal**



To file a brief movement of the light signal, move the lever to the steering wheel (Figure 1.52).

Railroad switch LED indicators

The corresponding indicator (arrow) blinks when the direction indicator. Blinking indicates the failure of the lamp one of the flashing lights or the appropriate fuse. When the emergency signal light flashing both sensors.

Mode switch indicators

Fig. **1.53.** **Mode switch indicators**

When turning right, move the lever up, with the left - down (Figure 1.53).
Lever indicators always returns to its original position. After turning the steering wheel back indicator lamp is automatically switched off.

Alarm inclusion winter mode automatic transmission or Easytronic boxes

Indicator is lit when the winter mode of operation.

Winter driving modes (box Easytronic)

In case of difficulty in moving from place on a slippery road, press the corresponding key (on the gearbox will display icons "A", included the transfer and). Easytronic transmission will switch to automatic mode, and the car touches the 2 nd gear.
Winter mode operation stops when the following conditions:
- Re-uses key activate;
- Turn off the ignition.

To protect against damage Easytronic transmission at too high a temperature coupling winter driving mode is automatically switched off.,

NOTE
When the winter regime regime «SPORT» off (if it was included).
If the winter when the mode switch was performed in manual mode, the winter mode is disabled. When returning to automatic mode back on winter mode.

Fig. **1.54.** **Power key winter driving mode**

Winter driving modes (automatic transmission)

In case of difficulty in moving from place on a slippery road, press the regime. This can be done only in the positions P, R, N, D, 3 (on the indicator icon will light transmission). The car will touch on the 3rd gear.

Winter mode operation stops when the following conditions:

- Re-activating the power key mode;
- Switched manually at 2 nd or 1 st transmission;
- Turn off the ignition.

To protect against damage to winter driving mode is automatically switched off at too high a temperature of transmission oil.

Fig. **1.55.** **Power key winter driving mode**

Easytronic Alarm mode «SPORT» automatic transmission or Easytronic boxes

Indicator is lit when the mode «SPORT».

Modes of driving a car with korbkami transmission with electronically controlled

If you switch «SPORT» switching occurs at a higher speed (if not included speed controller). The display gear indicator light is appropriate.

Mode automatically switches to the neutral position to reduce fuel consumption automatically sets the gearbox in position N, for example when stopping at a traffic light.

Automatic switching to the neutral position activates the following conditions:

- The gear lever is in position D, 3, 2 or 1;
- Brake pedal is pressed;
- The car stands still;
- The accelerator pedal is pressed.

When you release the brake and throttle the car from rest as usual.

The program of temperature control after a cold start automatically, due to delay in switching to higher gears (higher speed), quickly brings the catalyst to a temperature required for optimum reduction of emissions of harmful substances in the exhaust.

Adaptive mode automatically coordinate the process of switching to other programs in terms of driving, for example, when riding with a big boot or on the rise.

Alarm system, identification of employment Seats

Recognition System employment system disables the front seat side airbags and front seat passenger, if the front passenger seat is occupied or not at the front passenger seat mounted system for ensuring the safety of children «Opel» with transponders. Head airbag system is activated at the same time.

Alarm system, identification of employment seat is located on the dashboard. If the ignition is switched on indicator lights up for about 4 s, therefore, a car equipped with a system of identification of employment seat.

Security system of children «Opel» with transponders

Fig. **1.56.** **Alarm system to protect children**

Indication of the availability of child safety company «Opel» with transponders after ignition is carried out by continuously burning signaling in dashboard as soon as the identification system employment register the seat availability of the system to ensure the safety of children (Figure 1.56).

If the indicator is not lit during the motion - which means that the system of front and side airbags for front passengers are not disabled, which is dangerous for a child's life. In this case, a system for ensuring the safety of children should be set on the back seat. Eliminate the problem or refer to the service station.

Case of incorrect installation of child safety or transponder malfunction indicator light flashes. Verify that the installation of child safety. Instructions for installation of child safety with transponders, see enclosed guide.

NOTE

If the indicator flashes when properly mounted security system for children with transponders, so there was fault, it is dangerous for the child. Install a system for ensuring the safety of children in the back seat.

If the system is to ensure the safety of children Opel with transponders not installed, the alarm should not be lit or blinking, otherwise the system airbags for the front passenger will not work.

When properly mounted system, child safety company «Opel» with transponders after ignition fire alarm system, child safety company «Opel» with transponders, located in the dashboard.

If the indicator is not lit during the motion - which means that the system of airbags for the front passenger is not disabled, that life-threatening. In this case, a system for ensuring the safety of children should be set on the back seat.

When installed system to ensure the safety of children «Opel» with transponders after ignition indicator lights continuously when the system detects a seat. Only under this condition is allowed to use the system to ensure the safety of children with transponders on the front passenger seat.

Fig. **1.57.** **Label indicating that the system is installed in a car seat recognition of employment**

In addition, in vehicles with a system of identification of employment at the bottom of the seat front passenger seat is the appropriate label (see Figure 1.57).

Availability of child safety «Opel» with transponders automatically registered with the proper mounting system for the front passenger seat. When using these systems the safety of children on the front passenger front and side airbags with his side are disabled. Head airbag system, however, remains activated. Be sure to supervise the work of signaling recognition system employment seat.

Alarm systems, engine failure

Indicator lights up after turning on the ignition and goes out shortly after starting the engine.
Illuminated with the engine running indicates a malfunction in the device exhaust. Perhaps the excess of allowable parameters of the exhaust. Seek the help of the station maintenance.
Blinking with the engine running indicates a failure, which can cause damage to the catalyst.
In this case, you can continue to move without risk of damage if the throttle to a point to stop flashing and the alarm was burning continuously.

Fig. **1.58.** **Alarm systems, engine failure**

Detector ABS braking system

System ABS (ABS braking system) continually monitors the braking system and, regardless of the state of the road and tire, prevents wheel lock.
At the risk blocking one of the wheels of the device ABS regulates brake pressure of the wheel. The car is still manageable even with full braking in a corner or a side maneuvering. When emergency braking ABS allows you to bypass the obstacles, without releasing the brake.
Job ABS system is accompanied by pulsation of the brake pedal and the characteristic noise.
To achieve optimum braking effect is to squeeze brake pedal fully through the process of braking, without paying attention to the pulsation of the pedal and not reduce stress.

NOTICE
This protective system does not give the driver the right to risky driving style. Road safety is ensured only when the responsible driving.

Fig. **1.59.** **Detector ABS braking system**

Alarm system, lights for a few seconds after ignition. At this time, is self-diagnostic system, possibly accompanied by a specific noise. The system is ready to work after the alarm goes off.
If the alarm does not go off after a few seconds or burning during the ride - this indicates a malfunction in the system of ABS. The braking system continues to operate, but without regulation of ABS.

In the case of malfunction of the ABS when excessive braking wheel may lock up. A car loses control and can get into the skid.
In this situation, you can continue to travel, driving a car with caution.
For troubleshooting, visit the service station.

Alarm monitoring system pressure drop and the current tire pressure

Red light sensors shows a pressure drop in the bus, a yellow light - a malfunction in the system. To fix the problem ask for help at service stations.

Fig. **1.60.** **Alarm monitoring system pressure drop and the current tire pressure**

Monitoring system tire failure (DDS - Deflation Detection System)

The monitoring system tire failure while driving continuously monitors the rotational speed of the wheels. When a pressure drop in one of the tires decreases the diameter of the wheel and it rotates faster than the other wheels. When the system detects a difference between speed, alarm light glows red.
In this case, stop immediately and check the tire pressure. If necessary, install the spare wheel.
System functions after ignition and detects a pressure drop, starting with a speed of about 30 km / h.

Fig. **1.61.** **Key system initialization DDS**

NOTE
The triple flashing signaling points to initialize the system.
The monitoring system tire failure does not replace the manual control with the help of attorney manometer.
Check the tire pressure on cold tires at least once in 14 days and before every long trip.

System Initialization

After adjusting tire pressure, and after replacing the tire or wheel system must be initialized. To do this, with the ignition, hold DDS for approximately 4 s, alarm will flash 3 times. After a certain path towards the system will be ready to work.
The system can be initialized only if all the tires installed the prescribed air pressure.

Alarm indicators trailer

Indicator light flashes while driving with a trailer with a frequency indicators. Do not blink at a failure of one of the indicator lamps on the trailer or towing truck.

Alarm system, adaptive headlamps (AFL - Adaptive Forward Lighting)

If the indicator lights continuously - this indicates a system failure.
When failure of the rotary device for lighting turns off the light passing the appropriate lights. For security automatically corresponding fog lamp.
To fix the problem ask for help at service stations.
Flashing signaling device for about 4 sposle ignition recalled that the lights reconfigured in a symmetrical passing beam.

Fig. **1.62.** **Alarm system, adaptive headlamps**

Adaptive headlights (AFL - Adaptive Forward Lighting)

Vehicles with a system of double xenon headlights have special lighting to improve visibility when cornering.
Xenon light beam is deflected depending on the position of the steering wheel and speed (from about 10 km / h).
Lamps emit light at an angle of 15 ° to the right or left of the axis of the vehicle.
Light for the motorway.
When the vehicle is moving at a constant high speed of the passing light is automatically set somewhat higher, and thus increases the range of illumination.

Fig. **1.63.** **Scheme of adaptive headlamps**

Signaling speed regulator

During the drive indicator lights up when you turn on the system.

Fig. **1.64.** **Signaling speed regulator**

Speed controller

Speed regulator can remember and always maintain the value of the speed of about 30 to 200 km / h. For safety reasons, speed controller is switched on only after tapping the brake pedal.

Speed regulator is controlled by keys and on the lever indicators (see Figure 1.65).

Fig. **1.65.** **Control lever speed control**

Regulation is not included, if constant speed is not recommended (eg, in dangerous situations for their own car and other vehicles, as well as in heavy traffic, on winding, smooth or slippery roads).
When driving with an automatic transmission include a speed regulator only in the mode of D, while driving with the transmission Easytronic - only in automatic mode.
When the speed regulator response time may increase, due to the change of feet.

NOTICE
Failure to comply with the recommendations for driving with a speed regulator can lead to injury or danger to life.

Inclusion speed regulator

Press , The instantaneous velocity can be written in memory and will be maintained constant. The leg can be removed from the accelerator pedal.
To speed necessary to press the accelerator pedal. Once the accelerator pedal is released, the newly restored minded speed.

Acceleration

When the speed regulator for a long time or a few times, briefly press After that will include a continuous or a stepwise increase in the speed in increments of 2 km / h without uses the accelerator pedal.

When you release the keys current speed is stored in memory and saved.

Slowing

When the speed regulator for a long time or a few times, briefly press After that will include a smooth or stepwise decrease in the rate of 2 km / h.

When you release the keys current speed is stored in memory and saved.

Shutting

Press , Speed turns off the appropriate alarm goes off, the car gradually slows down. To continue, press trips, as usual, the accelerator pedal.
Under certain conditions, speed controller is automatically disabled for security.
This occurs in the following cases:
- Vehicle speed below 30 km / h;
- The main brake pedal is engaged;
- Engaged the clutch pedal;
- Gear lever on the automatic transmission or Easytronic box is in position N.

Return to recorded in the memory speed

Press at speeds above 30 km / h, in this case will be restored speed, before shutting down. Memorized in the speed you erased after turning off the ignition.

Emergency stop alarm

To simplify the search for a switch, with the ignition box, lighted red. When the indicator lights that flash with the same frequency as the indicator.

When you stop the car on the carriageway or near it, as well as in all cases under the rules of the road, turn on hazard warning lights.

Included is an emergency alarm system warns other road users that a defective car is a potential danger, and they should take extra precautions.

Fig. **1.66.** **Emergency stop alarm**

Beep

To file a beep, press the switch located on the steering wheel.

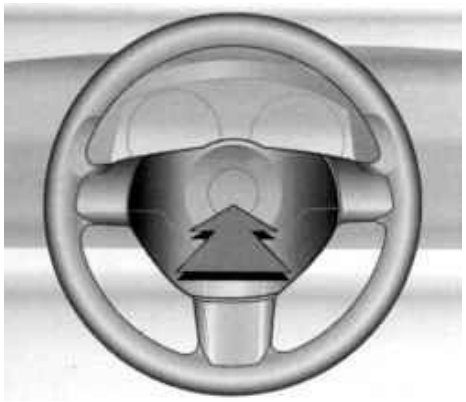


Fig. **1.67.** **Beep**

Tachometer

Fig. **1.68.** **Tachometer**

Tachometer shows the frequency of rotation of the crankshaft of the engine in units of 1000 min $^{-1}$ (Fig. 1.68).

NOTICE
Do not exceed the permissible speed of the crankshaft of the engine: tachometer needle should not go into the red zone of the scale. This can lead to engine failure.

Speedometer

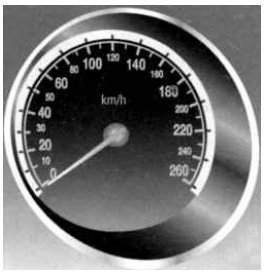


Fig. **1.69.** **Speedometer**

Speedometer shows the magnitude of the current vehicle speed (Figure 1.69).

Odometer (Odometer)

Fig. **1.70.** **Odometer**

Odometer shows the total mileage of the vehicle (Figure 1.70).

Counter daily run

Fig. **1.70.** **Odometer**

To set to zero, press installation with the ignition button (Figure 1.70).
Zeroing in cars with indication of time in odometer

Fig. **1.71.** **Indication of the switching modes odometer**

If you include a display of time, switch to the display counter daily run. To do this, briefly press the installation button (Figure 1.71).
Indication of time on the meter run

Fig. **1.71.** **Indication of the switching modes odometer**

To switch to display daily run to display the time, briefly press the installation button (see Fig. 1.71).

Time

When time displays make the most of installation button on the device and hold it down for about 2 seconds.
When the indicator readings time is flashing, briefly press the button and set the clock.
In the same way, set readings minutes.

Customer display on the odometer

InSP - Indication of service intervals. Indication of the race, remaining until the next maintenance.
InSP2 - the failure of the lamp.
InSP3 - discharged battery remote control device.
InSP4 - water in the diesel fuel filter.

NOTE
The vehicles with the system of control instead of inscriptions InSP2 and InSP3 on Information Display a message is displayed.

ESPoff - electronic stabilization program is disabled.
ESP on - electronic stabilization program included.

Information display

Triple information display

Triple information display shows time, outside temperature and the date or an infotainment system, when it is enabled.
Time, date and outside temperature can be displayed when ignition is turned off for 15 seconds by briefly pressing one of two buttons below the display.
Indication of F on the display indicates a malfunction.

Fig. **1.73.** **Triple information display**

On-board information display

On-board information display shows time, outside temperature and the date or an infotainment system, when it is enabled.
Indication of F on the display indicates a malfunction.

Fig. **1.74.** **On-board information display**

Graphical or color information displays

Graphical or color information display shows time, outside temperature and the date or an infotainment system, when it is included, as well as details of climate control.

On the graphical information display information is displayed in monochrome. On color information display, data mapping - color.

Some indication on the display in an abbreviated form.

Indication of F on the display indicates a malfunction.

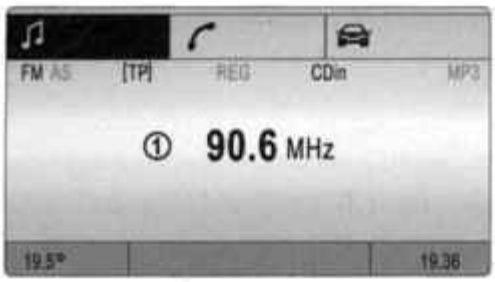


Fig. **1.75.** **Graphical information display**

Outside temperature

Thermometer responds to lowering the air temperature immediately, but to improve - with time delay.

Fig. **1.76.** **Outside temperature**

To prevent icing of the road when the outside temperature is lowered to 3 ° C in the treble or the on-board information display icon ❄ . With increasing temperature the icon disappears.

Fig. **1.77.** **Indications graphic display**

On cars with a graphic or a color information display for the prevention of icing of the road there is a warning message. At temperatures below -5 ° C message does not appear (Figure 1.77).

Set time and date on a triple information display

Turn off the infotainment system, click ◴ or ⊙ under the display as follows:

◴ - Press for 2 seconds, blinks, the date;

⊙ - Set the testimony of the day;

◴ - Flashing indication of the month;

⊙ - Set the testimony of the month;

◴ - Flashes indication of the year;

- Set the testimony of the year;
- Flashes the clock;
- Set the clock;
- Flashes reading minutes;
- Set the reading minutes;
- Hours run.

Fig. **1.78.** **Buttons for setting the date and time**

Correction time

Some radio stations broadcast RDS wrong time. If in connection with these watches often display the wrong time, you should disable the automatic synchronization clock and set the time manually.

Automatic installation is displayed on the display icon .

Plugging and unplugging of the automatic time synchronization

Turn off the infotainment system, click or under the display as follows:

- Hold the approximately 2 s, the time display switches to install;
- Click twice and flashes the testimony of the year;
- Press and hold for about 3 SDS until the display starts flashing and appears «RDS TIME»;
- Press, the indication on the display - RDS TIME 0 - disabled;
- Press, the indication on the display - RDSTIME 1 - enabled;
- Then tripled.

Choice functions on-board information display

With on-board information display manages the functions and settings of some equipment.

Fig. **1.79.** **Choice functions on-board information display**

Fig. **1.80.** **The four-switch**

These functions are selected using the keys or the four-switch on the infotainment system (Figure 1.80), and the left control wheel (Figure 1.81) on the steering wheel.
In this case the corresponding menu items are displayed alternately.
When a warning message display control system does not show any other information. Warning messages should be acknowledged by pressing the right or the left button of the cross-switch or the left switch on the steering wheel. If you receive several warning messages to confirm receipt of their rotation.

Fig. **1.81.** **The control wheel on the steering wheel**

Setting up the on-board information display

Press the «Settings» to the infotainment system, with the displayed menu item «Audio» or «System».
Press the lower key the four-switch to go to the menu item «System». After pressing the right button will display the four-switch is the first function menu «System».

Fig. **1.82.** **Menu item «System»**

Functions are displayed in the following order (some abbreviated):
- Time synchronization;
- The time clock setting;
- Time setting minutes;
- Date, setting the day;
- Date, setting month;
- The date of installation;
- The logic of ignition;
- Choice of language;
- Choice of units.

Correction time

Some radio station RDS reported wrong time. If in connection with these watches often display the wrong time, you should disable the automatic synchronization of time and set the clock manually.

Automatic installation is displayed on the display icon .
To correct the system with RDS choose to «Settings» point of time synchronization.
Set the desired values.

Fig. **1.83.** **Menu item «Clock Sync. On »**

Set time and date

In the menu «Settings» select the items to set the time and date.
Set the desired values.
Set after the menu is written in the memory.

Language

Language of text messages, some functions can be changed.
This menu «Settings» Locate the language and set a suitable value.

Fig. **1.84.** **Display language selection**

Selecting units

Units can be chosen.
This menu «Settings» locate the item selection system of units and set a suitable value.

Fig. **1.85.** **Display selection unit of measurement**

These on-board computer on the parameters of motion

On-board computer gives data on the parameters of motion, which is continuously collected and processed them in electronic form.

To display the on-board computer operating data press the Sun on an infotainment system or the left switch on the steering wheel.

After selecting the audio function of the bottom line of the selected function onboard computer continues to display.

Functions are displayed in the following order (some abbreviated):

- Instantaneous fuel consumption;
- Average fuel consumption;
- The absolute fuel consumption;
- Average velocity;
- Mileage;
- Cruising;
- Timer.

Cruising

Cruising range is calculated based on the current balance of fuel in the tank and instantaneous fuel consumption. The display shows the average value. Shortly after refueling the car indication of the range is automatically updated.

If the contents of the tank missing less than 50 km, displayed «Range».

Fig. **1.86.** **Indication of the range**

Instantaneous fuel

Display varies depending on the speed:

- Indication of l / h - below 13 km / h;
- Indication in l/100 km - above 13 km / h.

Fig. **1.87.** **Display of instantaneous fuel consumption**

Average fuel

Shows the average fuel economy display. Calculation at any time to start anew.

Absolute fuel

Displays indication of spent fuel. Measurement at any time to start anew.

Average speed

Displays the average speed indication. Calculation at any time to start anew.

It stops along the way, when ignition is turned off is not taken into account.

Mileage

Displays indication of the traversed path in kilometers. Measurement at any time to start anew.

Timer

Manage timer by using the four-switch.
By pressing the right button is included - start / stop.
By pressing the left key longer than 2 from discharging.

Fig. **1.88.** **Indication timer**

Resetting data on-board computer (reinstall)

The following data on-board computer can be cleared (re-launch measurements or calculations):
- Average fuel consumption;
- The absolute fuel consumption;
- Average velocity;
- Run.

Please select the required data on-board computer.
Zeroing is performed by pressing the left switch on the steering wheel or the right / left button of the cross-switch:
- Pressing than 2 to lead to zero current value;
- Keystroke longer than 4 to lead to zero for all values.

Interruption of power

After the interruption of power or when there is insufficient battery voltage values recorded in the memory of the onboard computer, erased.

The choice of functions or color graphic information displays

With the help of a graphic or a color information display functions are executed and implemented by setting a certain onboard equipment.
These features are highlighted on the display and run through the four-switch, multi-function knobs for information and entertainment system or the left control wheel on the handlebar.

Selection using the four-switch

Select items using the menu buttons or the four-switch on the infotainment system.
When a warning message display control system does not show any other information. Warning messages should be confirmed by pressing the right or the left button of the cross-switch. If you receive several warning messages to confirm receipt of their rotation.

Fig. **1.89.** **The four-switch**

Management with multifunctional pen

Turn handles carries the designation function menu or command to choose the appropriate function.
Pressing the knob selects the highlighted item and confirmation of the team.
To exit the menu, you should turn the multifunction button to the left or right on the item «Return» or «Main», and select it.
When a warning message display control system does not show any other information. Warning messages should confirm with multifunction buttons. If you receive several warning messages to confirm receipt of their rotation.

Manage with the left control wheel on the steering wheel

Wheel up making the transition to the previous menu item.
Rotating wheel down makes a transition to the next menu item.
Pressing the wheel selects a highlighted item and confirmation of the team.
During the display of warning message display control system does not show any other information. Warning messages should be confirmed by pressing the left switch. If you receive several warning messages to confirm receipt of their rotation.

Fig. **1.90.** **Multifunction pen**

For each area there is a function of home («Main»), you can select it in the top of the display (except for the infotainment system CD 30) (Fig. 1.90).

Fig. **1.91.** **The control wheel on the steering wheel**

System Configuration

Setting is carried out in the menu «Settings».
Press the Home key «Main» (not available in all systems) for information and entertainment system (the main menu).
Press the «Settings» to the infotainment system.

NOTE
If infotainment CD 30 can not select the menu.

You'll see a menu «Settings».

Fig. **1.92.** **Home menu**

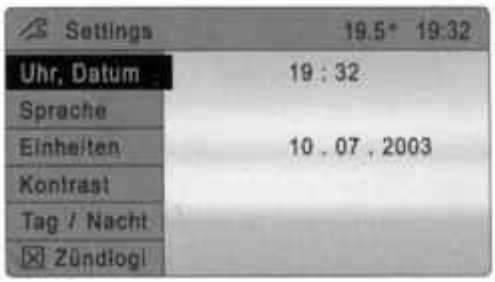


Fig. **1.93.** **Menu «Settings»**

Set time and date

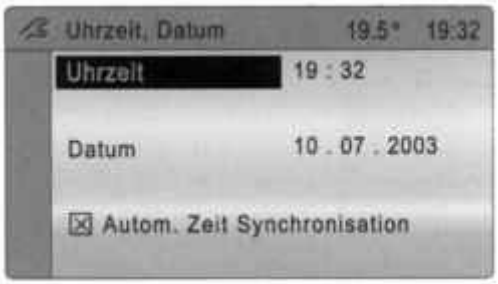
In the menu «Settings» choose the option «Time, Date».
A menu «Time, Date». Select the desired menu items and set the correct values.

Correction time

On systems with a GPS receiver with the GPS satellite signal reception time and date are set automatically. If the displayed time does not correspond to local, perform a manual installation or automatic adjustment by signal reception time of RDS.

Some radio station RDS reported wrong time. If in connection with this clock shows the wrong time, turn off the automatic synchronization of time and set the clock manually.

To correct the time with the help of RDS choose to «Time, Date» menu «Synchron. clock automatical ».



Ris.1.94. Menu «Time, Date»

Field in front of «Synchron. clock automatical »denotes a cross (see Figure 1.94).

Language selection

Language of text messages, some functions may be chosen.
This menu «Settings» choose the option «Language», and then displays a list of available languages.

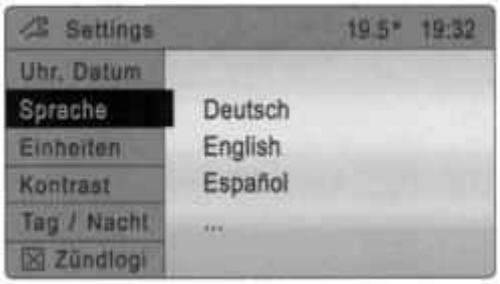


Fig. **1.95.** **Language selection**

Select the desired language

The selected notes symbol ▶ before the menu item.
On systems with voice informant after changing the display language are asked whether you want to change the language and voice informer.

Fig. **1.96.** **Language**

Selecting units

To select the units in the menu «Settings» choose the option «Units».
In this case the system displays a list of available units.
Select the desired system of units.

The selected notes symbol ● before the menu item.

Fig. **1.97.** **Menu selection unit**

Adjust the contrast (graphic information display)

To select this setting in the menu «Settings» choose the option «Contrast».
In this case, the menu is displayed «Contrast». Adjust the contrast and confirm your choice.

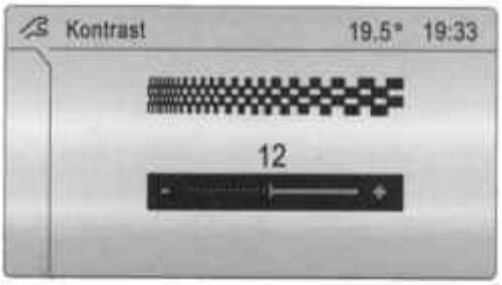


Fig. **1.98.** **Menu, select Contrast**

Setting the display mode

The image on the display can be customized depending on the illumination, ie choose monochrome or, respectively, colored text on a light background, either white or colored text on a dark background.
This menu «Settings» choose the option «Day / Night», then you will see the possible values.
«Automatic»: automatic adjustment depending on the lighting conditions in the car.
«Always day design»: black or colored text on a light background.
«Always night design»: a white or colored text on a dark background.

The selected notes symbol ● before the menu item.

Choice of data on stock status and instantaneous fuel consumption graphic information display

Onboard computers provide performance data that is continuously collected and analyzed electronically.

Home on-board computer («Main») informs you of the range and instantaneous fuel consumption.

To display other operational data on-board computer, press the **Sun** on an infotainment system, select the display menu on-board computer, or press the left switch on the steering wheel.

Fig. **1.99.** **Menu of the range**

Cruising

Cruising range is calculated based on the current balance of fuel in the tank and instantaneous fuel consumption. The display shows the average value. Shortly after refueling the car indication of the range is automatically updated.

If the contents of the tank missing less than 50 km, displayed «Range».

Confirm the warning message.

Instantaneous fuel

Display varies depending on the speed:

- Indication of l / h - below 13 km / h;
- Indication in l/100 km - above 13 km / h.

Fig. **1.100.** **Display of instantaneous fuel consumption**

Mileage

Indicator of the traversed path is given in kilometers. Measurement at any time to start anew.

Average speed

We give a calculation of average speed. Measurement at any time to start anew.

It stopover when ignition is turned off is not taken into account.

Absolute fuel

We give a indication of the amount of fuel consumed. Measurement at any time to start anew.

Average fuel

We give a calculation of the average fuel consumption. Measurement at any time to start anew.

Resetting data on-board computer (reinstall)

The following testimony onboard computer can be reset (re-run measurement):

- Mileage;
- Average velocity;
- The absolute fuel consumption;

- The average fuel consumption.
Select the menu item on-board computer or **Sun 1 Sun 2.**
Testimony of two on-board computers can be disposed of separately, so the opportunity to assess data for varying lengths of time.
Please select the relevant data on-board computer.
The value of the selected function is reset and is re-calculated.
To reset all data on-board computer, select the menu item "AN values».
After the reset the display instead of selected readings on-board computer displays the string - - - . After some time, will re-defined values.

Fig. **1.101.** **Menu sborsa data**

Interruption of power

After the interruption of power or when there is insufficient battery voltage values recorded in the memory of the onboard computer, erased.

Timer

To select this option in the menu «Board Computer» choose the option «Timer», then displays the appropriate menu.
To start the timer, select the menu item «Start».
To reset the timer, select the menu item «Reset».

Fig. **1.102.** **Set the timer menu**

Menu «Options»

Menu «Options» is used to set parameters for the timer and has a submenu, listed below.
«Driving Time excl. Stops ».
In this case, measured by the time that the vehicle is in motion. Time stops are not counted.
«Driving Time incl. Stops ».
In this case, measured by the time that the vehicle is in motion. In addition, take into account stops with the key in the ignition.
«Travel Time».
In this case, the measured time between the start and stop the timer manually using the menu items, respectively - «Start» and the «Reset».

Indication of the current tire pressure

To select this option in the menu «Board Computer» choose the option «Tyres», then will show the current value of pressure in each tire.

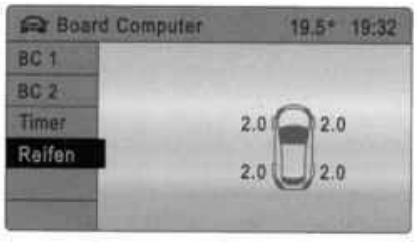


Fig. **1.103.** **Menu display current tire pressure**

Control system

This system monitors the fluid levels, tire pressure, battery remote control device, the device anti-theft alarm, as well as the serviceability of the most important lamp outdoor lighting, including wiring and fuses. When operating the vehicle with a trailer is controlled by the lighting of the trailer. Warning messages are displayed. If there are several warning messages are displayed alternately.

Some warning messages are displayed in abbreviated form. Warning messages appear, for example, graphical information display and a color information display. On-board information display some messages displayed in abbreviated form. Confirm the warning message. Unconfirmed warning messages may be after some time reappear on the display.

Fig. **1.104.** **Example display menu control system**

Warning messages

«Remote Control Battery check».
Informs that the battery voltage remote control device is too low.
«Brakelight switch check».
Informs that during braking the brake lights do not burn.
«Safeguard check».
Informs a fault an alarm.
In case of failure of the lighting system corresponding source text indicates a failure, for example:
«Brakelight check right».
The vehicles with the system, tire pressure monitoring at too low a tire pressure message will appear indicating the tire that you want to check, for example: «Tyre pressure check rear rightturn» (value in bar).
At the first opportunity, check tire pressures with calibrated pressure gauge.
The vehicles with the system of monitoring tire pressure with a significant pressure drop, a message will appear indicating the tire, for example: «Attention! Rear left tyre pressure loss »(value in bar).
Immediately stop and check the tires.
«Washer Fluid Level check».
The level of drilling fluid cleaning device of glasses is too low.

NOTE
At too low a level of liquid washing device rear window and headlights switched off.

«Coolant level check».
Too little fluid in the engine cooling system.

NOTE
In case of interruption of power supply stored in the memory warning messages are displayed alternately, after the power is restored.

Wipers and washers

Care wipers

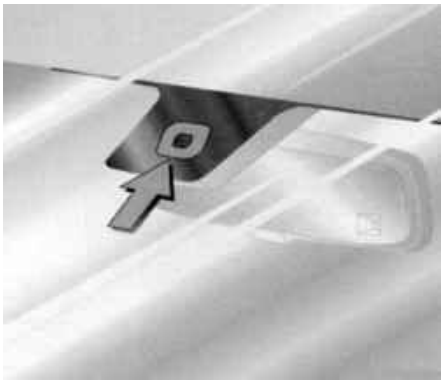


Fig. **1.105.** **Window rain sensor**

In order to ensure trouble-free operation of rain sensor, window sensor must be clean from dust, dirt and ice, so periodically switch the device washing windows or remove ice from the window of the sensor. Vehicles with rain sensor has a window above the sensor on the windshield (see Figure 1.105).

Job wipers

Fig. **1.106.** **Mode include wipers**

To activate the wipers move the lever up slightly (Fig. 1.106).
The lever always returns to its original position. to switch the lever to the next higher or lower stage, slightly move it up or down.
To enable a single lever, slide down from the position O .

Adjustable range of wiper

To adjust the cleanup interval in the range from 2 to 15 with a turn on the ignition, move the lever from the position O down, wait for a while and move the lever in the position of the periodic inclusion.
The installed length of the interval treatment remain stored in memory until the next change or until the ignition is turned off. After turning on the ignition and set the lever in position O interval inclusion is set at 4 seconds.

Fig. **1.107.** **Adjustable range of wiper**

Automatic control device wipers with rain sensor

To activate this mode, slide the lever up slightly, then enable automatic management of cleaning with rain sensor. In this mode, rain sensor determines the amount of water on the glass and automatically adjusts the speed of the wipers.
To turn off the regime pull the lever down.

Fig. **1.108.** **Mode for automatic control wipers with rain sensor**

Switch the device washing windows and headlights

To activate this mode, pull the lever for him. Wipers included several cycles of treatment. At low speed One-time cleaning.
Cleaning device works when the headlights illuminated. The washing liquid is sprayed on the lights, after which the device is flush headlights off at 2 min.

NOTE
On cars with rain sensor to monitor the cleanliness of the window sensor.

Fig. **1.109.** **Mode devices include washing windows and headlights**

Inclusion wiper and rear window

Fig. **1.110.** **Inclusion of the rear window wiper**

To activate the wipers push the lever forward (Fig. 1.110).
Rear window wiper works in periodic mode.
Rear window wiper is automatically enabled when working wipers and going backwards.
To activate the windshield of the slide lever forward and hold.

Care for the front wipers

Fig. **1.111. Installing the windshield in the upright position**

Before you replace or clean the brushes front windshield, within 4 seconds after the ignition is turned off, without removing the key, slide down the windshield wiper lever. Release the lever when the windshield wipers will take a vertical position (Fig. 1.111).

To remove the brushes lift the wiper arm, rotate the brush at 90 ° with respect to the lever and remove it.

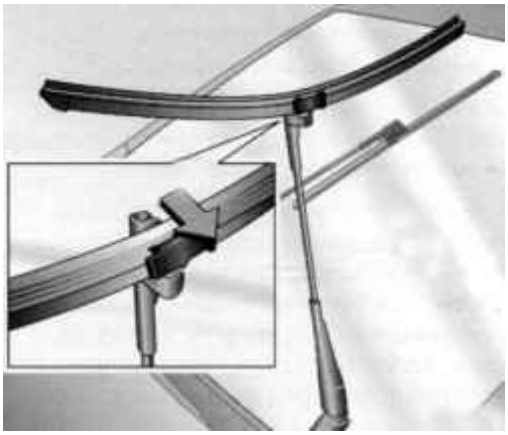


Fig. **1.112. Removing brush the front wiper**

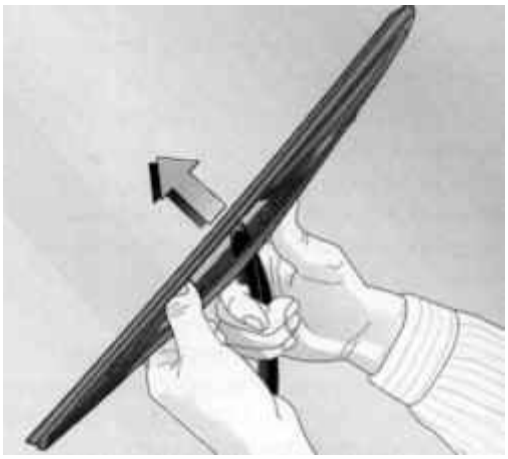


Fig. **1.113. Removing the rear wiper brushes**

To remove the brush, lift the rear wiper arm wiper. Disconnect and remove the brush, as shown in Figure 1.113.

Cover fuel filler

When replacing only install brand cap, which was released by Opel for the model of the car. Motor vehicles with diesel engines installed a special cover of the fuel tank.

Filling the car with fuel

Before dressing sure to turn off the engine and, if necessary, additional heaters with combustion chambers (indicated on the sticker on the cover fuel filler).

NOTICE
In dealing with fuel is not permitted near open flame or spark formation. Do not smoke. This also applies to the places where fuel availability is noticeable only by its characteristic odor. If you smell fuel in the cabin should immediately remove the cause of its appearance.

Filling hole is situated to the right side of the car behind.
Filling hatch simultaneously with the doors unlocked.
Open the filling hatch by turning the filler cap of the fuel tank, remove it and hang it on the filling hatch.

NOTE
The fuel tank has a fill limiter which prevents overfilling of the tank.

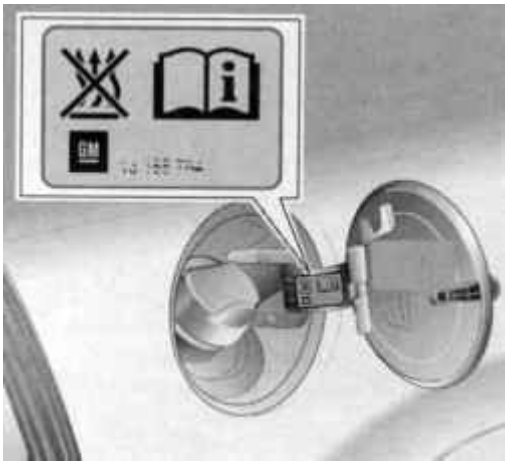


Fig. **1.114.** **Hatch lid and fuel filler**

To implement the correct filling must be able to handle the nozzle.
Insert the nozzle to stop and turn it on.
After the automatic shutdown is performed to re-dosed refueling prior to the nominal capacity of the fuel tank. Nozzle, however, remains stuck until it stops.
To close the fuel filler lid, set it in place and rotate, overcoming resistance to tangible clicking striker.
Close the filling hatch.

Parking Brake

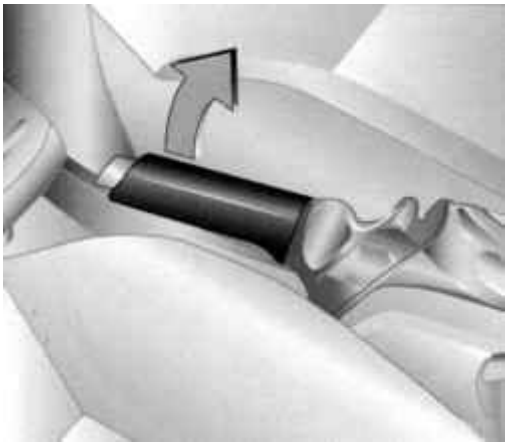


Fig. **1.115.** **Delayed styanochnogo brakes**

On a slope or on the rise always tighten the parking brake is the most dense (Fig. 1.115).
Mechanical parking brake acts on the brakes the rear wheels. When tightening, he recorded independently.

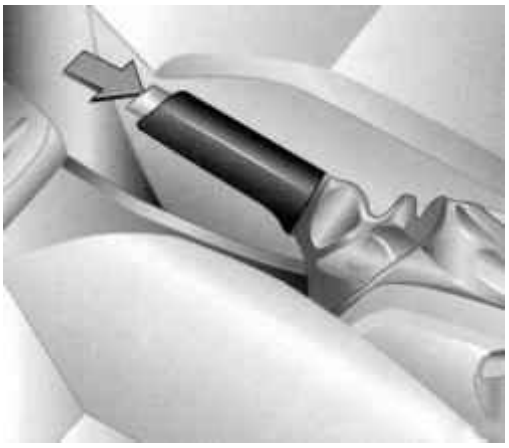


Fig. **1.116. Lowering styanochnogo brakes**

To release the parking brake a little, lift the lever, press the button latch and fully lower the lever (Fig. 1.116).

1.3. Air conditioner and heater

Heating and ventilation with air conditioning

Ventilation, heating and cooling constitute a single functional unit, which is designed to create comfortable conditions in any weather and at any outdoor temperature.

When the cooling air is cooled and dried. A heating device in all modes warms the air as needed depending on the position of the temperature switch. Air supply can be adjusted by means of airflow.

Keys cooling and air circulation system available only on cars equipped with optional air conditioning.

Fig. **1.117. Control panel for a heating and ventilation with air conditioning**

Electronic climate control system

This system provides maximum comfort for all weather, all outdoor temperature and at any time of year.

To ensure a constant and comfortable climate in the car, we automatically adjust the temperature of incoming air, as well as flow and its distribution depending on the outdoor weather conditions.

Indication of the system is an information display.

Fig. **1.118. Panel electronic climate control**

The system of heating and ventilation

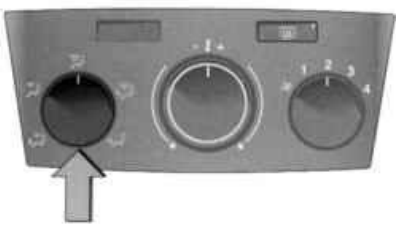


Fig. **1.119. Control air flow distribution**

The left rotary switch is responsible for the distribution of flows of air supplied to the cabin.

Mode blowing upper and lower interior space through the adjustable nozzle blowing.
The regime of airflow through the interior space of the upper adjustable nozzle blowing.
Regime of airflow through the windshield adjustable nozzle blowing.
Regime of the wind blowing and the side windows and lower cabin of the space through the adjustable nozzle blowing.
The regime of airflow through the interior space of the lower adjustable nozzle blowing.
Average rotary responsible for regulating the temperature of air supplied to the salon

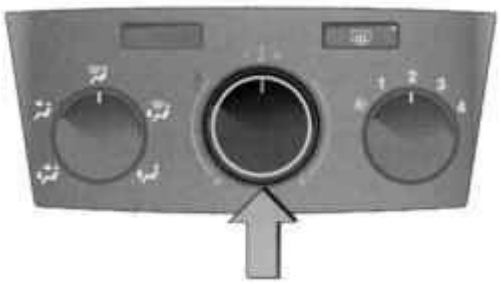


Fig. **1.120. Temperature air supplied**

Turning the knob to the right is served warm air to the left - cold.

Fig. **1.121. Control air flow**

Right rotary control is responsible for the air flow.

The regulator has four speed blower. Regulation air supply is terminated.

NOTE
Air flow is determined by the blow, so you must include blowing and during movement.

Fig. **1.122. Power key heating rear window and outside mirrors**

Heated rear window, heated outside mirrors

Heating is carried out with the engine running and automatically turns off after about 15 minutes. Alarm control is included in the switch.

NOTE
On vehicles with a diesel engine during cleaning soot filter, rear window automatically turns off.

Cooling conditioner
This mode is valid only when the engine is running and enabled blowing.
Alarm control is included in the switch.
When the cooling (air conditioning compressors), air is cooled and dried. If this is not necessary, turn off the cooling for the fuel economy.

Fig. **1.123. Key activate cool air conditioner**

At low ambient temperatures cooling off automatically.

Air circulation system
With key switch circulating ventilation system switches to a mode of air circulation (detector included).
With the penetration of smoke or smell from the outside for a short time, turn on the system of air circulation.

Fig. **1.124. Key off circulation**

Turn on the system of air circulation reduces breathability. Humidity increases, with the possible fogging glasses. Air quality inside the cabin eventually deteriorates.

If the air valve switching to blowing the windscreen, air circulation system will automatically shut down for the accelerated removal of moisture from the glass.

Medial and lateral nozzle blowing
By changing the position of temperature is achieved comfortable ventilation of the upper cabin space.
To open the nozzle, turn the knob down the vertical ring. Turning the horizontal rings of the regulator changes the direction of airflow.

Fig. **1.125. Average nozzle blowing**

To close the nozzle, turn the vertical ring controller to lock up. An icon appears 0. Deflector plates remain open, but the air supply is terminated.

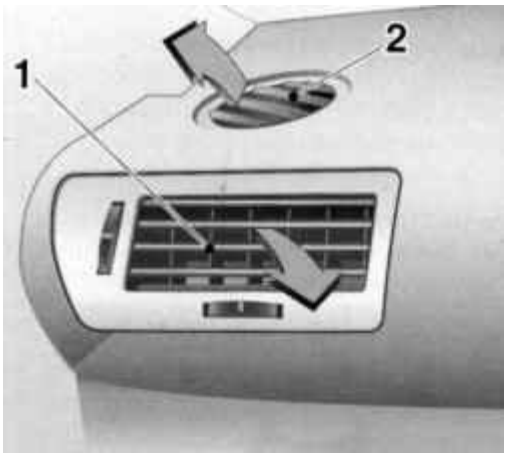


Fig. 1.126. **Side nozzle blowing**

Additional nozzles are located under the windshield and side windows, as well as the front in the lower area near the floor.

Heated front seats

Fig. 1.127. **Keys include heating front seats**

Depending on the desired degree of heating press for the inclusion of the seat once or several times. Indication of the inclusion of one of the three steps is carried out an alarm indicating a key.

NOTE
People with sensitive skin do not recommend prolonged use of heating at the highest level.

In order to turn off the heating, press. If the alarm goes off in the key, then heating is turned off.

NOTE
Seat heating is carried out only with the engine running.

Automatic mode electronic climate control

This mode performs automatic compensation of temperature changes due to external influences such as sunlight.

The indication is realized on the information display. Changes in individual parameters briefly displayed on the information display. Thus the currently displayed menu overlaps indication parameter.

Depending on the model of the display image may be different.

When locking the car using the remote control device settings climate control system are stored in memory for the corresponding remote control device.

It is possible to set the phone manually via the menu on the display.

When the cooling (air conditioning compressor) is cooling and drying.

Micro-filter cleans the air entering the outside air from dust and soot, as well as pollen and spores.

Automatic air circulation system

Automatic air circulation system with air quality sensor registers the presence of harmful gases surrounding and automatically switches to a mode of circulation.

In automatic mode, climate control maintains optimal parameters in almost any conditions. If necessary, climate-control settings can be configured manually.

Features climate control fully available only when the engine is running.

At low ambient temperatures cooling (air conditioning compressor) switches off automatically.

Automatic mode

Fig. **1.128.** **Enable automatic mode**

To enable automatic climate-control mode, press «AUTO», open all the blowing nozzle, turn the air conditioner compressor, and then left the set temperature control at 22 ° C (Fig. 1.128).

If necessary, you can set the temperature above or below.

If you turn off air conditioning compressor (the display shows the ECO) may reduce the level of comfort and security.

All nozzles blowing in the automatic mode, adjust automatically, so they must be kept open.

Automatic mode of air circulation

The ventilation system switches to circulation vozduhapri which the air in the cabin is mixed.

Automatic air circulation system with air quality sensor registers the presence of harmful gases surrounding and automatically switches to a mode of circulation.

At low outdoor temperature and off cooling (air conditioning compressors) the possibility of the automatic mode, the air circulation is limited. Thus avoid fogging of glasses. If necessary, activate the circulation of air manually.

Temperature

The temperature value is set left-regulator within 16-28 ° C.

To ensure comfortable conditions for the temperature should be changed gradually.

The vehicles with the system of rapid heating salon «Quickheat» is an additional electric heater.

When you install the temperature below 16 ° C, the display shows Lo. In this case, climate control is working continuously with maximum cooling without temperature control.

When setting the temperature above 28 ° C, the display shows Hi. In this case, climate control is working continuously with maximum power heating with no temperature control.

Installations temperature after ignition is turned off are recorded in the memory.

Manual Installation

In special circumstances (such as icing or sweating glasses) climate-control settings can be configured manually.

Climate-control settings can be changed through secondary rotary knob, buttons and menus displayed on the display.

To access the menu, press the middle knob. The display shows the menu for manual settings climate control.

Fig. **1.129.** **Menu display during the installation "manual" control mode**

Some menu items are indicated by turning the middle knob and select it by pressing. When you choose some other menu items appear, if the menu was selected by pressing.

To close the menu, turn the middle knob to the left or right to position «Return» or «Main» and confirm the selection.

Fig. **1.130.** **Power-Off "manual" control mode**

Performed manually install after the ignition is turned off are recorded in the memory.

Removal of moisture and frost from the glass

Fig. **1.131.** **Shutting down the regime remove moisture and frost from the glass**

Press activate the removal of moisture and frost from the glass. The display shows the appropriate symbol and the key will light signaling (Fig. 1.131).

NOTICE
Doing so rules can lead to sweat glasses and accidents as a result of reduced visibility.

Temperature and air distribution are installed automatically, airflow is over-capacity, and the glass quickly freed from frost and moisture.
Air flow rate can increase or decrease the rotation of the right of the regulator.
To return to automatic mode again, press mode or press «AUTO».

Switching the air conditioning compressors

Fig. **1.132.** **Mode on and off air conditioning compressors**

If the cooling or dehumidification is not necessary, turn off air conditioning compressor (the greatest fuel economy). To do this, click Manual Setup settings, scroll to the AU and press select it. The display ECO.

This cooling and removing moisture from the incoming air is not produced, thus limited comfort provided by electronic climate control system. This could lead, for example, sweat glasses.
To enable cooling mode, the manual settings menu, select the item and pressing a switch on AC cooling.

Mode of air distribution

Fig. **1.133.** **Vlyuchenie mode of air distribution**

Turn middle knob, the display will cycle to show the settings of air distribution. The distribution of air can also be controlled using the menu «Air distribut».

Top: the distribution of air to the windshield and front side window
In the middle: the distribution of air to the passengers through the adjustable nozzle blowing in the front.
Down: distribution of air into the lower space of the passenger compartment.
To return to the automatic shut-down the air distribution settings, or press «AUTO».

Airflow

Fig. **1.134. Selecting the air flow**

Turn the right knob left or right. Chosen level of airflow is shown on the display after the number of the icon (see Figure 1.134).
At stage 0 ventilation and cooling (air conditioning compressor) are switched off.
To return to automatic mode, press «AUTO».

Adjusting characteristics of airflow in the automatic mode
Parameters adjustment of airflow in the automatic mode can be changed manually.

Fig. **1.135. Setting the tuning characteristics**

In the manual settings menu choose the option «Autom blower» and then adjusting the desired characteristic (Fig. 1.135).
In accordance with the established value increases the maximum air flow - and with it the noise level.

Enabling and disabling the automatic mode, the air circulation
Automatic air circulation system with air quality sensor registers the presence of harmful gases surrounding and automatically switches to a mode of circulation.

Fig. **1.136. Selecting the automatic air circulation**

In the manual settings menu choose the option «Auto, recirc» and pressing the knob turn on or off mode (Fig. 1.136).
If necessary, turn the manual mode of air circulation.

Manual air circulation
Air circulation system prevents the infiltration of outside air in the cabin, while the internal air is pumped salon. Press, then on it will light detector. When the air circulation of air exchange is limited. Air quality inside the cabin eventually deteriorates. In the operating mode without cooling air humidity increases, so may fogging glasses. Manual air circulation includes only a short time. To turn off the manual mode of air circulation to re-press, a key indicator turns off.

Air conditioning with engine off
When parked the car and the ignition is turned off, you can use more available in the heat or, respectively, cold air conditioning in the cabin, for example at a stop in front of the railway crossing.

Fig. **1.137.** **Air conditioning mode when engine off**

To do this, press «AUTO» when ignition is turned off, the phone briefly displays the inscription «Residual air conditioning on».

NOTE
Length air conditioning in the engine off is limited.

To turn off the mode again press «AUTO».

Cooling of the front glove compartment
The cooled air flows through the nozzle in the front kit box.

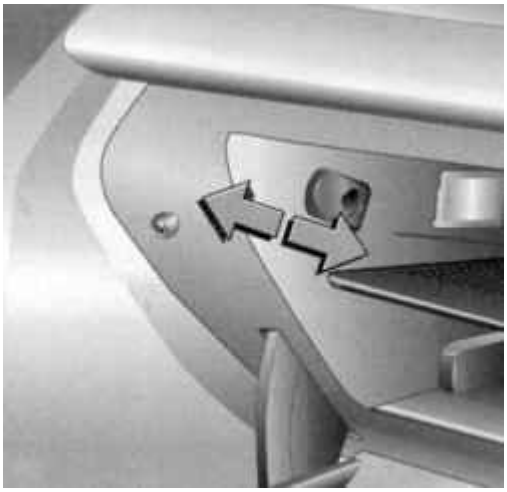


Fig. **1.138.** **Enabling and disabling airflow to the front glove compartment**

If the need for cooling the front glove compartment is not, move the nozzle forward (Fig. 1.138).

Intake

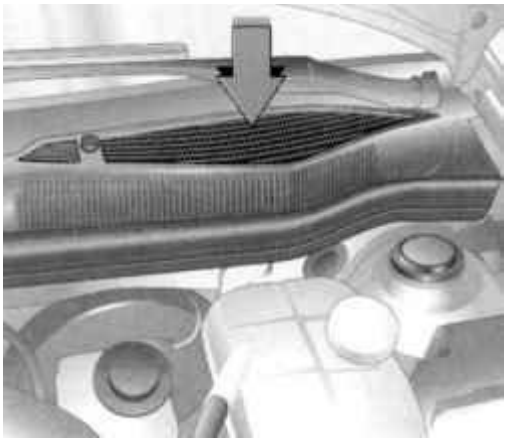


Fig. **1.139.** **Intake**

Air intakes are located in the engine compartment from the outside in front of the windshield (see Figure 1.139).
They should be free for the flow of air, if necessary, remove the leaves from the air intake grilles, mud or snow.

Deflates
When placing items in the trunk does not block any openings for air outlet located on the right and left on the back wall.

Air microfilter
Micro-filter cleans the air entering the outside air from dust and soot, as well as pollen and spores. A layer of activated carbon to remove the air from extraneous odors and harmful gases. Air microfilter should be replaced at intervals specified in the service book.

Instructions for maintenance of air conditioning and heating
If wet weather mist over the windshield, you should briefly turn the system airflow to the windshield.
The most efficient air conditioner works when the windows and sliding sunroof are closed. A strong heating of the passenger compartment after prolonged exposure to sunlight for a short time, open the windows and sliding sunroof to ensure the rapid removal of heated air.

NOTICE
When the air-conditioning (cooling compressor) is formed condensation water flowing at the bottom of the car.
When the air conditioning unit (cooling compressor) should be open at least one outlet air to the evaporator is not covered with frost due to insufficient air flow.

Maintenance System
To ensure stable operation, the compressor air conditioner should be regardless of the weather and time of year once a month to include a few minutes. If in-vehicle climate control is done automatically during the ride.

NOTICE
Mode conditioning system with the included air-conditioning compressor is not possible at low ambient temperatures.
In the event of a breakdown of the appeal for help in plant maintenance.

1.4. Salon Equipment

Lamps indoor lighting

Navigational light

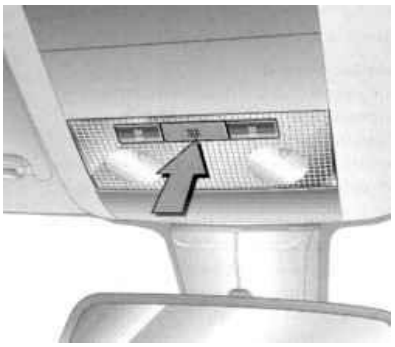


Fig. **1.140.** **Power key navigator lantern**

To activate the navigator's lamp click on the appropriate key. To turn off the light, press the same key povotorno (Fig. 1.140)

NOTE
After closing the car door off interior lighting occurs with some delay.

Adjusting lighting middle console automatically, depending on lighting conditions, with the ignition.

Auxiliary front reading lights
Reading lights right and left are included separately in the ignition.

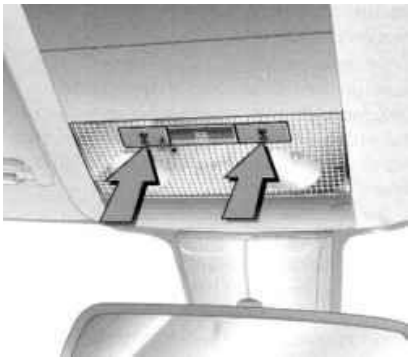


Fig. **1.141.** **Keys include auxiliary lamps**

To activate the auxiliary lamps click on the appropriate button. To turn off the light, press the same keys povotorno (Fig. 1.141)

Interior lighting and reading lamps rear
Lamps for reading includes a separate rear left and right with the ignition.

NOTE
The rear cabin lights burning in open court, together with the front when you install the switch in the middle position.

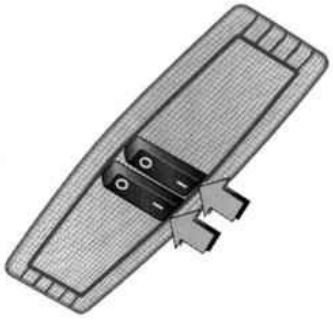


Fig. **1.142.** **Keys include the rear lights**

To activate the rear lights click on the appropriate button. To turn off the light, press the same keys povotorno (Fig. 1.142)

Coverage of the front glove compartment
Lamp illumination lights up when you open the lid.

Illuminated mirrors in the sun visor
Backlight turns on when lowering the mirror.

Lighting entrance
After unlocking the door for a few seconds lights dashboard lights and switches.

Highlighting the space behind the car
After unlocking the car for a few seconds of lights illuminating the plate.

Lights doorknobs
Internal handle for opening the front doors are illuminated when the exterior lighting.

Lighting a cigarette lighter and ashtray
Lamps lights burning when the ignition key.

Lighting luggage
Lamp lights up when you open the trunk.

Protection from discharge of the battery
Interior lighting, reading lamps, lighting, trunk and glove compartment in the front ignition is turned off automatically turns off after 20 minutes to protect the battery from discharging.

Caps fixtures
Under adverse conditions, in cold and damp weather, with heavy rain or after washing the car can be briefly sweat inner surfaces of fixtures. Fogging disappears quickly by itself, to accelerate the process can include lighting.

Interior rearview mirror

Fig. **1.143.** **Interior rearview mirror**

Tilt internal mirror by turning his body. Turn the lever on the underside of the shell mirror reduces glare at night (Fig. 1.143).

Automatic anti-dazzle interior mirror

Fig. **1.144.** **Automatic anti-dazzle interior mirror**

Automatically reduce the effect of glare at night to avoid discomfort while driving in the dark (Fig. 1.144).

NOTE
When ignition is turned off the mirror is not obscured.

Outside mirrors

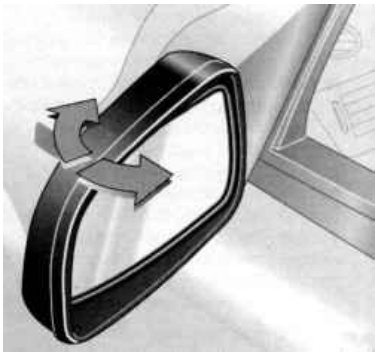


Fig. **1.145.** **The emerging outside mirror**

For the safety of pedestrians in a collision outside mirrors are made up of its state. Lock them in position can easily push (Fig. 1.145).

Aspheric convex outside mirror

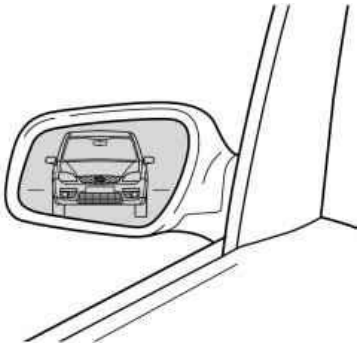


Fig. **1.146.** **Aspheric convex outside mirror**

The rear field of vision is increased to reduce to a minimum so-called "dead zones" in the rear corners of the vehicle (Fig. 1.146).

NOTE
Due to the small distortion can only be approximate estimate of the distance to the car following behind.

Adjusting exterior mirrors

Fig. **1.147.** **Mechanical adjustment of external mirrors**

The vehicles, mechanical installation is carried out lever by which the mirror can be rotated in the appropriate direction (Fig. 1.147).

Fig. **1.148.** **The switch of the automatic rear-view mirror**

Power adjustable exterior mirrors the situation by using the four-switch on the driver's door (Fig. 1.148).
To adjust the click of a button left or right mirror. In this case the four-switch controls the corresponding mirror.

To fold exterior mirrors
If you want to add the mirror manually, simply hold him to the body of the car body.
When adjusting the electrically press the corresponding key on the switch, both outside mirrors will arise.

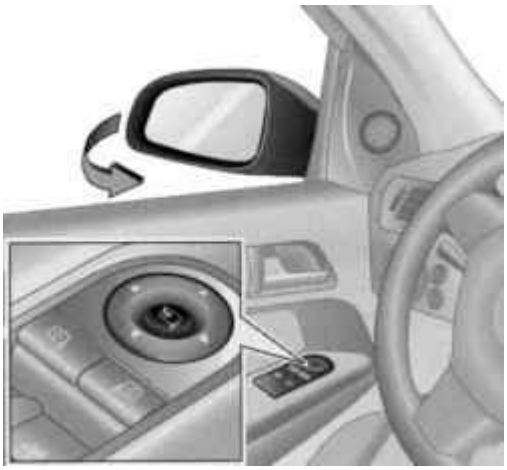


Fig. **1.149.** **To fold the automatic rear-view mirror**

Again press the same key and both exterior mirrors return to their original position (Fig. 1.149).

Steering wheel

Unlock the steering wheel

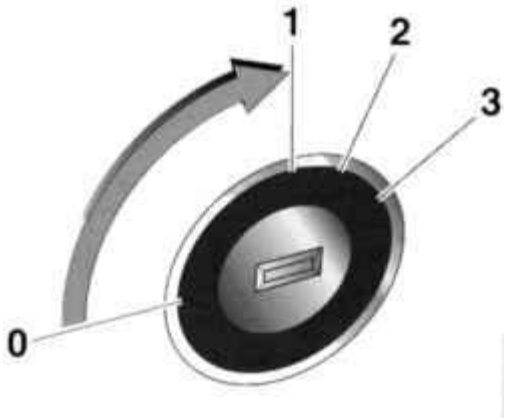


Fig. **1.150.** **Unlock the steering wheel**

To unload the stopper lightly turn the steering wheel, with a turn-key in the first fixed position of the ignition switch, as shown in Figure 1.150.

Tilt steering wheel

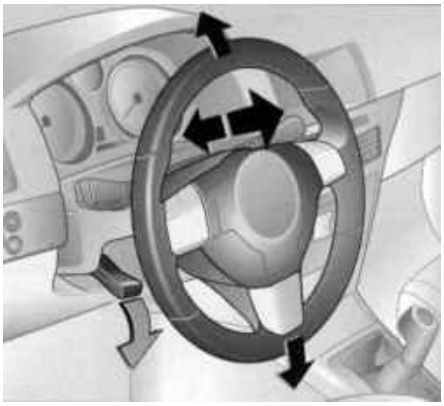


Fig. **1.151.** **Tilt steering wheel**

Turn the lever down and adjust the height and distance from the steering wheel, turn the lever up and fix it. It will emit a characteristic click (Fig. 1.151).

NOTICE
Regulation of the steering wheel produce only when parked car and when you unlock.

Cigarette lighter plug and power outlet

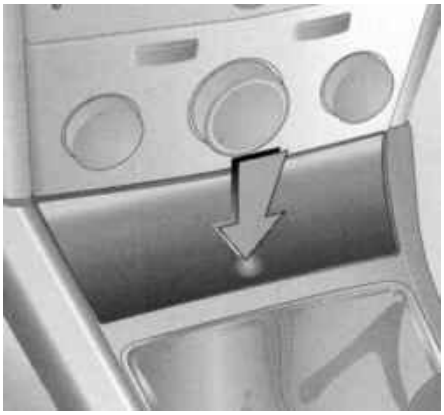


Fig. **1.152.** **Cigarette lighter**

Cigarette lighter is located under the ashtray lid (Fig. 1.152).
The lid is opened by pressing in the marked spot.
To use the cigarette lighter, press it. When spiral burn, cigarette lighter will automatically return to its original position.

Fig. **1.153.** **Location sockets for accessories**

Jack for optional accessories

Socket Cigarette Lighter can be used to activate electrical equipment.

NOTICE
When the engine is off, this leads to the battery.

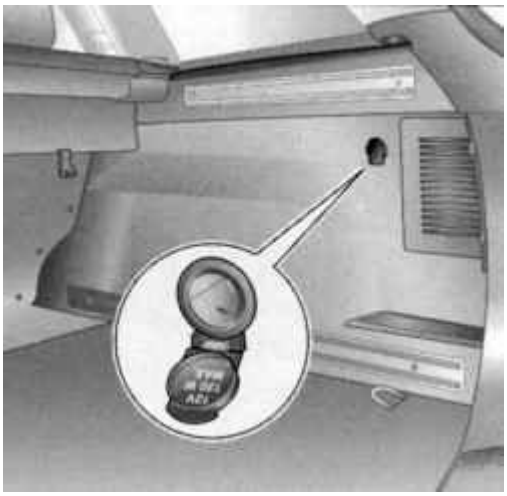


Fig. **1.154. Location of additional plug connectors in the model «Caravan»**

NOTE
In the model «Caravan» extra plug for the equipment located in the trunk (Fig. 1.154).
Do not damage the wall outlet plugs inappropriate.
Maximum power consumption of additional electrical equipment should not exceed 120 Tues
Do not connect appliances, supplies electric current, such as battery chargers or batteries.
Mapped appliances should meet the electromagnetic compatibility performance DIN VDE 40 839. Otherwise, possible malfunction of the car.

Ashtrays

NOTICE
Use the ashtray only for the ashes, but not for flammable waste.

Front ashtray

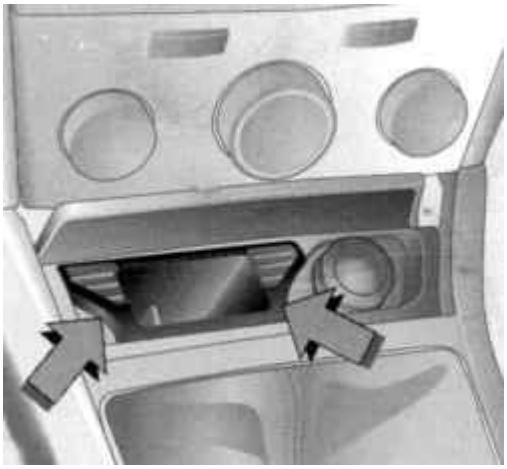


Fig. **1.155. Removing the front ashtray**

Ashtray lid is opened by pressing a marked spot. to empty the liner, you should take it from two sides, as shown in Figure 1.155, and pull up.

Rear Ashtray
Rear ashtray is located in the middle console rear.

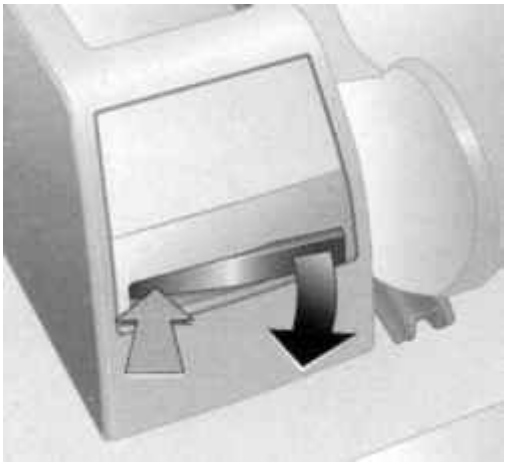


Fig. **1.156.** **Opening rear ashtrays**

To pull the ashtray, click on one of its sides, and turn (Fig. 1.156).

Fig. **1.157.** **Removing the rear ashtrays**

For emptying the ashtray open, click on the spring (arrow) and pull the ashtray back (Fig. 1.157).

Folding tables

Folding tables are located on the back of the front seats. To pull the tilt table top until it clicks. To return to the starting position with little effort to push the table and pull it down.

NOTICE
Do not place heavy objects on folding tables.

Front box kit

Fig. **1.158.** **Front box kit**

Front clothing box located on the dashboard, in front of the front passenger seat (see Figure 1.158).
To open a clothing box, pull the handle latch up. Rack front glove compartment is removed to free her from the latch, you need to pull the front edge.
To insert the shelf into place, insert it into the side rails and secure it, hugging the back wall.
In front of the open cover has a holder for a pencil and compartment for storage of coins (in case of parking).

Glove compartment in front armrest

Fig. **1.159.** **Glove compartment in front armrest**

To open the box, click the button and lift the upper arm (Fig. 1.159).

Compartment for glasses

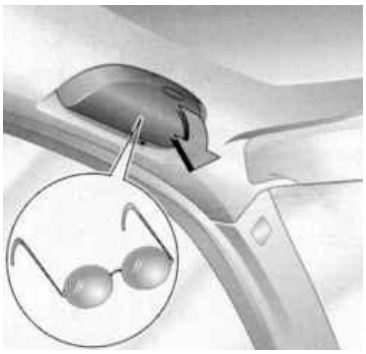


Fig. **1.160.** **Compartment for glasses**

Compartment for points located at the top of the car from the driver (Fig. 1.160). to open it, pull the compartment down.

NOTE
Do not place heavy objects in the compartment.

Sun visors

Sun visors are designed to protect from bright light. Roofs can be omitted and rotated to the side.

NOTE
On cars with a panoramic glass installed, before moving the head lining, sun visors should tilt upward.

Seats

The seats, headrests, seat belts and airbags protect people in the car.
When planting in the car to adjust the head restraint so that the tip of the head restraint is at the top of the head.
Do not install the front seats too close to the control panel. The driver must hold the steering wheel, so that his hands were in the points corresponding to 10 and 2 h on the dial clock, and elbows were slightly bent. The legs should also be slightly bent, the driver had the opportunity to press the pedal until it stops.
Seat belt must pass through the center of the shoulder. Belt should tightly enfold hips, not stomach.
Slide the front passenger seat back as far as possible.

Fig. **1.161.** **Proper landing voditelsom seat**

Seat backs should not be too rejected. Recommend installing seat-back angle of about 25 °.

Moving the seat forward, backward and upward

Fig. **1.162.** **Moving the seat forward, backward and upward**

To adjust the seat pull up the lever located on the outer front edge of the base seat. Letting go of the lever, push the seat to ensure the reliability of fixing the latch.

Adjust the height of the seat with a lever located on the outer side of the seat cushion.

NOTICE
To move the seat while driving. When elongated lever they can suddenly move.

Adjustable seat back angle

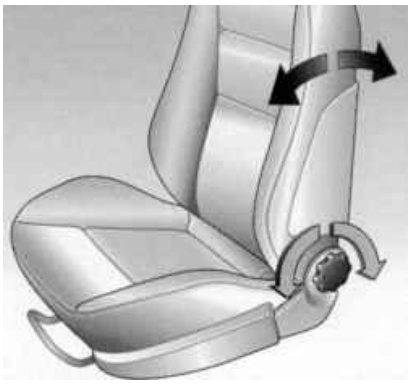


Fig. **1.163.** **Adjustable seat back angle**

Turn the knob located on the outer side of the seat cushion. If the seats are shifted all the way forward, the seat backs can be thrown back in full.

Lumbar support

Fig. **1.164.** **Lumbar support**

To increase the protrusion lumbar support seat forward pull lever on the side of the seat back. To reduce the protrusion pull the lever back.

Height adjustable driver's seat
Adjust the height of the seat with a lever located on the outer side of the seat cushion.

Fig. **1.165.** **Height adjustable driver's seat**

To lift the seat a few times pull the lever up until it reaches the desired height.

For lowering the seat a few times to push the lever until it reaches the desired height.
Each lever seat rises or falls at low altitude.

Tilt the front seats

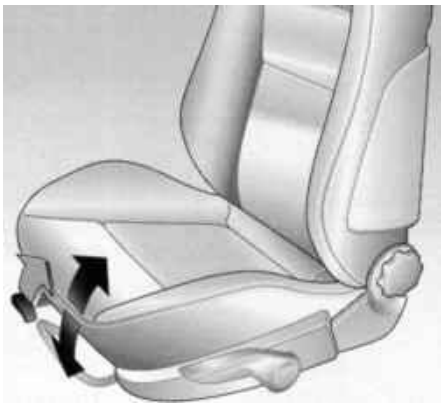


Fig. **1.166.** **Tilt the front seats**

To adjust the internal pull the lever in the front seat, adjust the desired tilt and release the lever. Secure the seat until it clicks. Changes in the tilt of gravity achieved by the movement of the body.

To fold the backrest of the front seats
In order to fold the seat back, pull up release lever, tilt the back forward and secure. Slide the seat forward.

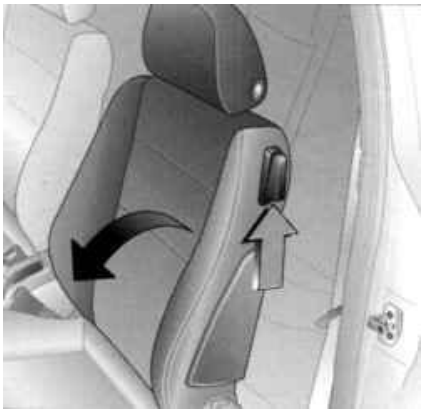


Fig. **1.167.** **To fold the front seat backrests**

To raise the back, move the seat all the way back, pull the release lever up and lift the back.

You move back the front seats with memory function of the electron of the seat is fixed in the previous situation.
Front seat without this feature when you move back to fix in the desired position.

NOTE
On cars with a panoramic glass set before folding down the seat headrests and lower fold up sun visors.

Front seat head restraints
Adjust podgolovnikitakim way to the top of the head restraint is at the top of the head.

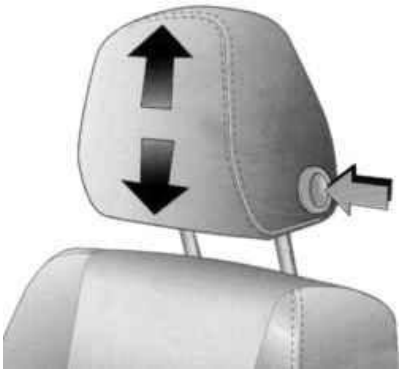


Fig. **1.168.** **Adjustable front seat head restraints**

To adjust the height pull the headrest up or click on the lock and push the head restraint down.

Make sure that the headrest is fixed.

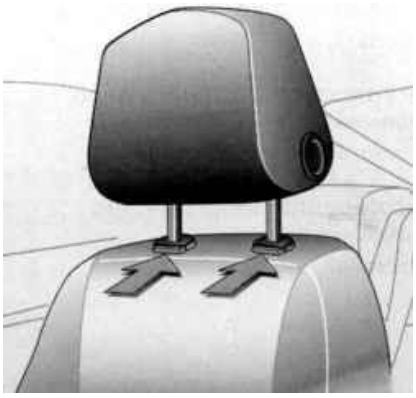


Fig. **1.169.** **Removing the front headrests**

To remove the head restraint, press the lock and pull the headrest up (Fig. 1.169).

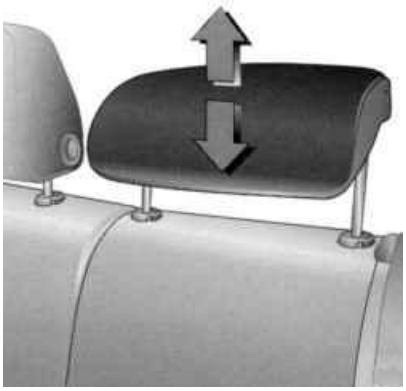


Fig. **1.170. Adjustable rear headrests**

For head restraints in place, click on the button and push the head restraint down.

Headrests rear seat
To raise the head restraint, pull it up to install the required position.
For lowering, click the lock and push the head restraint down.
Be sure to lift the rear seat headrest, if it sits a passenger or installed restraint device for children.

NOTE
To add back rear seats, should be completely deleted or dismantle the rear headrests.

Armrest on the driver's seat
Press the raised armrest down, overcoming resistance, and lower it.

Fig. **1.171. Adjustable front armrest Driver's seat**

By raising the armrest, it can be gradually set in one of several fixed positions (Fig. 1.171).

Adjusting the rear row of seats

Fig. **1.172. Adjusting the rear row of seats**

Lift the handle under the pillow and slide number of seats in the desired position. Lower the handle and fix a number of seats until it clicks (see Figure 1.172).

Armrest on the rear seat back

Fig. **1.173.** **Armrest on the rear seat back**

Raise the front armrest, pull the loop diagonally down (at 45 °) (Fig. 1.173).
When using the rear middle seat or a folding rear seat back, set up armrest.

NOTE
Over the armrest is the flap opening trunk for carrying long narrow objects.

Increased luggage space («Limousine»)
Fold the rear seat back. Rear headrests completely omit or dismantled. Move slightly forward front seats.

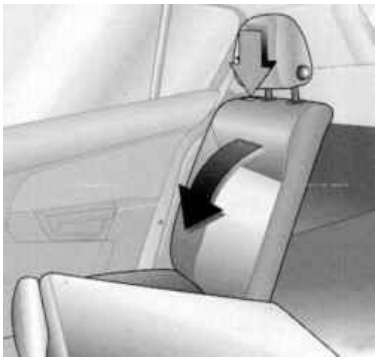


Fig. **1.174.** **Increased luggage space («Limousine»)**

Rear seat back, whole or split, and unlock button and fold on the seat cushion. Slide the front seats back in the desired position (Fig. 1.174).

To fold the middle rear seat back
Fully lower the head restraint down. Loosen the back, pulling the handle and put it on the seat cushion.

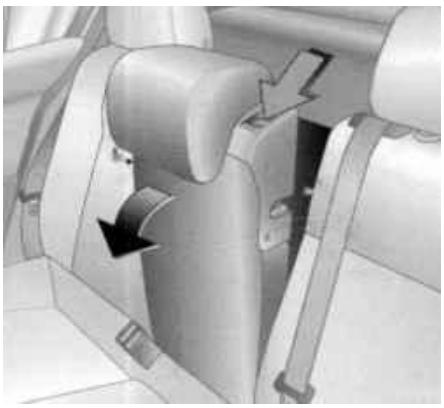


Fig. **1.175.** **To fold the middle rear seat back**

Folded average folding back seat allows you to load long items. The ends of the seat can be applied to passengers (see Figure 1.175).

NOTE
The goods must not interfere with management of the parking brake and shift lever.

Installing the rear seat back in upright position

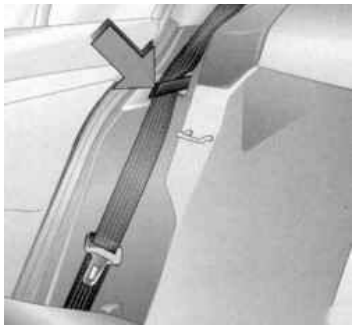


Fig. **1.176.** **Side holder belt**

To protect against damage to miss the safety belt through the side of the holder (Fig. 1.176).
To install the back of the rear seats in the upright position, you should fix the blockade until it clicks. Three-point safety belt in the middle and rear seats can be withdrawn from the traction device only if the fixed rear seat back.

Increased luggage space model «Caravan» without moving a number of rear seat

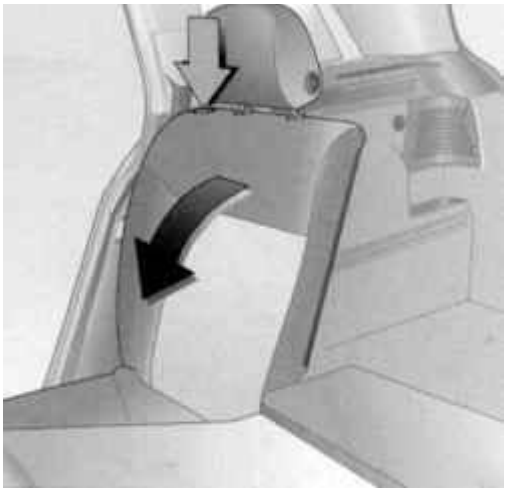


Fig. **1.177.** **Moving the rear seat back**

Put the rear seat back on the pillow (Fig. 1.177).
Fully lower down, or disassemble the rear headrests. Remove the hooks of the luggage enclosure with head restraints. Move slightly forward front seats. Rear seat back, whole or split, and unlock button and put it on the seat cushion.
Move the front seat back to the desired position.

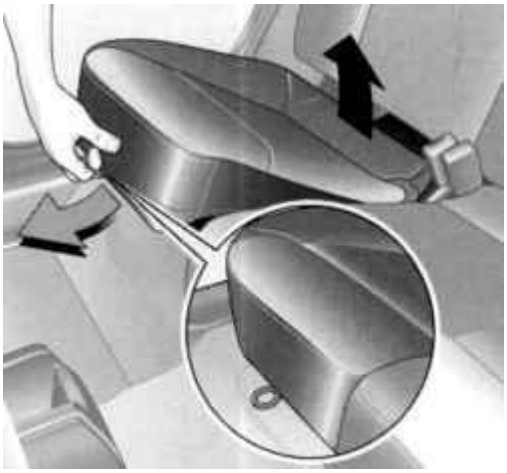


Fig. **1.178.** **Lifting the rear seat cushion**

Pull the loop on the seat cushion and lift the rear seat cushion (whole or split) (Fig. 1.178).
Remove the hooks of the luggage enclosure with head restraints.
Remove the outer rear head restraints, and the average HR is lower all the way down.

Fig. **1.179.** **Bays-trays for storing headrests**

Dismantled headrests place in compartments, trays under the raised seat cushion (Fig. 1.179).

Fig. **1.180.** **To fold the rear seat back**

Release the back seat (whole or split) by pressing the button latches, fold it and secure it (Fig. 1.180).

To fold the middle rear seat back the model «Caravan»
Fully lower the head restraint down.

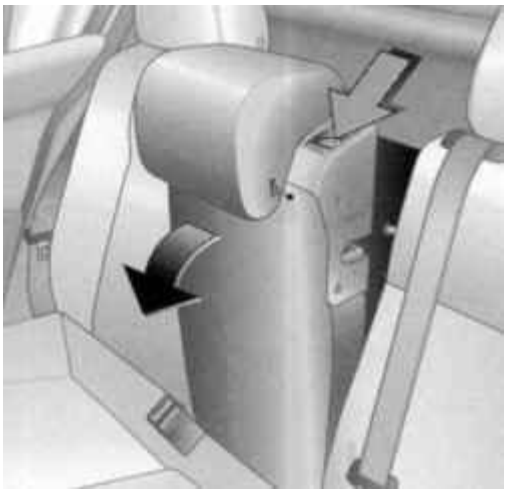


Fig. **1.181.** **To fold the middle rear seat back**

Unlock the back, pulling the handle and put it on the seat cushion, or, if raised rear seat cushion, put it forward until it clicks (see Figure 1.181).
Folded forward average folding back seat allows you to load long items. The ends of the seat can be applied to passengers.

NOTE
The goods must not interfere with management of the parking brake and shift lever.

Installing the rear seat back in upright
position or lowering the rear seat cushion

Fig. **1.182.** **Side holder belt**

To protect against damage to miss the safety belt through the side of the holder (Fig. 1.182),.
To install the seat back in upright position, should raise them up to do this, click the button on the backside. Backs in the upright position fix with a noticeable click.

Fig. **1.183.** **Installing the seat cushion in the upright**

Lift the seat cushion (Fig. 1.183).
Insert the headrests in the rear seat, and adjust their position. Lower the seat cushion, with a note on the correct position locks of safety belts. Fasten the hooks on the headrest shell luggage.

NOTE
Three-point safety belt in the middle and rear seats can be withdrawn from the traction device only if the fixed rear seat back.

Increased luggage space model «Caravan» with moving near the rear seats

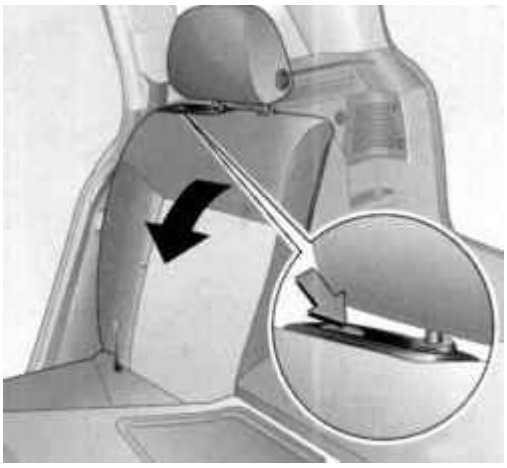


Fig. **1.184.** **Rivets rear head restraints**

Fully lower down or disassemble the rear head restraints (Fig. 1.184).
Remove the hooks of the luggage enclosure with head restraints. Move slightly forward front seats. Back seat, whole or split, razblokiriruyte with flaps and fold on the seat cushion. Move the front seat back to the desired position.

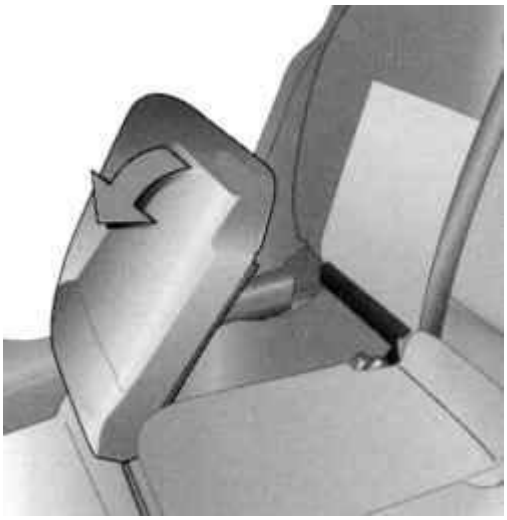


Fig. **1.185.** **To fold the rear seat cushion**

Lift the rear seat cushion and fold the seat backs (Fig. 1.185).
Lift the rear seat cushion (whole or split). Remove the hooks of the luggage enclosure with head restraints.

Fig. **1.186.** **Bays-trays for storing headrests**

Remove the outer rear head restraints, and the average HR is lower all the way down. Dismantled headrests place in compartments, trays under the raised seat cushion (Fig. 1.186).

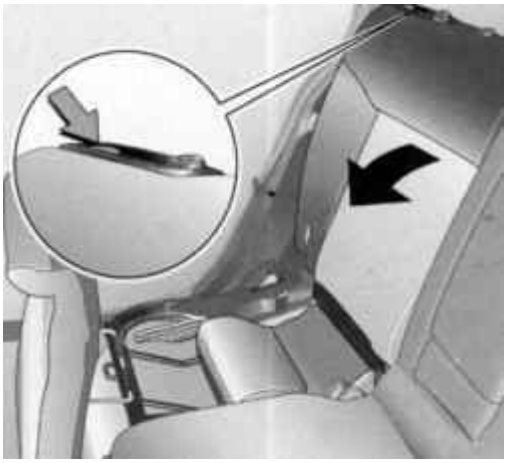


Fig. **1.187.** **To fold the rear seat back**

Release the latch rear seat back (whole or split), fold it and secure it (Fig. 1.187).

Ability to boot over the armrest on the rear seat back
Raise the front armrest, pull the loop diagonally down (at an angle 45 °).

Fig. **1.188.** **Handle flap rear armrest**

Pull the handle and lower the front flap (Fig. 1.188).
Either forward flap allows you to carry lengthy narrow objects. The ends of the seat can be applied to passengers.

To fold the front passenger seat back
Headrest front passenger seat lower down or dismantled. Slide back the front passenger seat.

Fig. **1.189.** **To fold the front passenger seat back**

Lower the front seat back, raising unlock lever (Fig. 1.189).
To set back in upright position, press the release lever forward, set the front passenger seat back in upright position and secure it with a noticeable click.

Casing luggage («Limousine»)

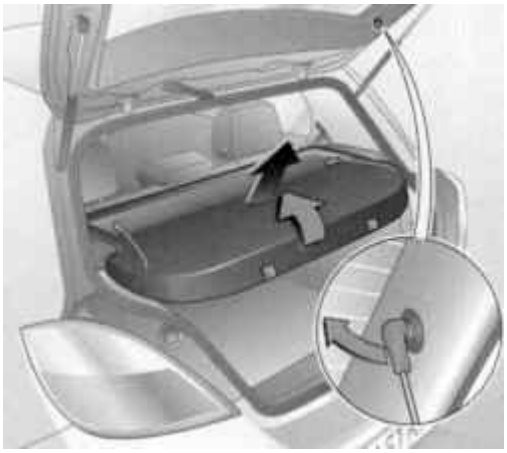


Fig. **1.190.** **Removing the shell luggage**

To dismantle the housing fastening straps to remove the rear door. Lift the cover and pull it out of the side rails (Fig. 1.190).
Installing the place is in the reverse order of removal.

Casing luggage («Caravan»)

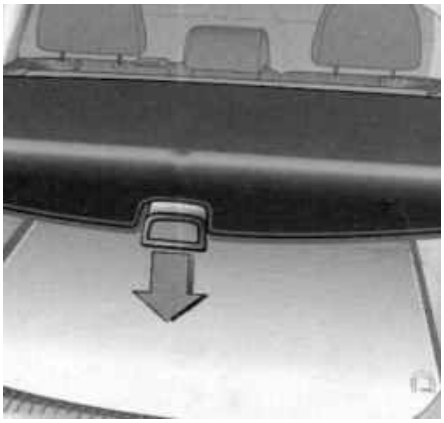


Fig. **1.191.** **Removing the shell luggage**

Click the handle housing luggage down jacket folds automatically (see Figure 1.191).
Pull the shell luggage back, it locks itself in position.

NOTE
Do not place objects on the cover with sharp edges and large weight.

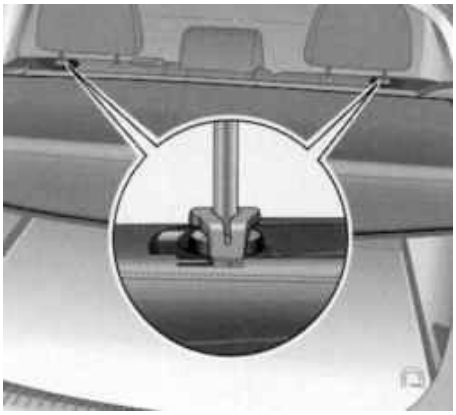


Fig. **1.192.** **Closing the gap between the hood and trunk of the rear seat backs**

To close the gap between the hood and trunk back of the rear seat of the tape set Regiment. Both the hook to attach the shelves in guiding head restraints installed in the barrier grid hooks pass through its cell lattice (Fig. 1.192).

Dismantling housing
To dismantle, open the trunk and remove the cover hooks to the head restraints.

Fig. **1.193.** **Hood release lever boot**

Turn the release lever on the right side of the trunk lining up (Fig. 1.193).
Lift sheeting on the right and pull it out of seizures.
In order to mount the luggage cover, insert it into the left mounting, turn the release lever on the right side up, set the luggage cover in the right mount, secure, and lower the lever down. Then fasten the hooks on the headrest.

Fencing lattice («Caravan»)
Fencing bars can be installed behind the rear seats or, with folded and raised the rear seat cushions for them.

Fig. **1.194.** **Install barrier lattice**

Expand the fence bars. In the frame of the roof are two mounting holes. Supports lattice hang in the mounting holes, first with one, and then the other side and lock forward movement (Fig. 1.194).

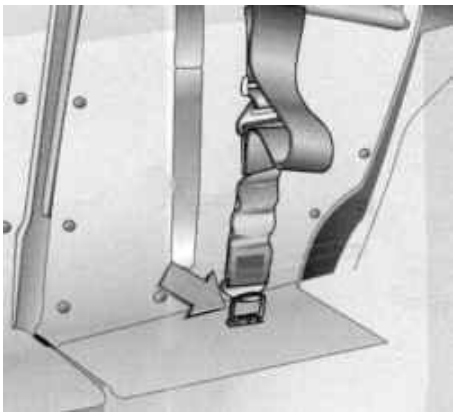


Fig. **1.195.** **Fixing straps barrier lattice**

If the car is equipped not moving near the rear seats to fit the length of the belt barrier bars, should pass a top hooks and eyelets straps to keep them in the lug on the floor left and right (Fig. 1.195).
If installed in a car moving a number of rear seats to fit the length of the belt barrier bars, should pass a top hooks and eyelets straps to keep them in the lug on the back of the rear seat backs left and right.

Installation lattice barrier behind the front seats
Lift the rear seat cushion. Expand the fence bars. In the frame of the roof over the front seats are two mounting holes. Supports lattice hang in the mounting holes, first with one, then the other side and secure it to move forward.

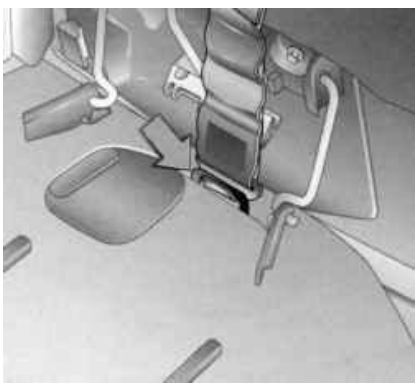


Fig. **1.196.** **Fixing straps barrier lattice**

If the number is not moving the rear seats to fit the length of the belt barrier grilles, should be removed from the upper hooks and eyelets straps to keep them in the lug on the floor left and right (Fig. 1.196).

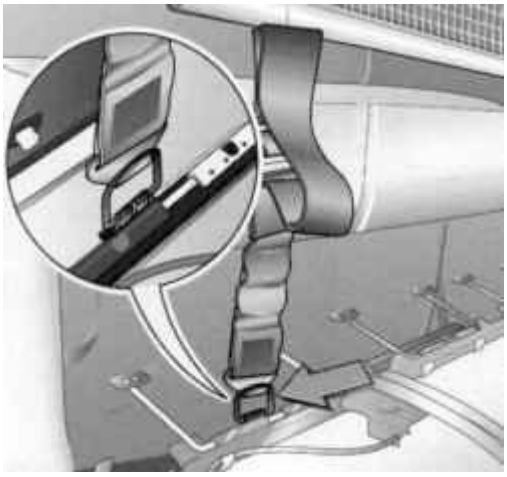


Fig. **1.197.** **Fixing straps barrier lattice**

If the number of moving the rear seats to fit the length of the belt barrier grilles, should be removed from the upper hooks and eyelets straps to keep them in the right and left of the bracket under the seat cushions raised (Fig. 1.197).
Then unmount the outer rear seat head restraints and seat backs folded forward.

Dismantling barrier lattice

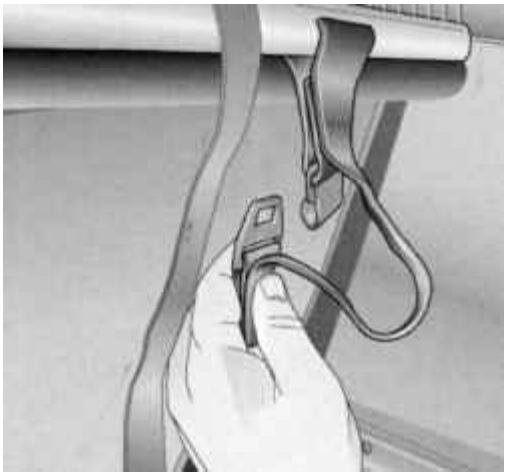


Fig. **1.198.** **Removing the hinge stretch belts**

Remove the hinge stretch belt barrier lattice, lifting knob length (Fig. 1.198).
Support barrier grid remove from mounting in the frame of the roof, roll up grille and styan belt-strap.

Guides and hooks in the trunk («Caravan»)

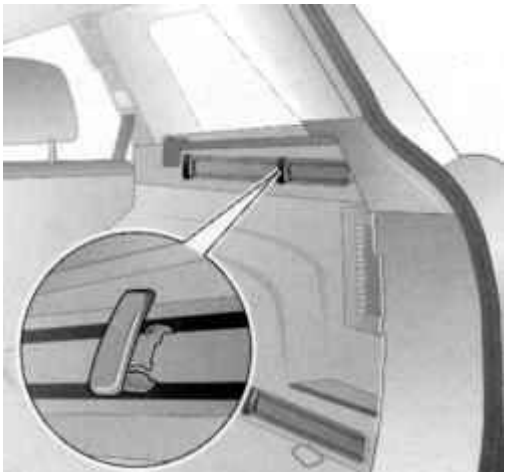


Fig. **1.199.** **Installation guide hooks in the trunk**

At the sidewalls of the boot is on the two guides. Insert the hook in the guide in the desired position to do so, set the hook in the top notch guide and slide into the lower groove (Fig. 1.199).
Pull the hooks to be removed.

The system of organization of space luggage «Flex Organizer» model «Caravan»
Universal mounting system for the separation of luggage space and stowage in the performance «Caravan» consists of the following elements:
- Adapters
- Adjustable net;
- Mesh bags on the side walls;
- Hooks in the trunk.

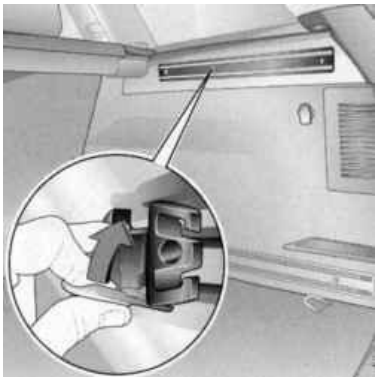


Fig. **1.200.** **Mounting adapters system «Flex Organizer»**

The components are mounted in two guides on each side wall of the trunk with the help of an adapter or hooks (Fig. 1.200).

Adjustable net

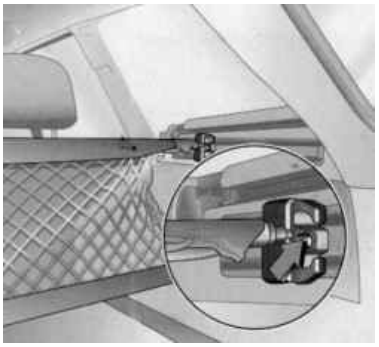


Fig. **1.201.** **Attaching adjustable net**

Install one adapter for each guide, lift the latch, insert the adapter into the upper or lower guide groove and move the guide in position (Fig. 1.201).
To lock the adapter, lift up the tongue. Lightly squeeze the support of the separation grid and insert into the holes adapters. A leg length should be inserted into the upper adapter.

Hooks and mesh bags

Fig. **1.202.** **Set a mesh bag**

Insert the hook in the desired position on the guide. To do this, set the hook into the upper groove guide and slide into the lower groove. On the hook you can hang a mesh bag (Fig. 1.202).
To remove the hooks, squeeze the bearing walls and remove them from the adapter.
To remove the adapter, lift the flap, and unlock the adapter into the bottom groove and pull it from the top groove.
Unlock the hooks on the rails.

Fixing lugs

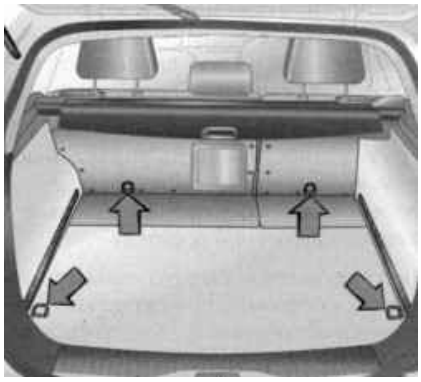


Fig. **1.203.** **Fixing lugs**

The lugs are designed for secure mounting in the boot straps and nets for luggage.

Staples for fastening security system
ISO-FIX child

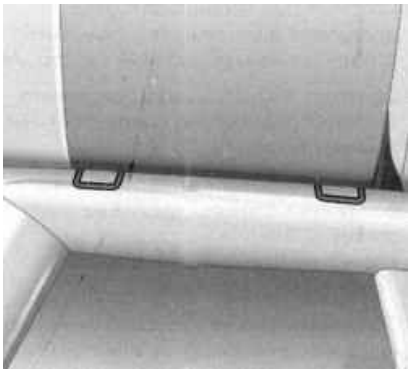


Fig. **1.204.** **Staples for fastening system to ensure children's safety ISO-FIX**

Staples, located between the backrest and seat cushion, used to mount the system to ensure children's safety ISO-FIX (Fig. 1.204).

NOTE
Be sure to follow instructions supplied with the system to ensure children's safety ISO-FIX. Permission is granted to use only permitted for this type of vehicle child safety system ISO-FIX.

Cargo Box

Fig. **1.205.** **Cargo Box**

Folding box located under the hood floor and serves to separate the luggage compartment (Fig. 1.205).

In the cargo box, you can download something only when fixed in an upright position back rest.

Removal cargo box remove cover sex, first right and then left him half. On cars with trailer coupling should release fastening strap ball bearing and pass it through the eyelet. Assembling the box is carried out in reverse order of removal.

1.5. Passive safety

Seatbelts

Seat belts help reduce the likelihood of severe injuries in an accident and emergency braking of the car. All seats are equipped with bias-seat belts. These belts are equipped with an inertia reel, which retracts the unused seat belt. Inertia reels provide convenience for the driver and passenger in a normal driving conditions. In the case of collision inertia reel block the issuance of the belt and keep the driver and passenger of dangerous movements. In the back seat installed diagonally-seat belts with inertia reels.

Always WEAR YOUR SAFETY BELT, and see to it that all the passengers were also wearing or using appropriate restraints.

Nepristegivanie belt is extremely dangerous. In the case of an accident, the driver and passengers not wearing seat belts, can hit each other or the elements of the body, and can be thrown from the car. And they can get seriously injured or even killed.

Do not operate the vehicle with faulty seat belts.

In the collision of a car seat belt strap is used may be damaged. Damaged belt does not provide effective protection in a collision a car. When an accident front airbags and pyrotechnic seat belt retractors triggered simultaneously. Irrespective of whether the front passenger seat or not worked or not any airbags or belt tensioners need to check whether your seat belt installed on the front, and serviceability of all bags. If necessary, replace the defective air bags and seat belts. Do not use twisted belt.

Twisting strap dangerous. In the collision of the vehicle inertia load of body weight will be perceived not the whole width of the strap, but only part of it. This increases the load on the bones of the chest, located under the strap, which can lead to serious injuries or death.

Do not buckle a seat belt, two (or more) people simultaneously.

In this case, a safety belt does not ensure the proper distribution of the dynamic loads from the impact of car, and the passengers fastened a belt, will cause each other serious injury, or may die.

Always follow the rule: for each passenger - his belt.

Instructions for use of seat belts

Seat belts must be based on those parts of the body, which are strong bones of the skeleton. The belt must pass over the pelvic bone, chest and shoulder, rather than lying on his stomach.

Need to adjust the belt so that it is maximally close to the body, while maintaining the convenience of landing. Only in this case, the belt is able to effectively carry out its protective function, for which it is installed on the car. Sagging seat belt greatly reduces the efficiency of passive protection of the passenger.

Make sure to strap on the seat belt did not get wax, oil and other chemicals, especially the electrolyte used in the battery. To clean the seat belt use a neutral soap and water. You should replace a safety belt, if the strap is worn, dirty or has traces of damage.

Make sure to replace the seat belt assembly, if it was used by the driver or passenger in a strong collision of a car, even if there are no visible signs of damage to the belt.

Never use a seat belt if the strap is twisted.

Each safety belt must be used only one passenger at a time. It is dangerous to buckle a seat belt and child passenger, sitting on his lap.

Prohibited any changes in design of safety belts, which violate the normal operation of devices for automatic selection of slacks strap or belt with the difficult adjustment to eliminate its sagging.

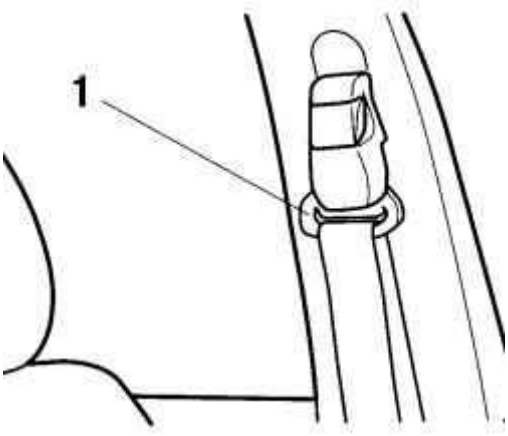


Fig. **1.206.** **Anchorage: 1 - guide bracket**

Retraction of the belt inertial reel can be difficult if the strap and the intermediate guide bracket contaminated. So check to see that portion of the belt and the guide bracket were clean (Fig. 1.206). If the seat belt drawn on the coil, it will work in emergency mode locking. In this mode, a safety belt does not violate the convenience of passengers. In the case of collision inertia reel blocks the issuance of safety-belt that holds the passenger in place. If fully stretch belt with a coil, then it switches to auto-lock belt. If there is a strong belt tension, or it impedes the movement of the passenger on a stationary car or while driving, the possible reason for switching is an inertia reel in the auto lock mode, after the belt was too long from the coil. In order to return the inertial reel in a more convenient mode of interlocking safety, stop the car in a safe place on a horizontal platform and fully Pass the belt inertial reel. This coil switches to emergency locking belt. Then, pull the seat belt to the required length, in order to buckle up.

Three-way security system

The structure of this system include:
- Three-point belts;
- Stoppers seatbelt in the front seat;
- Airbag system for driver, front passenger and rear outer seats.

Depending on the severity of the accident components of the three-tiered security system vlyuchayutsya alternately.

Auto lock safety belt prevents the extraction of belt that allows you to keep the passengers in the seats. Castles in the front seat belts drawn back. Due to this safety belt immediately adjacent to the body, which reduces the load on the body. Systems airbags triggered further in severe accidents and form a protective cushion for passengers. Actuation of the front airbags are depending on the severity of the accident in two phases.

Seat belts

Fig. **1.207.** **Installing belt**

Evenly pull the belt reel, and not perekruchivaya, drag it over the body.

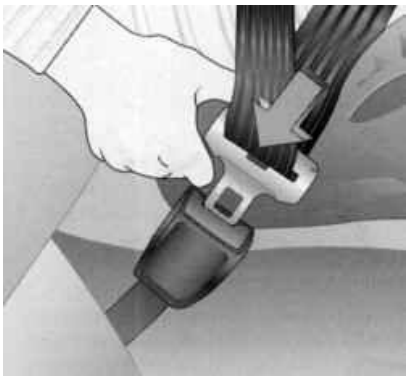


Fig. **1.208.** **Fixation belt**

Snap the tongue of the buckle, lock (Fig. 1.208).
The back of the front seat should not be tilted too far back, as it adversely affects the performance of safety belts. The recommended angle is about 25 °. Lap belt should fit snugly to the body without twisting. During the visit it from time to time should be tightened, pulling the shoulder strap.
Belt (especially when seat-pregnant women) should take place as far as possible down the thighs to avoid pressure on the lower abdomen.
A thick layer of outer clothing violates close fitting belt. Belt not impose on the firm or fragile items in the pockets of clothing (eg, keys, pens or glasses), as this can lead to injury. Between the belt and the body should not be any items such as handbags or mobile phones.

Adjusting the height of the upper guide element of the front and rear seat belt
Lightly pull the belt.
Press the down button on the sliding regulator.
Move the slide knob up or down.
Lock the sliding knob until it clicks tangible.

NOTICE
Do not adjust the height of the belt during the movement.

Fig. **1.209.** **Adjusting the height of the upper guide element of the front and rear seat belt**

Adjust the height of the belt so that it passed through the shoulder and tight to him. Never belt should not pass on the neck or upper arm.

Removing the belt

Fig. **1.210.** **Removing the belt**

To remove the belt, press the red button on the lock, the belt is automatically wound on the roller (Fig. 1.210).

Three-point safety belt middle rear seat space
Belt is pulled from the pulling device only if the back of the rear seat is fixed in an upright position in their holders.

Check belt
All parts of seat belts should be from time to time to check for damage and serviceability. Damaged parts, stretched belts in the accident and worked stoppers locks must be replaced.

NOTICE
Nothing has changed in the seat belts, their anchorages, the automatic winding mechanism and castles belts.
Avoid damage to safety-belt with sharp objects or clamping straps.

System of airbags «Opel Full Size»

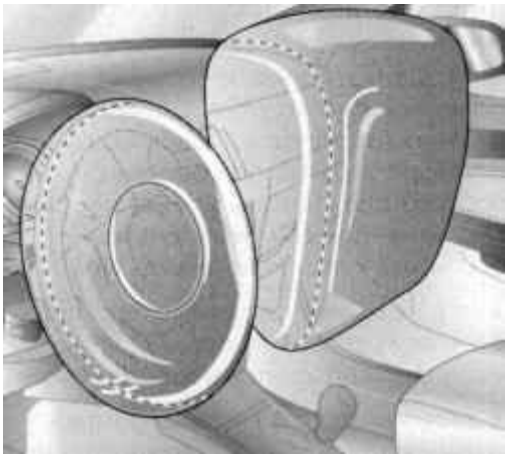


Fig. **1.211.** **The front airbag system «Opel Full Size»**

System of airbags «Opel Full Size» consists of several separate systems (Fig. 1.211).

System front airbags
System front airbags triggered by severe frontal collisions and form a safety bumper for driver and front passenger. Progress seated forward dramatically slowed down and, thus, significantly decreasing the risk of injury to the upper body and head.

System of side airbags

Fig. **1.212.** **Side airbag system «Opel Full Size»**

Side airbag system fires in side collisions and form a safety bumper for the driver or front passenger in the zone corresponding to the front door. Thus a side collision is significantly reduced risk of injury to the upper and pelvic parts of the body (Fig. 1.212).

Inflatable curtains security

Fig. **1.213.** **Inflatable curtains security «Opel Full Size»**

Inflatable curtains security system triggered in side collisions and forms a safety zone in the shock of the head on the corresponding side of the car. Thus a side collision is significantly reduced risk of injury to the head (Fig. 1.213).

Front airbag

Fig. **1.214.** **The airbag module driver**

The presence of front airbags marked with the inscription «AIRBAG» on the steering wheel and above the anterior compartment (Fig. 1.214).

System front airbags include:

- Air cushion with a gas generator placed in the steering wheel, and in the dashboard;
- Control electronics with sensors collision;
- Alarm systems, airbags on dashboard;
- System of identification of employment seat;
- Alarm systems, ensuring the safety of children with transponders in the dashboard.

System front airbag is triggered in the following cases:

- An accident of some gravity;
- Depending on the type of collision;

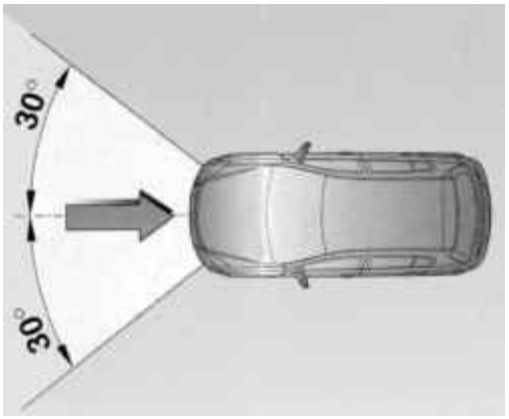


Fig. **1.215.** **Impact zone in which the system is triggered front airbags**

- In the zone of action, as shown in Figure 1.215;
- Irrespective of the side airbags and inflatable curtains.

The front passenger seat with seat recognition system of employment
System of identification of employment off the front seat side airbags and front passenger when the seat is occupied or not it is installed to ensure the safety of children Opel with transponders.

1.6. Driving and car maintenance

Start Engine

Before you start the engine, install the shift lever manual transmission in neutral position. Squeeze the clutch, press the brake pedal and turn the starter.

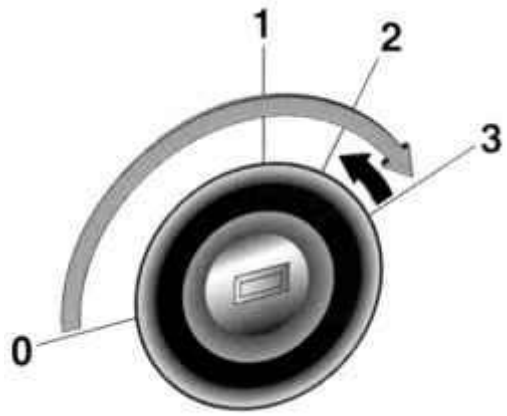


Fig. **1.216. Situation of the ignition key when starting the engine**

On vehicles with transmission Easytronic, set the selector lever to position N, and on cars with automatic transmission - in position P or N. Do not press the accelerator pedal. Turn the ignition key to position 3 (Fig. 1.216)
As the temperature increased at first engine speed is automatically reduced. Turn the key in the ignition back to position 0 and repeat the launch.

Easytronic transmission

Automated Easytronic manual gearbox enables manual (manual mode) or automatically (automatic mode) switching gears, while in both modes, the automatic clutch control.

Indicator gearbox

Fig. **1.217. Indicator Easytronic transmission**

Indication regime and enabled the transfer is displayed (Figure 1.217).

Start Engine
Start the engine is possible only when pressed the brake pedal. The display shows the icon gearbox N. When depressed the brake pedal N icon blinks.

Switching to the neutral position before the start of the engine is not required. Even when the gear box before the start of the engine automatically switches to the neutral position. Because of this may be a slight delay in starting the engine.

Office Easytronic transmission gear knob

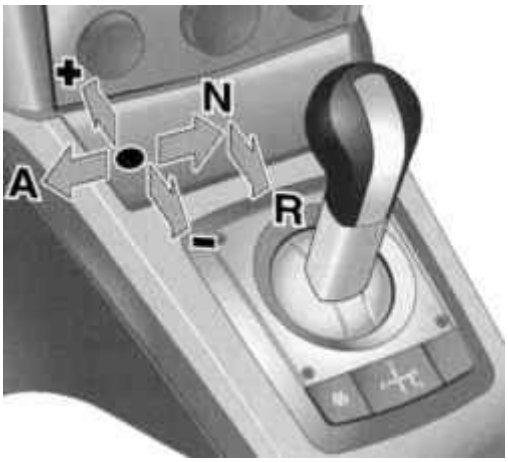


Fig. **1.218.** **Scheme switching modes of transmission Easytronic**

Gearshift lever must always move in each direction until it stops. After each step, it automatically returns to the middle position, so you must follow the indication of transfer / mode indicator on the gearbox (see Figure 1.218).

Route Vehicle

Press the brake pedal, release the parking brake, move the gear lever to position A. Easytronic system will switch to automatic mode and use the first transfer (when the winter mode - second gear). The display will display the symbol gearbox A1 (when the winter mode - A2).

This is also the case when, after starting the engine while holding down the brake pedal gear lever for the first time translated into position + or -.

Fig. **1.219.** **Starting up the car**

When you release the brake the car begins to move (Fig. 1.219)

You can also move, do not hit the brake, if immediately after moving the gear lever to press the accelerator pedal. If it does not click, transfer not included (the symbol A will be blinking). Move the gearshift lever in N position and begin the movement by pressing the brake, and then move the gearshift lever in position A.

In automatic mode, gear changes automatically depending on road conditions.

Switching between automatic and manual

In manual mode, the transfer switch manually. The display shows the transmission letter M and included the transfer.

At too low an engine speed Easytronic transmission is switched to a lower gear automatic even in manual mode. This prevents jamming of the engine.

Mode switching speeds

If you choose a higher transfer rate when there is insufficient or lower channel at too high speed, switching is not performed. This keeps too low or too high speed.

By repeatedly moving the gear lever with a short interval may miss the transfer.
If enabled the automatic mode, when you move the gear lever in the position of + or - Easytronic transmission will switch to manual mode and increase or, respectively, will lower the transmission. The display will display the symbol of the transmission M, and included in the current transfer.

Moving the gear lever in position R
Reverse mode can be enabled only on the parked car.
Press the brake pedal, release the parking brake, move the gearshift lever in position R. Login reverse. The display will display the symbol of the gearbox R.
When you release the brake the car starts moving.
You can also start off in reverse, not pressing the brake, if immediately after moving the gear lever to press the accelerator pedal. If it is not pressing, the transfer not included (R symbolic flashing). Move the gearshift lever in N position and start the movement, first by pressing the brake, and then move the gearshift lever in position R.

Driving modes with electronic control
In automatic mode, the program temperature control after a cold start by switching delay (at high speeds) automatically quickly bring the catalyst to a temperature required for optimum reduction of harmful emissions in the exhaust.
Adaptive mode automatically coordinate the process of switching to other programs in terms of driving, such as when driving with a trailer with a big boot and on the rise.
If you switch «SPORT» switching time is reduced, and switching occurs at a higher speed (if not included speed controller).

Forced downshifts

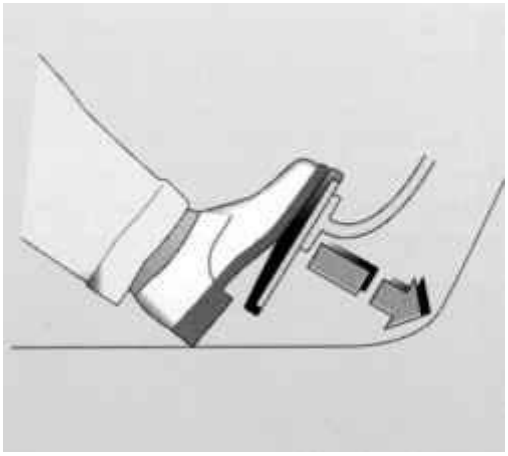


Fig. **1.220.** **Throttle**

Pressing the accelerator below the point of resistance leads to the fact that the speed is below a certain value gearbox switch to a lower gear. To speed up the need to use the full power of the engine (Fig. 1.220).

NOTE
When squeezing the accelerator pedal switch gears manually is impossible.

In the range of engine speeds, close to the upper limit, the gearbox when squeezing the accelerator is switched to a higher gear, even in manual mode.
Without squeezing the accelerator pedal this automatic switching to manual mode is not performed.
When moving from place in the mode «SPORT» Forced downshifts driving wheels a bit stuck. This ensures maximum acceleration of the car.

Auxiliary engine braking
Automatic mode.
During the descent Easytronic transmission switches to higher gears only at higher revs. During braking Easytronic transmission is switched to a lower gear in a timely manner.
Manual.
To use the engine brake capacity during the descent in time to switch to a lower gear.

Stop
Both the automatic and manual modes when you stop the car automatically switches gears (when the winter mode - the second channel) and off the clutch. In R remains on reverse.

If the engine is running the driver's door opens, and the brake pedal is pressed, issued a warning beep: you should move the gearshift lever in position N and tighten the parking brake.
When you stop on the rise should be sure to tighten the parking brake pedal or press the main brake. Do not hold the car when the transfer by increasing the engine speed to prevent overheating of the gearbox.
When excess heat traction automatically.
For longer stops, such as in a traffic jam or on the move, turn off the engine.

Installation of car parking
Before leaving the car tighten the parking brake, then remove the key from the ignition.
Inclusion of the last channel (the display on the indicator gear box) is enabled. In position N transfer is not included.
After turning off the ignition Easytronic transmission ceases to respond to the movement of the gear lever.
If you do not remove the ignition key, then long-time parking your car can happen discharging.
If not tightened the parking brake, within a few seconds after the ignition is turned off alarm flashing parking brake system.
If the engine is off and parking brake nezatyanutom opened the driver's door, issued a warning beep and flashes the same detector. In this case, turn on the ignition, including transfer, then turn off the ignition and tighten the parking brake.

Pulling the car when slips
To pull a car stuck in sand, mud, snow or a ditch, with a little throttle translating the gear lever back and forth between the provisions of the R and A (or + and -). If possible, hold the engine at low speeds and avoid falls when you press the accelerator pedal.

NOTE
The above method is used only in those exceptional cases.

Precise maneuvering
For precise maneuvering, such as the installation of parking, check-in garage, etc. You can use the property of "sliding" enabled the transfer when you release the main brake pedal.
Do not squeeze the accelerator and brake simultaneously.
To protect against damage Easytronic transmission overheating clutch function of "sliding" switch off automatically.

Driving a car with automatic transmission

After starting the engine before turning on the transfer, press the brake pedal. When the transmission and the brake released, the car starts moving. Do not press both the accelerator and brake pedals.
While D can ride in almost any conditions.
With a soft uniform squeezing the accelerator pedal is timely gear changes, providing fuel economy. Manual switching is necessary only in exceptional cases. Third, second or first choose a transfer only if switching to higher transfer undesirable, or when engine braking.
How to only allow traffic situation, switch back to mode D.

Indicator gearbox

Fig. **1.221.** **Indicator automatic transmission**

Indication regime and enabled the transfer is displayed (Figure 1.221).

Gearshift lever (modes P, R and N)

Fig. **1.222.** **Lever switch mode automatic transmission**

P - parking regime. In this mode, the vehicle's wheels are blocked. Include it only in the stationary vehicle and tightened parking brake. The display shows the transmission symbol R.

R - reverse mode. Include it only in the stationary vehicle. The display shows the transmission symbol R.
N - neutral position or idling. The display shows the transmission symbol N.
Gearshift lever can be switched from the position P only when the ignition key and pressing the brake pedal (to lock the gear lever).
To activate the P or R, press the button on the selector lever.
Start the engine is possible only in position P or N. When starting the engine in position N in addition make the most of the main brake pedal or turn on the parking brake.
During the gear shift does not squeeze the accelerator pedal.

Modes of motion (D, 1, 2, 3 and 4)
Permanent position for normal driving conditions - on transfers from the 1 st to 4 th.
Transmission will not switch above the established level.
To activate the 3rd or 1-th transmission, press the button on the selector lever.

Fig. **1.223.** **Display mode D automatic gearbox for the Information Display**

The display shows the position gearbox shift lever. In mode D, in addition, shows included in this time of transfer (Fig. 1.223).

Driving modes with electronic control

Fig. **1.224.** **Key activate «SPORT»**

If you switch «SPORT» switching occurs at a higher speed (if not included speed controller). The display is lit corresponding to the transmission detector (see Figure 1.224).

Mode automatically switches to the neutral position to reduce fuel consumption automatically sets the gearbox in position N, for example when stopping at a traffic light.
Automatic switching to the neutral position is activated in the following cases:
- The gear lever is in position D, 3, 2 or 1;
- Brake pedal is pressed;
- The car stands still;
- The accelerator pedal is pressed.
When you release the brake and throttle the car moving from the place as usual.
The program of temperature control after a cold start automatically, due to delay in switching to higher gears (higher speed) quickly brings the catalyst to the temperature required for optimum reduction of emissions of harmful substances in the exhaust.
Adaptive mode automatically coordinate the process of switching to other programs in terms of driving, such as when driving a large load or on the rise.

Winter driving modes

Fig. **1.225.** **Power key winter driving mode**

In case of difficulty in moving from place to slippery roads, press treatment (Fig. 1.225), which can be done only in the positions P, R, N, D, 3 (in the display lights up the appropriate gear icon).
The car will touch on the 3rd gear.
Winter mode operation stops when the following conditions:
- Re-uses the keys;
- Switched manually at 2 nd or 1 st transmission;
- Turn off the ignition.
To protect against damage to winter driving mode is automatically switched off at too high a temperature of transmission oil.

Forced downshifts
Pressing the accelerator below the point of resistance at a speed below a certain value gearbox switch to a lower gear. In order to accelerate use the full power of the engine.

Auxiliary engine braking
To use an engine brake function during descent include timely step 3, 2, or, if the situation so requires, 1.
Particularly high inhibitory effect on the level 1. If step 1 is included at too high a speed, the gearbox will continue to work on the 2 nd transfer to the point until it reaches the point of transition to the 1-th transmission, for example by braking.

Siphon "
To "pull" machine, stuck in the sand, mud, snow or a ditch, with a little throttle alternately translating lever back and forth between the provisions of D and R. The engine speed hold as low as possible, avoid falls by pressing the accelerator pedal.
The above method is used only in those exceptional cases.

Precise maneuvering
For precise maneuvering, such as the installation of parking, check-in garage, etc. You can use the property "sliding" when you release the brake pedal.
Do not squeeze the accelerator and brake simultaneously.

Stop

Included is level when you stop with the engine can be maintained.
When stopped on an uphill gradient must necessarily tighten the parking brake or press the brake pedal. Do not hold the car when the transfer by increasing the engine speed to avoid overheating of the gearbox.
For longer stops, such as in a traffic jam or on the move, turn off the engine.
Before leaving the car at first turn on the parking brake, then - P mode and remove the ignition key.
If you do not remove the ignition key, then long-time parking your car can happen discharging.
Take out the key can be only when the gearshift lever is in position R.

Interruption of power
When a discharged battery gear lever does not switch from the position R.
In the case of discharge of the battery, follow the procedure support the launch.
If the reason was not the battery, unlock the gearshift lever.
1. Tighten the parking brake.

Fig. **1.226.** **Lifting the hood selector lever**

2. Release the latches on the cover behind the gear lever from the middle console and wrap it up (Fig. 1.226).

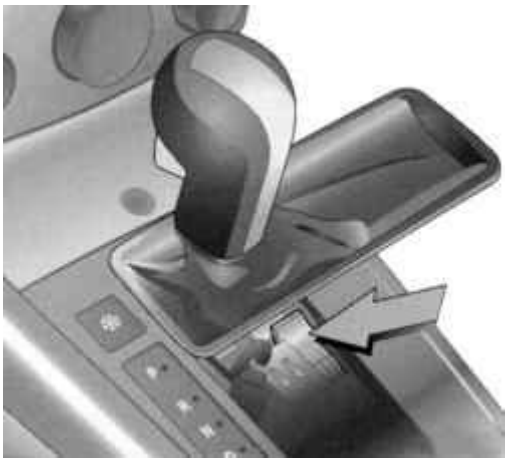


Fig. **1.227.** **Detent selector lever**

3. Use a screwdriver to push the stopper forward and bring the gear lever from position P (Fig. 1.227).
4. Put the gear lever cover in the middle console and secure it.
When you switched on again, R is the lock. Eliminate the cause of interruption of power supply.

Trailer coupling, riding with trailer

If the trailer coupling is installed on the car manufacturer, it is taken into account automatically.
When riding with the trailer parking pilot is automatically disabled when installing the trailer plug the cable into the slot.

NOTE
When installing the rear trunk, such as a bike, remember that they are mounted near the sensors' parking pilot "and can disrupt the functioning of the system.

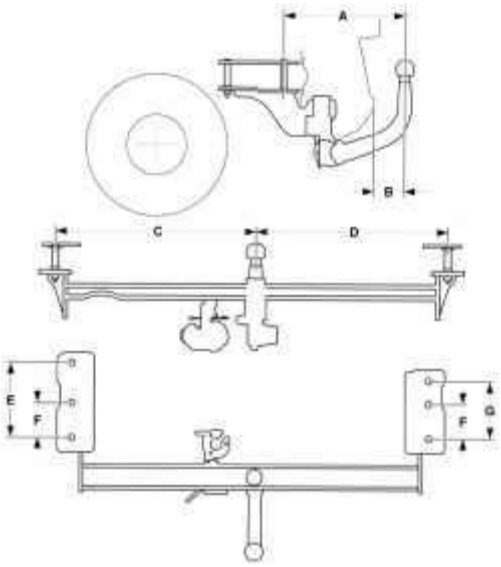


Fig. **1.228.** **Mounting dimensions trailer coupling with removable ball of "Limousine"**

Mounting dimensions trailer coupling with removable ball of "Limousine"

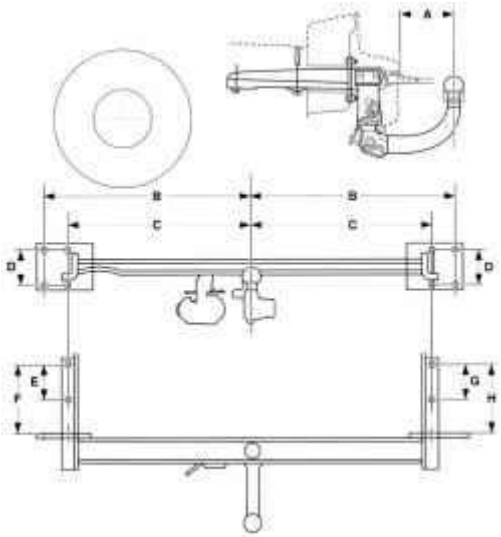


Fig. **1.229.** **Mounting dimensions trailer coupling with removable ball of «Caravan»**

All these dimensions correspond to the trailer coupling trailer, mounted by the manufacturer.

Размер	*Значение, мм*
A	342,9
B	83
C	513,4
D	488,6
E	211,4
F	94,3
G	160

NOTE
Use only admitted for this vehicle trailer coupling.

On cars with engines of Z 20 LEH montage trailer coupling is not allowed.
Mounting dimensions trailer coupling with removable ball of «Caravan»

All these dimensions correspond to the trailer coupling trailer, mounted by the manufacturer.

NOTE
Use only admitted for this vehicle trailer coupling.

On cars with engines of Z 20 LEH montage trailer coupling is not allowed.

Размер	*Значение, мм*
A	84,0
B	570,0
C	515,0
D	93,5
E	173,0
F	307,6
G	158,0
H	292,6

Placing ball bearing trailer coupling

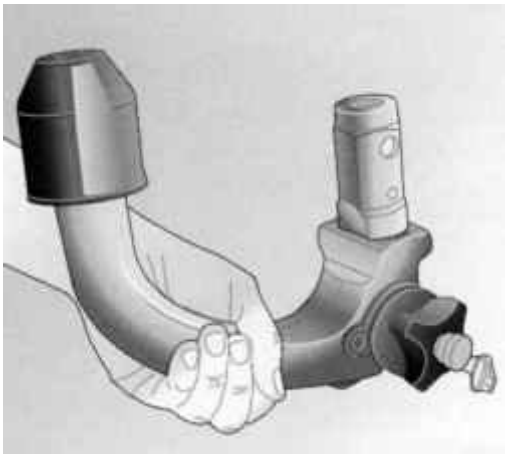


Fig. **1.230.** **Ball bearing trailer coupling**

In the model »Limousine» spherical bearing in the cover secured in the cargo box luggage fastening straps.

In the model «Caravan» spherical bearing fixed fastening straps to the luggage compartment in the recess for the spare wheel.

Installation of ball bearing

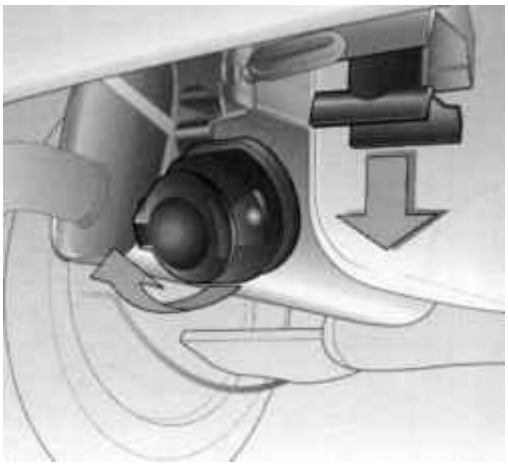


Fig. **1.231.** **When the connector trailer coupling**

To release the connector and slide it down. Remove the cap from the opening for ball bearing and place them in the trunk (Fig. 1.231).

Check the position of a ball bearing.
Red markings on the swivel bracket should be directed towards the white markings on the ball anvil.
Between the swivel bracket and ball support should be a gap width of about 6 mm (Fig. 1.232).
Stopper is inserted into the lock and is in position 1 (Fig. 1.232).
Otherwise, you must hold down ball-bearing before installing casing couplings.
Unlock the ball as transferring detent in position 1 (Fig. 1.232).

Fig. **1.233.** **Turning the lock bracket**

Pull the swivel bracket and turn it into the elongated position all the way to the right (Fig. 1.233)

Install ball bearing
Insert ball-bearing sandwiched into the body and sleeves with force fed up to its fixation (Fig. 1.233)

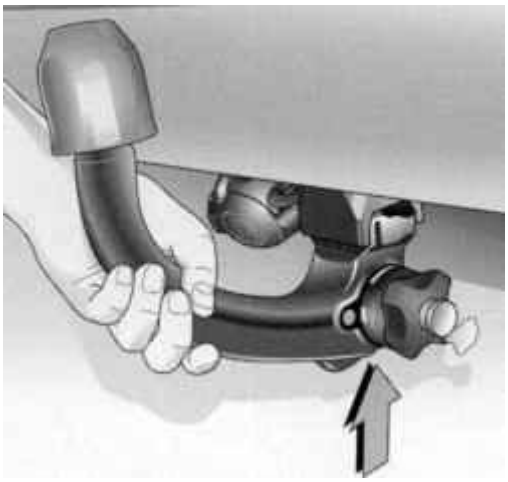


Fig. **1.234.** **Install ball bearing**

Swivel arm themselves back in position and again adjacent to the ball support.

NOTICE
When installing the ball bearing does not touch the swivel bracket, because at the time of fixation he can injure his hand.

Closed ball as setting the stopper in position 2 (Fig. 1.232). Remove the stopper and press the security tab (Figure 1.235)
After the closure of a ball bearing swivel bracket is no longer stretched.

Testing after installation
Check the correctness of mounting a ball bearing.
The green markings on the swivel bracket should be directed towards the white markings on the ball anvil.
Between the swivel bracket and ball support should not be any backlash.
Ball bearing tightly fixed in the clutch housing.
Ball bearing must be locked.

NOTICE
Driving with a trailer is allowed only with the correct fixed ball support. If the ball-bearing correctly can not fix, you must ask for help at service stations.

Eyelet for traction cable

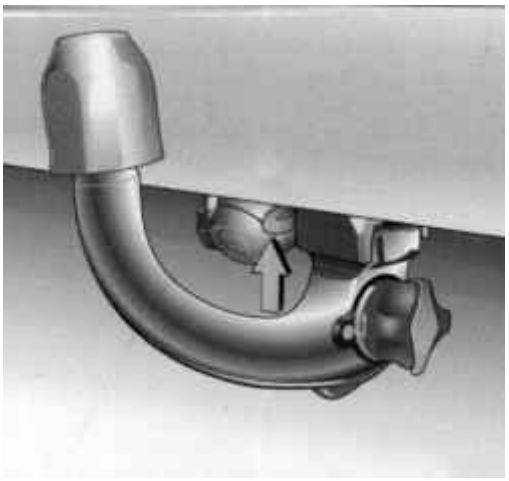


Fig. **1.235.** **Security tab**

For trailers with a brake hook tether for the eyelet (arrow in Figure 1.235).

Dismantling ball bearing
Unlock the ball as turning the stopper in position 1 (see Fig. 1.232).

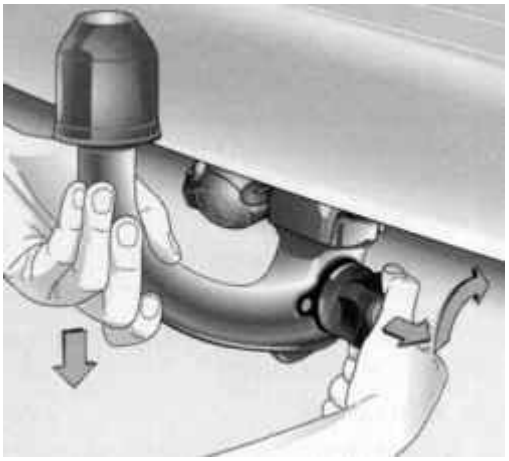


Fig. **1.236.** **Removing the ball bearing**

Pull the swivel bracket and turn it all the way to the right. Pull the ball bearing housing clutch down and put it in a duffel compartment in the trunk (Fig. 1.236).
Install plugs in the hole for a ball bearing. Close the socket (see Fig. 1.231).
Do not empty spherical bearing by blowing hot steam or using high pressure.

Placement ball bearing «Limousine» and «Caravan»

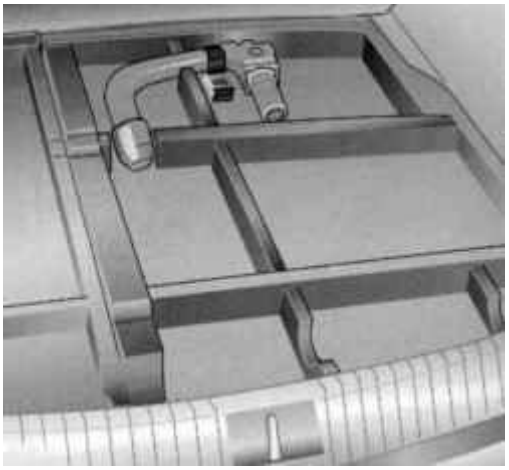


Fig. **1.237.** **Placing a ball bearing in the luggage car**

1. Ball joints in a case put the luggage in the cargo box and fasten the mounting strap.
2. Ball joints put in the luggage compartment in the recess for the spare wheel. Fasten it in the compartment fastening straps.

Trailed load

Permitted trailer load values depend on the type of car and engine, and the excess is prohibited. Trailed load - is the difference between the actual total weight of the trailer and the actual bearing load suspended on a condition. Therefore, to test the trailer load on the scales set only wheels of the trailer, not the nose wheel.

The values of permissible trailer load recorded in the documents of the car. In the absence of a special account value permissible trailer load applied to the gradient less than 12%.

Run the car with a full trailer load should be permissible only to drivers who have sufficient experience in the towing of large or heavy trailers.

Permitted trailer load values are valid only for these rises at an altitude of 1000 meters above sea level. Because of the thinness of air at higher altitude decreases the engine power and reduced gradeability, permissible trailer load decreases by 10% for each additional 1000 m ascent. When traveling on roads with a slight slope (less than 8%, for example on motorways) to reduce the trailing load is not necessary.

Fig. **1.1.** **Location type plate**

The actual trailer loads and total mass of the towing vehicle together must not exceed the permissible total weight of the train. If a permissible total weight is used in full trailer load can only be used to achieve the permissible total train weight. Permissible total train weight is specified on the type plate (see Fig. 1.1).

Bearing load

Bearing load is a load of pressure on the trailer coupling support. This force can be controlled through weight distribution when loading the trailer.

The maximum allowable bearing load (75 kg) car towing listed on the label with trailer coupling and the documentation of the car. Not be supporting the load of less than 25 kg.

The measurements of the reference load set pole trailer loaded to the altitude where it will be after the accession to the trailer loaded car. This is especially important for trailers with a double axle.

The load on the rear axle while driving with a trailer

When the associated trailer and fully loaded car, truck, including the weight of all passengers, rear axle load must not exceed the permissible load (see the relevant data on the type plate or in the documentation of the car) for a model of «Limousine» of 65 kg and the permissible total mass - 45 kg. For the model «Caravan» can not exceed the permissible rear axle load of 60 kg, and the permissible total weight - 30 kg. If the permissible rear axle load is exceeded, then the maximum speed should not exceed 100 km / h. If a country has set a lower speed when operating with a trailer, you should observe these rules.

Installation of new tires

Tires are in pairs, more complete set. At one bridge put tires of equal size, design, one manufacturer and with the same tread pattern.

Tires with a prescribed direction of rotation mount such a way that they were rolling in the direction of the car. The direction of rotation is shown with an asterisk (eg, arrow) on the sidewall of the tire.

Mounted rearward tires (for example, by changing the wheels) as soon as possible remount. Only in this way ensures optimal use of performance tires.
Some tires have a surrounding rim of thickening, designed to protect alloy rims from damage. Using caps wheels on steel wheels with tires having a protective thickening should observe the following conditions:
- Use the shields of the wheels and tires, admitted to the use by Opel and meet all the requirements of the relevant combinations of wheels and tires.
- In the case of caps of the wheels and tires, not admitted by Opel, the tires should not be protective thickenings.

NOTE
The use of unsuitable tires or wheels caps may lead to a sudden drop in pressure and, consequently, to the accident.

Tire pressure
Check pressure at least once in 14 days and before every long trip on cold tires. Do not forget to check the spare tire.

Fig. **1.238.** **Location puller lid valves**

To facilitate untwisting valve covers use a special puller. It is located on the inner side of the filling hatches (Fig. 1.238).

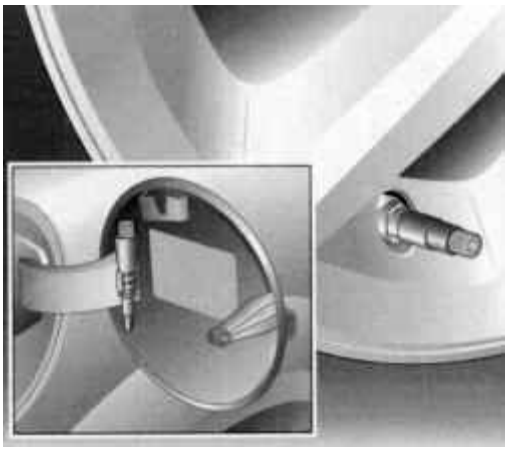


Fig. **1.239.** **Location puller with adapters to install a manometer**

The vehicles with the system of monitoring tire pressure in the lifter to valve caps have an adapter. Before installing the pressure gauge to check pressure wound adapter to valve (Fig. 1.239)
The pressure increased due to heating of tires, can not be reset, or cooling, it could fall below the minimum value.

Fig. **1.240.** **Screwdriving valve cover special key**

After checking tightly screw the lid valve special key (Fig. 1.240).
When the pressure is above or below the specified values decreased security deteriorating driving performance, comfort and fuel consumption, as well as increased tire wear.
Excessively low blood pressure can lead to heat tires, internal injuries and due to this at high speeds - to the running surface of the peeling tires and even to their rupture.
Hidden damage to the tires can not be eliminated subsequent adjustment of air pressure.

Condition of tires, rims state

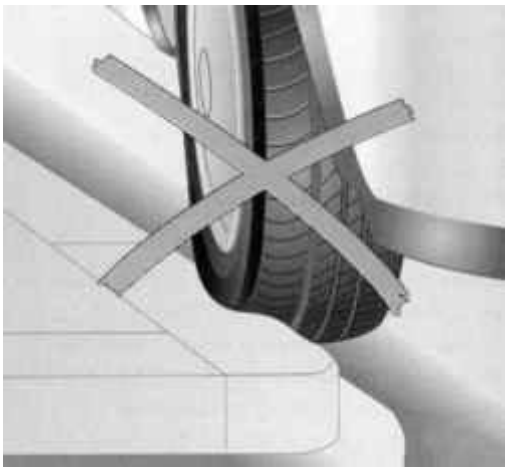


Fig. **1.241.** **Example of illegal parking car**

Curbs moving at low speed and if possible a right angle. Hit a sharp curbs can lead to hidden damage to tires and rims, which manifest themselves later in the form of leaks, which lead to the fall of the set pressure (Fig. 1.241);
Regularly check the tires for damage (punctures, cuts, cracks and dents on the sides). Verify that no damage to the wheels. If any damage or excessive wear should apply to service stations.

NOTICE
Damage can lead to rupture of the tire.

Height tread

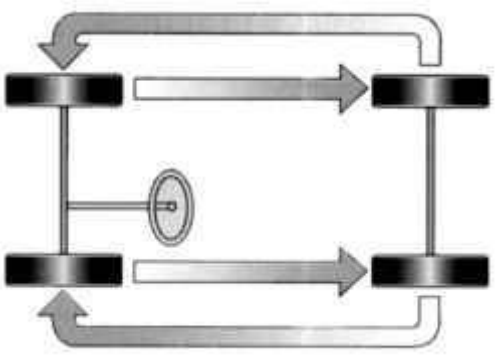


Fig. **1.242.** **Scheme reinstall wheels**

Regularly check the height of the tread pattern. If the wear in the front than the rear, swap the rear and front wheels. Wheels with the best protector should be installed in front (Fig. 1.242).
Adjust tire pressure.
To ensure safety, tires should be replaced at a height of 2-3 mm Tread (winter tires - 4 mm).

Fig. **1.243.** **Pointers tire wear**

Minimum permissible height of the tread pattern (1.6 mm) is achieved when the tread wears out before the wear indicator (TWI). Several signs of wear are shown at the same distance from each other in the pits running surface. Their situation was also pointers to the side of the tire (Figure 1.243).

General recommendations on tire
At low altitude tread greatly increases the risk of aquaplaning.
Tires get old, even if the car does not drive or drives low. Unused spare wheel after 6 months to apply only in extreme cases and only at a slow ride.
Never place used tires, whose origin is unknown.
In order not to impair brake cooling, use only shields the wheels, admitted for this car.

Winter tires
Winter tires at a temperature below 7 ° C provide improved safety, so they should be installed on all wheels.
Summer tires in its construction have limited features for winter operation.
If the maximum allowable speed for winter tires less than the car, attach the index plate with a permissible maximum speed of winter tires in a conspicuous place of the driver.

NOTICE
When using the spare wheel with summer tires may change driving characteristics. Urgent replace the damaged tire, otbalansiruyte wheel and set it on the car.

Wheel Caps
In the case of application is not approved by Opel caps wheels and tires need to pay attention to the fact that the tires had no protective thickening.

Snow chains

Fig. **1.244.** **Snow chains**

The use of chains is allowed only on the leading wheels (front) of the bridge.

Use melkozvennye chain, the height of which, together with a connecting link in the chain of running surface and the inside of the tire is a maximum of 15 mm.

NOTE
Caps made of steel wheels may come into contact with the links of chains and damaged. Before installing the chain shields the wheels should be removed.
Snow chains are allowed to use only up to 50 km / h and at snowless areas only for a short time, since the solid surface, they quickly wear out and can burst.

Emergency Wheel
Use of snow chains on the emergency wheel is not allowed. If you puncture to the front wheel drive with snow chains, emergency wheel should be installed on the rear axle and rear wheel - on the front.

Start the engine by using an auxiliary start cable

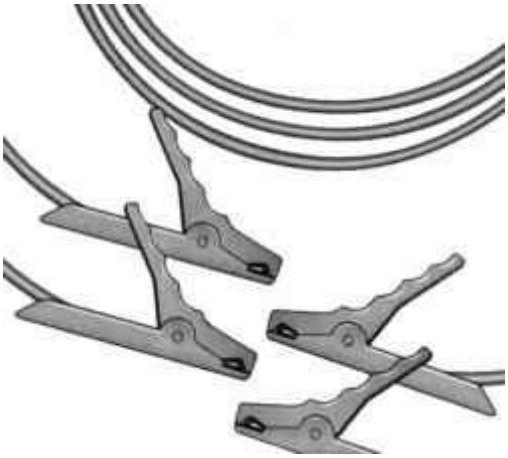


Fig. **1.245.** **Auxiliary starter cables**

If the battery is discharged, the engine can be run using the auxiliary start cable and battery of another car (Figure 1.245).
It should exercise extreme caution. Any deviation from the instructions given may result in injury or damage in the explosion of battery and damage to electrical devices of both cars.
Avoid sparks and open flame near the battery.
The discharged battery can freeze at a temperature 0 ° C. Before you connect the auxiliary starter cable, you need to defrost frozen battery in a warm room.
Do not expose the battery fluid in eyes, on skin, fabric and lacquered surfaces. The fluid contains sulfuric acid, which is in direct contact injuries.
When working with battery wear protective glasses and clothing.
Use the auxiliary battery constant voltage (12 V). Its capacity (Ah) must not be substantially less than the capacity discharged battery. The values of voltage and capacitance are listed on batteries.
Should use an auxiliary starter cable with insulated pole clamps, a section not less than 16 mm ^{2,} for diesel engines - 25 mm $^{2.}$
The discharged battery will disconnect from the onboard network.
Disable unnecessary consumers of current.
During the whole procedure did not lean over the battery.
Pole clamps a cable must not touch the terminals of another.
During the start-up support vehicles must be fixed.
Tighten the parking brake. Manual gearbox and a box Easytronic switch to the neutral position, the automatic transmission - in the position of R.

Connecting the auxiliary battery
Connect the cables to the one shown in Figure 1.246 sequence.
1. Connect the cable to the positive pole 1 auxiliary battery (the plus sign on the building or on the battery terminal).
2. The other end of the cable to the positive pole of 2 discharged battery (plus sign).
3. Connect the cable to the negative pole 3 auxiliary battery (minus sign).

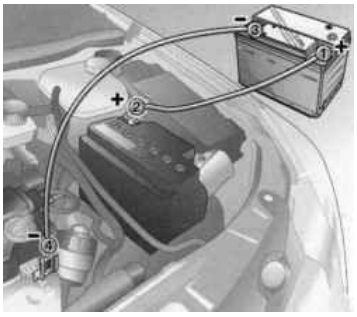


Fig. **1.246.** **The sequence of connecting the auxiliary battery**

4. The other end of the second cable 4 connect with the mass of another car - for example, connect to the engine block or a threaded connection suspension of the engine (Fig. 1.246).

NOTICE
Do not connect the cable to the negative pole of discharged battery.
Connection point should be located as far from the discharged battery.
Cables installed so that they do not touch rotating parts, engine compartment.

Start the car engine, which is fed with current.
After 5 minutes, start the engine of another car. Attempts to start should not last more than 15 seconds with an interval of 1 min.
After starting both engines give them something to work about 3 minutes at idle, without disconnecting cables.
To avoid excessive stress on the electrical system before disconnecting the cables from the terminals should include any consumer of electricity (eg, light, rear window) on the consumption current car.
Removing the cables are manufactured in the reverse order of installation.

Sign of the emergency stop «Limousine»

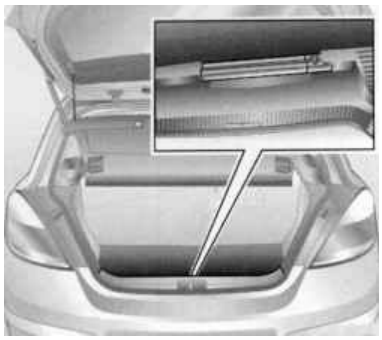


Fig. **1.247.** **Sign of the emergency stop «Limousine»**

Sign of the emergency stop is placed on the back of the trunk (Fig. 1.247).
To install the sign in place, slide it into the hole on the left, then insert in the guide on the right.
To remove the warning triangle, lift it from the right side and pull motion to the right.
In cars with the cargo compartment to lift the warning triangle on the right half of the cargo box. Remove the warning triangle motion to the right.

Sign of the emergency stop «Caravan»

Fig. **1.248.** **Sign of the emergency stop «Caravan»**

To install the sign in place, attach it to the fastening straps on the inside padding of the back door (Fig. 1.248)

Road kit «Limousine»

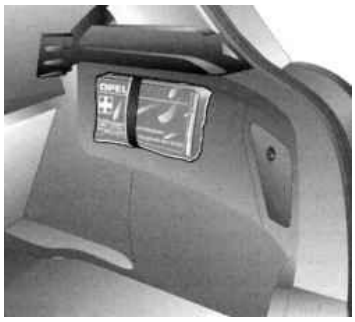


Fig. **1.249.** **Road kit «Limousine»**

Road kit is fastened with a belt on the right side of the trunk (Fig. 1.249).

Dressing «Caravan»

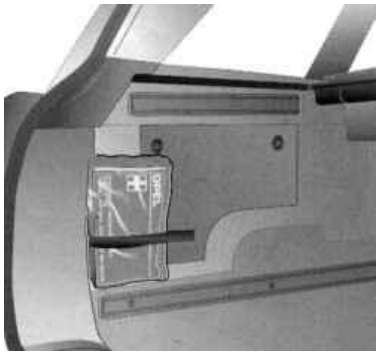


Fig. **1.250.** **Dressing «Caravan»**

Spare wheel

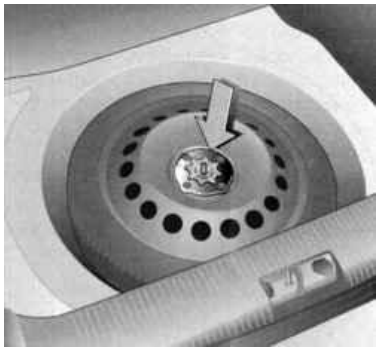


Fig. **1.251.** **Spare wheel**

The spare wheel is located in the trunk under the hood floor. It is enshrined nut. In the model «Caravan» over the mounting nut is laying.

Fig. **1.252.** **Removing the spare wheel**

In order to get the spare tire on the car models «Caravan», unplug the adapters and hooks from the guides in the walls of the luggage. Rear mounting lugs, set up and lift the hood floor to a vertical position so that he stood in the internal padding of the roof (Fig. 1.252).
With the addition of mounting lugs attach to the housing of sex through the slot.

General recommendations on the exploitation of the spare wheel
Spare wheel, depending on the version, can be accomplished as accidental.
When preparing the car alloy rims spare tire may have a steel rim.
When using the spare wheel with summer tires on a car with winter tires can change their driving performance. Urgent pomenyate faulty tire, otbalansiruyte wheel and install it on the car.
Spare tire may have a rim and tire smaller than the vehicle-mounted wheel. In this case, using the spare wheel can also change the driving characteristics. Urgent replace the damaged tire, otbalansiruyte wheel and set it on the car.

Instructions for using the emergency wheel
Mount only one emergency wheel.
Do not exceed the speed of 80 km / h.
Turns Keep moving slowly.
Do not use the emergency wheel for a long time.
How quickly replace the emergency wheel normal wheel.
Do not install the emergency wheel chains. If you puncture the front wheel to move with the use of chains, set the emergency wheel on the rear axle and rear wheel Relocate to the front. Check and if necessary, adjust tire pressure.

Jack and car tools
Jack and tools are designed specifically for this car. Use the jack only to replace the wheels.

Fig. **1.253.** **Jack and car tools**

Jack and tools are in the car trunk, in a compartment under the spare wheel (Fig. 1.253).
On vehicles with the tire repair kit car is a tool with this kit in the luggage compartment, in the recess for the spare wheel.

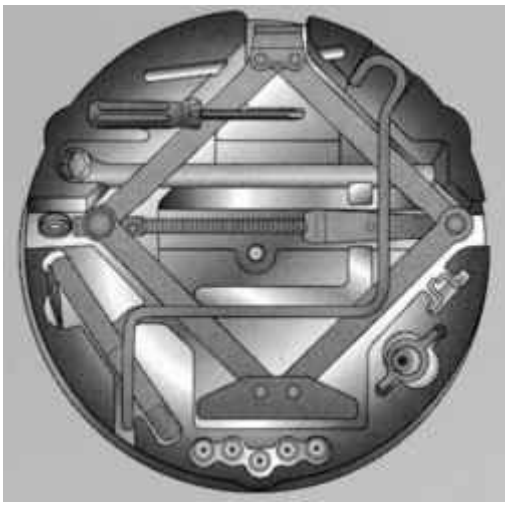


Fig. **1.254.** **The order of placing the car jack and tools**

After use, place the car jack and tools in the bay, as shown in Figure 1.254.

Replacement wheel

Instead of the spare wheel vehicle can be equipped with a tire repair kit.
During the replacement wheels for your own safety Perform preparatory work described below.
Set the car on a flat, firm and skid pad.
Turn on hazard warning lights, tighten the parking brake, the automatic transmission, set the gear lever in park position P, on the manual transmission or Easytronic box including 1-S transmission or reverse.
Exhibitions, in accordance with the requirements of the law, warning triangle.
Remove the spare tire from the trunk.
Before the rise of the car give front-wheel drive in a direct position.

NOTICE
It is strictly forbidden at the same time change the number of wheels.

Block the wheel, located diagonally to the changing, resting in front of and behind the wheel of wedges or similar items.
Please only use the jack for changing wheels.
In soft ground put a jack under sustained maximum thickness of the lining of 1 cm Use thicker pads can cause damage to the jack and the car.
In the lifted car should not be people or animals.
Do not crawl under the raised car jack.
Do not start the engine when the car upright.

Replacement procedure

Fig. **1.255.** **Removing wheel cap**

Remove the wheel cap with hook (Fig. 1.255).

Fig. **1,256.** **Removing plugs wheel bolts**

On alloy wheels with a screwdriver, release the cap bolts and remove their wheels (Fig. 1.256).

Fig. **1.257. Loosening wheel bolts**

Loosen the wheel bolts with a special Socket wrenches inserting it until it stops (Fig. 1.257).

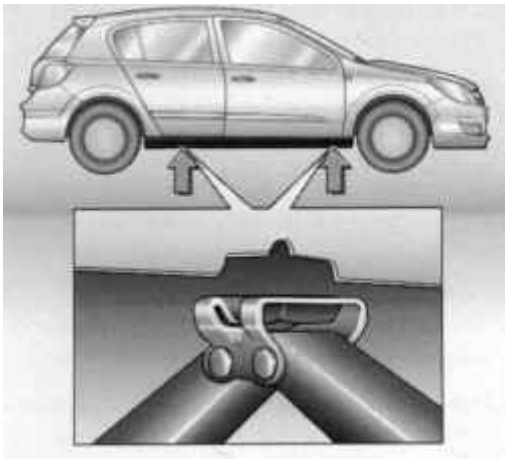


Fig. **1.258. Places install Ammunition jack**

NOTE
Places to install the jack on the bottom of the car indicated marks on the bottom edge of the body (Fig. 1.258).

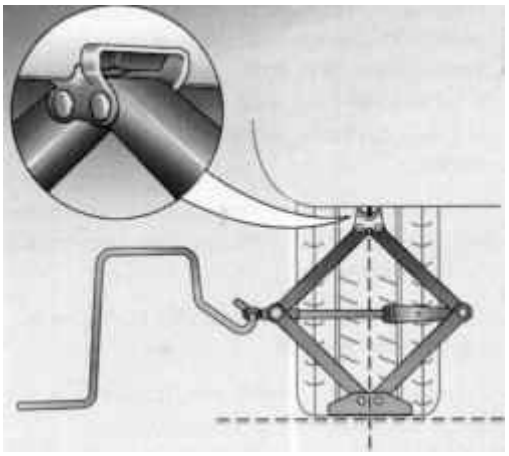


Fig. **1.259. Scheme correctly installed Ammunition jack**

Before installing the ram manually adjust the height by turning the lugs. To install the jack so that it covered the seizure of the vertical edge and was a slot in it (Fig. 1.259).
Check the reliability of the installation.
Toe jack set on the ground vertically beneath the point of installation.

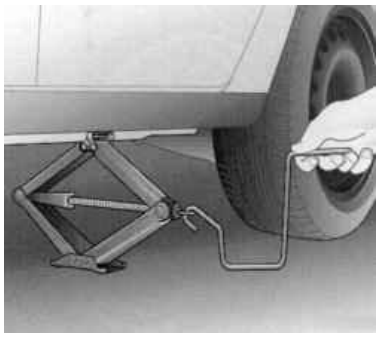


Fig. **1.260.** **Lifting the vehicle**

Insert the handle into the eyelet threaded rod and the rotation of the handle lift the car (Fig. 1.260).

NOTE
If in the process of lifting toe was not strictly a point of installation, immediately gently lower the car and repeat the procedure to install the jack.

Remove the screws and put them wheels so that the thread is not contaminated.
Replace the wheel.

Fig. **1.261.** **Tightening wheel bolts**

Screw the wheel bolts and lightly tighten them, and the insert face wrench until it stops (Fig. 1.261).
Lower the car.
Tighten the wheel bolts crosswise, with the insert face wrench until it stops.
Before installing the wheel cover to clear the wheel at the site of clamping holders. The symbol of the valve with the back of the wheel cover is for the valve wheel.
Install and tighten the cap and wheels, respectively, caps wheel bolts.
Replaced wheel, instrument and warning triangle place in the trunk.
Check the tire pressure set the wheels when necessary, correct it.
Using a torque wrench, check the time of bolting the wheels on the fixed wheel, when necessary, correct it.
Replace the defective tire.
At the first opportunity to completely replace the wrecked wheel to normal.
Initialize the control system tire failure or a system to monitor tire pressure.

Towing

Fig. **1.262.** **Removing the aperture for the tow loop**

Open the aperture for towing eyelets in the front right side (Fig. 1.262).
To release the latches from the bottom cover and remove it.
Towing lug is in the clothing compartment for the jack and motor instrument or in the clothing compartment for the tire repair kit in the trunk, in the recess for the spare wheel.

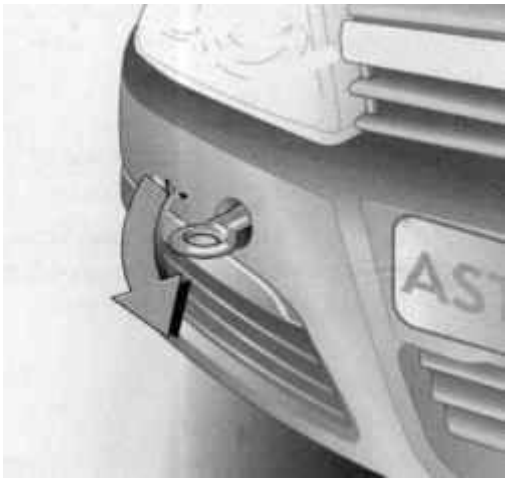


Fig. **1.263.** **Fixing the tow loop**

Tighten the left towing eyelet and tighten until it stops in a horizontal position (Fig. 1.263).
Attach a tow rope or tow bar to the eyelet.
Turn on the ignition to unlock the steering wheel and to ensure that the brake lights, sound signals and wipers.
Manual transmission or Easytronic gearbox must be installed in idle mode, automatic transmission - is included in the position of N.
Slowly touch the place with. Do not let jerks. Excessive traction may cause damage to cars.
For inhibition requires much more effort, since the braking power is valid only when the engine is running.
The rotation of the steering wheel will also require greater effort, since the power steering mechanism works only when the engine.
Turn on the system of air circulation and close the window to the salon did not get towed vehicle exhaust gases.

Terms towing
Vehicles with automatic transmission can tow only forward at a speed not exceeding 80 km / h and at a distance of no more than 100 km. When the faulty transmission, higher speeds or longer distances need to raise the tow vehicle for the front axle.

NOTE
If the cars with Easytronic transmission with interruption of power supply was turned off auto-clutch manual, towing is not allowed. In this case, you should immediately seek assistance at service stations.

Towing another vehicle

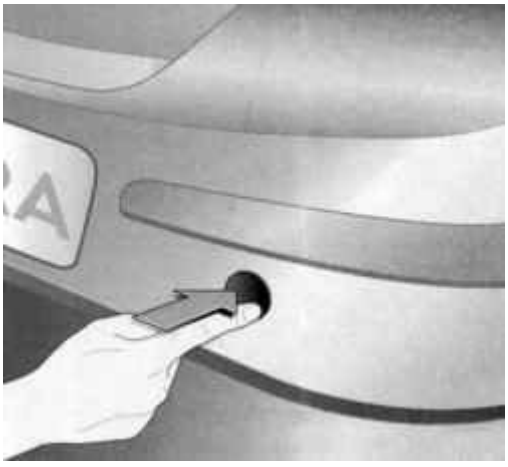


Fig. **1.264.** **Location rear tow loop**

Open the aperture for towing lug back to the right (Fig. 1.264).

Click the cover down to release the latches, and remove it.
Towing lug is in the clothing compartment for the jack and the car instrument or in the case for the tire repair kit in the trunk, in the recess for the spare wheel.

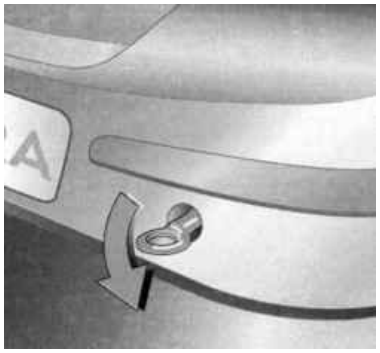


Fig. **1.265.** **Fixing rear tow loop**

Tighten the left towing eyelet and tighten until it stops in a horizontal position (Fig. 1.265).
Attach a tow rope or tow bar to the eyelet.
Slowly touch the place with. Do not let jerks. Excessive traction may cause damage to cars.

Tire repair kit

Minor damage to the running surface and the tire sidewalls, such as punctures extraneous objects, can be eliminated with a set of tires for repair.
Damage to tires larger than 4 mm, as well as damage to the rim with tire repair kit can not be repaired.
Driving with too low pressure in the tire or run flat tire leads to hidden damage that can not be corrected with a set of tires for repair. Park your car and ask for help at service stations.

Fig. **1.266.** **Location tire repair kit**

Tire repair kit is located in the luggage compartment, in the recess for the spare wheel (Fig. 1.266).

Using the kit for tire repair
Remove the bag with a tire repair kit from the bay. Carefully remove the parts kit from the bag.
Remove the compressor.

Fig. **1.267.** **Removing elektroshnura**

Remove elektroshnur and air hose from offices on the lower side of the compressor (Fig. 1.267).

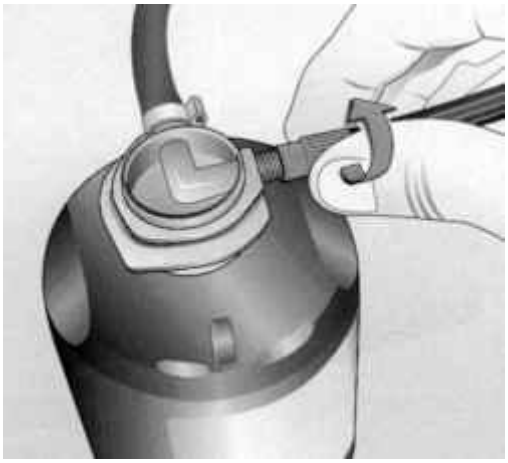


Fig. **1.268.** **Installation of air compressor hose**

Screw the air hose to the compressor fitting the flask with a sealant (Fig. 1.268).
Insert the flask sealed with a holder on the compressor.
Install the compressor closer to the wheel to the flask was sealed with the vertical.
Unscrew the valve cap of the damaged tire.

Fig. **1.269.** **Binding the hose to the valve to inflate the tires**

Screw the hose to inflate a tire valve (Fig. 1.269).
Switch the compressor must be in the position.
Insert the plug the cord into the outlet of the compressor for supplies or cigarette lighter socket.
Turn on the ignition.

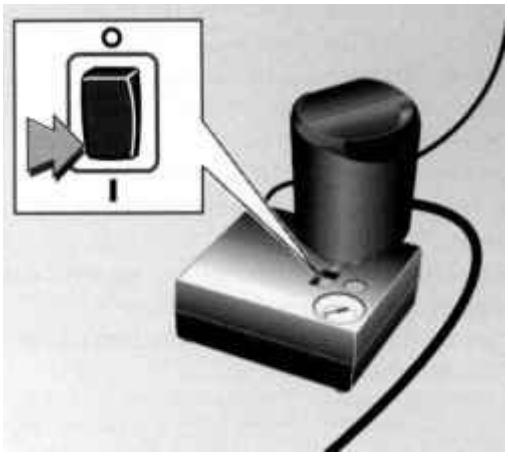


Fig. **1.270.** **Button on and off the compressor**

Set toggle switch on the compressor in the position I, a tire will be filled with sealant (Fig. 1.270).

NOTE
During the devastation of the flask with a sealant (about 30 s) on the gauge will be displayed briefly compressor pressure to 6 bar. After this pressure is lowered.

Sealant will be fully pumped into the tire. After the tire is inflated with air.
The target tire pressure should be achieved within 10 min. Turn off the compressor reaches the specified pressure.
If the prescribed tire pressure is not reached within 10 minutes, remove tire repair kit. Push the car a distance of about 2 meters (one turn of tires) in the direction of motion or back. Reinstall the tire repair kit, and then continue pumping for another 10 min. If during this time will not achieve the prescribed pressure in the tires, so tire is damaged too much. Park your car and ask for help at service stations.

Fig. **1.271.** **Reset button pressure**

NOTE
Excessive pressure is reset using the button on the gauge (Fig. 1.271).

NOTICE
Do not switch the compressor for longer than 10 minutes.

Remove the tire repair kit. Screw the hose to inflate tires to a free socket flasks with sealant. This prevents leakage of sealant. Remove the tire repair kit in the trunk.
Remove speaking sealant with a rag.
Fold the warning triangle and remove the trunk.
Appended to the kit label the maximum available speed, which allowed to go after the repair tires. Attach the sticker in the driver's field of vision.

Fig. **1.272.** **Installation of compressor**

Immediately proceed with a trip to the sealant evenly distributed within the tire. About 10 kilometers (not later than 10 minutes) stop and check the tire pressure. To do this, screw air compressor hose directly to the tire valve (see Fig. 1.272).

NOTE
If the tire pressure exceeds 1,3 bar, turn down it to the specified value. Repeat the process until such time as there is no fixed pressure loss.
If the tire pressure has fallen below 1,3 bar, go on a car can not. Obratittes for help at service stations.

Motor Oil

Level and flow of motor oil

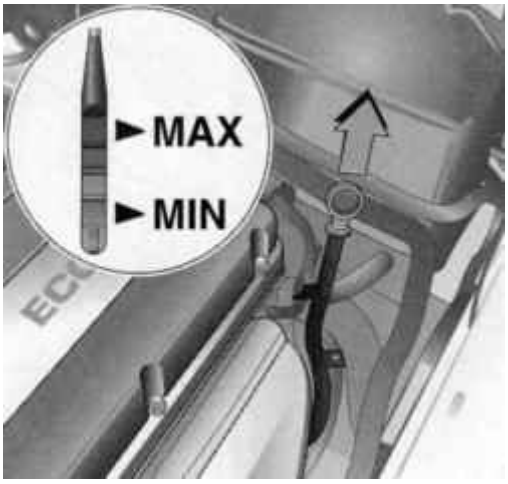


Fig. **1.273.** **Masloizmeritelny probe Astra motor car**

Rate oil consumption is possible only after a sufficiently long run, while in the initial period (during running) the level of expenditure may exceed the value specified in the documentation. Frequent driving at high engine speeds also leads to increased oil consumption.

Controlling the level of engine oil is carried out automatically. Before long trip is recommended to monitor the level of motor oil.

Control level and refilling the engine oil

Control is performed only on the car and placed horizontally off a hot engine. Before you check wait at least 5 minutes to oil, located in the lubricating circuit has had time to drain the oil pan.

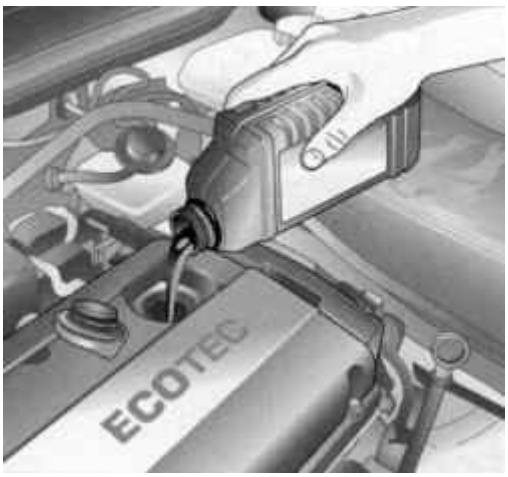


Fig. **1.274.** **Topped engine oil**

To check the oil level plug grated masloizmeritelny probe to the hard surface on the handle. Top up the oil, if its level dropped in the region mark refueling MIN (Fig. 1.274).

The oil level should not exceed the upper mark MAX oil level gauge. Transfused oil drain or pump out. If the oil level exceeds the MAX mark, there is a risk of engine damage or a catalyst.

Oil should be topped up with the same brand that was used in the previous oil change, observing the instructions in the service book.

Position the plug and tighten it until it stops.

Coolant

During operation the system is under increased pressure, so the temperature may briefly rise above 100 ° C.

Coolant through glycol provides corrosion protection for cooling and heating, as well as from freezing to about -28 ° C. She remains in the cooling system all year round and does not need to be replaced.

The use of some anti-freeze can cause damage to the engine. To avoid this, use antifreeze, admitted by Opel.

Antifreeze is harmful to health, so keep it only in the original packaging and take care of the children.

Protect from freezing and corrosion protection

Before the winter period, check the concentration of the coolant. Contents of antifreeze in the radiator should provide protection from freezing to about -28 ° C.

Fig. **1.275. Check the concentration of antifreeze**

Fig. **1.276. Mess with the coolant**

Too low concentration of antifreeze affects the protection against freezing and corrosion. If necessary, add antifreeze.

In the case of loss of coolant top up the water, check the concentration of antifreeze and if necessary, add antifreeze (Fig. 1.275).

The level of coolant

In a closed system, cooling losses are practically absent, so refilling the coolant is needed very rarely.

The level of coolant in the compensating tank with cold cooling system should be slightly above the mark KALT / COLD. When warmed up to operating temperature the engine level rises, and when cooling is reduced again. If he falls below the mark, top up coolant should be a little above it.

Before opening plugs allow the engine to cool down. Carefully open the tube to excessive pressure slowly fell, because otherwise there is a risk of burns.

Top up the antifreeze. In the absence of antifreeze tuck system clean drinking water or distilled water as a substitute.

After refueling drinking or distilled water, check the concentration of antifreeze and if necessary, add it. Eliminate the cause of loss of coolant.

Position the plug and tighten it until it stops.

Coolant temperature

Illuminated the appropriate sensors on the instrument cluster shows the excess coolant temperature. Immediately check the coolant level.

Brake fluid

The level of brake fluid

The level of brake fluid in the tank must be above MAX mark and below the MIN.

NOTICE

Brake fluid is toxic. Keep it in the eyes, on skin, fabric and lacquered surfaces. Direct contact with the brake fluid can cause injury and damage.

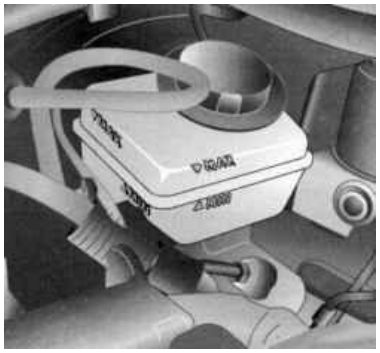


Fig. **1.277.** **Mess with brake fluid**

There are brake fluid, use of which could result in damage or deterioration in braking performance, so use only high-quality brake fluid.
If refueling is necessary to ensure the highest degree of purity, as well as contamination of brake fluid can lead to abnormal functioning of the braking system.
After topping up the brake fluid eliminate the cause of her loss.

Replacing brake fluid
Brake fluid is hygroscopic, ie it absorbs moisture. Due to excessive heat build up during braking, for example on the long descent, can be formed vapor bubbles, which significantly (depending on water content) impair the effectiveness of inhibition.
You should exercise the brake fluid change intervals specified in the service book.

Replacement lamps

NOTICE
Before replacing the lamp, turn off the ignition and the appropriate switch.
New lamp take only a cap. Do not take the lamp for the glass with bare hands, because otherwise the glass remains fingerprints. Dirt settles on the reflector and impairs its reflectivity. Remove traces of touch nevoloknistoy clean cloth soaked in alcohol.

Replaceable lamp podobirayte in accordance with the marking on the pedestal of defective lamps. Do not exceed specified wattage.

Fig. **1.278.** **Gaps in the front wheel recess**

Replacement lamps extreme front headlight unit is made through the openings in the front wheel recess. To do this, turn the wheel in the desired direction, release the clamp and remove the cover (Fig. 1.278).

Adjusting headlights

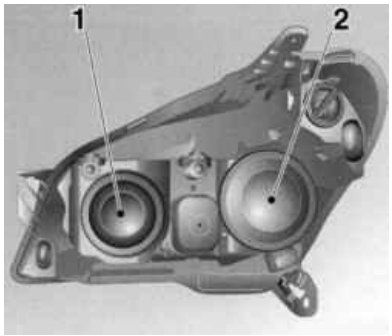


Fig. **1.279.** **Headlights**

In the management of lights set to 0 the corresponding control angle headlights.

Replace dim light bulbs

Fig. **1.280.** **Kolpak lights**

Remove the cap lamp (Fig. 1.280).

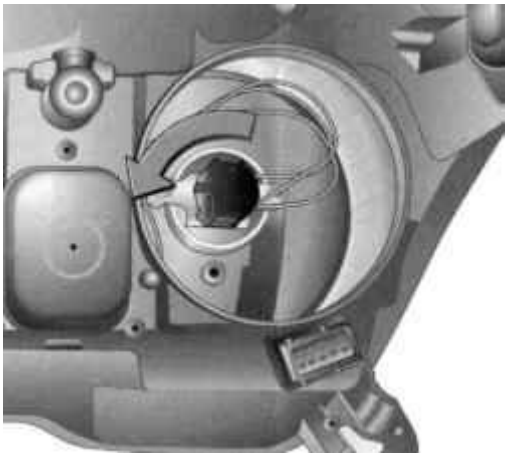


Fig. **1.281.** **Releasing the lamp holder**

Turn left and release the latch from the lamp holder (Fig. 1.281).

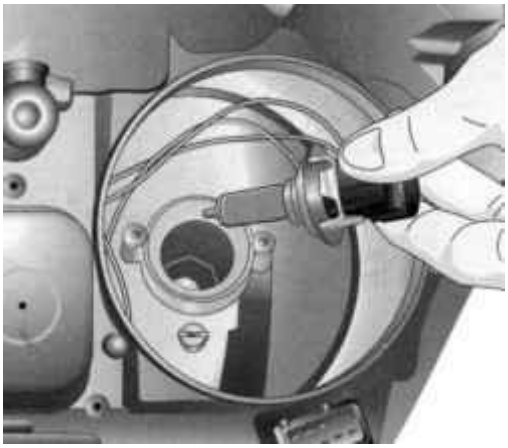


Fig. **1.282.** **Removing the lamp from reflktora**

Remove the lamp holder together with the lamp from the reflector (Fig. 1.282).

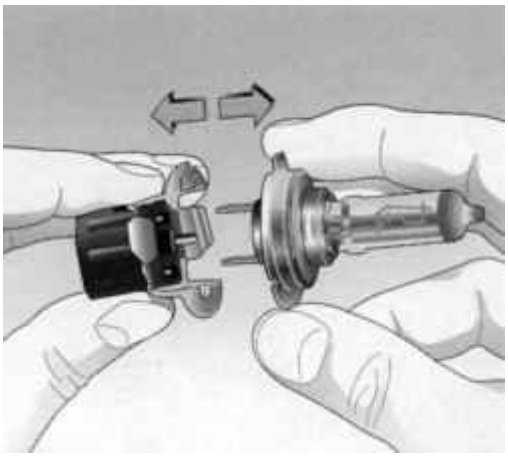


Fig. **1.283.** **Removing the lamp from the holder**

Remove the bulb from the holder (Fig. 1.283).
Insert the new lamp into the holder without touching with its bulb.
Insert the lamp holder so that it coincided with the locking lugs notches reflector.
Turn the lamp holder to the right until it stops.
Install and close the protective cap lights.
Replace the lid on the hole in the wheel recess and fix it.

Replacement lamp beam
Open the hood.
Replacing the lamp beam is produced from the engine compartment.
When replacing the lamp on the right side remove the hose from the air filter.
When replacing the lamp on the left side, disconnect the connector on the fuse box.

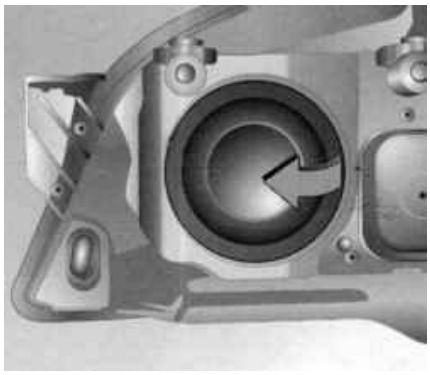


Fig. **1.284.** **Kolpak lights**

Remove the cap lamp (Fig. 1.284).
Disconnect the plug from the lamp.
Release the spring-wire clamp, pushing forward with projections of restraint, and turn it down.
Remove the lamp from the holder.
When installing a new lamp insert the locking lugs in the recesses of the reflector, it does not touch her flask.
Secure the spring-wire clamp, insert the plug into the lamp.
Install and close the protective cap lights.
After replacing the lamp on the right side, install and tighten the hose to the air filter.

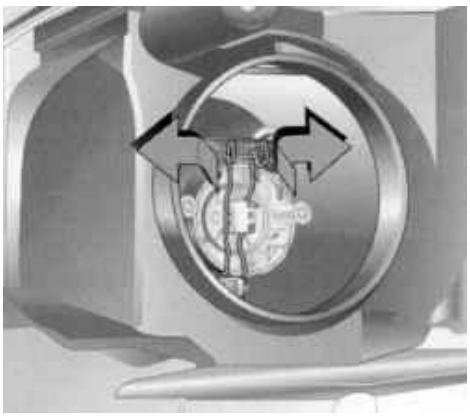


Fig. **1.285.** **Plug lamp**

When replacing the lamp on the left side, attach and tighten the connector on the fuse box.

Replacing parking light bulbs
Open the hood.
Replacing the lamp beam is produced from the engine compartment.
When replacing the lamp on the right side remove the hose from the air filter.
When replacing the lamp on the left side, disconnect the connector on the fuse box.

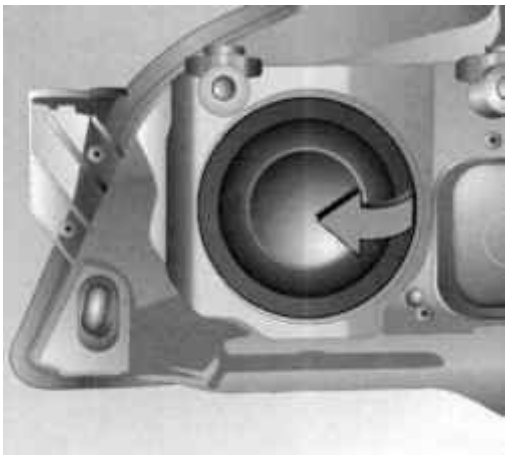


Fig. **1.286.** **Protective cover the parking lights light**

Remove the protective cap lights parking light (Fig. 1.286).

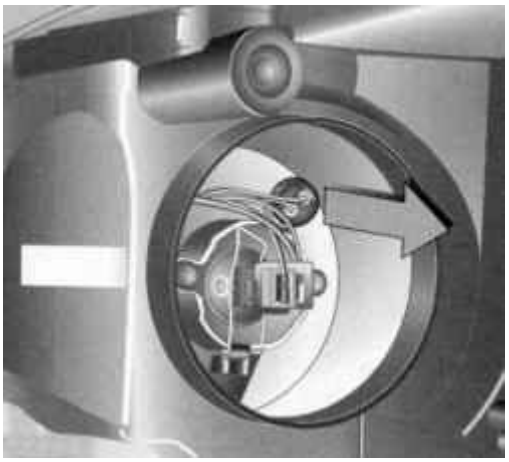


Fig. **1.287.** **Removing the lamp holder**

Remove the reflector lamp parking lamp (Fig. 1.287).

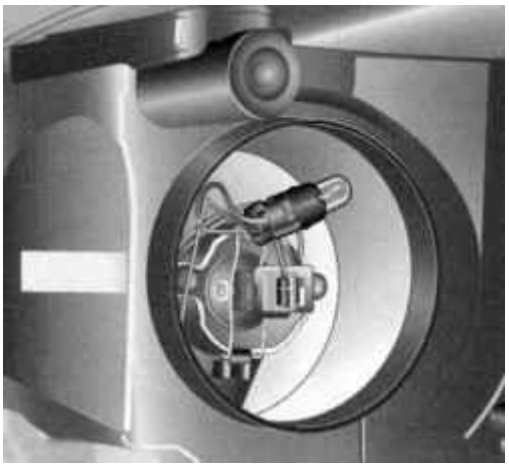


Fig. **1.288.** **Removing headlight**

Remove the lamp from the cartridge (Fig. 1.288).
Insert the new bulb without touching with its bulb.
Insert the cartridge in the reflector, install, and close the protective cap lamps.
After replacing the lamp on the right side, install and tighten the hose to the air filter.

When replacing the lamp on the left side, attach and tighten the connector on the fuse box.

System xenon headlamps, adaptive headlights (AFL)

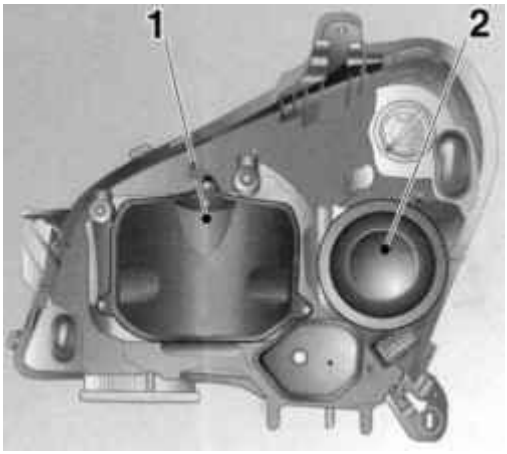


Fig. **1.289.** **Headlight xenon light**

Lights Xenon light bulbs are composed of groups with separate systems of beam 1 (inner tubes) and beam 2 (the extreme lamp) (Fig. 1.289).

Passing

NOTICE
Passing operates at very high electric voltage. Do not touch the connectors - this is dangerous to life. Requested to replace the bulbs xenon light specialists servicing station.

Replacement lamp beam
Replacing the lamp is made through a hole in the wheel recess. To do this, turn the wheel in the desired direction, release the clamp and remove the cover (see Fig. 1.278).

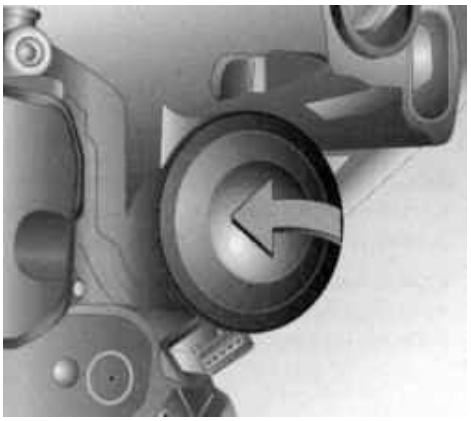


Fig. **1.290.** **Removing the cap**

Remove the cap lamp (Fig. 1.290).

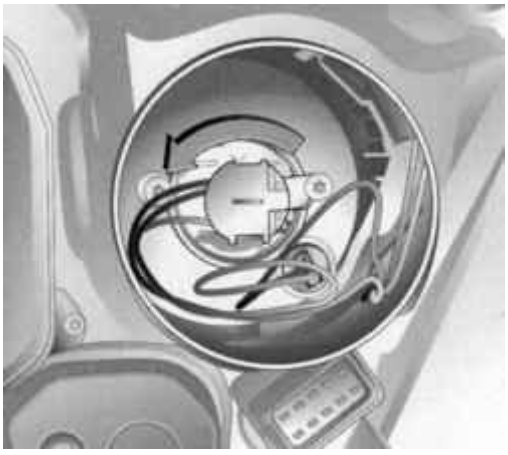


Fig. **1.291.** **Velcro lamp holder**

Turn left and release the latch from the lamp holder (Fig. 1.291).

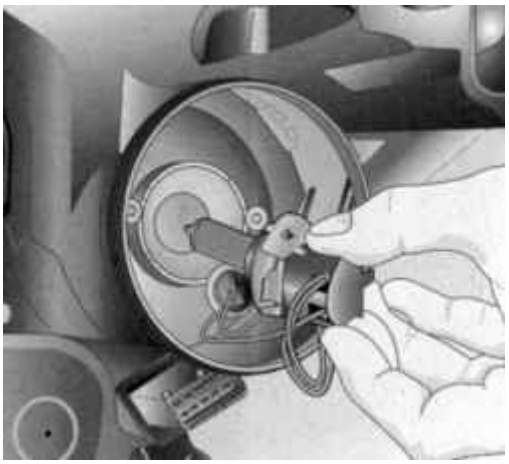


Fig. **1.292.** **Removing the lamp with a cartridge**

Remove the cartridge from a lamp with reflector (Fig. 1.292).

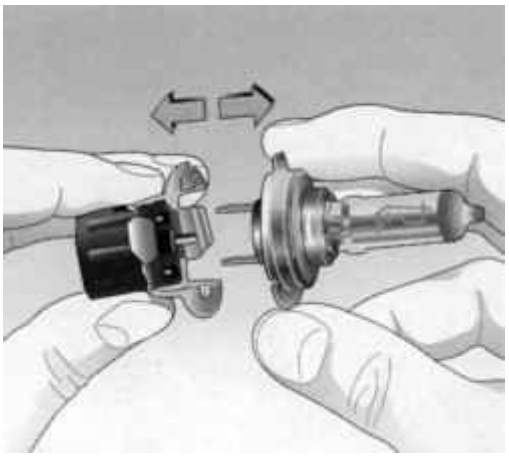


Fig. **1.293.** **Removing the lamp from the holder**

Remove the bulb from the holder (Fig. 1.293).
Insert the new lamp into the holder without touching with its bulb.
Insert the lamp holder so that it coincided with the locking lugs notches reflector.
Turn the lamp holder to the right until it stops.
Install and close the protective cap lamps.
Replace the lid on the hole in the wheel recess and fix it.

Replacing parking light bulbs
Open the hood.
Replacing the lamp beam is produced from the engine compartment.
When replacing the lamp on the right side remove the hose from the air filter.
When replacing the lamp on the left side, disconnect the connector on the fuse box.

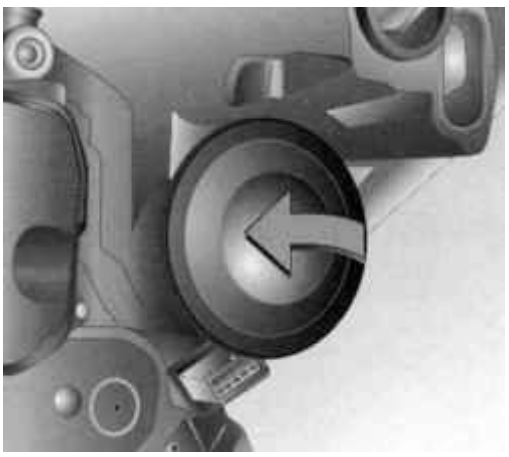


Fig. **1.294.** **Protective cover the parking lights light**

Remove the protective cap lights parking light (Fig. 1.294).

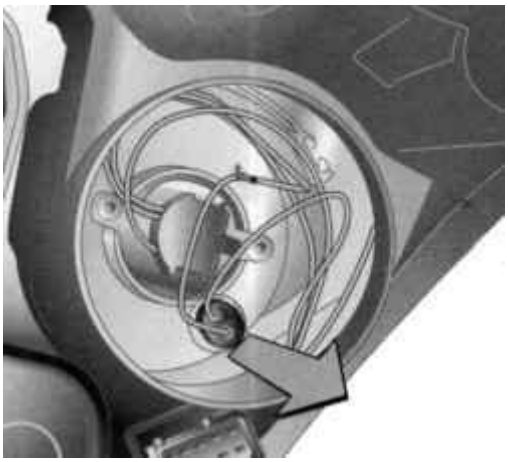


Fig. **1.295. Removing the lamp holder**

Remove the reflector lamp parking lamp (Fig. 1.295).

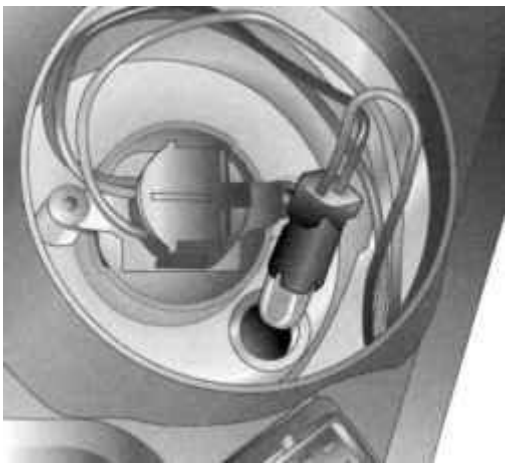


Fig. **1.296. Removing headlight**

Remove the lamp from the cartridge (Fig. 1.296).
Insert the new bulb without touching with its bulb.
Insert the cartridge in the reflector, install, and close the protective cap lamps.
After replacing the lamp on the right side, install and tighten the hose to the air filter.
When replacing the lamp on the left side, attach and fix it.

Replacement lamps perednihukazateli rotation
Open the hood.
Replacing the lamp beam is produced from the engine compartment.

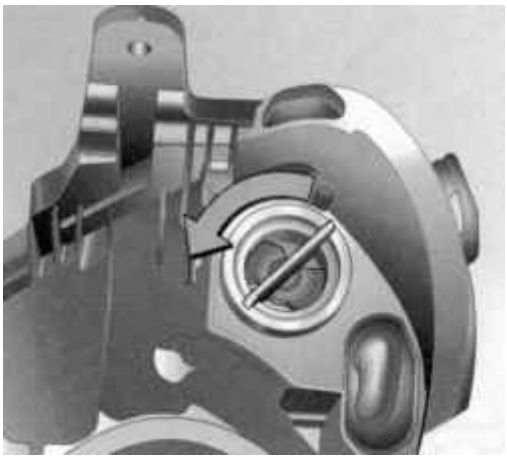


Fig. **1.297. Releasing the lamp holder**

Turn left and release the latch from the lamp holder (Fig. 1.297).

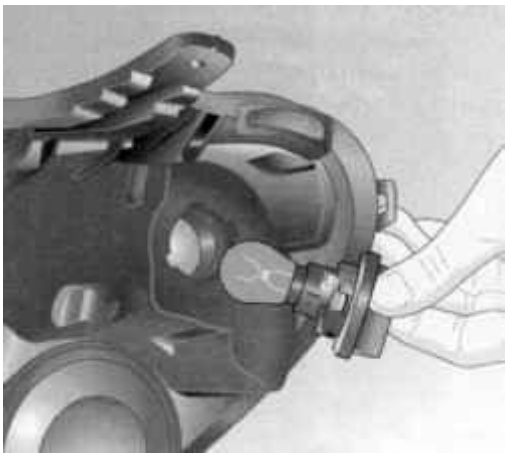


Fig. **1.298.** **Removing headlight**

Lightly press the lamp in the cartridge, turn left and pull it in Fig. 1.298).
Insert the new bulb without touching at the same time to its klobe.
Insert the lamp in the reflector, turn right and fix it.
Replace the lid on the hole in the wheel recess and fix it.

Replacement lamps rear combination lamps («Limousine»)

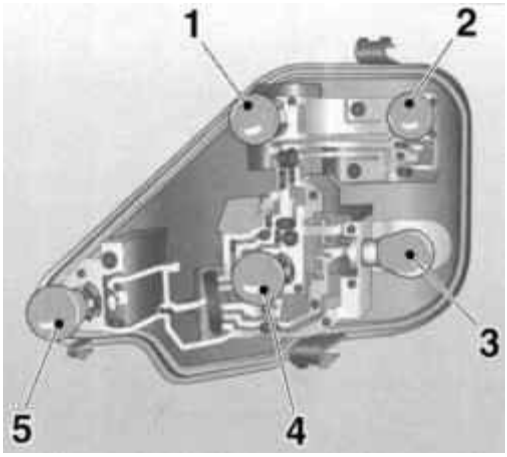


Fig. **1.299.** **Paws rear combination lamps: 1 - reverse 2 - direction indicator, 3 - marker / brake light, 4 - position lamp, 5 - rear fog lamp**

Fig. **1.300.** **Turning the latch cover**

To replace the bulbs on the right side of the coin, turn the lock, as shown in Figure 1.300, and flip the lid down.
To replace the bulbs on the left side, turn both latch flip the coin and the lid down.

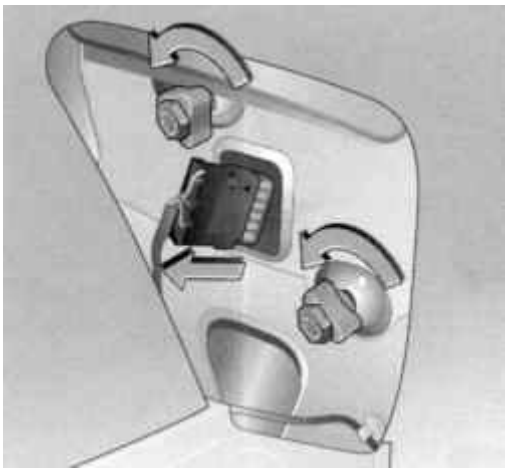


Fig. **1.301.** **Removing the plug cable with lamp holder**

Remove the cable plug to the lamp holder (Fig. 1.301).
Holding the lamp housing from the outside, loosen the nuts wrench for wheel bolts and unscrew them with his hand.

Fig. **1.302.** **Removing the lamp housing**

Remove the lamp housing by having his back (Fig. 1.302).

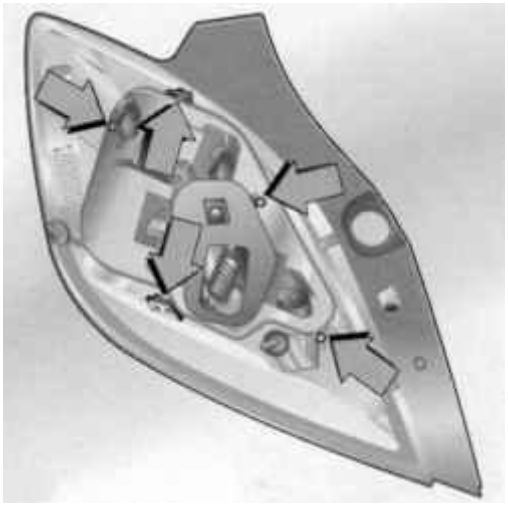


Fig. **1.303.** **Screw lamp holder**

Remove the three screws with a screwdriver (Fig. 1.303).
Wring out the tabs on the outer side of the fixator lamp holder and remove it.
Remove the necessary lamp from the holder.
Insert the new bulb without touching the glass bulb. Fix the holder in the lamp housing. Insert the lamp housing to the body and hand tighten the nuts. Insert the plug the cable into place. Close and lock lid.
To insure proper operation of the rear lights:
- Turn on the ignition;
- Press the brake pedal;

- Turn on the parking light.

Replacement lamps rear combination lamps («Caravan»)

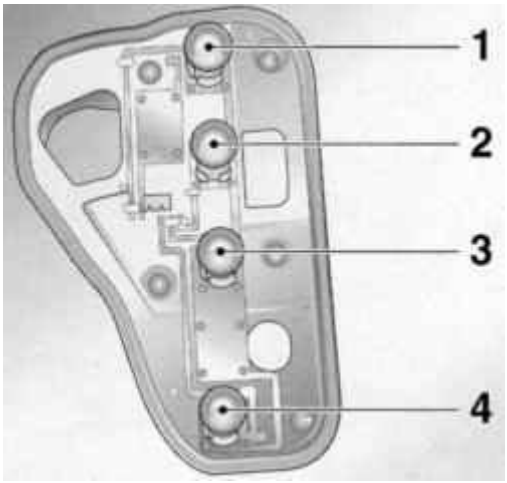


Fig. **1.304.** **Paws rear combination lamps: 1 - marker lamps / brake light, 2 - indicator lamps, 3 - lamp reversing, 4 - rear fog lamp**

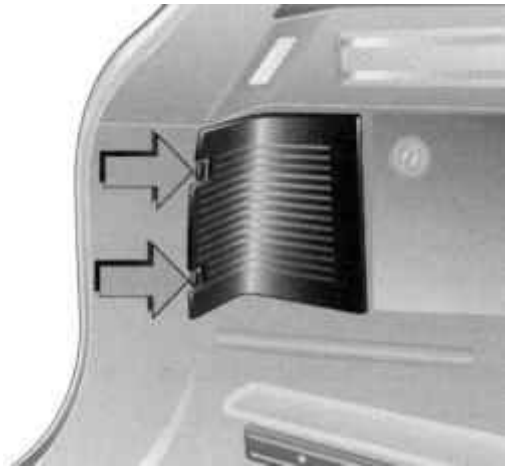


Fig. **1.305.** **Removing the combined lantern**

Unlock the cover by pressing the clamp retainers and remove it (Fig. 1.305).
Remove the cable plug to the lamp holder.

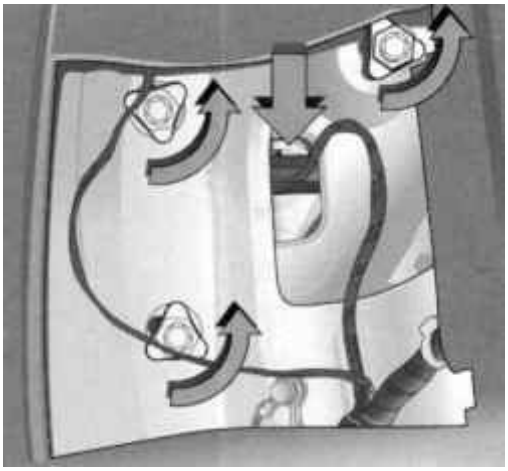


Fig. **1.306.** **Removing the lamp housing**

Holding the lamp housing from the outside, remove the nuts and remove it, pulled back (Fig. 1.306).
Remove the three screws with a screwdriver and remove the lamp holder.

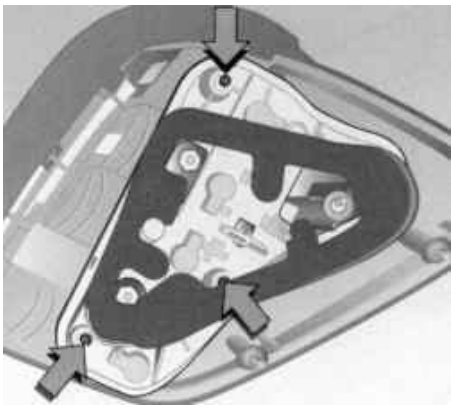


Fig. **1.307.** **Screw lamp holder**

Remove the necessary lamp from the holder.

Insert the new bulb without touching the glass bulb. Insert the holder in the lamp housing and secure it with bolts. Insert the lamp housing to the body and hand tighten the nuts. Lock the plug wires. Close and lock lid.
To insure proper operation of the rear lights:
- Turn on the ignition;
- Press the brake pedal;
- Turn on the parking light.

Replacement lamps and lighting plate

Fig. **1.308.** **Unlock the spring holder body lamps**

Insert a screwdriver, as shown in Figure 1.308.
Click and unlock the spring holder.

Fig. **1.309.** **Removing the lamp housing**

Remove the lamp housing (Fig. 1.309).

NOTE
Do not pull the cable housing.

Lift the pad and remove the plug from the lamp holder.
Turn the lamp holder to the left and remove it.

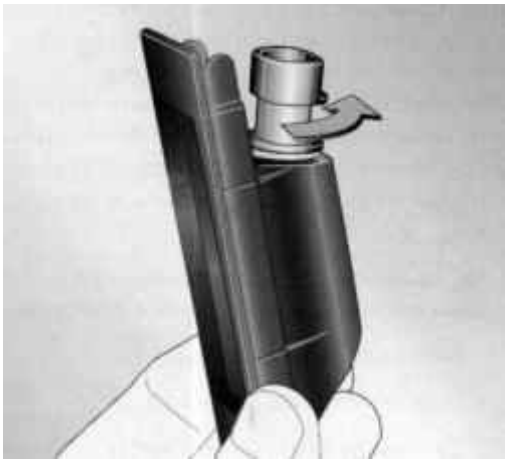


Fig. **1.310.** **Removing headlight**

Remove the lamp from the cartridge (Fig. 1.310).
Insert the new bulb without touching with its bulb.
Insert the cartridge into the body of the lamp and lock it by turning right.
Insert the plug into the lamp holder.
Insert and secure housing.

Replacing the lamp interior lighting front
To disconnect a lamp before it dismantles close the door.

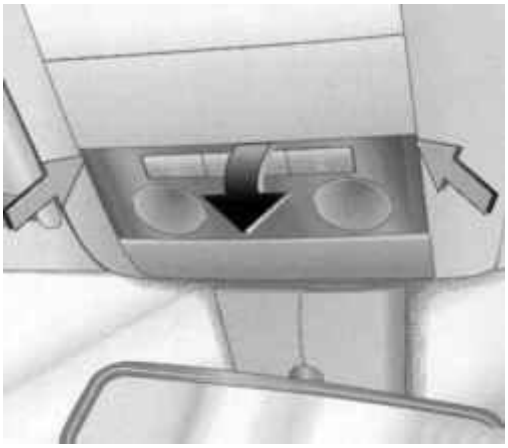


Fig. **1.311.** **Removing the lens**

Release the lens, taking his hands in shown on 1,311 places, slightly bend down and pull back diagonally.
Remove the lamp from the holder.
Insert the new bulb without touching with its bulb.
Install and fix the glass of the lens.

Replacement lamp lighting glove compartment
To disconnect a lamp before it dismantles close the doors or hold the limit switch.

Fig. **1.312.** **Removing the lamp**

Loosen and remove the lamp with a screwdriver (Fig. 1.312).
Lightly push the lamp in the direction of spring terminals and remove it.
Insert the new bulb without touching with its bulb.
Insert the lamp into the hole and fix the lamp.

Electrical equipment

Fuses

The car has two fuse boxes: in the trunk lid and left for the front left in the engine compartment.

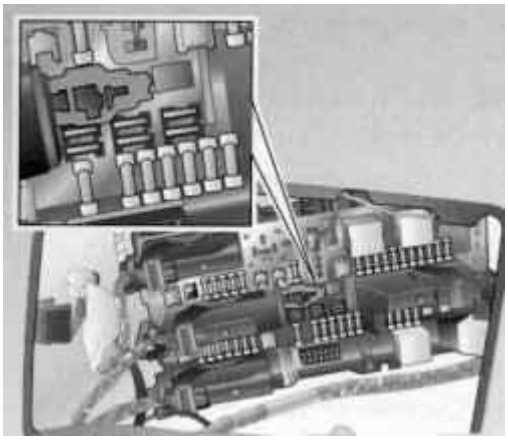


Fig. **1.313. Fuse box in the cabin**

Recommend that you always have with you a complete set of fuses. Spare fuses put in a special box in the trunk.

Before replacing the fuse or disconnect the appropriate radio button turn the ignition off.

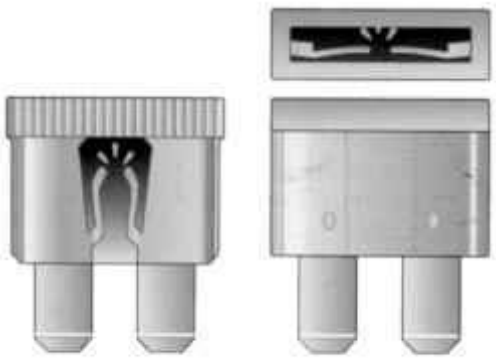


Fig. **1.314. An example of a working and a blown fuse**

Defective fuse (Fig. 1.314), can be identified by burned-fusible thread. Replacement fuse only after the damage repaired.
In the box located in the trunk, there is a device for extracting fuses.
Use only fuses specified amperage. She indicated on each fuse and additionally marked with color.

In the trunk

Fig. **1.315. Fuse block, located in the trunk of a car**

Fuse box located on the left in the trunk, under the lid. To get access to it, unscrew the two retainer coin, as shown in Figure 1.315, and flip the lid down.

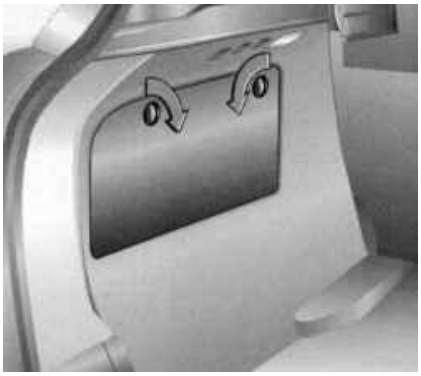


Fig. **1.316.** **Fuse block cover**

Fig. **1.317.** **Fuse block, located in the engine compartment of the car**

Do not put foreign objects under the cover.

NOTE
Some chains may be protected by several fuses.

Tsvetovayaya labeling and amperage fuses

Маржирующий цвет	*Сила тока, А*
желто-коричневый	5
коричневый	7,5
красный	10
синий	15
желтый	20
прозрачный	25
зеленый	30
синий	20
прозрачный	25
розовый	30
зеленый	40

Fuse box in engine compartment
Fuse box located in the front left in the engine compartment.
Before you open a box of fuses in the engine compartment, turn off the engine.

Fig. **1.318.** **Removing the fuse block**

To open the lid, release the latches by inserting a screwdriver until it stops in the holes and turning away. Lift the lid and remove it (Fig. 1.318).

1.7. Tables

Table 1.1 Specifications of engines

Параметры двигателей Обозначение двигателя (Торговое обозначение)	*1.4 Z 14 XEL*	*1.4 Z 14 XEP*	*1.6 Z 16 XEP*	*1.8 Z 18 XE*	*2.0 Turbo Z 20 LEL*	*2.0 Turbo Z 20 LER*	*OPC Z 20 LEH*
Число цилиндров	4	4	4	4	4	4	4
Диаметр, мм	73,4	73,4	79,0	80,5	86,0	86,0	86,0
Ход, мм	80,6	80,6	81,5	88,2	86,0	86,0	86,0
Рабочий объем, $см^3$	1364	1364	1598	1796	1998	1998	1998
Полезная мощность, кВт (при $мин^{-1}$)	55 (5200)	66 (5600)	77 (6000)	92 (5600)	125 (5200)	147 (5400)	177 (5600)
Крутящий момент, Н·м (при $мин^{-1}$)	120 (3800)	125 (4000)	150 (3900)	170 (3800)	250 (1950)	262 (4200)	320 (2400–5000)
Сжатие	10,5	10,5	10,5	10,5	8,8	8,8	8,8
Октановое число (RON)[1] неэтилированное или неэтилированное или неэтилированное	95 (S)[2] 98 (SP)[2] 91 (N)[2,3]	95 (S)[2] 98 (SP)[2] 91 (N)[2,3]	95 (S)[2] 98 (SP)[2] 91 (N)[2,3]	95 (S)[2] 98 (SP)[2] 91 (N)[2,3]	95 (S)[2] 98 (SP)[2] 91 (N)[2,4]	95 (S)[2] 98 (SP)[2] 91 (N)[2,4]	95 (S)[2,5] 98 (SP)[2] 91 (N)[2,4]
Допустимая максимальная частота вращения, постоянная эксплуатация, $мин^{-1}$ прибл.	6200	6200	6400	6400	6400	6400	6400
Расход масла, л/1000 км	0,6	0,6	0,6	0,6	0,6	0,6	0,6

1 Standardized quality grade of fuel, such as unleaded fuel DIN EN 228; N - normal, S - Super, SP - super plus, in bold: recommended fuel.
2 Regulator detonation, depending on the type of fuel filled (the octane number) automatically adjusts the ignition system.
3 When using fuel with 91 RON reduces power and torque.
4 In the absence of super unleaded grades, you can use fuel with 91 RON, while avoiding high engine load and full load the car and drive away in the mountains with a trailer or a high load.
5 If you use fuel with 95 RON reduces power and torque. Slightly increases fuel consumption.

Table 1.2 Gas volumes and operational materials used

Заправочные объемы (прибл. литров)							
Двигатель	*Z14XEL*	*Z 14 XEP*	*Z 16 XEP*	*Z 18 XE*	*Z 20 LEL*	*Z 20 LER*	*Z 20 LEH*
Система охлаждения на автомобилях с механической коробкой передач или Easytronic							
без кондиционера или климат-контроля	5,6	5,6	5,9	5,9	–	–	–
с кондиционером или климат-контролем	5,6	5,6	5,9	5,9	7,1	7,1	7,1
Система охлаждения на автомобилях с автоматической коробкой передач							
без кондиционера или климат-контроля	–	–	–	5,9	–	–	–
с кондиционером или климат-контролем	–	–	–	5,9	–	–	–
Топливный бак (номинальная емкость)	52	52	52	52	52	52	52
Замена моторного масла с фильтром	3,5	3,5	4,0	4,25	4,25	4,25	5,0
между отметками масломера MIN и MAX	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Бачок устройства промывки стекол	2,4	2,4	2,4	2,4	2,4	2,4	2,4
с устройством промывки фар	4,0	4,0	4,0	4,0	4,0	4,0	4,0

2. Engine

2.1. New petrol engine Z 18 XER DOHC-I

General

In 2006, the gasoline engine Z 18 XER DOHC-I appeared in the line of engines fitted on the Zafira-B.
Gasoline engine Z 18 XER is the second modification of the third generation in a family of medium-sized engines.

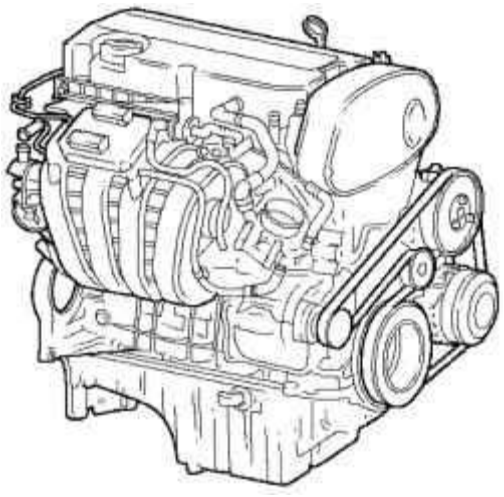


Fig. **2.1.** **Type of gasoline engine Z 18 XER DOHC-I**

With the introduction of two continuously adjustable camshafts power and torque of the engine Z 18 XER increased compared with familiar gasoline engine Z 18 and Z 18 XE XEL, while simultaneously reducing fuel consumption.

To further reduce fuel consumption and weight and improve performance petrol engine Z 18 XER is also equipped with a new plastic intake module.

Inlet channels in the cylinder head petrol engine Z 18 XER DOHC-I also redesigned. In the new design of the engine air flow at the inlet, which is used to smooth out in a plastic module, intake, can fed to the intake valve without turbulence.

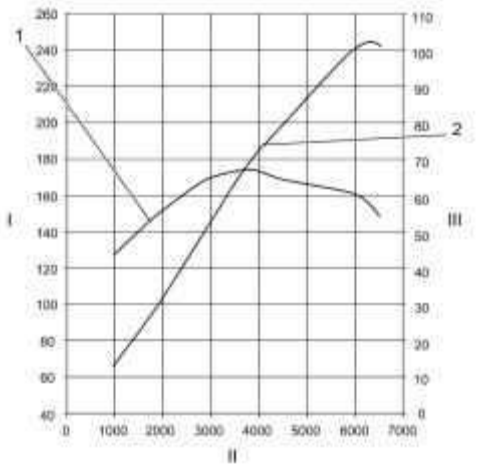


Fig. **2.2.** **Dynamic characteristics of torque and power gasoline engine Z 18 XER DOHC-I: 1 - torque curve 2 - the power curve; I - Torque (Nm); II - engine speed (rpm); III -- power (kW)**

Gasoline engine Z 18 XER has two stars camshafts, which can be adjusted independently from each other due to oil pressure. Camshaft drive the intake valves can be rotated by 60 ° forward of the angle of rotation of the crankshaft, camshaft drive exhaust valves - an angle of 45 °. Office of camshaft position is carried out continuously while the engine and through the oil pressure adjustment mechanism stars camshaft, which in turn controls the engine management system, depending on the load.

Gasoline engine Z 18 XER DOHC-I used an electronic engine management system Simtec 75.1 EMS production of Siemens VDO.

Gasoline engine Z 18 XER DOHC-I is also equipped with a thermostat with a multidimensional adjusting a characteristic that is familiar on the gasoline engine Z 16 XEP DOHC. Coolant temperature is regulated system EMS Simtec 75.1, depending on the loading conditions and requirements of the engine.

The main features of a gasoline engine Z 18 XER DOHC-I are listed below.

1. The engine has two overhead camshafts with the mechanisms of continuous adjustment of their position.
2. Use new plastic intake module with two-stage controlled by the switching of the drum and a new exhaust manifold
3. Installed new pistons with floating piston pins and cooling.

4. In the cooling system used a new plastic thermostat module with electronic control and adjusting the multidimensional characteristic.
5. In the mechanical part of the engine installed cylinder head and cylinder block of the new design. Optimized the work of a crank drive and drive cams.
6. In addition to the engine installed a new oil pan, the standard for all engines of the third generation of the family.

Adjustable stars camshaft

Continuous adjustment of camshafts used on gasoline engines Z 18 XER DOHC-I to reduce harmful emissions and fuel consumption. Adjustable camshaft provides an additional means to control the engine in case of load changes.

At idle speed decreases the engine speed and optimized performance setting minimum overlap valves.

When partial loads to ensure low fuel consumption and minimal emissions changes position and length of time of overlapping valves.

When the full load, increase the maximum torque and power is achieved by optimizing the installation time of closing of the intake valves.

Camshaft adjustment system consists of the following sites:

- Adjusting module;
- Control valve;
- The oil line to the valve;
- The oil line from the valve chamber to «A» regulator of camshaft;
- The oil line from the valve chamber to «B» the regulator of camshaft;
- A gear with the camshaft sensor;
- Engine control module.

Situation camshaft drive the intake valves changes within 60 ° angle of rotation of the crankshaft. When the camshaft drive intake valves "delayed", the content of the residual gas in the cylinder decreases as the overlap inlet / exhaust valve is also reduced. This means that the cylinder is filled with mostly fresh mixture.

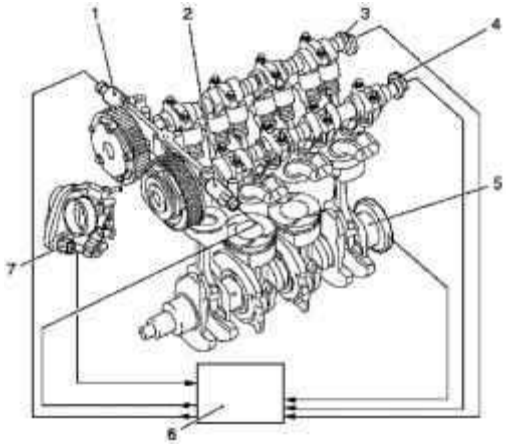


Fig. **2.3.** **Node camshaft engine Z 18 XER DOHC-I: 1 - Hydraulic Solenoid valve camshaft drive intake valves, 2 - Hydraulic Solenoid valve camshaft drive of the exhaust valves, 3 - sensor camshaft drive intake valves, 4 - sensor camshaft drive exhaust valves 5 - crankshaft sensor, 6 - engine control module; 7 - choke tube**

When advance camshaft drive exhaust valve increases, the overlap of valves also increased to 45 ° angle of rotation of the crankshaft. Here, because of the vacuum in the intake manifold, increasing the number of products of combustion falls back into the cylinder of exhaust ports.

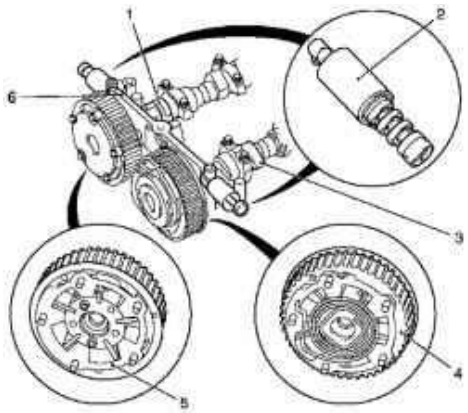


Fig. **2.4.** **Scheme adjust camshaft engine Z 18 XER DOHC-I: 1 - camshaft drive intake valves, 2 - valve camshaft adjustment, 3 - camshaft drive of the exhaust valves, 4 - control camshaft drive exhaust valves, 5 - control camshaft drive intake valves, 6 -- camshaft bearings**

Number of residual gas is determined by the overlap of valves and vacuum in the inlet pipe. The presence of vacuum in the inlet pipe throttle position.

Running the engine at idle

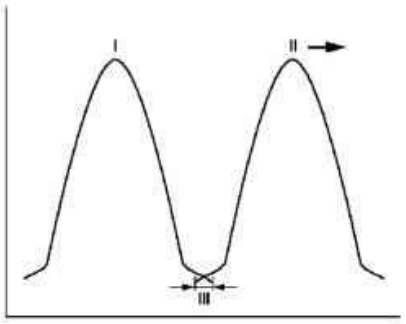


Fig. **2.5.** **Diagram of the engine during the idling: I - intake valve lift; II - rise of the exhaust valve, ahead; III - minimal overlap of valves**

Idle set minimum valve overlap, since a high value of the vacuum in the inlet pipe allows a large number of residual gas to fall back into the cylinders, even with a slight overlap. This ensures uniform operation of the engine at idle.

Running the engine in a mode of small and medium-sized loads

While small and medium-sized loads have large valve overlap, because the engine in these conditions allows for a greater number of residual gases. The result is a substantial reduction of nitrogen oxide emissions.

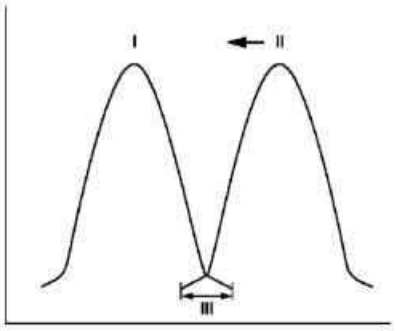


Fig. **2.6.** **Diagram of the engine during operation in the mode of small and medium-sized loads: I - intake valve lift; II - rise of the exhaust valve, ahead; III - minimal overlap of valves**

In the upper range of the regime of partial loads, closer to full load, valve overlap is minimized, because the engine in this range require the maximum amount of fresh mixture.

Adjusting the overlap valve replaced previously used technology of exhaust gas recirculation.
To achieve maximum filling of the cylinder, is also important to agree on the time of closing the intake valves with the engine speed.

The principle of controlled camshaft sprockets

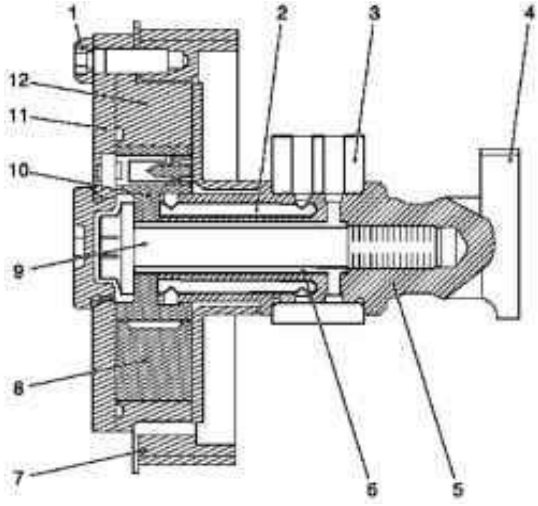


Fig. **2.7.** **Cross-section of oil sending control camshaft drive intake valves: 1 - attachment bolt - a cover of the regulator of camshaft 2 - oil pipe to the chamber "A" regulator of camshaft 3 - block bearing camshaft, 4 - cams, 5 - camshaft; 6 - oil feed to the cameras "B" regulator of camshaft; 7 - toothed belt pulley 8 - separation chambers "A" and "B", 9 - bolts fastening the regulator of camshaft, 10 - rotor, 11 - a cover of the regulator of camshaft, 12 - Stator**

Camshaft control system consists of hydraulic control, which is enshrined in the anterior part of the camshaft, a control valve mounted on the cylinder head, oil between the valve guide and camshaft position controller camshaft (holes in the camshaft), as well as electronic control circuit with feedback.

To properly adjust the camshaft must implement continuous oil flow from the periphery of the lubrication system.

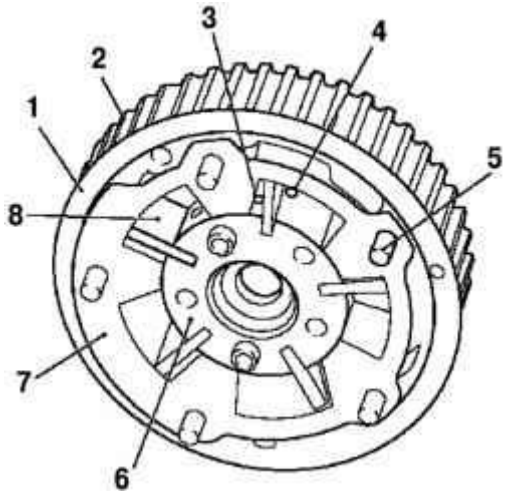


Fig. **2.8.** **Regulator camshaft drive intake valves: 1 - separating disk (external) - the regulator camshaft drive intake valves, 2 - toothed belt pulley 3 - channel fill and drain - the camera "A" 4 - channel fill and drain - the camera "B"; 5 - screw pin - Lid regulator of camshaft 6 - rotor is rigidly connected to the camshaft; 7 - stator can be moved hydraulically, 8 - separation chambers "A" and "B"**

Motor oil is fed through a special oil line from oil pump to the cylinder head and block camshaft bearings. Camshaft bearing block contains a solenoid valve for each of the controlled camshaft; this valve delivers oil in the oil line of the control camshaft position to fill or drain the camera «A» or «B» the regulator of camshaft or maintain the current installation of camshaft.

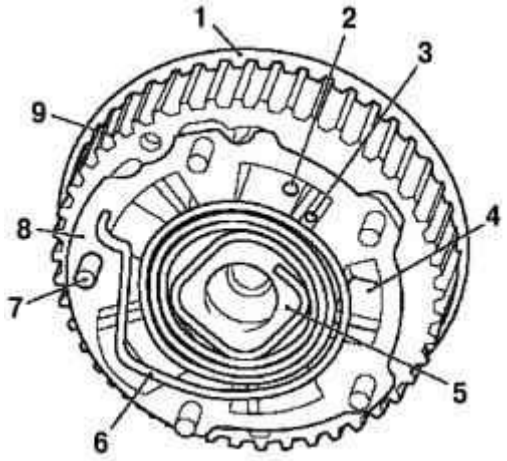


Fig. **2.9.** **The regulator exhaust valve camshaft drive: 1 - separating disk (internal) - the regulator camshaft drive intake valves, 2 - channel fill and drain - the camera «A»; 3 - channel fill and drain - the camera «B»; 4 - separation chambers «A "and« B »; 5 - rotor is rigidly connected to the camshaft 6 - return spring, moves the stator to its original position in the absence of oil pressure; 7 - threaded pin - Lid regulator of camshaft 8 - stator can be moved hydraulically, 9 - pulley toothed belt**

Oil to the appropriate chamber «B» the regulator of camshaft is served on the flange bolts. Oil to the corresponding cell «A» regulator of camshaft is served by a separate, off-center channels. Lifting height varies valve when filling or discharge of oil from the chambers of the regulator of the intake camshaft and exhaust valves.

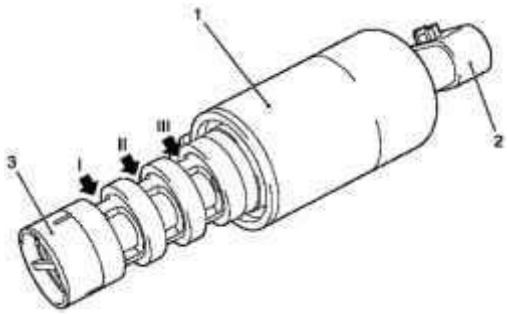


Fig. **2.10.** **Electrohydraulic valve: 1 - body with an electromagnet, 2 - a connection through the wiring harness connector, 3 - cross section of the valve with a groove for connecting the annular grooves I and II and the center channel for connecting the annular grooves (III) to drain the oil**

Control valve camshaft used to fill chambers «A» and / or «B» regulators of camshafts, oil drain or preserve the current status of the regulator camshaft intake and exhaust valves.

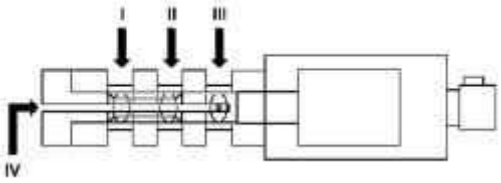


Fig. **2.11. Block diagram of the electrohydraulic valve**

Electrohydraulic valves direct the flow of engine oil to the appropriate channels to fill or drain the oil from the chambers «A» or «B». This action is the movement of the valve in one of three provisions. Valve controls the engine control module.

An annular groove II associated with the ring groove I, allowing you to switch pressurized oil feed to the camera «A» or chamber «B».
An annular groove III serves only to drain the oil from the chamber IV «B».

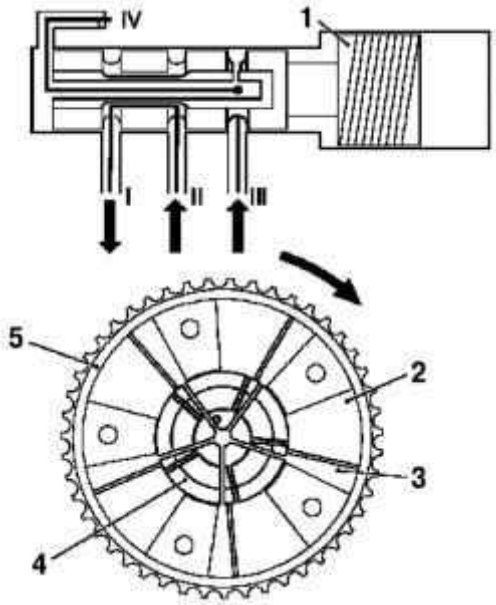


Fig. . Wiring the supply line to the oil guide chamber "A" camshaft position controller: 1 - electromagnetic hydraulic valve, 2 - Camera «A»; 3 - camera «B»; 4 - rotor, 5 - stator

Feedline II constantly connected with a source of oil under pressure. Figure 2.12 shows the position of the valve, where the feedline is connected to the oil guide chamber "A" camshaft position controller. Luggage «B» control of both camshafts is emptied through a discharge channel III and IV.

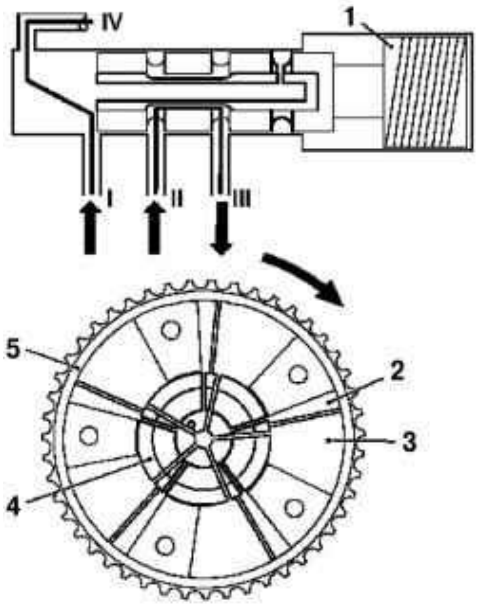


Fig. **2.13. Wiring the supply line to the oil guide chamber "B" regulator of camshaft: 1 - electromagnetic hydraulic valve, 2 - Camera «A»; 3 - camera «B»; 4 - rotor, 5 - stator**

Feedline II constantly connected with a source of oil under pressure. Figure 2.13 shows the position of the valve, where the feedline is connected to the oil guide chamber «B» the regulator of camshaft. Camera "A" camshaft position regulator simultaneously discharged through the discharge channel IV.

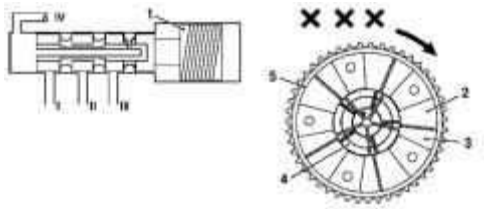


Fig. **2.14. Scheme of the valve position, in which all the holes for the supply and discharge of oil closed: 1 - electromagnetic hydraulic valve, 2 - Camera «A»; 3 - camera «B»; 4 - rotor, 5 - stator**

Figure 2.14 shows the position of the valve, in which all the holes for the feed and oil drain closed. Oil does not enter the cell «A» or camera «B» the regulator of camshafts, and there is no discharge of oil or from one of the two chambers. Mutual position of stator and rotor remains unchanged.

Rack and belting

Gasoline engine Z 18 XER DOHC-I is equipped with a lid toothed belt of three parts.

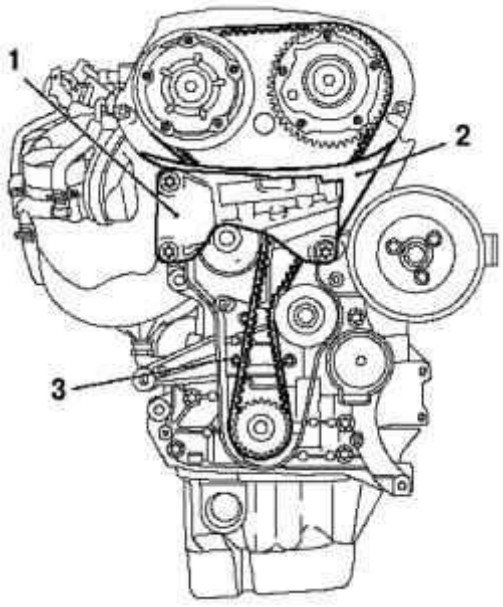


Fig. **2.15. Rack-belt drive gasoline engine Z 18 XER DOHC-I: 1 - damping the engine block, 2 - toothed belt cover central, 3 - toothed belt**

Toothed belt traced in such a way that in his removal and installation of the central part of the toothed belt cover and damping motor unit are not removed. This greatly facilitates maintenance. The cover protects the toothed belt from external influences and prevents the ingress of dust and liquids in the finger-belt transmission, thus preventing premature wear of the belt. Frequency of replacement of the toothed belt has increased to 150 000 km.

Poly-V belt

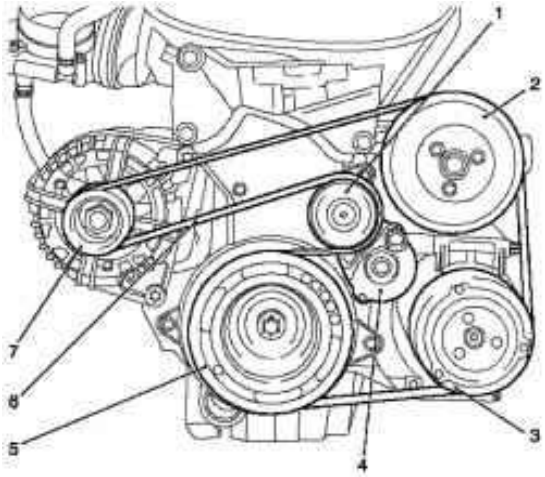


Fig. **2.16. Poly-V belt petrol engine Z 18 XER DOHC-I: 1 - tensioning and guide roller Poly-V belt, 2 - drive pulley coolant pump, 3 - drive pulley of the compressor air conditioning systems; 4 - Poly-V belt tensioner, 5 - snubber crankshaft 6 - Poly-V belt; 7 - drive pulley of the alternator**

The alternator, coolant pump and compressor air conditioning systems are linked together through a Poly-V belt (Fig. 2.16).
Poly-V belt guide rollers, which rejects it and sends it to the contact pressure on the tensioner.
The tension is continuously passed through the Poly-V belt tensioner. The action of the spring tensioner provides compensation of linear expansion and fluctuations Poly-V belt when the engine.

Cylinder head

Redesign of the cylinder head gasoline engine Z 18 XER DOHC-I allowed to improve the circulation of coolant in the cylinder head, resulting in increased heat dissipation.
Exhaust ports in the cylinder head redesigned so that the air flow at the inlet, which sglazhivaets in a plastic module, intake, could be fed to the intake valve without turbulence.
Gasoline engine Z 18 XER is rotating stars camshaft and a camshaft drive on the intake valves and camshaft drive on the exhaust valves.
Continuous adjustment of the camshaft sprockets carried by the pressure of engine oil. Two solenoid valves regulate the oil pressure in the controlled camshaft sprocket in accordance with commands from the engine control module.
Valve drive is equipped with a piston pushers. As in the petrol engine Z 16 XEP DOHC, valve clearance by altering the valve tappets appropriate size.
In the petrol engine Z 18 XER DOHC-I used conical valve springs. Because of the conical valve springs back pressure increases during compression of plunger. This allows the valve after passing the bottom dead point cam cam, immediately shut down again under the influence of inertia of conventional springs.
Application of new technology for continuous adjustment of camshaft allowed to build a channel for oil supply in the cylinder head. Oil leak svyazzan a supply line of crankshaft bearings.

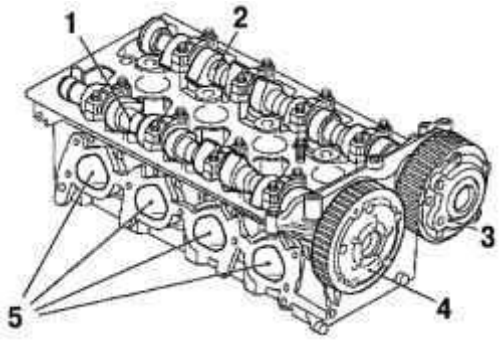


Fig. **2.17.** **The head of the cylinder - petrol engine Z 18 XER DOHC-I: 1 - camshaft drive intake valves, 2 - camshaft drive of the exhaust valves, 3 - Leading gear camshaft drive intake valves, 4 - Leading gear camshaft drive of the exhaust valves, 5 - inlet channels**

Block front bearing camshaft was redesigned and includes two control valves for camshaft drive the intake and exhaust valves. Block bearing camshaft is equipped with a special channel through which oil under pressure coming from the engine lubrication system. The head of the cylinder block has a separate oil line connected to a supply oil channel crankshaft bearings.

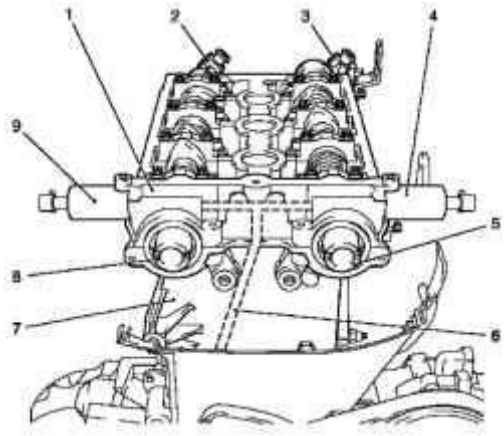


Fig. **2.18.** **The head of the cylinder block by block poshipnika bridge cam: 1 - block the bridge bearing camshaft, 2 - position and connection of the sensor camshaft drive intake valves, 3 - position and connection of the sensor camshaft drive of the exhaust valves, 4 - valve adjust camshaft drive of the exhaust valves, 5 -- camshaft drive of the exhaust valves, 6 - oil slide in the cylinder head; 7 - cylinder head, 8 - camshaft drive intake valves, 9 - regulating valve camshaft drive the intake valves**

Features
The head of the cylinder block has re-designed inlet channels. Improved return system of motor oil and heat. The revised cam profile and the mechanical plunger. Established conical valve springs and re-designed blocks camshaft bearings. In addition, the increased rigidity of the block.

Crankshaft and Pistons

Crank mechanism is made more rigid without increasing weight.

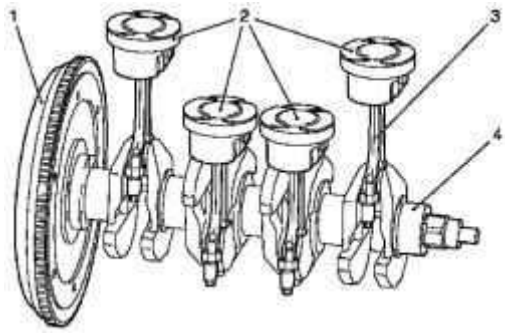


Fig. 2.19. **Crankshaft and Pistons: 1 - Handwheel, 2 - piston, 3 - connecting rod, 4 - Crankshaft**

In connection with higher power and using a special form of pistons used oil, jet nozzles for cooling the pistons. They are located on the engine block and are aimed at the underside of the piston. The crankshaft has a more rigid structure, without increasing weight. It also uses floating piston pins.

Cooling of the piston

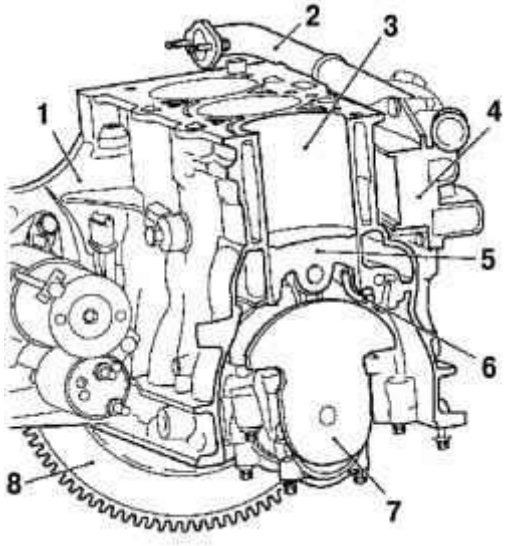


Fig. 2.20. **Cooling of the piston: 1 - the engine block, 2 - pipe cooling system, 3 - cylinder walls, 4 - oil cooler 5 - piston, 6 - oil spray atomizer; 7 - crankshaft 8 - Flywheel**

To new pistons (Fig. 2.20) gasoline engine Z 18 XER DOHC-I could cope with thermal loads, increased due to increased power output, the engine is equipped with piston cooling.

Rear crankshaft oil seal with the sensor

At petrol engine Z 18 XER mount for the sensor is integrated into the crankshaft oil seal crankshaft.

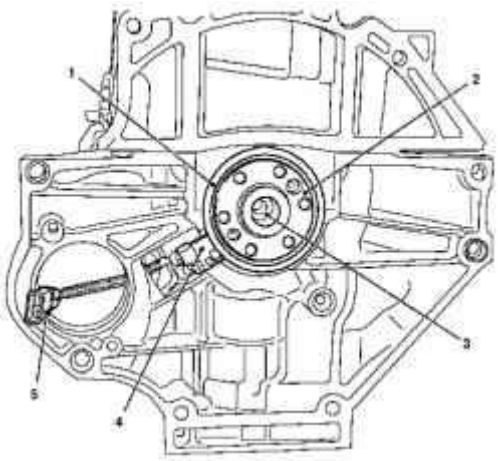


Fig. 2.21. **Rear crankshaft oil seal with the sensor: 1 - rear crankshaft oil seal, 2 - encoder, 3 - Crankshaft, 4 - crankshaft sensor, 5 - connecting cable to plug the wiring harness of the crankshaft sensor**

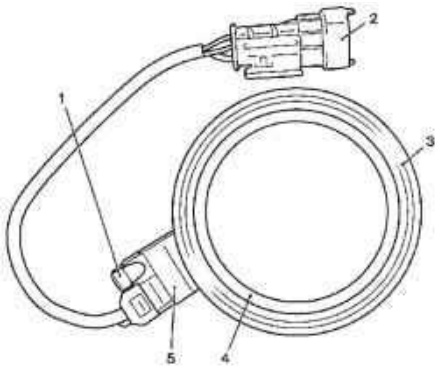


Fig. **2.22.** **Scheme of connecting the sensor to the rear crankshaft oil seals: 1 - attachment bolt crankshaft sensor, 2 - plug the wiring harness of the crankshaft sensor, 3 - Rear crankshaft oil seal, 4 - sealing edge of the crankshaft flange, 5 - a nest of the crankshaft sensor**

In contrast to previously used constructions, the working edge (Figure 2.22) the omentum crankshaft on gasoline engines Z 18 XER directed outwards. Strand-like working edge and the vacuum created in the crankcase, provide pressing of the working edge to the sealing surface.

Freezing in the crankcase, which also serves to remove the crankshaft position sensor, ensures the correct installation of the crankshaft flange.

To avoid damage to the flange of the crankshaft and maintain its performance at the required level, when removing and installing the omentum must accurately follow the guidance instructions for maintenance.

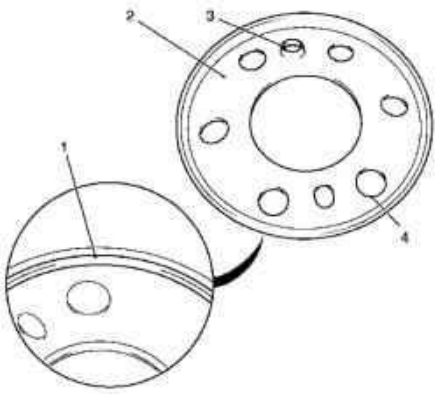


Fig. **2.23.** **Encoder: 1 - magnetized path coding device; 2 - encoder, 3 - hole for precise positioning of the encoder on the crankshaft, 4 - holes for the mounting bolts flywheel**

In gasoline engines Z 18 XER crankshaft position and speed can not be read sensor crankshaft with a gear: it uses disk (encoder) with an external magnetized surface.

Region coding device goes directly to the omentum of the crankshaft, which allows the crankshaft sensor signal is regarded as a magnetic encoder.

Sam crankshaft sensor can be removed from the flange of the crankshaft by weakening the attachment bolt and disconnect the wiring harness connector. This allows the replacement of two separate elements: the omentum and the crankshaft sensor.

Rubberized track encoder includes the northern and southern magnetic poles, magnetic field sensor which recorded the crankshaft rotating shaft is converted to the engine control module to the magnitude of the angular velocity of rotation and are used to determine top dead center (TDC).

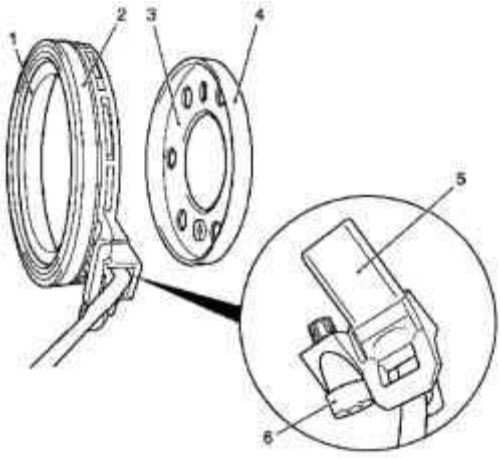


Fig. **2.24.** **Scheme to connect the sensor and encoder to the rear crankshaft oil seals: 1 - sealing edge of the flange of the crankshaft, 2 - outer surface of the sealing flange of the crankshaft 3 - encoder, 4 - Runner encoder 5 - crankshaft sensor, 6 - bolt mount crankshaft sensor**

Magnetic fields are detected using the Hall effect. In response to changing magnetic fields the Hall sensor sends digital signals to the engine control module.

In order not to disrupt the magnetic properties of the encoder, while working with them, observe the following instructions:
- Do not let the encoder to come into contact with the external magnetic fields and metal shavings;
- Avoid mechanical damage to the track encoder;
- Do not drop the encoder.

The exhaust manifold and catalytic converter
The exhaust manifold is a structure deep drawing with a catalytic converter, located near the engine.

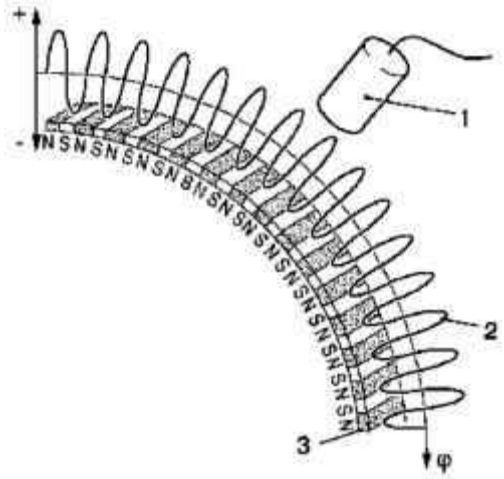


Fig. **2.25. Magnetic poles encoder: 1 - crankshaft sensor (shown schematically), 2 - track the magnetic field, 3 - rubber coating provides a mounting magnets**

This helps reduce backpressure on the issue and to optimize the exhaust emissions. Improvement of the exhaust manifold achieved through proper distribution of exhaust gases entering the catalytic converter, which ensures uniform flow in the zone of oxygen sensor.

To avoid fluctuations in the exhaust manifold with catalytic converter on the natural frequencies, the collector is also attached to the cylinder block.

Features

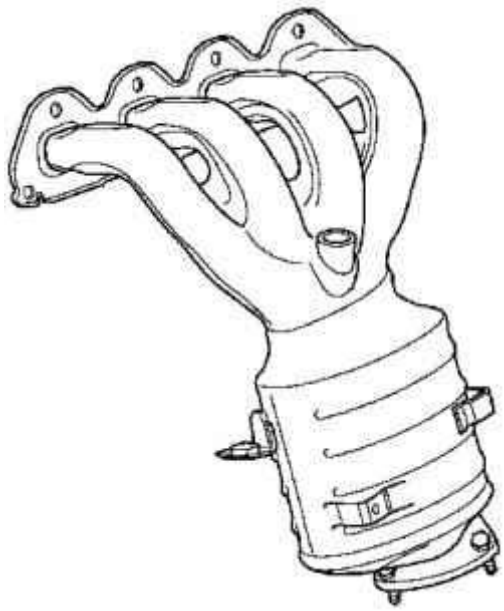


Fig. **2.26. The exhaust manifold and catalytic converter**

Catalytic converter located close to the exhaust manifold and its mass is reduced through the use of sheet metal

Intake manifold

Gasoline engine Z 18 XER DOHC-I has a new two-stage plastic intake module.
Depending on the mode of the engine air is directed in a plastic module inlet through one of the two inlet tracts, which differ in length. Treatises intake drum switch, built-in plastic module intake. Using the drum switch to control the inlet channel has significant advantages over conventional eddy plates. Example greatly reduced resistance to flow in a plastic module intake at high engine speeds.

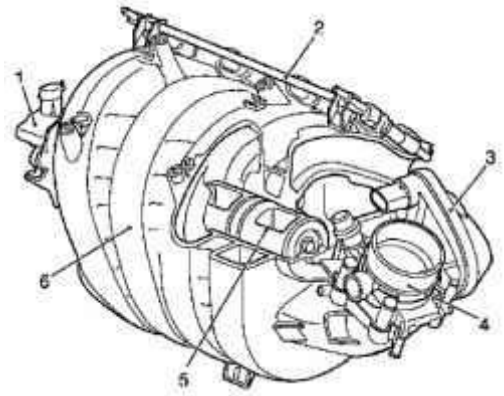


Fig. **2.27.** **Intake manifold: 1 - cervomotor - switching intake tract 2 - Fuel rail, 3 - throttle position sensor, 4 - choke tube, 5 - switching the drum 6 - plastic module inlet**

A unique feature of the petrol engine Z 18 XER DOHC-I is the location of the throttle pipe. It is installed on the side of a plastic intake module, this allows to locate the individual parts of the inlet pipe and reduce the loss of the flow of fresh air from the air filter to the intake valves. In this cross-section of the pipe remains constant throughout the length of the intake tract.

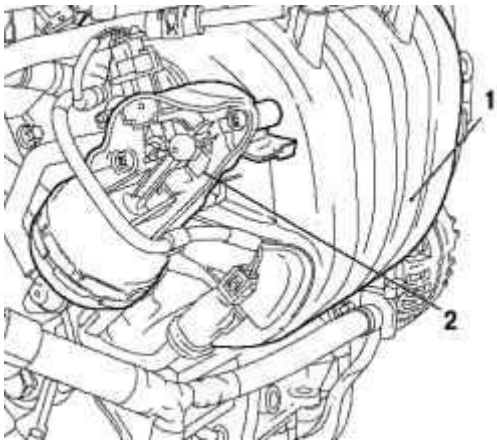


Fig. **2.28.** **Node servomotor: 1 - plastic intake module 2 - Servo - switching intake tract (left behind)**

Features
Reducing weight by using plastic.
The presence of two inlet pipes of different lengths for each cylinder.
The new device switching paths intake (switchable drum).
The new location of the throttle.

Contour grease gasoline engine Z 18 XER DOHC-I

Because of the introduction of controlled asterisks camshaft adjustment mechanism which is activated by oil pressure and is controlled by two solenoid valves, changed the contour of the engine lubrication.

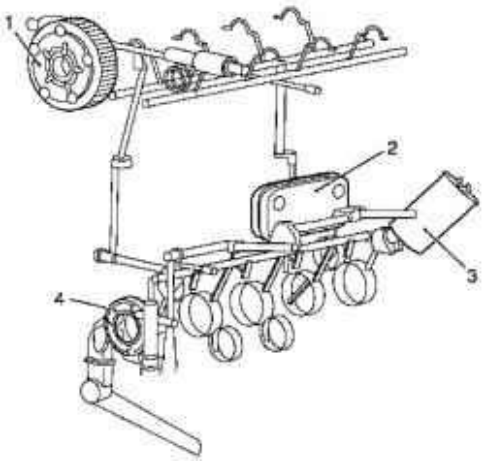


Fig. **2.29.** **Contour grease gasoline engine Z 18 XER DOHC-I: 1 - regulators of camshaft, 2 - oil cooler, 3 - Oil filter, 4 - oil pump**

The diagram concept of the contour shows a special power supply lubrication oil line, included in the lower oil channel and serves to supply regulators of camshaft.

Oil cooler module

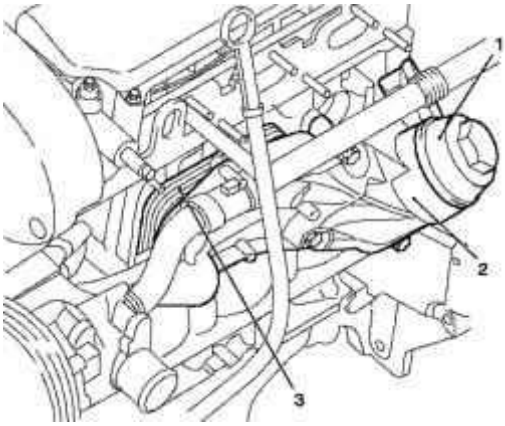


Fig. **2.30.** **Oil cooler module: 1 - oil filter housing cover, 2 - oil filter housing, 3 - heat exchanger - cooling the engine oil**

On petrol engine Z 18 XER DOHC-I oil filter housing, filter element and oil cooler Oil cooler integrated in the module. This module is equipped with an integral filter, engine oil, which heats up faster during the warm phase of the engine through direct connection with the contour of the cooling system.

Sump

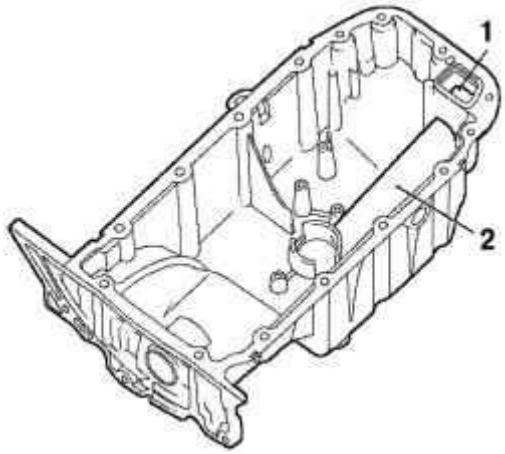


Fig. **2.31.** **Oil pan: 1 - Communications - Oil pump inlet port, 2 - cast inlet pipe**

Sump gasoline engine Z 18 XER redesigned and is the same for all engines of the third generation of the family. This concept greatly simplified manufacturing and assembly.

Module thermostat petrol engine Z 18 XER DOHC-I

Gasoline engine Z 18 DOHC-I module is equipped with a thermostat, is a lightweight plastic construction.

Connect the thermostat is identical for all engines of the third generation.

Thermostat with a three-dimensional characteristics of the tuning, which is part of the temperature control of the engine, borrowed from the construction of a petrol engine Z 16 XEP.

The use of plastics for the shell module thermostat has greatly improved the circulation of coolant.

With the thermostat with a three-dimensional adjusting parameters are different operating temperatures of coolant, which correspond to the engine, taking into account fuel consumption, power output and durability.

As the temperature of coolant in the mode of partial load control system reduces the temperature of the engine mean pressure friction and heat loss through the walls, thus reducing fuel consumption.

There are two temperature levels.

105 ° C - the level of coolant temperature for idling and medium loads. It is governed by thermal extension element in the thermostat.

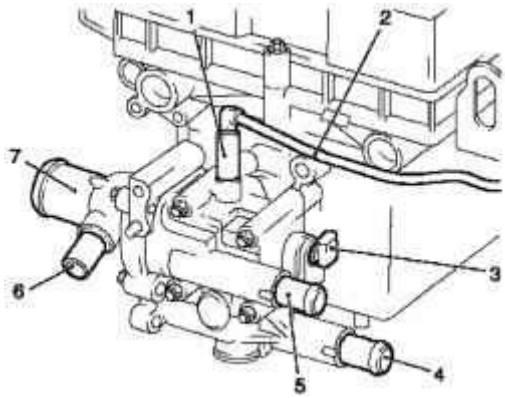


Fig. **2.32.** **Module Thermostat: 1 - connecting valve - heating throttle tube, 2 - the supply line - heating throttle tube, 3 - Sensors - coolant temperature, 4 - Channel connectivity - reusable tube heat exchanger heating the passenger compartment, 5 - Channel connection - the line feeding the heat exchanger system heating the interior of 6 - to connect - the thermostat wiring harness connector from the three-dimensional characteristics of the adjusting, 7 - Channel connection - reusable tube radiator**

90 ° C - the level of coolant temperature to medium and full loads. It is regulated by electrically heating element in the extension element at a signal from the temperature control system in the engine management system, control is a function of engine speed, load, gear selection and ambient temperature.

The range of coolant temperature to 105 ° C (idle speed and average load) is regulated by a thermostat with an element of expansion.
The range of coolant temperature to 95 ° C (medium and full load) is regulated by an additional electric heater element in the expansion. The heater is powered by a system of temperature control and stirs an extension element, so that the thermostat open at higher temperatures.
Ranges coolant temperature regulated as a function of engine speed, engine load, gear selection and ambient temperature.

Features
Reducing weight by using plastic. Improved cooling by optimizing the circulation of coolant. No exhaust gas recirculation valve. Coolant temperature is regulated by engine management system.

Simtec 75.1 electronic control module petrol Z 18 XER DOHC-I

Gasoline engine Z 18 XER DOHC-I is equipped with electronic engine control system Simtec 75.1 EMS production of Siemens VDO.
Engine Management System provides adjustment of camshafts and control the temperature regime of the engine. To perform these functions, increased computing power and installed additional sensors.

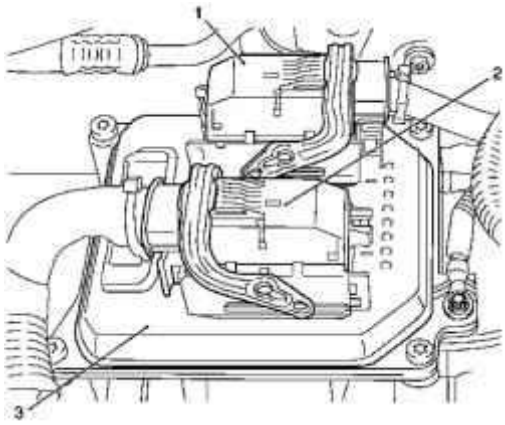


Fig. **2.33.** **Simtec 75.1 electronic control module gasoline engine: 1 - the wiring harness connector - engine wiring harness, 2 - wiring harness connector - engine wiring harness, 3 - Simtec 75.1 electronic engine control module**

Improved design of the control unit, located on the module inlet. Used a new crankshaft sensor and two camshafts are driven control valve inlet and exhaust valves. In addition, installed a new throttle body pipe is heated from the periphery of the coolant. The electronic engine control module Simtec 75.1 located on the housing intake manifold and secured by four threaded bushings.

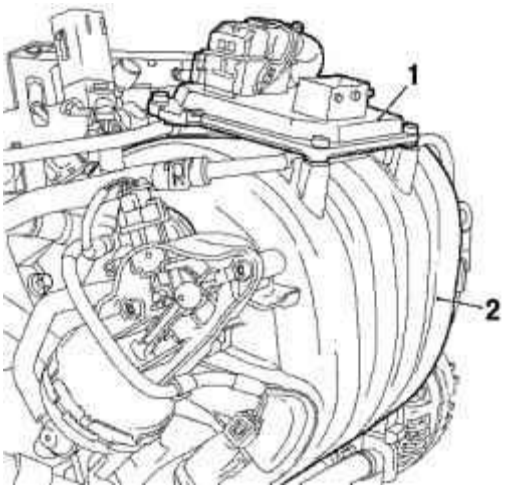


Fig. **2.34.** **Mounting electronic module: 1 - an electronic control module engine Simtec 75.1; 2 - inlet manifold**

Features

Engine management system has the following differences from the engine systems Z 18 XE and Z 16 XEP:

- Installed PCB - printed circuit board;
- Set the second sensor camshaft;
- Set the second temperature sensor.

2.2. Petrol engines - general inspection procedures

2.2.1. General

The Test values for all engines, see Table. 2.2, Table. 2.3, Table. 2.3, Table. 2.4, Table. 2.5

Checking the pressure loss in the engine (1,4-1,6 l)

Removing the air filter housing

Open the hood

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

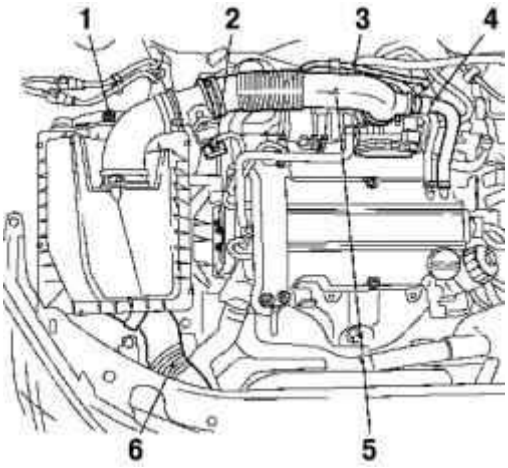


Fig. **2.35.** **Components, shooting in the dismantling of the air filter: 1 - screw fixing the lower rubber support, 2 - wiring harness mass air flow sensor, and 3 - line of ventilation of the fuel tank, 4 - hose, ventilation motor, 5 - air intake hose, 6 - inlet pipe**

Remove the air filter housing (Fig. 2.35).
Disconnect the wiring harness sensor mass air flow.
Disconnect the fuel tank ventilation line.
Disconnect the ventilation hose from the engine air intake hose.
Removing the clamp, disconnect the hose from the air intake throttle pipe.
Removing the clamp, remove the air filter housing.
Loosen the screw fixing the lower rubber support and unplug it.
Disconnect the inlet pipe.

Removing the ignition module
Remove the wiring harness ignition module.

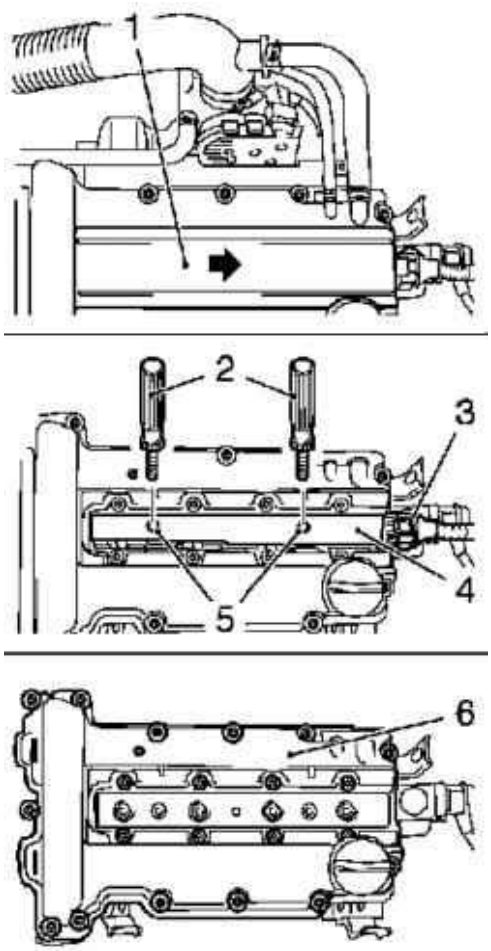


Fig. **2.36.** **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - a special tool; 3 - Ignition module wiring harness, 4 - ignition module 5 - mounting screws, 6 - cylinder head cover**

Remove the ignition module with the lid of the cylinder head in the direction strelki.2

Loosen the two bolts.
Separate the ignition module from the spark plug with a special tool KM-6009 2.

Removing the camshaft sensor
Disconnect connectors camshaft sensor, film mass airflow sensor, pressure sensor oil and coolant temperature sensor.

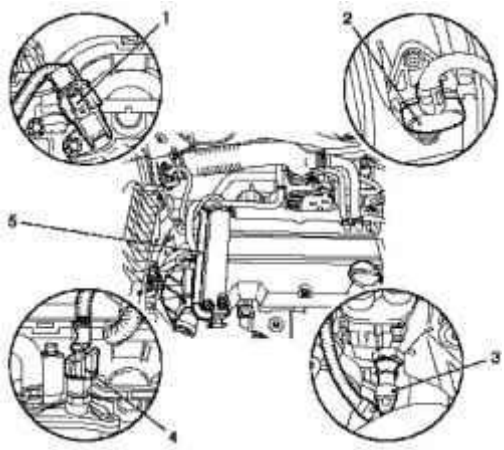


Fig. **2.37.** **Components shooting in dismantling the camshaft sensor: 1 - camshaft sensor connector, 2 - plug the sensor mass air flow, 3 - oil pressure sensor connector, 4 - slot coolant temperature sensor, 5 - posting**

Disconnect the wires from the lid of the cylinder head.

Take it back.

Removing the cylinder head

Remove the two clamp and disconnect the hose from the cover of the engine cylinder head.
Disconnect the wiring harness connector module plugs.
Remove the ignition module with the lid of the cylinder head in the direction of the arrow.
Loosen the two bolts.

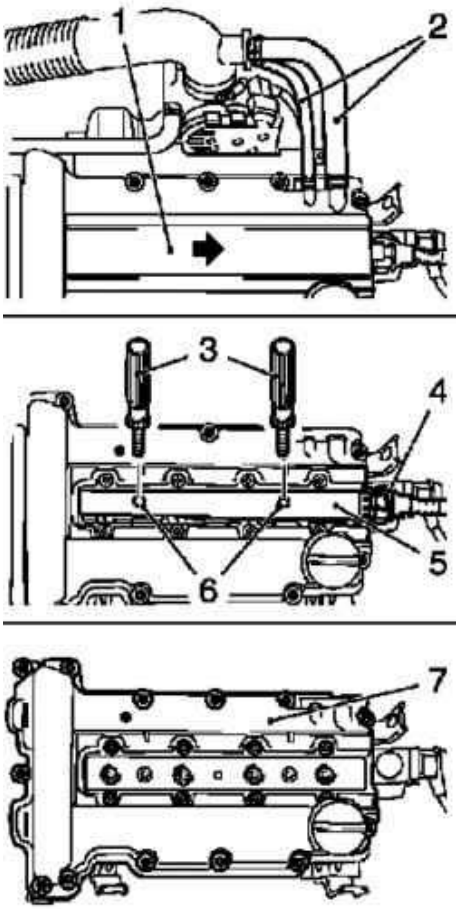


Fig. 2.38. **Components, Removable cover for dismantling the cylinder head: 1 - ignition module cover, 2 - Hoses Engine 3 - the wiring harness ignition module 4 - module wiring harness connector plugs, 5 - ignition module, 6 - bolt mount; 7 - a special tool**

Separate the ignition module from the spark plug with a special tool KM-6009 3.

Remove the cylinder head.
Loosen the mounting bolts 13.
Remove the remains of seals and sealing surfaces clean.
Remove the spark plug with a special tool KM-194-E.

NOTICE
Open the lid carefully and slowly. There is a risk of burns.

Unscrew the expansion tank coolant.
Remove the oil dipstick.
Raise the car.

Withdrawal right boryzgovika Engine

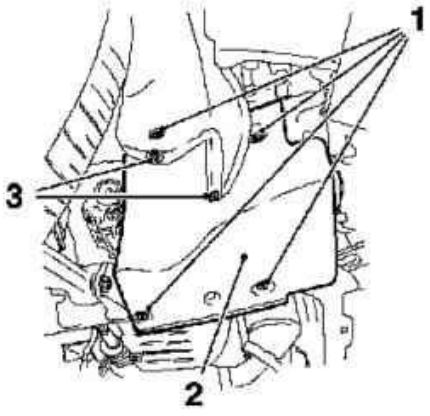


Fig. 2.39. **Components, Removable cover for dismantling the cylinder head: 1 - right engine splash guard, 2 - mounting screws, 3 - rivets**

Loosen the 4 bolts and remove the attachment right mudflap engine.

Remove the two set out on the back of the rivets.

Install the crankshaft position at top dead center (TDC), piston cylinder number 1

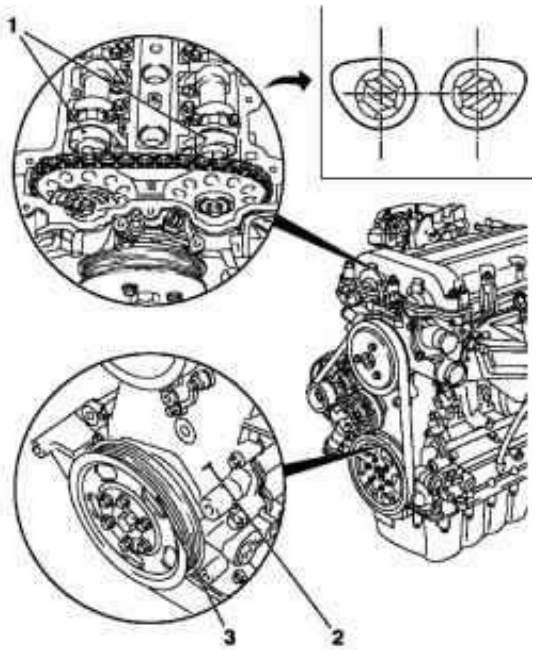


Fig. **2.40.** **Install the crankshaft position at top dead center (TDC), piston cylinder number 1: 1 - cams cylinder number 1, 2 - lug 3 - Tag**

Use a bolt on the hub of the crankshaft for installation of the crankshaft in the position of top dead center (TDC), piston cylinder number 1 in the direction of rotation of the engine.
Check belt pulley on the crankshaft must be aligned with the projection on the case.

NOTE
In this position the number 1 cylinder cams are located in the TDC (both cam facing outwards).

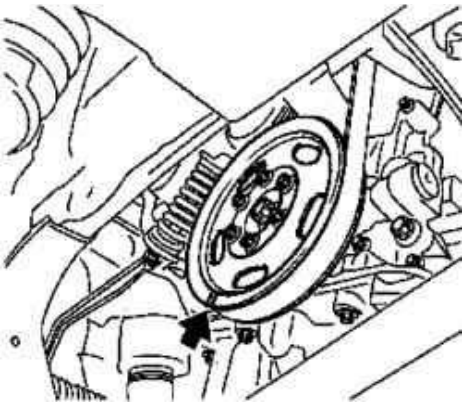


Fig. **2.41.** **The shift marks on the belt pulley of 180 ° relative to the TDC marks the first cylinder**

Move the label on the belt pulley of 180 ° relative to the TDC marks the first cylinder (arrow) (Figure 2.41).
Lower the car.

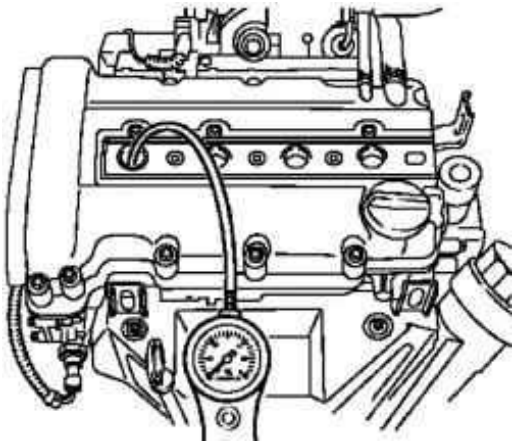


Fig. **2.42.** **Connecting tester**

Connect the tester to the system pressure drop, the compressed air (Figure 2.42).
Calibrate the tester pressure drop.

Replace the connection piece in the candle hole cylinder number 1 and plug the tester pressure drop to the adapter (in accordance with the manufacturer's instruction).
Select a program and turn the hand brake.

NOTE
All wheels must touch the ground.

On the automatic transmission, move the selector lever to position «P».
Check the pressure drop in cylinder number 1.
Consider the testimony of pressure drop on the tester as a percentage.

NOTE
Pay attention to any noise from the leakage of air from the intake manifold, exhaust system or sump, as well as bubbles in the expansion tank cooling system.

Set the crankshaft in the position of ignition in the cylinder number 3 (TDC).
Check the pressure drop in the cylinder number 3.
Set the crankshaft in the position of ignition in the cylinder number 4 (TDC).
Check the pressure drop in cylinder number 4.
Set the crankshaft in the position of ignition in the cylinder number 2 (TDC).
Check the pressure drop in cylinder number 2.
Compare the results.
Maximum pressure variation between the individual cylinders is about 10%.
Maximum pressure drop in a separate cylinder should not exceed 25%.

Installation components
Raise the car.
Attach the right engine splash guard.
Tighten the 4 bolts.
Install two rivets.
Lower the car.
Replace the cover expansion tank coolant and oil dipstick.
Replace spark plug with a special tool KM-194-E in the cylinder head and tighten the moment 25 Nm

Replacing cylinder head

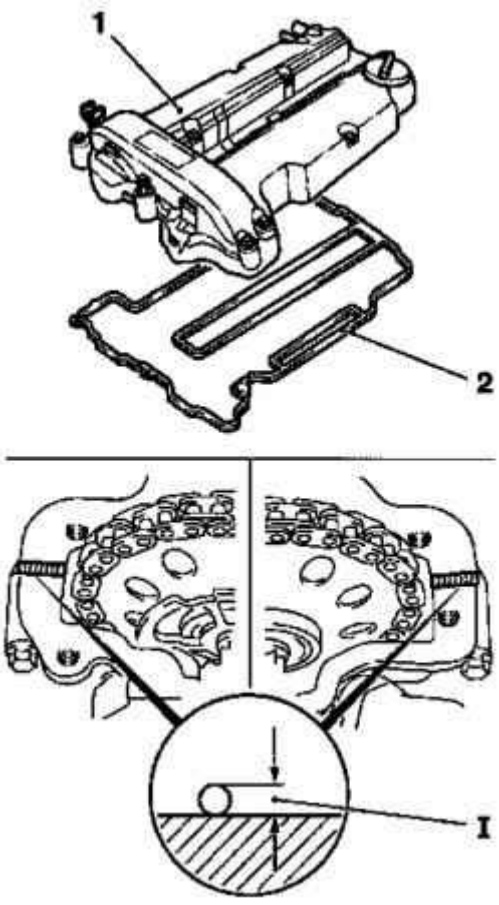


Fig. **2.43.** **Replacing Cylinder head: 1 - cover of the cylinder head, 2 - Seal**

Replace the cover cylinder head.
Replace gasket.

NOTICE
Follow the assembly within 10 minutes after the installation of seals.

Apply a layer of silicone sealant (gray) with a thickness of about 2 mm (the size I) in place of the body synchronization and the cylinder head.

NOTICE
Visually check the bolts and make sure the seal is not damaged. If necessary, replace the bolts with new ones.

Tighten the mounting bolts 13 point 8 Nm
Replace ignition module.
Connect the module to the spark plugs.
Tighten the two screws fastening point 8 Nm
Install the ignition module cover on the lid of the cylinder head.
Connect the wiring harness ignition module.
Attach the wiring harness on the lid of the cylinder head.
Connect the camshaft sensor, mass airflow sensor, pressure sensor oil and coolant temperature sensor.
Replace the air filter housing on the arch of the wheel and tighten the attachment bolt.
Attach the intake hose to throttle module and attach the clamp.
Attach the hose to the ventilation of the engine air intake hose and secure clamp.
Connect the wiring harness to the sensor air flow mass.
Connect the ventilation pipe of the fuel tank.
Close the hood.

Checking the pressure loss in the engine (1,8 l)

Removing the air filter housing
Open the hood.

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

Loosen nuts and remove the massive wire from the battery.
Remove the air filter housing and intake manifold.

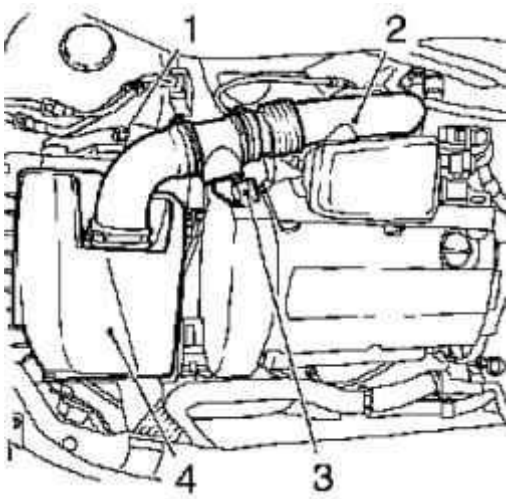


Fig. **2.44.** **Components, shooting in the dismantling of the air filter: 1 - attachment bolt, 2 - inlet manifold, 3 - the wiring harness connector sensor mass air flow, 4 - air filter housing**

Disconnect the wiring harness connector sensor mass air flow.

Loosen the mounting bolt, remove the collar and the inlet pipe of air filter.

Removing the front cover toothed belt

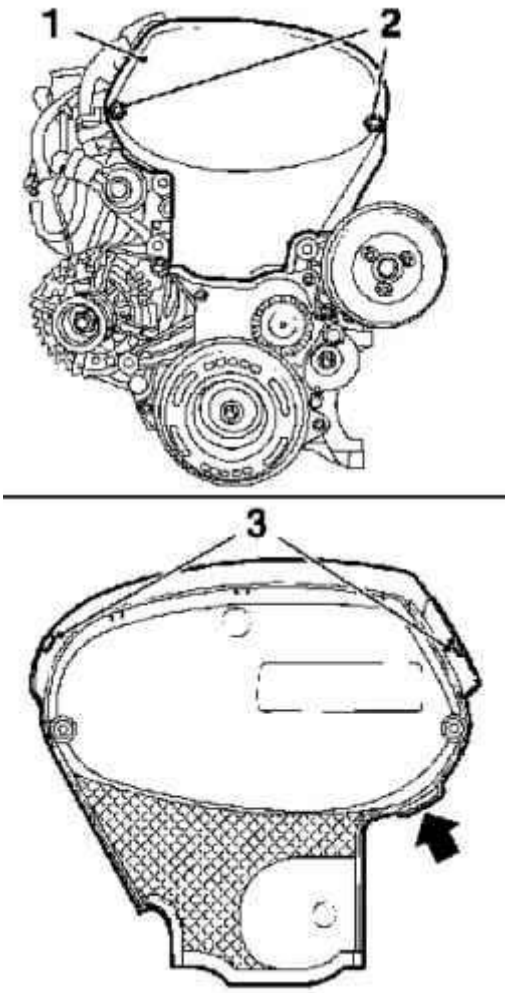


Fig. **2.45. Mounting the front cover toothed belt: 1 - the front cover of the toothed belt 2 - mounting screws, 3 - Latch**

Loosen the two mounting screws, disconnect the upper latch and remove the front cover of the toothed belt (top) (Figure 2.45).

NOTE
Pull the front cover of the toothed belt upwards, the protrusion (arrow in Figure 2.45).

Remove the ignition module in the direction of the arrow shown therein.

NOTE
Mark the position of arrows on the lid.

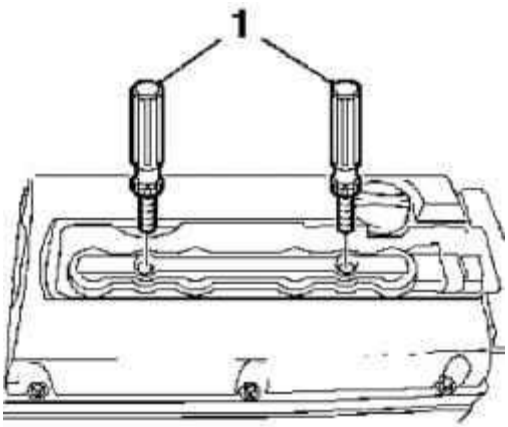


Fig. **2.46. Removing the ignition module: 1 - bolts fastening**

Unscrewing 2 screws, remove the spark plug, using a special tool KM 6009 (Fig. 2.46).
Remove the coolant expansion tank.

Remove the oil dipstick.
Raise the car.

Withdrawal right boryzgovika Engine
Loosen the 4 bolts and remove the attachment right mudflap engine.

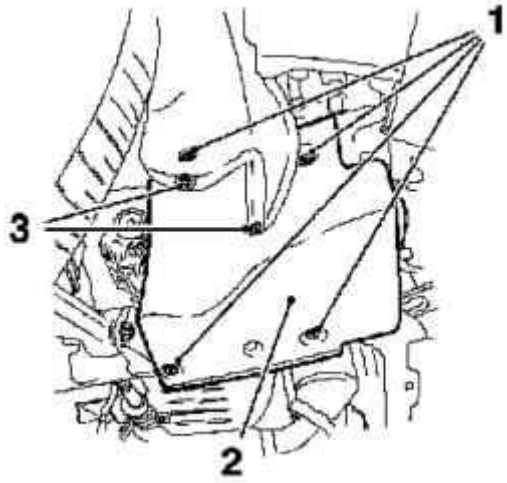


Fig. **2.47.** **Components, Removable cover for dismantling the cylinder head: 1 - right engine splash guard, 2 - mounting screws, 3 - rivets**

Remove the two set out on the back of the rivets.

Install the crankshaft position at top dead center (TDC), piston cylinder number 1

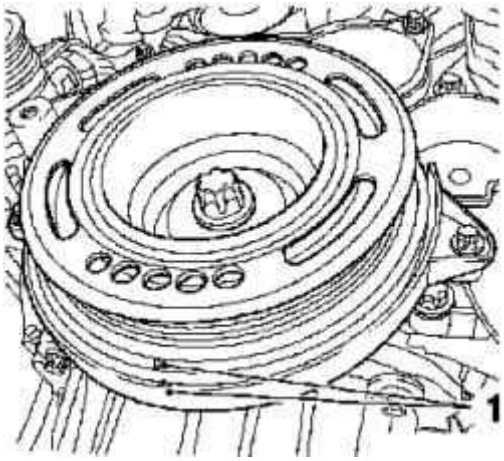


Fig. **2.48.** **Install the crankshaft position at top dead center (TDC), piston cylinder number 1: 1 - Tags**

Rotate the crankshaft of the engine in the direction of rotation, set the piston cylinder number 1 in the position of top dead center (TDC) (mark 1) (Figure 2.48).
Lower the car.

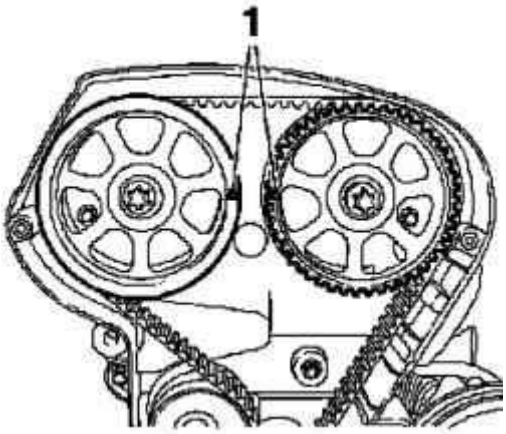


Fig. **2.49.** **The combination of marks on camshaft gears: 1 - Tags**

A 3 tag on one of the camshaft gears and align the marks on both wheels (Fig. 2.49).

Each label should be shifted by 90 ° relative to the next tag.

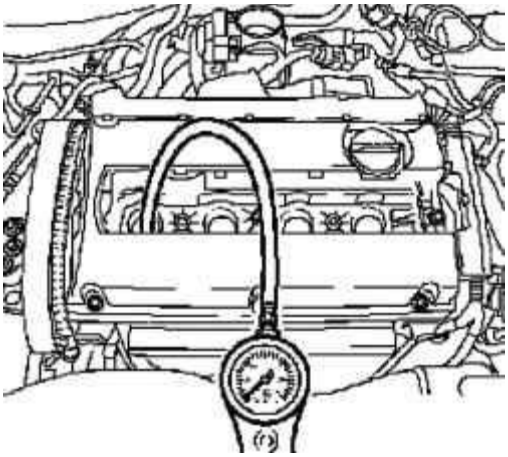


Fig. **2.50.** **Connecting tester**

Connect the tester to the system pressure drop, the compressed air (Figure 2.50).
Calibrate the tester pressure drop.
Turn prvuyu transfer and parking brake systems.

NOTE
The wheels must be in contact with the ground.

Replace the connection piece into the threaded hole plugs cylinder number 1.
File a compressed air into the cylinder.

Check the pressure drop
Determine the value of pressure drop.
The maximum allowable pressure difference between the cylinders - approximately 10%.
Maximum loss of pressure in the cylinder - 25%.

NOTE
Watch for any visible leaks of compressed air in the intake and exhaust manifold and the crankcase.
Pay attention to the bubbles in the coolant expansion tank.

Rotate the crankshaft 180 ° in the direction of motor rotation (corresponding to 90 ° rotation of cam gear) and set the piston cylinder number 3 in the position of top dead center (TDC) (pre-stamped label).
Connect the tester pressure drop.
Replace the connection piece into the threaded hole plugs cylinder number 3 and submit the compressed air into the cylinder.
Determine the value of pressure drop.
The maximum allowable pressure difference between the cylinders - approximately 10%.
Maximum loss of pressure in the cylinder - 25%.
Rotate the crankshaft 180 ° in the direction of motor rotation (corresponding to 90 ° rotation of cam gear) and set the piston cylinder number 4 in the position of top dead center (TDC) (pre-stamped label)
Connect the tester pressure drop.
Replace the connection piece into the threaded hole plugs cylinder number 4, and submit the compressed air into the cylinder.
Determine the value of pressure drop.
The maximum allowable pressure difference between the cylinders - approximately 10%.
Maximum loss of pressure in the cylinder - 25%.
Rotate the crankshaft 180 ° in the direction of motor rotation (corresponding to 90 ° rotation of cam gear) and set the piston cylinder number 2 in the position of top dead center (TDC) (pre-stamped label)
Connect the tester pressure drop.
Replace the connection piece into the threaded hole plugs cylinder number 2 and submit the compressed air into the cylinder.
Determine the value of pressure drop.
The maximum allowable pressure difference between the cylinders - approximately 10%.
Maximum loss of pressure in the cylinder - 25%.

Installation components
Raise the car.
Install the engine splash guard.
Lower the car.
Insert the oil dipstick hole.
Replace the cover expansion tank coolant.
Replace spark plugs with sptsialogo tool KM 6363 and then tighten the moment 25 Nm

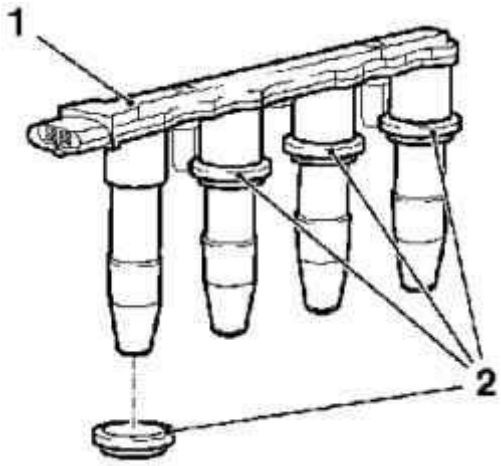


Fig. **2.51.** **Ignition Module**

Replace ignition module, replacing the 4 pads (Figure 2.51).
Tighten the two screws fastening point 8 Nm
Install the ignition module cover.
Replace the front cover of a toothed belt.

NOTICE
Check that the lids.

Tighten the two screws fastening the cover time 6 Nm
Replace the air filter housing, tighten the attachment bolt and attach the clamp moment 3,5 Nm
Install inlet pipe.
Connect the wiring harness air flow sensor.
Connect the battery pack.
Tighten the nut mounting terminals.
Program transient memory.
Close the hood.

Checking the pressure loss in the engine (2,0 l)

Removing the air filter housing
Open the hood.

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

Remove the air filter housing with the sensor mass air flow.
Unplug the wiring harness connector sensor mass air flow.

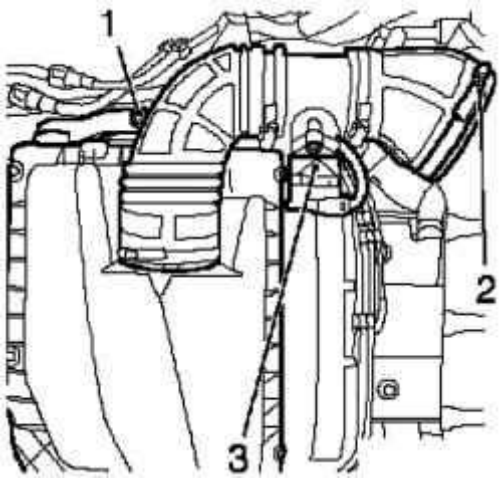


Fig. **2.52.** **Components, shooting in the dismantling of the air filter: 1 - attachment bolt, 2 - clamp, 3 - the wiring harness connector sensor mass air flow**

Disconnect the air intake hose from the inlet pipe to remove it and loosen the clamp attachment bolt (Figure 2.52).

Removing the intake manifold
Remove the intake manifold.
Loosen the mounting bolt and remove the vent hose from the engine cylinder head cover.

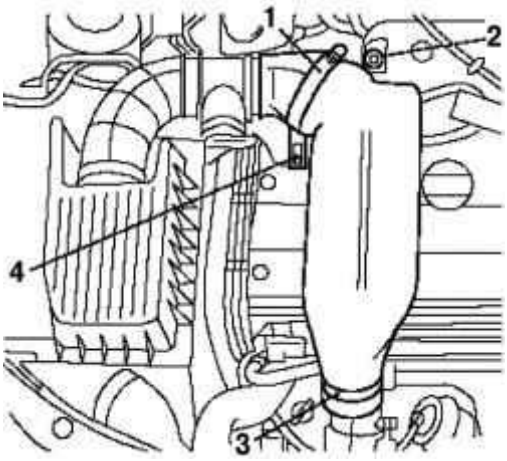


Fig. 2.53. **Mounting inlet pipe: 1, 3, 4 - clamps, 2 - screw fixing**

Remove the clamps and separate the inlet pipe from the turbo and remove it (Figure 2.53).
Remove the air hose pressurization.

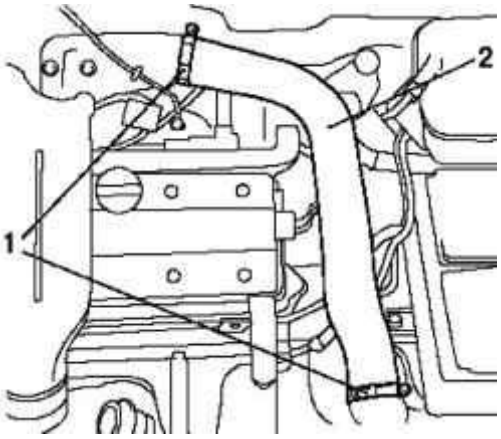


Fig. 2.54. **Hose Pressurization: 1 - clamps, 2 - Hose Pressurization**

To do this, remove the two clamps and disconnect the air hose blower (Figure 2.54).

Removing the pipe deflection air pressurization

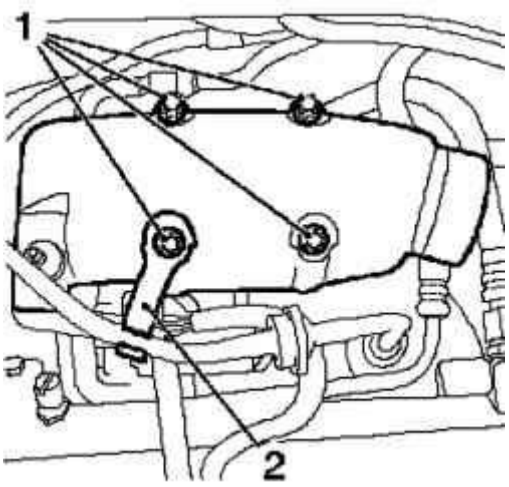


Fig. 2.55. **Mounting pipe deflection air pressurization: 1 - mounting screws, 2 - Bracket**

Loosen the 4 bolts and separate the vacuum line from the bracket and remove the tube deflection air pressurization (Figure 2.55).

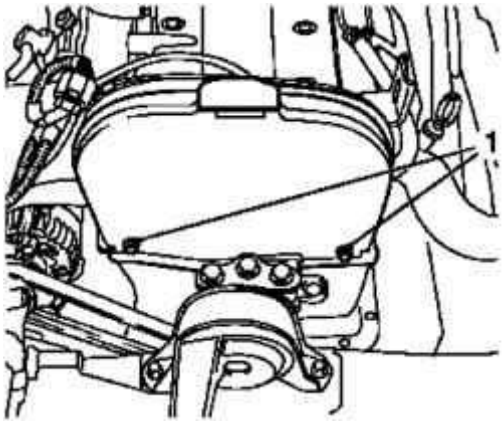


Fig. 2.56. **Removing the upper part of lid toothed belt: 1 - bolts fastening**

Loosen the mounting bolts and separate the upper cap element toothed belt from the back cover (Figure 2.56).

Removing the ignition module

Disconnect the wiring harness connector from the ignition module.
Remove the ignition module in the direction of the arrow shown therein.

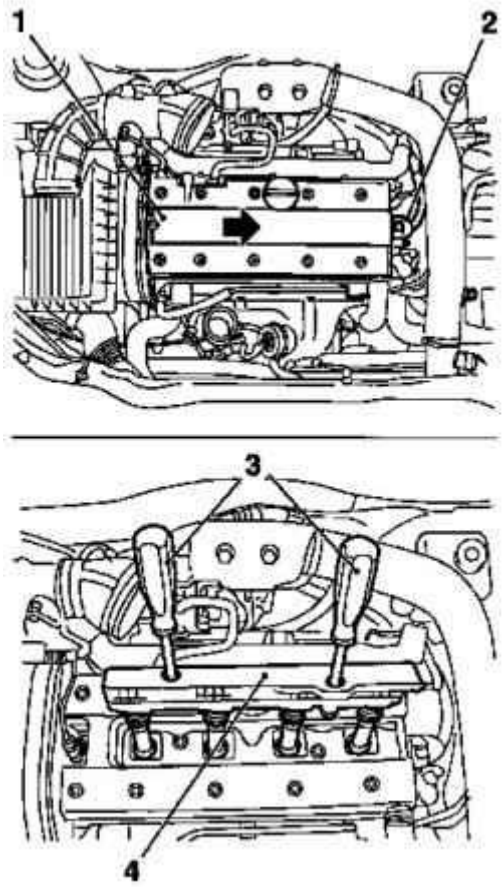


Fig. 2.57. **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - wiring harness connector ignition module, 3 - a special tool, 4 - ignition module**

Loosen the mounting bolts and detach the ignition module from the spark plugs, using a special tool KM 6009 (Fig. 2.57).
Remove the spark plugs, using a special tool KM-194-E.
Remove the oil-filling neck.
Remove the coolant expansion tank.
Remove the oil dipstick.

Install the crankshaft position at top dead center (TDC), piston cylinder number 1 and the connection tester

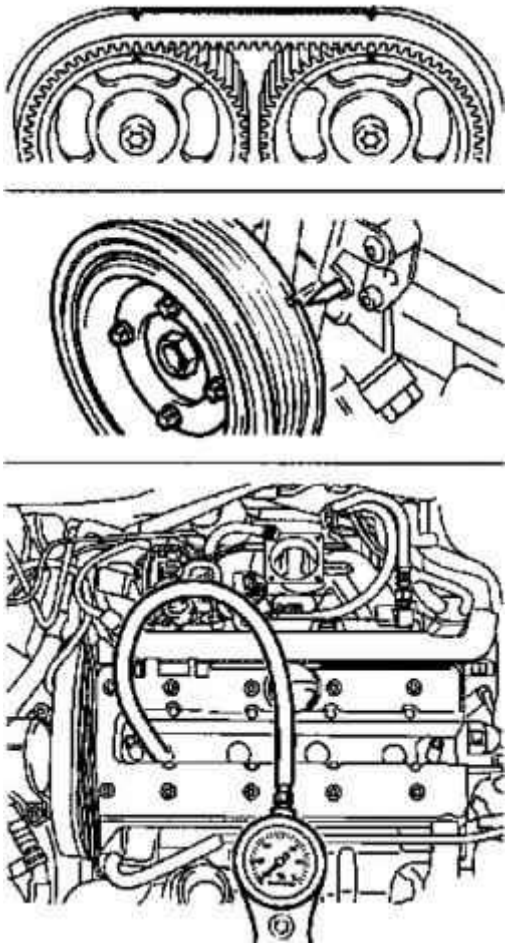


Fig. **2.58.** **Install the crankshaft position at top dead center (TDC), piston cylinder number 1 and the connection tester**

Rotate the crankshaft of the engine in the direction of rotation, set the piston cylinder number 1 in the position of top dead center (TDC), using the attachment bolt finger pulley belt transmission (Fig. 2.58).

NOTE
At the same time slots on the camshaft sprocket should be aligned with marks on the lid of the cylinder head.

Rotate the crankshaft slowly and smoothly.
Connect the tester to the system pressure drop, the compressed air.
Calibrate the tester pressure drop.
Replace the connection piece in the candle hole cylinder number 1 and plug the tester pressure drop to the adapter (in accordance with the manufacturer's instruction).

NOTICE
During the test, the rotation of the crankshaft is not allowed. to avoid rotation, including 1-S transmission and the parking brake systems.

Determine the pressure drop in percentage terms. Listen carefully to the sound of air leakage from the intake manifold, exhaust system or crankcase and pay attention to the bubbles in the coolant expansion tank.
The maximum pressure drop between the individual cylinders is approximately 10%, the maximum pressure drop in one cylinder should not exceed 25%.

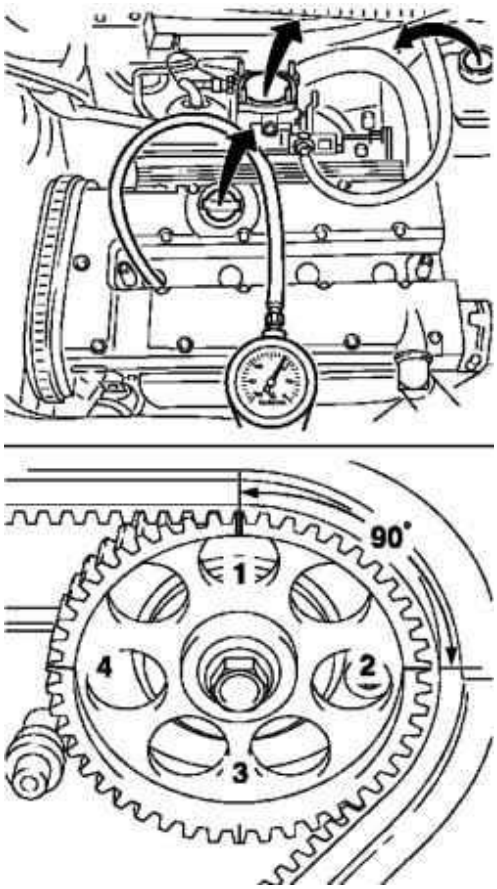


Fig. **2.59.** **Verification procedure**

Check the pressure drop in the cylinders 3, 4 and 2, using the same method. Tested piston cylinder is mounted in the position of TDC. The sequence of cylinders: 1-3-4-2. Defines the position at TDC matching labels 1, 2, 3 and 4, the star of a camshaft (Figure 2.59).
Continue to rotate the camshaft at 180 ° in the direction of motor rotation (corresponding to 90 ° on the pulley camshaft) to the combination of marks on camshaft pulley with the marks on the lid of the cylinder head. Determine the position of TDC for the 4 th and 2-th cylinder, respectively. Crankshaft rotate slowly and evenly.

Installation components
Replace spark plug with a special tool KM-194-E, torque 25 Nm
Connect the ignition module for spark plugs and tighten the cylinder head at point 8 Nm
Install the ignition module cover on the lid of the cylinder head.
Connect the wiring harness connector to the ignition module.
Replace the cover oil-filling neck.
Set the cover expansion tank coolant.
Insert the oil dipstick hole.
Install the upper part of the toothed belt cover on the back cover of the toothed belt tightening torque 6 Nm
Replace the air filter housing with the sensor mass air flow. To do so, attach the hose to the inlet of the air intake tube and attach the clamp.
Tighten the attachment bolt.
Connect the wiring harness connector sensor mass air flow.
Install pipe deflection air pressurization and tighten the 4 bolts fastening.
Insert the vacuum line to the bracket.
Install the air hose and attach the two pressurization clamp.
Remove the seal turbocharger inlet pipe.
Connect the vent hose to the lid of the engine cylinder head and attach the clamp.
Connect the inlet pipe to the turbocharger and attach the clamp.
Connect the inlet pipe to the air intake hose and secure clamp.
Install an insulating cover, tighten its mounting point 4 Nm

Checking compression (1,4-1,8 liter engines)

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

Removing the ignition module
Remove the wiring harness ignition module.
Remove the ignition module with the lid of the cylinder head in the direction of the arrow.
Loosen the two bolts.
Separate the ignition module from the spark plug with a special tool KM-6009 2.
Open the throttle, using the device TECH 2.

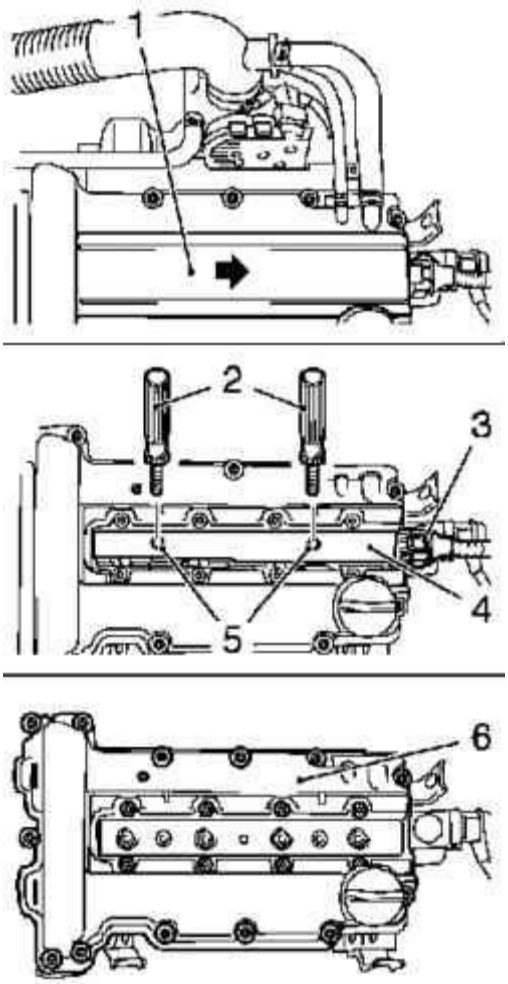


Fig. **2.60.** **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - a special tool; 3 - Ignition module wiring harness, 4 - ignition module 5 - mounting screws, 6 - cylinder head cover**

Use the program "test compression" of the device (TECH 2).

Verification procedure

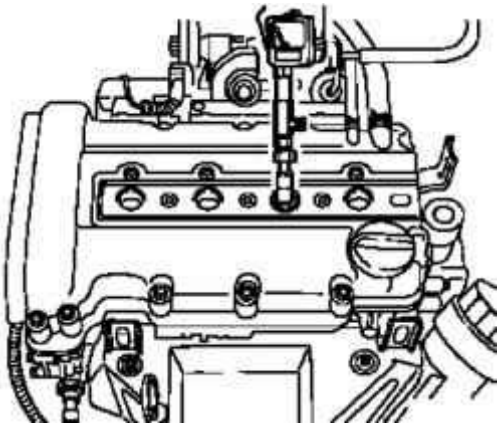


Fig. **2.61.** **Connecting tester**

Connect the tester and turn the starter at the 4 s (Fig. 2.61).

NOTE
Use a compression tester with a rubber cone and a measurement range up to 1750 kPa (17.5 bar).

The minimum engine speed 300 min $^{-1.}$
Compare the testimony of the values of compression.
The difference between the values of maximum pressure between the cylinders should not exceed 100 kPa (1 bar).

Installation components
Replace spark plug with a special tool KM-194-E in the cylinder head and tighten the moment 25 Nm
Connect the ignition module for spark plugs.
Tighten the two screws fastening point 8 Nm
Install the ignition module cover on the lid of the cylinder head.
Connect the wiring harness ignition module.

Check compression (engine 2.0 l)

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

Removing the intake manifold
Remove the intake manifold.
Loosen the mounting bolt and remove the vent hose from the engine cylinder head cover.

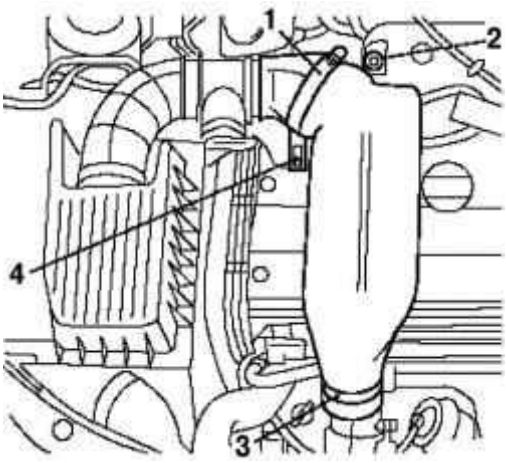


Fig. **2.62. Mounting inlet pipe: 1, 3, 4 - clamps, 2 - screw fixing**

Remove the clamps and separate the inlet pipe from the turbo and remove it (Figure 2.62).
Remove the air hose pressurization. To do this, remove the two clamps and disconnect the air hose supercharger.
Loosen the 4 bolts and separate the vacuum line from the bracket and remove the tube deflection air pressurization.

Removing the ignition module
Disconnect the wiring harness connector from the ignition module.
Remove the ignition module in the direction of the arrow shown therein.

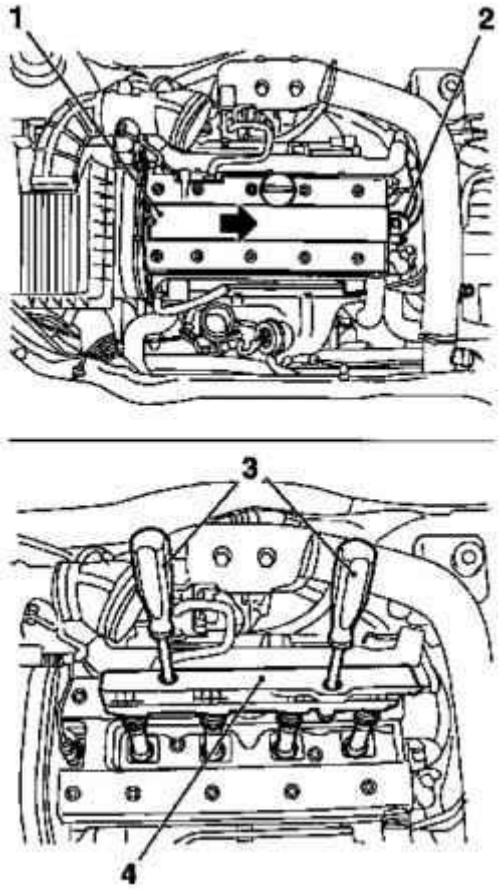


Fig. **2.63.** **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - wiring harness connector ignition module, 3 - a special tool, 4 - ignition module**

Loosen the mounting bolts and detach the ignition module from the spark plugs, using a special tool KM 6009 (Fig. 2.63).
Remove the spark plug using a special tool KM-194-E.
Open the throttle, using the device TECH 2.
Use verification program compression (TECH 2).
Use a compression tester with a rubber cone and a measurement range up to 1750 kPa (17.5 bar).

Verification procedure

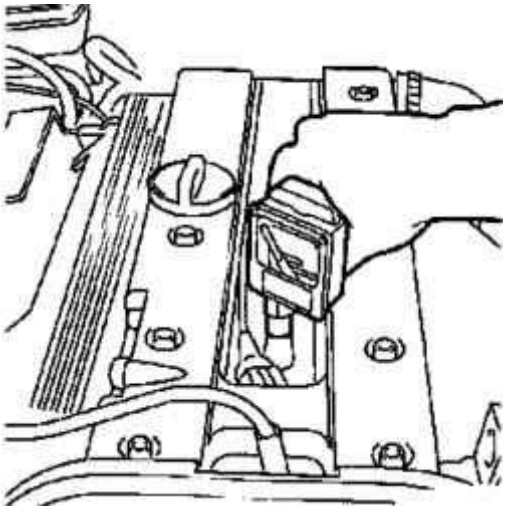


Fig. **2.64.** **Connecting tester**

Connect the tester and turn the starter at the 4 s (Fig. 2.64).

NOTE
Use a compression tester with a rubber cone and a measurement range up to 1750 kPa (17.5 bar).

Minimum engine speed - 300 min^{-1}.
Compare the testimony of the values of compression.

The difference between the values of maximum pressure between the cylinders should not exceed 100 kPa (1 bar).

Installation components

Connect the ignition module for spark plugs and attach to the cylinder head moment of 8 Nm
Install the ignition module cover on the lid of the cylinder head.
Connect the wiring harness connector to the ignition module.
Remove the seal turbocharger inlet pipe.
Connect the vent hose to the lid of the engine cylinder head and attach the clamp.
Connect the inlet pipe to the turbocharger and attach the clamp.
Connect the inlet pipe to the air intake hose and secure clamp.

Checking the engine oil pressure (engine 2.0 liters)

Unplug the wiring harness connector from the oil pressure sensor.
Disconnect the oil pressure sensor on the oil pump.
Check the bottom of the container.
Connect the measuring instrument.

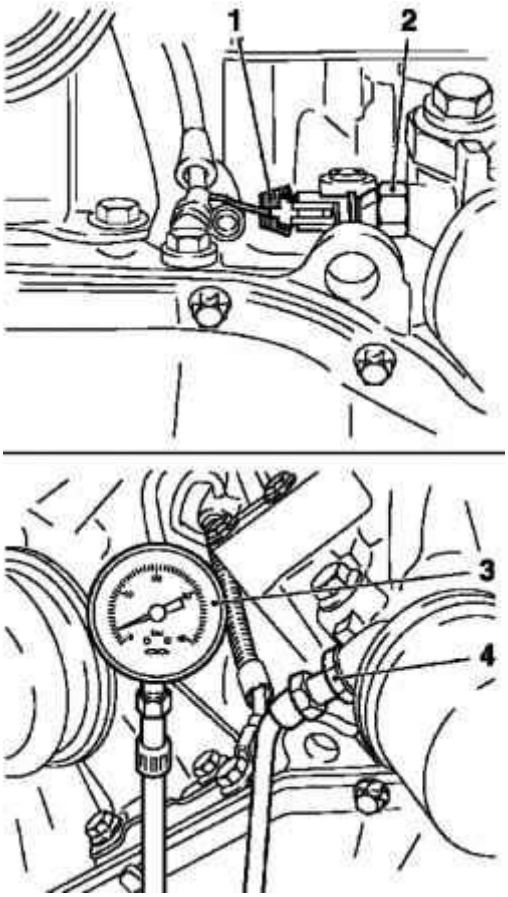


Fig. 2.65. **Checking the engine oil pressure: 1 - the wiring harness connector of the oil pressure sensor, 2 - oil pressure sensor, and 3 - meter, 4 - socket connection**

NOTE
At idle the oil pressure should be equal to approximately 150 kPa (1.5 bar), oil temperature - 80 ° C.

Install the oil pressure sensor with a new O-ring on oil pump, tighten the moment 40 Nm
Connect the wiring harness of the oil pressure sensor.
Check the engine oil and top up the oil if necessary.

Check tightness of the engine (CO content in the cooling system)

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

NOTICE
Remember that the cooling system is under pressure.

Open the hood.
Remove the coolant expansion tank.
Slowly unscrewing the lid, reset the pressure in the system.
Check the coolant. Top up the coolant to the COLD mark if necessary.

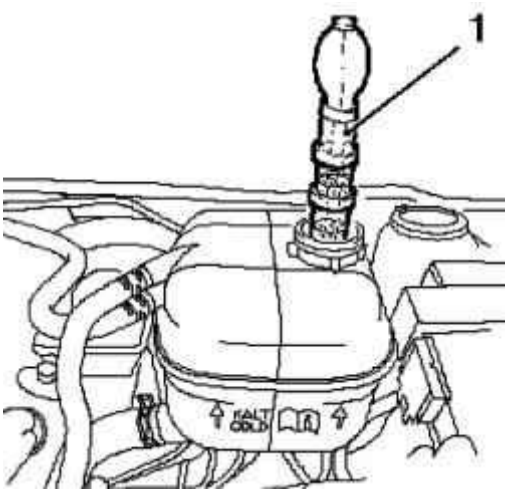


Fig. **2.66. Installing the tool on the coolant expansion tank: 1 - tester**

Set the tester at the coolant expansion tank (Figure 2.66).
Start the engine.
Check the engine for leakage.

NOTE
Transparent cylinder tester contains a blue reactive liquid that turns yellow in the presence of air containing trace of carbon monoxide. If you pull fresh air in the test fluid, it is restored and regains blue.

The air is taken from the coolant expansion tank with a rubber bulb.

NOTICE
Coolant should not fall into the tester.

If the blue liquid in the main chamber of the tester was yellow, the cylinder head gasket or cylinder head leaky.

Check tester
The fluid can be tested by a fence of gases from the exhaust pipe. In this case the test liquid should be yellow.
Disconnect tester and carefully reset the pressure.
Replace the cover expansion tank coolant.
Close the hood.

Measurement of oil

Under the oil consumption of internal combustion engine means the amount of oil consumed in the process of combustion. Oil consumption should not be confused with the loss of oil due to leakages through seals oil pan and the lid of the cylinder head.
Motor oil is designed to separate the friction surfaces of the oil film, ie, to prevent dry friction, and dissipation of heat produced by friction and remove products of combustion.
All this leads to a gradual flow of oil during engine operation.
In addition to the operating conditions on oil consumption affects driving style and manufacturing tolerances.
Need to top up the oil, when its level falls below «MIN» on schupe to measure.
It is also important to ensure that the oil level did not exceed the mark «MAX» to schupe to measure, because it can lead to increased consumption of oil.
Since oil consumption is determined by technical factors, we can conclude that the motor does not consume oil, under certain operating conditions, which lead to the dilution of oil.
Subject to frequent launches of a cold at the beginning of motion, until the engine operating temperature, oil falls back into the oil pan, carries with it a fuel. Fuel "dissolved" oil and its level rises.
Such dissolved oil loses its lubricating ability and may cause engine damage, if not complied with the prescribed oil change intervals.

The movement in mainly urban conditions, cold engine, a crankshaft speed above idle speed is the main cause dilution of oil.
Since the oil consumption stabilizes after only a few thousand kilometers, the value of its consumption can not be determined accurately until a run of approximately 7500 km.
Before measuring the flow of oil, make sure that the engine oil does not lose because of the leak.
Oil probe can be used only in order to check the oil level. The engine must be switched off for at least 5 Mindo check the oil level. If after replacing the maximum amount of oil is not flooded with the maximum level of schupu, are the cause of the necessary manufacturing tolerances.
All information regarding the allowable consumption of motor oil and gas volumes is in the user's manual and service book.

Verification procedure

1. To check the car must be installed on a horizontal surface, and the engine warmed up to operating temperature (engine oil temperature of 80 ° C).
2. Drain the engine oil immediately after the engine stops. Time of discharge - approximately 30 minutes (this value is obtained by technical tests).
3. Number drained the engine oil is determined by measuring container. Container is filled with new oil up to the maximum filling level, which is deducted from the amount of oil remaining in the oil filter.
4. This quantity of motor oil should be enough to run 1000 km without the need for topping (road conditions and driving style should not change).
5. Then repeat the previous procedure (paragraphs 1 and 2) with the same time, drain the oil.
6. Number of oil, now "missing" in the measuring container, is the engine oil consumption for this run.
7. Oil consumption is calculated as follows: the number of flooded oil (l) - the number of drained oil (l) + total mileage (km) x 1000 = oil consumption (l/1000 km).

Check tension Poly-V belt (engine 2.0 l)

NOTE
Poly-V belt tension is automatically adjusted Poly-V belt retractor.

Test

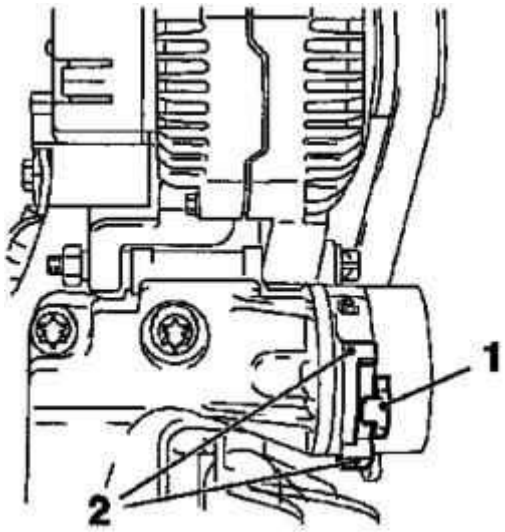


Fig. **2.67.** **Check tension Poly-V belt: 1 - movable lever tensioner, 2 - Stoppers**

Check the position of movable arm tensioner (Figure 2.67).

NOTE
The movable lever tensioner should be placed between the delimiters.
If the movable lever Poly-V belt tensioner relies on one of the constraints, Poly-V belt Poly-V belt and tensioner should be replaced.

Checking the synchronization of the timing mechanism (motor 2,0 l)

Removing components

Disconnect the mass wire from the battery

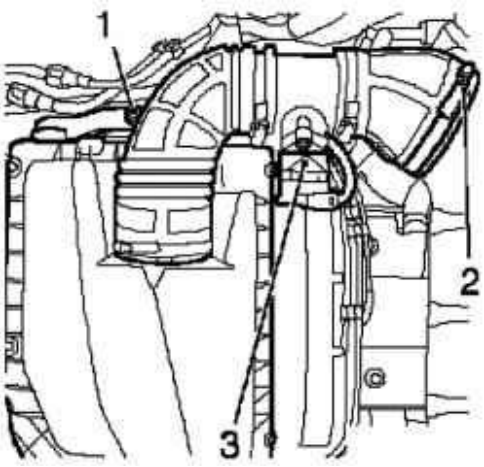


Fig. **2.68.** **Removing the air filter housing: 1 - the front cover of the toothed belt 2 - mounting screws, 3 - Latch**

Remove the air filter housing with the sensor mass air flow (Fig. 2.68).
Simply unplug the wiring harness connector sensor mass air flow.
Relaxed the collar and unscrewing bolts, disconnect the air intake hose inlet pipe.

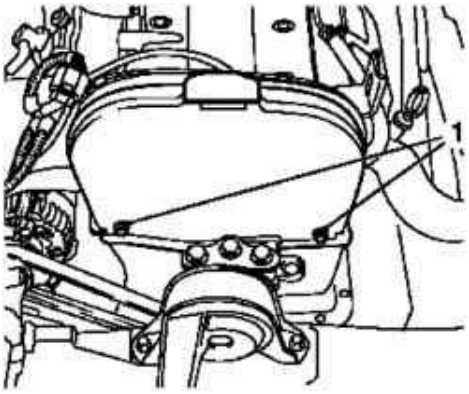


Fig. **2.69.** **Bolts for fastening the top of the lid toothed belt: 1 - bolts fastening**

Loosen the mounting bolts and remove the upper lid toothed belt with a toothed belt rear cover

Test

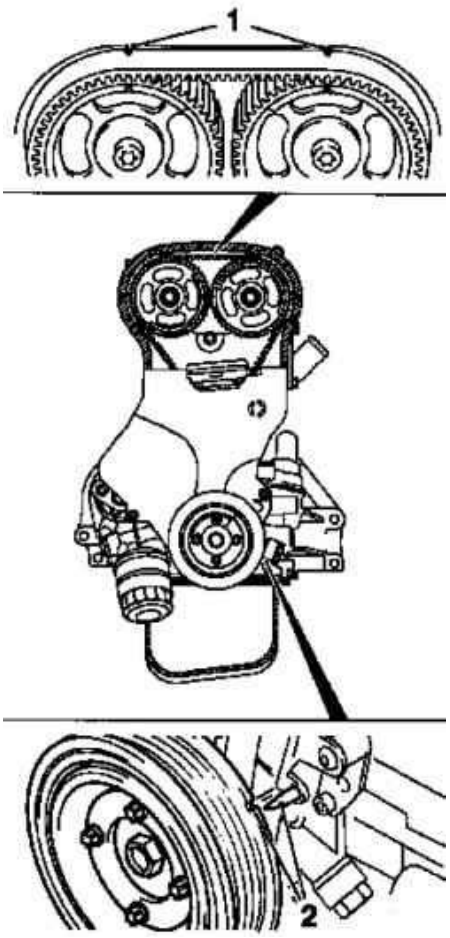


Fig. **2.70.** **Install the crankshaft position at top dead center (TDC) of cylinder number 1: 1 - marks on the lid of the cylinder head, 2 - a label at the crankshaft**

Rotate the crankshaft in the position of top dead center (TDC) of cylinder number 1 (ignition) in the direction of rotation of the engine (tag 2) (Figure 2.70).
To do this, rotate the crankshaft attachment bolt for the drive gears.
Notches on the camshaft sprocket should be aligned with marks on the lid of the cylinder head.

NOTE
Locking device KM-853 should be installed in this position.
Adjust the synchronization of the timing mechanism, if necessary

Installation components
Attach the top of the cover toothed belt to the back cover of the toothed belt and tighten the moment of 6 Nm
Replace the air filter housing with the sensor mass air flow.
Connect the wiring harness connector sensor mass air flow.
Connect a massive wire to the battery.

Adjusting the tension of the toothed belt (engine 2.0 l)

NOTE
Adjustment is performed on a cold start at room temperature.
Before adjustment necessary to check the tension of a toothed belt. This means that the crankshaft is set to TDC of cylinder number 1 and the star camshaft locked device KM 853.

Adjustment

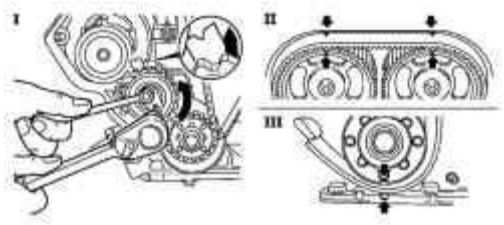


Fig. **2.71. Adjusting the tension of the toothed belt**

Loosen the bolt mounting tension pulley toothed belt I (Figure 2.71).
Turn toothed belt tension roller eccentric control in the direction of the arrow (counterclockwise).

NOTE
Index tension pulley toothed belt should be just right before the constraint I (Fig. 2.71).

Tighten the attachment bolt tension pulley toothed belt
Remove the device KM 853.
Rotate the crankshaft two turns (720 °) in the direction of rotation of the engine in the position of top dead center (TDC) of cylinder number 1 mark III (Figure 2.71).
Turn the screw for mounting drive gears.

NOTE
Rotate the crankshaft slowly and smoothly.

Notches on the camshaft sprocket should be aligned with the tag II on the cover of the cylinder head (Figure 2.71).
Block stars camshaft in position by a KM-853.
Partially loosen the attachment bolt tension pulley toothed belt and turn the adjusting eccentric in the direction of the arrow (clockwise).
Option I: pointer tension pulley toothed belt combined label.

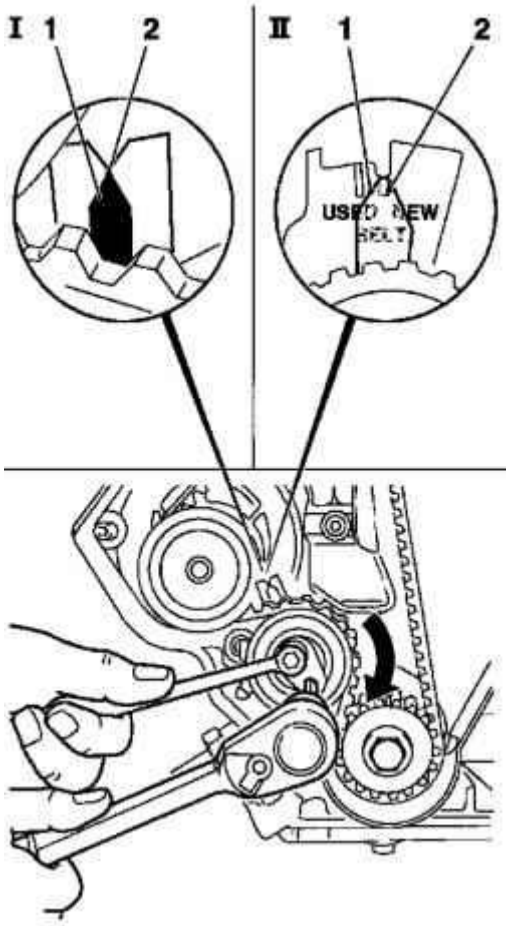


Fig. **2.72.** **Adjusting the tension of toothed belt tension pulley on a pointer: 1 - pointer tension pulley, 2 - Tag**

Option II: Index tension pulley toothed belt combined with the label «NEW» (Figure 2.72).
Tighten the attachment bolt tension pulley toothed belt moment 20 Nm
Remove the device KM 853.

Check after adjustment

Rotate the crankshaft by two turns (720 °) in the direction of rotation of the engine in TDC position of the first cylinder and check the adjustment of tension pulley toothed belt.
If the pointer tension pulley toothed belt is not combined with the label, repeat the process of adjustment.

Readjusted

Обкатайте timing belt and adjust it.
Partially loosen the attachment bolt tension pulley toothed belt and turn the adjusting eccentric in the direction of the arrow (clockwise).
Option I: pointer tension pulley toothed belt is located approximately 4 mm to the left of the tag.

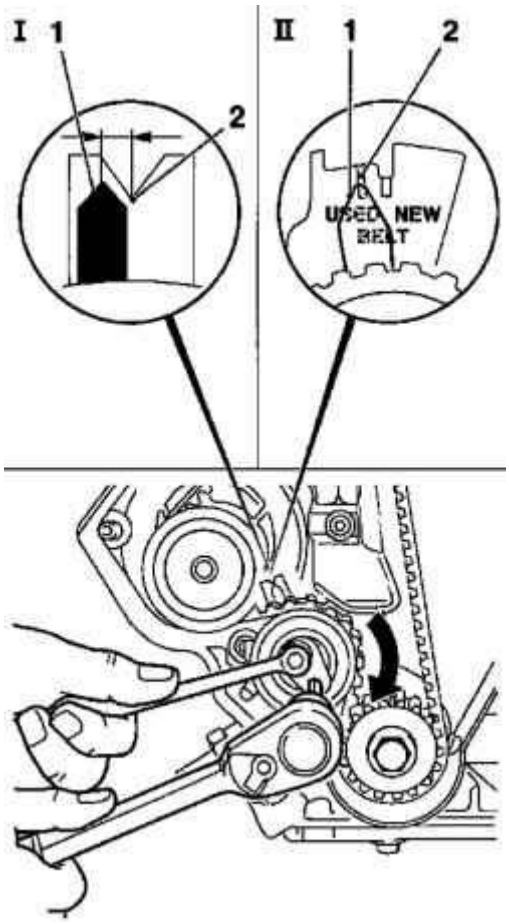


Fig. **2.73.** **Re-adjust the tension on the toothed belt tension pulley index: 1 - pointer tension pulley, 2 - Tag**

Option II: Index tension pulley toothed belt combined to tag «USED» (Figure 2.73).
Tighten the attachment bolt tension pulley toothed belt moment 20 Nm
Remove the device KM 853

Check after adjustment
Rotate the crankshaft by two turns (720 °) in the direction of rotation of the engine in TDC position of the first cylinder and check the adjustment of tension pulley toothed belt.
If the pointer tension pulley toothed belt is not combined with the label, repeat the process of adjustment.

Checking the tension of the toothed belt (engine 2.0 l)

NOTE
This operation applies only to the toothed belt after running. When installing a new toothed belt must be adjusted. The test is performed on the engine is cold - at room temperature.

Removing components
Disconnect the mass wire from the battery
Remove the air filter housing with the sensor mass air flow.
Simply unplug the wiring harness connector sensor mass air flow.
Relaxed the collar and unscrewing bolts, disconnect the air intake hose inlet pipe.
Loosen the mounting bolts and remove the upper lid toothed belt with a toothed belt rear cover
Check direction of rotation of Poly-V belt.

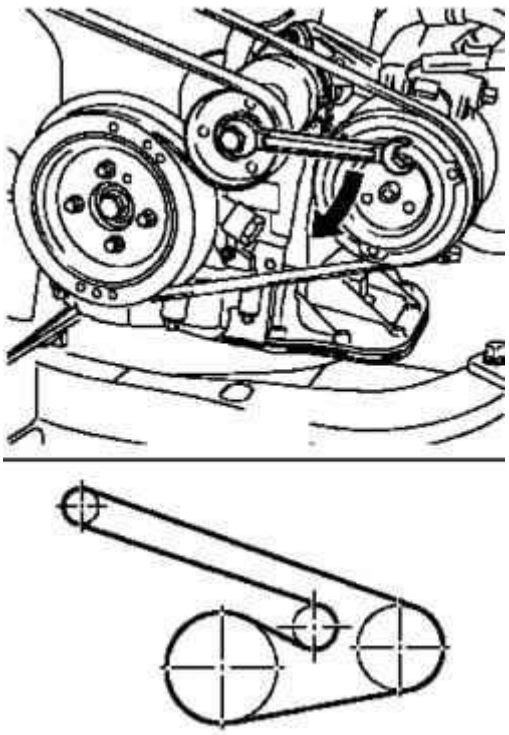


Fig. **2.74.** **Rotate tensioner Poly-V belt**

Turn Poly-V belt tensioner in the direction of the arrows in Figure 2.74.
Clear Poly-V belt
Remove the lower engine splash guard.
Turn Poly-V belt tensioner (clockwise) and block, using a suitable mandrel.

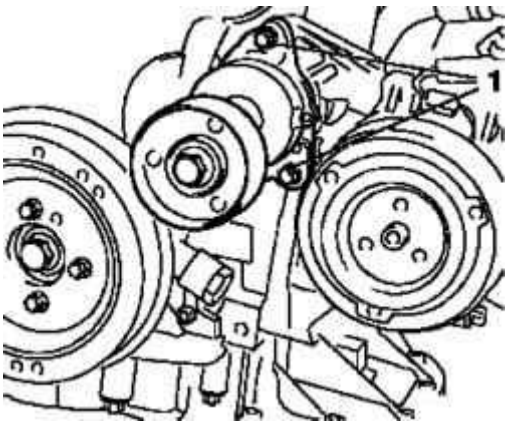


Fig. **2.75.** **Screw tensioner Poly-V belt: 1 - screws**

Loosen the clamping screws and remove the bearing compressor tensioner Poly-V belt (Figure 2.75).
Remove the snubber, holding his attachment bolt drive gears.

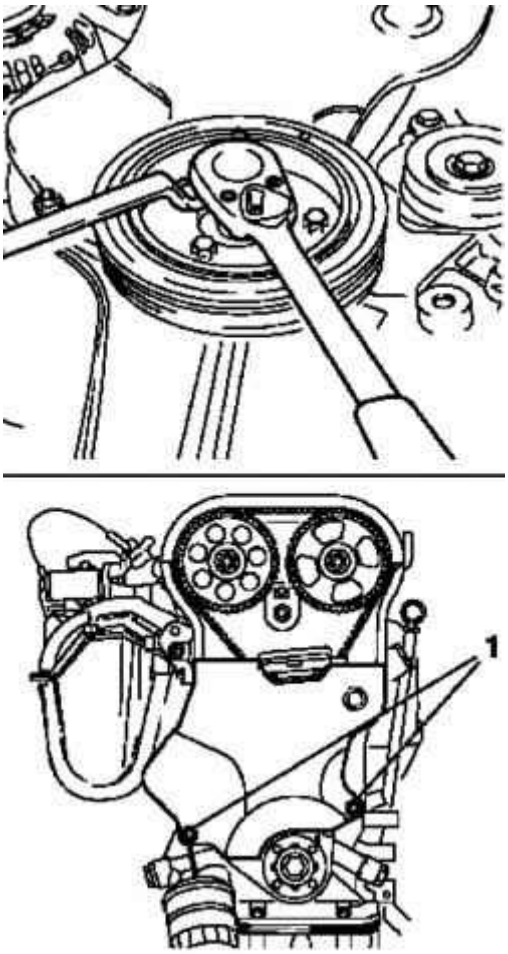


Fig. **2.76.** **Removing the snubber and the bottom of the cover toothed belt: 1 - bolts fastening**

Remove the mounting bolts and detach the bottom of the cover toothed belt from the back of the cover toothed belt (Figure 2.76).

Rotate the crankshaft in the position of top dead center (TDC) of cylinder number 1 (ignition) in the direction of rotation of the engine (tag 2)

Turn the screw for mounting drive gears.

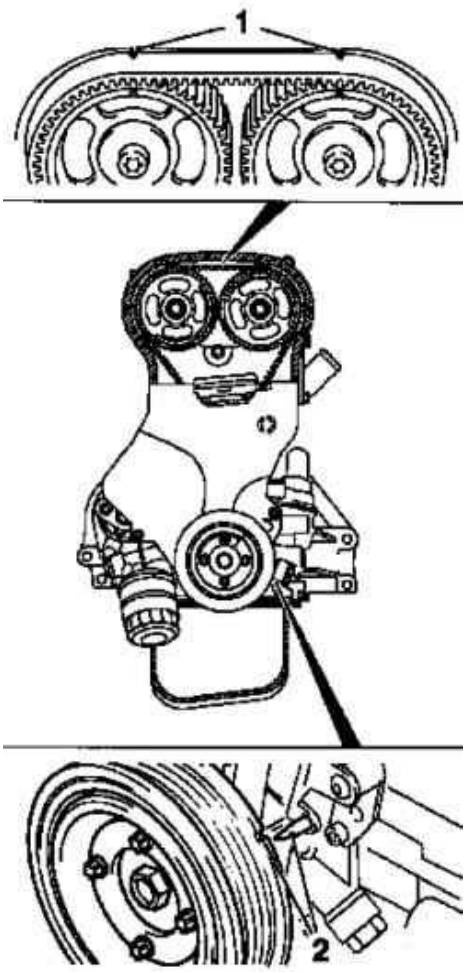


Fig. **2.77.** **Install the crankshaft position at top dead center (TDC) of cylinder number 1: 1 - marks on the lid of the cylinder head, 2 - a label at the crankshaft**

Notches on the camshaft sprocket should be aligned with marks on the lid of the cylinder head (Figure 2.77).

NOTE
Locking device KM-853 should be installed in this position.

Adjust the synchronization of the timing mechanism in case of need.

Test

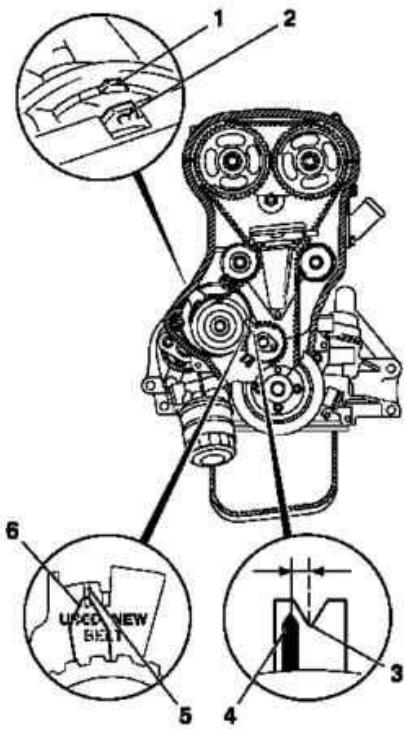


Fig. **2.78.** **Check the installation of coolant pump: 1 - the tide on the engine block, 2 - projection coolant pump, 3 - groove; 4 - pointer tension pulley toothed belt 5 - Tag «USED»; 6 - Index toothed belt tension pulley**

Check the loading position, coolant pump and adjust if necessary (Figure 2.78).
Tab pump coolant should be compatible with the corresponding tide at the engine block.
Option 1: The tension of the toothed belt is set correctly when the pointer tension pulley toothed belt - about 4 mm to the left slot.
Option 2: The tension of the toothed belt is set correctly, if the pointer tension pulley toothed belt combined with the tag «USED».
Adjust the tension of the toothed belt if necessary.

Installation components
Remove the locking device KM-853.
Attach the bottom of the cover toothed belt to the back cover of the toothed belt and tighten the moment of 6 Nm
Attach the snubber to the drive gears and tighten the moment 20 Nm

NOTE
Attaching the damper, hold it by the attachment bolt drive gears.

Connect Poly-V belt tensioner to the support of the compressor and tighten the moment 25 Nm
Turn Poly-V belt tensioner (clockwise) and remove the retainer.
Install the lower engine splash guard.
Replace Poly-V belt.

NOTE
Ensure the correct direction of rotation and position of Poly-V belt.

Tighten belt retractor Poly-Poly-V belt.
Attach the top of the cover toothed belt to the back cover of the toothed belt and tighten the moment of 6 Nm
Replace the air filter housing with the sensor mass air flow.
Connect the wiring harness connector sensor mass air flow.

Replacing the front lower lid toothed belt (engine 2.0 l)

Withdrawal
Unplug the wiring harness connector sensor mass air flow.
Disconnect the air intake hose, inlet pipe.
Remove the air filter housing with the sensor mass air flow.
Loosen the mounting bolts and remove the top element covers a toothed belt from the back cover toothed belt.
Check direction of rotation of Poly-V belt.

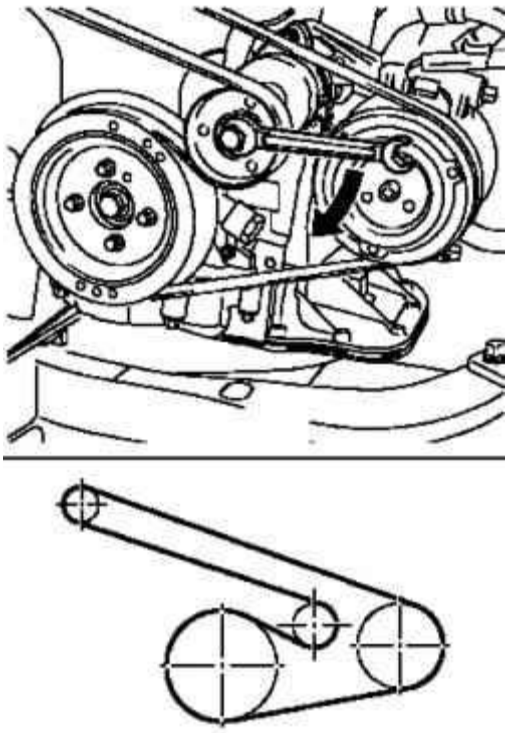


Fig. **2.79.** **Rotate tensioner Poly-V belt**

Turn Poly-V belt tensioner in the direction of the arrows in Figure 2.79.
Clear Poly-V belt.
Remove the lower engine splash guard.
Block and squeeze the Poly-V belt tensioner in the direction of the arrow (clockwise).

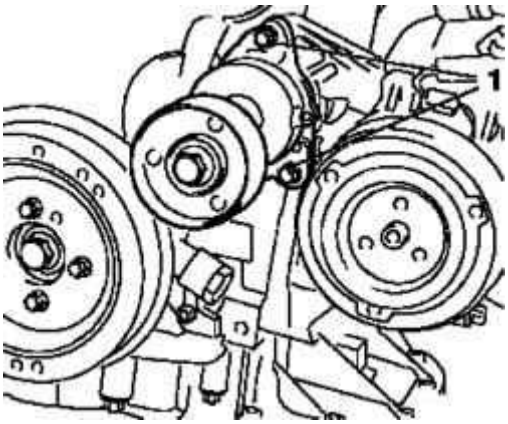


Fig. **2.80.** **Screw tensioner Poly-V belt: 1 - screws**

Loosen the clamping screws and remove the bearing compressor tensioner Poly-V belt (Figure 2.80).
Remove the snubber holding his attachment bolt drive gears.
Loosen the mounting bolts and remove the bottom of the cover toothed belt with the back cover toothed belt.

Setting
Attach the bottom part of the new toothed belt cover to the back cover of the toothed belt, tighten the time 6 Nm
Attach the snubber to the drive gears toothed belt, tighten the moment 20 Nm
Connect Poly-V belt tensioner to the support of the compressor, tighten the moment 25 Nm
Squeeze the Poly-V belt tensioner (clockwise) and remove the retainer.
Install the lower engine splash guard
Replace Poly-V belt.

NOTE
Make sure that the direction of rotation and position of Poly-V belt compliance.

Tighten Poly-V belt, using a Poly-V belt tensioner.
Attach the top of the cover toothed belt to the back cover of the toothed belt, tighten the time 6 Nm
Replace the air filter housing with the sensor mass air flow.
Connect the wiring harness connector sensor mass air flow.

Replacing the toothed belt (engine 2.0 liters)

Withdrawal
Unplug the wiring harness connector sensor mass air flow.
Disconnect the air intake hose, inlet pipe.
Remove the air filter housing with the sensor mass air flow.
Loosen the mounting bolts and remove the top element covers a toothed belt from the back cover toothed belt.
Check direction of rotation of Poly-V belt.
Turn Poly-V belt tensioner clockwise.
Clear Poly-V belt.
Remove the lower engine splash guard.
Block and squeeze the Poly-V belt tensioner in the direction of the arrow (clockwise).
Loosen the clamping screws and remove the bearing compressor tensioner Poly-V belt.
Remove the snubber holding his attachment bolt drive gears.
Loosen the mounting bolts and remove the bottom of the cover toothed belt with the back cover toothed belt.
Attach a special device KM-6173 to the body of the front axle.

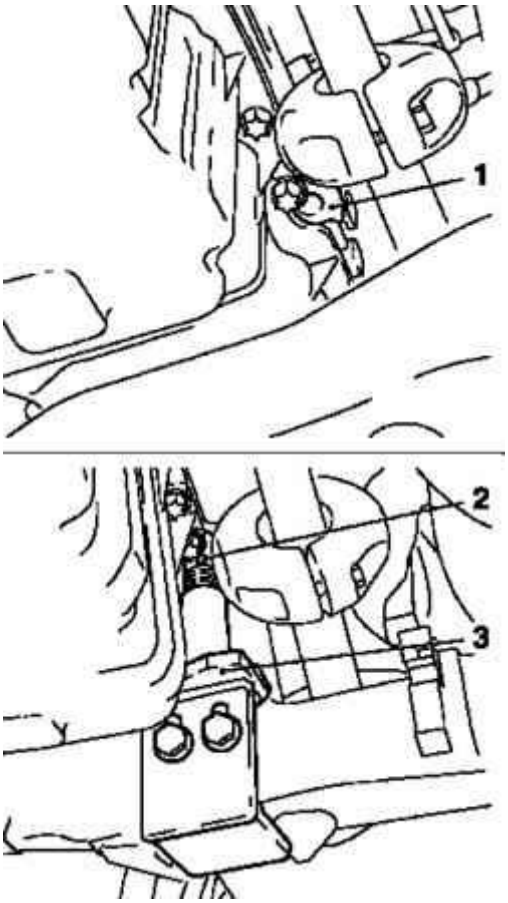


Fig. **2.81.** **Mounting a special device KM-6173 to the body of the front axle: 1 - mount on the engine block, 2 - support; 3 - a special device**

Raise your legs to hit in the neck fastening on the cylinder block (Figure 2.81).
Loosen the mounting bolts (arrows) on adjusting tire accessories KM-6001-A.

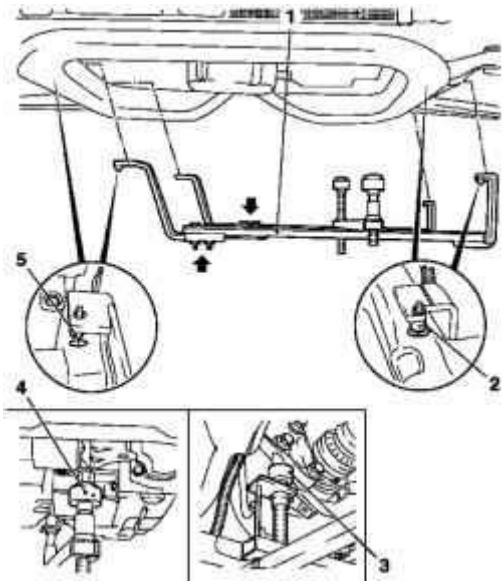


Fig. **2.82.** **Installation of a special device KM-6001-A on the housing front axle: 1 - a special device, 2, 5 - neck, 3 - rear support 4 - front support**

Install it as shown in Figure 2.82.

NOTE
Necks should be in the holes of the guiding body of the front axle.

Tighten the bolts fastening the adjustment tires.
Raise the front and rear pillars, and then sending them in front of the necks brackets front and rear damping block engine.

NOTE
Necks should be in the supports gapless.

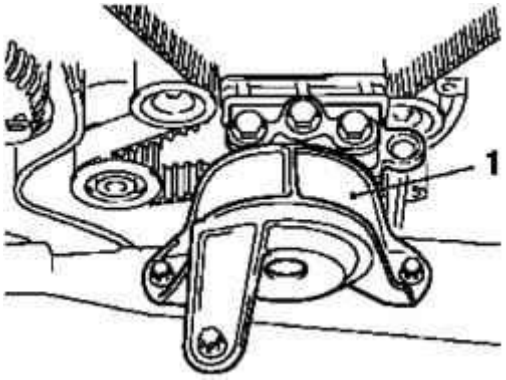


Fig. **2.83.** **Damping engine block: 1 - block**

Remove the damping motor unit with spar and support damping engine block (Figure 2.83).

Adjustment

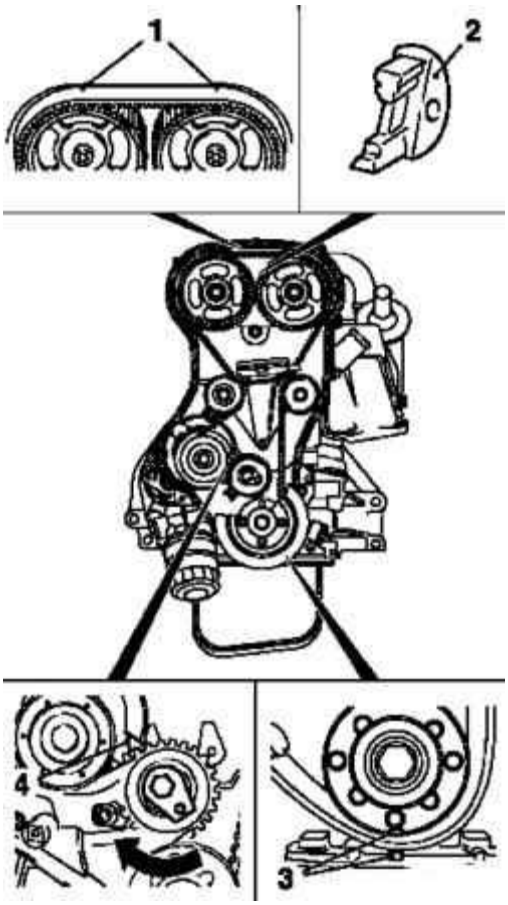


Fig. **2.84.** **Adjust the toothed belt: 1 - marks on the lid of the cylinder head, 2 - a special tool, 3 - mark the first cylinder; 4 - pointer regulator**

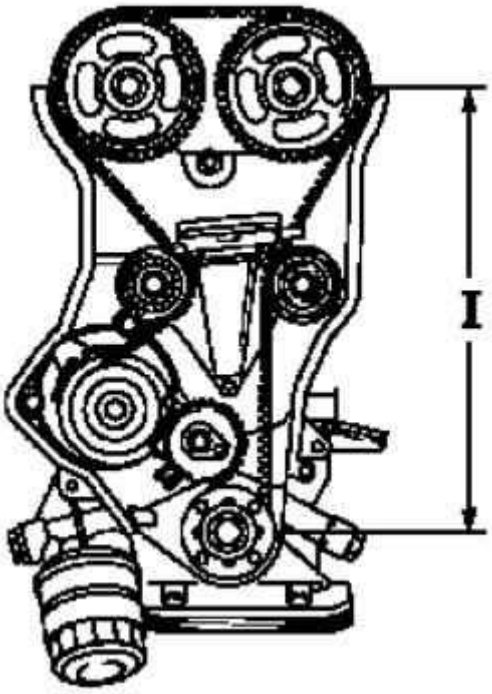
Set the crankshaft in TDC position of the first cylinder (label 3) (Fig. 2.84).

NOTE **Rotate the crankshaft slowly and smoothly. Turn his attachment bolt drive gears.**
NOTE **Notches on the camshaft sprocket should be aligned with marks on the lid of the cylinder head.**

Block camshafts with a special tool KM-853 (Fig. 2.84)
Loosen the bolt mounting tension pulley toothed belt.
Turn the eccentric knob in the direction of the arrow (clockwise) until the pointer reaches the left limiter (Figure 2.84).
Check direction of rotation of the toothed belt.
Remove the timing belt.

Setting
Check timing belt for wear and replace if necessary.
Pay attention to the direction of rotation of the toothed belt.
Install timing belt.

Fig. **2.85.** **Party Tension**



NOTE
Make sure that the side of tension I stretched (Fig. 2.85).

NOTE
Costs will depend on the reference mark.

Adjust the tension of the toothed belt.
Attach damping engine block to spar and tighten the moment 35 Nm
Attach the bracket damping engine block to frame damping engine block and tighten the moment 55 Nm
Remove the mounting KM-6001-A and KM-6173.
Attach the bottom of the cover toothed belt to the back cover of the toothed belt and tighten the moment of 6 Nm
Attach snubber to lead the drive gear and tighten the moment 20 Nm
Hold him for attachment bolt drive gears.
Replace Poly-V belt tensioner on the anvil of the compressor and tighten the moment 25 Nm
Squeeze the Poly-V belt tensioner (clockwise) and remove the retainer.
Install the lower engine splash guard.
Replace Poly-V belt.

NOTE
Make sure the correct direction of rotation and of Poly-V belt.

Tighten Poly-V belt, using a Poly-V belt tensioner.
Install the upper part of the toothed belt cover on the back cover of the toothed belt and tighten the moment of 6 Nm
Replace the air filter housing with the sensor mass air flow.

NOTE
Do not forget to write the date of the replacement tooth belt.

Connect the air intake hose to the intake tube and secure it ring.
Connect the wiring harness connector sensor mass air flow.

2.3. Removing and installing the power unit

General and safety by disconnecting power unit

If it was decided to lift the engine, it is necessary to undertake certain preparatory activities.

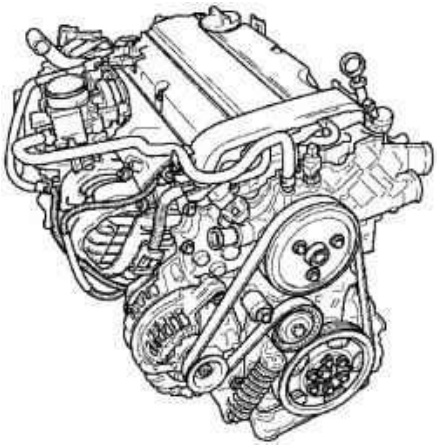


Fig. **2.86.** **General view of the engine Z 14 XEL**

It is important to determine the place where the work will be done. Undoubtedly, the best place is to shop. It is very important to have a work platform, as well as a place to store the car. If no workshop, garage or not, you will need a flat smooth concrete or asphalt playground.

Cleaning the engine compartment and the engine before removing the tool will provide clean and continuous operating condition.

Fig. **2.87.** **General view of the engine Z 16 XEP**

Also need the lift or telpher. Make sure that these devices have a margin of capacity and are able to raise the engine with all the mounted units. Safety measures plays a crucial role, since the rise of the motor car - a potentially dangerous operation.

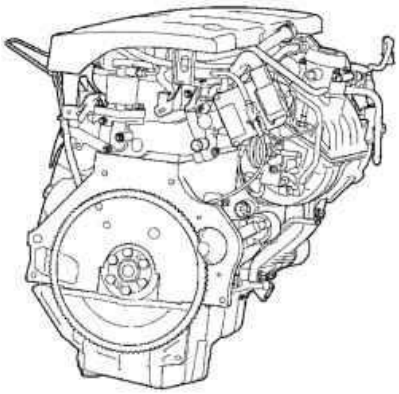


Fig. **2.88.** **General view of the engine Z 18 XE**

If you work for the removal of the engine carried inexperienced person, it is necessary to be an assistant. Ask and ask them to help people who have experience in such work. There are many ways to perform the work to raise the engine from the engine compartment, which preclude their implementation in isolation.

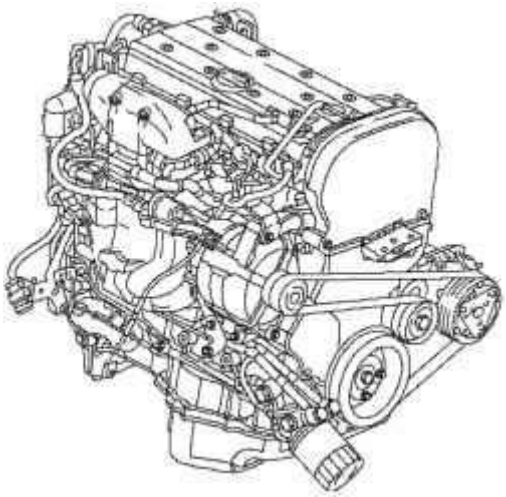


Fig. **2.89. General view of the engine Z 20 LEL**

Plan in advance their actions. Agree or razdobudte all the necessary tools and equipment before you begin work. Some of the aids for safe removal and installation of the engine, as well as reducing labor costs include (in addition to the elevator) a strong stand, full set of keys and arbors, wooden shoes, rags and cleaning solvent for the inevitable puddles of spilled fluids performance. If the lift will be rent, the contract in advance and do all the work for which this mechanism is not required. This will save time and money.

Keep in mind that considerable amount of time you can not use the car. To perform some works that are not available at home (due to lack of specialized equipment), will seek the services of a service station or a specialized workshop. These companies are working on a plan, so it would be appropriate to consult it before removing the engine, to accurately estimate the time spent on repair and restoration parts.
When removing the engine always be very careful. Ill-considered actions and haste can cause serious injuries.

Removing sealant

Fig. **2.90. Remove the old sealant**

After removing the mounting bolts and nuts, use the appropriate tool to remove the sealant (Fig. 2.90).

NOTICE
Try not to damage the surface details.

Remove sealant as carefully as possible from the surface, pits and holes of the mounting bolts using a suitable tool, such as a scraper. If necessary, slightly heat the surface and remove particles of dried sealer with cloth moistened with gasoline.

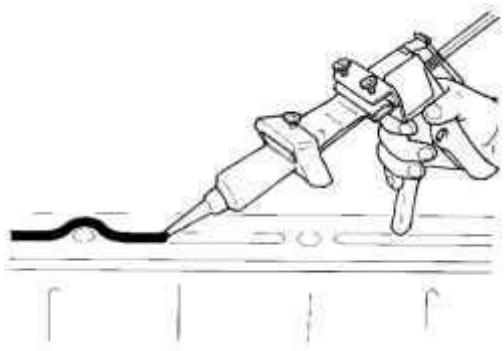


Fig. **2.91. Laying new sealant**

After the operation put the new sealant (Fig. 2.91).
Try to use proprietary sealant or equivalent.
After laying a new sealant wait 5 minutes and then mate. Remove excess sealant piece of matter.
Tighten mounting bolts.

Removing and installing the power unit (engine 1.4 l)

Withdrawal
Open the hood.
Remove the intermediate axis of the steering column.
To do this, the steering wheel in position rectilinear motion.
Remove the ignition key and lock the steering column.

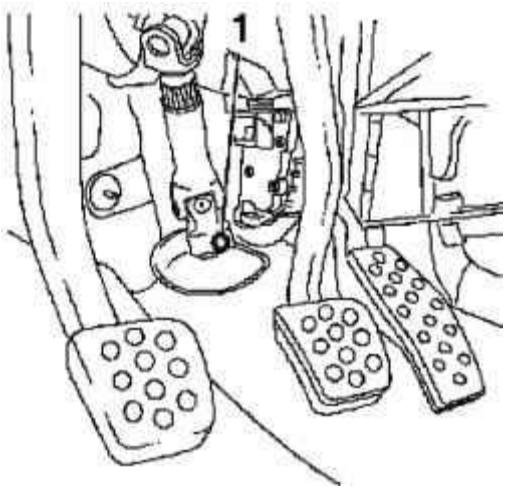


Fig. **2.92. Bolt fixing the steering column: 1 - Bolt**

Loosen the mounting bolt (Figure 2.92).

Removing the air filter housing
Open the hood.

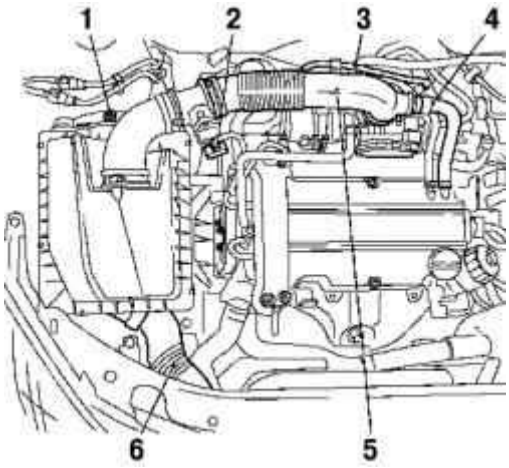


Fig. **2.93. Components, shooting in the dismantling of the air filter: 1 - screw fixing the lower rubber support, 2 - wiring harness mass air flow sensor, and 3 - line of ventilation of the fuel tank, 4 - hose, ventilation motor, 5 - air intake hose, 6 - inlet pipe**

Remove the air filter housing (Fig. 2.93).

Disconnect the wiring harness sensor mass air flow.
Disconnect the fuel tank ventilation line.
Disconnect the ventilation hose from the engine air intake hose.
Removing the clamp, disconnect the hose from the air intake throttle pipe.
Removing the clamp, remove the air filter housing
Loosen the screw fixing the lower rubber support and unplug it.
Disconnect the inlet pipe.

Disconnect the wires "masses" and the battery power

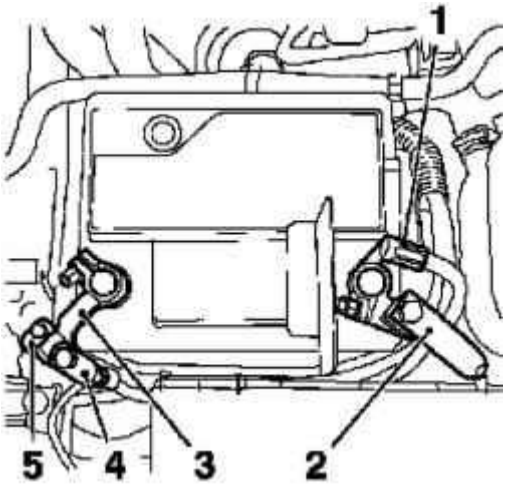


Fig. **2.94.** **Wires "weight" and feeding the battery: 1 - the positive terminal, 2 - the positive wire, 3 - finding the "masses", 4, 5 - wire "mass"**

Disconnect the wires from the massive withdrawal of the "masses" unscrewing the two mounting screws (Figure 2.94).
Loosen the bolt and disconnect the wire from the negative terminals of the battery.
Disconnect the positive lead from the positive terminal.

Removing the battery and supports

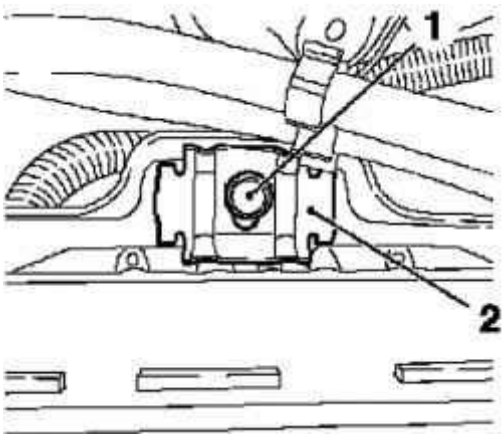


Fig. **2.95.** **Mounting the battery: 1 - pin 2 - spud**

Remove the battery by unscrewing the bolt and removing the strap (Figure 2.95).

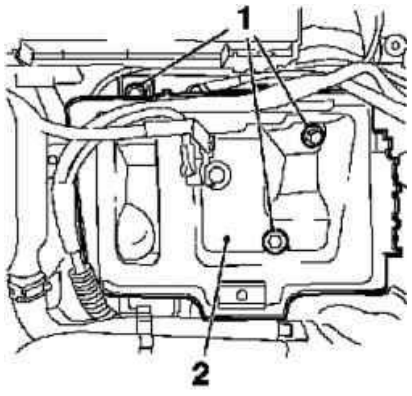


Fig. **2.96.** **Support Battery: 1 - mounting screws, 2 - prop**

Remove the prop battery by unscrewing the three mounting bolts (Figure 2.96).
Disconnect the wiring harnesses and collars

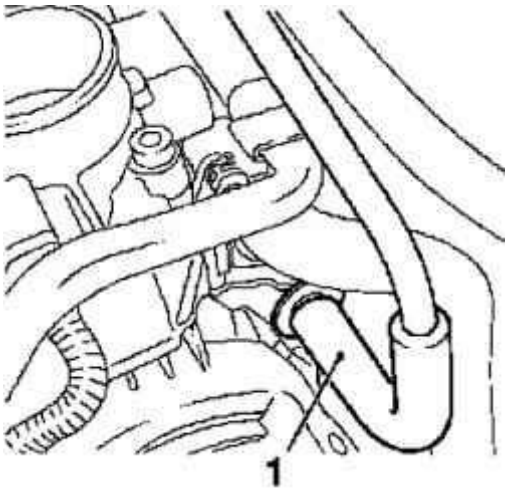
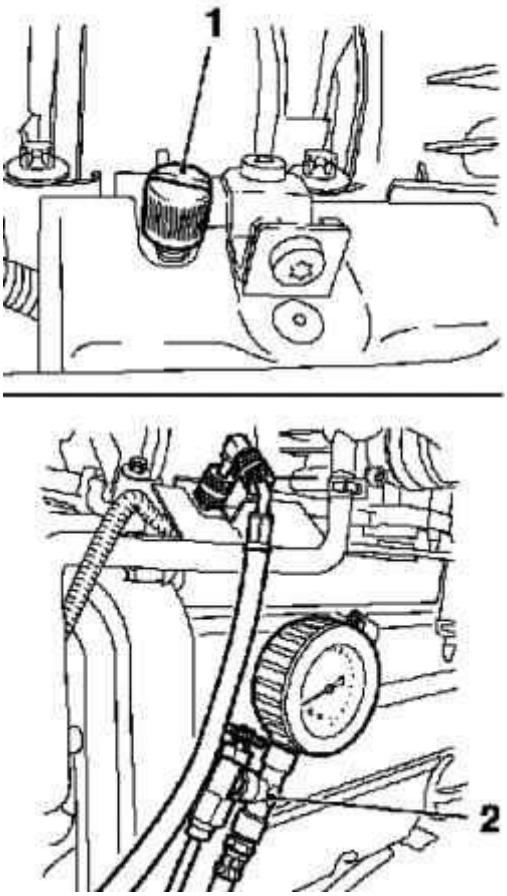


Fig. **2.97.** **Hose ventilation valve tank: 1 - hose**

Disconnect the ventilation hose from the exhaust valve of the tank (Fig. 2.97).

Reset the fuel pressure

Fig. **2.98.** **Reset the fuel pressure: 1 - a protective cover, 2 - a special device**



Reset the fuel pressure with a special device KM-J-34730-91 through the test jumper (see Figure 2.98).

NOTE
Collect withdrawing fuel in a suitable container - while adhering to safety precautions.

Remove the protective cover (Figure 2.98).

Disconnect fuel lines and brake booster vacuum line

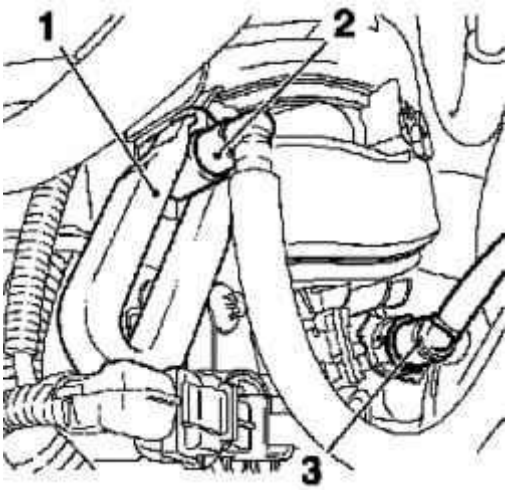


Fig. **2.99.** **Wires "weight" and feeding the battery: 1 - a special device, 2 - feeding the fuel line, 3 - vacuum brake booster line**

Disconnect the fuel line feeding from the fuel rail with a special device KM-796 (Fig. 2.99).
Disconnect the quick release coupling.
Disconnect brake booster vacuum line from the intake manifold.
Disconnect the quick release coupling.

Removing the engine control module and wiring harnesses

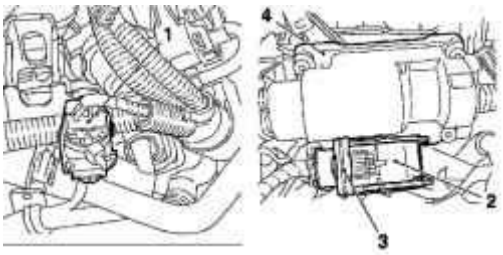


Fig. **2.100.** **Wires "weight" and feeding the battery: 1 - the wiring harness connector, 2 - the wiring harness connector, 3 - Holder, 4 - module for motor control**

Disconnect the wiring harness of the engine (Fig. 2.100).
Disconnect the holder in the direction of the arrow.
Remove the wire clamps.
Disconnect the engine control module and wiring harness connectors (Fig. 2.100).

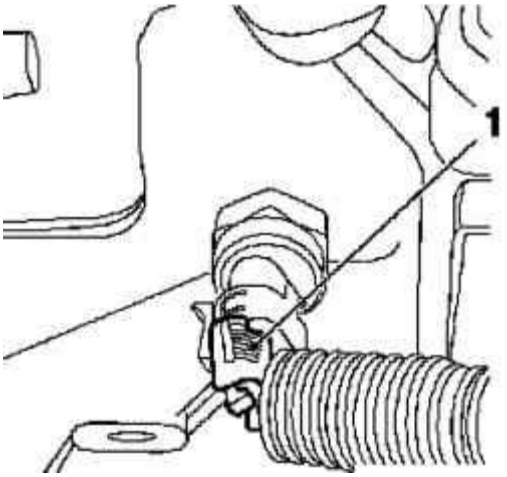


Fig. **2.101.** **Wiring harness connector switch reversing: 1 - connector**

Disconnect the wiring harness connector switch reversing (Fig. 2.101).
Disconnect the wiring harness connector weight.

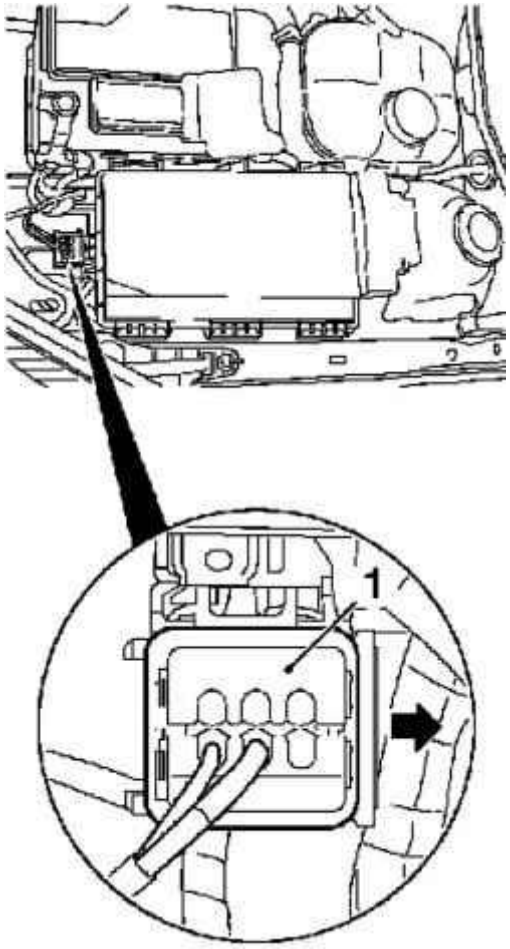


Fig. **2.102.** **Connector wiring harness weight: 1 - holder**

To release the holder in the direction of the arrow (Fig. 2.102).
Remove the coolant expansion tank.

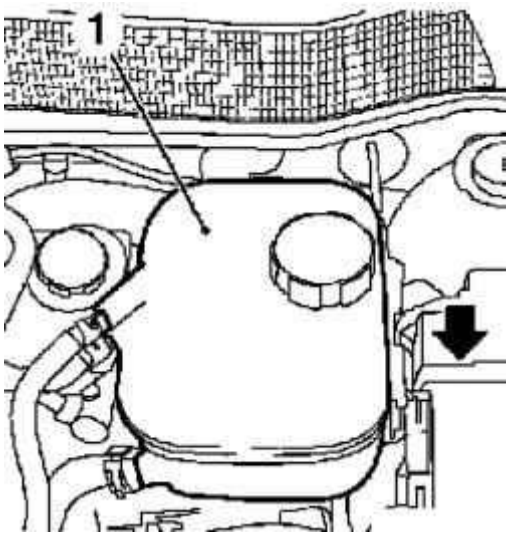


Fig. **2.103.** **Removing the bracket expansion tank coolant: 1 - tank**

Remove the bracket in the direction of the arrow (Fig. 2.103).
Disconnect the wiring harness of steering control.
To do this, remove the cover mounting element fuse.
Disconnect the positive lead from the fastening element fuse.
Loosen nuts.

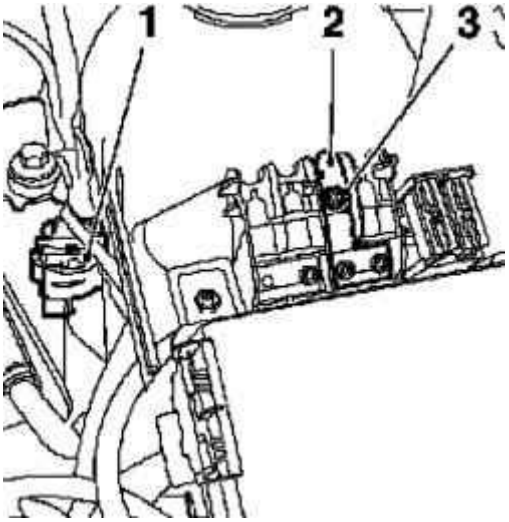


Fig. **2.104.** **Wiring harness Steering: 1 - the wiring harness connector, 2 - nuts, 3 - positive lead**

Disconnect the wiring harness connector (Fig. 2.104).

Removing the central hose
Unplug the central hose.
Place the bottom of the container.

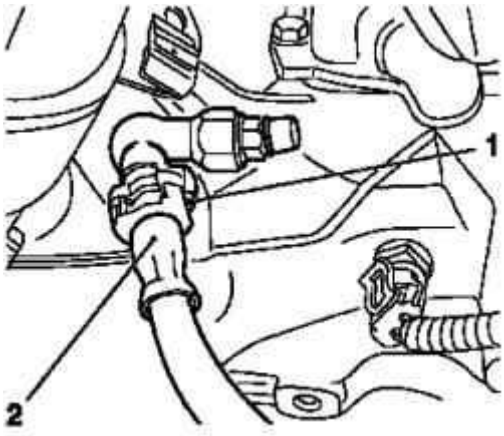


Fig. **2.105.** **Central hose: 1 - holding the collar, 2 - hose**

Unlock and remove the retaining clamp with a screwdriver (Fig. 2.105).
Bend the clip and insert back into the connector.
Podvyazhite central flow line.

Removing the grille
Loosen the 8 bolts secure the front wheels.
Raise the car in half.
Loosen the 8 screws and remove the front wheels.
Remove the 4 rivets and grille.

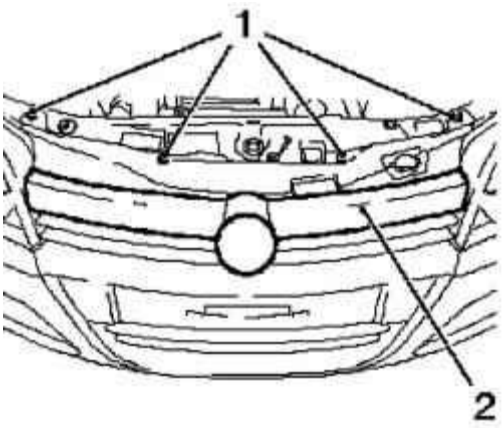


Fig. **2.106.** **Removing the grille: 1 - rivets 2 - grille**

Remove the grille (see Figure 2.106) from the front panel from the top.

Removing bumper
Raise the car in half.

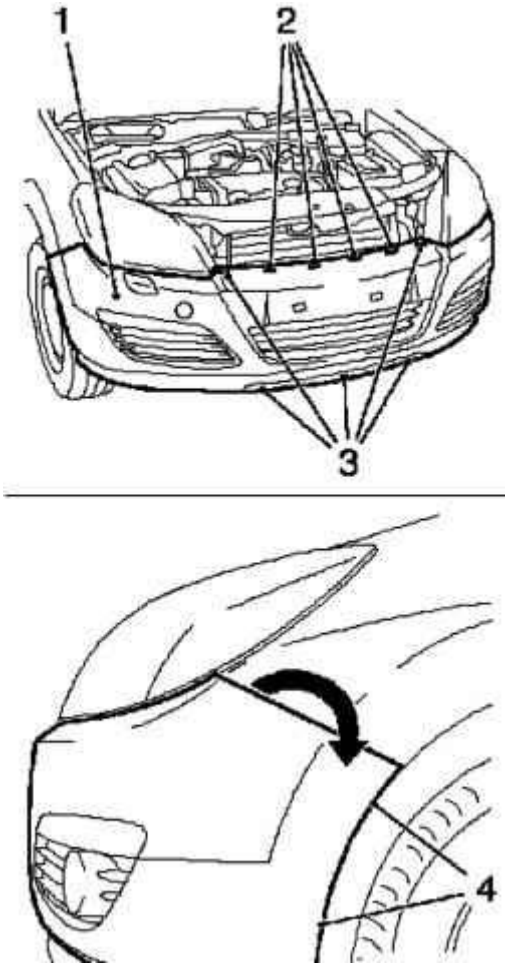


Fig. **2.107. Removing the bumper: 1 - bumper, 2 - clamps, 3 - rivets, 4 - bolts fastening**

Remove the bumper (see Figure 2.107) removing the 5 rivets and unscrewing 4 fixing screws (two on each side).
Pull the front cover up in the direction of the arrow and move out from the bracket.
Remove the front paneling, removing the 4 times.
Remove the external temperature sensor.
Remove the right engine splash guard.

Disconnecting the levers and pivots chassis

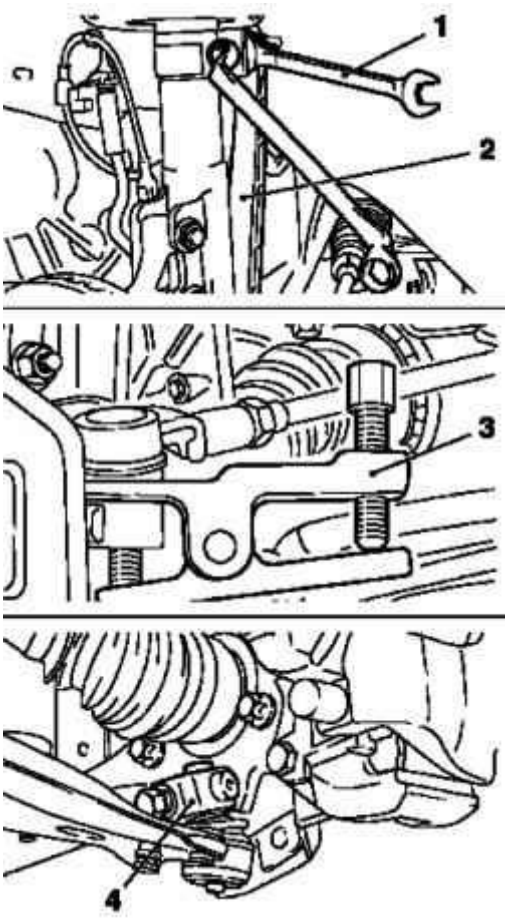


Fig. **2.108.** **Disconnecting the levers and pivots chassis: 1 - Wrench, 2 - lever pipe support rack springs, 3 - a special device KM-507-C; 4 - steering knuckle joints**

Loosen the two nuts and disconnect the lever from the pipe rack support springs (Fig. 2.108).

NOTE
For holding the pipes, use the wrench.

Disconnect the steering traction from steering knuckle using a special device KM-507-C (Fig. 2.108).
Remove the hinges from the steering knuckle, unscrewing the two nuts and removing the two screws.
Extend bolt steering knuckle using special tool KM 915.
Remove the hinges from the steering knuckle.
Remove the rolls from the wheel hub otvernv 2 nuts.

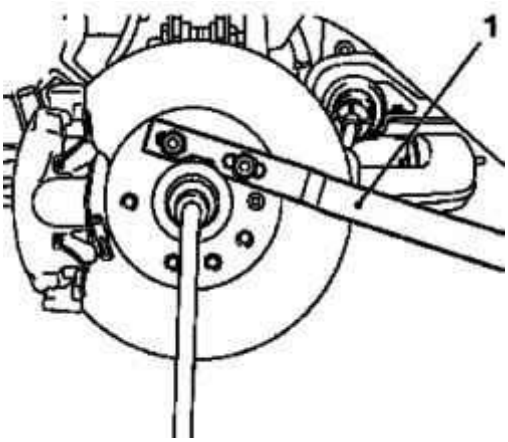


Fig. **2.109.** **Removing the shaft hub: 1 - a special device**

Hold the wheel hub with a special device KM-468-B (Fig. 2.109).

Drain coolant
Raise the car in half.
Drain the coolant.
To do this, place the bottom of the container for collecting liquid.
Attach a suitable hose to the drain fitting.

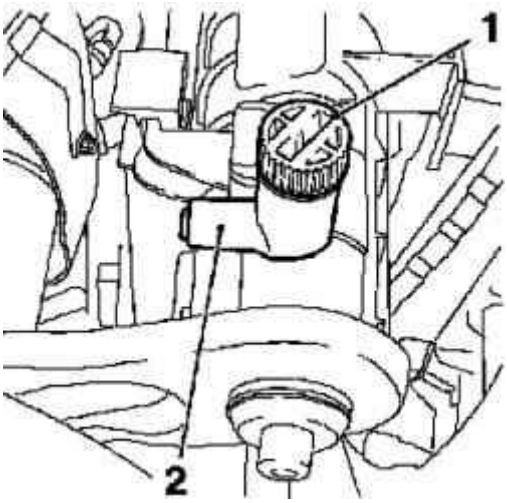


Fig. **2.110. Discharge connections are: 1 - discharge screw 2 - schtutser**

Loosen the drain screw coolant (Fig. 2.110).
After discharge tighten the drain screw coolant.

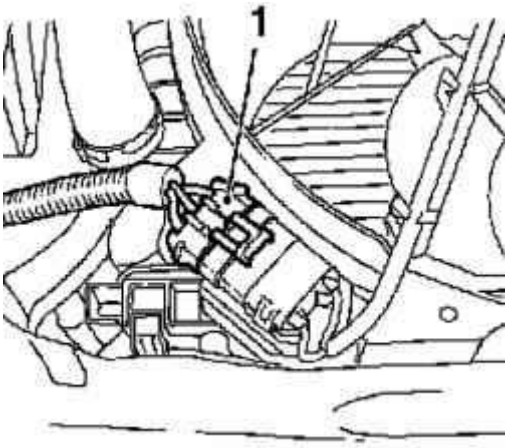


Fig. **2.111. Wiring harness connector module cooling: 1 - connector**

Disconnect the wiring harness connector module cooling (Fig. 2.111).

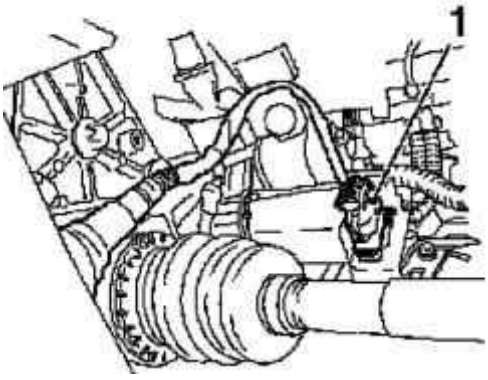


Fig. **2.112. Connector wiring harness of oxygen sensor catalytic converter: 1 - connector**

Disconnect the wiring harness of oxygen sensor catalytic converter (see Figure 2.112).

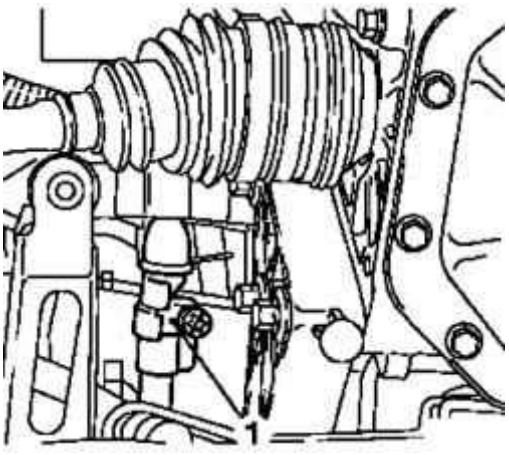


Fig. **2.113.** **Clamp draft gear: 1 - clamp**

Remove the clamp draft gear. Loosen the mounting bolt and remove the steering deflector (Fig. 2.113).

Removing the components of the exhaust system

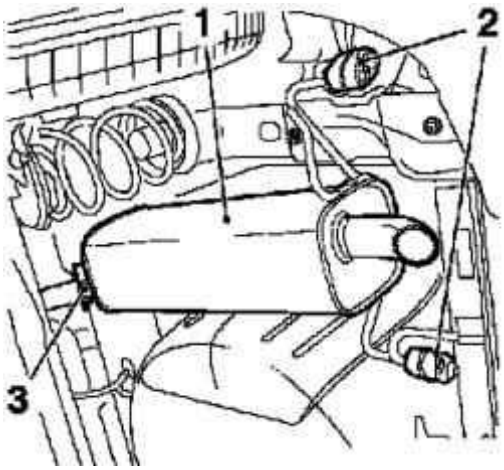


Fig. **2.114.** **Terminal silencer: 1 - silencer, 2 - rubber bearing 3 - clamp**

Remove the endpoint silencer (Fig. 2.114).
Loosen the clamp mounting, unscrew the nut fastening.
Remove the muffler from the bracket.
Disconnect the two rubber feet.
Remove the endpoint from the front muffler muffler.

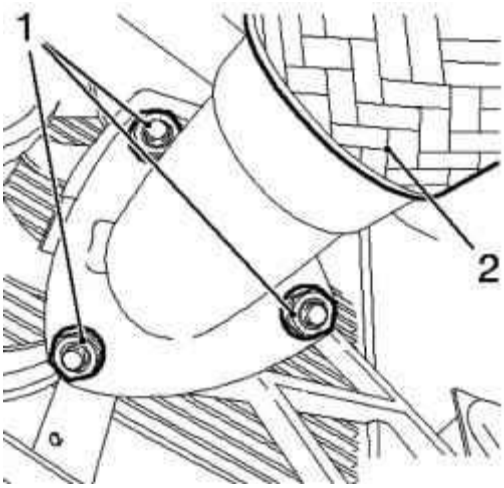


Fig. **2.115.** **Front exhaust pipe: 1 - nuts, 2 - Exhaust**

Disconnect the front exhaust pipe from the catalytic converter 3 unscrewing nuts (Fig. 2.115).

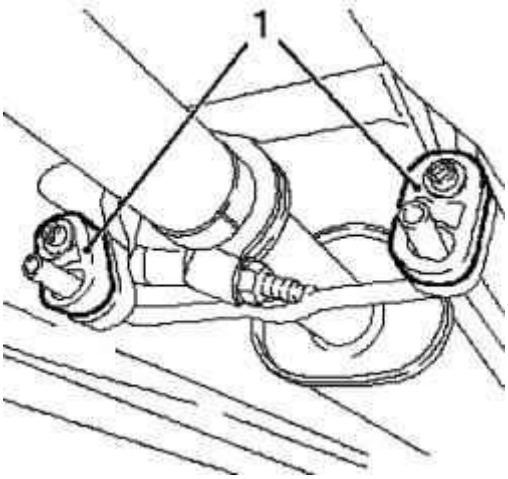


Fig. **2.116.** **Mounting the front of the exhaust pipe: 1 - rubber bearing**

Remove the front exhaust pipe from the front muffler, disconnect the two rubber supports (see Figure 2.116).

Installing the front axle support

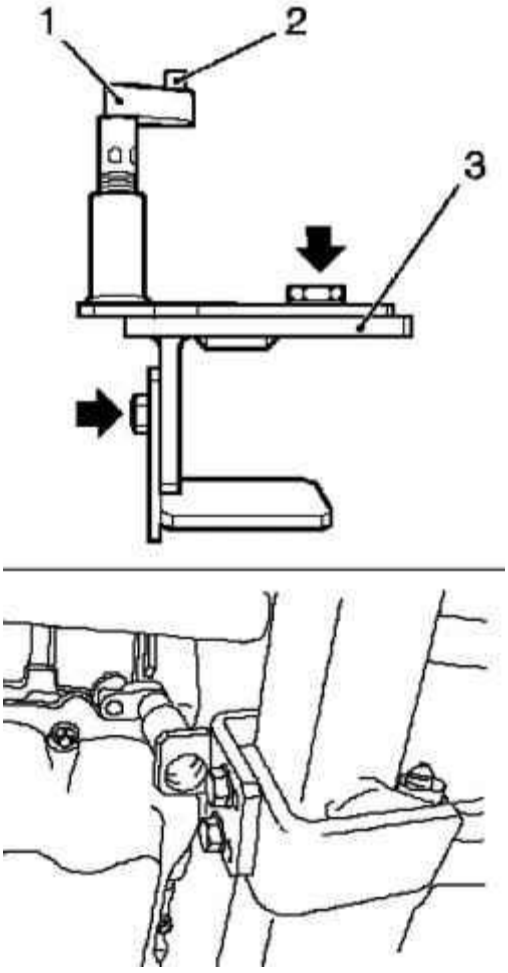


Fig. **2.117.** **Installation support the front axle: 1 - prop, 2 - neck, 3 - a special device**

Insert special device KM-6173 (Fig. 2.117).
Loosen the 4 bolts (arrows) and tighten by hand.
Align special device KM-6173 with the shell of the front axle.
Enter your support.
The neck of this should be a fixture on the engine block.
Tighten the 4 bolts.

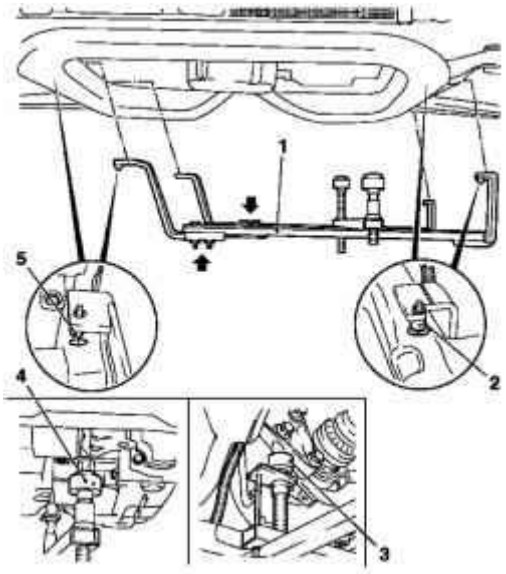


Fig. 2.118. **Installation of a special device KM-6001-A on the housing front axle: 1 - a special device, 2, 5 - neck, 3 - rear support 4 - front support**

Attach the KM-6001-A as shown in Fig. 2.118.

NOTE
Using the KM-6001-A ensures alignment with the drive housing the front axle.

Loosen the 3 bolts (arrows) in the adjustment tires.
Insert special device KM-6001-A.
Necks should be in the holes to the front axle housing.
Tighten the 3 bolts fastening the adjustment in the tires.
Adjust the support and lift them to the constraints on the neck guides.

NOTE
Necks should be in the supports gapless.

Disconnecting the hoses of the cooling system and damping bearings
Lower the car.

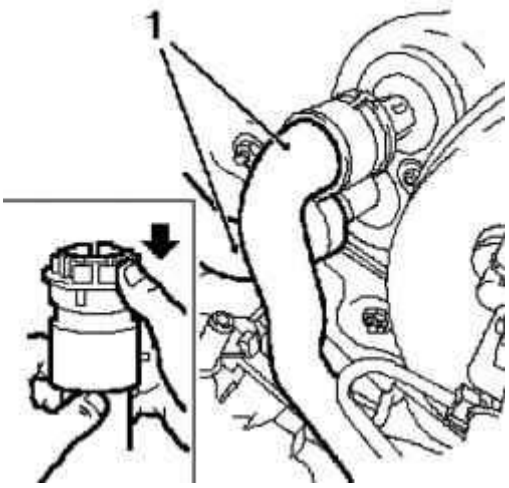


Fig. 2.119. **Disconnecting the hoses of the cooling system: 1 - Hoses**

Disconnect the coolant hoses from the radiator heater (Fig. 2.119).

NOTE
Pre-apply for their tags

Place the bottom of the container for collecting liquid.
Disconnect the 2 quick-coupling in the direction of the arrow.
Pull the hoses coolant.
Disconnect the right engine damping block bracket on the block.

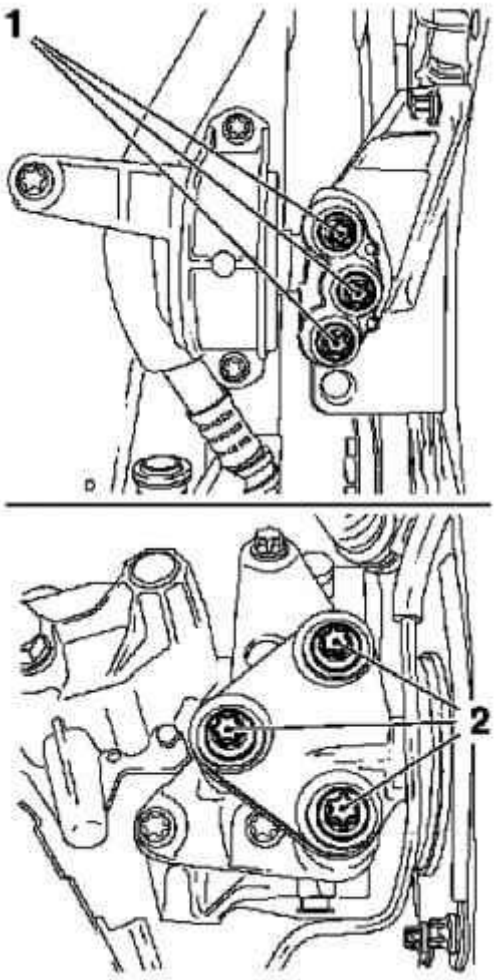


Fig. **2.120.** **Left and right damping blocks: 1, 2 - bolts fixing**

Disconnect the left engine damping block bracket from the block (Fig. 2.120).

Fixing the front axle on jack
Raise the car completely.
Attach a special device KM 904 and KM 6390.
Connect to the hydraulic lifter.

NOTE
Use a hydraulic jack, which can be dropped to a height of at least 100 cm

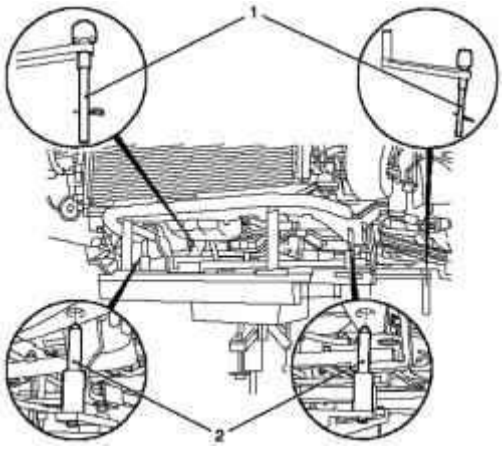


Fig. **2.121.** **Fixing the front axle on jack: 1, 2 - pins**

Vybeyte pins (see Figure 2.121).
Remove the two pins.
Podoprite housing front axle, make sure the reliability of support.

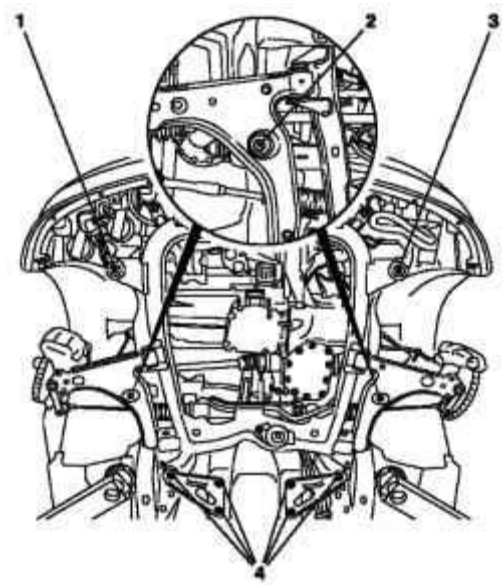


Fig. 2.122. **Removing the body of the front axle: 1, 2,3,4 - bolts fixing**

Pins must enter the corresponding holes in the hull of the front axle.

Removing the body of the front axle

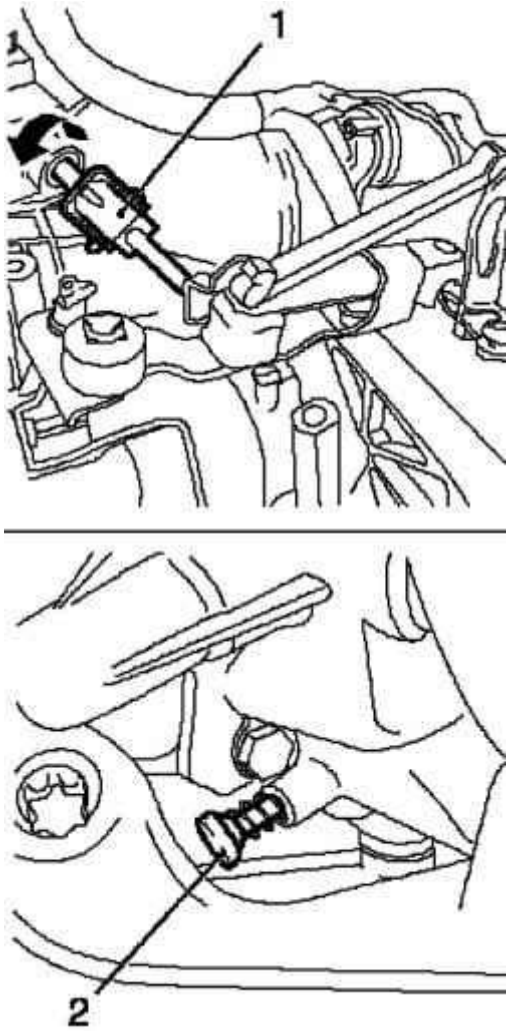


Fig. 2.123. **Blocking draft gear: 1 - draft gear, 2 - locking pin**

Remove the front axle housing by unscrewing 10 screws (1, 2, 3, 4) (Fig. 2.123).

NOTE
Not be disassembled body of the front axle of a shock pulse or a screwdriver.

NOTE
Bolts are different lengths.

During disassembly of the shell of the front axle careful to not to damage the adjacent elements.
Pull the front axle housing.

Setting
Check the thread.
Check ease of movement of 10 mounting screws, replace them if necessary.
Block draft gear.
Turn the traction gear in the direction of the arrow.

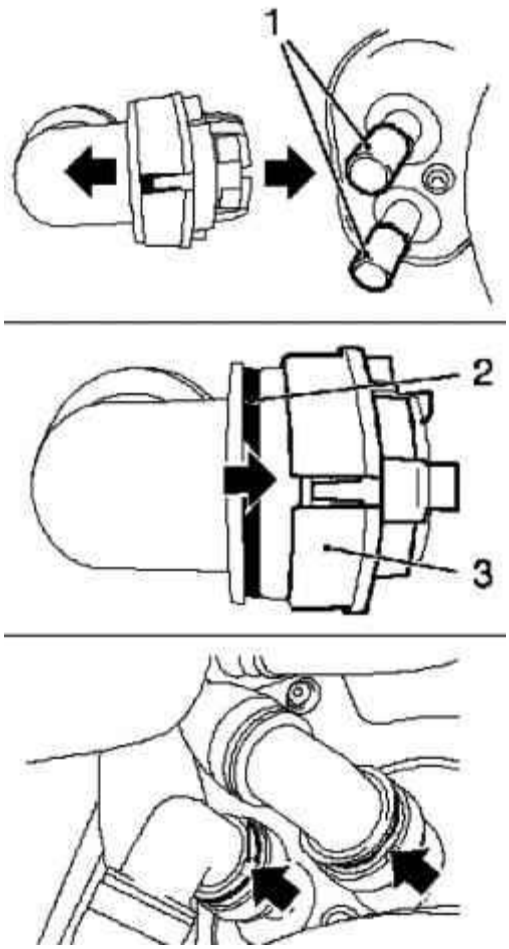


Fig. **2.124.** **Connecting the hoses of the cooling system: 1 - socket radiator heater, 2 - clamps, 3 - locking mechanism**

At the same time press on the locking pin (Fig. 2.124).
Replace the front axle housing.

NOTE
Not be disassembled body of the front axle of a shock pulse or a screwdriver.

Install the front axle housing
Install the front axle housing.
Use with new bolts.
Tighten the screws 10 force 90 N * m, and then Dauvergne at +45 ° and +15 °.
Remove the special adaptations KM 904 and KM 6390.
Lower the hydraulic jack.
Lower the car completely.
Install the right damping motor unit to the adapter block.
Tighten the 3 bolts are 55 Nm
Install the left engine damping block to the adapter block.
Tighten the 3 bolts are 55 Nm

NOTICE
Be sure to follow the following order of assembly.

Connecting hoses of the cooling system
Connect the hoses to the radiator cooling system heater (Fig. 2.124).
Move the two locking mechanism of quick couplings in the direction of the arrow until it stops.
Plastic (green) rings at the same will be closed.
Put two quick couplings for connecting pipes of the radiator heater until it stops.

NOTE
Note the color marking

Move the two locking mechanism of quick couplings in the direction of the arrow until it stops (Fig. 2.124).
Plastic (green) rings at the same will be closed.
Ensure that quick release couplings are correct, and plastic rings (arrows) are visible.
Raise the car in half.
Set shafts of the wheels into the wheel hub.
Insert the hinge in the steering knuckle.
Tighten the two nuts moment 150 Nm, loosen the nuts at 45 °, and then tighten the moment of 250 Nm
Use new nut.
Hold the wheel hub with a special device KM-468-B.
Set joint to steering knuckle.
Use new nut.
Tighten the two pivot point 50 Nm
Attach the steering pull to the steering knuckle.
Use new nut.
Tighten the two nuts moment 30 Nm, then Dauvergne at +90 °, and then another +15 °.
Install the lever on the pipe rack supports the suspension.
Tighten the two nuts moment 65 Nm
Use new nut.
Use a wrench to keep from turning.
Raise the car in half.
Remove the special device KM 6173.
Remove the two screws.
Remove special device KM-6001-A.
Remove the three screws.
Install the front exhaust pipe from the front muffler.
Install two rubber feet.
Attach the front exhaust pipe with a front muffler to catalytic converter.
Use a new gasket.

NOTE
Use new nut.

Tighten the three screws moment 20 Nm
Install rear silencer.
Attach the rear silencer with a front muffler.
Install two rubber supports and tighten the nuts.
Connect the wiring harness of oxygen sensor catalytic converter.
Connect the wiring harness connector module cooling.
Install the right engine splash guard, tighten the 4 bolts fastening and fixed 2 rivets.
Install drain bolt in the oil pan, using a new sealing ring.
Tighten the drain bolt moment 10 Nm
Replace the front paneling.
Insert the panel plating in the bracket.
Fasten outdoor sensor.
Set 5 rivets.
Tighten the 4 bolts.
Install grille, fixing it in front of the casing.
Set 4 rivets.
Install the front wheel and tighten the 8 bolts fastening point 110 Nm
Lower the car.
Attach the delivery pipeline.

Connecting
Connect the wiring harness of steering control.

Connect the positive wire to the fuse holder and secure it nut.
Install the wiring harness connector steering, secure it and styan wire clamps.
Fasten all three terminals.
Replace the cover fuse block.
Install expansion tank coolant in the bracket.
Connect the wire to the conclusion that a massive weight.
Connect the positive wire to the positive terminal, and tighten the attachment bolt.
Connect the wiring harness of the engine.
Connect the wiring harness to the engine control module and wiring harness to secure it.
Connect the wiring harness connector to the switch reverse.
Connect the wiring harnesses of the engine.
Connect the brake booster vacuum line to the intake manifold.
Connect the fuel line feeding to the fuel rail.
Connect the vent hose to the valve of the fuel tank.

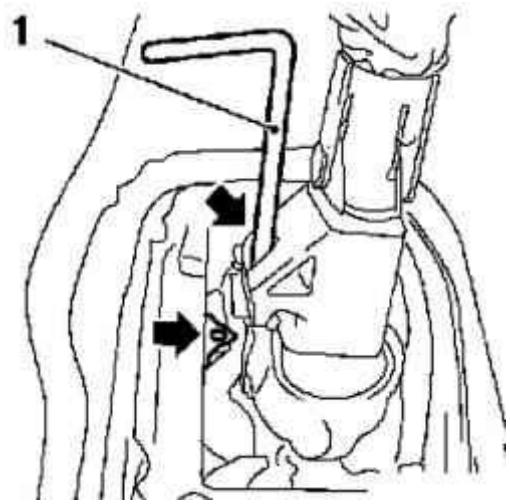


Fig. **2.125.** **Install the locking mechanism of the gear lever: 1 - fixing mechanism**

Set fixing mechanism the gear lever, KM-527-A in case the gear lever (Fig. 2.125).
Remove the lid from a central console.
Remove the gear lever from the central console by unscrewing the two screws fastening.
Raise the car completely.
Install clamp rail for traction gear.
Tighten the bolt fastening point 12 Nm Dauvergne it to +180 ° - 225 °.
Lower the car completely.
Remove air from the cylinder clutch.
Replace the battery holder.
Replace the air filter housing on the wheel arch and tighten the bolts.
Connect the air intake hose to the throttle module and secure it ring.
Connect the vent hose to the engine air intake hose.
Connect the wiring harness to the sensor mass air flow.
Fix the holder in the line of ventilation of the fuel tank.
Replace the battery pack.
Tighten the bolt, the intermediate steering shaft moment 22 Nm
Cover the screw sealer to the threads (red) and wrap it.
Remove the lock gear.

NOTE
Locking pin in the hole this aiming automatically nominated when you first start reverse gears

Remove the special tool KM-527-A of the body gear.
Replace the cover gear lever on the center console.
Check the action of the gear lever.
Check the ease of gear when parked car, engine running and the clutch is off.
Fill the cooling system with liquid and remove it from the air.
Program temporary memory.
Close the hood.

Removing and installing the power unit (engine 2.0 l)

Withdrawal

Open the hood.
Disconnect the battery.
Disconnect the connection with the mass withdrawal from the masses - loosen the nuts.
Empty the climate installation.
Connect the gas station.
Connect the blue hose to the technology fitting the low-pressure small diameter.
Connect the red hose to the fitting of high pressure technology of large diameter.

> **NOTE**
> **Carefully read the instruction manual petrol station.**
> **Determine the amount of refrigerant recovered from the oil separator gas station.**

Remove the intermediate shaft steering column.
To do this, the steering wheel in position rectilinear motion.
Remove the ignition key and lock the steering wheel.

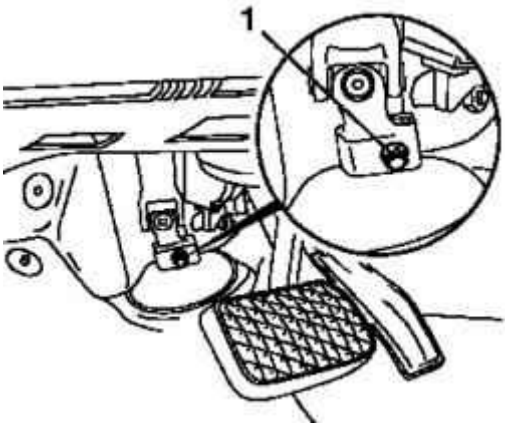


Fig. **2.126.** **Bolt kreleniya intermediate shaft steering column: 1 - Bolt**

Loosen the screw fastening (2.126).
Remove the battery.
Disconnect the positive lead from the positive terminal.
Loosen the bolt mounting bracket and remove the battery.

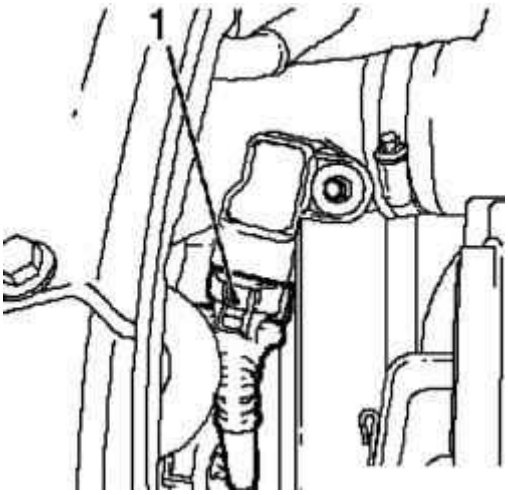


Fig. **2.127.** **Sensor wiring harness connector boost pressure: 1 - connector**

Unplug the wiring harness connector boost pressure sensor (2.127).
Disconnect the upper wiring harness module cooling.
Disconnect the wiring harness connector.
Disconnect the relay from the bracket.
Remove the battery support.

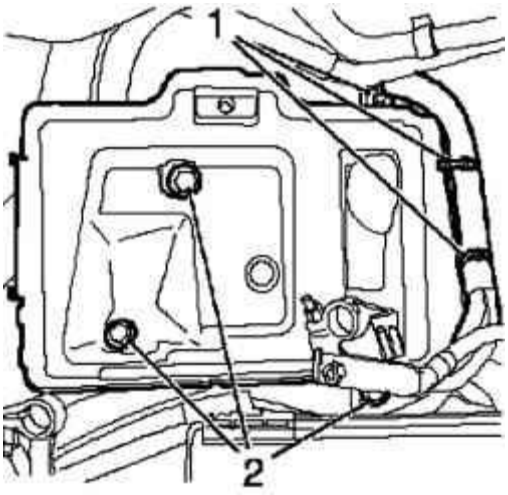


Fig. **2.128. Withdrawal of support battery: 1 - wire clamps, 2 - bolts fixing**

Disconnect the wiring harness to support the battery, remove the clamps for the wires and unscrew the 3 bolts (Fig. 2.128).
Remove the air filter housing with the sensor mass air flow.
Unplug the wiring harness connector sensor mass air flow iotsoedinite air intake hose inlet pipe.
Disconnect brake booster vacuum line from the intake manifold

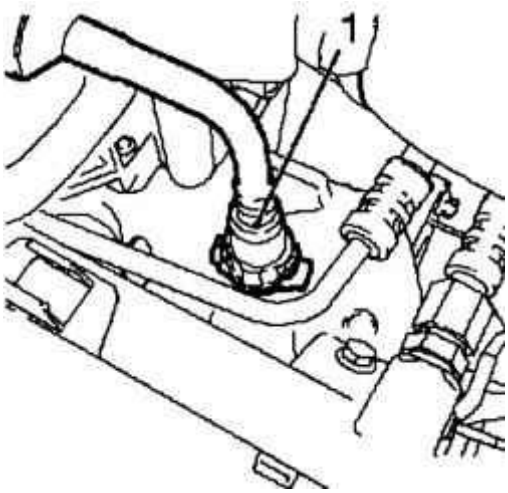


Fig. **2.129. Hose brake booster vacuum line: 1 - hose**

This quick-disconnect coupling and separate the vacuum line from the bracket (Fig. 2.129).
Remove the intake manifold by unscrewing the bolt fastening.
Loosen the clamp and remove the vent hose from the lid of the engine cylinder head.
Loosen the clamp and disconnect the inlet pipe from the air intake hose.
Disconnect the inlet pipe from the turbocharger.

NOTE
Inlet pipe has a gasket in the turbo.

Remove the inlet pipe.
Place the bottom of the container for collecting liquid.

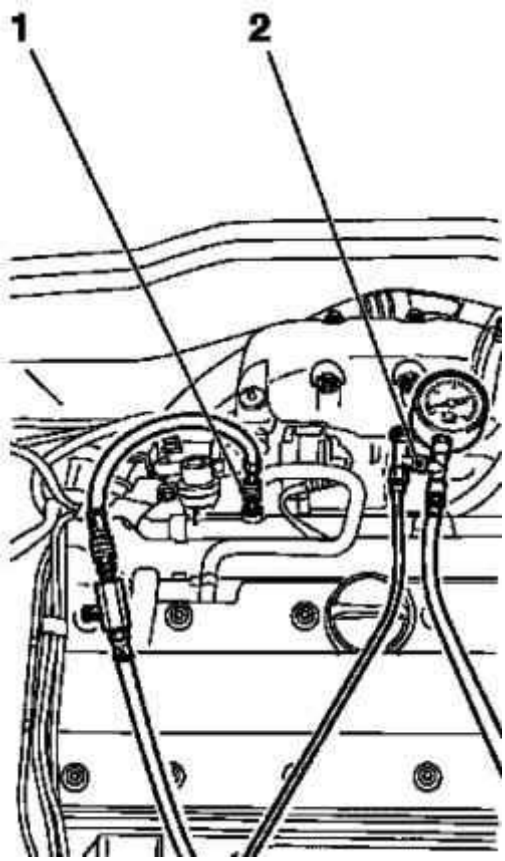


Fig. **2.130.** **Reset the fuel pressure: 1 - Specials Tool 2 - Test the connection**

Reset the fuel pressure with the tool Specials KM-J-34730-91 through the test compound (Fig. 2.130).

NOTE
Collect leaking fuel into a suitable container, while respecting the rules of precaution.

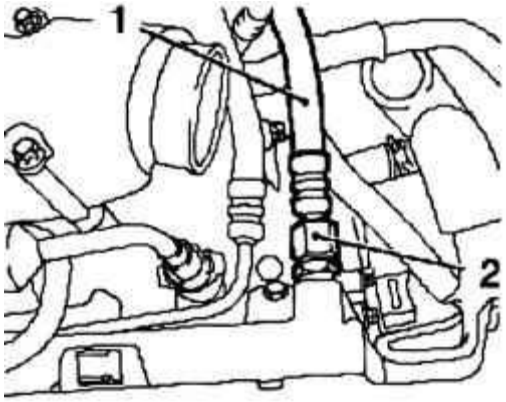


Fig. **2.131.** **Mounting fuel feedline: 1 - the supply line 2 - nipple**

Disconnect the supply line from the fuel rail by unscrewing the coupling nut (see Figure 2.131).

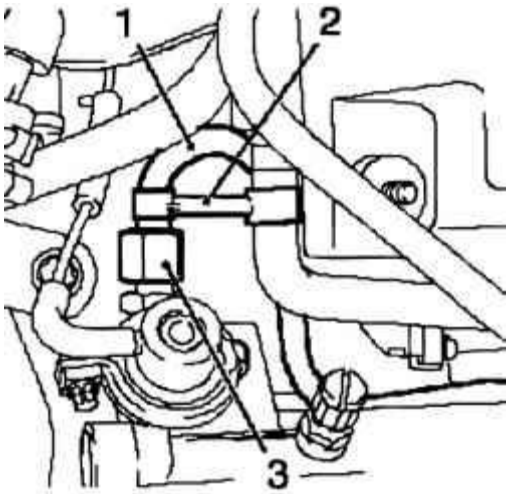


Fig. **2.132.** **Mounting fuel feedline: 1 - reverse pipeline; 2 - nipple, 3 - Bracket**

Disconnect the return fuel line from the fuel rail by unscrewing the coupling nut and disconnect the bracket (Fig. 2.132).
Unplug the line of withdrawal vent the fuel tank.

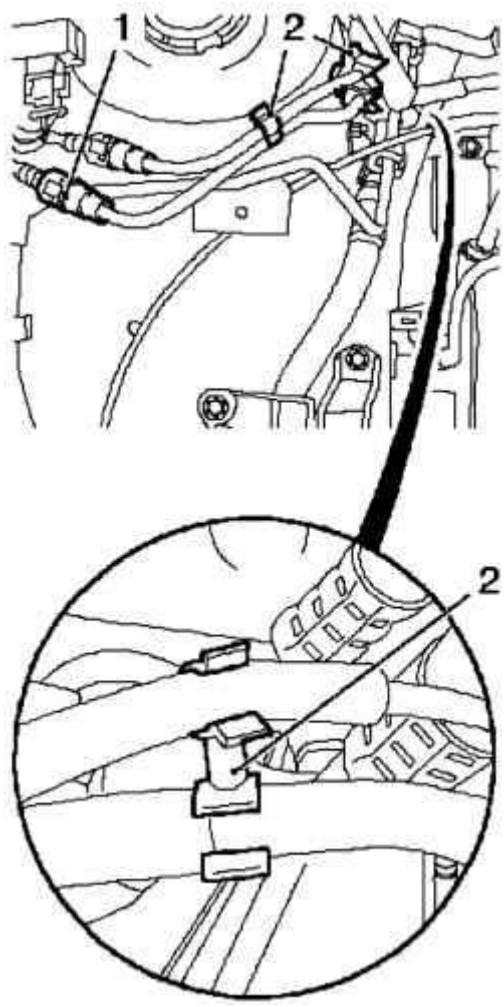


Fig. **2.133. Mounting withdrawal line vent: 1 - a quick-coupling 2 - bracket**

Remove the quick release coupling with a special tool KM-796-A and disconnect from the bracket (Fig. 2.133).
Disconnect the vacuum line from the turbocharger.
Unplug the two lines and disconnect them from the bracket.
Remove the grille by removing the four rivets. Remove the grille from the front shell top, removing the five clips.
Loosen the front wheels.
Raise the car in half.
Remove the front wheels.
Remove the front bumper, removing the rivets, five, and four clamping.
Place the bottom of the container for collecting liquid.

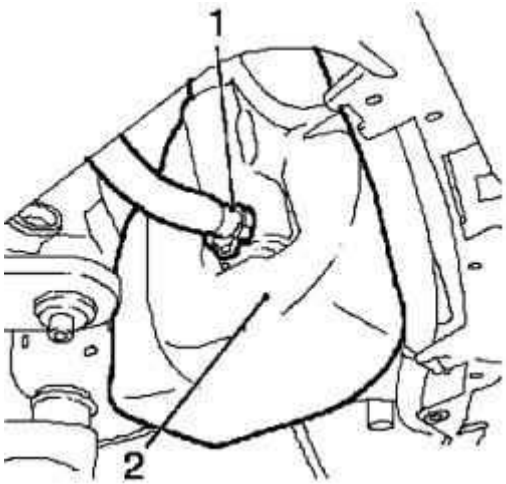


Fig. **2.134. Disconnecting the hose high pressure headlamp cleaning system: 1 - high pressure hose, 2 - a quick-coupling**

Disconnect high pressure hose cleaning system lights from the reservoir (Fig. 2.134).
Disconnect the quick release coupling.

NOTICE
This liquid is spilled from a hose.

Remove the front paneling.

Fig. **2.135.** **Side mount front bumper: 1 - Clamps**

Pull the front lining up the side and remove from the bracket in the direction of the arrow (Fig. 2.135).
Separate from the bumper bracket, disconnect 4 times.
Disconnect and remove the outdoor sensor.
Remove the right engine protection by unscrewing 4 bolts.
Remove the two set out on the back of the rivets.
Disconnect the levers on both sides of the supporting pipe rack spring by unscrewing the two nuts.

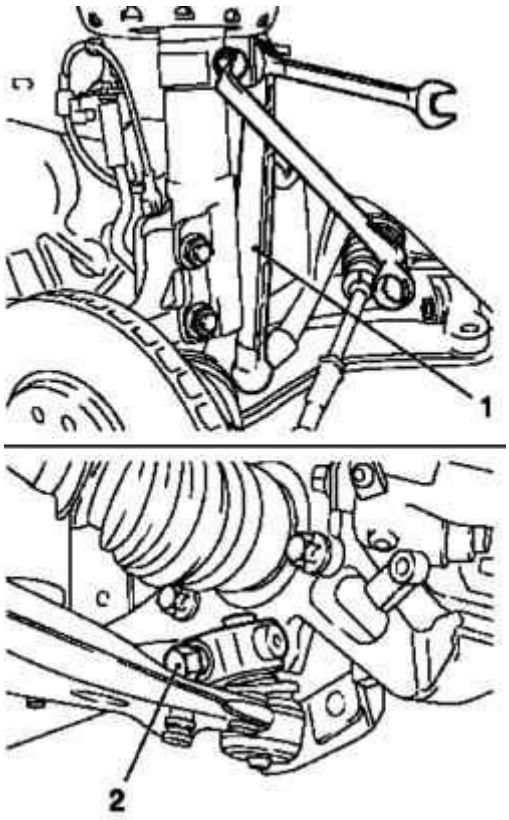


Fig. **2.136.** **Disconnecting from the steering knuckle joints: 1 - lever, 2 - bolts fixing**

Remove the two hinges on the steering knuckle, unscrewing the two nuts and removing the two screws (Fig. 2.136).
Extend pin steering knuckle using a special device KM-915 and remove the joint from the steering knuckle.

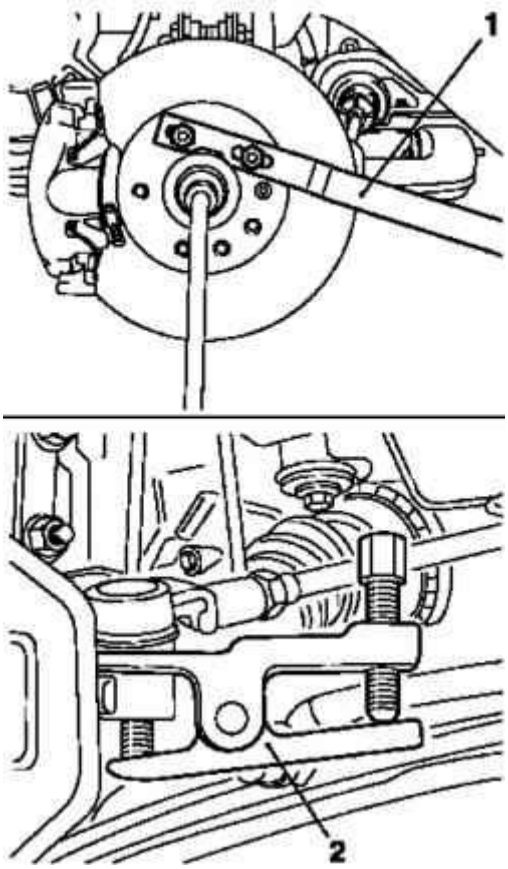


Fig. **2.137.** **Disconnect tie rod from steering knuckle: 1, 2 - special arrangements**

Disconnect the tie rod ends from steering knuckle using a special device KM-507-C (Fig. 2.137).
Remove the shafts of the wheels of the wheel hub while holding the wheel hub with a special device KM-468-B (Fig. 2.137).
Raise the car in half

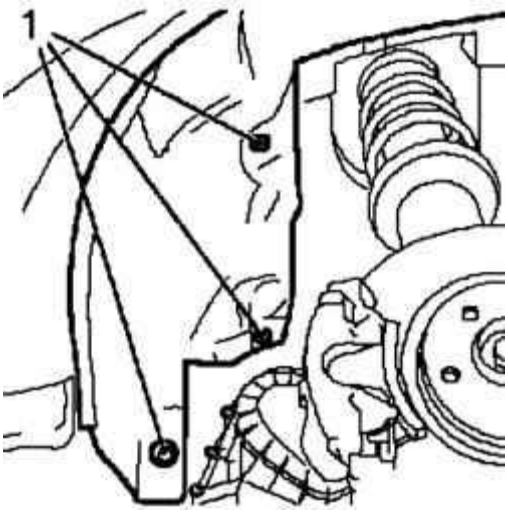


Fig. **2.138.** **Mounting upholstery wheel arches: 1 - rivets**

Remove the inner lining of wheel arches (left), taking out 3 rivets (Fig. 2.138).
Unplug the wiring harness module cooling
Unplug the mass wire by unscrewing the nut fastening.
Unplug the wiring harness connector and remove it.
Remove the wire clamps.
Place the bottom of the container for collecting liquid.
Drain the coolant.

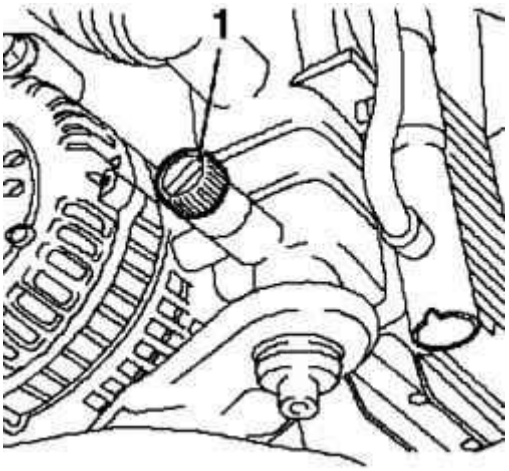


Fig. **2.139.** **Drainage bolt heatsink: 1 - bolt**

To do this, loosen the drain bolt on the radiator (Fig. 2.139).
Collect the coolant.
Tighten the drain bolt.
Unplug the wiring harness of oxygen sensor catalytic converter

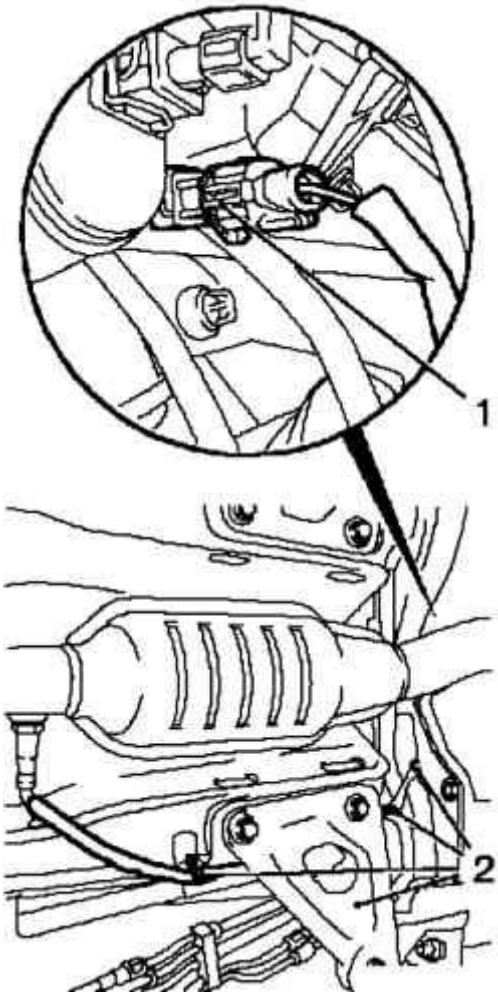
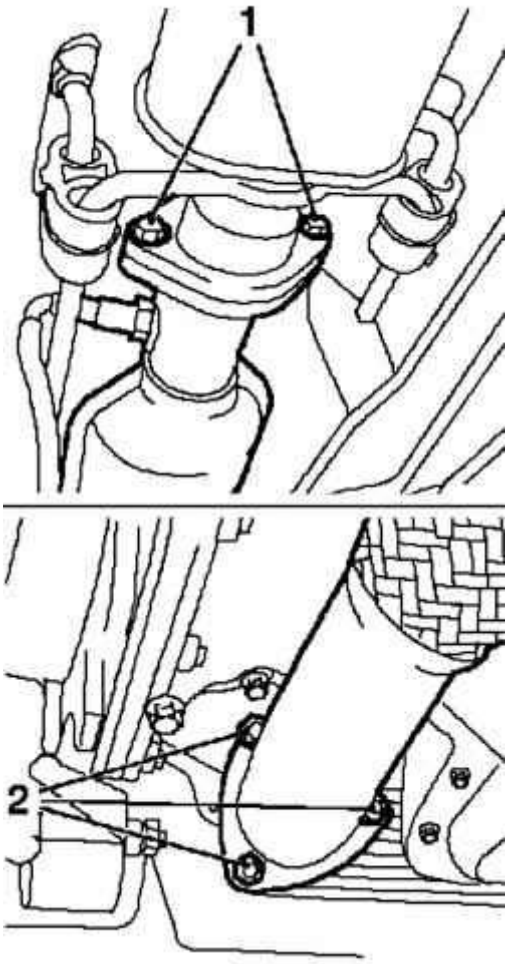


Fig. **2.140.** **Mounting the wiring harness of oxygen sensor catalytic converter: 1 - the wiring harness connector, 2 - clamps**

To do this, remove the wiring harness connector and Division 4 time (Fig. 2.140).
Remove the front exhaust pipe.
Disconnect the front exhaust pipe from the catalytic converter 3 unscrewing nuts.

Fig. **2.141.** **Mounting the front of the exhaust pipe: 1 - Nuts 2 - Bolts**



Disconnect the front exhaust pipe from the middle silencer unscrewing the two mounting screws (Fig. 2.141).
Remove the right drive shaft.

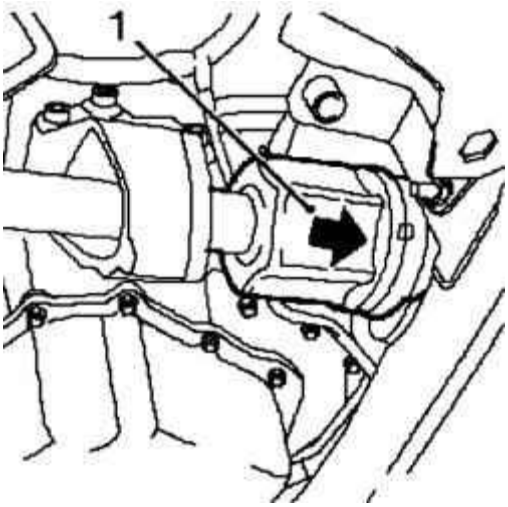


Fig. **2.142.** **Withdrawal of the right shaft: 1 - drive shaft**

NOTE
Vybeyte in the direction of the arrow tool of soft metal (Fig. 2.142).

Insert special device KM-6173.
Loosen the 4 bolts and tighten by hand.
Align special device KM-6173 with the shell of the front axle.
Enter your support.

The neck of this should be a fixture on the engine block.
Tighten the 4 bolts.

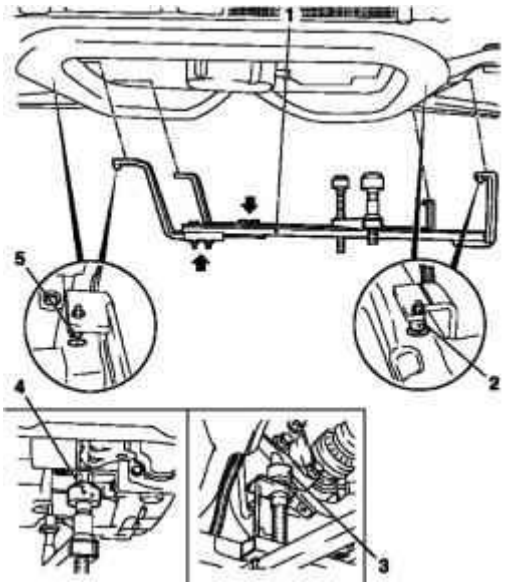


Fig. **2.143.** **Installation of a special device KM-6001-A on the housing front axle: 1 - a special device, 2, 5 - neck, 3 - rear support 4 - front support**

Attach the KM-6001-A (Fig. 2.143).

NOTE
Using the KM-6001-A ensures alignment with the drive housing the front axle.

Loosen the 3 bolts (arrows) in the adjustment tires.
Insert special device KM-6001-A.
Necks should be in the holes to the front axle housing.
Tighten the 3 bolts fastening the adjustment in the tires.
Adjust the support and lift them to the constraints on the neck guides.

NOTE
Necks should be in the supports gapless.

Lower the car completely.
Remove the coolant expansion tank from the bracket.

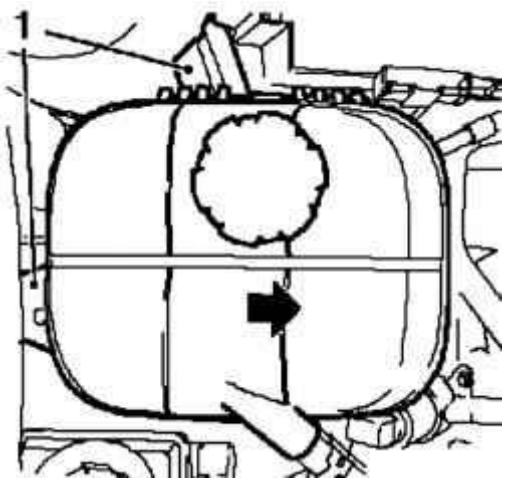


Fig. **2.144.** **Removing expansion tank: 1 - tank**

Remove the expansion tank from the bracket in the direction of the arrow. (Fig. 2.144).
Unplug the two cable drive switching.

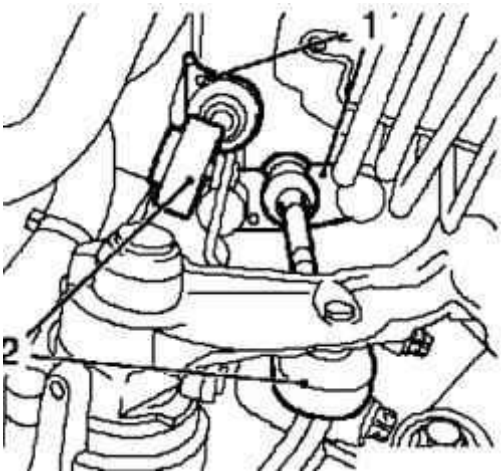


Fig. **2.145.** **Disconnect the drive cables switch: 1 - Bracket 2 - guide lever**

Separate from the bracket and separate from the guide lever (Fig. 2.145).

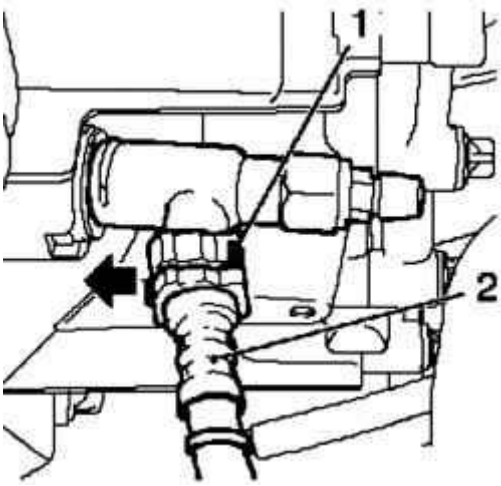


Fig. **2.146.** **Removing the central discharge line on sump clutch: 1 - clip 2 - the central flow line**

Disconnect the central flow line of the crankcase clutch disconnecting the clamp in the direction of the arrow using a screwdriver (Fig. 2.146).

NOTE
Wrap the ends of the pipe with a cloth.

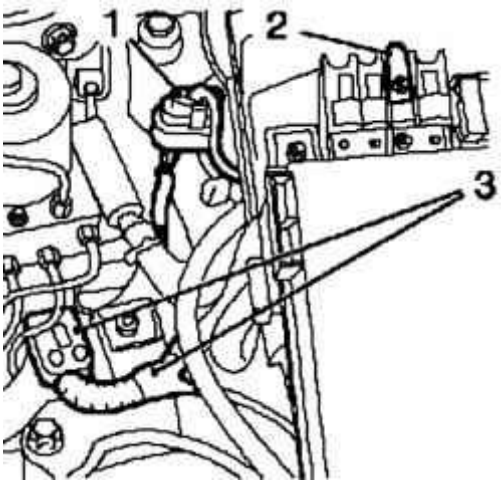


Fig. **2.147.** **Disconnect the wiring harness Steering: 1 - the wiring harness connector, 2 - nut, 3 - brackets wiring harness**

Unplug the wiring harness of steering control (Fig. 2.147).
To do this, remove the fuse holder cover.
Disconnect the positive cable from the fuse holder by unscrewing the nut fastening.
Disconnect the wiring harness connector.
Unplug the wiring harness.

Disconnect the two wiring harness bracket (Fig. 2.147).

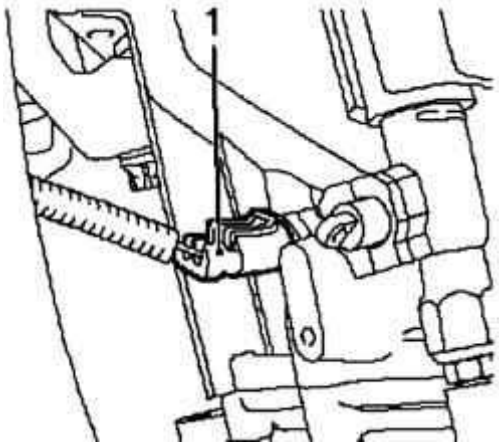


Fig. **2.148.** **The wiring harness connector lamps reversing: 1 - the wiring harness connector**

Unplug the wiring harness connector tubes reversing (Fig. 2.148).
Disconnect the positive cable from the positive terminal, unscrewing bolts.

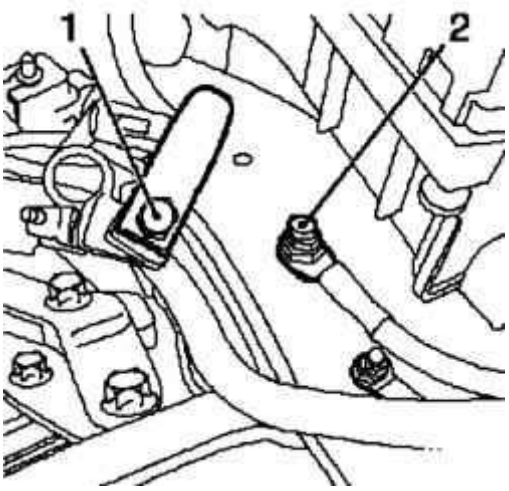


Fig. **2.149.** **Fastening wire body mass: 1 - pin 2 - Nut**

Unplug the lead from the body mass, turning away gaku attachment (Fig. 2.149).
Unplug the wiring harness connector.

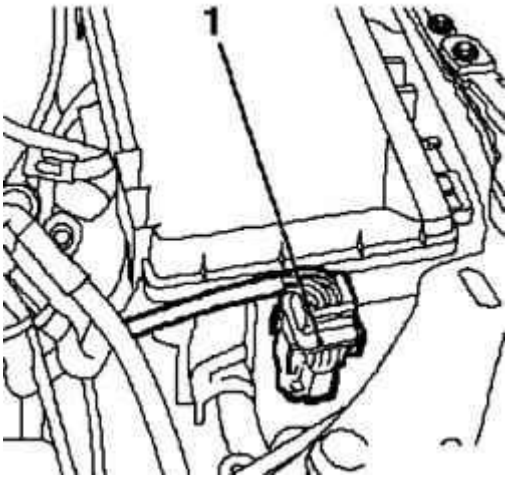


Fig. **2.150.** **Front wiring harness connector to the holder of fuses: 1 - connector**

Disconnect the front wiring harness connector to the fuse holder (Fig. 2.150).

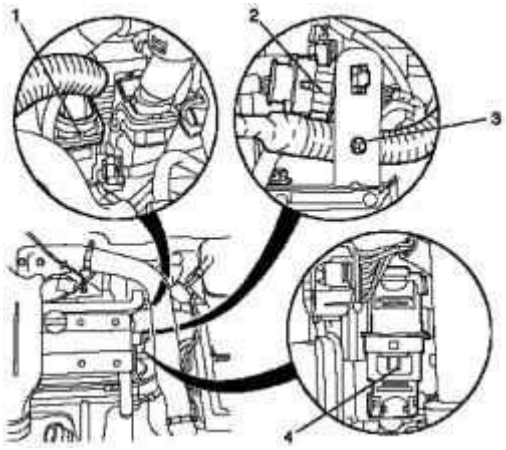


Fig. **2.151.** **Wiring harnesses, engine: 1 - the wiring harness connector module engine management, 2 - the wiring harness connector oxygen sensor, 3 - wire clamps, 4 - the wiring harness connector**

Unplug the wiring harness of the engine (Fig. 2.151).
Disconnect the wiring harness of oxygen sensor (2) of the bracket.
Disconnect the wiring harness connector.
Disconnect the wiring harness connector module engine control.
Remove the wire clamps.

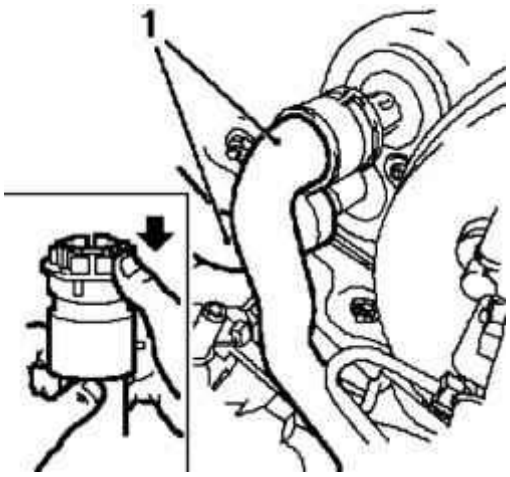


Fig. **2.152.** **Radiator Hoses: 1 - Hoses**

Disconnect the coolant hoses from the radiator heater (Fig. 2.152).
Disconnect the upper and lower quick coupling.

NOTE
Disconnect in the direction of the arrows in Figure 2.152.

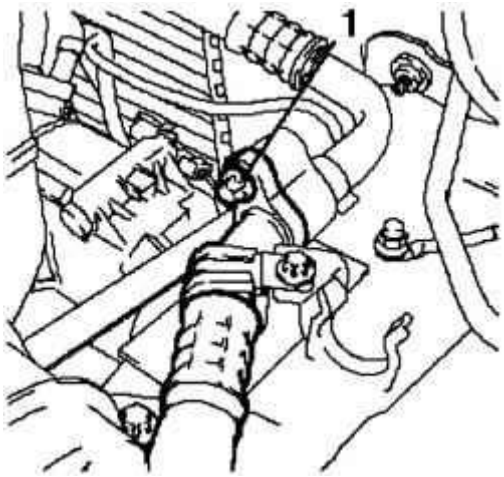


Fig. **2.153.** **Line circuit cooling system (low pressure side): 1 - screw fixing**

Disconnect the line circuit cooling system (low pressure side), unscrewing the bolt fastenings (Fig. 2.153).
Unplug the line contour of the cooling system of the condenser

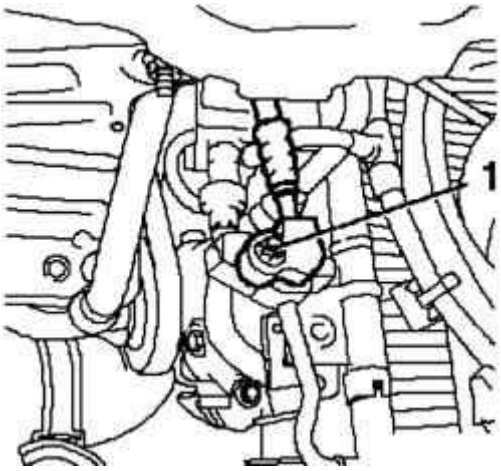


Fig. **2.154.** **Line circuit cooling system (high pressure side): 1 - screw fixing**

Disconnect the line circuit cooling system (high pressure side), unscrewing the bolt fastenings (Fig. 2.154).

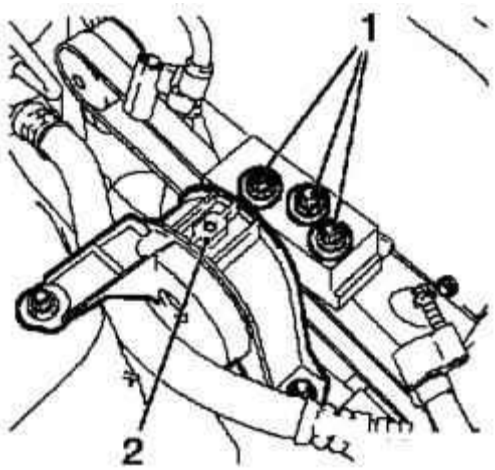


Fig. **2.155.** **Right damping motor unit: 1 - damping block; 2 - bolts fixing**

Disconnect the right damping motor unit from the adapter unit by unscrewing the bolt fastening 3 (Fig. 2.155).

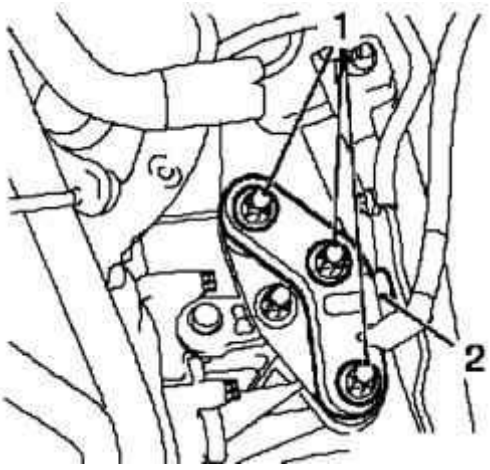


Fig. **2.156.** **Left damping motor unit: 1 - damping block; 2 - bolts fixing**

Disconnect the left damping motor unit from the adapter unit by unscrewing the bolt fastening 3 (Fig. 2.156).

Fixing the front axle on jack
Raise the car completely.
Attach a special device KM 904 and KM 6390.
Connect to the hydraulic lifter.

NOTE
Use a hydraulic jack, which can be dropped to a height of at least 100 cm

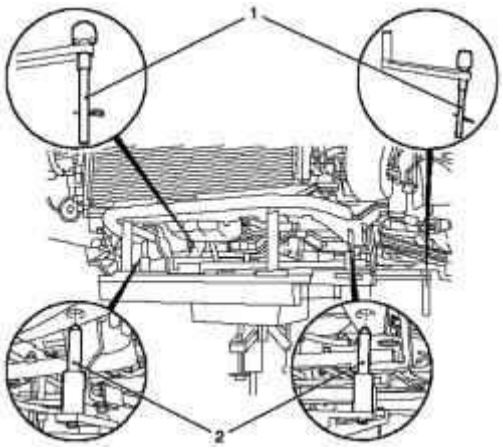


Fig. **2.157.** **Fixing the front axle on jack: 1, 2 - pins**

Vybeyte pins (see Figure 2.157).
Remove the two pins.
Podoprite housing front axle, make sure the reliability of support.
Pins must enter the corresponding holes in the hull of the front axle.

Removing the body of the front axle

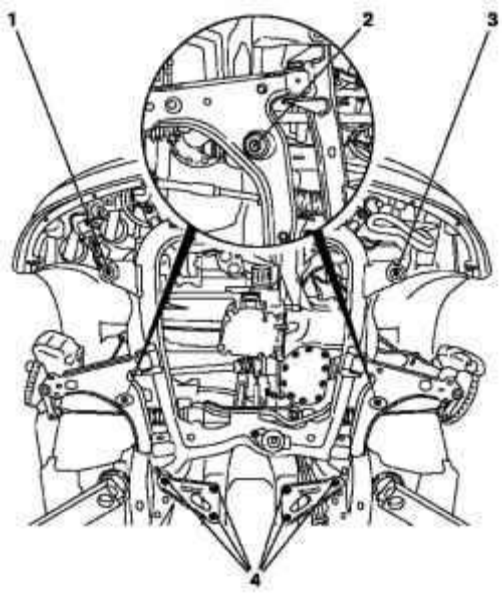


Fig. **2.158.** **Removing the body of the front axle: 1, 2,3,4 - bolts fixing**

Remove the front axle housing by unscrewing 10 screws (1, 2, 3, 4) (Fig. 2.158).

NOTE
Not be disassembled body of the front axle of a shock pulse or a screwdriver.

NOTE
Bolts are different lengths.
During disassembly of the shell of the front axle careful to not to damage the adjacent elements.

Pull the front axle housing.

Setting
Carefully move the front axle housing with the drive, steering mechanism and a radiator in the engine compartment and install the chassis without a gap.

NOTE
Be careful not to damage the adjacent elements

NOTICE
Not be disassembled body of the front axle of a shock pulse or screwdriver

Set the module to attach the new front axle bolts (1-4), torque 90 Nm +45 ° +15 ° (Fig. 2.158).
Remove the special adaptations KM 904 and KM 6390.
Lower the hydraulic jack.
Disconnect the special adaptations KM 904 and KM 6100 by a hydraulic jack.
Lower the car completely.
Install the right damping motor unit to the adapter block and tighten the 3 bolts fastening force of 55 N m.
Install the left engine damping block to the adapter block and tighten the 3 bolts fastening force of 55 N m.
Attach the line circuit to the condenser cooling system and tighten the bolt fastening force of 20 N m.

NOTE
Use a new gasket.

Attach the line circuit cooling system (low pressure side) and tighten the bolt fastening force of 20 N m.

NOTE
Use a new gasket.

Connecting hoses of the cooling system

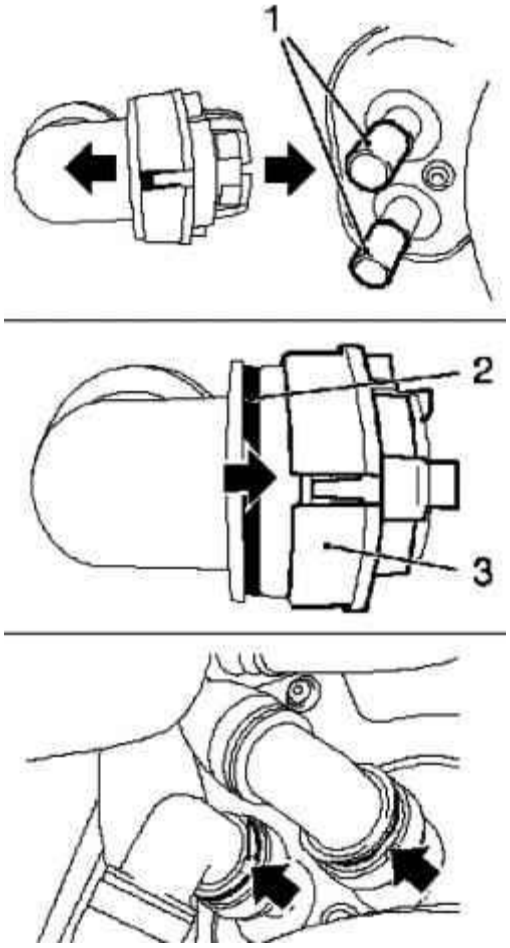


Fig. **2.159. Connecting the hoses of the cooling system: 1 - socket radiator heater, 2 - clamps, 3 - locking mechanism**

Connect the hoses to the radiator cooling system heater (Fig. 2.159).
Move the two locking mechanism of quick couplings in the direction of the arrow until it stops.
Plastic (green) rings at the same will be closed.

Put two quick couplings for connecting pipes of the radiator heater until it stops.

NOTE
Note the color marking.

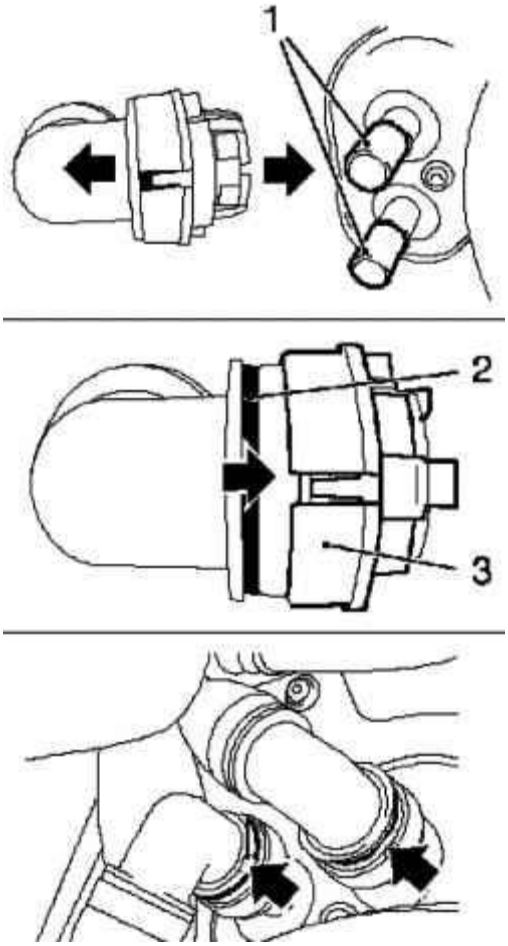


Fig. **2.124.** **Connecting the hoses of the cooling system: 1 - socket radiator heater, 2 - clamps, 3 - locking mechanism**

Move the two locking mechanism of quick couplings in the direction of the arrow until it stops (Fig. 2.124).
Plastic (green) rings at the same will be closed.
Ensure that quick release couplings are correct, and plastic rings (arrows) are visible.
Connect the wiring harness of the engine.
Connect the wiring harness engine control module.
Attach 2 Hold time.
Seal up the wire clamps.
Connect the wiring harness.
Attach the wiring harness connector oxygen sensor in the bracket.
Connect the wiring harness to the fuse holder.
Connect the wiring harness reverse gears and fasten it to the bracket.
Connect the wire to the body mass.
Connect the positive wire to the positive terminal.
Connect the wiring harness of steering control.
To do this, insert the wiring harness, to secure it in 2 brackets and wrapped nuts, connect the positive cable to the fuse holder
Install the wiring harness connector.
Replace the cover holder fuse
Connect the central pipes on the crankcase clutch, quick-connecting coupling.
2 Connect the cable drive switch, to keep them in a bracket and installing the clamps.
Lower the car completely.
Select the right drive shaft into the intermediate shaft.
Install the front exhaust pipe.

NOTE
When installing, use the new seal

Attach the front exhaust pipe to the catalytic converter and tighten the 3 nuts effort 20 Nm
Attach the front exhaust pipe to the middle silencer, secure it with two bolts.
Connect the wiring harness of oxygen sensor catalytic converter.
Lower the car in half.
Connect the wiring harness module cooling.
Install internal lining wheel arches.
Set shafts of the wheels into the wheel hub.

NOTE
During installation, hold the wheel hub with a special device KM-468-B.

2 Attach the hinge to the steering knuckle and tighten the effort of 50 N m.

NOTE
Use with new nuts

Attach 2 of the lever to the supporting pipe rack and tighten the spring a new nut element 65 Nm

NOTE
During the installation, use a wrench to hold the spring bar.

Attach 2 tie rod ends to the swivel and tighten new nut element 50 Nm
Install the right engine splash guard
Install the front bumper.
Attach the outdoor sensor, cementing his time.
Attach high pressure hose of the cleaner to a tank.
Attach the quick release coupling to the windscreen washer reservoir.
Install the front wheels.
Lower the car in half.
Fasten the bolts fastening the front wheels the moment 110 Nm
Install radiator grille.
Connect the vacuum line to the turbocharger.
Connect 2 lines and secure them in a bracket.
Attach the vent line of the fuel tank.
Connect the quick coupling and secure it in a bracket.
Connect the return fuel line to fuel rail
Tighten the coupling nut and secure the return fuel line bracket.
Connect the fuel line feeding to the fuel rail.
Tighten the coupling nut.
Install inlet pipe.

NOTE
Remove the inlet pipe from the turbocharger outlet.

Remove the ventilation hose from the engine cylinder head cover and secure it ring.
Attach the brake booster vacuum line to the intake manifold.
Connect the quick coupling.
Attach the vacuum line to the bracket.
Replace the air filter housing with the sensor mass air flow.
Insert the air filter housing.
Attach the intake hose to the intake tube and secure it ring.
Connect the wiring harness connector sensor mass air flow.
Connect the device to pump the brakes to the valve pumping.
Remove the valve cap.
Connect the device MKM-6174-1 to the valve pumping.
Install a device for pumping the brakes to the brake fluid reservoir.
Install adapter device for pumping the brakes on the reservoir with brake fluid.
Set device MKM-6174-2 on the adapter device for pumping the brakes.
Remove air from the clutch.
Turn on the device for pumping the brakes.
Open the vent valve.

Remove air from the circuit coupling.
Tighten by hand vent valve.
Turn off the device for pumping the brakes.
Remove the device for pumping the brakes with the brake hydraulic system reservoir.
Remove the device MKM-6174-2 with the adapter device for pumping the brakes.
Remove the adapter device for pumping the brakes with the brake hydraulic system reservoir.
Install the reservoir cover brake hydraulic system.
Remove air from the discharge line to the transmission housing.

NOTE
This procedure is performed with an assistant.

Remove the device for pumping the brakes with exhaust valve
Check and adjust the level of brake fluid.
Install support the battery and tighten the 3 bolts fastening point 15 Nm
Attach the wiring harness to frame the battery and connect cable clamps.
Set the bracket expansion tank coolant.
Connect the upper wiring harness module cooling.
Install the wiring harness connector.
Secure the relay in the bracket.
Connect the wiring harness connector boost pressure sensor.
Replace the battery pack.
Connect the positive wire to the positive terminal.
Tighten the nut fastening the moment 3,5 Nm
Connect with a mass at the conclusion of mass.
Tighten the nuts and tighten the moment 3,5 Nm
Fill the coolant and adjust the level of coolant.
Fill in the climate installation.
Use a gas station to fill the cooling circuit in the same amount of new lubricant compressor, which was removed during discharge system.
Fill the cooling circuit refrigerant R 134a.
Number of refrigerant: 700
Program transient memory.
Close the hood.

2.4. The mechanical part of the engine

Removing and installing the flywheel (engine 1.4 liters)

Withdrawal

Remove the gearbox.
Remove the clutch housing.

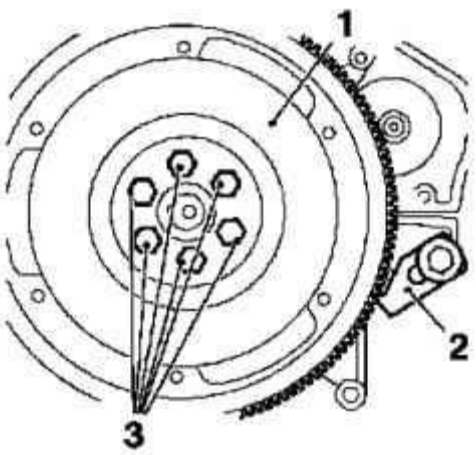


Fig. **2.160.** **Removing the flywheel:**
1 - Handwheel, 2 - a special device,
3 - bolts fastening

3. Remove the flywheel (2.160).

NOTE
Special device KM-6263 is still on the engine.

Lock the flywheel using a special device KM-652.
Loosen the mounting bolts 6.
Check the rear oil seal of crankshaft, flywheel and flywheel gear ring for damage or wear, replace if necessary.
Clean the contact surfaces of the crankshaft and flywheel.

Setting
Install the flywheel on the crankshaft.

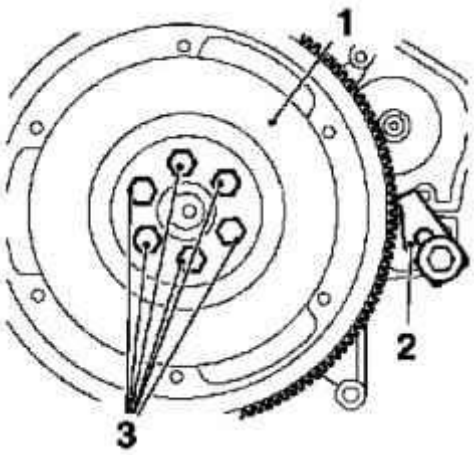


Fig. **2.161.** **Install the flywheel: 1 - Handwheel, 2 - a special device, 3 - bolts fastening**

Block it with a special device KM-652 (Fig. 2.161).
Clear 6 threads.
Tighten the 6 bolts (3) point of 35 Nm, Dauvergne at +30 °.

NOTE
When installing, use new bolts.

Apply (red) for the fixing of the threads.
Replace the clutch housing.
Set the gearbox.

Removing and installing the flywheel (engine 2.0 liters)

Withdrawal
Remove the manual transmission.
Remove the clutch.
Remove the flywheel from the crankshaft.

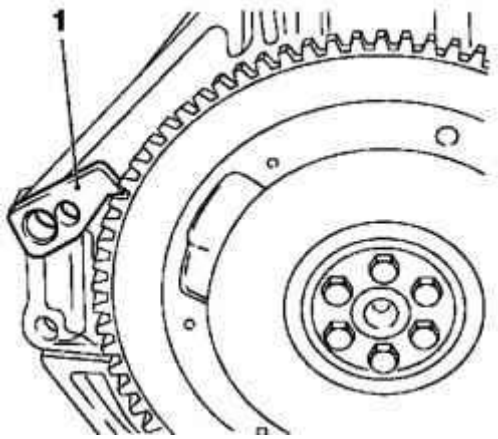


Fig. **2.162.** **Locking wheel when removing: 1 - a special device**

Block with a special device KM 652 (Fig. 2.162).
Loosen the 6 bolts
Clean threads

Setting
Attach the flywheel to the crankshaft with new bolts.

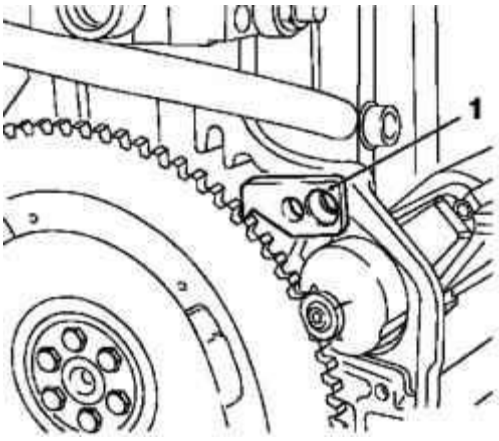


Fig. **2.163.** **Lock the flywheel during installation: 1 - a special device**

Lock the flywheel using the KM 652 when tightening the screws (Fig. 2.163).
Tighten the 6 bolts moment 35 Nm, Dauvergne at +30 ° and + 15 °.
Apply (red) for the fixing of the threads.
Use new bolts
Replace clutch
Set the gearbox.

Replacing the rear flange of the crankshaft

Withdrawal
Remove the flywheel.

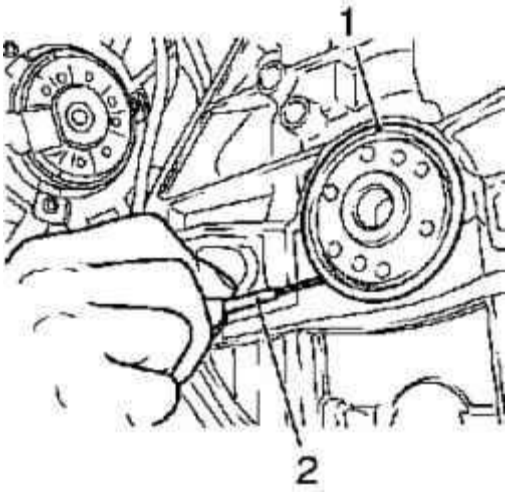


Fig. **2.164.** **Removing the plastic ring: 1 - plastic ring, 2 - Screwdriver**

Remove the plastic ring with a screwdriver (Fig. 2.164).

NOTE
Make holes in the areas shown in Figure 2,165 in provisions: 5 h and 7 h, it is the only area where there are behind the O-ring cavity.

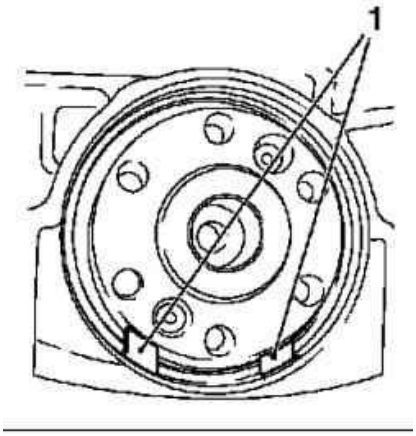
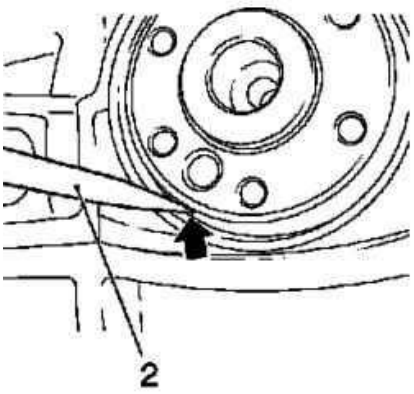


Fig. **2.165.** **Places Hole: 1 - space for holes, 2 - the right tool**



Use a suitable tool, such as awls (Fig. 2.165), in order to make a hole in the O-ring

NOTE
The diameter of the hole should not be more than 2 mm. Otherwise, screw accessories CM 6624 will not be able to keep the ring.

Place the awl on the outer edge of the seal ring.
Remove the O-ring.

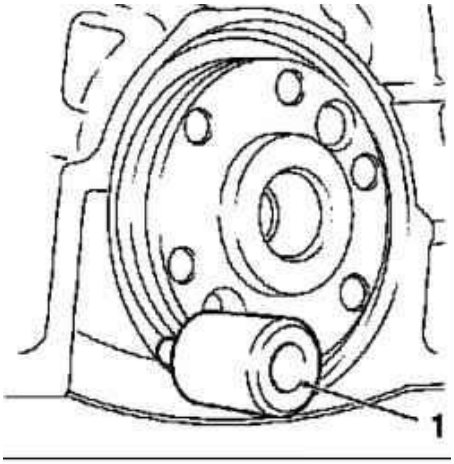
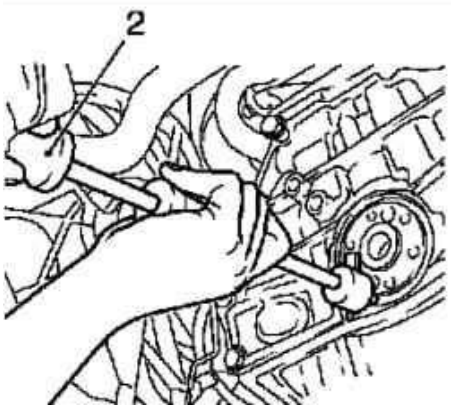


Fig. **2.166.** **Removing the omentum: 1 - a special tool KM 6624; 2 - special tools KM-328-B, and KM 6624**



Attach special tool KM 6624 on the O-ring (Fig. 2.166).
Tighten the bolt.
Attach special tool KM-328-B of the CM 6624.
Remove the O-ring with the help of special instruments KM-328-B, and KM 6624 (Fig. 2.166).

Setting

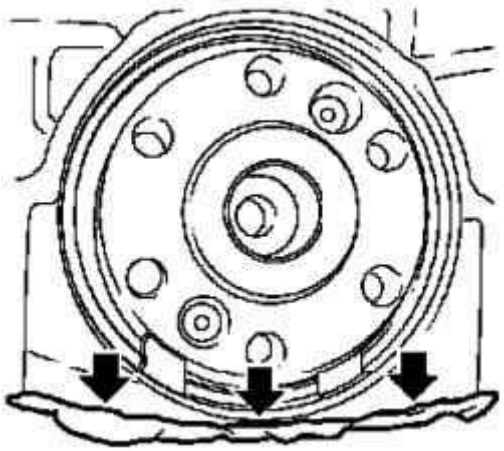


Fig. **2.167.** **Remains of seal**

Remove the remnants of a sealant compound cylinder with oil pan (the arrows in Figure 2.167).
Install new O-ring
Slide the O-ring on the crankshaft. Slide to a complete and uniform planting in the engine block.

NOTE
No O-ring is pressed fully.

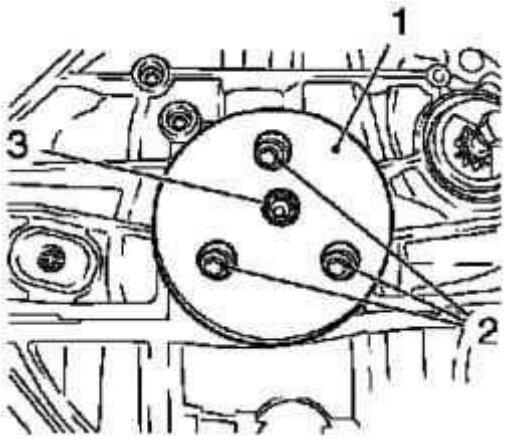


Fig. **2.168.** **Installation omentum: 1 - a special tool KM 6623; 2 - fixing screws, 2 - screw fixing**

Install the O-ring with a special tool KM 6623 (Fig. 2.168).
Tighten the 3 screws for fixation.
Fully zapressuyte O-ring.
Tighten the attachment bolt.
Remove the special tool KM 6623
Loosen the 3 screws for fixation.
Install the flywheel.

Replacing the valve stems seals (installed cylinder head)

Withdrawal
Remove the camshafts.
Remove the spark plug with a special tool KM-194-E.
Raise the car.
Remove the right engine splash guard.

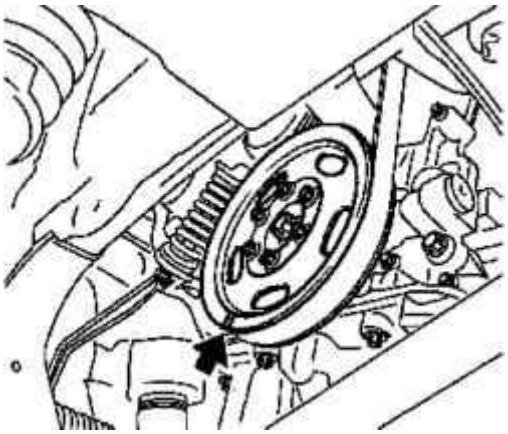


Fig. **2.169.** **Check belt pulley on crankshaft**

Can create the label on the belt pulley crank shaft (arrow in Figure 2.169).

NOTE
Move to 180 ° relative to the label, TDC cylinder number 1.

Prepare a lever MKM-6086 to remove the valve springs.
Adjust bearing special tool MKM-6086-6.

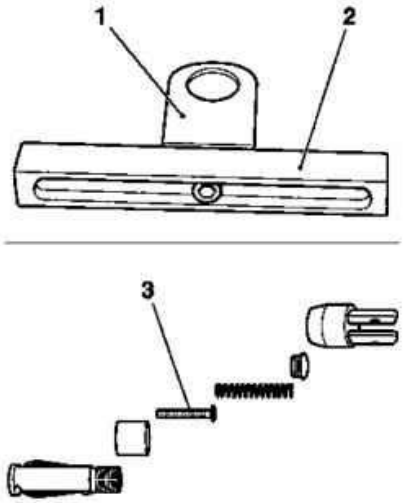


Fig. **2.170.** **Preparation of a special tool for removing valve springs: 1 - head support, 2 - stem bearing 3 - hard part**

Adjust the head bearings on the center on the leg supports and tighten (Fig. 2.170).
Extend lever MKM-6086-7 joint MKM-6086-8, and a removable head MKM-6086-10.
Install the unit MKM-6086-200.
Set a stubborn part of the MKM-6086-200-10.
Attach the lever for the valve springs MKM-6086.
Attach the support MKM-6086-6.
Insert the shaft in a block of support.

NOTE
Align the shaft block with the center hole plugs

Tighten the 4 bolts fastening.

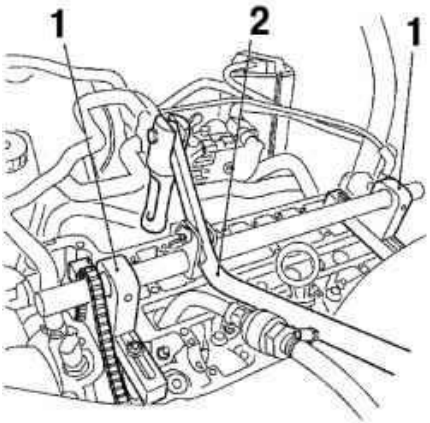


Fig. **2.171.** **Installation of the lever and the poles to remove the valve springs: 1 - supports 2 - lever**

Install lever MKM-6086-7 (Fig. 2.171).

NOTE
Removable head should be towards the intake side.

Attach the installation shaft and tighten the 2 screws fastening.
Install adapter compressed air.
Replace the spark plug threads in the cylinder number 1.
Give compressed air into the cylinder number 1.
Remove 2 springs intake valve cylinder number 1.

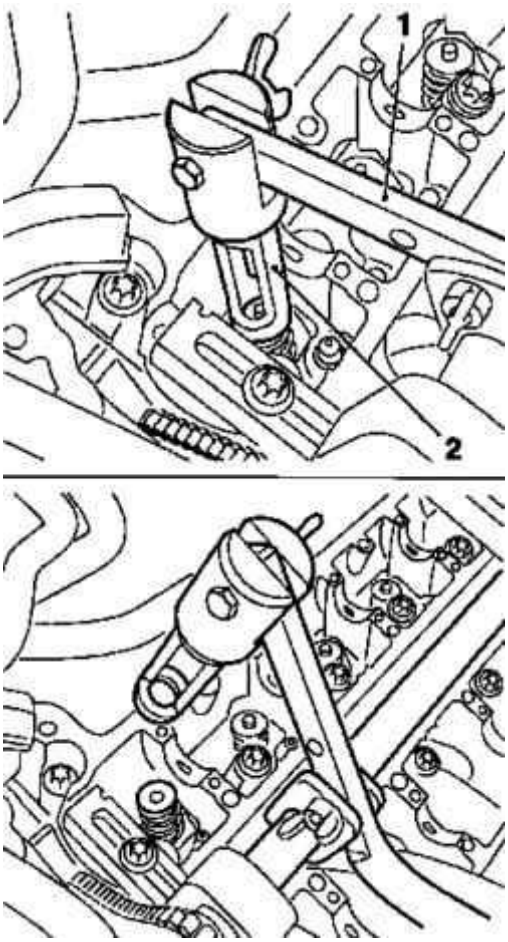


Fig. **2.172.** **The procedure for compression of valve springs: 1 - lever, 2 - Removable Head**

Gently pull down the lever valve springs (Fig. 2.172).

NOTE
Removable head (Fig. 2.172) should be placed vertically above the valve stem.

NOTICE
Observe the correct installation.

Remove the biscuits and the valve head, valve springs.

NOTE
Do not use with magnetic tools.

Replace valve stem seals.

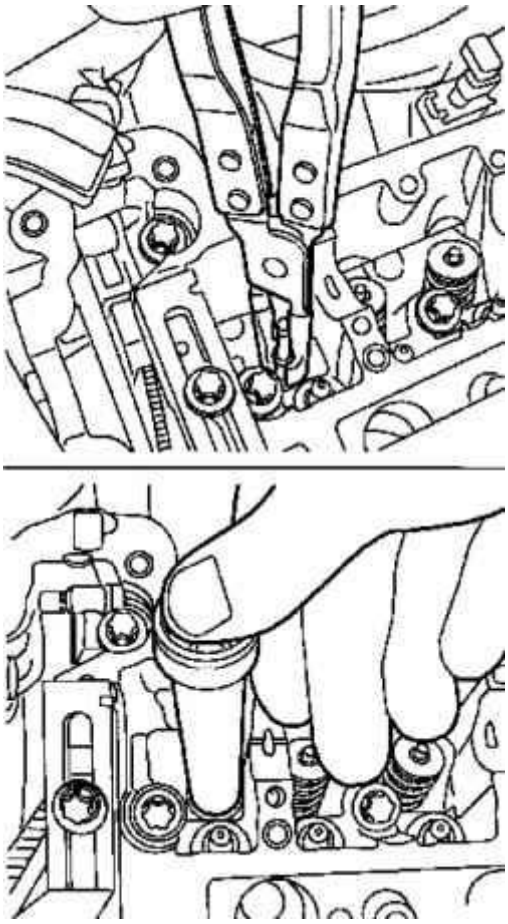


Fig. **2.173.** **Removing the old and installing a new valve stem seals**

Place the new seal valve stem on the valve stem (Fig. 2.173).
Put all the way through the CM 958.
Install the intake valve springs, cylinder number 1.
Install valve springs and valve heads.
Install biscuits in the valve cylinder head.

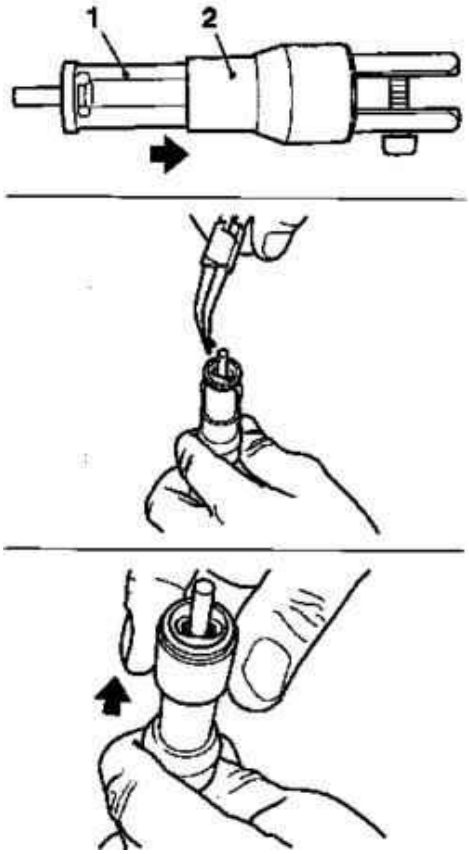


Fig. **2.174.** **Installing the valve in the head biscuits installation unit: 1 - biscuit valve, 2 - plastic collet**

Slide the plastic collet (Fig. 2.174) in the direction of mounting arm of the lever.

NOTICE
Set biscuits offset by the end of the cone in the direction of the valve

Slide the plastic collet in the direction of the valve (arrow in Figure 2.174).
Attach the installation head to the lever.

NOTICE
The head should be positioned vertically above the valve stem. Rusk must log on seat with the click.

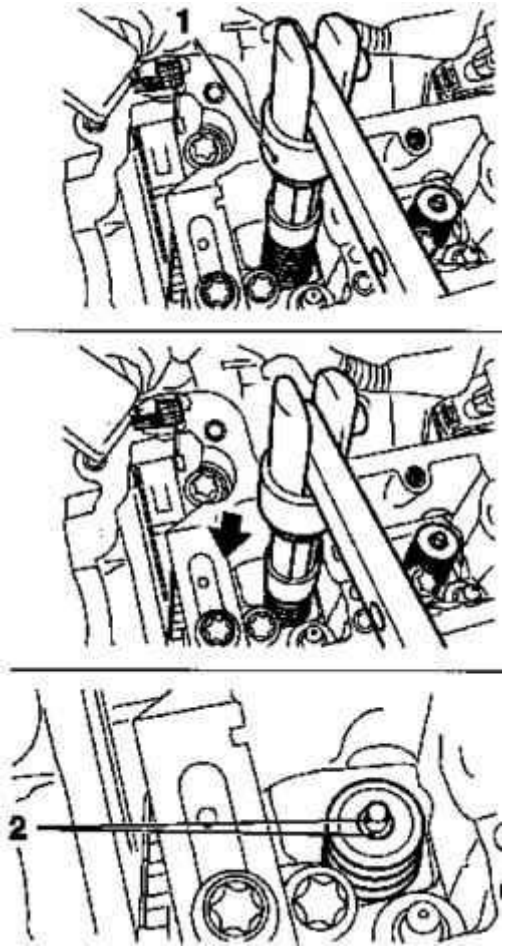


Fig. **2.175. Installing crackers valves and valve springs: 1 - head, 2 - biscuits**

Carefully slide the valve springs down with a lever (arrow in Figure 2.175).

NOTICE
Do not make the 2-S attempt, without making sure that the two biscuit installed in the cylinder head. Make sure landing crumbs. Ensure supply of compressed air.

Move the lever and remove it.
Perform this procedure to all cylinders.
Shut off the supply line of compressed air
Unlock the crankshaft.
Install the piston cylinder number 3 in the position of TDC.
Pull the chain drive mechanism for timing up.
Evenly, rotate the crankshaft (180 °).

Lock the crankshaft with a special tool KM-952.
Relocate adapter supply of compressed air.
Shut off the supply line of compressed air.
Unscrew the adapter from the spark plug threads, cylinder number 4.

Replace the spark plug threads in the cylinder number 2.
Give compressed air into the cylinder number 2.
Replace valve stem seals, cylinder number 2.
Relocate adapter supply of compressed air.
Shut off the supply line of compressed air.
Unscrew the adapter from the spark plug threads, cylinder number 2.
Replace the spark plug threads in the cylinder number 3.
Give compressed air into the cylinder number 3.
Replace valve stem seals, cylinder number 3.
Shut off the supply line of compressed air.
Detach lever valve springs.
Remove the adapter compressed air.
Loosen the crankshaft.
Set the gearshift lever to neutral position.
Turn off the parking brake systems.
Raise the car.
Lock the crankshaft.
Pull the chain drive mechanism for timing up.
Evenly, rotate the crankshaft until it stops a special device KM 952.
Install special tool KM-952.
Lower car

Setting

Replace spark plug with a special device KM-194-E and tighten the moment 25 Nm
Visually check the elements - camshafts, camshaft bearing cap, cylinder head, valve tappets, hydraulic valve tappets.
Install hydraulic lifters and tappets.

Removing and installing the crankshaft (engine 1.4 liters)

Withdrawal

Remove the engine.
Remove the manual transmission.
Install the engine in a special fixture KM 412.
Lift the engine.
Set a special device KM-412-18 (1) on the engine.
Tighten the 4 bolts fastening.

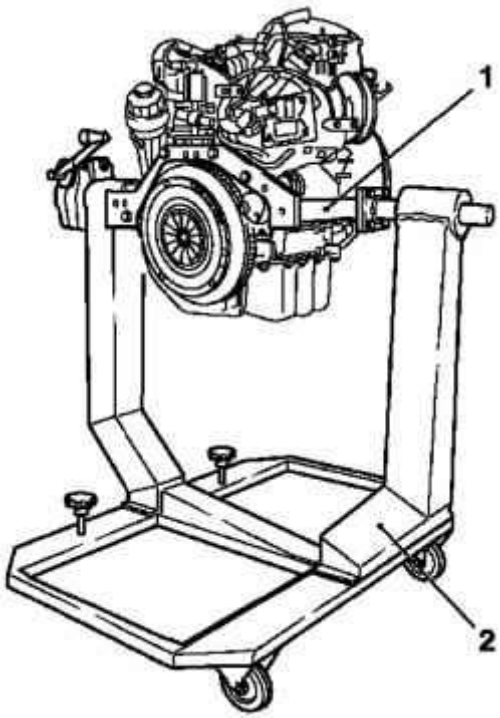


Fig. **2.176.** **The engine installation on a special stocks: 1 - head, 2 - biscuits**

Secure the motor in the KM 412 (Fig. 2.176).
8 Tighten the mounting bolts.
Remove the restraining ropes KM-2358.

Remove the flywheel, block it with a special device KM-652 and loosen the mounting bolts 6.

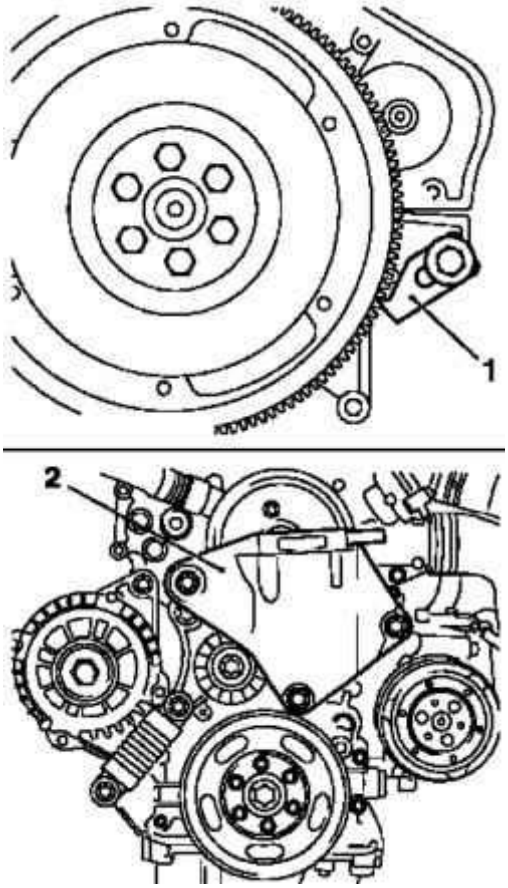


Fig. **2.177. Withdrawal of support damping unit: 1 - a special device, 2 - bearing damping unit**

Disconnect the support damping engine block from the housing valve gear / cylinder (Fig. 2.177).
Loosen the 3 bolts.
Remove the clutch.
Place the bottom of the container for drainage, loosen the bolt holes drain and drain engine oil.
Assemble the motor oil.
Tighten the bolt holes drain with a new O-ring moment 10 Nm

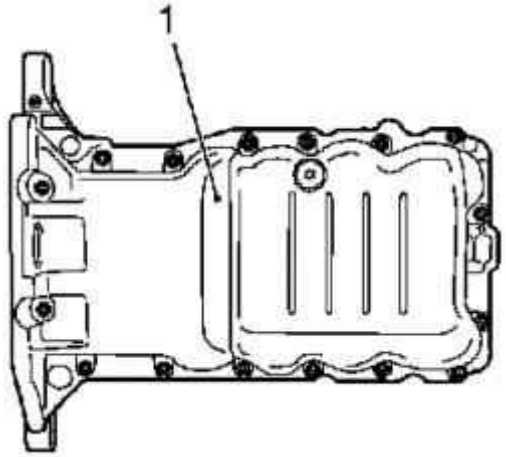


Fig. **2.178. Oil-pan: 1 - Palette**

Remove the oil pan from the base of the cylinder block, turning away 16 mounting bolts (Fig. 2.178).
Clear Poly-V belt.
Check direction of rotation.
Turn tensioner Poly-V belt (arrow in Figure 2.179), in a clockwise direction using a special tool KM 6131
Install special tool KM-955-2 and with his help loosen the tensioner Poly-V belt (Fig. 179).
Clear Poly-V belt tensioner. To do this, turn the tensioner Poly-V belt in the direction of the arrows in Figure 2.180, using a special tool KM 613.
Remove the special tool KM-955-2.
Belt Poly Loosen tensioner, loosen the 2 bolts (arrows in Figure 2.180).

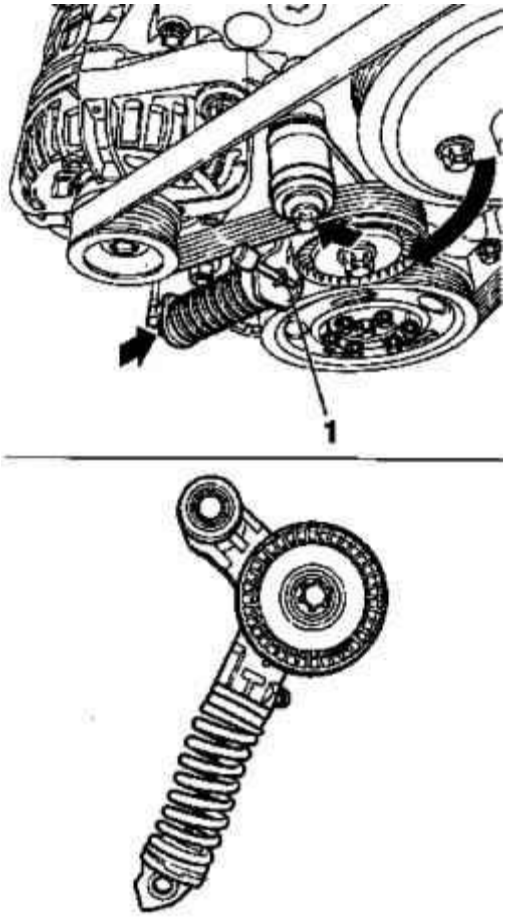


Fig. **2.180.** **Removing Poly-V belt tensioner: 1 - special tool**

Remove the tensioner Poly-V belt (Fig. 2.180).

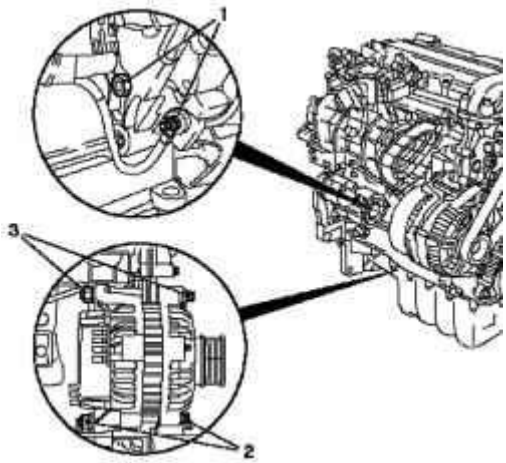


Fig. **2.181.** **Removal of the alternator: 1 - nuts, 2, 3 - Bolting**

Disconnect the alternator. To do this, disconnect the wiring harness of an alternator, loosen the 2 nuts, remove the 2 bolts and remove the alternator (see Figure 2.181).
Remove the thermostat housing and coolant hose from the coolant pump, 3 unscrewing bolts.
3 Remove the clamp and disconnect the coolant hoses from the pump coolant.
Disconnect connectors camshaft sensor wiring harnesses, oil pressure and coolant temperature.

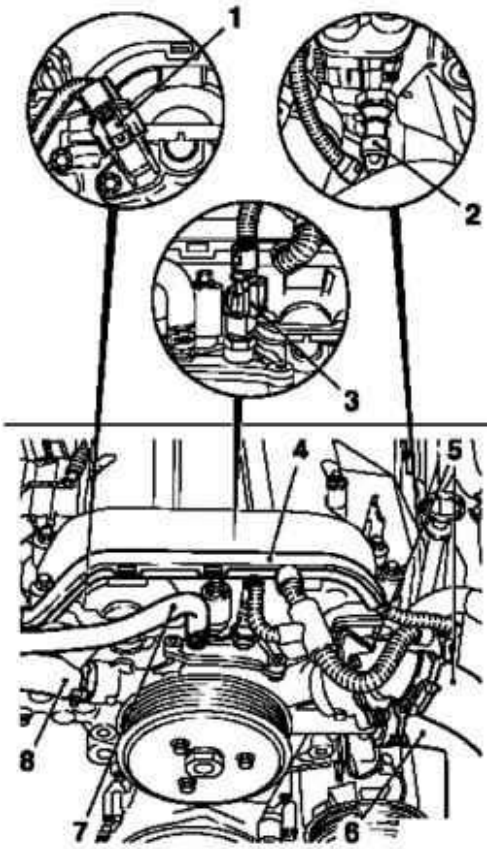


Fig. **2.182.** **Removing the coolant hoses and wiring of sensors: 1 - connectors wiring harnesses camshaft sensor, 2 - wiring harness connector of the oil pressure sensor, 3 - the wiring harness connector coolant temperature sensor, 4 - wiring harnesses, 5 - coolant hose, 6, 7, 8 - coolant hoses**

Disconnect the wiring harness from the lid of the cylinder head, and bring them back (Fig. 2.182).

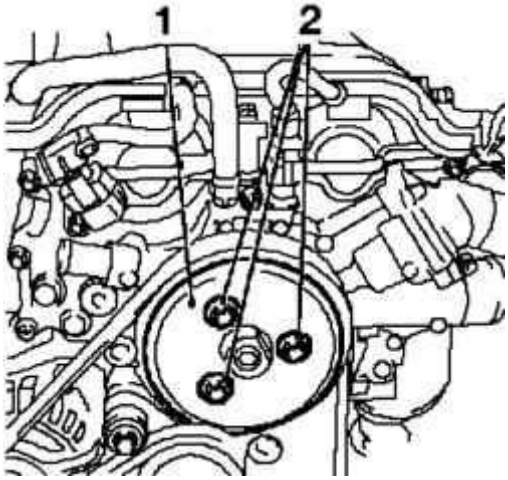


Fig. **2.183.** **Removing the belt pulley pump coolant: 1 - pulley, 2 - bolts fixing**

Remove the belt pulley coolant pump by unscrewing the bolt fastening 3 (Fig. 2.183).
Mark the position of guide bushings, when removing the pump coolant.

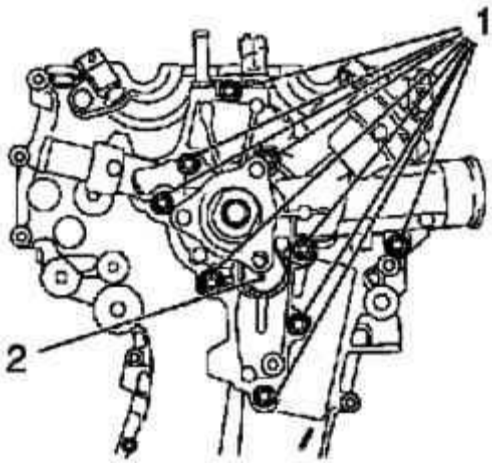


Fig. **2.184.** **Removing the pump coolant: 1 - mounting screws, 2 - pump coolant**

Disconnect the pump cooling fluid from the body of valve gear, unscrewing 9 mounting bolts (Fig. 2.184).

NOTE
Pump bolts are different lengths.

Disconnect the ventilation hose from the cover of the engine cylinder head
Remove the wiring harness ignition module.
Remove the ignition module with the lid of the cylinder head in the direction of the arrows in Figure 2.185.
Loosen the two bolts.

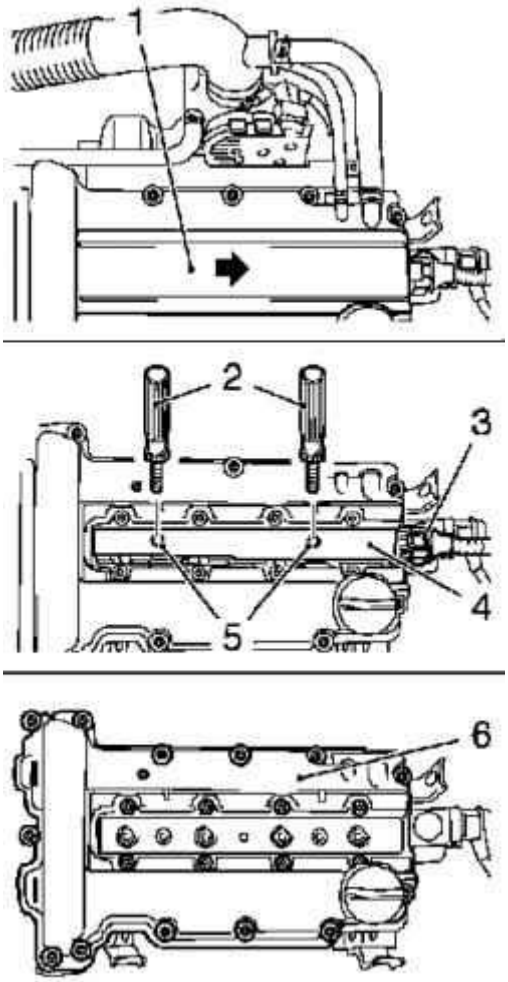


Fig. **2.185.** **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - a special tool; 3 - Ignition module wiring harness, 4 - ignition module 5 - mounting screws, 6 - cylinder head cover**

Separate the ignition module from the spark plug with a special tool KM 6009 (Fig. 2.185).
Remove the lid of the cylinder head from the cylinder head by unscrewing the mounting bolts 13.
Rotate the crankshaft in the position of top dead center (TDC) of cylinder number 1 (ignition) in the direction of rotation of the engine.
Check belt pulley on the crankshaft must sit in front of the projection on the case of the mechanism of timing.

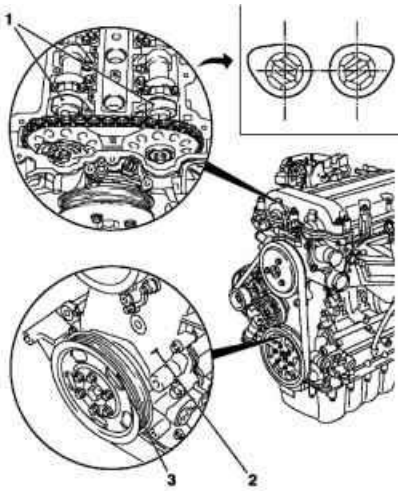


Fig. **2.186.** **Install the crankshaft position at top dead center (TDC), piston cylinder number 1: 1 - cams cylinder number 1, 2 - lug 3 - Tag**

In this position number 1 cylinder cams are located in front of TDC (the ignition) (both cam pointing outward) (Fig. 2.186).

Remove the belt pulley of the crankshaft.

Hold the hub of the crankshaft bolt, loosen the 6 bolts.

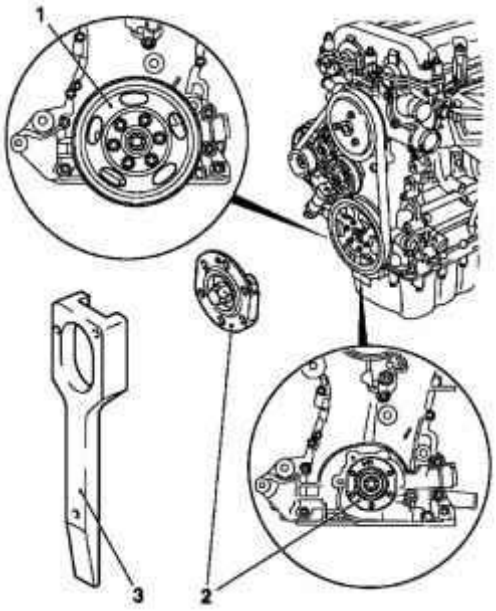


Fig. **2.187.** **Removing the belt pulley crankshaft: 1 - belt pulley, 2 - wheel hub bolt crankshaft, 3 - special tool**

Loosen the bolt hub of the crankshaft (2) (do not remove it), hold a special tool KM 956 (Fig. 2.187).

Loosen the bolt from the hole at the base of the cylinder block

Lock the crankshaft.

Install special tool KM-952 in the hole.

Slowly turn the crankshaft bolt for the hub of the crankshaft in the direction of rotation of the engine, while a special tool KM-952 you hit a jumper in the crankshaft or the base of the cylinder block.

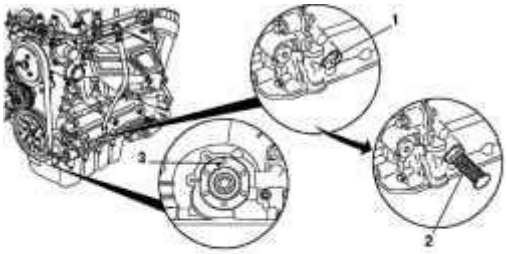


Fig. **2.188.** **Поворачивание коленчатого вала: 1 – болт; 2 – специальный инструмент; 3 – метка**

Check on the hub of the crankshaft must be turned up in this position (Fig. 2.188).

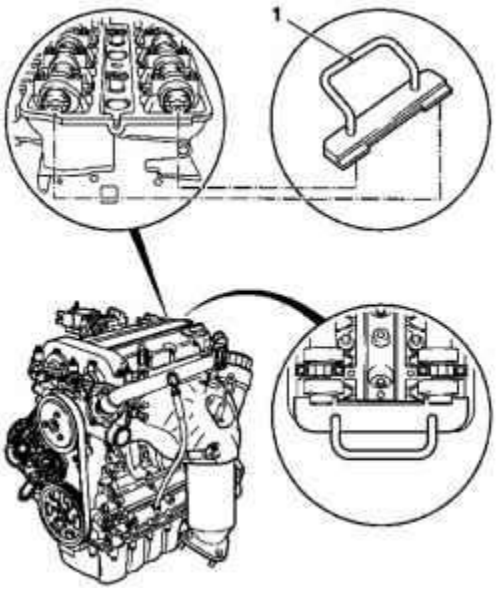


Fig. **2,189.** **Locking camshaft: 1 - special tool**

Install special tool KM-953 on the camshaft (Figure 2.189).

NOTE
Special tools must be installed in the grooves of shaft until it stops.

Remove the hub of the crankshaft and unscrewing bolts.

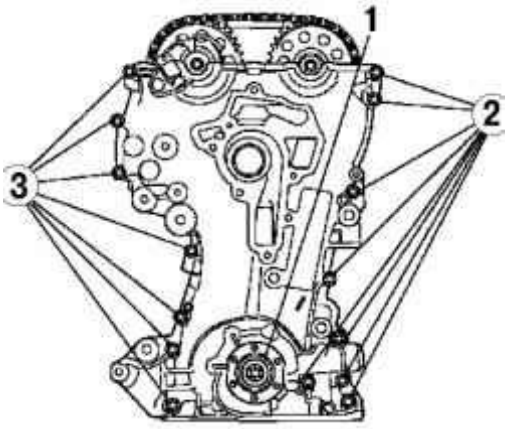


Fig. **2.190.** **Removing the hub of the crankshaft: 1 - hub, 2, 3 - bolts fastening**

Remove the casing valve timing mechanism by unscrewing bolts 15 (Fig. 2.190).

Removing the timing chain drive mechanism
Loosen the pulley bolts distribution shaft.
Hold camshafts per hexahedron.
Block chain tensioner.
Install special tool KM-955-1.
Slide back timing chain and lock it with a special tool KM-955-1.
Remove the guide by unscrewing 2 screws fastening.
Remove the guide by unscrewing 2 screws fastening.
Remove the guide tension by unscrewing the bolt fastening.

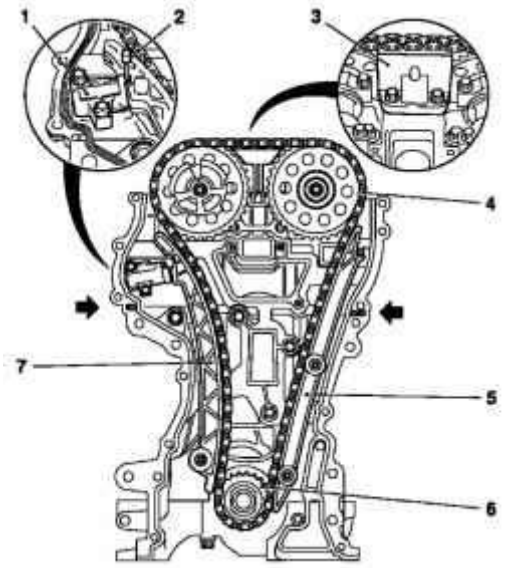


Fig. **2.191.** **Removing the timing chain drive mechanism: 1 - timing chain, 2 - a special tool, 3 - slide 4 - timing chain drive mechanism; 5 - slide 6 - asterisk, 7 - directing tension**

Remove the drive chain mechanism for timing, drive sprocket and the gasket body mechanism timing (Fig. 2.191).
Disconnect the wiring harness connector pulse sensor crankshaft.
Remove the special tool KM 952.
Remove pulse generator crankshaft, unscrewing bolts.

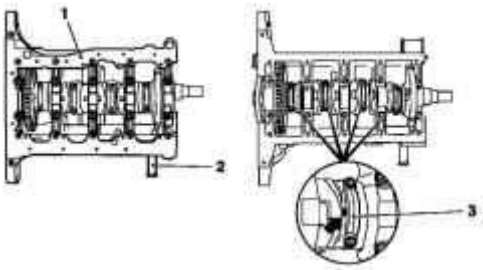


Fig. **2.192.** **Removing the connecting rod: 1 - the base of the cylinder block, 2 - a special tool, and 3 - connecting rod bearing caps**

Disconnect the base of the cylinder block of the cylinder block by unscrewing the bolt 22 fastening (Fig. 2.192).
Remove the connecting rod bearing.

NOTE
Surfaces of contact rods and connecting rod bearing caps are selected individually, and therefore they can not be rearranged or prevent their injuries. to avoid damage, do not put rods and caps on the contact surface.

Check lid connecting rod bearings.
Check the sequence of cylinders.
8 Loosen the mounting bolts and remove the cover of a connecting rod.

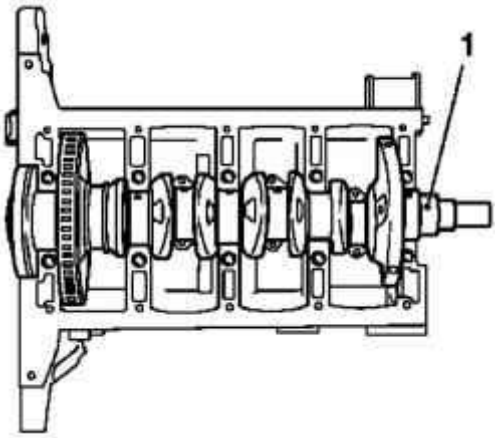


Fig. **2.193.** **Removing the crankshaft: 1 - kolechaty shaft**

Remove the crankshaft (Fig. 2.193).
Disconnect the base of the cylinder block.

NOTE
Separate base evenly mounting shovel.

Loosen the bolt 22.
Remove the rear oil seal crankshaft.
Remove the crankshaft and put on wooden bars.
Remove the clamps crankshaft bearings.

NOTE
Follow the correct sequence

Remove the connecting rod bearing inserts and label them, while respecting the proper sequence.
Check all items for wear and replace if necessary.

Checking crankshaft
Check the roundness of the crankshaft. Check the free running axis of the crankshaft.

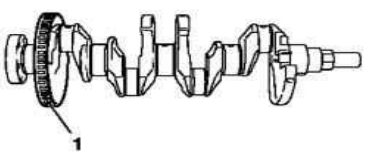


Fig. **2.194.** **Drive pulse sensor crankshaft: 1 - CD**

Disconnect the drive pulse sensor crankshaft (Fig. 2.194), 3 unscrewing bolts.

Setting
Attach the drive pulse sensor crankshaft and tighten the 3 bolts fastening point 15 Nm
Install the crankshaft bearing shells in the cylinder block and the base of the cylinder block.
Cover of engine oil.

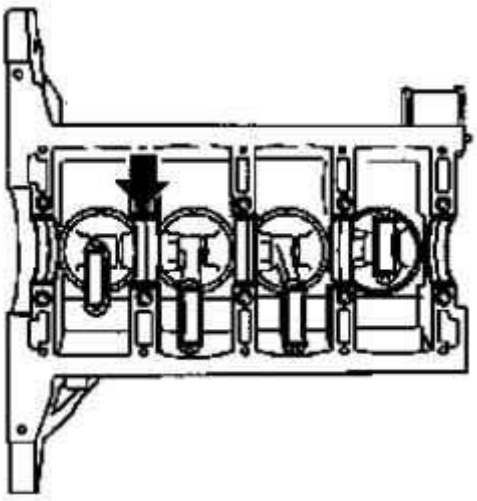


Fig. **2.195.** **Situation thrust bearings**

Mark the position of thrust bearings (arrow in Figure 2.195).
Install connecting rod bearings bushings in connecting rods and connecting rod bearing caps.
Cover of engine oil.
Carefully set the crankshaft in the cylinder block.

NOTE
Position of the crankshaft can be adjusted with a rubber hammer tap on the cheek crank.

Cover the engine oil crankshaft journals.
Attach the base of the cylinder block to the cylinder block with new bolts.

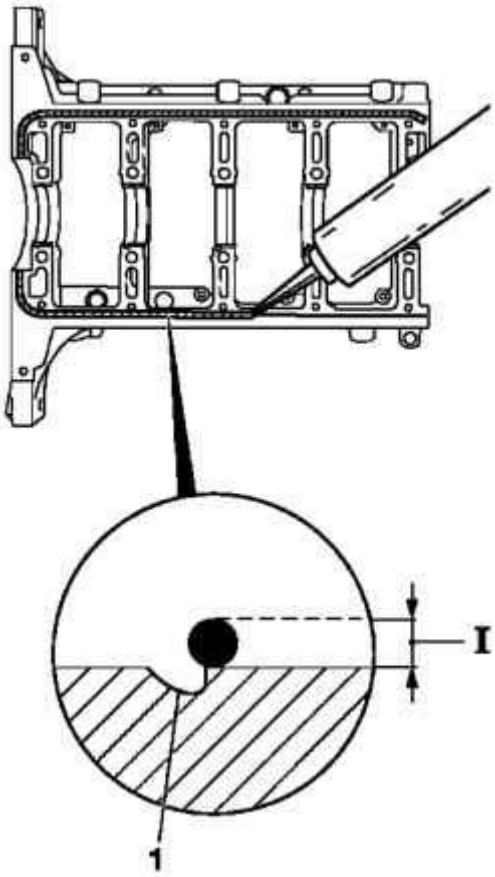


Fig. **2.196.** **Scheme sealants: 1 - slot**

Apply sealant to the outer edges of the groove (the size of I = 2 mm) (Fig. 2.196).

NOTE
Do not apply sealant in the groove.
Follow the assembly within 10 minutes.

NOTICE
Observe the sequence of delays.

10 Tighten the screws M8 (internal) point 25 N * m, Dauvergne at +60 °.
12 Tighten the screws M6 (external) point of 10 Nm, Dauvergne at +60 °.
Remove the remnants of a sealant.
Replace rear oil seal crankshaft. Before that apply to the working edge (white) with silicone grease.
Install special device KM-235-6 on the neck of the crankshaft.

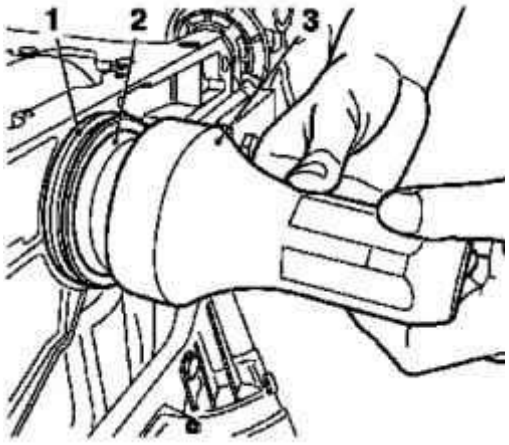


Fig. **2.197.** **Mounting the rear flange of the crankshaft: 1 - gasket, 2 - a special device, 3 - a special device for pressing**

Put the O-ring on a special device and zapressuyte flush using KM-658-1 (Fig. 2.197).

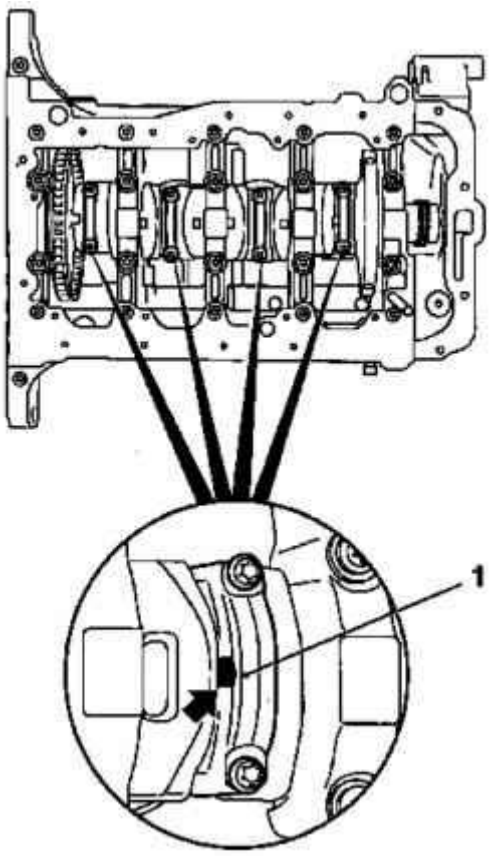


Fig. **2.198.** **Install covers types of bearings: 1 - cover**

Attach lid connecting rod bearings to the connecting rod with new bolts (Fig. 2.198).

NOTE
Pay attention to the loading position, the tides (arrow in Figure 2.198) on the covers of some types of bearings are pointing in the direction of the gearbox.

8 Tighten the mounting bolts moment 13 Nm, Dauvergne at +60 ° +15 °.

NOTE
Always use screws M 6,5.

Connect the wiring harness pulse sensor crankshaft.
Lock the crankshaft, establishing a special tool KM 952.
Smoothly rotate the crankshaft to stop the special tool KM 952.
Install new pump seal coolant housing timing mechanism.
Ensure correct installation guide bushings (arrows in Figure 2.199)

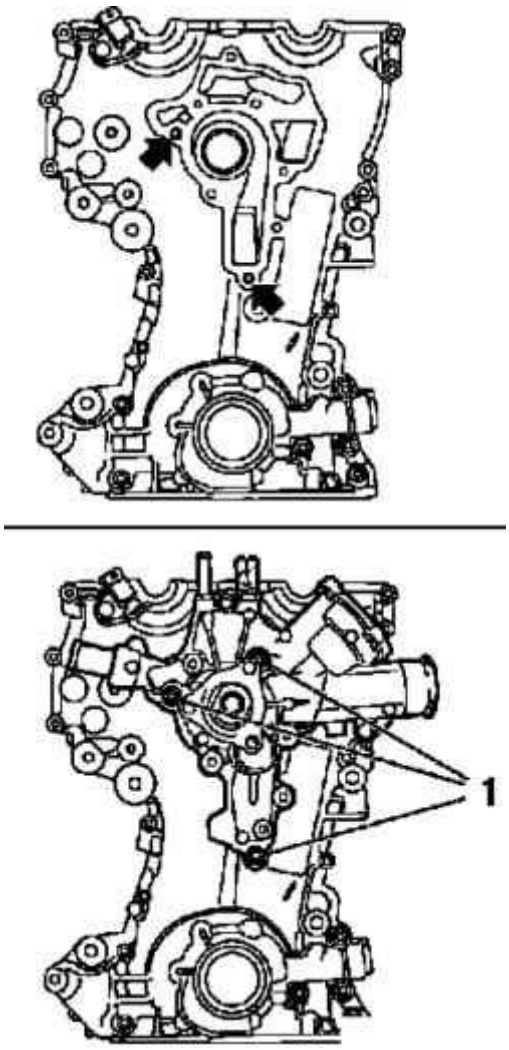


Fig. **2.199.** **Install the coolant pump: 1 - bolts fastening**

Attach the pump coolant to the body of the mechanism of timing short screws (Fig. 2.199).
Tighten the 3 bolts fastening point 8 Nm
Apply sealant.

NOTE
Housing timing mechanism must be established within 10 min after the application of silicon sealant (gray).

Turn the engine on a special adaptation of the CM 412 at 90 °.
Cut off the protruding parts of elastomer gaskets to the cylinder head and replace them with a roller silicon sealant (gray) 2 mm thick.

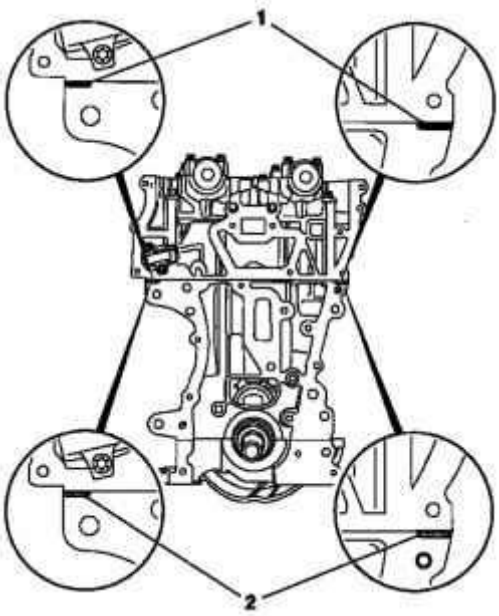


Fig. **2.200.** **Scheme laying sealer: 1 - Cylinder head gasket, 2 - roller silicone sealant**

NOTE
The roller is a silicone sealant (gray) can be applied directly, if there is no elastomer protrusions (Fig. 2.200).

Installing timing mechanism
Install new gasket body timing mechanism.

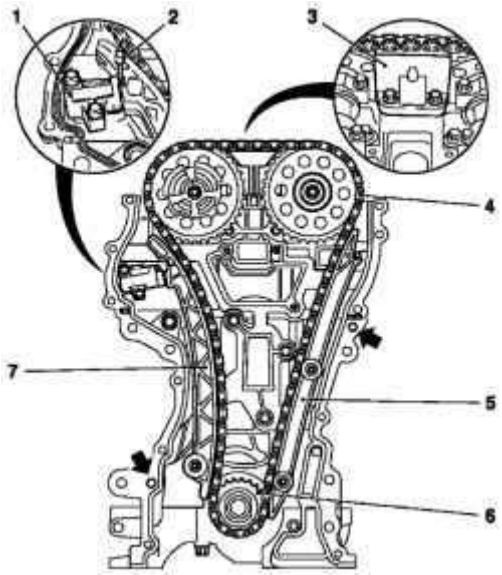


Fig. **2.201.** **Installing the valve gear: 1 - timing chain, 2 - a special tool, 3 - slide 4 - timing chain drive mechanism; 5 - slide 6 - Leading gear; 7 - bus clamping**

Ensure correct installation guide bushings (arrows in Figure 2.201).
Install timing chain drive mechanism.

NOTE
When installing, use the new camshaft pulley bolts.

Ensure correct installation guide bushings (arrows in Figure 2.201).
Install drive gears.
Install asterisk camshaft drive exhaust valves.
Tighten the attachment bolt.
Install timing chain drive mechanism.

NOTE
Provide tension leads (outlet side) branches of the chain drive mechanism for timing.

Install camshaft pulley drive the intake valves in a chain drive mechanism timing disk sensor phase and tighten the attachment bolt.

NOTE
Disk-phase sensor must rotate the hand force.

Attach the rail clamp to the cylinder.
Tighten the attachment bolt moment 20 Nm
Attach the guide to the cylinder block.
Tighten the 2 screws fastening point 8 Nm
Attach the guide to the cylinder head.
Tighten the 2 screws fastening point 8 Nm
Loosen the chain tensioner.
Remove the special tool KM-955-1.
Attach the housing timing mechanism.
Tighten the mounting bolts 22.
Tighten the screws 6 point 8 Nm
Tighten the bolts 14 point 8 Nm
Tighten the 2 bolts moment 35 Nm
Remove the special tools KM 952 and KM 953

NOTE
Special tools should not be used for retention.

Attach the hub of the crankshaft.
Check the loading position, the hub of the crankshaft.
Label should be facing up.

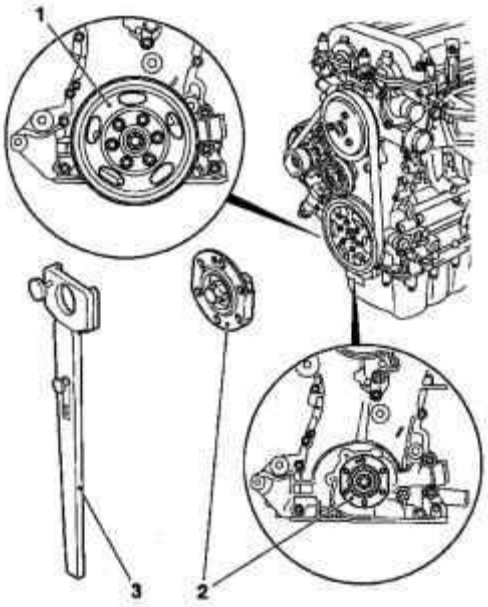


Fig. **2.202.** **Joining the hub of the crankshaft: 1 - belt pulley of the crankshaft 2 - the hub of the crankshaft 3 - special tool**

Hold with a special tool KM-956-1 / -2 (Fig. 2.202).
Tighten the bolt moment 150 Nm, Dauvergne at +45 °.

NOTE
Use a new bolt.

Remove the special tool KM-956-1 / -2.

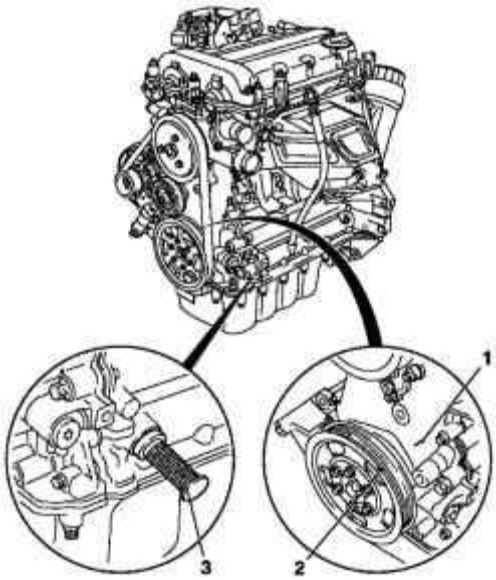


Fig. **2.203.** **Combining marks on the belt pulley of the crankshaft with the projection on the case of the mechanism of timing: 1 - projection on the case of timing mechanism, 2 - a label on the belt pulley, 3 - special tool**

Attach the belt pulley of the crankshaft (Fig. 2.203).
Tighten the mounting bolts 6 point 8 Nm
Rotate the crankshaft to approximately 720 ° in the direction of rotation of the engine crankshaft bolt hubs.
Check belt pulley on the crankshaft is installed in front of the projection on the case of the mechanism of timing (Fig. 2.186).
In this position number 1 cylinder cams are located before TDC (both cam facing outwards).
Install special tool KM-952. (3)
While continuing to rotate the shaft in the direction of rotation of the engine crankshaft hub bolt to lock device KM 952.

NOTE
Rotate the crankshaft slowly and smoothly.

In this position, the label on the belt pulley of the crankshaft must be aligned with the projection on the case of the mechanism of timing (see Figure 2.203).
Set a special device on the camshaft 953 KM.

NOTE
If the device CM 953 can not be established, it is necessary to fulfill the basic ignition timing.

Gadgets KM 953 should be installed in the grooves of shaft until it stops.

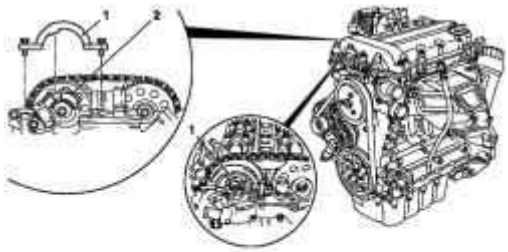


Fig. **2.204.** **Installation of a special device KM 954 on the drive sensor phase: 1 - a special device, 2 - Disk sensor phase**

Set a special device KM 954 (1) to drive the phase detector (2) and attach to the body of the mechanism of timing (see Figure 2.204).

NOTE
If the device CM 953 can not be established, it is necessary to fulfill the basic ignition timing.

Tighten the 2 screws fastening.

Remove appliances KM 954, KM 953 and KM 952.
Insert the bolt into the hole base of the cylinder block with a new sealing ring and tighten the torque 60 Nm
Remove the remains of seals and sealing surfaces clean.
Apply sealant.

NOTE
The lid of the cylinder head must be installed within 10 minutes after applying sealant (gray).

Cut off the protruding part of the construction of the shell valve timing mechanism is flush with the cylinder head / body valve timing mechanism.

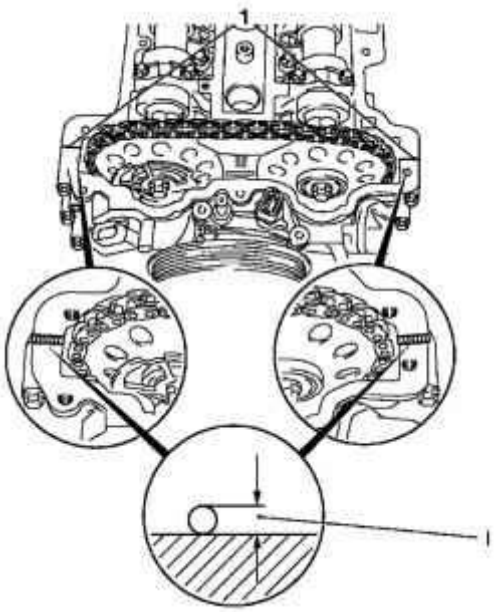


Fig. **2.205.** **Laying sealer: 1 - Sealant**

Apply the roller (gray) silicone sealant thickness of approximately 2 mm (dimension I) (Fig. 2.205).
Replace the cover cylinder head.

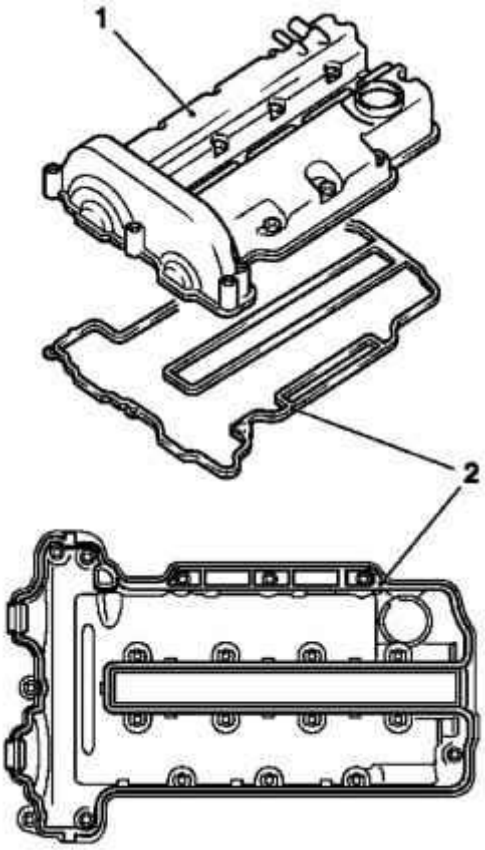


Fig. **2.206.** **Replacing Cylinder head: 1 - cover 2 - Seal**

Install the new seal in the lid of the cylinder head (Fig. 2.206).

NOTICE
You need to see the bolts for damage to the seal. If the seal is damaged, the bolt should be replaced.

Attach the lid of the cylinder head to cylinder head
Tighten the mounting bolts 13 point 8 Nm
Replace ignition module.
Connect the ignition module for spark plugs.
Tighten the 2 screws fastening point 8 Nm
Connect the wiring harness ignition module.
Attach the ignition module cover to the lid of the cylinder head.
Attach the vent hose to the lid of the engine cylinder head.
Attach the pulley to the pump coolant.
Tighten the 3 bolts fastening moment 20 Nm
Connect the wiring harnesses coolant temperature sensor, camshaft sensor and oil pressure sensor.
Secure the wiring harnesses on the cover of the cylinder head.
Connect the coolant hoses to the coolant pump and put 2 clamps.
Connect the thermostat housing to the upper coolant hose to pump coolant.
Install new O-ring.
Tighten the 3 bolts fastening point 8 Nm
Replace alternator.
Install 2 bolts and tighten the moment 35 Nm
Attach the wiring harness of the alternator.
Connect Poly-V belt tensioner.
Tighten the bolt M8 moment 20 Nm
Tighten the M10 bolts are 55 Nm

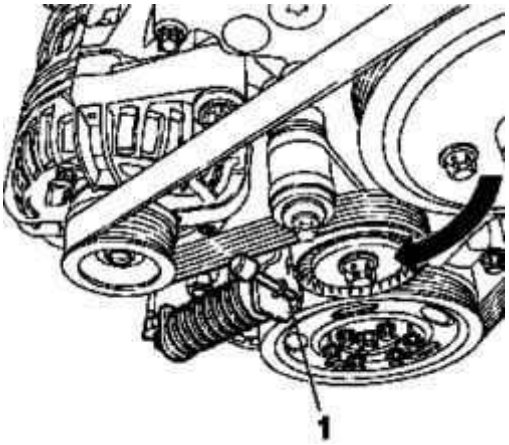


Fig. 2.179 **. Ослабление натяжителя поликлинового ремня: 1 – специальный инструмент**

Turn Poly-V belt tensioner in the direction of the arrow (Fig. 2.179), using a device KM 6131, KM-6130, install a device.
Replace Poly-V belt. Replace Poly-V belt.
Pay attention to the direction of rotation and position of the belt.
Squeeze the Poly-V belt tensioner device KM 6131.
Loosen the tensioner Poly-V belt. Loosen the tensioner Poly-V belt.
Attach the support damping engine block to the hull valve gear / cylinder block.
Tighten the 3 bolts fastening point 50 Nm
Install the flywheel. Install the flywheel.
Lock the flywheel using a device KM 652.
Clean the threads on the crankshaft.
Use new bolts. Use new bolts.
Tighten the 6 bolts fastening point 35 Nm, Dauvergne on + 30 °.
Attach the clutch.
Attach the oil baffle plate to the base of the cylinder.
Tighten the mounting bolts 8 point 8 Nm
Install oil pan.
Install a new oil pan gasket.
16 Tighten the mounting bolts moment 10 Nm
Top up the engine oil.
Check the engine oil and adjust if necessary.

Remove the engine from the shipyard.
Attach the manual gearbox to the engine.
Install engine.

Checking the axial free motion of the crankshaft

NOTE
The test is conducted with a liner installed and removed the flywheel. Crankshaft freely installed in the engine block.

Measure the axial clearance.

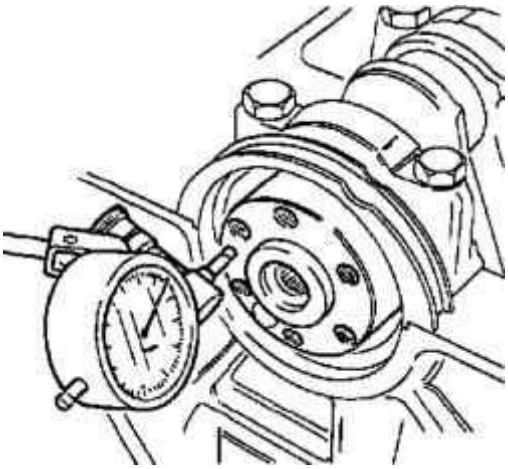


Fig. **2.207.** **Measurement of the axial clearance of the crankshaft**

Set the indicator type guard in front of the front contact surface of the crankshaft (Fig. 2.207).
Measure the axial clearance by moving the crankshaft.
Permissible axial clearance: from 0,100 to 0,202 mm.
Checking roundness of crankshaft

NOTE
Crankshaft removed and placed freely in the cylinder block

Disconnect the base of the cylinder block.
12 Loosen the mounting bolts M6.
10 Loosen the mounting bolts M8.
Install LED watch type opposite the central neck.

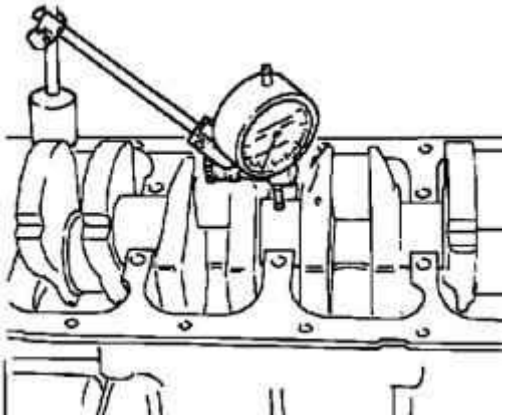


Fig. **2.208.** **Measurement of roundness of the clearance of the crankshaft**

Measure the roundness turning the crankshaft (Fig. 2.208).
Allowable roundness: 0,03 mm.
Apply (gray) kremnievorganichesky sealant.

NOTE
After drawing kremnievorganicheskogo sealant (gray) base of the cylinder block should be installed within 10 minutes.

NOTICE
Do not apply sealer roller kremnievorganicheskogo (gray) in the slots or on the inner edge. Apply silicone sealant roller (gray) on the outer edge of the groove on the basis of the cylinder thickness about 2 mm.

Attach the base of the cylinder block to (tighten by hand) 22 bolts.
Use new bolts.
10 Tighten the screws on the inside (M8) moment of 25 Nm and Dauvergne at +60 °.
12 Tighten the bolts (M6) outside the point of 10 Nm and Dauvergne at +60 °.

Removing and installing cylinder head (engine 2.0 l)

Withdrawal

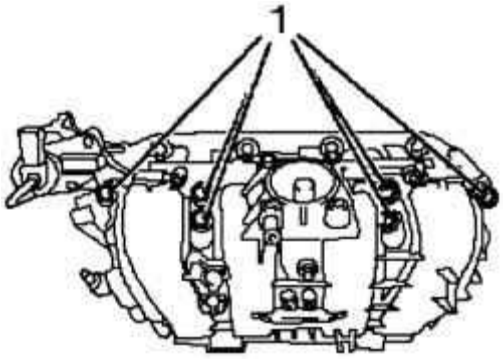


Fig. **2.209.** **Bolts fastening intake manifold: 1 - screw fixing**

Separate the intake manifold from the cylinder head. To do this, loosen the 6 mounting bolts (Fig. 2.209).
Remove the seal.
Clean the sealing surfaces.
Separate chain tensioner from the cylinder head.
Unscrew the 2 screws fastening.
Disconnect the oil pressure sensor on the cylinder head.
Disconnect the exhaust gas recirculation valve from the cylinder head.
Loosen the 4 bolts fastening.
Remove the spark plug with a special tool KM-194-E.
Check the label before the dismantling of the camshaft bearing caps.
Camshaft drive exhaust valves, the identification of: 1-3-5-7-9.
Camshaft drive intake valves, identification: 2-4-6-8-10.
Remove the camshaft drive exhaust valves.

NOTE
When otvorachivanii camshaft bearing caps, provide a smooth transition from the camshaft bearing.

Loosen the camshaft bearing caps gradually on 1/2-1 turnover.
Loosen the mounting bolts 10.
Remove the camshaft bearings.
Put in the correct order.
Remove the camshaft drive exhaust valves
Loosen the camshaft bearing caps gradually on 1/2-1 turnover.
Loosen the mounting bolts 10.
Remove the camshaft bearings, put in the correct order.
Remove the camshaft drive the intake valves
Remove the valve tappets and hydraulic tappets from the cylinder head.

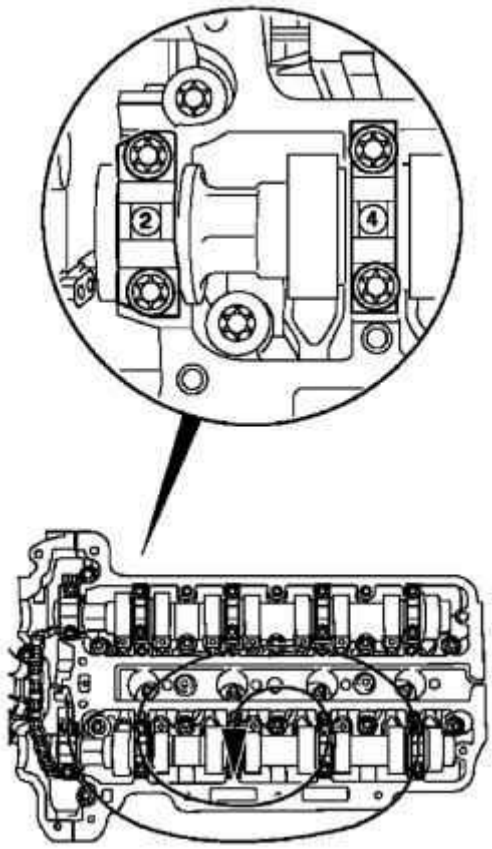


Fig. **2.210.** **Order untwisting the mounting bolts camshaft bearing caps**

Place shot tappets and hydraulic tappets apart in the sequence of withdrawal

Setting
Clear all withdrawn items.
Set tappets and hydraulic tappets in the cylinder head.
Cover the surface friction of clean engine oil.
Coat the camshaft bearing lubricating paste (gray).
Install camshaft drive the intake valves.
Cover the surface friction of the lubricant paste (gray).
Install camshaft drive intake valves

NOTE
Install camshaft so that the cams of the cylinder number 1 has been in the position of TDC ignition (cams directed outwards).

NOTICE
Check the label and location.

Install camshaft bearing cap.

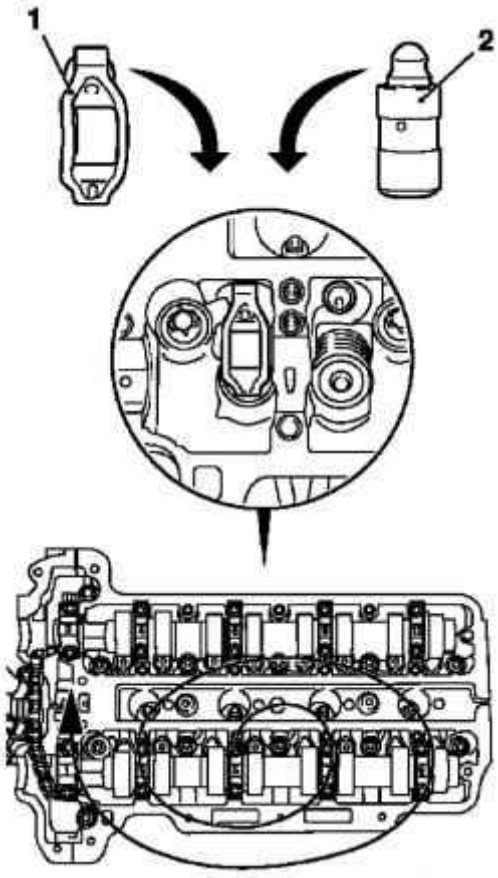


Fig. 2.211. **The order of tightening the mounting bolts caps camshaft bearings**

NOTE
Tighten bolts gradually in a spiral, starting from the center (Fig. 2.211).

Tighten the bolts 10 point 8 Nm
Install camshaft drive exhaust valves.
Cover the surface friction of the lubricant paste.
Install camshaft drive exhaust valves

NOTE
Install camshaft so that the cams of the cylinder number 1 has been in the position of TDC ignition (cams directed outwards).

Install camshaft bearing cap.
Replace the cover camshaft bearings.

NOTE
Tighten bolts gradually in a spiral, starting from the center.

Tighten the bolts 10 point 8 Nm
Replace the spark plugs in the cylinder head using a special tool KM-194-E, tighten the moment 25 Nm
Attach the exhaust gas recirculation valve to the cylinder head.
Use a new gasket.
Tighten the 4 bolts fastening point 8 Nm
Attach the oil pressure sensor to the cylinder head and tighten the moment 20 Nm
Use new O-ring.
Attach the chain tensioner to the cylinder head.
Tighten the 2 screws and tighten the mounting point 8 Nm
Attach the intake manifold to cylinder head
Install 4 new o-rings.
6 Tighten the mounting bolts and tighten the moment 10 Nm

Removing and installing cylinder head (engine 1,4-1,6 l)

Withdrawal

Open the hood

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

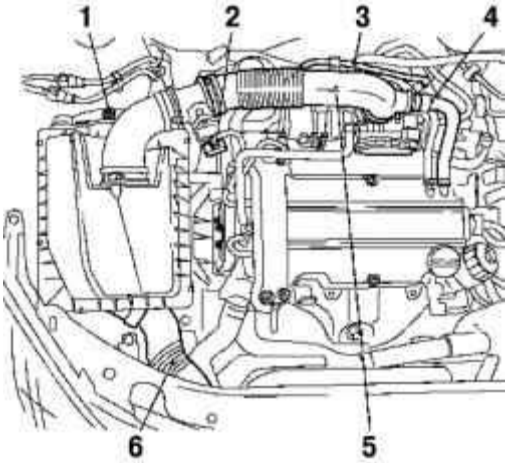


Fig. **2.212.** **Components, shooting in the dismantling of the air filter: 1 - screw fixing the lower rubber support, 2 - wiring harness mass air flow sensor, and 3 - line of ventilation of the fuel tank, 4 - hose, ventilation motor, 5 - air intake hose, 6 - inlet pipe**

Remove the air filter housing (Fig. 2.212).
Disconnect the wiring harness sensor mass air flow.
Disconnect the fuel tank ventilation line.
Disconnect the ventilation hose from the engine air intake hose.
Removing the clamp, disconnect the hose from the air intake throttle pipe.
Removing the clamp, remove the air filter housing.
Loosen the screw fixing the lower rubber support and unplug it.
Disconnect the inlet pipe.

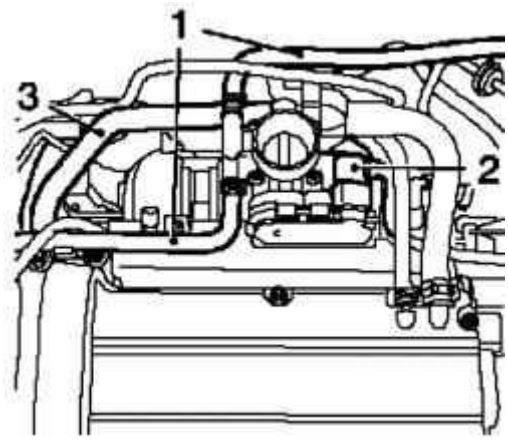


Fig. **2.213.** **Removal of cooling nozzles to throttle: 1, 3 - schlangi coolant 2 - connector wiring harness throttle tube**

Disconnect the wiring harness connectors throttle tube (Fig. 2.213).
Disconnect the coolant hoses from the throttle tube.
Place the bottom of the container for drainage.
Remove the 2 clamps.
Disconnect the coolant hose.

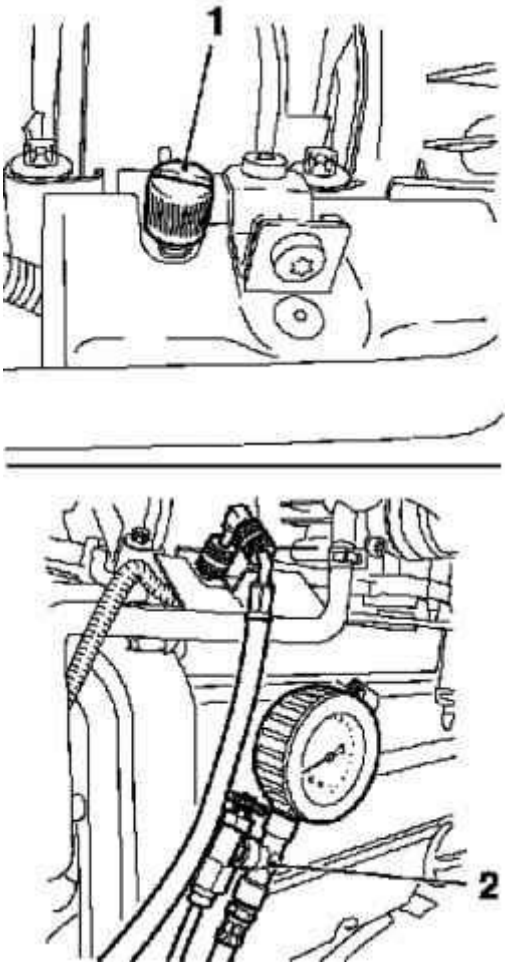


Fig. **2.214.** **Reset the pressure in the fuel system: 1 - the test socket, 2 - a special tool**

Reset the fuel pressure with a special tool KM-J-34730-91 through the test socket to loosen the protective cover of the test connections (Fig. 2.214).
Collect withdrawing fuel in a suitable container.
Observe safety rules and requirements of local legislation

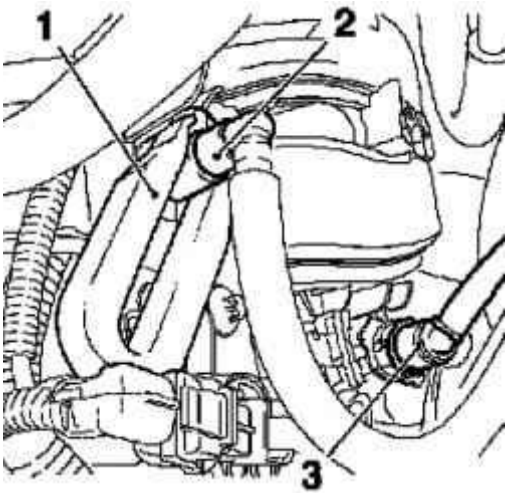


Fig. **2.215.** **Removing the fuel line and vacuum line: 1 - a special tool, 2 - feeding the fuel line, 3 - vacuum brake booster line**

Disconnect the fuel line feeding from the fuel rail with a special tool KM 796 (Fig. 2.215).
Disconnect the quick release coupling.
Disconnect the brake booster vacuum line from the intake manifold.
Disconnect the quick release coupling.
Disconnect the vent line from the fuel tank intake manifold.
Disconnect the wiring harness connector vent the fuel tank.
Disconnect the front exhaust pipe from the catalytic converter 3 unscrewing nuts.
Place the bottom of the container for drainage

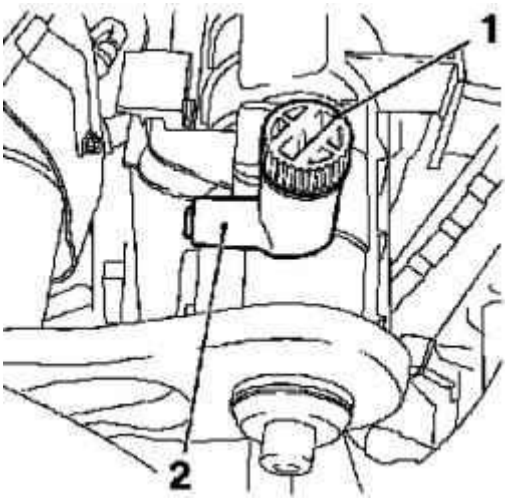


Fig. **2.216.** **Drain coolant: 1 - Drain screw coolant, 2 - drain fitting**

Attach a suitable hose to the drain fitting (2.216).
Loosen the drain screw coolant.
Drain the coolant.
Tighten the drain screw coolant.

Disconnect power supply systems and engine control
Disconnect the wiring harness connectors engine control module.
Disconnect the fuse.
Disconnect the 2 wires mass by unscrewing 2 nuts.
Disconnect the wiring harness plugs 6 engine: cap, ignition module, sensor oil pressure, coolant temperature sensor, camshaft sensor.

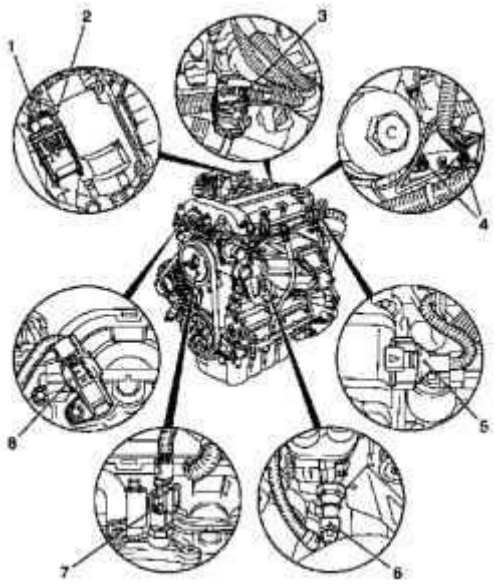


Fig. **2.217.** **Disconnect power supply systems and engine control: 1 - connector wiring harness engine control module, 2 - fuse, 3 - zalushka 4 - the mass of wire, 5 - plug plug ignition module 6 - cap connector oil pressure sensor, 7 - plug connector sensor coolant temperature, 8 - plug connector camshaft sensor**

Release the wiring harness.

Remove the thermostat housing from the coolant pump, 3 unscrewing bolts.

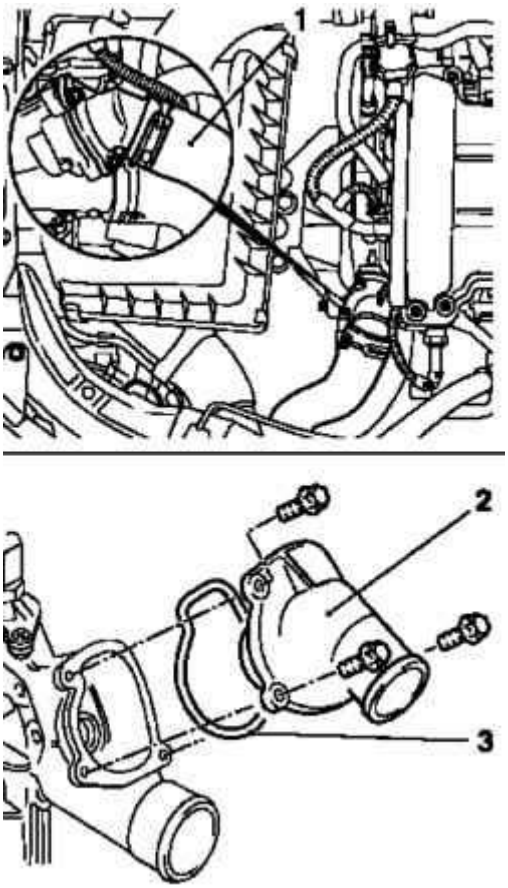


Fig. **2.218.** **Removing the thermostat housing: 1 - coolant hose, 2 - body thermostat, 3 - gasket**

Remove the gasket.

Disconnect the coolant hose from the radiator.

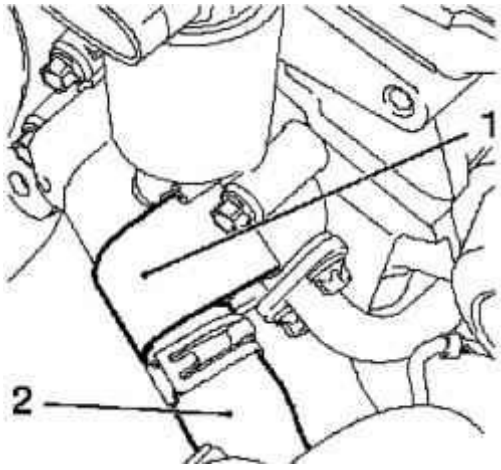


Fig. **2.219.** **Disabling the cooling of the exhaust gas recirculation valve: 1 - exhaust gas recirculation valve, 2 - hose coolant**

Disconnect the coolant hose from the valve exhaust gas recirculation (Fig. 2.219).
Loosen the clamp.
Disconnect the wiring harness of oxygen sensor.
Remove the cover bracket.
Disconnect the wiring harness from the bracket.
Remove the engine lifting bracket by unscrewing 2 screws fastening.
Loosen the heat shield.
Unscrew the 2 screws.
Remove the guide tube probe for measuring the oil level.

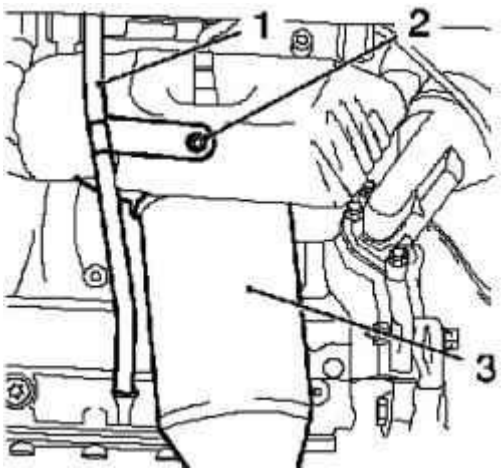


Fig. **2.220.** **Removing the tube probe for measuring the oil level: 1 - guide tube probe for measuring the oil level 2 - bolt krepelniya 3 - intake manifold**

Disconnect the exhaust manifold.

Loosen the screw.
Remove the exhaust manifold by unscrewing 9 bolts.

Removing the oil filter
Remove the lid from the oil filter housing.
Remove the oil filter element.
Remove the oil filter housing from the cylinder by unscrewing 3 bolts.
Remove the gasket.
Clear Poly-V belt.
Mark direction of rotation.
Turn Poly-V belt tensioner clockwise using a device KM 6131.

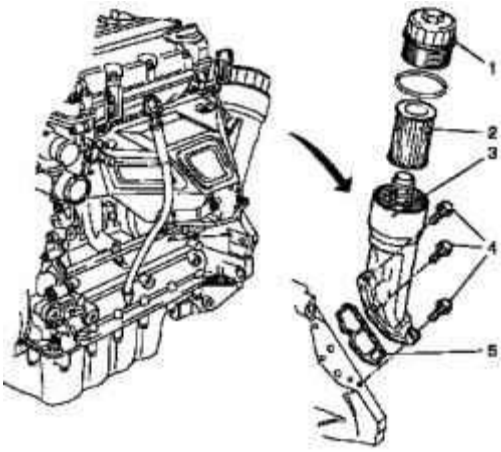


Fig. **2,221.** **Disconnect power supply systems and engine control: 1 - cap 2 - filter element 3 - the oil filter housing, 4 - bolts fastening, 5 - gasket**

Set device KM-955-2.

Loosen the tensioner Poly-V belt.
Remove the belt pulley pump coolant from the coolant pump, 3 unscrewing bolts.
Remove the casing valve timing mechanism.
Loosen 4 bolts mounting the pump coolant.
Loosen the 5-bolt mounting Corps timing mechanism.
Disconnect the sensor from camshaft timing mechanism housing by unscrewing bolts.
Disconnect the ventilation hose from the cover of the engine cylinder head.

Removing the ignition module
Remove the wiring harness ignition module.
Remove the ignition module with the lid of the cylinder head in the direction of the arrow
Loosen the two bolts.
Separate the ignition module from the spark plug with a special tool KM 6009.
Remove the lid of the cylinder head from the cylinder head by unscrewing the mounting bolts 13.
Remove the cap base of the cylinder block.

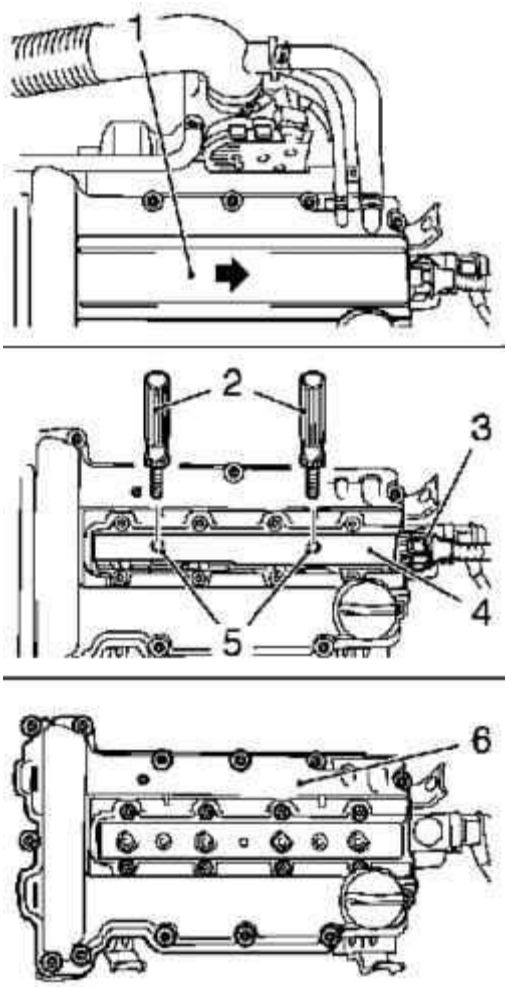


Fig. 2.222. **Components shooting in dismantling the ignition module: 1 - ignition module cover, 2 - a special tool; 3 - Ignition module wiring harness, 4 - ignition module 5 - mounting screws, 6 - cylinder head cover**

Lower the car.

Install the first piston cylinder in position TDC (the ignition)
Install special tool KM-952. Smoothly rotate the crankshaft until the special tool the CM 952 does not reach the stop.
Check belt pulley on the crankshaft must be aligned with the projection on the case of the mechanism of timing.
Remove the guide from the cylinder head by unscrewing 2 screws fastening.
Remove the camshaft gears by unscrewing 2 screws fastening.
Hold open spanner for hexagon camshaft.
Put an asterisk camshaft on one side with a chain timing mechanism in the body.

Removing the cylinder head

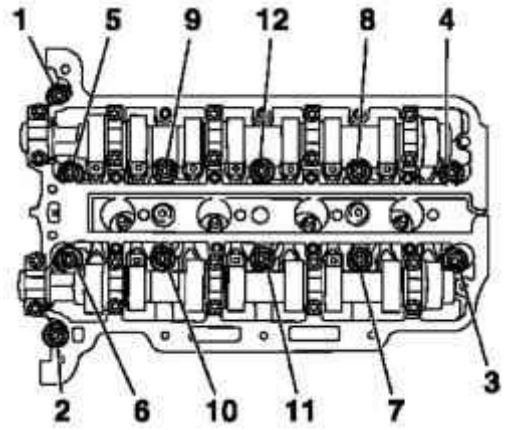


Fig. 2.223. **Order otvorachivaniya bolts fastening the cylinder head**

Loosen the bolts fastening the cylinder head in the manner shown in Figure 2.223.
Remove 12 bolts of 90 °.
Remove 12 bolts of 180 °.
Remove the cylinder head
Start a chain tensioner for tire tension.
Set cylinder head on the bars.
Remove the cylinder head gasket.
Remove the gasket body timing mechanism.
Cut off the edge of the sealing elastomer (size II) construction of housing arrangement for gas distribution inside to the outside of a sharp knife and make flush with the cylinder block

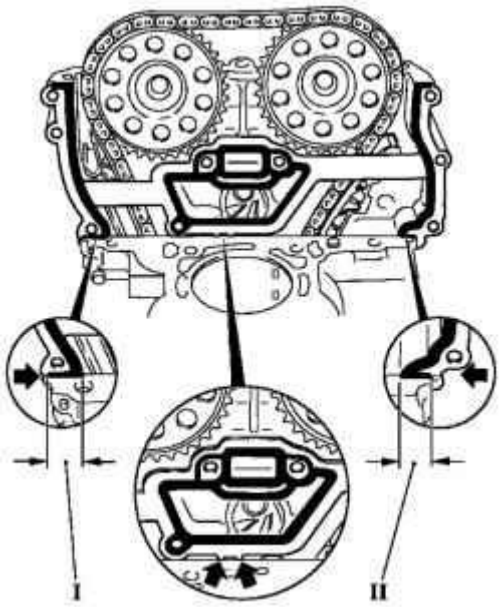


Fig. **2.224.** **Gasket valve timing mechanism**

Carefully bend the gasket at the points bending (arrows) (Fig. 2.224).
Remove the remains of seals and sealing surfaces clean

NOTE
Provide debris removal elastomer sealing edge of the space between the hull valve gear and cylinder block, as well as the timing mechanism of the case.

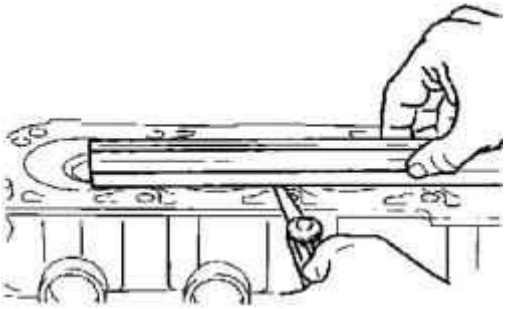


Fig. **2.225.** **Check the cylinder head**

Check the cylinder head and cylinder block for flatness (Fig. 2.225).
When testing or repairing the cylinder head, disconnect all external elements of the cylinder.
Install the cylinder head gasket.

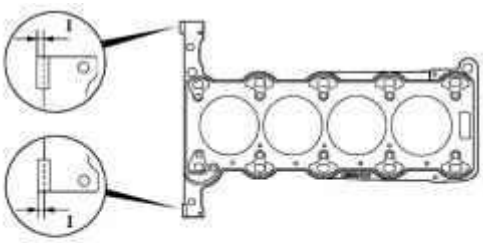


Fig. **2.226.** **Apparatus cylinder head gasket**

Cut off the protruding parts of elastomer (size I) by the mechanism of timing (see Figure 2.226).

Setting

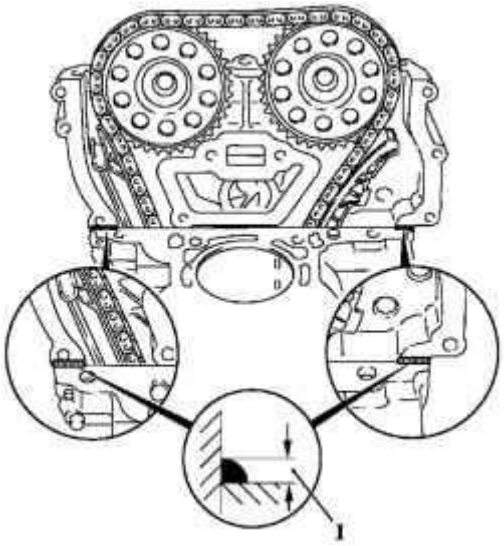


Fig. **2.227.** **The experimental setup is laying on the hull valve timing mechanism**

Apply sealer roller kremnievorganicheskogo (gray) on the hull valve gear / cylinder block thickness of approximately 2 mm (size I) (Fig. 2.227).

NOTE
The head of the cylinder should be installed within 10 minutes after application of the silicon (gray) sealant and install bolts Corps timing mechanism.

Install a new cylinder head gasket on the cylinder block.
Labeling TOP must be at the top.
Click on the gasket in the application of the silicon (gray) sealant.

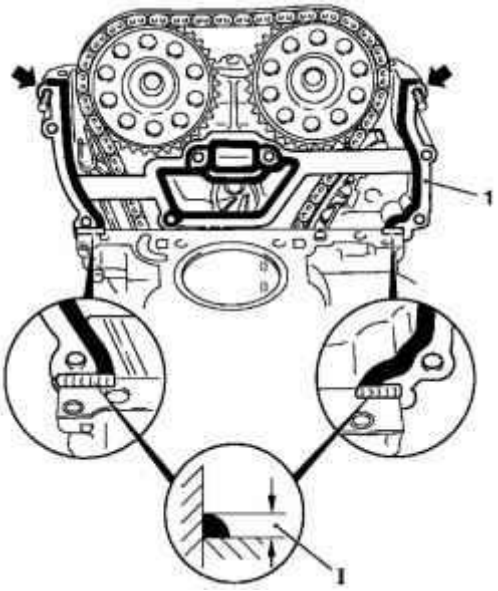


Fig. **2.228.** **The experimental setup is laying on top of body mechanism Timing: 1 - upper gasket, 2 - tourniquet**

Install the upper body pad valve timing mechanism (Fig. 2.228).
Set 2 (arrows) bolt housing timing mechanism.
Install new gasket on the housing mechanism timing.
Fasten the bolts.
Click on the gasket in the application of the silicon (gray) sealant.
Apply roller kremnievorganicheskogo sealant (gray) on the hull valve gear / cylinder block thickness of approximately 2 mm (the size I).

Set cylinder head
Enter a special tool KM-955-1 through a hole in the hull valve timing mechanism.
Enter the timing chain on the tire tension.
Insert the pin in the guide.
Secure the cylinder head.
Tighten the bolts fastening the new cylinder head for a few turns.
Install casing timing mechanism.

NOTE
Adjust the position of the cylinder head light rubber hammer blows in the direction of the shell valve timing mechanism.

Tighten the bolt 3 point 8 Nm
12 Tighten the mounting bolts of the cylinder head moment of 25 Nm, Dauvergne at +60 ° +60 ° +60 °.

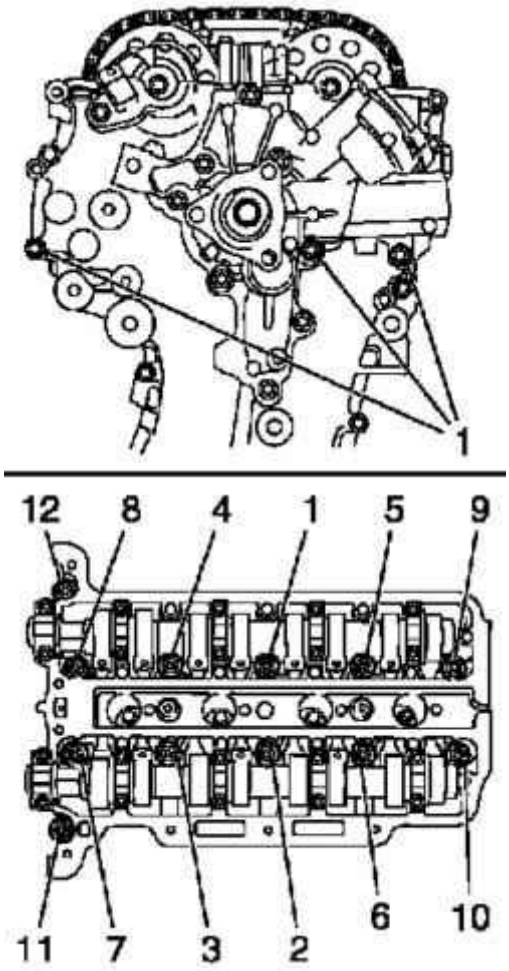


Fig. **2.229.** **The order of tightening the bolts fastening the cylinder head**

Pay attention to the proper tightening sequence (Fig. 2.229).
Install the remaining components is carried out in reverse order of removal.

2.5. Inspection, and repair operations components of the mechanical part of the engine

Checking the gap in the connecting rod bearings

Measurement

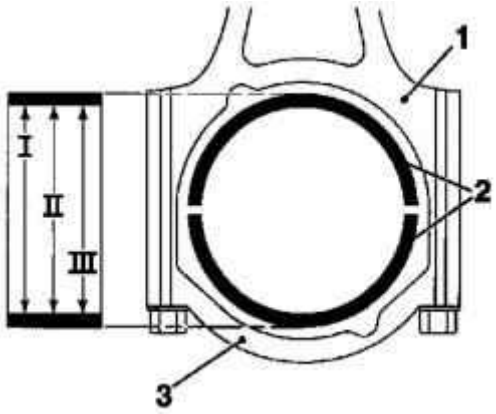


Fig. **2.230.** **Replacing some types of bearings: 1 - connecting rod 2 - connecting rod bearing inserts, and 3 - connecting rod bearing cap**

Replace the cover connecting rod bearings (3) with the connecting rod bearing inserts (2) on connecting rod (Fig. 2.230).

NOTE
Do not change the cover connecting rod bearings and connecting rod during installation, and ensure the purity of the contacting surfaces

NOTE
The old bolts can be reused for testing.

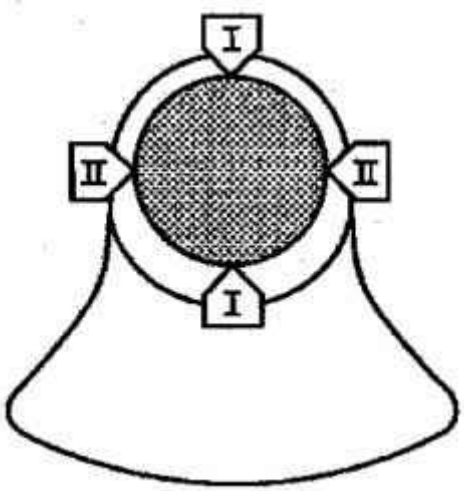


Fig. **2.231.** **Points of measurement of diameter connecting rod**

Tighten the 2 bolts moment 13 Nm, then Dauvergne at +60 ° +15 °.
The diameter of the connecting rod center is measured with an internal micrometer in positions I, II, and arithmetic. Formula and calculate the diameter of connecting rod bearing: I + II + III.
I - 43, 026 mm.
II - 43, 027 mm.
III - 43, 031 mm.
129.084 mm: 3 = 43.028 mm.
The average inner diameter of connecting rod bearings - 43.028 mm.
Neck diameter shaft connecting rod bearing is measured by an external micrometer in positions I, and II. Formula and an example to calculate the diameter of the neck of the shaft connecting rod bearing:
I + II / 2;
I - 42,977 mm + II - 42,985 mm.
85.962 mm: 2 = 42.981 mm.
The average diameter of the neck shaft connecting rod bearings - 42.981 mm.
Identify the gap in the connecting rod bearings, using the average inner diameter of the connecting rod bearings, and the average diameter of the neck shaft connecting rod bearing.

The average inner diameter of connecting rod bearing: 4,028 mm.
The average diameter of the neck shaft connecting rod bearing: 2,981 mm.
Clearance in connecting rod bearings: 0,047 mm
Calculated gap in connecting rod bearings is equal to 0,047 mm in this example. Allowable gap connecting rod bearing is from 0,013 mm to 0,061 mm.

Checking the gap in the connecting rod bearings

NOTE
The inquiry is made an instrument for measuring gaps in the bearings.

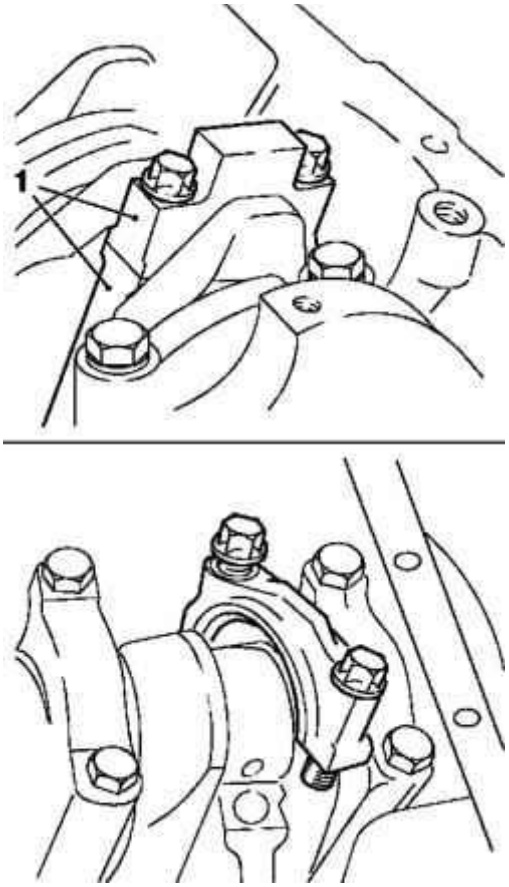


Fig. **2,232.** **Installation position covers types of bearings: 1 - cover**

Check the loading position, connecting rod bearing caps (Fig. 2.232).
Disconnect the connecting rod bearing inserts and connecting rod bearing cap by unscrewing 2 screws fastening.
Measure the clearance in the connecting rod bearings, using the tool to measure clearances in bearings (plastic wire).

NOTE
Tool for measuring gaps in the bearings is available for different ranges of measurements.

Cut the wire so that its length is consistent with the width of the connecting rod bearing.

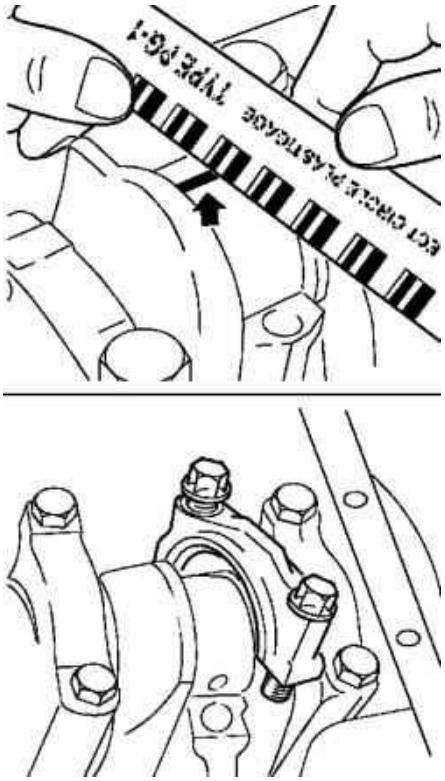


Fig. 2.233. **Installing wire: 1 - cover**

Lay the wire along the axis between the root neck of the crankshaft connecting rod bearings and connecting rod bearing liner (Fig. 2.233).

Replace the cover connecting rod bearings

NOTE
To wire did not break when removing the lid connecting rod bearings, remove the grease from the crankshaft crank shaft and lightly grease the liner connecting rod bearings - do not turn the crankshaft.

Tighten the 2 bolts moment 13 Nm Dauvergne at +60 ° and +15 °.

Remove the connecting rod bearings, unscrew the 2 screws.

NOTICE
Do not confuse the decimal and metric information scale of measurement.

Measure the width of the flattened section of plastic wire using a measuring scale.

Allowable gap in the connecting rod bearings: from 0,013 mm to 0,061 mm.

Install the liner connecting rod bearings and connecting rod bearing cap.

Clean the crankshaft crank shaft bearings and connecting rod bearing liner.

Lightly grease the bushings connecting rod bearing.

Tighten the 2 bolts moment 13 Nm and Dauvergne at +60 ° and +15 °.

NOTICE
Always use screws M6, 5. Use new bolts.

Replace connecting rod bearings

Remove the oil pan.

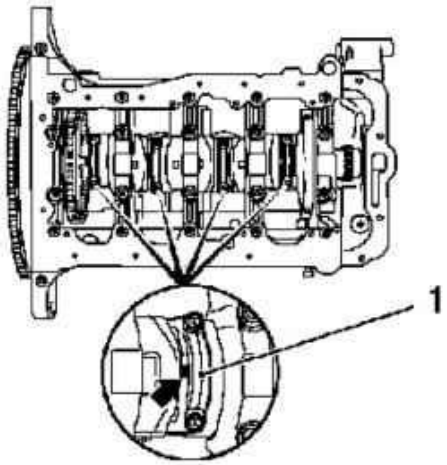


Fig. 2.234. **The order covers the installation types of bearings: 1 - connecting rod bearing caps**

Check the order covers connecting rod bearings (Fig. 2.234).
Remove the lid connecting rod bearings of connecting rods.

NOTE
Surfaces of contact rods and connecting rod bearing caps are selected individually, and therefore they can not be rearranged or prevent their injuries. to avoid damage, do not put rods and caps on the contact surface.
Pay attention to the loading position - hot flashes (arrow) on the covers of some types of bearings are pointing in the direction of the gearbox.

8 Loosen the mounting bolts.
Clear all sites, check and replace if necessary.
Install new connecting rod bearings bushings and cover their motor oil.
Attach the lid to the connecting rod bearings connecting rod.
8 Tighten the mounting bolts moment 13 Nm and Dauvergne at +60 ° and +15 °.
Use new bolts.

NOTICE
Always use screws M6, 5.

Replacing piston rings

Remove the piston rod.

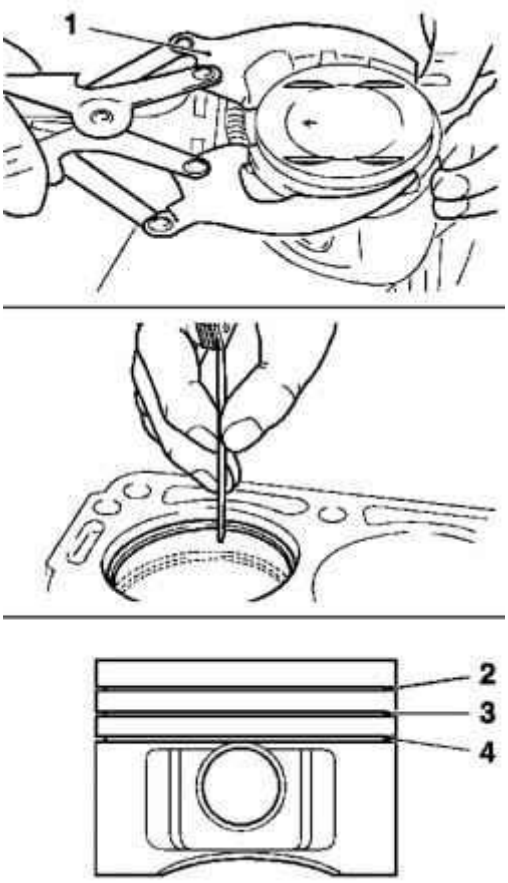


Fig. **2.235. Removal of piston rings: 1 - puller; 2 - compression ring of rectangular cross section 3 - conical compression ring, 4 - maslosemnoe ring**

Remove the piston ring pliers to remove the piston rings (Fig. 2.235).
Clean the ring grooves.
Clean the grooves of piston rings compression rings of rectangular cross section, conical compression ring and the ring maslosemnogo using broken piston ring.
Check gap.
Install piston rings into the cylinder.
Check the clearance probe.

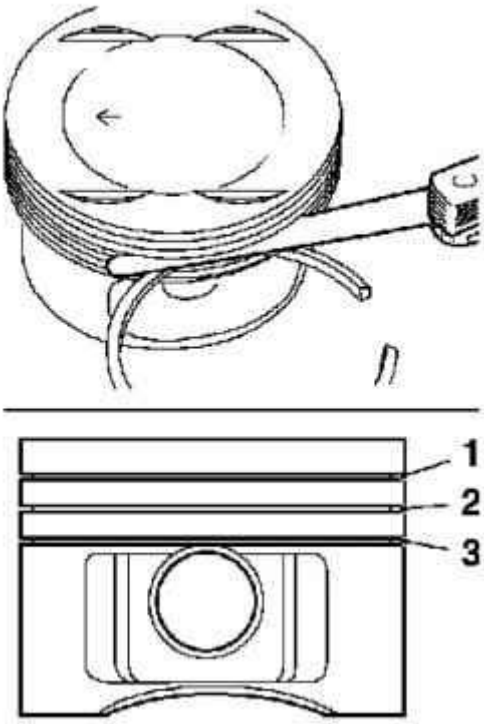


Fig. **2.236.** **Check clearance of piston rings: 1 - compression ring of rectangular section, 2 - conical compression ring 3 - maslosemnoe ring**

Check vertical clearance of a piston ring groove in a piston ring probe (Fig. 2.236).
Compression ring of rectangular section.
Conical compression ring.
Maslosemnoe ring.
Install piston rings.
Install piston rings in annular grooves, special tongs.
Marking «TOP» should be on top.
Set clearances piston rings.
The first piston ring (right ring) in position 1.
The second piston ring in position 4.

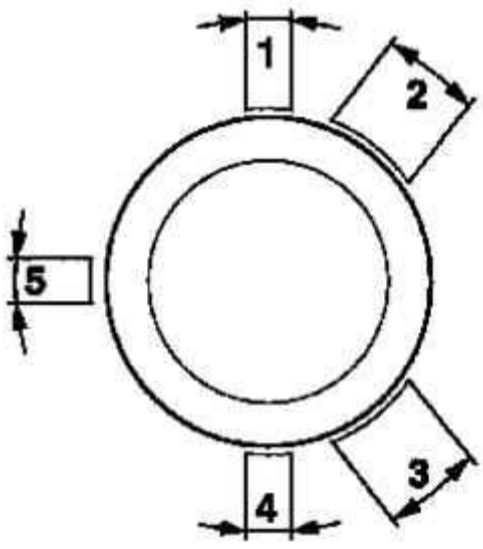


Fig. **2.237.** **Experimental setup of piston rings**

Intermediate ring maslosemnogo ring in position, drives maslosemnogo ring in position and / or 3 (Fig. 2.237).

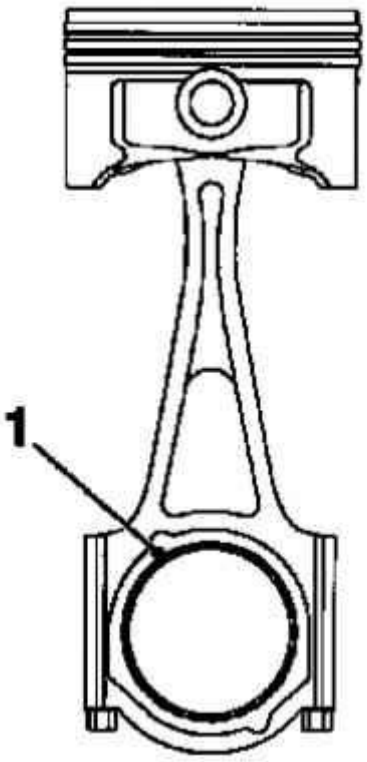


Fig. **2.238.** **Situation of the tide at the cranks**

The rush to the cranks should be turned in the direction of transmission (Fig. 2.238).

Replacing the piston rod with

NOTE
If one of these two elements must be replaced, replace all the nodes in the block (piston, piston rings, piston pin and connecting rod) new.

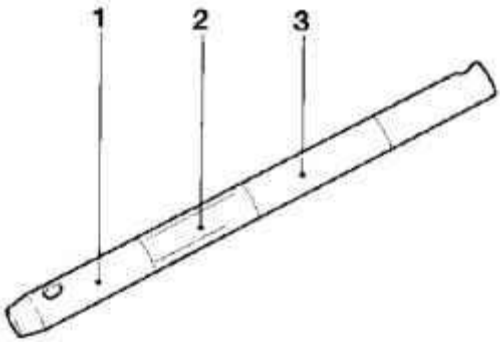


Fig. **2.239.** **Build a special tool**

Assemble guide bolt using special instruments KM-634-6 (1), KM-634-7 (2) and KM-634-5 (3) (Fig. 2.239).

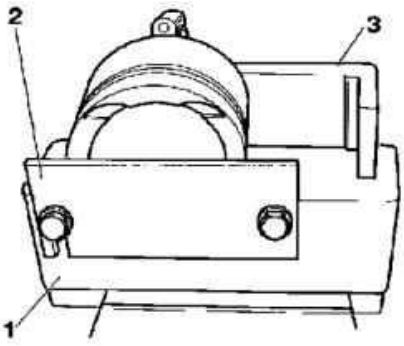


Fig. **2.240.** **Special tools for assembling the piston**

Install a new piston in the slot KM-634-1 (1) (Fig. 2.240).

NOTE
Hole piston pin must be placed horizontally.

Set KM-634-4 (3) of KM-634-1 (Fig. 2.240).
Tighten the bolts by hand.
Securely fasten the piston, using the KM-634-2 (2) that he could not shift (Fig. 2.240).
Determine the depth of the pressing piston pin.
Zapressuyte node (1), consisting of the KM-634-6, KM-634-7, and KM-634-5 hole in the piston pin and connecting rod to achieve the KM-634-7 central position in the piston.

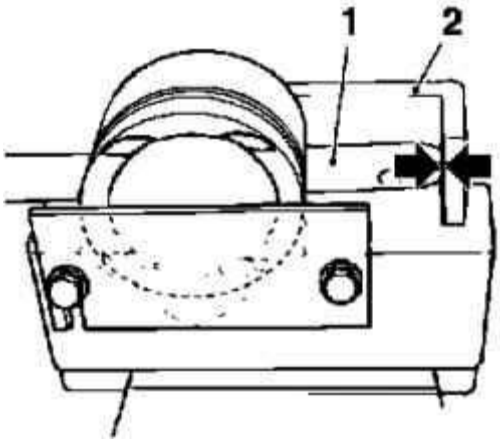


Fig. **2.241.** **Mounting node in the piston**

In this position, KM-634-4 (2) should be against the edge node (arrows) (Fig. 2.241).
Tighten bolts KM-634-4.
Remove the KM-634-7 with the guide bolt and replace the new (oiled) piston pins.
Heat a new crank in the upper part of the heating plate.
Put the upper end of connecting rod on a heating plate.

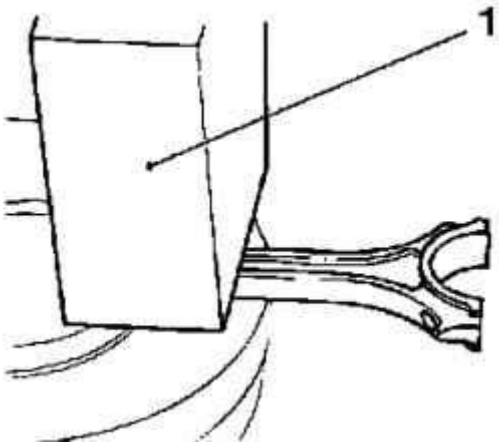


Fig. **2.242.** **Removing the heat loss through the refractory brick: 1 - firebrick**

Reduce heat loss through the refractory bricks (Fig. 2.242).
Temperature settings: from 280 ° C to 320 ° C

NOTICE
Re-machining the connecting rod is impossible, because he has no balancing pins. Observe the correct location device.

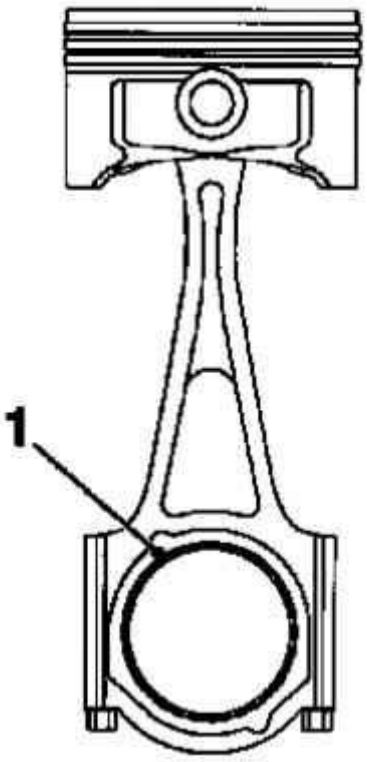


Fig. **2.243.** **Situation of the tide at the cranks**

The rush to the rods should be opposite the arrows on the bottom of the piston (Fig. 2.243).

Install piston on the piston rod with.

NOTE
Stuck piston can not be pressed - to perform the installation quickly.

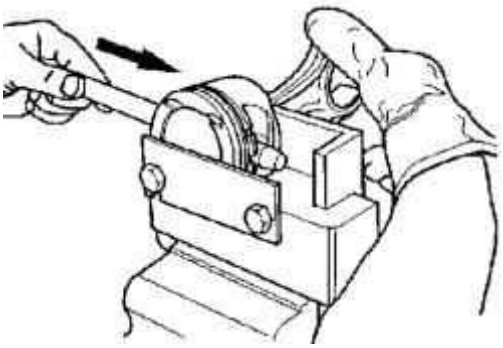


Fig. **2.244.** **Installing piston pin**

Zapressuyte unit, consisting of KM-634-6, piston pin and KM-634-5 smoothly and without delay through the hole piston pin and crank all the way into KM-634-4 (Fig. 2.244).

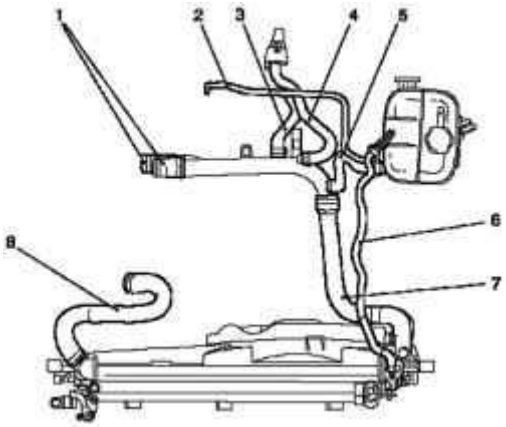


Fig. **2.245.** **The components of the cooling system (engines 1,4-1,6 l): 1 - the coolant expansion tank, 2 - connecting a hose from the expansion tank to the radiator, 3 - heater, 4 - elbow pipe of the lower radiator hose, 5 - a coupling to refrigerator exhaust gas recirculation, 6 - tube cooling exhaust gas recirculation; 7 - thermostat, 8 - relapsing hose, radiator heater, 9 - delivery hose, radiator heater, 10 - connecting a hose from the choke to the expansion tank, 11 - connecting a hose from the cooling circuit of the engine to the expansion tank**

Disconnect the KM-634-5, and KM-634-6 from the right and left sides of piston pin.

2.6. Cooling

Filling and removing air from the cooling system

Test

Always use antifreeze 1940650 / 9194431 (red). Make sure that the concentration is: 50% water and 50% antifreeze. Antifreeze not only protects all cooling system from freezing, but also protects all the washing liquid cooling parts from deposits and corrosion.

Water quality also plays an important role. Drinking water quality generally meets these requirements.

The engine may be damaged when used antifreeze is not recommended.

If the radiator, cylinder head gasket or cylinder heads were replaced, the old coolant must not be reused.

NOTICE
When replacing the coolant in cars with air conditioning: air conditioning off and install ECO mode.

Open the cooling system.

NOTICE
The cooling system is under pressure.

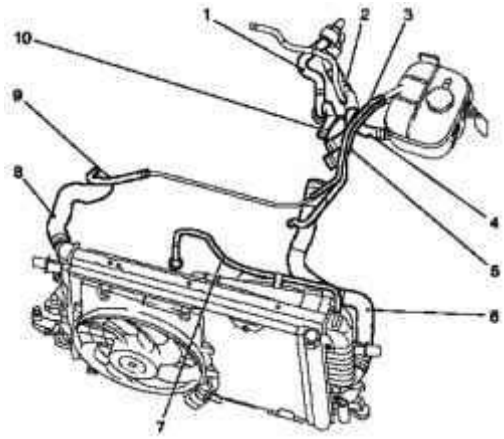


Fig. **2.246.** **The components of the cooling system (engine 2.0 l): 1 - feeding tube heater radiator, 2 - heater radiator hose-back and 3 - connecting hose between the expansion tank the coolant and thermostat housing, 4 - connecting hose between the radiator and the coolant expansion tank; 5 - relapsing hose coolant turbo 6 - elbow pipe of the lower radiator hose, 7 - relapsing turbocharger coolant hose, 8 - upper radiator hose elbow pipe, 9 - connecting hose between the expansion tank the coolant and thermostat housing, 10 - hose, electric pump coolant**

Unscrew the expansion tank coolant.

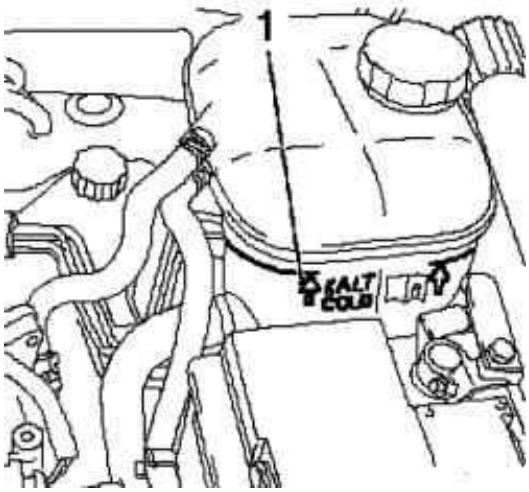


Fig. **2.247.** **Mess with coolant: 1 - Evaluation**

Fill the coolant to the lower mark the coolant expansion tank (Fig. 2.247).
Close the cooling system.
Tighten the lid of the coolant expansion tank.
Let the engine warm at 2500 min $^{-1}$ until a radiator fan.
Remove air from the cooling system.
Allow the engine to work for about 2 minutes at 2000-2500 min $^{-1.}$

NOTE
The air from the cooling system is removed through the line of withdrawal.

Stop the engine and let it cool.
Check the coolant and top up the coolant to the mark «COOL».

Checking the tightness of the cooling system

Test
Open the hood.

NOTE
Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).

Check the coolant and adjust if necessary.

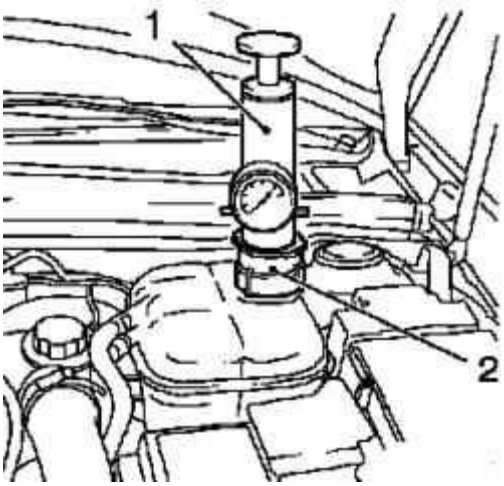


Fig. 2.248. **Installing the adapter to check: 1 - manometer, 2 - Adapter**

Install adapter KM 471 and Test Equipment for the radiator to the expansion tank (follow manufacturer's instructions) (Fig. 2.248).
Create a cooling system pressure of approximately 100 kPa (1 bar).
Remove the test equipment and close the expansion tank.
Close the hood.

Replacing the auxiliary electric fan (2.0 liter engines)

Withdrawal
Open the hood.
Disconnect the battery.
Disconnect the connection with the mass of the output mass.

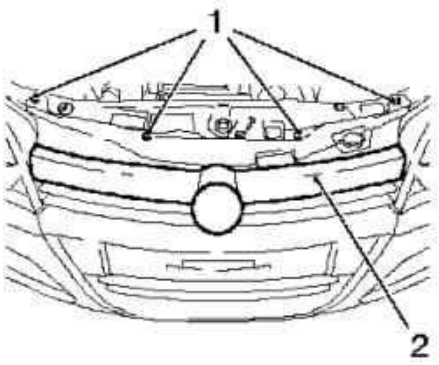


Fig. 2.249. **Removing the grille: 1 - grill, 2 - Rivets**

Remove the grille, disconnect the 4 rivets (Fig. 2.249).
Disconnect from the front facing the top.
Disconnect 5 times.

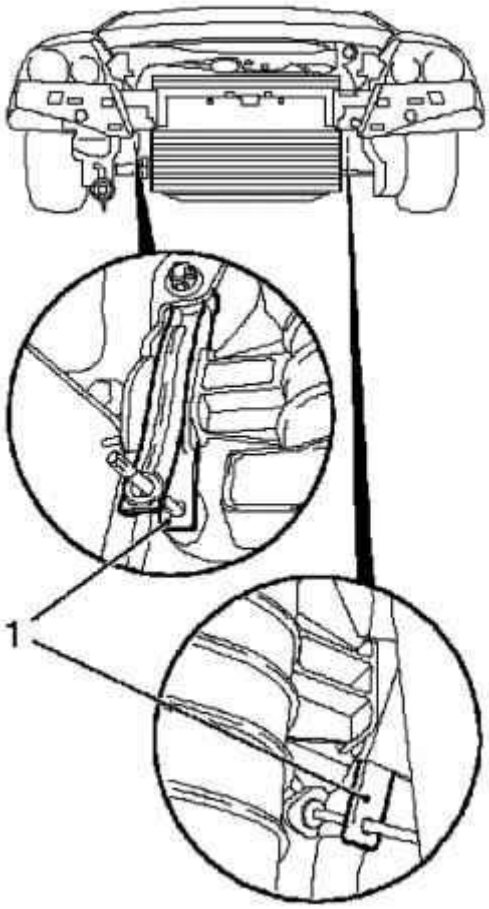


Fig. **2.250.** **Attachments to the upper radiator brackets: 1 - Brackets**

Attach the radiator to the upper bracket (Fig. 2.250).
Raise the car in half.
5 Remove the rivets.

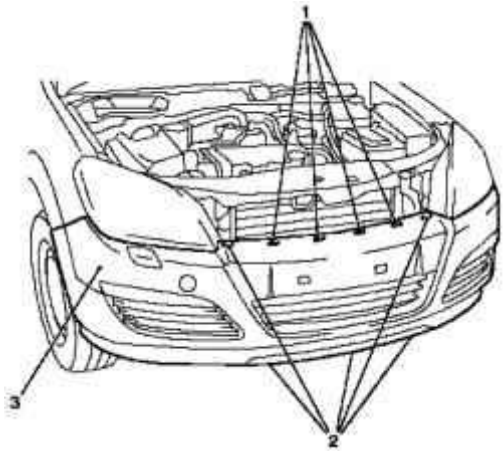


Fig. **2.251.** **Removing the grille: 1 - clamps, 2 - Rivets, 3 - Bumper**

Disconnect 4 times and remove the front bumper (see Figure 2.251).
Place the bottom of the container for drainage.
Disconnect the hose of the cleaner high pressure from the reservoir.
Disconnect the quick release coupling.
Collect the effluent.
Disconnect and remove the outdoor sensor.
Remove the auxiliary fan, to disconnect the cable clamps 5 and 2 relays.
Disconnect the wiring harness connector.
Disconnect the wiring harness.

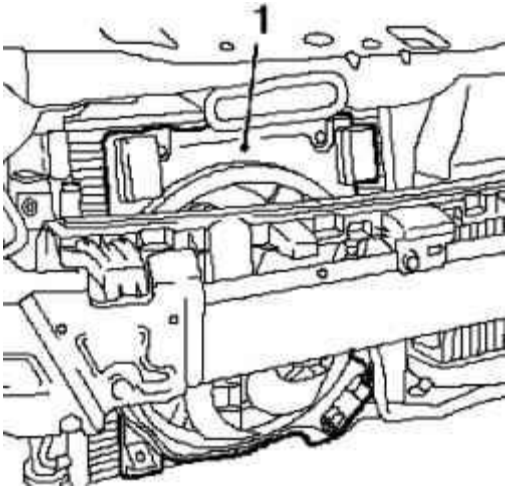


Fig. **2.252.** **Withdrawal of ventilator support: 1 - fan**

Remove the auxiliary fan from the bracket below.

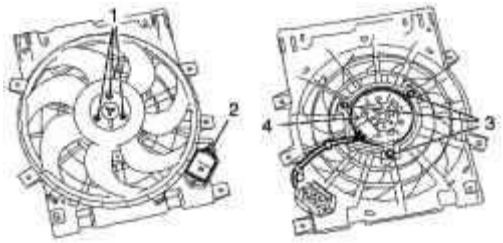


Fig. **2.253.** **Removing the motor: 1 - mounting screws, 2 - attachment bolt connector, 3 - bolts fixing electric fans, 4 - electric auxiliary fan**

Remove the electric auxiliary fan (Fig. 2.253).
Disconnect the fan impeller from the motor fan.
Loosen the 3 bolts.
Disconnect the wiring harness connector from the unit auxiliary fan.
Loosen the screw.
Disconnect the electric fan from the fan casing.
Loosen the 3 bolts.

Setting
Install electric fan.
Attach the fan motor to the chassis fan.
Connect the wiring harness to the chassis fan.
Attach the fan impeller to the electric motor fan.
Install an auxiliary fan.
Install the fan in the housing support bracket.
Attach the wiring harness.
Attach the wiring harness connector.
Attach the cable clamps 5.
Install the front bumper.
Replace the front liners in the bracket side.
Fasten outdoor sensor.
Attach the hose of the cleaner high pressure to the reservoir.
Connect the quick coupling.
Lower the car in half.
2 Remove the holder of the radiator bracket.
Install radiator grille.
Fasten the front facing of the bottom.
Connect the battery pack.
Attach connection with a mass at the conclusion of mass.
Close the hood.

Replacing the radiator (2.0 liter engines)

Withdrawal

Open the hood.
Disconnect the battery.
Disconnect the connection with the mass of the output mass.
Remove the grille, disconnect the 4 rivets.
Disconnect from the front facing the top.
Disconnect 5 times.
Attach the radiator to the upper bracket.
Raise the car in half.
5 Remove the rivets.
Disconnect 4 times and remove the front bumper.
Raise the car in half.
Place the bottom of the container for drainage.
Drain the coolant.

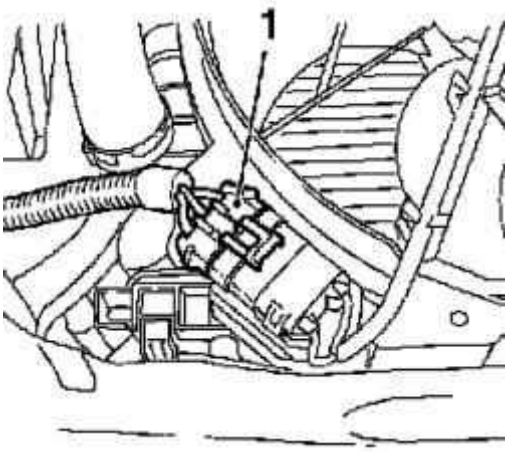


Fig. **2.254.** **Wiring harness connector from the fan case fan: 1 - connector**

Disconnect the wiring harness from the fan case fan (Fig. 2.254).
Undock the cable clip.
Remove the right bracket of the radiator, otvernuy 2 bolts fastening.

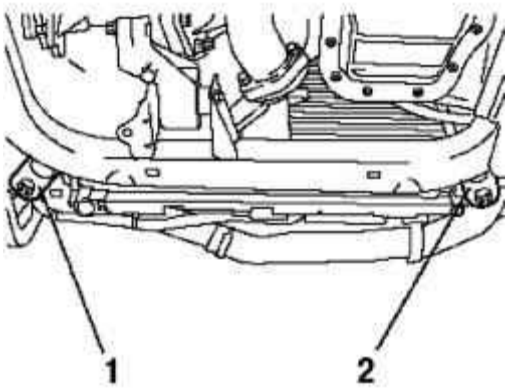


Fig. **2.255.** **Radiator brackets: 1 - right 2 - left**

Remove the left arm of the radiator, otvernuy 2 bolts fastening (Fig. 2.255).
Lower the car completely.

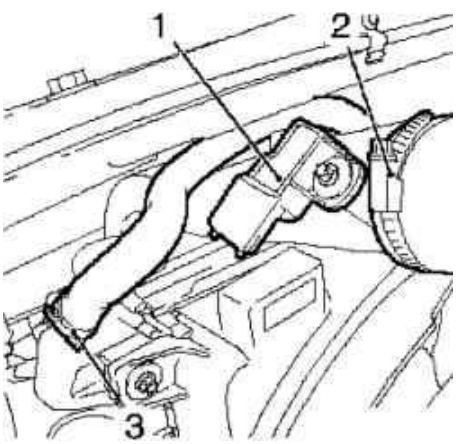


Fig. **2.256.** **Removing the boost pressure sensor: 1 - boost pressure sensor, 2, 3 - clamps**

Remove the boost pressure sensor, remove the attachment bolt (Fig. 2.256).
Disconnect the hose from the boost air intercooler.
Disconnect relapsing turbocharger coolant hose from the radiator.
Disconnect the bracket.

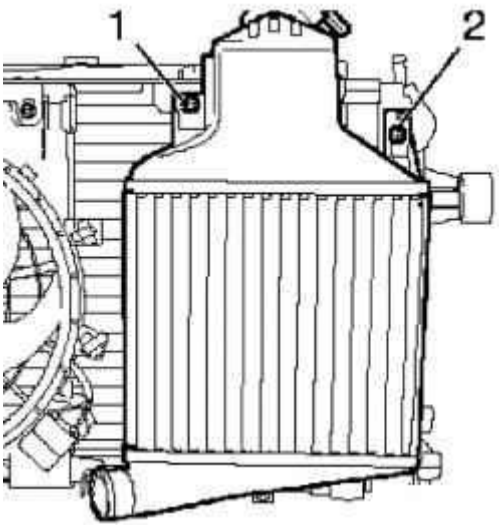


Fig. **2.257.** **Mounting the cooler air pressurization: 1 - attachment bolt, 2 - nuts**

Unplug the cooler air from the boost capacitor, unscrewing the nut and bolt attachment (Fig. 2.257).

NOTE
Module coolant is shown removed for clarity.

Tilt intercooler forward in the lower bracket.
Disconnect the fan from the radiator by unscrewing 2 screws fastening.

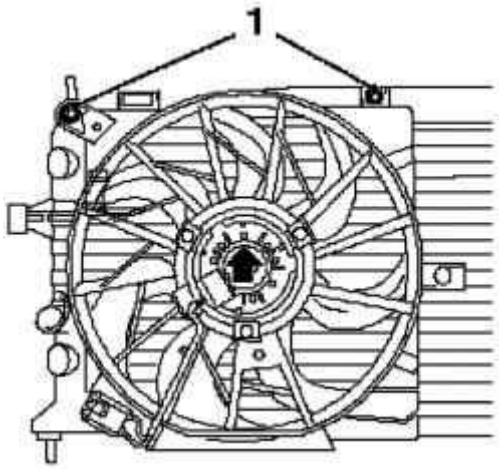


Fig. **2.258.** **Mounting the fan: 1 - bolts fastening**

Remove the fan with a car in the direction of the arrows in Figure 2.258.

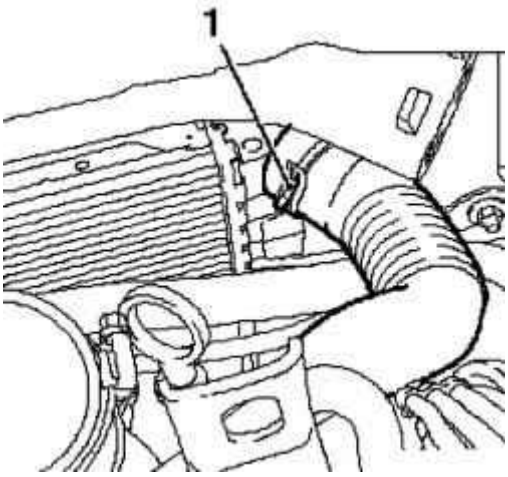


Fig. **2.259.** **Upper radiator hose: 1 - hose**

Disconnect the upper hose from the radiator by removing the clamp (Fig. 2.259).

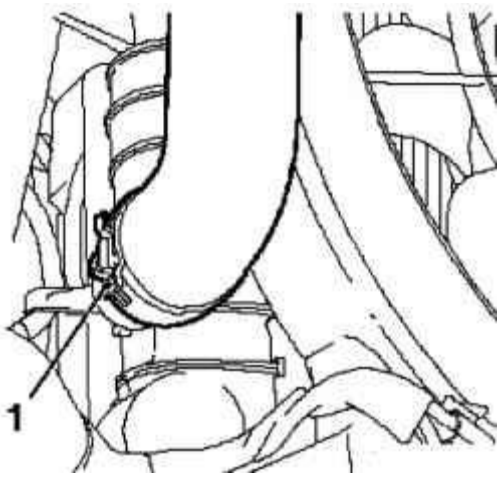


Fig. **2.260.** **Lower radiator hose: 1 - hose**

Disconnect the lower hose from the radiator by removing the clamp (Fig. 2.260).
Raise the car in half.

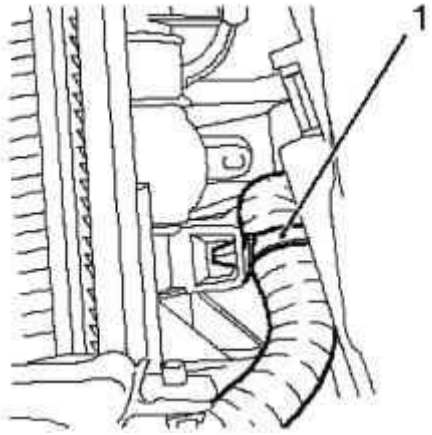


Fig. **2.261.** **Wiring harness conditioner: 1 - clamp**

Disconnect the wiring harness from the air conditioner radiator, removing the cable clamp (see Figure 2.261).

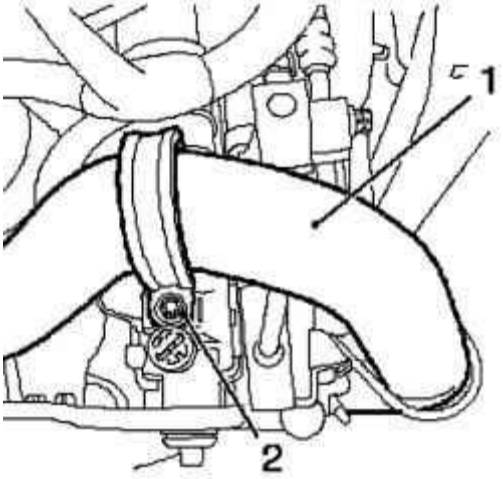


Fig. **2.262.** **Hose Air Pressurization: 1 - hose**

Disconnect the hose from the radiator air pressurization (Fig. 2.262).

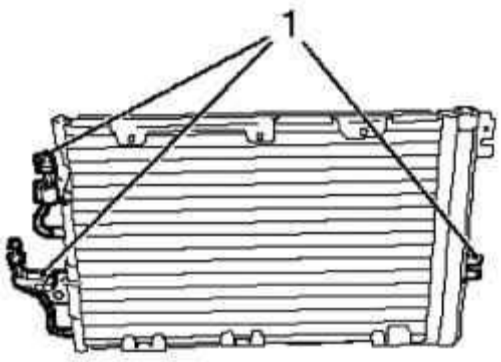


Fig. **2.263.** **Mounting the condenser: 1 - bolts fastening**

Remove the condenser from the radiator by unscrewing the bolt fastening 3 (Fig. 2.263).
Mount the capacitor with intercooler.
Remove the 2 radiator holder from the bracket.
Carefully remove the radiator from the bottom.

NOTE
Be careful not to damage the fins.

Setting
Install radiator below.
Install 2 of the holder of the radiator bracket.
Set 2 of the holder of the radiator bracket.
Disconnect the capacitor with intercooler.
Attach the condenser to the radiator.
Tighten the 3 bolts.
Attach the hose to the radiator air pressurization
Attach the clamp and tighten the bolt.
Attach the wiring harness to the radiator air conditioning.
Attach the cable clip.
Lower the car in half
Connect the lower radiator hose to the radiator and attach the clamp.
Attach the upper radiator hose to the radiator and attach the clamp.
Install the fan.
Attach the coolant hose bracket.
Attach the fan to the radiator and tighten the two bolts.
Attach the intercooler to the condenser, and tighten the two bolts.
Attach hose-back from the turbocharger coolant to the radiator and tighten the clamp.
Fasten vozvaratny hose bracket.
Connect the boost pressure sensor.
Install the hose between the boost air duct pressurization and intercooler.
Raise the car completely.
Set the left and right brackets radiator.
Tighten the 4 bolts fastening point 15 Nm
Attach the wiring harness to the fan the fan.
Attach the cable clip.
Attach the wiring harness connector.
Lower the car in half.
Install outdoor sensor to the mounting
Attach the hose of the cleaner high pressure to the reservoir.
Connect the quick coupling.
Install the front bumper.
Remove the 2 radiator holder from the bracket.
Install radiator grille.
Connect the battery pack.
Attach connection with a mass at the conclusion of mass.
Fill coolant and adjust the level of coolant.
Program temporary memory.
Close the hood.

Removal and installation of coolant pump

Withdrawal
Remove the timing belt
Lift car.
Drain the coolant.
Tighten the drain bolt.
Lower the car completely

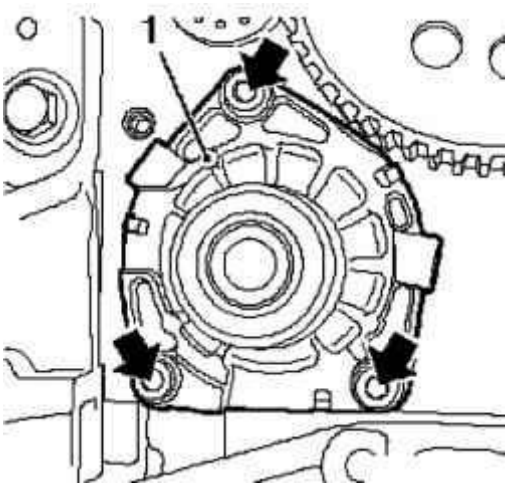


Fig. **2.264.** **Mounting the pump coolant: 1 - pump**

Remove the coolant pump by unscrewing the bolt fastening 3 (2.264).

Setting
Install the coolant pump.
Replace gasket.
Tighten the 3 new bolts fastening point 25 Nm
Install timing belt.

Replacing the intercooler

Withdrawal
Remove the radiator.

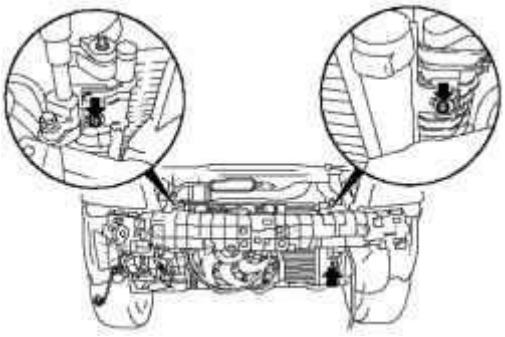


Fig. **2.265.** **Mounting intercooler**

Disconnect the capacitor from the intercooler, turn away 3 fixing bolts (arrows on riunke 2.265).
Disconnect the auxiliary wiring harness from the cooling fan, disconnect the cable clip.
Remove the intercooler.

Setting
Install intercooler.
Attach the auxiliary wiring harness to the fan intercooler.
Attach the cable clamps.
Install radiator.

2.7. The system of fuel injection gasoline engines

Removing and installing fuel injectors

NOTICE
It is important to maintain the purity of an emergency when working with fuel system, as even tiny particles of dirt can lead to abnormal operation of the system or the engine. Connections of the fuel system must be closed with suitable plugs (Catalog Opel parts number 45 06 154 / part number: 9201697). Sealing plugs - disposable.

Withdrawal
Open the hood.
Disconnect the battery.

Disconnect the grounding connector from the time ground, loosening the nut fastening.

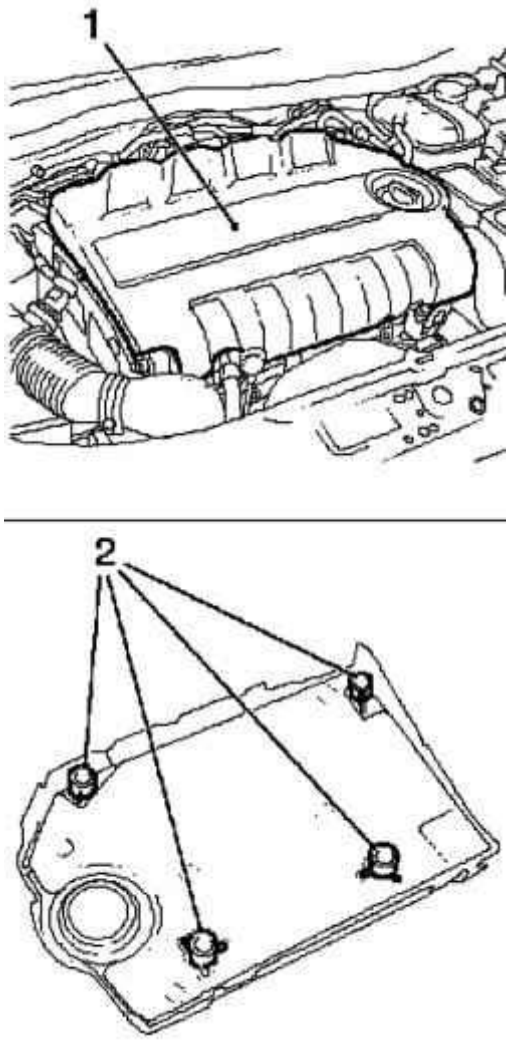


Fig. 2.266. **Removing the engine: 1 - cover 2 - support**

Remove the engine (Fig. 2.266).

NOTE
Again, attach the rubber supports that may be disconnected when removing, to the top of the engine.

NOTICE
After the separation of high pressure pipelines, close the hole fuel injector and the pressure chamber with a protective cap.

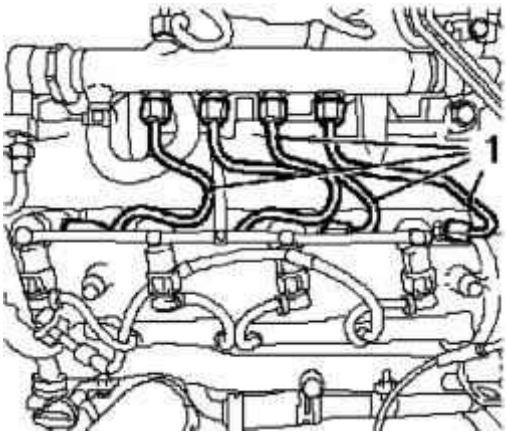


Fig. 2.267. **Removal of pipelines: 1 - pipelines**

4 Remove the high pressure pipeline (Fig. 2.267).

NOTICE
When otvorachivanii locking nut, hold the nozzle open wrench.

8 Loosen the locking nuts.

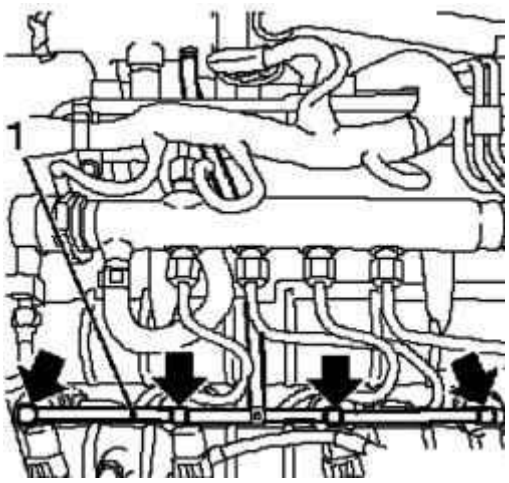


Fig. **2.268.** **Disconnect the oil line: 1 - oil pipe**

Disconnect the oil line (Fig. 2.268).

NOTE
Oil leak can not be disconnected from the damper body fuel return.

4 Remove the clamp (arrows in Figure 2.268).
Remove the oil line.

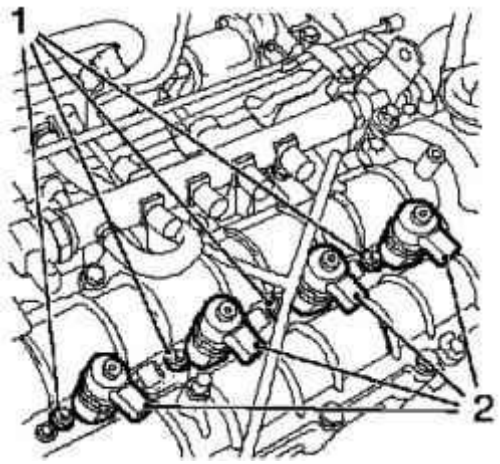


Fig. **2,269.** **Removing the fuel injectors: 1 - Nuts 2 - burner**

Remove the 4 fuel injector by unscrewing 4 fixing screws (Fig. 2.269).

NOTE
If the fuel injectors can not be removed manually, use the special tool in conjunction with 46786 KM-328-B.

Setting
Clean the casing 4 fuel injectors.

NOTE
To clear the saddle fuel injector, set in 47,632, with coarse fur to cover the fuel injector and clean the saddle fuel injector. Repeat the cleaning process of pure wool.

Set 4 fuel injectors.
Replace 4 sealing ring.
Set 4 fuel injectors with the bracket.

NOTE
The sequence of installation - cylinder 4, 3, 2, 1.

Tighten the 4 nuts moment 25 Nm
Attach masloproovod.
Connect 4 oil line to the fuel injectors.

NOTICE
When tightening the locking nut holding the fuel injectors open wrench. Flow line can only be connected only once.

Install 4 new high pressure pipeline.
4 Tighten the lock nut (M12) moment 25 Nm
4 Tighten the lock nut (M14) moment 23 Nm
Connect the battery pack.
Attach the grounding connector to the grounding terminal. Tighten the nut.
Check the tightness of the fuel system.

NOTICE
Before checking wear goggles and protective gloves.

Start the engine.
Replace the cover of the engine.
Program volatile memory.
Close the hood.

Replacing the fuel line pressure (High pressure pump - pressure chamber)

NOTICE
When working with system «Common Rail» wait for one minute after the engine stops. The system automatically resets the pressure.

NOTICE
When you work with observe the cleanliness of the fuel, since even very small particles of dirt can cause problems in the engine or system. Close an open socket of the fuel system with suitable plugs. Reapply placeholders are not allowed.

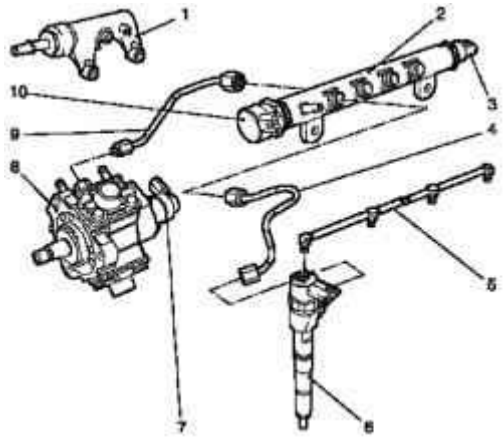


Fig. **2.270.** **The components of the fuel system «Common Rail»: 1 - damp housing, fuel return, 2 - high-pressure chamber, 3 - pressure sensor, 4 - a pipeline of high pressure (pressure chamber to the fuel injector), 5 - oil line 6 - the fuel injector, 7 - high pressure pump, 8- pressure regulator, high pressure pump, 9 - pressure regulator, pressure regulator, 10 - line of high pressure (high pressure pump to a pressure chamber)**

Withdrawal
Open the hood.
Disconnect the battery.
Disconnect the grounding connector on the grounding clamp.
Remove the engine
Remove the inlet pipe.
3 Disconnect the wiring harness.

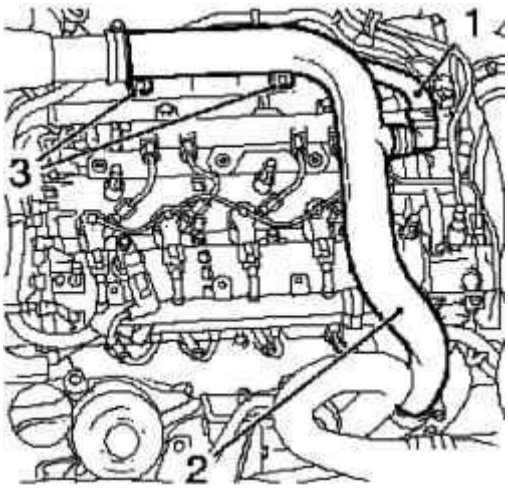


Fig. **2.271.** **Removing the inlet pipe and ventilation hose Engine: 1 - ventilation hose Engine, 2 - inlet pipe, 3 - bolts fastening**

Disconnect the vent hose, the engine (Fig. 2.271).
Disconnect the quick release coupling.
Disconnect the air intake hose from the turbocharger.
Loosen the clamp.
Disconnect the hose from the air intake, mass air flow sensor.
Loosen the clamp and unscrew the 2 screws fastening.
Place the bottom of the container for drainage.

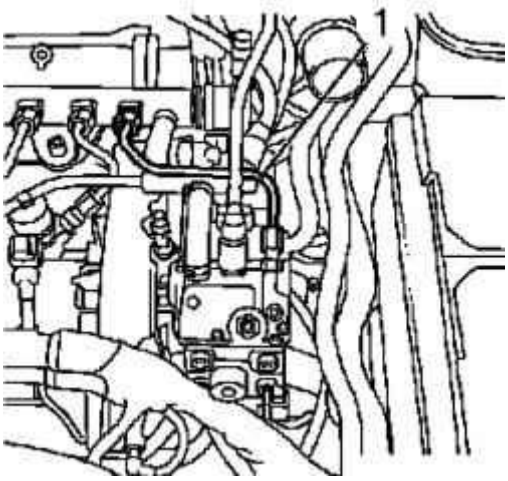


Fig. **2.272.** **Removing the high pressure pipeline: 1 - Pipeline**

Disconnect the high pressure pipeline from the high pressure pump to the pressure chamber. 2 Loosen the coupling nut. (Fig. 2.272).

Setting
Install high pressure pipeline from the high pressure pump to the pressure chamber.
Use the new high pressure pipeline.
Tighten the coupling nut M14 moment 19 Nm
Tighten the coupling nut M12 moment 24 Nm
Install inlet pipe.
Attach the hose to the inlet turbocharger.
Tighten the clamp point 3.5 Nm
Attach the sensor mass air flow to the air intake hose.
Tighten the clamp point 3.5 Nm
Attach the vent hose engine.
Fasten the clamp.
Tighten the 2 screws fastening.
Attach the wiring harness 3.
Replace the cover of the engine.
Connect the battery pack.
Attach the grounding connector to the grounding terminal.
Tighten the nuts.
Program volatile memory.
Close the hood.

Fuel Pump Module

In Astra-H using the combined fuel pump module. It is used for gasoline and diesel engines on the options. Fuel pump module includes all components necessary to control the level and the fuel supply.

In gasoline engines the fuel filter is installed in the module. For diesel engines using an external fuel filter, which is located in the engine compartment. Module for diesel engines is also different in that the pre-fuel pump is not used for engine Z 17 and Z 17 DTL DTN.

The design of the fuel pump module

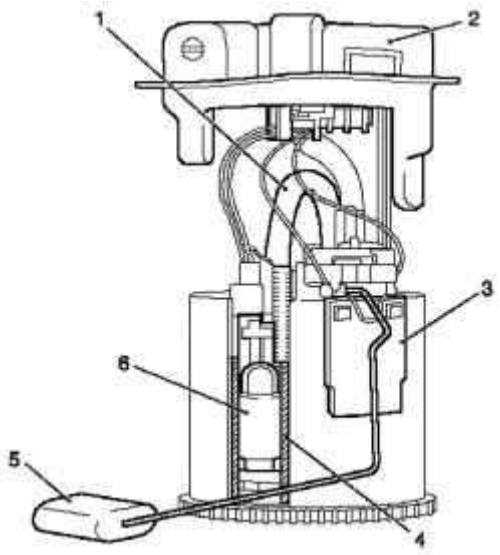


Fig. **2.273.** **The design module of the fuel pump: 1 - Line pre-fuel pump, 2 - upper body - the fuel pump module, 3 - lower body - the fuel pump module 4 - prefilter; 5 - Float - Fuel Level**

The chart below shows the approximate structure of the fuel pump module. Fuel pump module contains nodes that do not pertain to all models of the engine (Fig. 2.273).

Fuel pump, fuel pre -

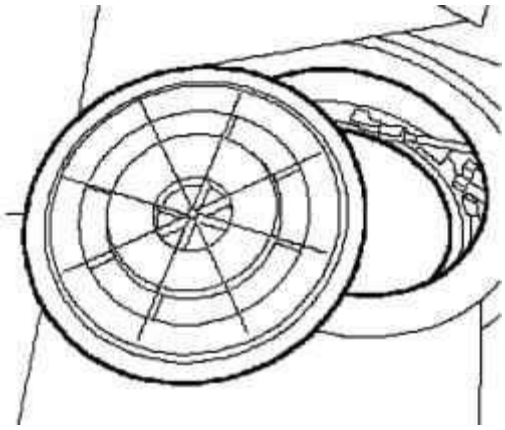


Fig. **2.274.** **Opening access to the fuel pump**

At Astra-H, access to the fuel pump module for maintenance is provided through a hole located under the rear seat in the panel floor. Pillow rear seat must be removed to gain access to the hole (Fig. 2.274).

Fuel pump provisional fuel (roller pump)

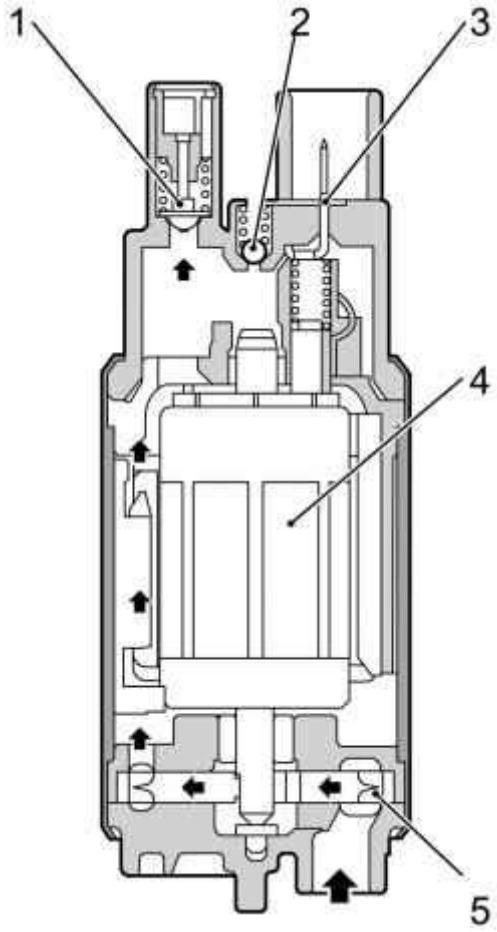


Fig. **2.275.** **The design of the roller pump: 1 - check valve, 2 - safety valve, and 3 - connecting to the mains, 4 - electric motor 5 - impeller**

Fuel pump, fuel pre-installed in the fuel pump module. Problem of the fuel pump prior fuel is to bring enough fuel at a certain pressure on the inlet to the engine under all operating conditions. It consists of the lid with electrical connectors, check valve and an output socket. Cover is usually also includes carbon brushes needed for the electric motor and an element of noise reduction.

Requirements for the work of the roller pump:
- Consumption of 60 to 200 l / h;
- Pressure at the inlet to the fuel system from 3,0 to 4,5 bar.

Special tools

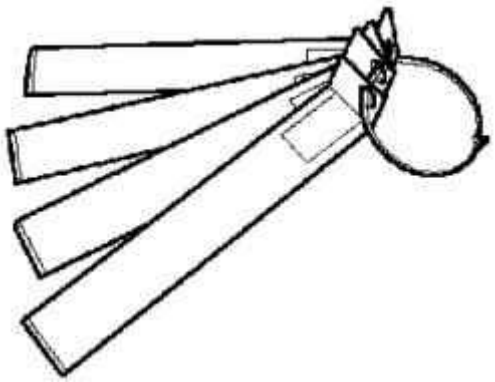


Fig. **2.276.** **Special tools**

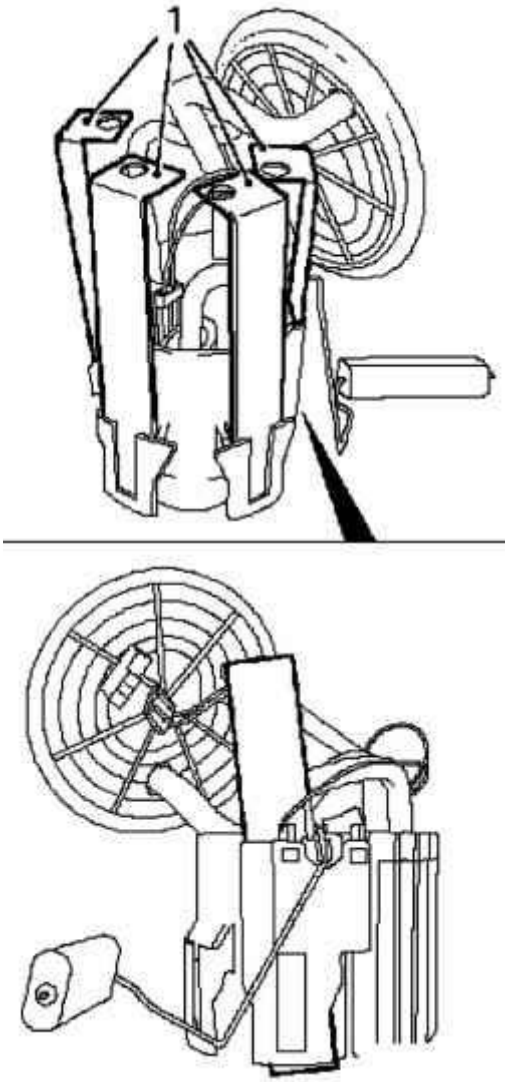


Fig. **2.277. Using a special tool: 1 - a special tool**

Special tools required for removal of the fuel pump module. Figure 2.276 shows a special device KM 6391. Four guides are installed vertically into the existing fuel pump module guides for the separation module from the bracket and the lifting assembly (Fig. 2.277).
For better visibility of the module is shown removed from the car.

Replacement module dosage

NOTICE
When working with fuel system, pay attention to cleanliness because, even the smallest particles of dirt can cause problems in the engine or fuel system.

Withdrawal
Open the hood.
Disconnect the battery.
Disconnect the connection with the mass of the output mass.

NOTICE
Module and the area around the dosage should be cleaned of grease.

NOTICE
After removing the module and the area around the dosage should be cleaned again.

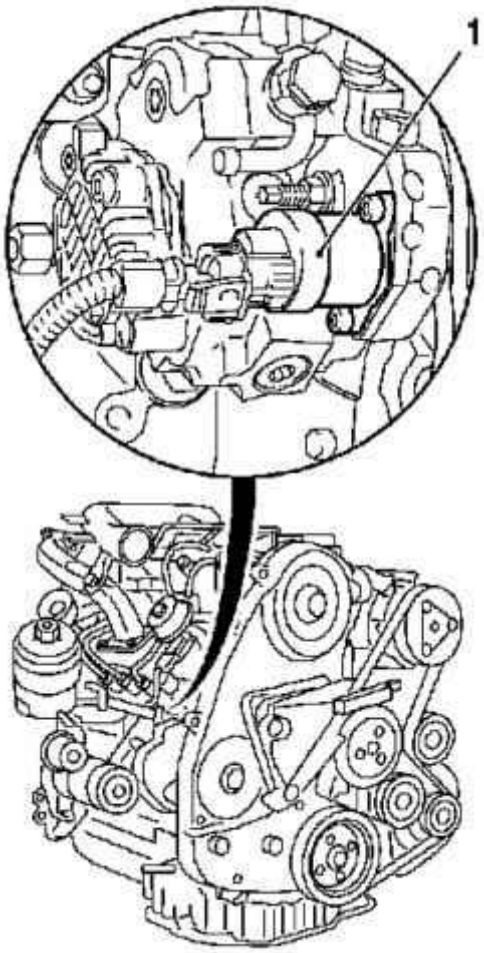


Fig. **2.278.** **Removing the module dosage: 1 - special tool**

Remove module dosage (Fig. 2.278).
Disconnect the wiring harness connector.
Loosen the 3 bolts.

NOTICE
Do not tilt the unit dosage.

Turn the dosing module and remove it by holding horizontally.

Setting
Clean the hole and seals the surface, using a lint-free cloth.
Install the new module dosage.

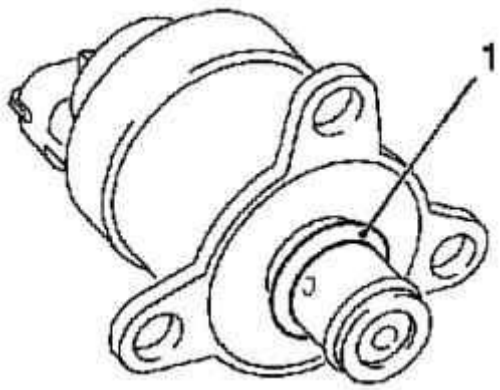


Fig. **2.279.** **Sealing unit dosage: 1 - Seal**

Cover seal clean engine oil (see Figure 2.279).
Install module dosage horizontally and rotate.
Tighten the 3 bolts time 6 Nm
Attach the wiring harness connector.
Connect the battery

Attach connection with a mass at the conclusion of mass.
Program volatile memory.
Close the hood.

Replacing the fuel pressure regulator

Withdrawal

Remove the intake manifold by unscrewing the bolt fastening.
Remove the ventilation hose from the engine cylinder head cover.
Disconnect the inlet pipe from the air intake hose.
Disconnect the inlet pipe from the turbocharger.

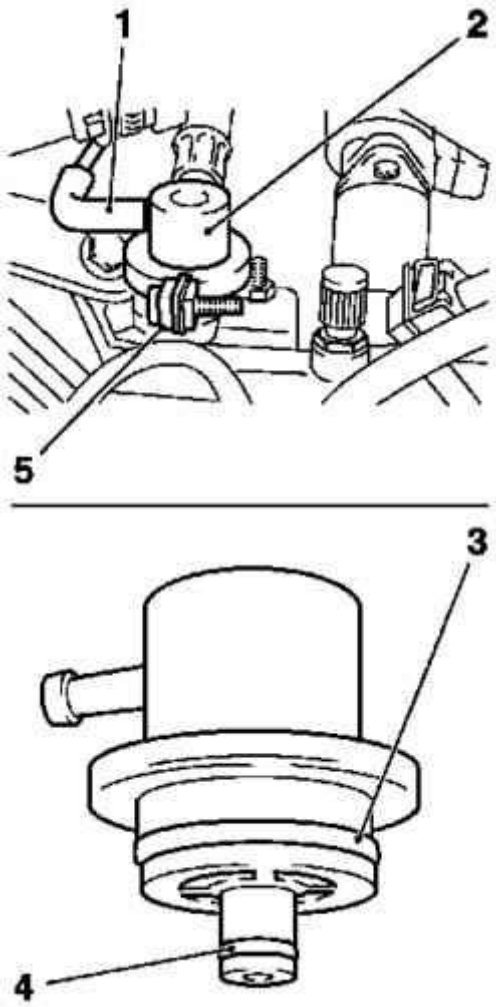


Fig. **2.280.** **Components that are replaced when removing the pressure regulator: 1 - vacuum line, 2 - fuel pressure regulator, 3, 4 - uplonitelnye ring, 5 - clamp mounting**

NOTE
Close the inlet pipe turbocharger.

Remove the inlet pipe.
Reset the fuel pressure through the test socket using the device to verify the tightness of KM-J-34730-91.
Collect leaking fuel into a suitable container.
Disconnect the vacuum line (1) of the fuel pressure regulator (2). Remove the mounting clamp (5) with the fuel pressure regulator and fuel rail.
Label loading position and carefully remove the fuel pressure regulator and fuel ramp.

NOTE
At this point, absolute cleanliness is essential.

Replace O-rings.

Setting

Before installing the cover O-rings with a thin layer of silicone grease (white).
Check the loading position, the fuel pressure regulator. Install the fuel pressure regulator in the fuel rail.

NOTE
At this point, absolute cleanliness is essential.

Install clamp fastening the fuel pressure regulator and attach the fuel rail, tighten the moment of 5 Nm
Connect the vacuum hose to the fuel pressure regulator.
Remove the cap turbocharger inlet pipe.
Attach the vent hose to the lid of the engine cylinder head and attach the clamp.
Connect the inlet pipe to the turbocharger.
Connect the inlet pipe to the air intake hose.
Tighten the attachment bolt clamp.

Replacing the damping body fuel return

Withdrawal
Open the hood.
Disconnect the battery.
Disconnect the grounding connector on the grounding clamp.
Remove the engine.

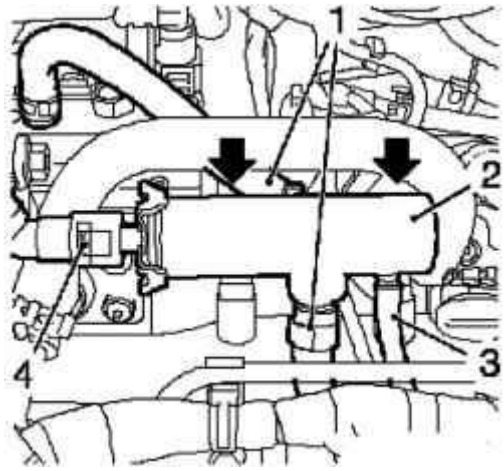


Fig. **2.281.** **Components damping body vozvarata fuel: 1 - Hoses 2 - damping case, 3 - oil line 4 - the return fuel line**

Remove the fuel return damping case (Fig. 2.281).
Remove the return fuel line with a special tool KM-796-A.
Remove 2 hose.
Remove the 2 clamps.
Disconnect the oil line.
Loosen the 2 bolts (arrows in Figure 2.281).

NOTE
If the oil line is disconnected from the damper body, it should be replaced.

4 Remove the oil line.
4 Remove the clamp (arrows in Figure 2.281)

Setting
Install oil line.
Connect 4 oil line to the fuel injectors.
Attach the damping body fuel return.
Attach the oil line.
Attach the return fuel line.
Attach the hose 2.
Install 2 tie.
Tighten the 2 bolts moment 9 Nm
Replace the cover of the engine.
Connect the battery pack.
Attach the grounding connector to the grounding terminal.
Program volatile memory.
Close the hood.

Replacing the fuel level sensor

Withdrawal

Open the hood.
Disconnect the battery.
Remove the clamp from the output of the mass of the mass.
Place the bottom of the container for drainage.
Reset the fuel pressure using a special device KM-J-34730-91 through the test channel.

NOTE
Collect leaking fuel into a suitable container - observe safety regulations and national legislation.

Open both rear doors
Remove the bench.

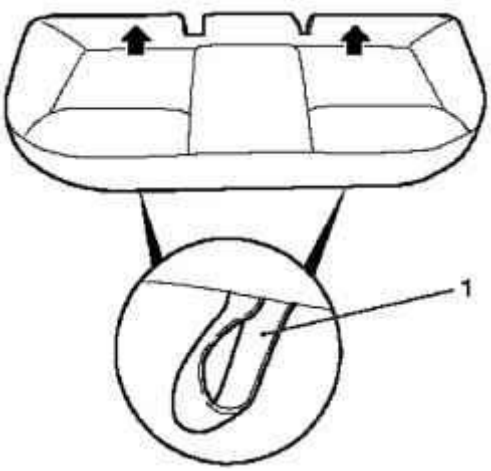


Fig. **2.282.** **Staples issuance rear seat: 1 - Staples**

2 Pull the clips release (Fig. 2.282).
Remove the bracket in the direction of the arrows in 2 places.
Remove the bench seat of the car.
Remove the cover.
Bend the noise isolation and open the lid.
Disconnect the wiring harness connector.

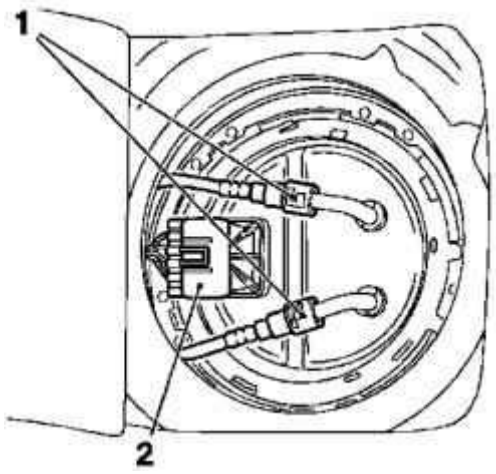


Fig. **2.283.** **Fuel lines: 1 - fuel, 2 - Connector**

Mark and remove the fuel lines using a special tool KM-796-A (Fig. 2.283).
Close the fuel plugs special tool KM 807 and KM 6015.

NOTE
Make sure that the special tool KM-797 properly and safely installed.

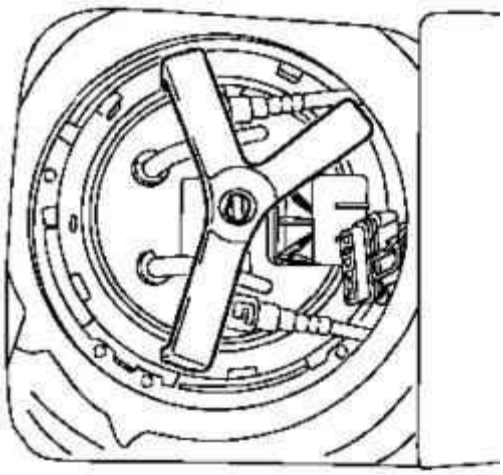


Fig. **2.284.** **Install special tool**

Loosen the locking ring lid using a special tool KM 797 (Fig. 2.284).

NOTE
Rotate counter-clockwise.

Carefully remove the module cover up.

NOTE
Be careful not to damage the wires and hoses.

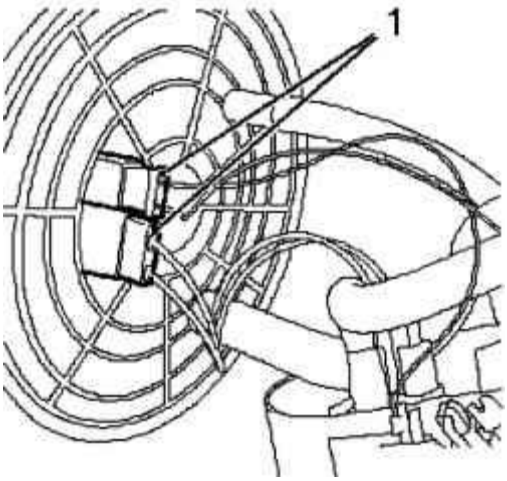


Fig. **2.285.** **Disconnect the wiring harness connector from the cover:**
1 - Connectors

Disconnect the 2 connectors from the wiring harness cover (Fig. 2.285).

NOTE
Special Tools KM-6391-1 must be installed so that the sensor in the tank was moved vertically.
Install special tool 4 KM-6391-1 and remove the module.

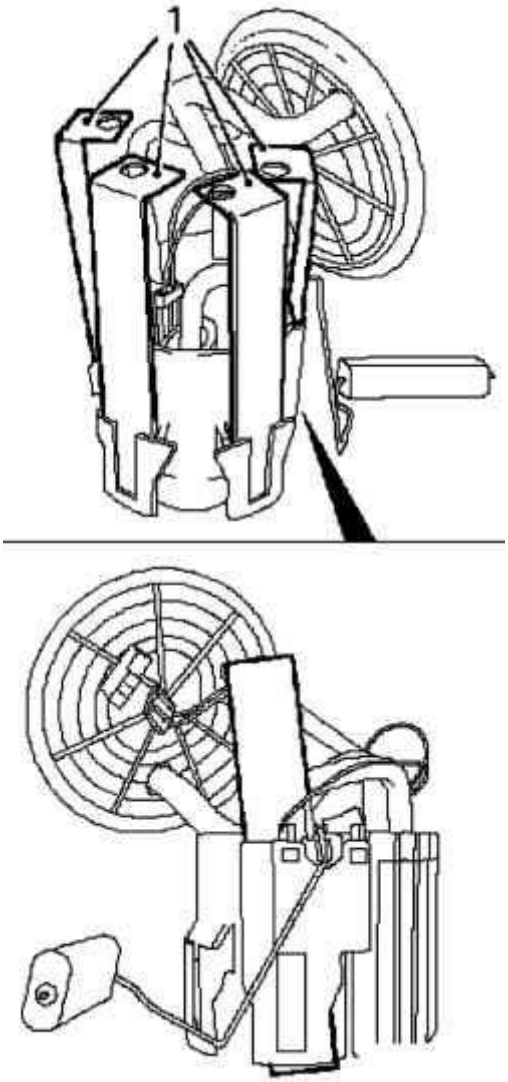


Fig. **2.286.** **Removing the module: 1 - special tool**

Remove the module using a special tool KM 6391 (Fig. 2.286).
Install special tool 4 km 6391 on the module, as shown in Figure 2.286.
Release the module by clicking on the special tool and remove it.
Remove the module from the fuel tank.

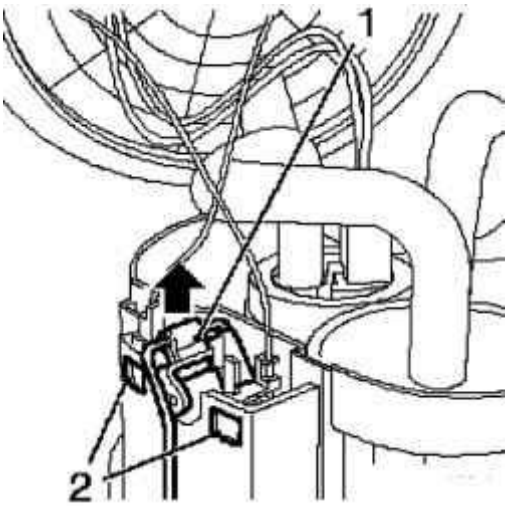


Fig. **2.287.** **Removing the fuel level sensor: 1 - fuel level sensor, 2 - Holders**

Remove the fuel level sensor (Fig. 2.287) and release the holder.

NOTE
Do not pull the shaft fuel level sensor.

Gently pull out the guide in the direction of the arrow (Fig. 2.287).

Setting
Check fuel level sensor.
Set in the guide.
Install the module.

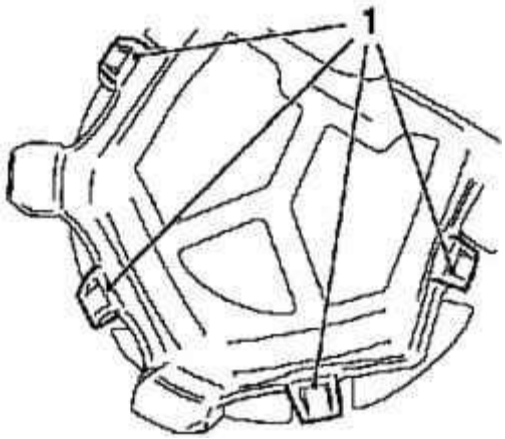


Fig. **2.288.** **Mounting module: 1 - Latch**

Set 4 latch (Fig. 2.288).

NOTE
Latches should hear a click to get in touch.

Connect 2 connector wiring harness with a lid.
Close the module locking disc.
Replace the cover with a new gasket, using a special tool KM 797.
Clockwise.
Connect the fuel lines and quick connect coupling.
Connect the wiring harness connector.
Close the lid.
Bend in the direction of noise isolation.
Install the rear bench seat.
Attach the 2 time.
Crush and lock in place.
Close both rear doors.
Connect the battery pack.
Connect the clip weight to the conclusion that mass.
Program volatile memory.
Close the hood.

Fuel Tank

As with the Astra-G, the fuel tank on the Astra-H is made of plastic and has a filling volume of 52 l. The fuel tank is equipped with two locking straps for fastening. These brackets are fastened with bolts at the four points under the floor of the car. To protect the fuel tank from a high temperature of the exhaust system attached to a fuel tank heat shield.

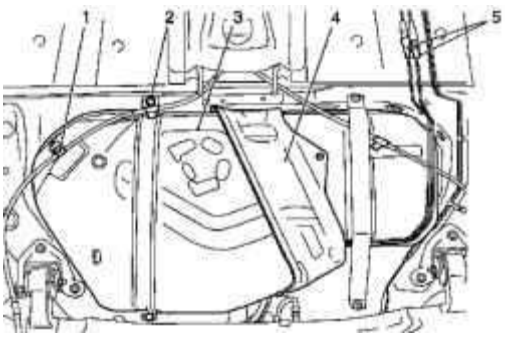


Fig. **2.289.** **The design of the fuel tank (installed): 1 - the parking brake cable bracket system, 2 - mount - fixing bracket of the fuel tank, 3 - fuel tank, 4 - heat shield, 5 - make-fitting - fuel line**

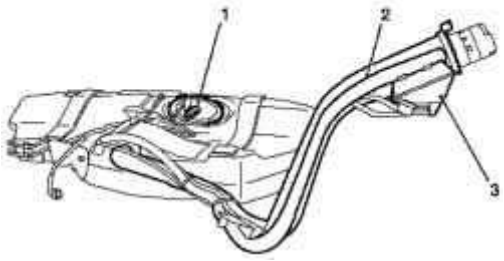


Fig. **2.290.** **The design of the fuel tank (removed): 1 - module cover, 2 - Tube fuel filler, 3 - tank removal / air ventilation - Tube fuel filler**

Tube fuel filler
As for Astra-G, Astra-H to remove the tank air / ventilation tube is fixed on the fuel filler.

Replacing the tube fuel filler (petrol engines)

Withdrawal
Open the hood.
Disconnect the battery.
Remove the clamp from the output of the mass of the mass.
Disconnect the pipe fuel filler. To do this, open the lid hatches fuel tank filler cap (3)

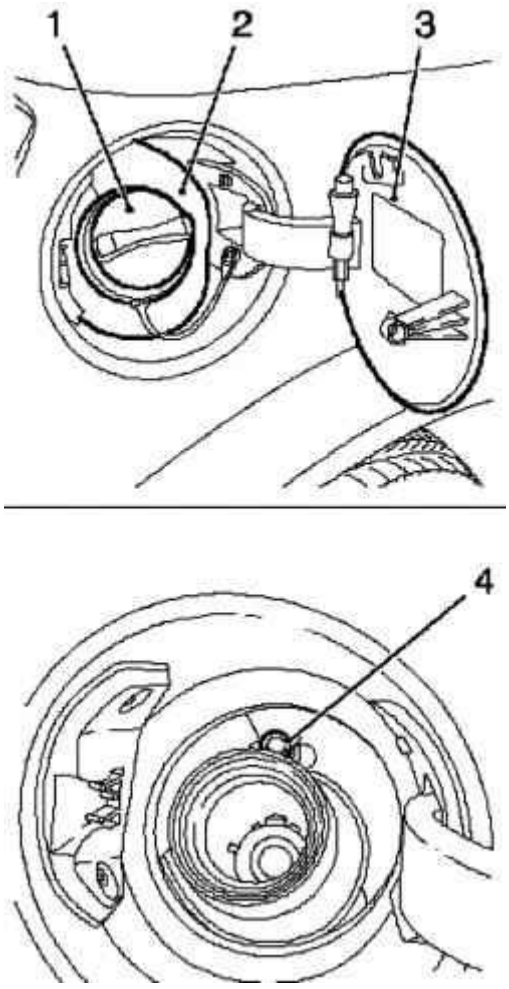


Fig. **2.291.** **Removing the tube fuel filler: 1 - plastic lid, 2 - rubber membrane, 3 - cover hatches fuel tank filler cap, 4 - bolt**

Remove the fuel filler (Fig. 2.291).
Remove the rubber sheath.
Loosen the screw.
Attach the plug fuel filler.
Remove the right rear wheel.
Raise the car in half.
Remove the right rear wheel.

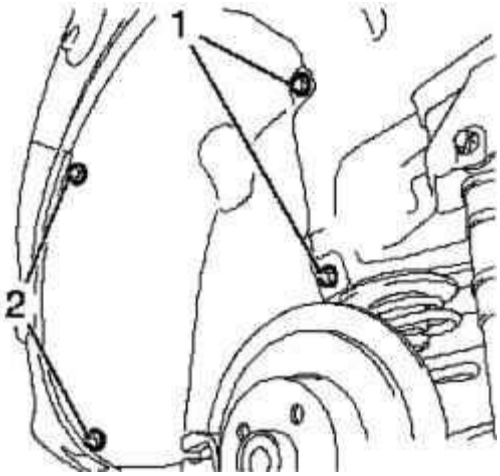


Fig. **2.292.** **Mounting lining wheel arches: 1 - Nuts 2 - Bolts**

Remove the inner lining of wheel arches, unscrewing 2 screws and two nuts (see Figure 2.292).
Raise the car in half.

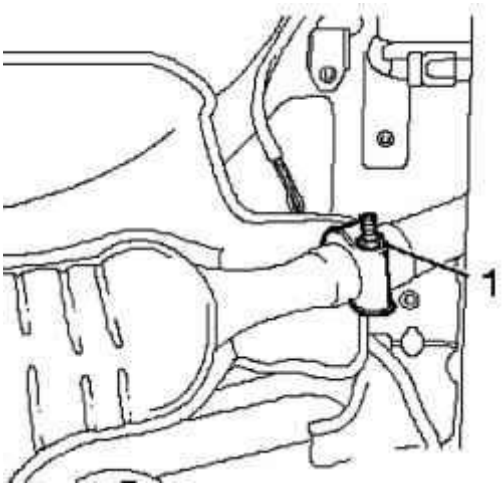


Fig. **2.293.** **Mounting rear muffler clamp: 1 - nut**

Loosen the rear shackle mount muffler, for this loosen the nuts (Fig. 2.293).

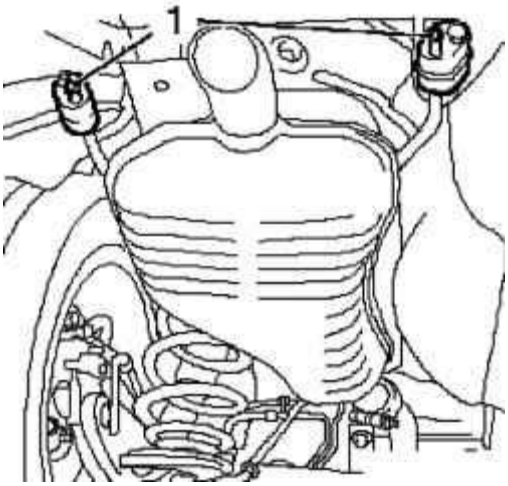


Fig. **2.294.** **Mounting bracket muffler: 1 - bracket**

Remove the rear silencer with the bracket in 2 locations (Fig. 2.294).
Remove the rear silencer from the main silencer.

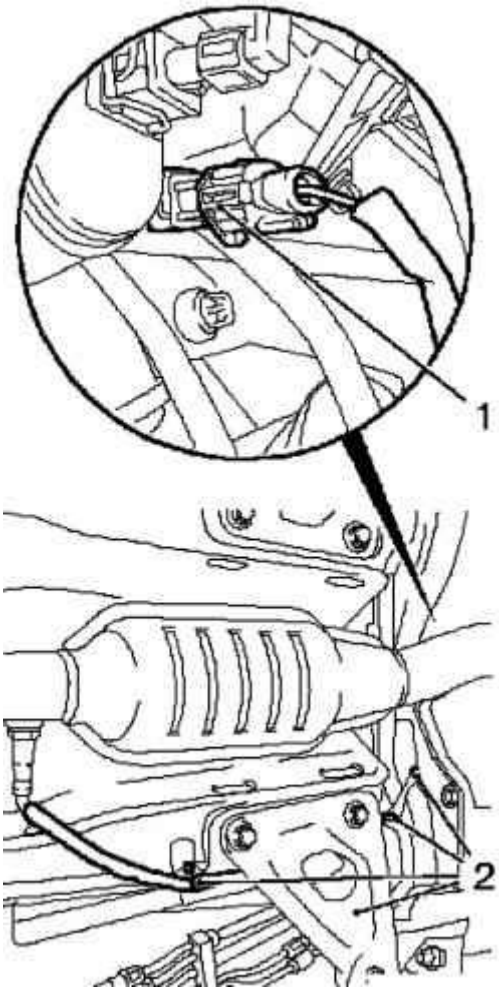


Fig. **2.295.** **Mounting oxygen sensor: 1 - slot 2 - clamps**

Disconnect the wiring harness of oxygen sensor (control of the catalytic converter) (Fig. 2.295).
Disconnect the wiring harness connector and unscrew the 4 times.

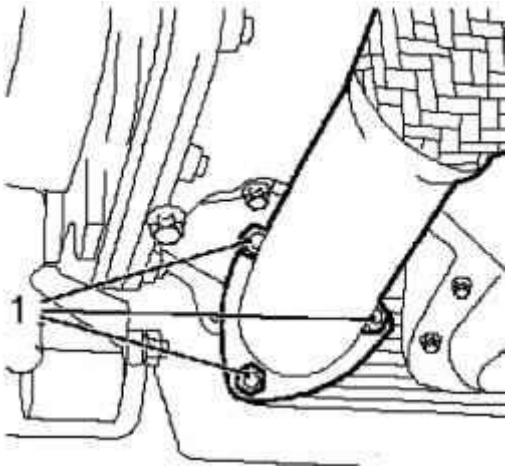


Fig. **2.296.** **Nuts front exhaust pipe: 1 - Nuts**

Disconnect the front exhaust pipe from the front muffler from the catalytic converter 3 unscrewing nuts (Fig. 2.296).
Remove the front exhaust pipe from the front muffler.
Remove the bracket in 4 locations.

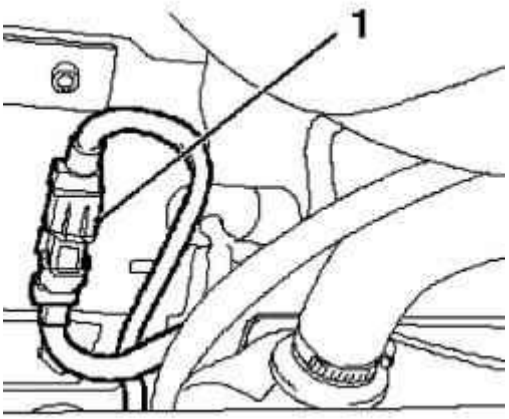


Fig. **2.297. Wiring harness connector module in the tank: 1 - connector**

Disconnect the wiring harness connector module in the tank (2.297).
Disconnect the fuel line 2.

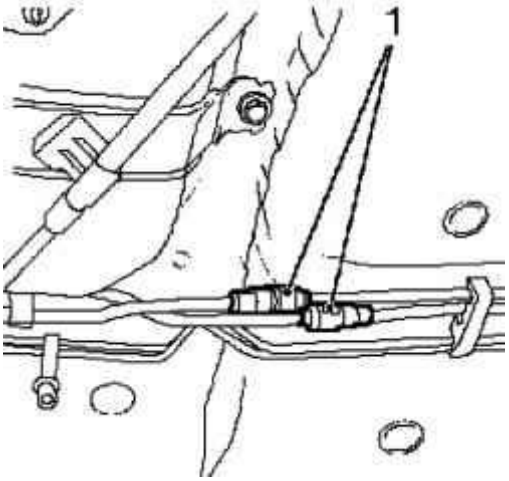


Fig. **2.298. Quick couplings of fuel lines: 1 - couplings**

Disconnect the 2 quick-couplings (Fig. 2.298).
Close the ends of pipework with special plugs.

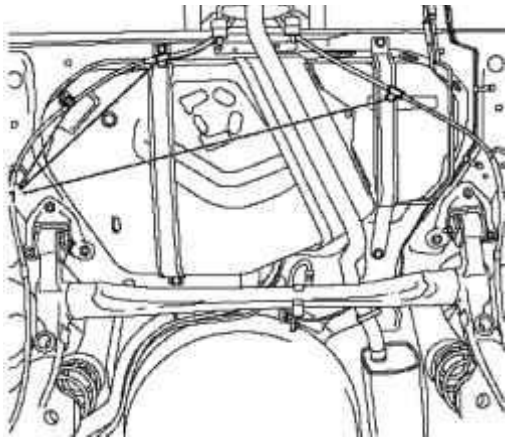


Fig. **2.299. Mounting cable parking brake system: 1 - mount**

Remove the parking brake cable from the bracket in 3 places (Fig. 2.299).

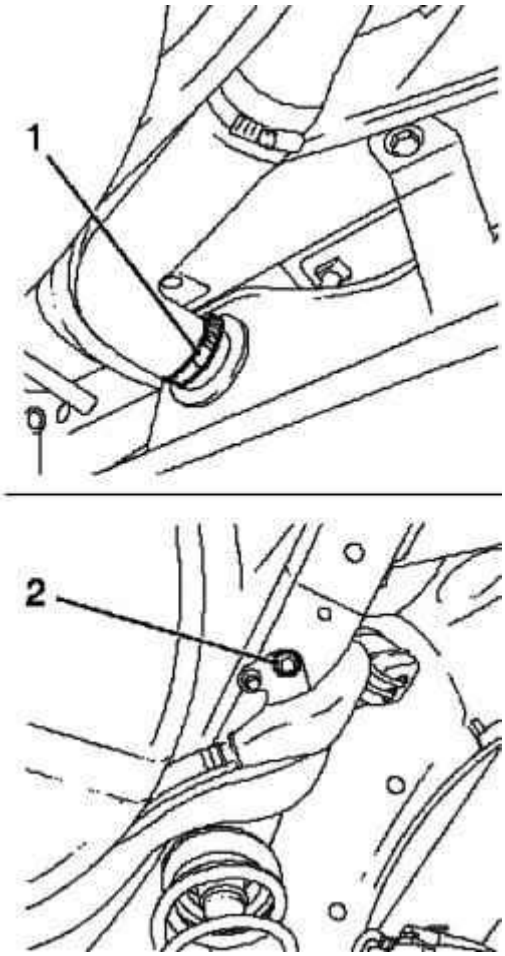


Fig. **2.300.** **Mounting tube fuel filler: 1 - clamp 2 - bolt**

Disconnect the pipe fuel filler. To do this, remove the clamp and loosen the attachment bolt (Fig. 2.300).

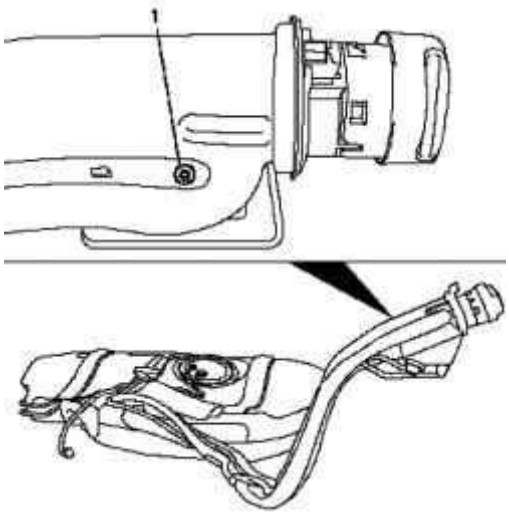


Fig. **2.301.** **Mounting the fuel water separator: 1 - bolt**

Disconnect the fuel water separator from the tube fuel filler by unscrewing the bolt fastenings (Fig. 2.301).
Remove the jack.

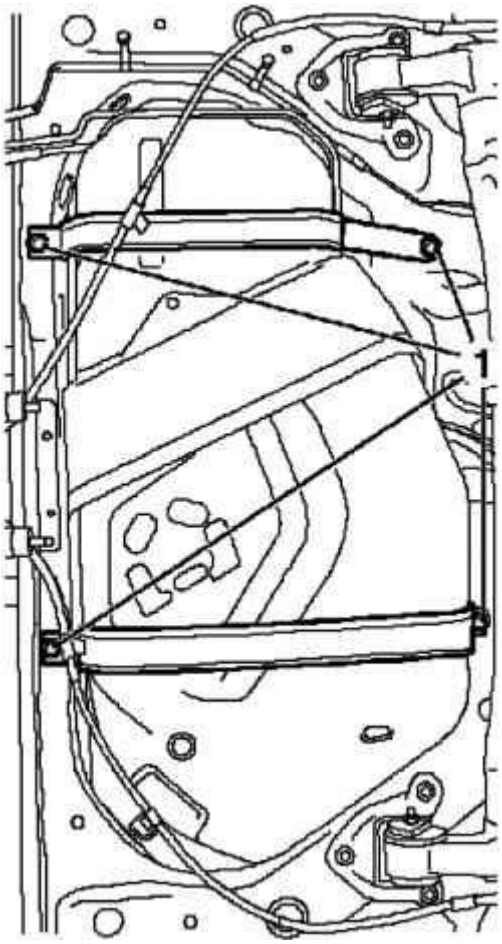


Fig. **2.302.** **Mounting Fuel Tank: 1 - Bolts**

Remove the 2 clamp mounting the fuel tank, unscrew the 4 bolts (Fig. 2.302).
Remove the fuel tank with a pipe fuel filler.

NOTE
Tube fuel filler should be skipped over the rear axle.

NOTICE
Make sure that the socket of the fuel tank is not damaged if you disconnect the hose. Leakage from damaged nipples may cause a fire.

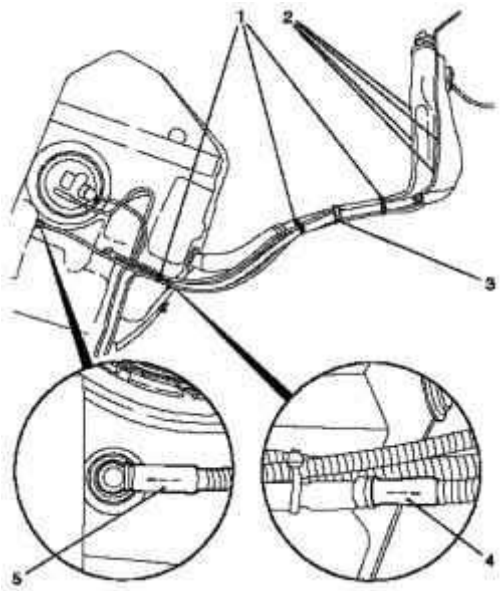


Fig. **2.303.** **Removing the tube from the water separator fuel filler: 1 - cable ties 2 - filler tube, 3 - line of ventilation of the fuel tank, 4, 5 - hoses Ventilation motor**

Remove the separator from the tube, fuel filler (Fig. 2.303).
Disconnect the 3 cable ties.

2 Disconnect the ventilation hose (4) and (5)

NOTE
трежьте по пунктирной линии острым ножом.

2 Remove the vent hose from the bracket and disconnect them from the filler neck. in 4 locations.
Disconnect the hose from the fuel pipe fuel filler.
Loosen the clamp attachment.

Setting
Attach the hose to the fuel pipe fuel filler.
Fasten the clamp moment 3,5 Nm
Attach the vent pipe to pipe fuel filler.
Connect the vent pipe.
Attach the fuel water separator.
2 Connect the vent hose.
2 Remove the vent hose from the bracket.
Attach to the filler pipe in 4 locations.
3 Install cable ties.
Install the fuel tank with a pipe fuel filler.
Attach the 2 clamp mounting the fuel tank.
Tighten the 4 bolts fastening moment 20 Nm
Raise the jack.
Attach the tube to the fuel water separator fuel filler and tighten the attachment bolt.
Attach the pipe fuel filler, tighten the bolt and fasten the clamp.
Set the parking brake cable system in the bracket.
2 Connect the fuel line.
2 quick-connect couplings.
Connect the wiring harness connector module in the tank.
Install the front exhaust pipe from the front muffler.
Attach the front exhaust pipe from the front muffler to catalytic converter, tighten the moment 20 Nm
Install a new gasket.
Tighten the 3 new nuts moment 20 Nm
Connect the wiring harness of oxygen sensor (control of the catalytic converter).
Install rear silencer.
Attach a silencer to the front of the rear exhaust.
Fasten the rear silencer and tighten the clamp fixing point 18 Nm
Lower the car in half.
Install lining the rear right wheel arch.
Install the right rear wheel.
Lower the car in half.
Tighten the right rear wheel.
Attach the pipe fuel filler.
Remove the cap fuel filler.
Install a rubber membrane.
Attach the plug fuel filler.
Close the hatches of the fuel tank filler cap.
Connect the battery pack.
Connect the clip weight to the conclusion that mass.
Program volatile memory.
Close the hood.

Vapor Fuel System

Fuel vapor recovery system prevents the formation of fuel vapors from the fuel tank into the environment.
Couples going into a container filled with activated charcoal. These fuel vapors are involved in the process of combustion under certain operating conditions of the engine.
According to the construction and function of this system is the appropriate model system, Astra-G.

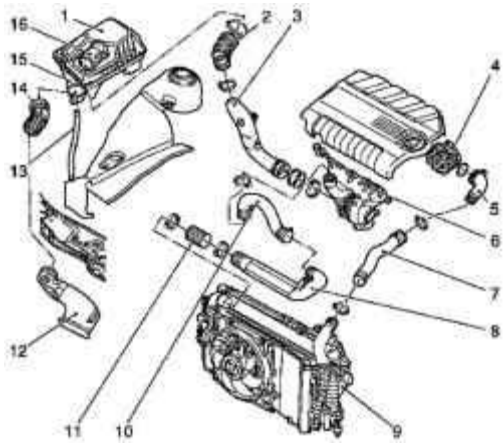


Fig. **2.304.** **Air Vent fuel vapor recovery system: 1 - air filter housing, the upper part 2 - the air intake hose, 3 - turbo air intake hose, 4 - choke tube, 5 - air hose pressurization 6 - turbocharger with the exhaust manifold, 7 - air hose pressurization; 8 - duct pressurization; 9 - intercooler, 10 - hose, air pressurization, 11 - hose, air pressurization, 12 - resonator; 13 - culvert; 14 - inlet pipe, 15 - air filter housing, the lower part, 16 - mass flow sensor air**

The capacity of activated charcoal placed in a secure position for the plastic cover on the right side in the arch of the wheel.

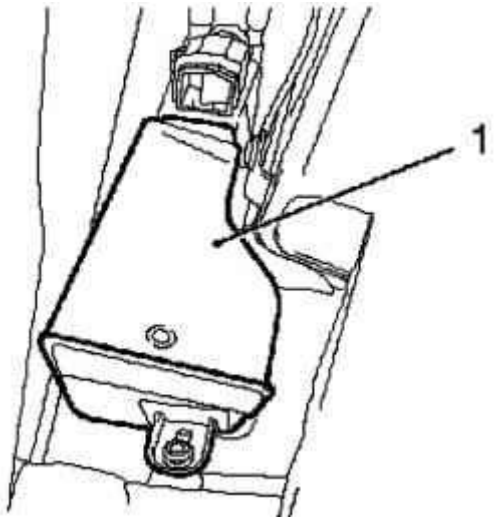


Fig. **2.305.** **The design capacity of activated charcoal: 1 - container of activated charcoal**

Replacing the front vent tube

Withdrawal

Remove the front axle.

Remove the 2 lower fuel line bracket by unscrewing 2 screws fastening.

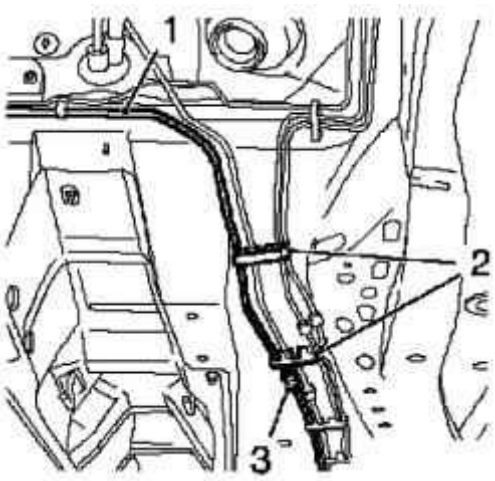


Fig. **2.306.** **Disconnecting the front of the ventilation tube from the central ventilation tubes: 1 - Front ventilation tube, 2 - fuel line brackets, 3 - a quick-coupling**

Disconnect the front vent pipe from the central ventilation tubes (Fig. 2.306).

Disconnect the quick release coupling.

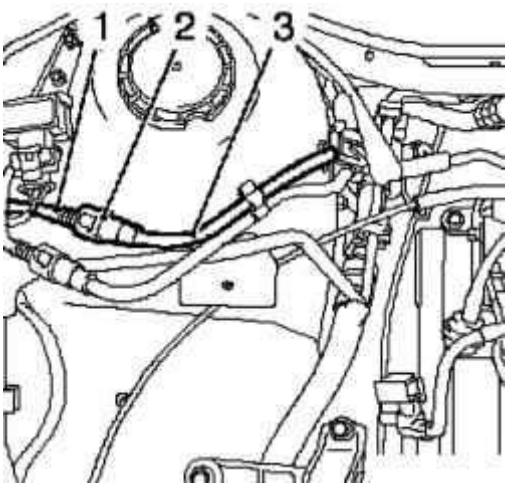


Fig. **2.307.** **Disconnecting the front of the ventilation tube from the tank vent tube with activated charcoal: 1 - container with activated charcoal, 2 - a quick-coupling, 3 - the front vent tube**

Disconnect the front of the ventilation tube from the ventilation tube containers with activated charcoal (Fig. 2.307).
Disconnect the quick release coupling.
Remove the vent pipe, freeing it from the arm in 6 places.

Setting
Install a ventilation pipe.
Attach a bracket in 6 locations.
Reattach the front vent pipe to the central vent tube and vent tube containers with activated charcoal.
2 quick-connect couplings.
Attach the 2 lower fuel line bracket and secure them with 2 bolts.
Install the front axle.

Removing and installing tanks with activated charcoal

Withdrawal
Disconnect the line using a special tool KM-796-A.
Remove the front right wheel
Remove the protective lining, wing,
Disconnect the wiring harness connector from the indicator lamps on the wing and remove the lamp indicator lamp

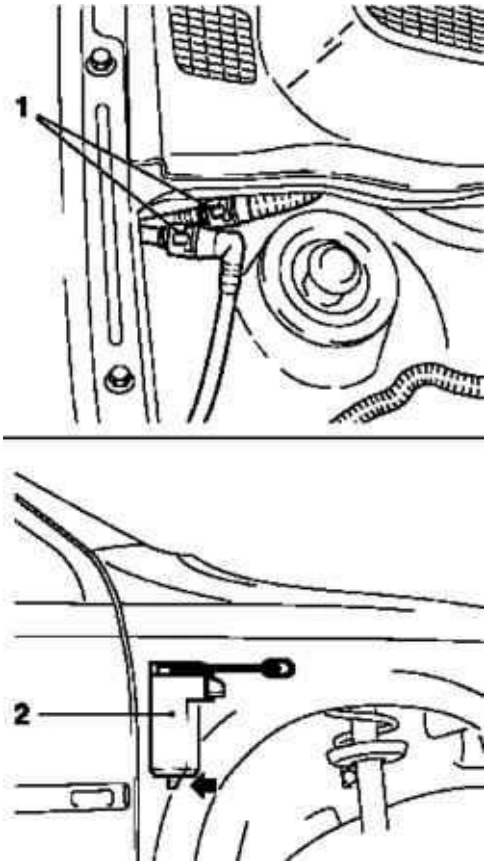


Fig. **2.308.** **Removal of containers with activated charcoal: 1 - Line 2 - container with activated charcoal**

Loosen the attachment bolt (arrow) and remove the container with activated charcoal (Fig. 2.308).

Setting
Set a container of activated charcoal and secure at the back.
Set indicator lamps on the wing and attach the wiring harness connector to the lamp indicator.
Install a protective lining, wing.
Install the wheel, tighten the bolts fastening point 110 Nm
Attach the line.

Removing and installing the sensor mass air flow

Withdrawal
Open the hood
Remove the mass air flow sensor.

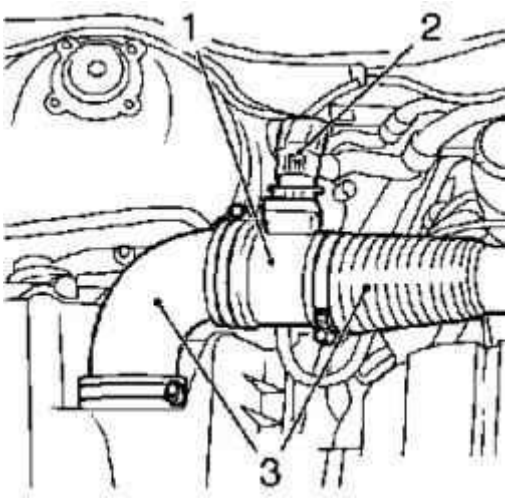


Fig. **2.309.** **Removing the sensor mass air flow rate: 1 - mass air flow sensor, 2 - wiring harness connector, 3 - air intake hoses**

To do this, disconnect the wiring harness connector and 2 air intake hose (Fig. 2.309).
Remove the 2 clamps.

Setting
Install sensor mass air flow.
Connect the intake hose.
Tighten the clamp 2 point 3.5 Nm
Connect the wiring harness connector.
Close the hood.

Replacing boost pressure sensor (Z 20 LEH)

Withdrawal
Open the hood
Remove the mass air flow sensor.

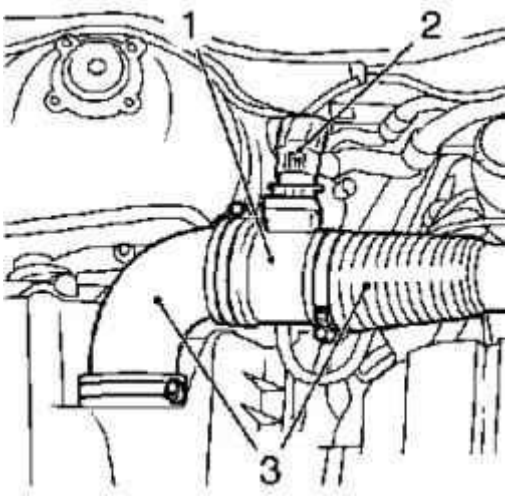


Fig. **2.309.** **Removing the sensor mass air flow rate: 1 - mass air flow sensor, 2 - wiring harness connector, 3 - air intake hoses**

To do this, disconnect the wiring harness connector and 2 air intake hose (Fig. 2.309).
Remove the 2 clamps.

Setting
Install sensor mass air flow.
Connect the intake hose.
Tighten the clamp 2 point 3.5 Nm
Connect the wiring harness connector.
Close the hood.

Removing and installing the thermostat housing (engine 2.0 l)

Withdrawal
Open the hood.
Disconnect the battery.
Disconnect the grounding connector on the grounding clamp.
Raise the car completely.
Place the bottom of the container for drainage.
Drain the coolant.

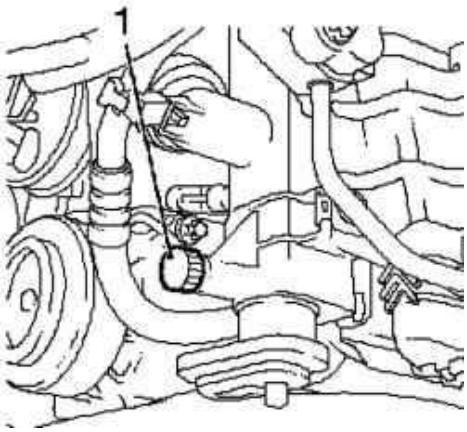


Fig. **2.311.** **Drainage bolt heatsink: 1 - bolt**

Loosen the drain bolt on the radiator (Fig. 2.311).
Collect the coolant.
Tighten the drain bolt.
Lower the car completely.
Remove the battery.

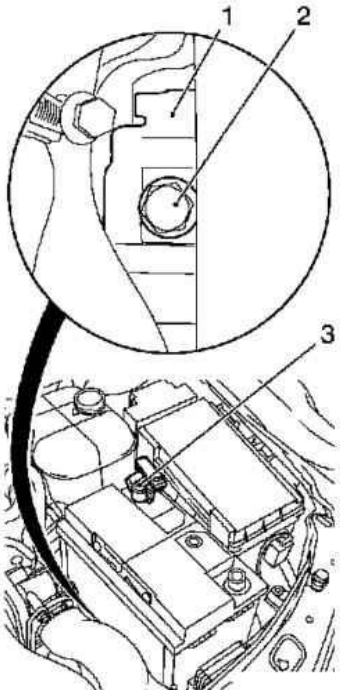


Fig. **2.312.** **Removing the battery: 1 - Bracket 2 - attachment bolt, 3 - positive terminal**

Disconnect the positive terminal from the positive terminal, remove the bracket and loosen the attachment bolt (Fig. 2.312).
Remove the battery support.

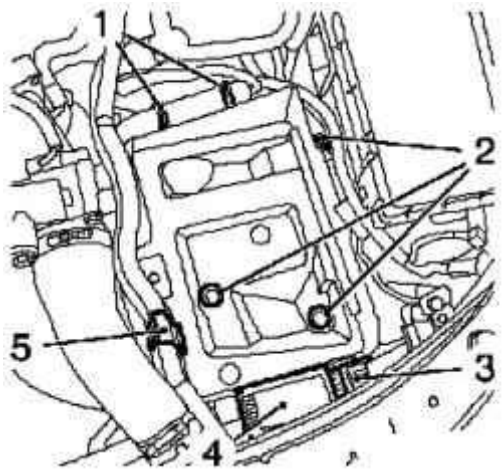


Fig. 2.313. **Removing the pre-launch heating: 1 - cable ties 2 - mounting screws, 3 - the wiring harness connector, 4 - control unit heating system pre-launch, 5 - time**

Remove the control system pre-launch heating (Fig. 2.313).
Remove the wiring harness connector.
Disconnect the coolant hose.
Remove the clamp.
Disconnect the wiring harness.
Disconnect the 2 cable ties.
Loosen the 3 bolts.
Disconnect the wiring harness coolant temperature sensor.
Disconnect the wiring harness connector.
Unleash the wiring harness.
4 Disconnect the coolant hose lifting clamps.

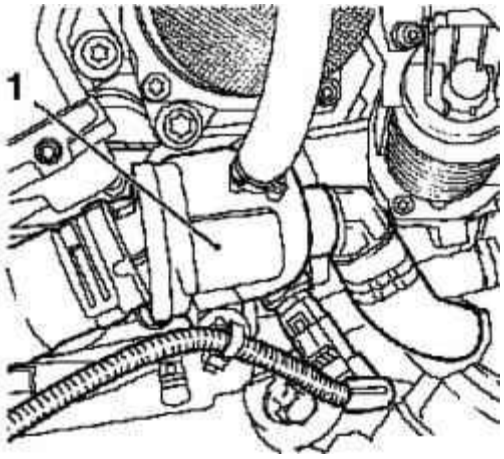


Fig. 2.314. **Housing Thermostat: 1 - body**

Remove the thermostat housing by unscrewing the two mounting screws (Fig. 2.314).
Disconnect the hose from the coolant.
Tighten the thermostat housing in a vise.

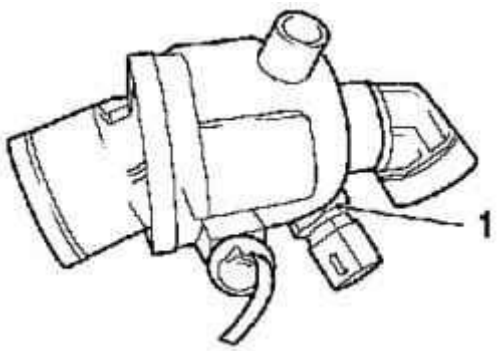


Fig. 2.315. **Coolant temperature sensor: 1 - sensor**

Remove the coolant temperature sensor (see Figure 2.315).

Setting
Replace coolant temperature sensor.
Tighten the coolant temperature sensor element 34 Nm
Set the thermostat housing.
Replace gasket.
Put the hose on the coolant.
Tighten the 2 screws fastening the moment 25 Nm
4 Connect the coolant hose.
Set 4 clamp.
Attach the wiring harness coolant temperature sensor.
Connect the wiring harness connector.
Replace the battery holder.
Tighten the 3 bolts fastening point 15 Nm
Attach the control unit of preheating.
Connect the wiring harness.
Attach a hose clamp coolant.
Attach the wiring harness.
Connect 2 cable ties.
Replace the battery pack.
Connect the battery
Attach the grounding connector to the grounding terminal.
Top up the coolant and make sure that it corresponds to the number of normal.
Program volatile memory.
Close the hood.

Exhaust system (Z 14 XEP, Z 14 XEL, Z 16 XEP)

The design of the exhaust system, engine Z 14 XEP, Z 14 and Z 16 XEL XEP Astra-H is essentially the same.

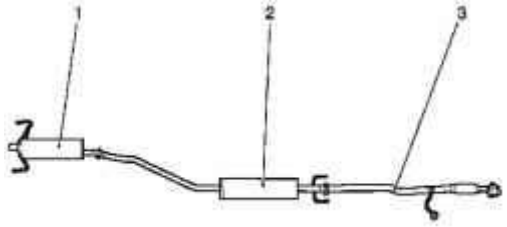


Fig. **2.316.** **The design of the exhaust system (Z 14 XEP, Z 14 XEL, Z 16 XEP): 1 - endpoint muffler with exhaust pipe and 2 - the central exhaust pipe with a central silencer, 3 - Front exhaust pipe with a flexible tube**

The chart below shows the position and location of individual components of the exhaust system (Fig. 2.316).

Exhaust system (Z18 XE)

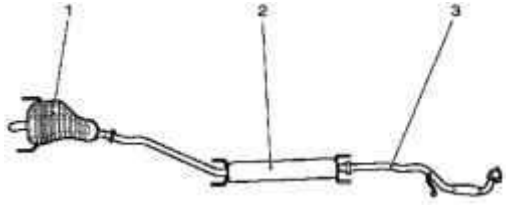


Fig. **2.317.** **The design of the exhaust system (Z 18 XE): 1 - endpoint muffler with exhaust pipe, 2 - central exhaust pipe with a central silencer, 3 - Front exhaust pipe with a flexible tube**

The chart below shows the position and location of individual components of the exhaust system (Fig. 2.317).

Exhaust system (Z 20 LEL)

Unlike engines Z 14XEP, Z 14 XEL, Z 16 and Z 18 XEP XE, exhaust system turbo engine Z 20 LEL DOHC II has an additional catalyst to the front of the exhaust pipe.

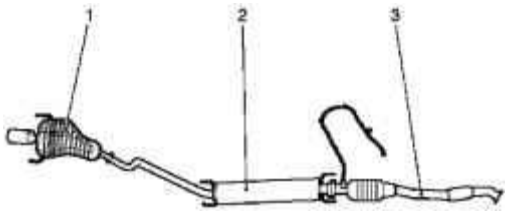


Fig. **2.318.** **The design of the exhaust system (Z 20 LEL): 1 - endpoint muffler with exhaust pipe, 2 - central exhaust pipe with a central silencer, 3 - Front exhaust pipe with a flexible tube**

The chart below shows the position and location of individual components of the exhaust system (Fig. 2.318).

Replacing a refrigerator exhaust gas recirculation (2.0 liter engine)

Withdrawal

Open the hood.
Disconnect the battery.
Disconnect the grounding connector on the grounding clamp.
Raise the car completely.

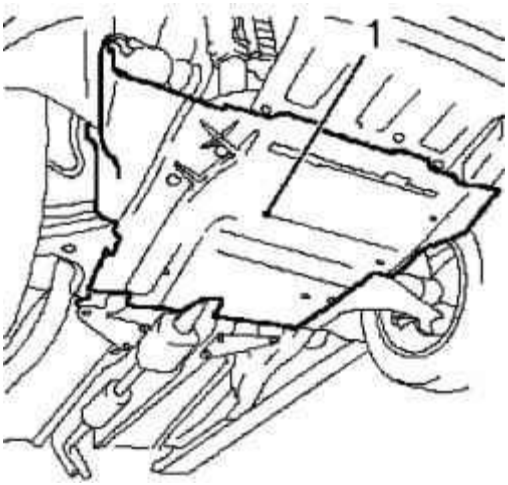


Fig. **2.319.** **Lower engine compartment lid: 1 - cover**

Remove the bottom cover of the engine compartment by unscrewing the mounting bolts 10 and removing the 4 rivets (Fig. 2.319).
Place the bottom of the container for drainage.
Drain the coolant. To do this, loosen the drain bolt on the radiator and collect coolant. Tighten the drain bolt
Lower the car completely.
Remove the engine.

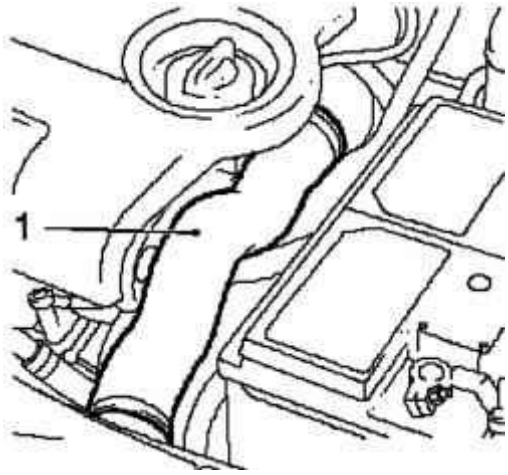


Fig. **2.320.** **Removing hose air pressurization: 1 - hose**

Remove the hose, air pressurization, removing 2 clamp (Fig. 2.320).
Remove the battery.

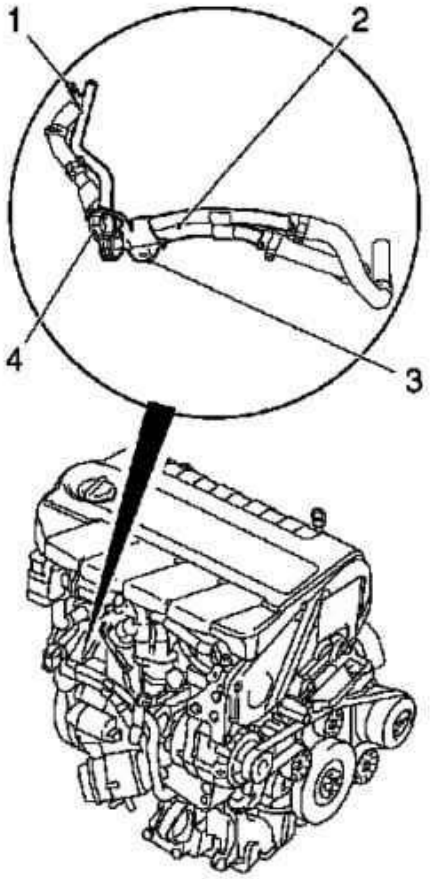


Fig. **2.321.** **Removing the pipe cooling system: 1 - screw fixing the lower rubber bearing, 2, 3, 4 - Brackets**

Remove the pipe cooling system (Fig. 2.321).
Unlock the 2 coolant hose from the bracket by removing the mounting bracket.

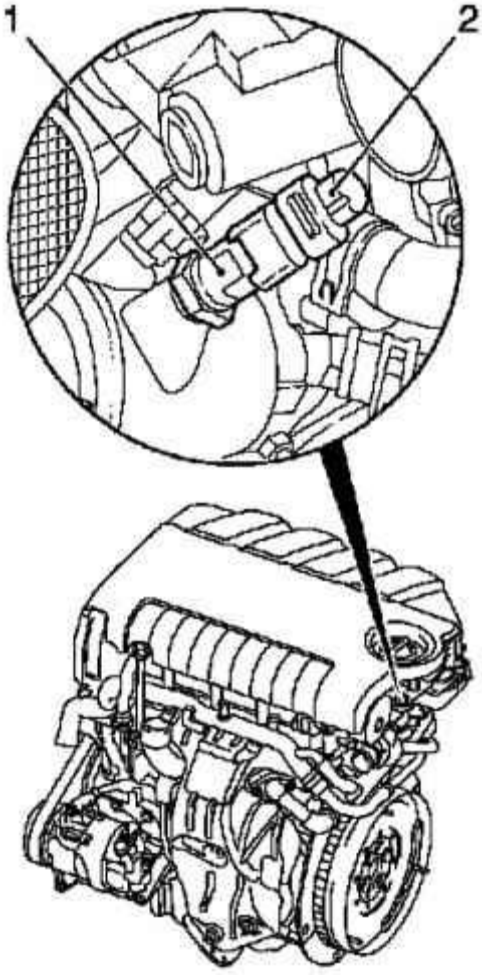


Fig. **2.322.** **Coolant temperature sensor: 1 - Sensor 2 - wiring harness connector**

Disconnect the wiring harness connector from coolant temperature sensor (see Figure 2.322).

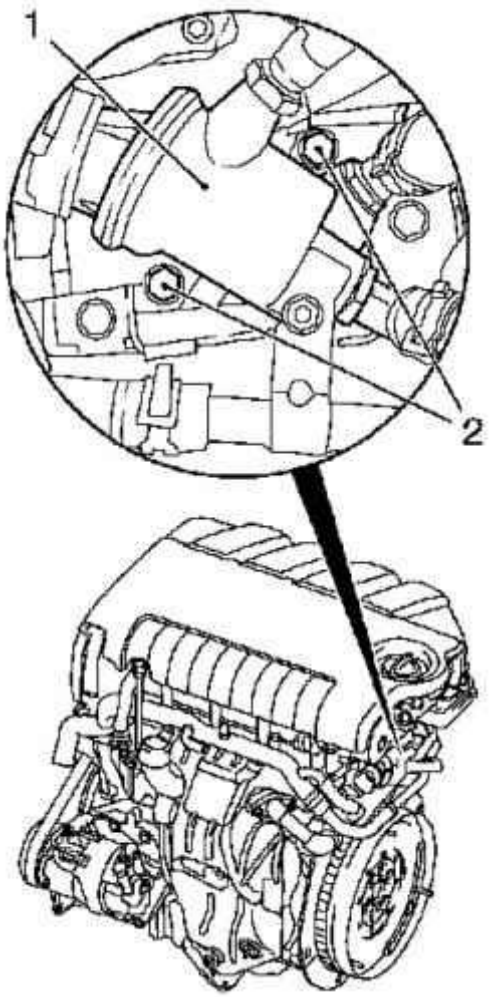


Fig. **2.323.** **Housing Thermostat: 1 - body, 2 - bolts fastening**

Remove the thermostat housing (see Figure 2.323).
4 Disconnect the coolant hose.
4 Remove the clamp and unscrew the 2 screws fastening.

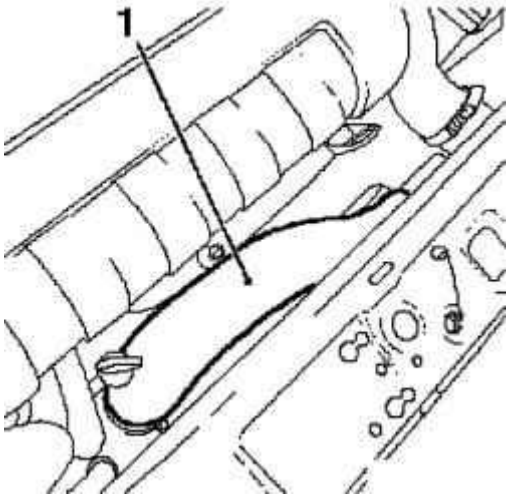


Fig. **2.324.** **Hose Air Pressurization: 1 - hose**

Remove the hose, air pressurization, removing 2 clamp (Fig. 2.324).

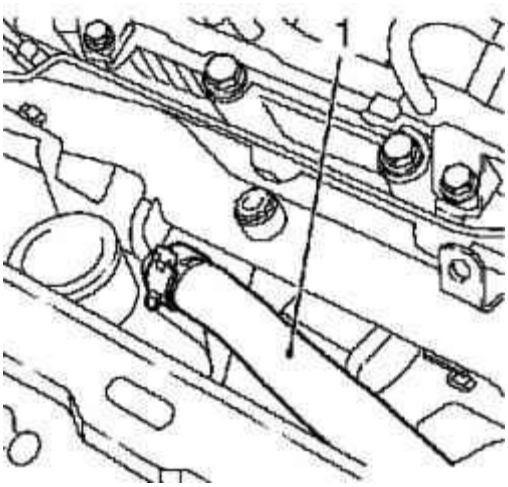


Fig. **2.325.** **Hose coolant: 1 - hose**

Disconnect the coolant hose from the pipe cooling system, removing the clamp (Fig. 2.325).

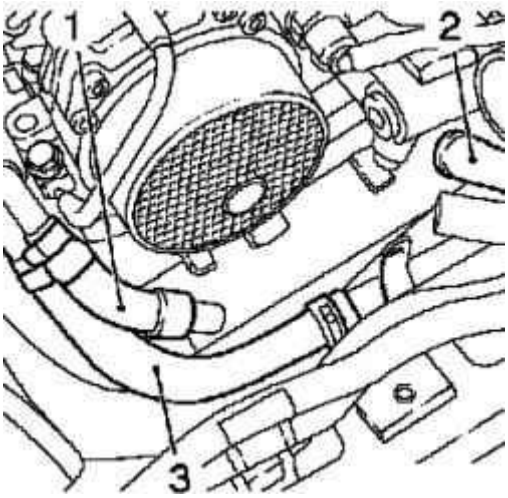


Fig. **2.326.** **Coolant hoses: 1 - hose coolant main pipe cooling system, 2 - Lower coolant hose pipe cooling system, 3 - hose coolant cooler exhaust gas recirculation**

3 Disconnect the coolant hose (Fig. 2.326).
Disconnect the coolant hose from the main pipeline of the cooling system.
Disconnect the coolant hose from the bottom of the pipe cooling system.
Disconnect the coolant hose from the exhaust gas recirculation cooler.
Disconnect the EGR tube from exhaust manifold production.
Remove refrigerator recycling of exhaust gases.
Disconnect the tube from the exhaust gas recirculation valve exhaust gas recirculation.

Setting
Set refrigerator recycling of exhaust gases.
Tighten the 2 bolts moment 25 Nm
Connect the EGR tube to the exhaust manifold.
Install a new gasket.
Tighten the 2 screws.
Tighten the clamp.
Attach the tube to the exhaust gas recirculation valve exhaust gas recirculation.
Install a new gasket.
Tighten the 2 screws.
Tighten the clamp.
3 Connect the coolant hose.
Attach the coolant hose to the upper pipe cooling system.
Attach the hose to the lower coolant pipe cooling system.
Attach the coolant hose to the refrigerator recycling of exhaust gases.
Attach the hose to the coolant pipe cooling system.
Attach the hose to the turbocharger boost air duct pressurization.
Tighten the clamp 2 point 3.5 Nm
Clean the sealing surface.
Peel 2 Threads.
Set the thermostat housing and new gasket.

NOTE
Cover the laying of the special (white) grease.

Tighten the 2 screws fastening.
4 Connect the coolant hose.
Connect the wiring harness connector coolant temperature sensor.
Install pipe cooling system.
Tighten the 3 nuts point 9 Nm
Attach the 2 coolant hose bracket
Install hose air intercooler boost choke on the throttle.
Tighten the clamp 2 point 3.5 Nm
Replace the cover of the engine.
Raise the car completely.
Install the bottom cover of the engine compartment.
Lower the car completely.
Replace the battery pack.
Connect the battery pack.
Attach the grounding connector to the grounding terminal.
Top up the coolant and make sure that it corresponds to the number of normal.
Program volatile memory.
Close the hood.

2.8. Lubrication

Replacing the oil pump (1.4 l)

Withdrawal

Before the verification procedure warming up the engine to operating temperature (oil temperature - 80 ° C).
Open the hood.
Loosen nuts and disconnect the wire from the massive battery
Remove the air filter housing and intake manifold.
Disconnect the wiring harness connector sensor mass air flow.

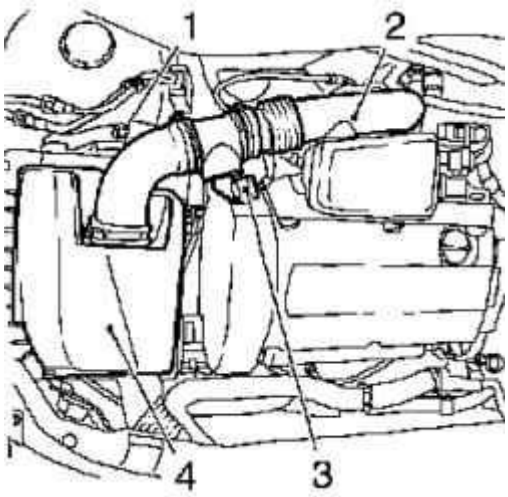


Fig. **2.327.** **Components, shooting in the dismantling of the air filter: 1 - attachment bolt, 2 - inlet manifold, 3 - the wiring harness connector sensor mass air flow, 4 - air filter housing**

Loosen the mounting bolt, remove the collar and the inlet pipe of air filter.

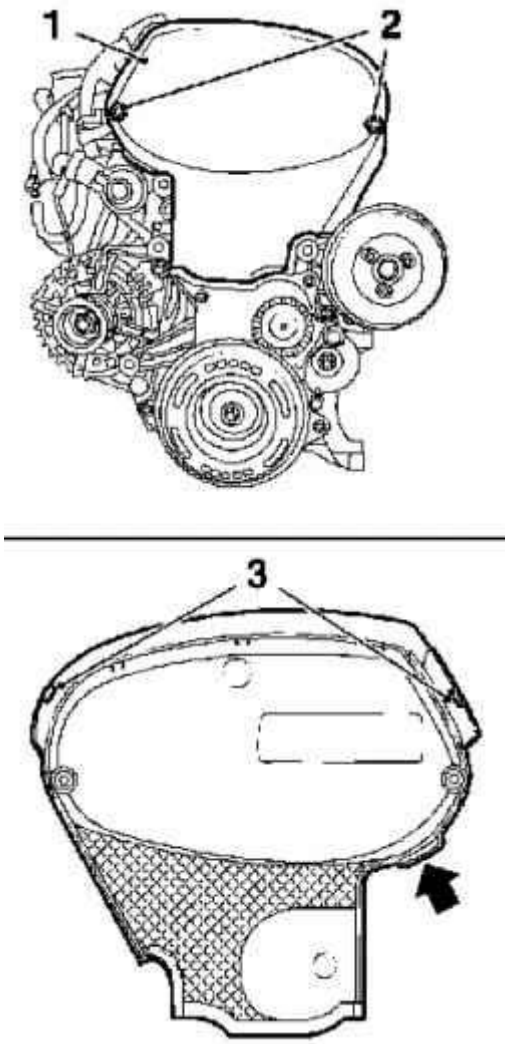


Fig. 2.328. **Mounting the front cover toothed belt: 1 - the front cover of the toothed belt 2 - mounting screws, 3 - Latch**

Loosen the two mounting screws, disconnect the upper latch and remove the front cover of the toothed belt (top) (Fig. 2.328).

NOTE
Pull the front cover of the toothed belt upwards, the protrusion (arrow in Figure 2.328).

Remove the ignition module in the direction of the arrow shown therein.

NOTE
Mark the position of arrows on the lid.

Clear Poly-V belt.
Check direction of rotation.

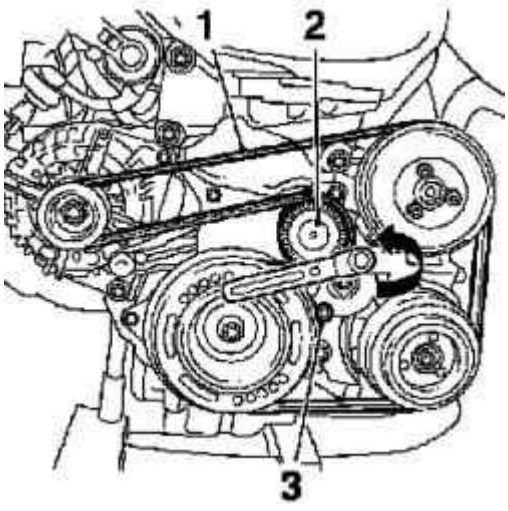


Fig. 2.329. **Removing Poly-V belt: 1 - Poly-V belt, 2 - Poly-V belt tensioner, 3 - special tool**

Squeeze the Poly-V belt tensioner in the direction of the arrows in Figure 2.329 and lock it with a special tool KM 6130.
Remove the guide tube probe for measuring the oil level.
Remove the probe.
Loosen bolts.

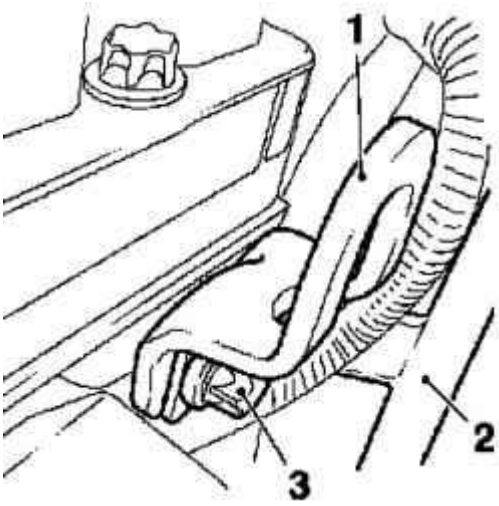


Fig. **2.330. Withdrawal of the guide tube probe for measuring the oil level and the transport engine brackets: 1 - Transportation clamp Engine 2 - guide tube probe for measuring the oil level 3 - bolts fastening**

Remove transport bracket of the engine (Fig. 2.330).
Raise the car.
Remove the engine splash guard.

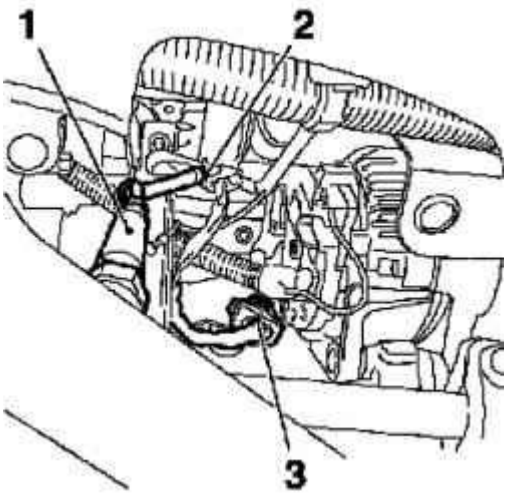


Fig. **2.331. Disconnecting the supply of oxygen sensor catalytic converter: 1 - oxygen sensor catalytic converter, 2 - wire clamps, 3 - the wiring harness connector**

Unplug the wiring harness of oxygen sensor catalytic converter (see Figure 2.331).
Remove the wire clamps.
Disconnect the wiring harness connector.

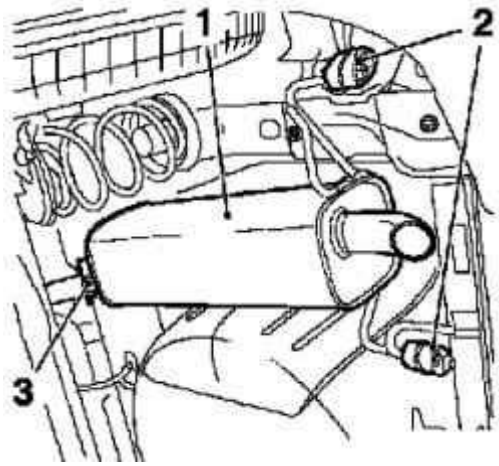


Fig. **2.332. Removing the terminal silencing: 1 - endpoint silencer, 2 - rubber bearing 3 - clamp mounting**

Remove the endpoint silencer (Fig. 2.332).
Loosen the clamp attachment.
Loosen nuts and remove the silencer from the bracket.
Remove the 2 rubber supports and remove the endpoint from the front muffler muffler.

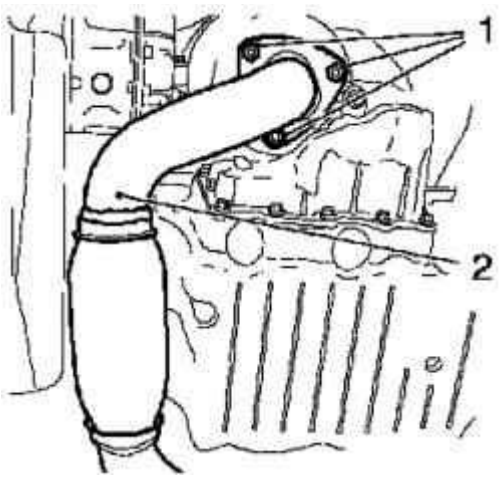


Fig. **2.333.** **Removing the terminal silencing: 1 - nuts, 2 - Front Exhaust**

Disconnect the front exhaust pipe (2) from the catalytic converter, 3 unscrewing nuts (Fig. 2.333).

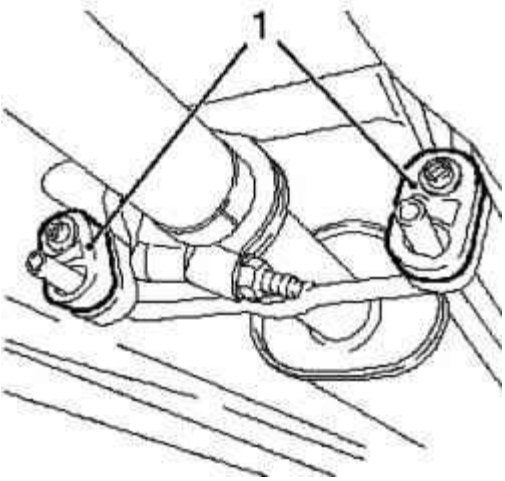


Fig. **2.334.** **Removing the front exhaust pipe: 1 - rubber bearing**

Remove the front exhaust pipe from the front silencer unplugging 2 rubber supports (see Figure 2.334).
Place the bottom of the container for collecting liquid.
Drain the engine oil.
Disconnect the wiring harness connector oil level sensor.
Remove the oil pan.
Remove the 2 rubber stoppers.
Loosen the 3 mounting bolts on the gearbox.

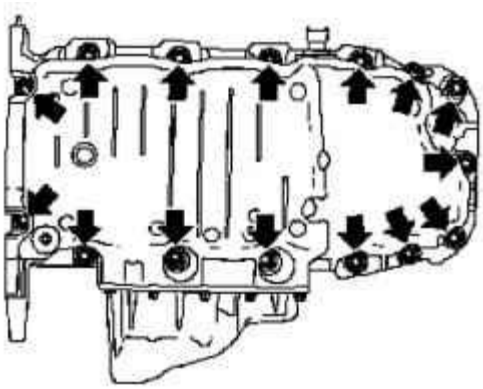


Fig. **2.335.** **Bolts fixing oil pan**

15 Loosen the mounting bolts (arrows) (Fig. 2.335).
Remove the oil pan suitable tool.
Remove the alternator from the power supply by unscrewing 2 nuts.
Remove the 2 bolts.

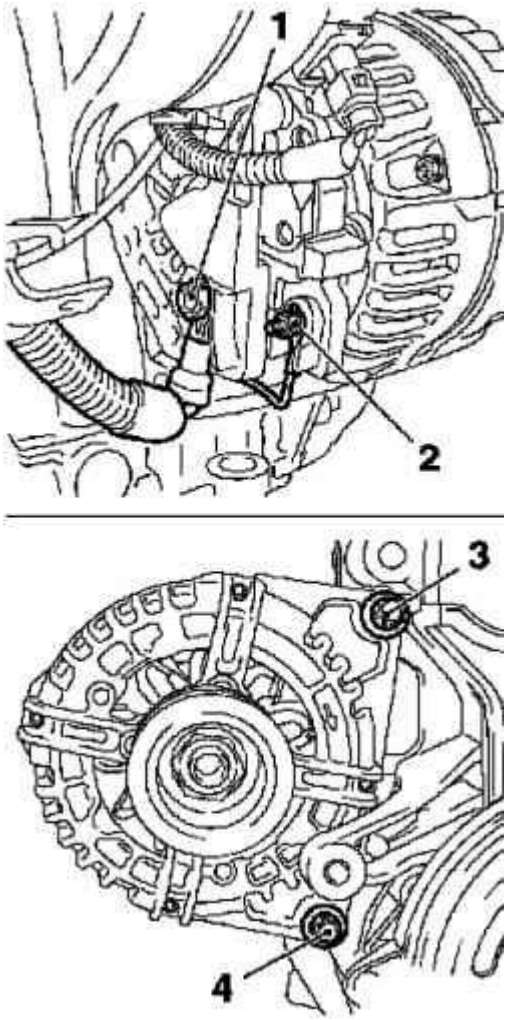


Fig. **2.336.** **Mounting generator: 1, 2 - nuts power; 3,4 - Bolting**

Remove the alternator (see Figure 2.336).
Remove the cap.

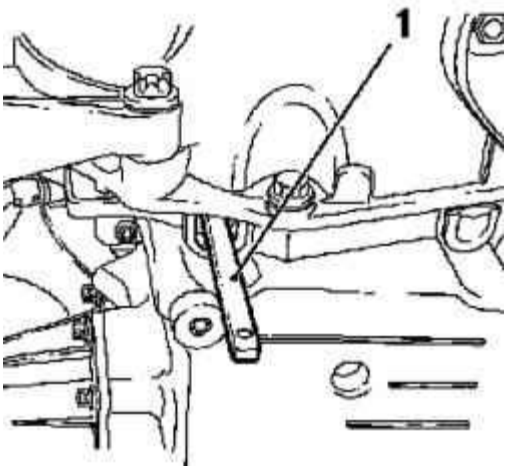


Fig. **2.337.** **Lock the flywheel: 1 - special tool**

Insert the special tool KM-911 and lock the flywheel (Fig. 2.337).
Remove the snubber by unscrewing bolts.

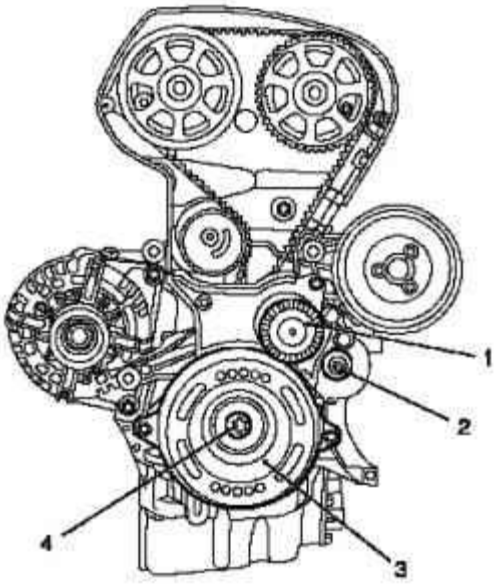


Fig. **2.338.** **Removing Poly-V belt: 1 - Poly-V belt tensioner, 2 - attachment bolt 3 - snubber, 4 - bolt mount**

Remove the tensioner Poly-V belt by unscrewing the bolt fastenings (Fig. 2.338).
Poly-V belt tensioner is locked with a special tool KM 6130.

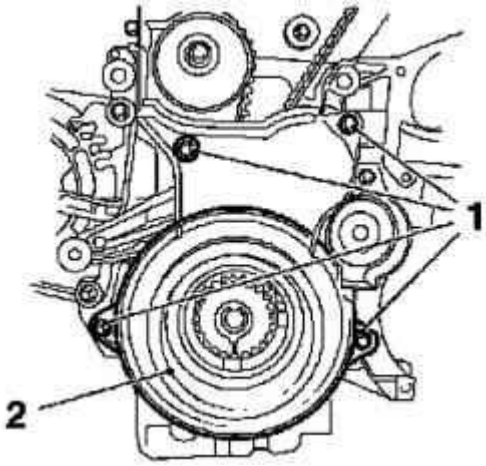


Fig. **2.339.** **Mounting the front cover toothed belt: 1 - mounting screws, 2 - the front cover of the toothed belt**

Remove the front cover of the toothed belt (bottom) by unscrewing 4 bolts fastening (Fig. 2.339).
Install the engine in TDC.
Remove the special tool KM 911.
Tighten the bolt snubber.

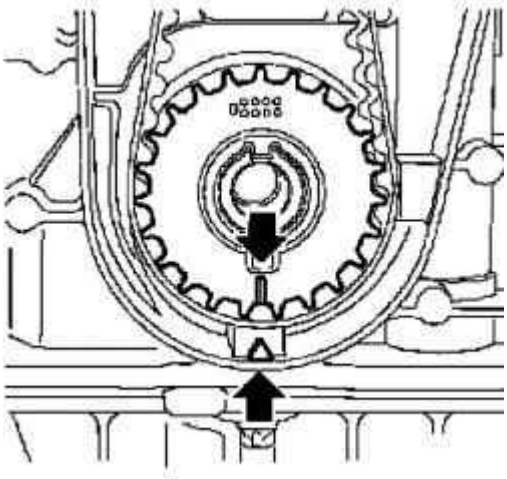


Fig. **2.340.** **Installing piston cylinder number 1 in the position of top dead center**

Rotate the crankshaft of the engine in the direction of rotation, set the piston cylinder number 1 in the position of top dead center (TDC) (arrow) (Fig. 2.340).

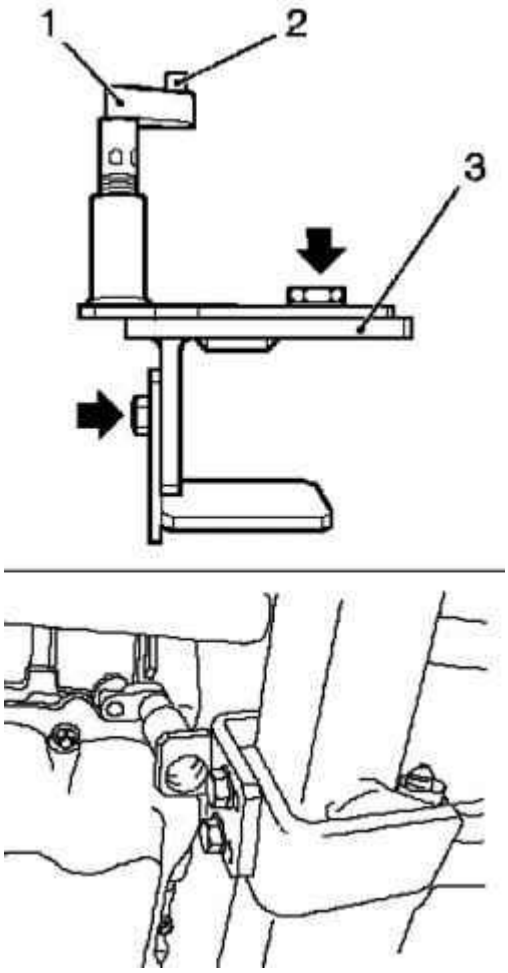


Fig. **2.117.** **Installation support the front axle: 1 - prop, 2 - neck, 3 - a special device**

Insert special device KM-6173 (Fig. 2.117).

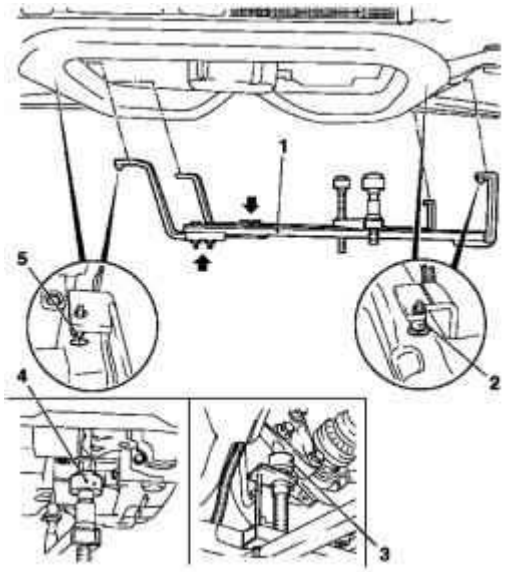


Fig. **2.118.** **Installation of a special device KM-6001-A on the housing front axle: 1 - a special device, 2, 5 - neck, 3 - rear support 4 - front support**

Attach the KM-6001-A (Fig. 2.118).

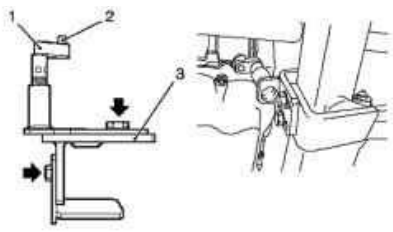


Fig. **2.341.** **Installation support the front axle: 1 - prop, 2 - neck, 3 - a special device**

NOTE
Using the KM-6001-A ensures alignment with the drive housing the front axle.

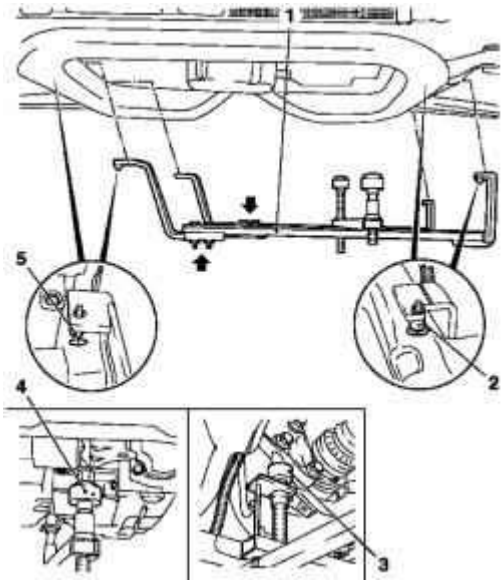


Fig. 2.342. **Installation of a special device KM-6001-A on the housing front axle: 1 - a special device, 2, 5 - neck, 3 - rear support 4 - front support**

Loosen the 3 bolts (arrows) in the adjustment tires.

Insert special device KM-6001-A.
Necks should be in the holes to the front axle housing.
Tighten the 3 bolts fastening the adjustment in the tires.
Adjust the support and lift them to the constraints on the neck guides.
Tighten the 3 regulatory stud.

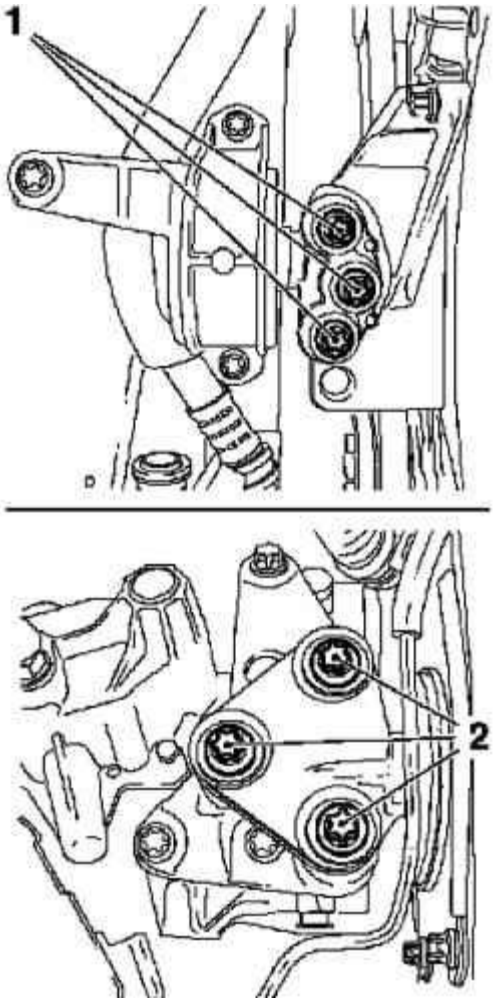


Fig. 2.343. **Left and right damping blocks: 1, 2 - bolts fixing**

Adjust the support - front and rear (Fig. 2.343).
Raise your legs to the limiter on the neck guide.

NOTE
Cervical guide must be placed on piers without a gap.

Lower car
Remove damping engine block with the right adapter damping unit by unscrewing 6 mounting bolts (see Fig. 2.343).

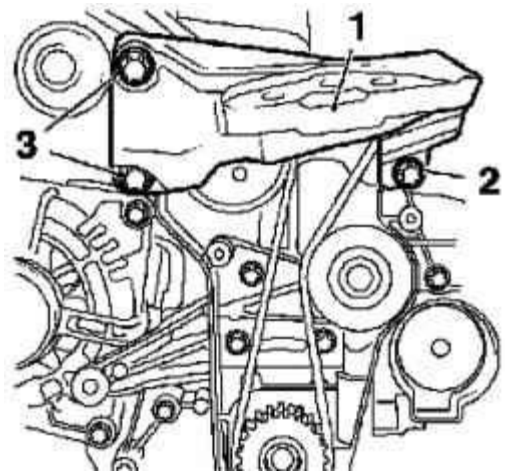


Fig. **2.344.** **Mounting right support damping engine block: 1 - right bearing damping block, 2, 3 - bolts fastening**

Remove the right support damping engine block, turn away 3 fixing screws (Fig. 2.344).
Install camshaft gears, using a special tool KM 6340.

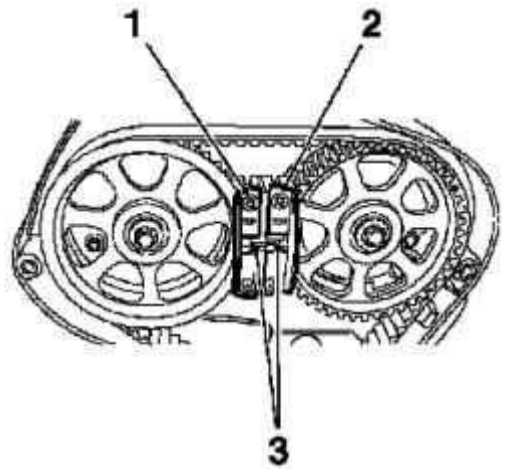


Fig. **2.345.** **Installing camshaft star: 1 - a special tool, 2 - a special tool, 3 - tags**

Install asterisk camshaft so that the label (3) were located opposite each other (Fig. 2.345).
Install special tool KM-6340-left the star camshaft drive the intake valves (I).
Install special tool KM-6340 rules.
Remove the timing belt, mark direction of rotation.

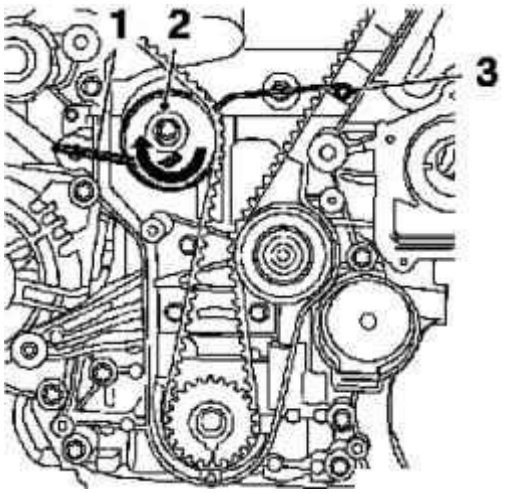


Fig. **2.346.** **Removing toothed belt: 1 - Allen Key 2 - toothed belt tension roller, 3 - special tool**

Apply force to the toothed belt tension roller in the direction of the arrow, using the Allen key. Fix the with a special tool KM 6333 (Fig. 2.346).

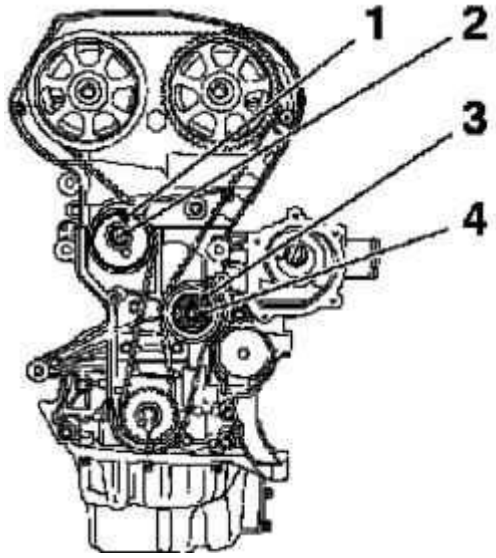


Fig. **2.347.** **Removing the tensioner and guide rollers toothed belt: 1 - tension roller, 2, 4 - mounting screws, 3 - guide roller**

Remove the tensioner and guide rollers toothed belt (Fig. 2.347).

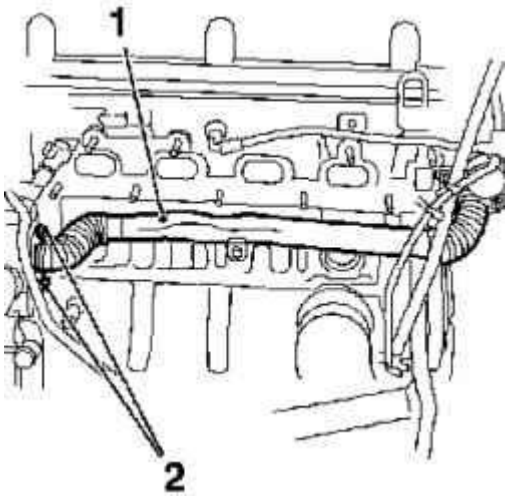


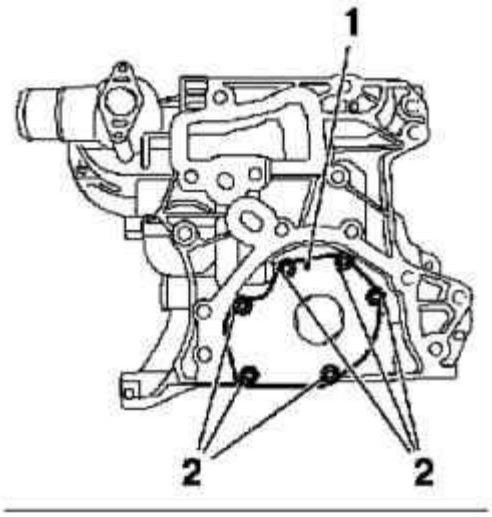
Fig. **2.348.** **Removing the pipe cooling system: 1 - pipe cooling system, 2 - bolts fastening**

Remove the piping of the cooling system by unscrewing 2 screws fastening (Fig. 2.348).
Remove the pump module by unscrewing 8 mounting bolts.

NOTE
Bolts are different lengths.

Remove the crankshaft oil seal (front) a suitable tool.

Test
Check the distance between the outer rotor and the pump module.



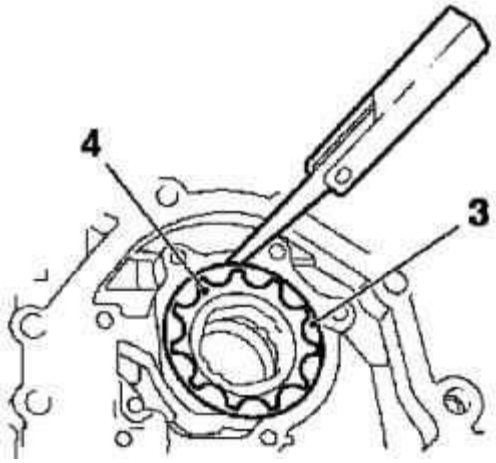


Fig. **2.349.** **Checking the oil pump: 1 - cover oil pump, 2 - mounting screws, 3 - external rotor, 4 - inner rotor**

Remove the oil pump (Fig. 2.349).
Check the distance between the outer rotor and oil pump housing.
Remove the outer rotor with inner rotor.
Visually check nodes.

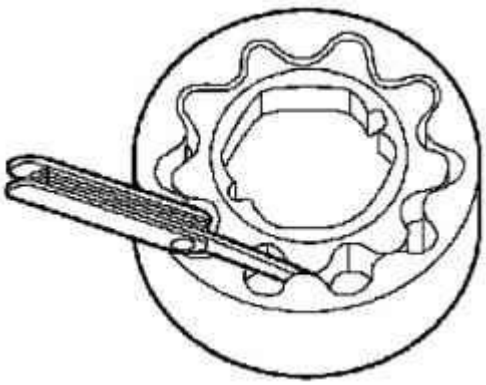


Fig. **2.350.** **Measuring the gap between the inner and outer rotor**

Measure the clearance between the inner and outer rotor (Fig. 2.350).

Setting
Replace the cover oil pump.
Tighten the mounting bolts 6 point 8 Nm
Replace the pump module.

NOTE
The screws are different lengths.

8 Tighten the mounting bolts moment 20 Nm
Insert the front O-ring of the crankshaft.

Clean the sealing surfaces.
Apply sealant to the edge silicone grease (white).

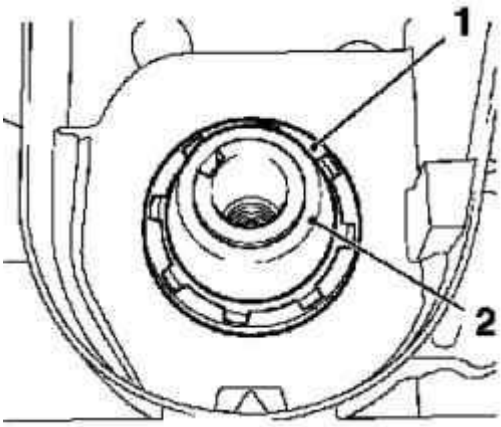


Fig. **2.351. Install the seal ring of the crankshaft and a protective sleeve: 1 - O-ring of the crankshaft 2 - protective sleeve**

Install a protective sleeve on the neck of the crankshaft (Fig. 2.351).
Put O-ring shifting it to a protective sleeve on the neck of the crankshaft.
Push the O-ring in the crankshaft.

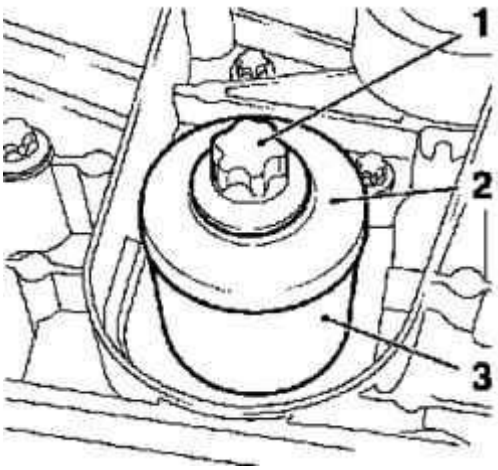


Fig. **2.352. Heat sealing ring: 1 - pin 2 - Disc 3 - a special tool**

Remove the protective sleeve and zapressuyte O-ring in the sump pump with a special tool KM 6351 (Fig. 2.352).
Use a bolt and washer drive gears of the crankshaft.
Install the remaining components is in reverse order of removal.

2.9. Tables

Table 2.1 Specifications petrol engine Z 18 XER DOHC-I

Параметр	*Технические характеристики*
Двигатель	Z18XER
Рабочий объем, см³	1796
Диаметр цилиндра, мм	80,5
Ход поршня, мм	88,2
Степень сжатия	10,5:1
Расстояние между цилиндрами, мм	86,0
Мощность/ частота вращения, кВт/ мин⁻¹	103/ 6300
Крутящий момент/ частота вращения, Н·м/ мин⁻¹	175/ 3800
Угол регулировки впускных/выпускных клапанов, °С	60/ 45
Нейтрализатор	Регулируемый
Масса (DIN70020), кг	121
Система управления двигателя	Simtec 75.1
Нормирование выбросов вредных веществ с отработавшими газами	Евро 4

Table 2.2 Validation and tuning values - DOHC-I (engine volume 1.4 liters)

Двигатель	*Z14XEP*	*Z14XEL*
Частота вращения на холостом ходу (АКПП), мин⁻¹	750–970	
Максимальная частота вращения, мин⁻¹	6200	
Зазор между электродами свечи зажигания, мм	0,85–0,95	
Компрессия, кПа	1400–1600	
Потеря давления	Не более 25% на цилиндр	
Клапанный зазор, мм	0	

Table 2.3 Validation and tuning values - DOHC-I (engine volume 1.6 liters)

Двигатель	*Z16XEP*
Частота вращения на холостом ходу (МКПП), мин⁻¹	710–930
Максимальная частота вращения, мин⁻¹	6000
Зазор между электродами свечи зажигания, мм	1,30–1,40
Компрессия, кПа	1400–1600
Потеря давления	Не более 25% на цилиндр
Клапанный зазор, мм	
Впуск	0,21–0,29
Выпуск	0,26–0,35

Table 2.4 Validation and tuning values - DOHC-I (engine volume 1.8 liters)

Двигатель	*Z18XE*
Частота вращения на холостом ходу (АКПП), мин⁻¹	710–930
Максимальная частота вращения, мин⁻¹	6400
Зазор между электродами свечи зажигания, мм	0,9–1,1
Компрессия, кПа	1400–1600
Потеря давления	Не более 25% на цилиндр
Клапанный зазор, мм	0

Table 2.5 Validation and tuning values - DOHC-I (engine capacity of 2,0 l)

Двигатели	*Z 20 LEL, Z 20 LER, Z 20 LEH*
Частота вращения на холостом ходу (МКПП), мин$^{-1}$	700–900*
Максимальная частота вращения, мин$^{-1}$	6400
Зазор между электродами свечи зажигания, мм	0,9–1,1
Компрессия, кПа	1100–1400**
Потеря давления	Не более 25% на цилиндр
Клапанный зазор, мм	0

** Checking and adjustment using TECH2 in accordance with the instruction.*
*** Spread pressure on the cylinders must not exceed 100 kPa.*

Table 2.6 Poly-V belt - valve gear (engine volume 1.4 liters)

Двигатель	*Z14XEP, Z14XEL*
Длина ремня	
без системы кондиционирования воздуха	1230
с системой кондиционирования воздуха	1368
Натяжение ремня	Автоматическое

Table 2.7 Poly-V belt - valve gear (engine volume 1.6 liters)

Двигатель	*Z16XEP*
Длина ремня	
без системы кондиционирования воздуха	1450
с системой кондиционирования воздуха	1546
Натяжение ремня	Автоматическое

Table 2.8 Poly-V belt - valve gear (engine volume 1.8 liters)

Двигатель	*Z18XE*
Длина ремня	
без системы кондиционирования воздуха	940
с системой кондиционирования воздуха	1212
Натяжение ремня	Автоматическое

Table 2.9 Poly-V belt - valve gear (engine capacity of 2,0 l)

Двигатель	*Z 20 LEL, Z 20 LER, Z 20 LEH*
Длина ремня с системой кондиционирования воздуха	1680
Натяжение ремня	Автоматическое

Table 2.10 Specifications (engine volume 1.4 liters)

Параметр	*Технические характеристики*	
Двигатель	Z14XEP	Z14XEL
Цилиндры/ Расположение	4, рядное	
Число клапанов	16	
Рабочий объем, см³	1364	
Диаметр цилиндра, мм	73,4	
Ход поршня, мм	80,6	
Мощность, кВт/ мин⁻¹	66/ 5600	55/ 5200
Крутящий момент, Н·м/ мин⁻¹	125/ 4000	120/ 3800
Компрессия	10.5:1	
Стандарт по выбросам вредных веществ с отработавшими газами	Euro 4	

Table 2.11 Specifications (engine volume 1.6 liters)

Параметр	*Технические характеристики*
Двигатель	Z16XEP
Цилиндры/ Расположение	4, рядное
Число клапанов	16
Рабочий объем, см³	1598
Диаметр цилиндра, мм	79
Ход поршня, мм	81,5
Мощность, кВт/ мин⁻¹	77/ 6000
Крутящий момент, Н·м/ мин⁻¹	150/ 3900
Компрессия	10,5:1
Стандарт по выбросам вредных веществ с отработавшими газами	Euro 4

Table 2.12 Specifications (engine volume 1.8 liters)

Параметр	*Технические характеристики*
Двигатель	Z18XE
Цилиндры/ Расположение	4, рядное
Число клапанов	16
Рабочий объем, см³	1796
Диаметр цилиндра, мм	80,5
Ход поршня, мм	88,2
Мощность, кВт/ мин⁻¹	92/ 5600
Крутящий момент, Н·м/ мин⁻¹	170/ 3800
Компрессия	10,5:1
Стандарт по выбросам вредных веществ с отработавшими газами	Euro 4

Table 2.13 Specifications (engine capacity of 2,0 l)

Параметр	*Технические характеристики*		
Двигатель	*Z 20 LEL*	*Z 20 LER*	*Z 20 LEH*
Цилиндры/ Расположение	4, рядное	4, рядное	4, рядное
Число клапанов	16	16	16
Рабочий объем, $см^3$	1998	1998	1998
Диаметр цилиндра, мм	86	86	86
Ход поршня, мм	86	86	86
Мощность, кВт/ $мин^{-1}$	125/ 5200	147/ 5400	177/ 5600
Крутящий момент, Н·м/ $мин^{-1}$	250/ 1950–5300	262/ 1950–5300	320/ 2400–5000
Компрессия	8,6:1	8,6:1	8,6:1
Стандарт по выбросам вредных веществ с отработавшими газами	Euro 4/ D4	Euro 4/ D4	Euro 4/ D4

Table 2.14 toothed belt (engine volume 1.6 liters)

Двигатель	*Z16XEP*
Зубчатый ремень*	
Число зубьев	146
Ширина, мм	24
Шаг, мм	8
Натяжение ремня	Автоматическое

** Check the label on the date the replacement strap.*

Table 2.15 toothed belt (engine volume 1.8 liters)

Двигатель	*Z18XE*
Зубчатый ремень*	
Число зубьев	162
Ширина, мм	20
Шаг, мм	8
Натяжение ремня	Автоматическое

** Check the label on the date the replacement strap.*

Table 2.16 Recommended tightening torques threaded

Компонент	*Момент затяжки, Н·м*
Клапан системы рециркуляции к головке блока цилиндров	8
Приводной вал к ступице колеса	150 – 45°+250
Стартер к блоку цилиндров	25
Выпускной коллектор к головке блока цилиндров	15*
Кронштейн аккумуляторной батареи к кузову	15
Крышка насоса системы охлаждения	8
Крышка масляного фильтра к корпусу масляного фильтра	15
Дроссельная заслонка к впускному коллектору	8
Впускной коллектор к головке блока цилиндров	10
Опора к крышке насоса системы охлаждения	10
Направляющая к блоку цилиндров	8
Кронштейн акселератора к стойке	12
Генератор к передней крышке и блоку цилиндров	35
Коробка передач к блоку цилиндров	45
Направляющая к головке блока цилиндров	8
Основание блока цилиндров к блоку цилиндров (М6)	10 +60° +15°**
Основание блока цилиндров к блоку цилиндров (М8)	25 +60° +15°**
Левая опора демпфирующего блока двигателя к коробке передач	35
Левая опора демпфирующего блока двигателя к блоку цилиндров	50
Каталитический нейтрализатор к кронштейну	20
Кронштейн задней опоры демпфирующего блока двигателя к коробке передач	80
Кронштейн левого демпфирующего блока двигателя к опоре демпфирующего блока	55
Кронштейн левого демпфирующего блока двигателя к демпфирующему блоку	55
Кронштейн правого демпфирующего блока двигателя к опоре демпфирующего блока	55
Кронштейн правого демпфирующего блока двигателя к демпфирующему блоку	55
Теплоизолирующий экран к выпускному коллектору	8
Датчик импульсов коленвала к основанию блока цилиндров	8
Диск датчика импульсов коленвала к коленвалу	15
Линия хладагента к осушителю	20
Линия хладагента к линии хладагента	20
Каталитический нейтрализатор к выпускному коллектору	35
Натяжитель поликлинового ремня к корпусу привода газораспределительного механизма (М10)	55
Натяжитель поликлинового ремня к корпусу привода газораспределительного механизма (М8)	20
Натяжитель цепи к головке блока цилиндров	8
Датчик детонации к блоку цилиндров	20
Топливная рампа к впускному коллектору	8
Топливопровод к распределителю топлива	15
Кронштейн радиатора к переднему подрамнику	15
Насос системы охлаждения к корпусу привода газораспределительного механизма	8
Датчик кислорода к выпускному коллектору	40
Передний датчик кислорода каталитического нейтрализатора	40
Задний демпфирующий блок двигателя к кронштейну	55
Задний демпфирующий блок двигателя к переднему подрамнику	55
Левый демпфирующий блок двигателя к кузову	20
Правый демпфирующий блок двигателя к кузову	35
Передний демпфирующий блок двигателя к коробке передач	80

** Two passes*
*** Use new bolts*

Table 2.17 Cooling system (engine 1.4 l)

Двигатели	*Z14XEP, Z14XEL*
Заправочный объем* МКПП	
без системы кондиционирования воздуха	5,6
с системой кондиционирования воздуха, л	5,6
Тип насоса охлаждающей жидкости	Центробежный
Расход**, л/ мин (мин⁻¹)	120 (6000)
Тип термостата	байпас
Начало открытия, °С	92

** Use only antifreeze 19 40 656 / 90 297 545 (blue) to MY 2001 and only antifreeze 19 40 650 / 09 194 431 (red) from MY 2001 to 50% with water.*
*** When coolant temperature 20 ° C / 68 ° F.*

Table 2.18 Cooling system (engine 1.6 l)

Двигатели	*Z16XEP*
Заправочный объем* МКПП	
без системы кондиционирования воздуха	6,1
с системой кондиционирования воздуха, л	6,3
Тип насоса охлаждающей жидкости	Центробежный
Расход**, л/ мин (мин⁻¹)	160 (6000)
Тип термостата	Управляемый
Начало открытия, °С	
электрическое	90
температурное	105

** Use only antifreeze 19 40 650 / 09 194 431 (red) in 50% mixture with water.*
*** When coolant temperature 20 ° C.*

Table 2.19 Cooling system (engine 1.8 l)

Двигатели	*Z18XE*
Заправочный объем* МКПП	
без системы кондиционирования воздуха	6,5
с системой кондиционирования воздуха, л	6,8
Заправочный объем* АКПП	
без системы кондиционирования воздуха	6,4
с системой кондиционирования воздуха, л	6,7
Тип насоса охлаждающей жидкости	Центробежный
Расход**, л/ мин (мин⁻¹)	146 (6000)
Тип термостата	байпас
Начало открытия, °С	92

** Use only antifreeze 19 40 656 / 90 297 545 (blue) to MY 2001 and only antifreeze 19 40 650 / 09 194 431 (red) from MY 2001 to 50% with water.*
*** When coolant temperature 20 ° C / 68 ° F.*

Table 2.20 Cooling system (engine 2.0 l)

Двигатели	*Z 20 LEL, Z 20 LER, Z 20 LEH*
Заправочный объем* МКПП с системой кондиционирования воздуха, л	7,7
Тип насоса охлаждающей жидкости	Центробежный
Расход**, л/ мин (мин$^{-1}$)	150 (6000)
Тип термостата	байпас
Начало открытия, °С	92

** Use only antifreeze 19 40 650 / 09 194 431 (red) in 50% mixture with water.*
*** When coolant temperature 20 ° C.*

Table 2.21 Lubrication system (1.4 liter engines)

Двигатель	*Z 14 XEP, Z 14 XEL*
Заправочный объем, л	
с масляным фильтром	3,5
без масляного фильтра	3,15
уровень масла между метками «min» и «max»	1,0
Качество масла (минимальные требования)	
ECOService-Flex	GM-LL-A-025
ECOService	ACE A A3/ B3
Вязкость масла (минимальные требования)	
ECOService-Flex	0W-X, 5W-X (X = 30, 40)
ECOService	0W-X, 5W-X, 10W-X (X greater than or equal to 30)
Утилизация масла	В соответствии с требованиями местного законодательства
Масляный насос	Роторный
Зазор между роторами и верхней частью корпуса	0,020–0,065
Давление масла*, кПа	150
Расход масла в двигателе, л/1000 км	0,6

Table 2.22 Lubrication (Engine 1,6 l)

Двигатель	*Z 16 XEP*
Заправочный объем, л	
с масляным фильтром	4,0
без масляного фильтра	3,75
уровень масла между метками «min» и «max»	1,0
Качество масла (минимальные требования)	ACE A A3 / B3, GM-LL-A-025
Вязкость масла (минимальные требования)	SAE 0W-X*, 5W-X*, or 10W-X*
Утилизация масла	В соответствии с требованиями местного законодательства
Масляный насос**	Роторный
Давление масла, кПа	130
Расход масла в двигателе, л/1000 км	0,6

** «X» is greater than or equal to 30.*
*** The engine warmed up and running at idle.*

Table 2.23 Lubrication system (1.8 liter engines)

Двигатель	*Z 18 XE*
Заправочный объем, л	
с масляным фильтром	4,25
без масляного фильтра	4,0
уровень масла между метками «min» и «max»	1,0
Качество масла (минимальные требования)	ACE A A3 / B3
Вязкость масла (минимальные требования)	SAE 0W-X*, 5W-X*, or 10W-X*
Утилизация масла	В соответствии с требованиями местного законодательства
Масляный насос**	Роторный
Давление масла, кПа	140
Расход масла в двигателе, л/1000 км	0,6

** «X» is greater than or equal to 30.*
*** The engine warmed up and running at idle.*

Table 2.24 Lubrication system (2.0 liter engines)

Двигатель	*Z 20 LEL, Z 20 LER*	*Z 20 LEH*
Заправочный объем, л		
с масляным фильтром	4,25	5,0
без масляного фильтра	4,0	4,0
уровень масла между метками «min» и «max»	1,0	1,0
Качество масла (минимальные требования)	ACE A A3 / B3	
Вязкость масла (минимальные требования)	SAE 0W-X*, 5W-X*, or 10W-X*	
Утилизация масла	В соответствии с требованиями местного законодательства	
Масляный насос**	Двуцентровый насос	
Давление масла, кПа	180–260	
Расход масла в двигателе, л/1000 км	0,6	

** «X» is greater than or equal to 30.*
*** The engine warmed up and running at idle.*

3. Transmission

3.1. Strength

General

At Opel Astra cars with manual gearbox set the single-plate dry clutch with overlays do not contain asbestos, and dvuhmassovym flywheel. Management is carried out through a hydraulic clutch. Vehicles equipped with automatic hydraulic multi-plate clutch.

During the operation does not require maintenance of cohesion, as well as in his work, worn out parts of the linings themselves aligned. The replacement slave clutch disc to hold approximately 100 000 km, but this largely depends on the load condition of the car.

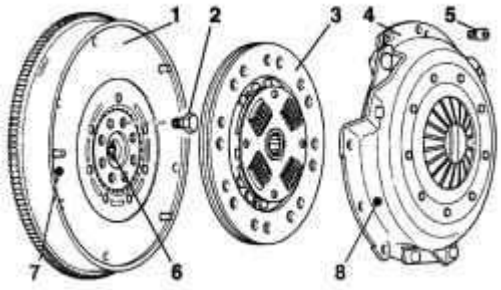


Fig. **3.1.** **Clutch Components: 1 - Handwheel, 2 - attachment bolt flywheel, 3 - slave drive, 4 - pressure plate, 5 - bolt mounting pressure plate, 6 - bearing clutch, 7 - marking combination flywheel, 8 - marking combination of pressure plate**

Depending on engine model and type of gear coupling design may vary slightly (see Figure 3.1).

Flywheel

Flywheel rigidly connected to the crankshaft of the engine. Dvuhmasso-headed drum is using spring-damper system provides maximum damping of torsional vibrations.

Led and pressure plate

Led by the disc is placed on the primary shaft of the gearbox. On both sides of him riveted lining. Push the disc through the diaphragm mennuyu spring and clutch housing rigidly connected to the flywheel. Push the disc is pressed for the slave drive to the flywheel. The surface of the screw drive suitable corrosion compound. When cleaning the pressure plate must handle only its surface - so you extend the life of clutch.

Bearing clutch

Bearing clutch slave drive provides an exemption from the lead in pressing the clutch pedal.

The flow of hydraulic clutch (gearbox - F13 / F17 + / F23 / M20 / M32)

NOTICE
Use only brake fluid DOT 4.

The hydraulic clutch is pumped only "bottom", that is pumped through the valve. For this purpose the device is used to remove air from the hydraulic brakes.

NOTICE
Manual pumping is not allowed.
Follow instructions when using the production device for removing air from the brakes.
Device for removing air from the brake should provide pressure around 2 bar.

Hardware Installation

Connect the device to remove air from the hydraulic drive. To do so, attach the adapter device for removing air from the brakes to Backa hydraulic brake system. Install special tool MKM-6174-2 on the adapter.

Lower the end of the hose into a suitable container.

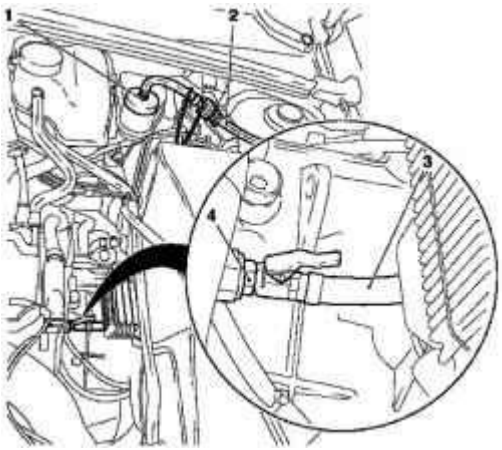


Fig. **3.2.** **The flow of hydraulic clutch: 1 - Adapter 2 - a special tool MKM-6174-2, 3 - a special tool MKM-6174-1, 4 - valve pumping**

Remove the valve cap from the valve pumping and attach a special tool MKM-6174-1 to the valve pumping (Fig. 3.2).
Remove air from the clutch.
Turn on the device for removing air from the hydraulic drive.
Open the valve pumping (2-3 overleaf).
Pump to release the brake fluid without bubbles.
Close (by hand) valve pumping.

Removing device
Unplug the device for removing air from the hydraulic drive. Disconnect the adapter device for removing air from the hydraulic drive.

NOTICE
Must take the following steps to fill the discharge line transmission housing of the working cylinder clutch. When pumping, make sure the tank is filled with hydraulic brake system.

Remove air from the discharge line of the working cylinder clutch.
Install special tool MKM-6174-2 at MKM-6174-1 on the valve pumping, lower the free end in a suitable container
Press and hold the clutch pedal.
Open the valve pumping.
Open the valve before pumping air and / or a mixture of air / brake fluid.
Close (by hand) valve pumping.
Slowly release the clutch pedal and wait approximately 5 seconds.
Repeat the procedure four times.
Tighten the valve point pumping 5 Nm
Remove the special tools MKM-6174-1, and MKM-6174-2.
Remove the cap from the valve pumping.
Fill the tank hydraulic clutch brake fluid to the mark «MAX».
Close the tank hydraulic brake system.
Check the opening pressure of the clutch pedal.
Check to include all gear with the engine running and clutch depressed.

NOTE
Take a test drive to ensure precise work the clutch and braking. The trip was spend with different speeds and frequent gear changes to achieve operating temperatures.

Removal, inspection and installation of hard plates and the driven clutch plate (without SAC)

NOTE
To prevent damage to the petals spring thrust plate use a special device KM-6263 after removal and installation.

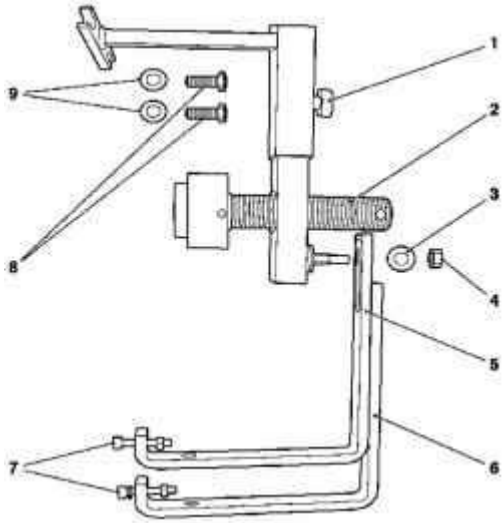


Fig. 3.3. **Device for removing and installing hard plates and driven clutch plate: 1 - pin 2 - retractors, 3 - Disc 4 - nut, 5 - KM-6263-4 (short arm), 6 - KM-6263-5 (the long arm), 7 - lower bolt engine block, 8 - upper bolt engine block; 9 - Puck**

NOTE
Note the different length brackets for joining the CM 6263 at lowering engine block.

Withdrawal

Remove the gearbox

NOTE
Special device KM-6263 can be attached only to the engine block, not the oil sump.

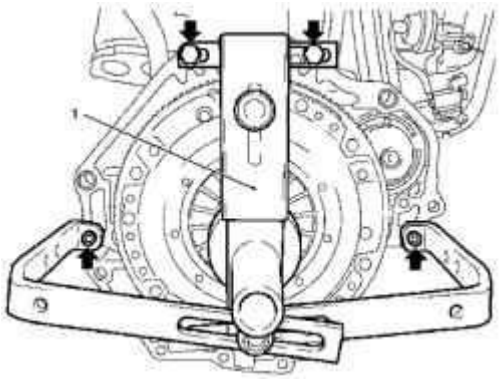


Fig. 3.4. **Joining device: 1 - adaptation**

Attach a special device KM-6263 to the engine block and tighten the 4 bolts (arrows in Figure 3.4).

NOTE
Do not tighten the bolts.

Трансмиссия	*Центровочная оправка*
F13	KM-6263-21
F17+	KM-6263-21
F23	KM-6263-22

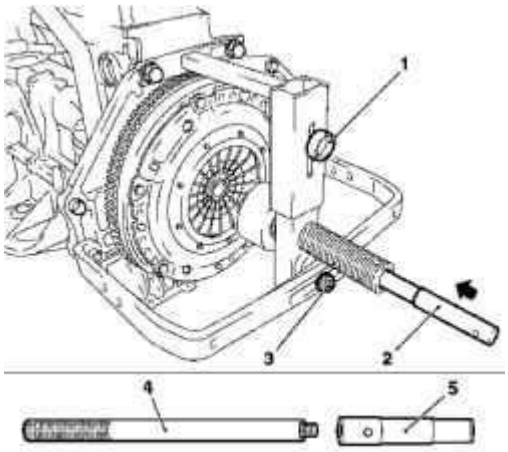


Fig. 3.5. **Installing a special device and alignment mandrel: 1 - pin 2, 4 - a special device KM-6263-30, 3 - nut, 4 - aligning arbor**

Attach a special device KM-6263-30 (4) to the alignment fixture (Fig. 3.5).
Attach a special device KM 6263.
Align special device KM-6263 with the center.
Set alignment mandrel with a special device KM-6263 KM-30 through 6263 in the drive clutch and the crankshaft (center).
Tighten the bolt and nut.
Tighten the 4 bolts special device KM-6263 to the engine block (Fig. 3.5).
Free slave clutch disc.

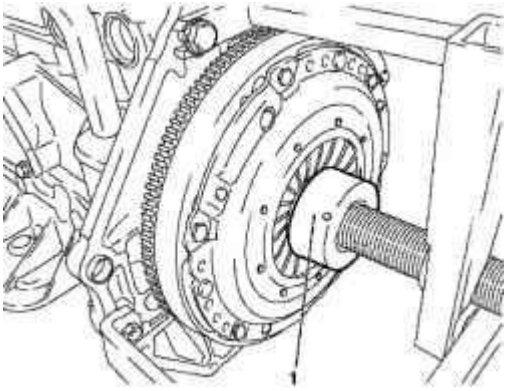


Fig. **3.6.** **Installation of special devices: 1 - adaptation**

Set a special device KM-6263 so that it was situated opposite the petals spring thrust plate (Fig. 3.6).
Turn special device KM-6263 clockwise to the limiter.
Remove the thrust plate to the flywheel.

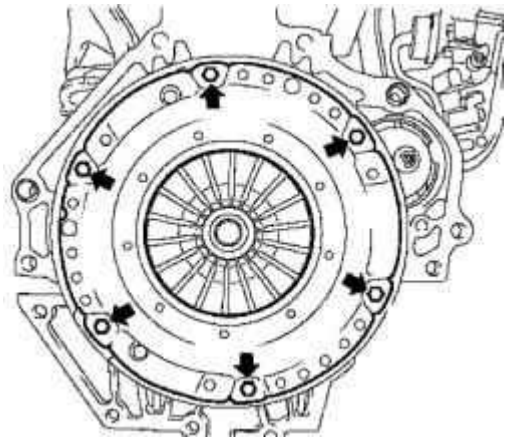


Fig. **3.7.** **Bolts mounting the flywheel**

6 Loosen the mounting bolts (arrows in Figure 3.7).

NOTE
Figure 3.7 shows the clutch without special adaptations KM 6263 and balancing the mandrel.

Remove the thrust plate and clutch disc.
Turn special device KM-6263 counter-clockwise until the limiter and pull the mandrel alignment with a special device KM-6263-30.

Test
Check thrust plate and driven clutch disc wear.
Replace if necessary.

NOTE
The clutch labor-contaminated products (oil, detergent, etc.) should be replaced. Check the slave clutch disc for damage and wear products on the hub and replace if necessary. Do not empty the thrust plate and driven clutch disc high-pressure cleaners or washing machine.

Check the friction surface of the flywheel on the absence of cracks, burnt and the wear surface.
Check the condition of the friction linings and clutch slave drive if they have traces of oil or mechanical damage, replace the slave drive.

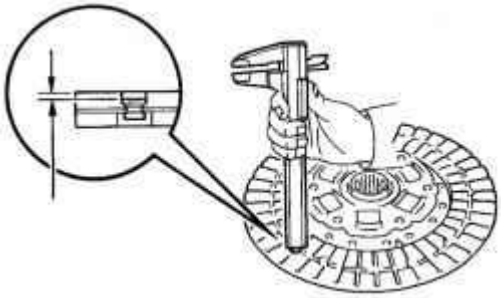


Fig. **3.8.** **Measurement of friction linings driven clutch plate**

Check the thickness of the lining driven clutch plate, with the help of vernier calipers. Overlays should speak over the heads of rivets not less than 0.3 mm (Fig. 3.8).
If the thickness of the lining is less than the permissible or rivet heads are close to the working surface, replace them or slave drive clutch. Check that the springs were not broken and they are no cracks. Check on the lack of wear slots in the hub clutch discs.

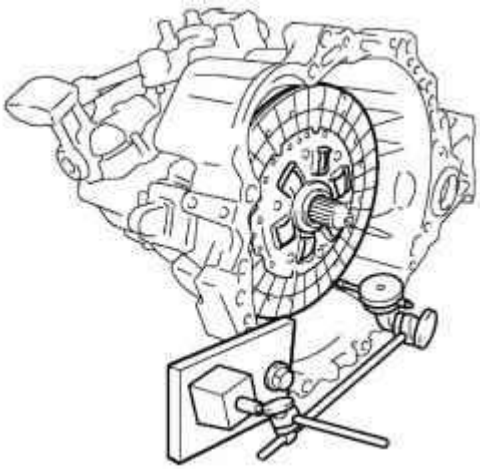


Fig. **3.9.** **Installing slave drive clutch to the shaft of the gearbox**

Replace clutch disc to the shaft of the gearbox (Figure 3.9).
Slave clutch disc should be easily and smoothly slide in the slots of the primary shaft of the gearbox.

NOTICE
If being replaced clutch slave drive, replace the bearing and clutch.

Using a clock-type indicator, check the pulse of the disc clutch.
Minimal beat: 0,8 mm.

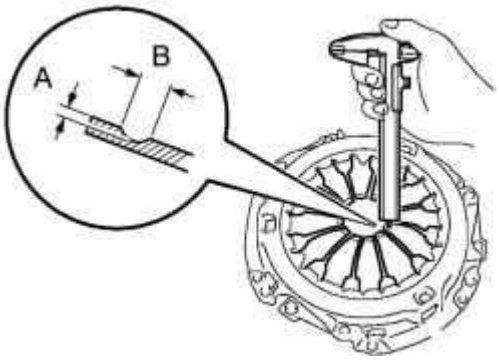


Fig. **3.10.** **Measuring the depth and width of wear petals diaphragm spring**

Using vernier calipers to check the depth and width of wear petals diaphragm spring (3.10).
Maximum:
A (Depth): 0,5 mm
B (Width): 6,0 mm

NOTE
Minor damage to the friction surface can remove the fine-grained sandpaper, but in case of any doubt about the condition of the pressure plate must be replaced.

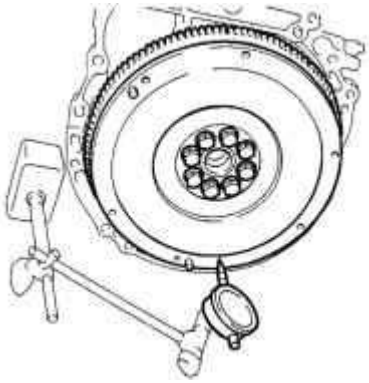


Fig. **3.11.** **Measuring the beats flywheel**

Using a clock-type indicator, check the pulse of the flywheel (Fig. 3.11).
Maximum beat: 0,1 mm

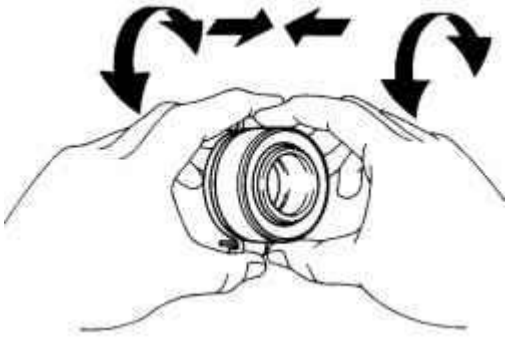


Fig. **3.12.** **Check bearing clutch**

Rotate bearing clutch hand, applying force in the axial direction, check the clutch bearing (Fig. 3.12).

NOTE
In bearing lubrication laid, calculated for the entire period of operation, thus, additional lubrication is required.
If necessary, replace the bearing clutch.

If you install new parts, be sure to find out what pressure plate and slave drive is required for the designation of the engine and its number, to avoid error. If you set the former in the clutch components, they must first check.
Before installing the new pressure plate corrosion protective grease must be removed only at the working surface. In other places, to remove grease in any case is not recommended, because it can significantly reduce the lifetime of adhesion.
Make sure the installation of centering pins on the flywheel.
Clean the rust on the splines slave drive. Lubricate the teeth of the drive shaft gear box with a thin layer of lubricant MoS2. At stations used for this purpose grease G000100. Then move the slave on the primary drive shaft so that the hub is easily moved about the shaft. Sure to remove excess grease.

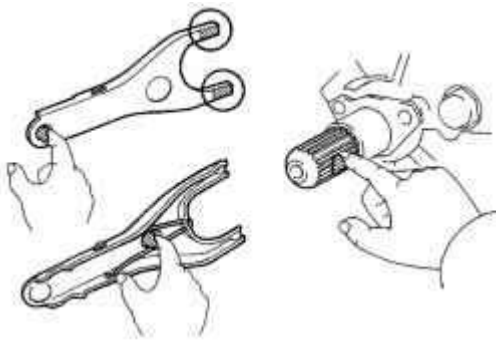


Fig. **3.13.** **Position of grease on the clutch fork, fork and pusher and the fulcrum fork**

Apply grease on the contact surface couplings and clutch fork, fork and push rod and fulcrum fork (Fig. 3.13).
Apply grease to the splines on the clutch and drive shaft splines.
Install clutch fork with bearing clutch in the gearbox.

NOTE
After installation, move the fork back and forth to check the smoothness of movement Clutch release bearing.

Setting
Attach the slave drive clutch and thrust plate to the flywheel.

NOTE
Lettering "Transmission side» should be drawn to the gearbox.

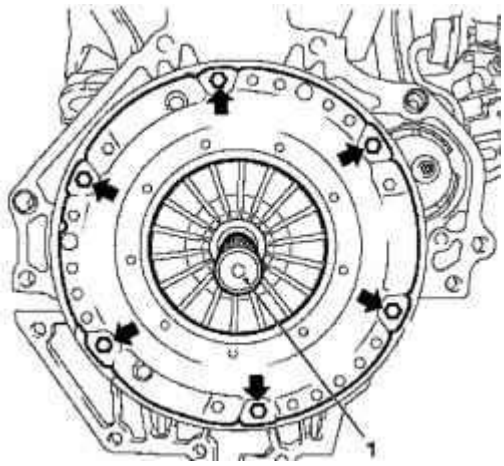


Fig. **3.14.** **Centering hard plate and clutch plate: 1 - device KM-6263-30**

Ottsentriruyte thrust plate and clutch disc alignment mandrel and a special device KM-6263-30 (Fig. 3.14).

NOTE
For clarity, Figure 3.13 shows the clutch without modifications KM 6263.

Tighten the 6 new bolts (arrows in Figure 3.13).

NOTE
Do not tighten the bolts.

Attach the thrust plate to the flywheel.
Turn special device KM-6263 clockwise to the limiter.
6 Tighten the mounting bolts around 15 N m.

NOTE
Tighten the screws crosswise.

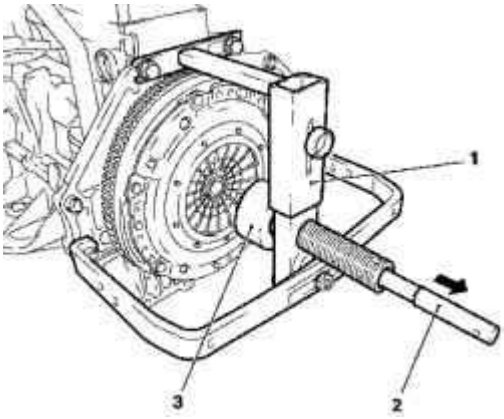


Fig. **3.15.** **Installing slave drive and the hard plate: 1, 3 - a special device KM-6263-30, 2 - mandrel**

Remove special device KM-6263 from the engine block. Turn counterclockwise to remove the limiter and alignment mandrel and KM-6263-30 (Fig. 3.15).
Loosen the 4 bolts special device KM-6263 to the engine block.
Set the gearbox.

Removing and installing the piping and discharge hose coupling (gear - F13 / F17 / F17 + / F23 / M20 / M32)

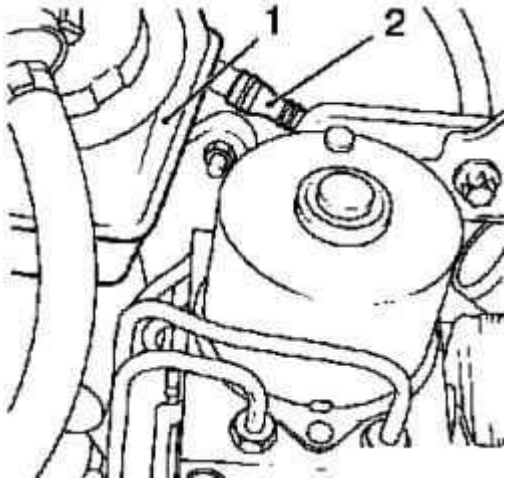


Fig. **3.16.** **Supply line and tank brake hydraulic system: 1 - tank brake hydraulic system, 2 - the supply line**

Close the tank and disconnect the brake hydraulic supply line from the clutch master cylinder (Figure 3.16).
Assemble arising brake fluid.
Close the tank hydraulic brake system of protective cap.
Fill the tank hydraulic brake system to the mark «MAX».
Disconnect the mass wire from the battery, disconnect the positive wire from the battery.

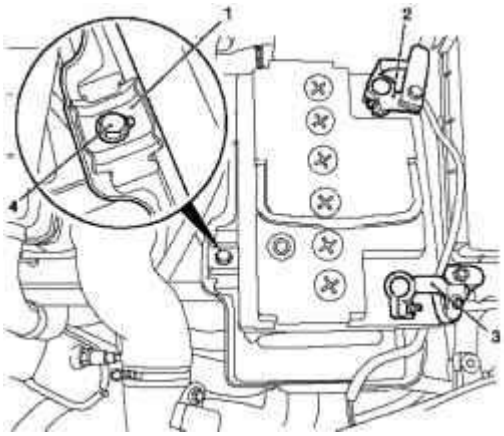


Fig. **3.17.** **Removing the battery: 1 - spud, 2 - a massive lead, 3 - the positive wire, 4 - bolt**

Remove the strap, loosen the bolt and remove the battery (Figure 3.17).

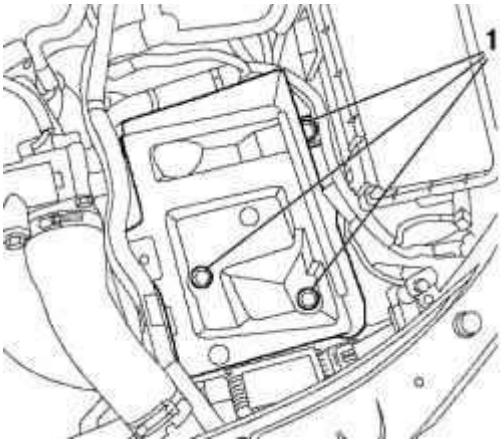


Fig. **3.18.** **Withdrawal of support battery: 1 - bolts fastening**

Remove the battery support. To do this, remove the cable ties and loosen the 3 bolts fastening (Fig. 3.18).
Take the expansion tank cooling system places the side.
Remove the expansion tank with the support.
Disconnect the module anti-lock braking system

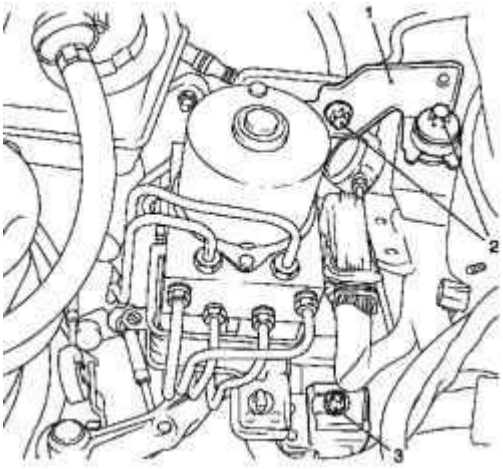


Fig. **3.19.** **Removing the module anti-lock braking system: 1 - upper bracket, 2 - mounting screws, 3 - bottom bracket**

Disconnect the module anti-lock braking system from the top by unscrewing 2 screws fastening (Figure 3.19).
Unleash the conclusion of the bracket.
Disconnect the module anti-lock braking system from the bottom.
Remove the retaining clamp on the clutch master cylinder.
Carefully slide the module anti-lock braking system to the side.

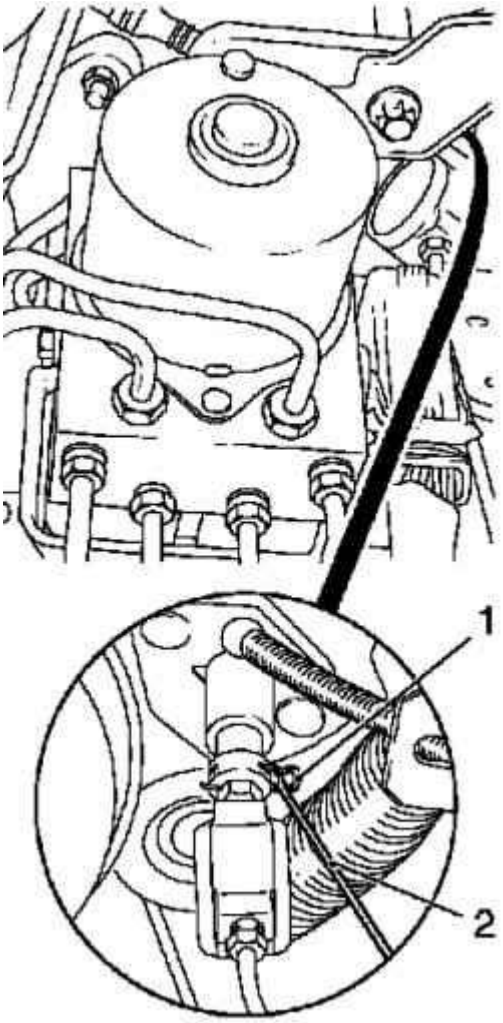


Fig. **3.20.** **Removing the retaining clamp: 1 - holding the collar, 2 - Screwdriver**

Remove the retaining clamp with a screwdriver (Figure 3.20).

Disconnect the flow line of the actuator with the damper on the clutch master cylinder clutch.

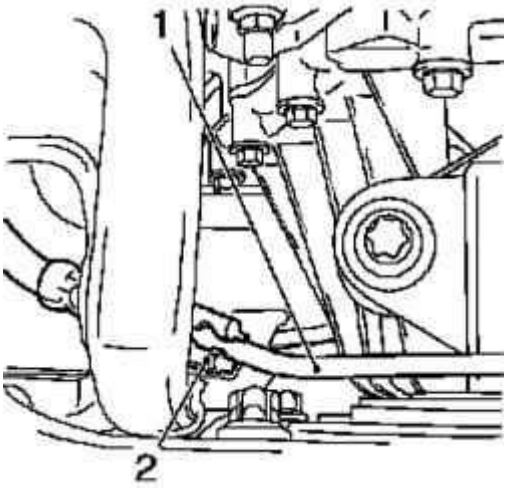


Fig. **3.21.** **Disconnecting the discharge line of the actuator clutch: 1 - flow line of the actuator coupling, 2 - Bracket**

Disconnect the discharge pipe from the clutch actuator arm on the support bracket of the battery (Figure 3.21).
Remove the discharge pipe from the working cylinder clutch.

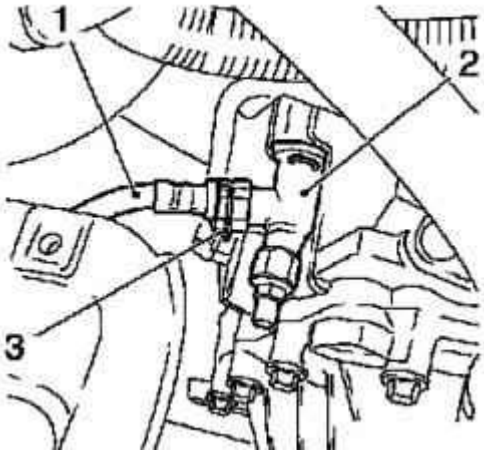


Fig. **3.22.** **Removing the discharge line from the working cylinder clutch: 1 - flow line 2 - connector working cylinder clutch 3 - retention clamp**

Unlock the retaining collar on the connector working cylinder holding a screwdriver and remove the retaining clamp (Figure 3.22).
Disconnect the discharge pipe connections from the working cylinder clutch

Fig. **3.23.** **Discharge pipe: 1 - Pipeline**

Remove the flow line of the actuator coupling (Fig. 3.23).

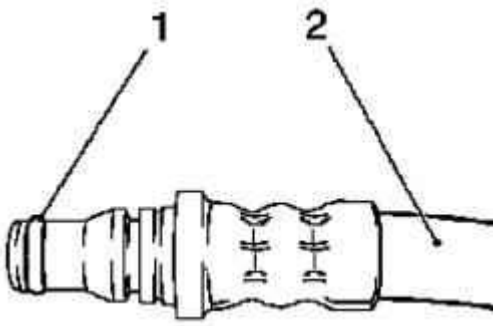


Fig. **3.24.** **O-ring discharge line: 1 - O-ring, 2 - flow line**

Check the O-ring on the discharge line (Figure 3.24).

NOTE
O-ring can not remain in the socket of the working cylinder clutch.

Setting
Install flow line of the actuator coupling to the engine compartment.
Install retaining collar.
Slightly bend the clamp and set to choke working cylinder clutch.
Connect the discharge pipe to the socket of the working cylinder to the crankcase clutch clutch.

NOTE
Discharge piping should issue a click

Attach the flow line in a bracket on the battery.
Set delivery pipeline to the executive cylinder clutch.
Some bend the clamp and gently insert the module anti-lock braking system with one hand.
Attach a clamp holding the master cylinder to the clutch.
Insert ynagnetatelny pipeline in the clutch master cylinder.
Attach the module anti-lock braking system, and tighten the attachment bolt moment 20 Nm
Attach the bracket module anti-lock braking system, and tighten the 2 screws fixing moment 20 Nm
Attach the output to the bracket.
Connect the expansion tank cooling system.
Install the expansion tank in the bracket.
Install the battery support, secure the cable ties and tighten the 3 bolts fastening point 10 Nm
Replace the battery pack.
Connect the positive terminal of the battery.
Connect the negative cable to the battery.
Attach the supply line clutch master cylinder.
Connect the supply line to the clutch master cylinder Backa hydraulic brake system.
Program volatile memory.
Remove air from the hydraulic drive.

Replacing the clutch pedal

Withdrawal
Remove the lining of the steering column.
Remove the light switch.
Click on the light switch on the left, turn clockwise and remove it.

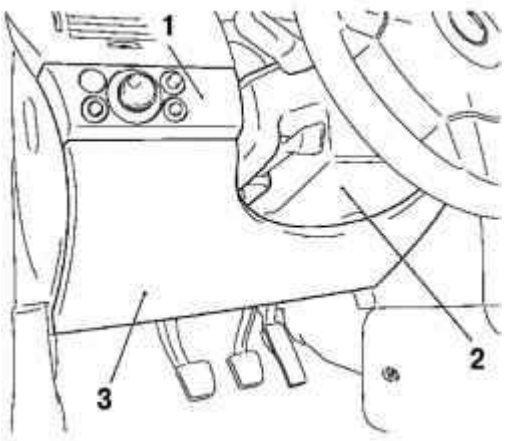


Fig. **3.25.** **Removing the front panel finish: 1 - light switch, 2 - facing the steering column, 3 - the lower instrument panel pad**

Remove the bottom pad of the instrument panel by unscrewing 4 bolts fastening (Fig. 3.25).

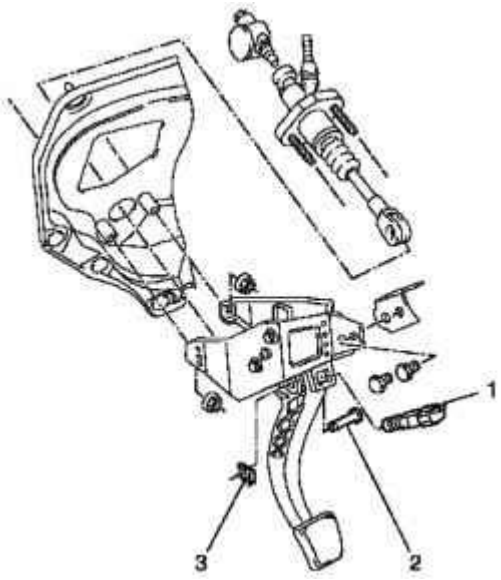


Fig. **3.26.** **Removing the clutch pedal: 1 - traction control switch, 2 - attachment bolt pedal, 3 - spud**

Remove the clutch control switch (Fig. 3.26).
Disconnect the return spring from clutch pedal
Disconnect the clutch pedal from the clutch master cylinder (Figure 3.26).
Bend up a screwdriver and remove the strap.
Loosen the bolt pedal (Figure 3.26)

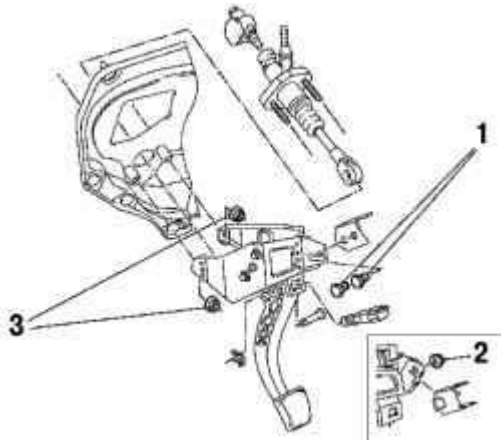


Fig. **3.27.** **Removing Oprah pedal: 1 - bolts, 2 - nut, 3 - nuts pedal**

Remove the pedal from the cross-pillar (Figure 3.27).
On vehicles with left-hand steering unscrew the 2 screws fastening.
On cars with right-hand-steering unscrew the nut fastening.
Remove the support from the pedal clutch master cylinder by unscrewing 2 nuts (see Figure 3.27).
Slide back to the master cylinder clutch.

NOTE
Do not damage the wiring harness and associated elements.

Remove the prop pedal carefully assembled with the clutch pedal.

Setting
Install prop pedal with clutch pedal.

NOTE
When installing, use new bolts.

Attach the pedal to the crossbar support by tightening the 2 nuts moment 20 Nm

NOTE
Use new nut.

Attach the clutch pedal to the clutch master cylinder.
Attach the strap.

NOTE
Use the new strap.

Attach the return spring to the clutch pedal.
Attach the control switch gears.
Install the lower instrument panel pad.
Install light switch and turn counterclockwise.
Install the steering column shroud.

3.2. Manual transmission

General

Cars Opel Astra / Zafira equip 5 and 6-speed manual gearboxes for all types of engines. All forward gears are equipped with synchronizers, gear ratios vary in each version of the engine. Corps gearboxes are made of aluminum or magnesium alloy.

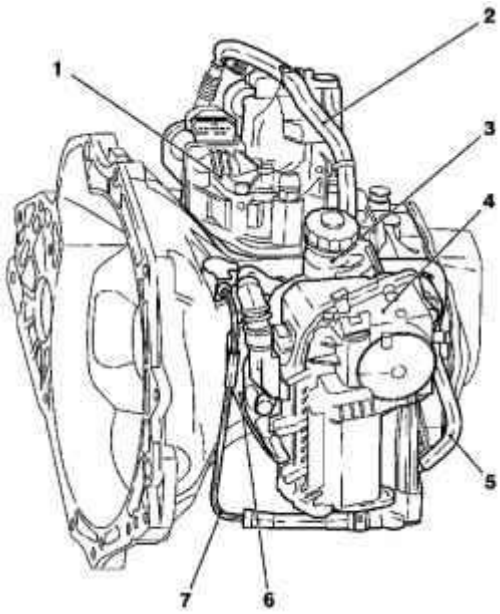


Fig. **3.28.** **Transmission Easytronic: 1 - module gear, 2 - TV 3 - tank with brake fluid; 4 - the clutch control unit, 5 - hose, hydraulic circuit coupling, 6 - bracket clutch control unit, 7 --back hydraulic circuit**

Gears and gear lever

In the primary shaft of a manual gearbox written 5 or 6 gears forward gears (5 - or 6-speed manual) and one reverse gear. All the leading front of the gears are constantly meshed with the respective slave gears. Some gear is made for one with trees, others mounted on needle bearings, which provide noise-free rotation of the gears. In neutral gear shift torque from the leading to the driven shaft is not transmitted.

The gears rotate freely until the shift lever is in neutral position. The inclusion of transmission by moving the sliding clutch synchronizer, resulting in gear rigidly connected to the shaft of the gearbox. To accomplish this, each shaft for the respective gear set their synchronizers.

To the gears are engaged with each other, the number of revolutions should be equalized. This is achieved by means of synchronizers that before gearing gears in contact with each other and by comparing the friction speed shafts.

The speed of the first three transmission is less than the engine speed, fourth speed transmission (direct) is the same as that of the motor shaft. In the fifth and sixth gear speed increases compared with engine speed. For the reverse is more gear, which changes the direction of rotation of the shaft. To prevent accidental inclusion of reverse gear when moving forward on the cars Passat set switching mechanism, in which the rear channel has traditionally included with the preliminary pressing the lever down.

With the handle switch, select the desired transmission. Handle switch is connected to the gearbox through the cross, fork pushers and levers.

Differential and transmission oil

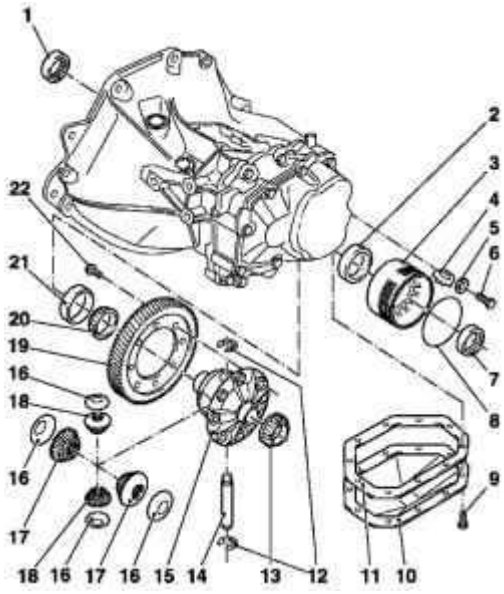


Fig. **3.29.** **Differential gearbox F13: 1 - O-ring shaft wheel, 2 - outer ring taper roller bearings, 3 - cage, 4 - tongue blocking, 5 - spring washer, 6 - bolt; 7 - O-ring shaft wheel, 8 - O-ring ; 9 - bolt, 10 - cap differential, 11 - Gasket 12 - retaining rings; 13 - inner ring of the taper roller bearing, 14 - axle differential mechanism; 15 - housing differential, 16 - annular friction pads; 17 - bevel gears shaft wheels, 18 - differential bevel gears, 19 - toothing; 20 - the inner ring of taper roller bearing, 21 - outer ring taper roller bearing, 22 - Bolt**

The differential is connected to the gearbox. It is mounted on two tapered bearings between the buildings clutch and gearbox. Two different diameters gland seal output shaft places outside. The leading differential gear is fixed in the casing and connected to the gear shaft drive wheels.

For the lubrication of parts of mechanical gear boxes provided long-term synthetic oil. Unlike the engine oil in the gearbox almost spent. If the outside of the gearbox no traces of water stains of oil, which means that its level is not decreased. Nevertheless, the oil level from time to time to check. An automatic transmission hydraulic fluid level can be checked only in the main transmission, the level in the gearbox must be checked for STOA with special diagnostic equipment.

Inspection and maintenance

Oil can flow out because of the leaky gaskets. Check the connections at the following locations:
- Between the gearbox and engine;
- Place output shaft of the gearbox;
- Cork filler;
- Plug the drain holes.

All gear transmission nodes have very long service life. If the box fails, it must be repaired in TechCentre, as the repair should be performed by qualified professionals with a special tool.

If you decide to undertake the repairs yourself, remember that the quality of repair gear needed orderly and very clean job. In addition to repair would require a special tool.

Check transmission oil level (gearbox M20 / M32)

NOTICE
Cork monitoring holes in the front of the gearbox should not turn away.

NOTE
Transmission oil, blended for verification can be reused. New transmission oil should be used with care. Before discharging gear oil should be warmed up to operating temperature.

Withdrawal

Remove the bottom cover of the engine compartment, if it is installed.
Check the bottom of the pan.

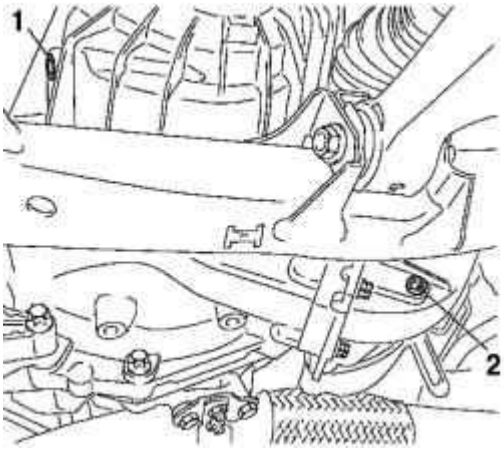


Fig. **3.30.** **Drain transmission oil: 1 - control bolt; 2 - bolt to drain**

Loosen the oil drain bolt (Figure 3.30).

NOTE
Control rod (Figure 3.30) can not turn away.

Let the transmission oil drain for about 10 minutes.

Setting

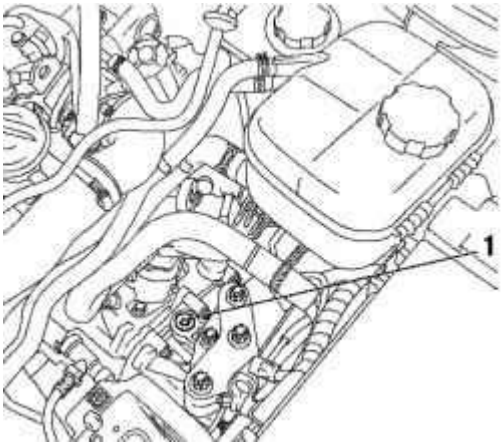


Fig. **3.31.** **Cork controlling openings: 1 - cork**

Top up gear oil until it will flow from the control holes (Fig. 3.31).

The level of transmission oil
All gear, except for M20 / M32, after repairs must be completed before the bottom of the control holes.
Since gear oil is poured on the plant, by weight, the liquid level - always below the reference holes, during the interval of maintenance of correction is not needed if there is no leak.

NOTE
Despite the fact that the transmission fluid completely blended, in the box is still approximately 0.2 liters. In this case, the filling volume of the gearbox M20 / M32 - 2.2 liter.
If you installed new box, you need to pour 1.8 liters of liquid, as in a factory in the new box is filled with approximately 0.68 liters. oil.

Tighten the stopper control point 30 Nm

NOTE
Use a new plug.

Replace the battery pack.
Install support battery.
Attach the bottom cover of the engine compartment, if it is installed
Program volatile memory.

Check transmission oil level (gearbox F13)

NOTE
The level of transmission oil should always be below the reference holes (up to 16 mm). Check transmission oil level only after the repair operations on the gearbox and adjust if necessary.

Withdrawal
Remove the bottom cover of the engine compartment, if it is installed.

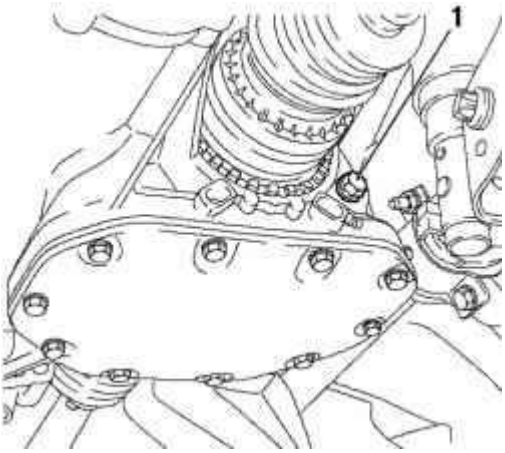


Fig. **3.32.** **Cork controlling openings: 1 - cork**

Loosen the stopper control holes on the gearbox housing (Fig. 3.32).

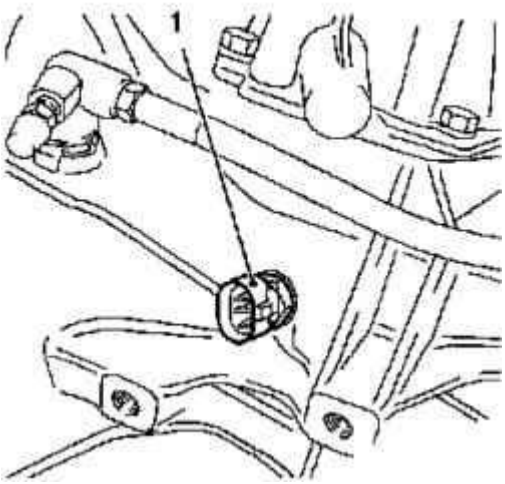


Fig. **3.33.** **Wiring harness connector switch reversing lamps: 1 - connector**

Disconnect the wiring harness connector switch reversing lamps (Figure 3.33).

Setting
Refill transmission oil level.
Top up gear oil until it will flow from the control holes.
Tighten the plug hole controlling time 4 N m, Dauvergne at + (45-135) °.
Tighten the switch reversing lamps moment 20 Nm
Use new O-ring.
Connect the wiring harness connector switch reversing lamps.
Attach the bottom cover of the engine compartment, if it is installed.

Removing and installing transmission (F13)

NOTE
If the transmission is replaced, should be replaced by the elements listed below.

Socket clutch.
Bracket damping engine block.
Bracket cable switch.
Rear bracket gearbox.

Withdrawal
Remove the bottom cover of the engine compartment, if it is installed.
Remove the central silencer and a front exhaust pipe.
Connect the CM 6001-A to the body of the front axle.

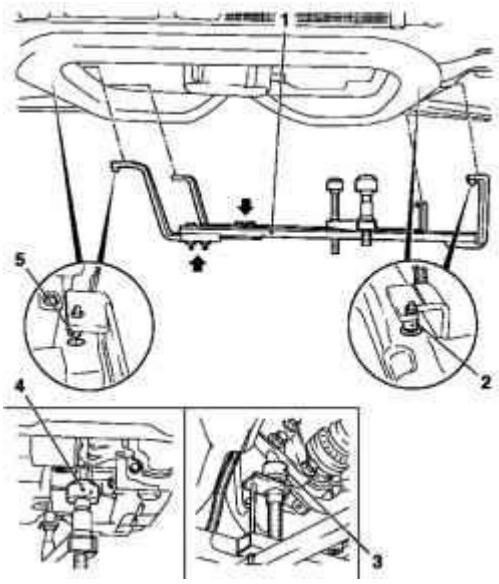


Fig. **3.34.** **Special device KM-6001-A to remove the gearbox: 1 - a special device KM-6001-A; 2 - neck, 3 - rear supporting bearing, 4 - front supporting bearing, 5 - neck**

Loosen the 2 bolts (arrows) to guide KM-6001-A (Figure 3.34).
Set KM-6001-A as shown in Figure 3.34.

NOTE
2 neck should be in the holes to the front axle housing.

Tighten 2 screws to adjust the tire.
Turn the front supporting bearing to the contact with the guide pin front damping engine block.

NOTE
Guide pin should be located in the support bearings without a gap.

Turn back to the journal-bearing contact with the guide pin rear bracket damping engine block.

NOTE
Guide pin should be located in the support bearings without a gap.

Remove the casing front axle.
Remove the air filter housing with the hose inlet.

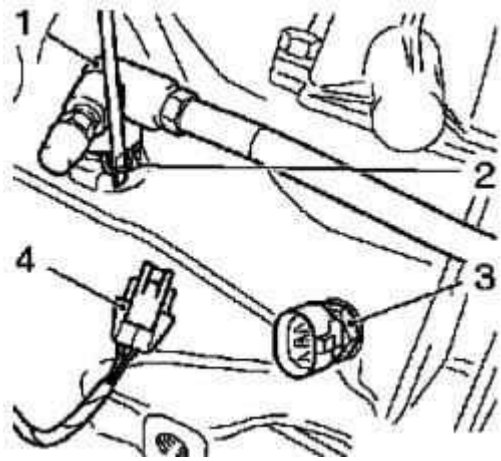


Fig. **3.35.** **Removing the elements of supply and discharge line: 1 - pressure pipe with nipple, 2 - retaining clamp, 3 - switch reversing lamps, 4 - the wiring harness connector**

Disconnect the wiring harness connector (4), switch reversing lamps (Figure 3.35).
Close the tank hydraulic brake system.

Fill the tank hydraulic brake system to the mark «MAX».
Disconnect the discharge pipe from the nipple (Figure 3.35).

NOTE
Check the bottom of the pan so drained brake fluid.

Unlock the retaining clamp with a screwdriver and remove the discharge line.
Bend the retaining collar a bit and then reinstall it on the socket.
Disconnect the left engine damping block.
Disconnect from the left arm damping engine block.

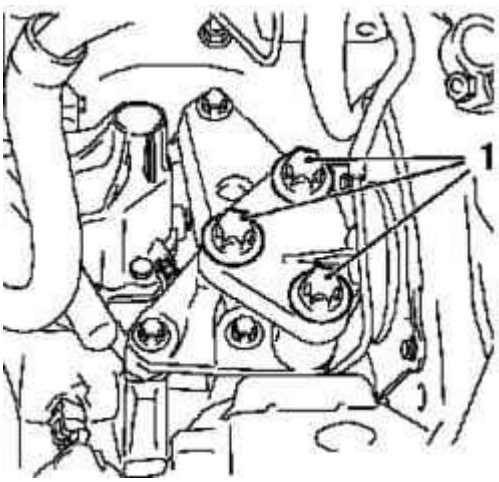


Fig. **3.36.** **Mounting the left arm damping engine block: 1 - Bolts**

Loosen the 3 mounting screws (Figure 3.36).

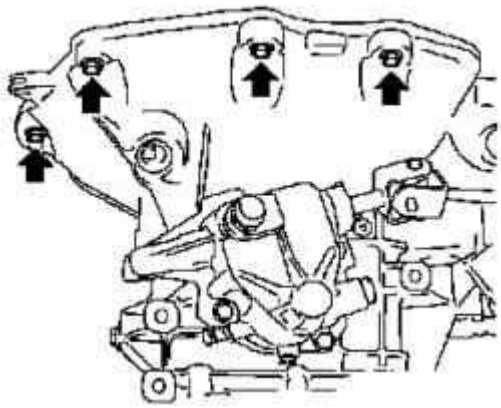


Fig. **3.37.** **Mounting gear**

Remove the top of the gearbox from the engine by unscrewing 4 bolts fastening (arrows in Figure 3.37).

NOTE
If necessary, pull the pipe cooling system up and secure with cable ties.

NOTICE
Do not damage the wiring harness and retention.

Lower the engine and transmission of approximately 5 cm with a special tool MKM-883-1.
Remove the shafts of the wheels of the gearbox.
Check the bottom of the pan to leaked transmission oil.

NOTE
Shafts wheels remain in the wheel hubs.

Attach the shafts of the wheels to the bottom of the car.
Close the wheel shaft hole plugs.

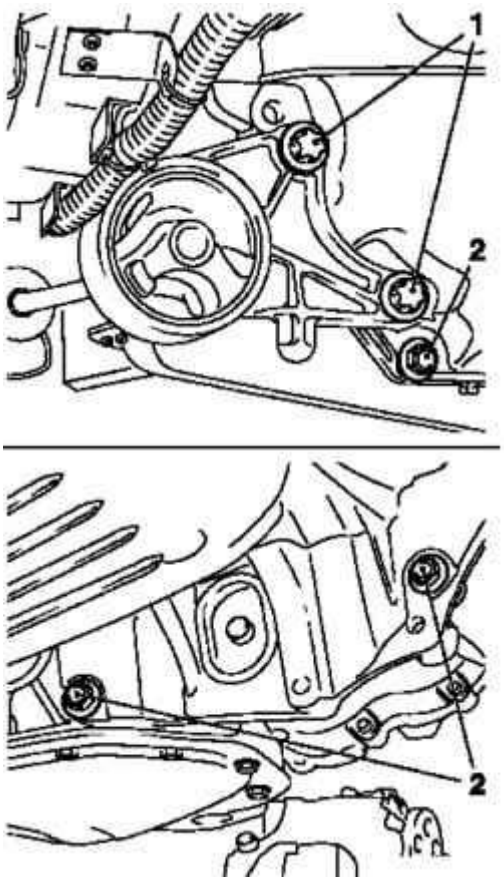


Fig. **3.38.** **Mounting the front damping engine block: 1 - bolts fastening the block, 2 - bolts fastening the box**

Disconnect the front damping motor unit from the gearbox by unscrewing 2 screws fastening (Figure 3.38).
Remove the gearbox from the pan, turning away 3 fixing screws (Fig. 3.38).

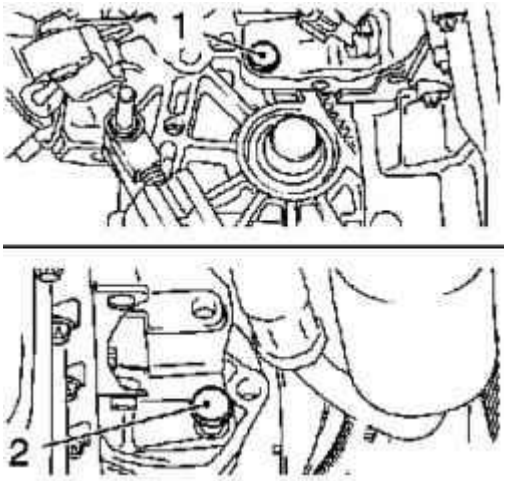


Fig. **3.39.** **Mounting the front and rear of the gearbox: 1, 2 - bolts fixing**

Remove the front and rear of the gearbox from the engine by unscrewing 2 screws fastening (Figure 3.39).

NOTICE
Do not damage the wiring harness and retention.

Remove the gearbox.
Put the gearbox from the engine block and gently pull down.

Setting
Attach the gearbox to the engine.
Be sure to install.
Lift and ottsentriruyte gearbox.

Attach the front and rear of the gearbox to the engine and tighten the 2 screws mounting torque 60 N m.
Set pan gearbox and tighten the 3 bolts fastening point 40 Nm
Attach the front damping motor unit to the gearbox and tighten the 2 screws fastening the moment 80 Nm
Set shafts of the wheels.
Lift the engine and transmission with the help of a special device MKM-883-1.

NOTE
When mounting the body of the front axle, make sure that the supporting bearing KM-6001-A properly located in the front guide pin damping engine block and rear brackets damping engine block. If necessary, adjust the loading position of the engine and gearbox, using a special device MKM-883-1.

Install the front axle housing.

NOTE
Do not install the central silencer, front exhaust pipe, battery and battery support.

Replace the air filter housing and air intake hose.
Install left damping engine block.
Attach to the left relying damping engine block and tighten the 3 mounting bolts are 55 Nm
Attach the gearbox to the top and tighten the 4 mounting bolt torque 60 Nm
Connect the discharge pipe from the socket.

NOTE
Cyanoacrylate clamp to latch.

Connect the wiring harness connector switch reversing lamps.
Remove special device KM-6001-A from the body of the front axle.
Install central silencer and a front exhaust pipe.
Check the fluid level in the gearbox.
Attach the bottom cover of the engine compartment.

NOTE
If necessary, adjust the draft switching gear.

Install support battery.
Replace the battery pack.
Program volatile memory.
Remove air from the hydraulic clutch.

Transmission, removing and installing on the engine (dismantled)

Withdrawal

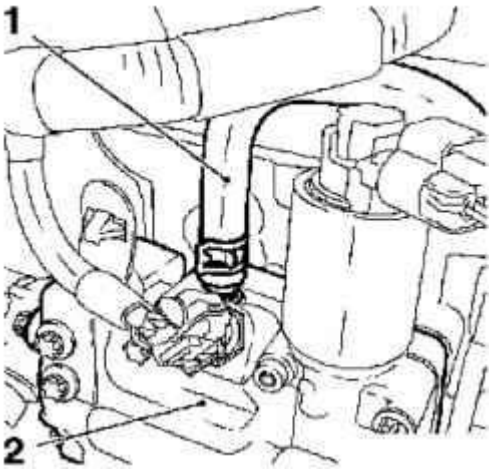


Fig. **3.40.** **Removing the coolant hose from the thermostat housing: 1 - coolant hose, 2 - housing thermostat**

Remove the coolant hose (1) with the thermostat housing (Fig. 3.40).
Remove the clamp.
Remove the hose from the coolant pump coolant.

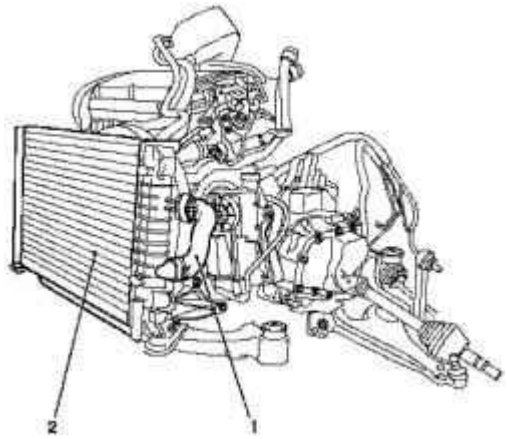


Fig. 3.41. **Disabling the module heatsink: 1 - coolant hose, 2 - module heatsink**

Disconnect the coolant hose from the body of the thermostat and turn off the module heat sink, pulling it from the lower radiator brackets (Figure 3.41).

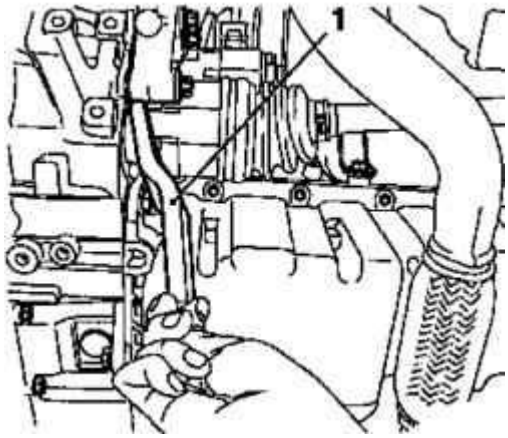


Fig. 3.42. **Extract from the body axis of the differential mechanism: 1 - a special device**

Remove the body axis of the differential mechanism with the help of a special device KM-460-B (Figure 3.42).
Hole in the differential close flap.

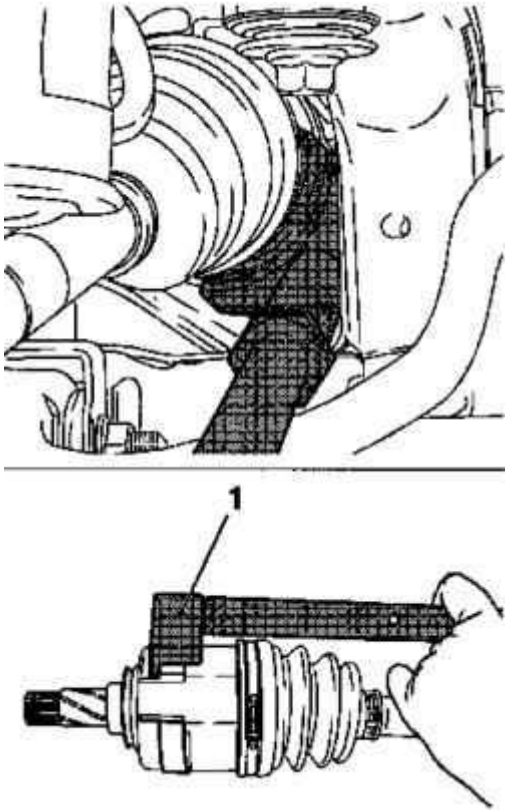


Fig. 3.43. **Removing the left body axis of the differential mechanism: 1 - a special device**

Remove the left body axis of the differential mechanism with the help of special devices KM 313 and KM-6003-1 (Figure 3.43).
Hole in the differential close cap

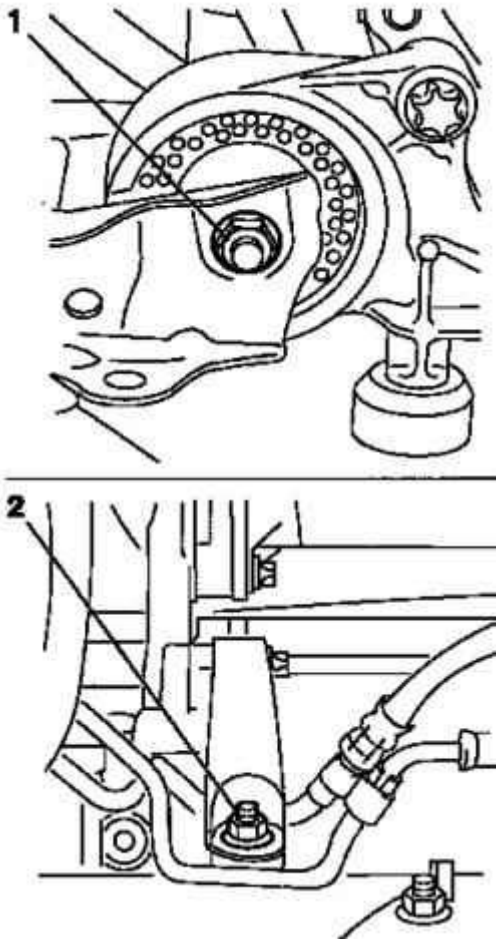


Fig. 3.44. **Removing the front and rear damping engine blocks: 1, 2 - bolts fixing**

Remove the front and rear damping block engine by unscrewing the bolts fastening (Figure 3.44).
Remove the engine from the body of the front axle.
Attach the cables to the motor vehicle footboards.
Tighten up the engine hoist.
Lift the engine.

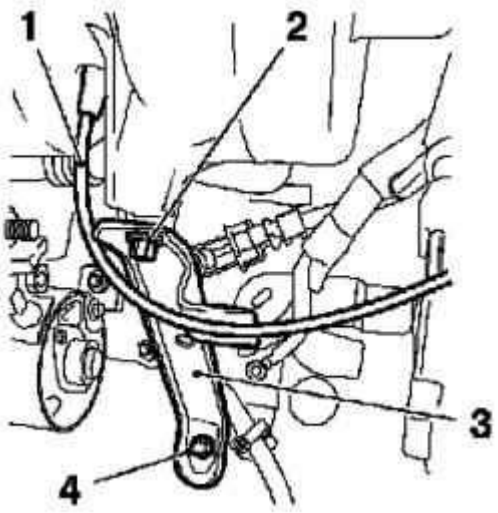


Fig. 3.45. **Withdrawal of support intake manifold: 1 - vacuum hose, 2, 4 - mounting screws, 3 - support**

Remove prop intake manifold, disconnect the vacuum hose and unscrewing 2 screws fastening (Figure 3.45).

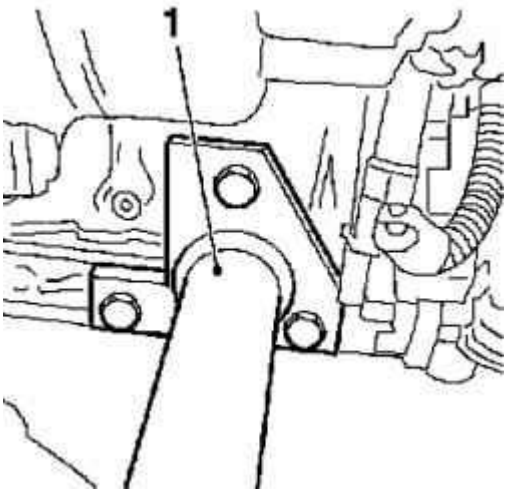


Fig. **3.46.** **Installation of special devices: 1 - adaptation**

Install special device KM-412-31 and tighten the 3 mounting bolts (Figure 3.46).

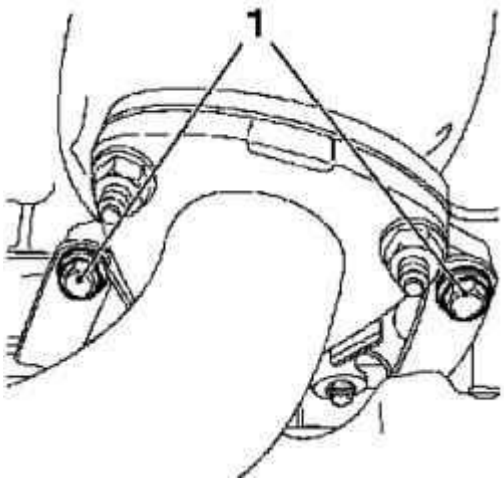


Fig. **3.47.** **Mounting bracket catalytic converter: 1 - Bolts**

Remove the catalytic converter bracket by unscrewing 2 screws fastening (Figure 3.47).
Unscrew the 2 screws fastening of the cylinder.

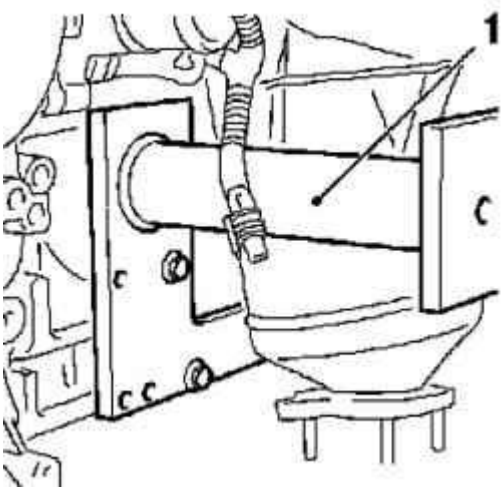


Fig. **3.48.** **Installation of special devices: 1 - adaptation**

Insert a special device KM-412-31 and tighten the 3 mounting bolts (Figure 3.48).
Install the engine on the stand KM-412 and secure his 8 bolts.
Disconnect the wires from the transport brackets.
Remove the gearbox, remove the 6 mounting bolts.

NOTE
One bolt is set to lock.

Attach the cables.

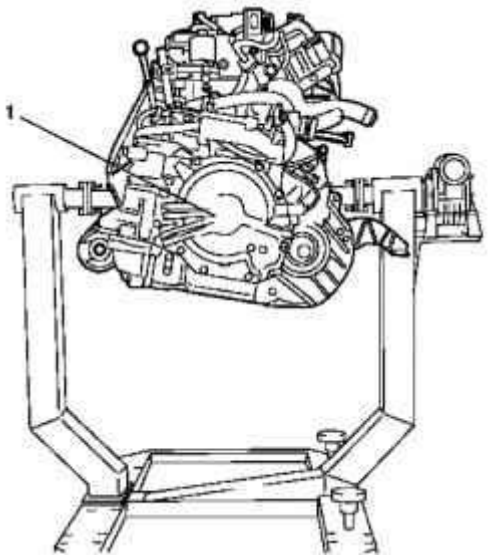


Fig. **3.49.** **Removing the gearbox: 1 - gearbox**

Lift the gear box, loosen the bolt and remove the gearbox from the flange of the engine (Fig. 3.49).

NOTE
Make sure that the adjacent components and wiring harnesses will not be damaged.

Setting
Lift the gearbox.
Attach the gearbox to the flange of the engine.
Tighten the attachment bolt.
Remove the cables.
Secure the gearbox bolts.
Transmission of the cylinder block - 4 bolt torque 60 Nm
Transmission to the oil sump - 3boltami moment 40 Nm
Lift the engine crane.
Attach cables to transport footboards.
Remove the engine from the stand of the CM-412, unscrewing 8 mounting bolts.
Attach the intake manifold support by tightening the 2 screws fastening point 8 Nm
Replace catalytic converter bracket by tightening the mounting bolts - on the catalytic converter element 15 Nm at the engine block moment 20 Nm
Lift the engine.
Gently pull down on the housing front axle.
Unhook the motor from a crane.
Remove the cables from the transport brackets.
Install rear damping block engine.
Use new bolts, tightening them are 55 Nm
Install the front damping engine block.
Use new bolts, tightening them are 55 Nm
Install the left body axis.

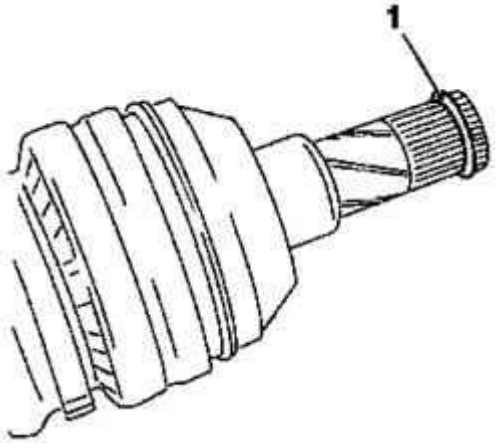


Fig. **3.50.** **Install the new retaining rings: 1 - Ring**

Install a new circlip on the body axis (Figure 3.50).
Brush teeth and supports motor oil.
Insert the body axis in the gearbox until it snaps into the locking ring.
Set the right body axis.
Install a new circlip on the body axis.
Brush teeth and supports motor oil.
Insert the body axis in the gearbox until it snaps into the locking ring.
Install the module heat sink.
Attach the coolant hoses to the body of the thermostat and the coolant pump and set the 2 clamp.
Replace Poly-V belt.

Replacing the transmission housing (gearbox F13)

Withdrawal

Remove the gearbox

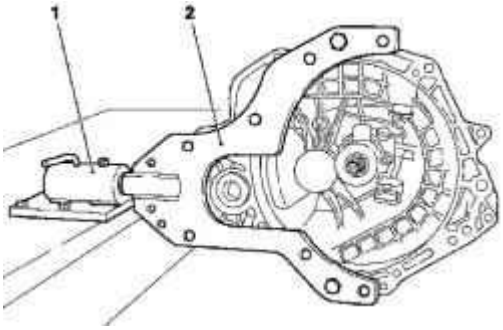


Fig. **3.51.** **Joining crankcase to special adaptations: 1, 2 - special arrangements**

Attach the gearbox to the special adaptations KM 6115 and KM-113-2 (Figure 3.51).
Remove the left arm damping engine block by unscrewing 3 bolts.
Set the gearbox in neutral position.

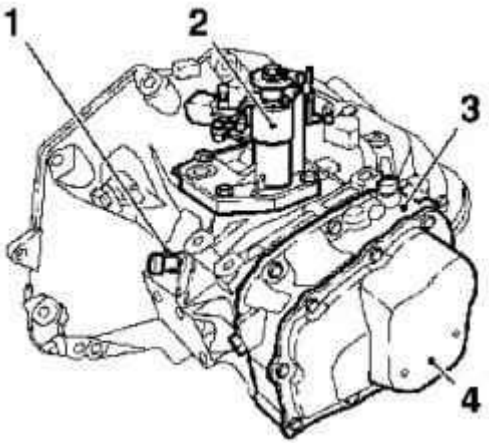


Fig. **3.52.** **Removing the caps with gear: 1 - Reversing light switch, 2, 3, 4 - cover**

Remove the gearbox.
Remove light switch reverse.

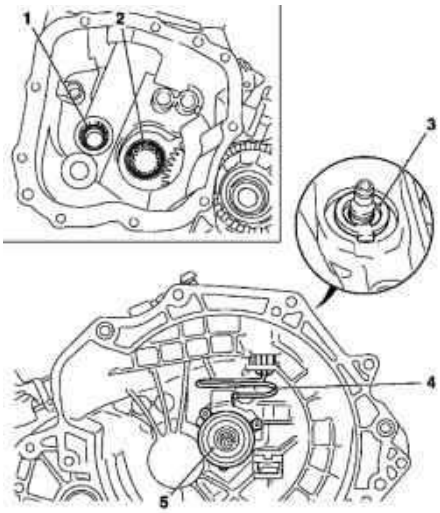


Fig. **3.53.** **Removing the gearbox components: 1 - bearing shaft, 2 - bearing main shaft, 3 - bush mounting discharge line 4 - flow line, 5 - a working cylinder clutch**

Remove the back cover (Figure 3.53).
Remove the cover gasket.

NOTE
If necessary, loosen the fastening lid light strikes a rubber hammer.

NOTE
Drain the gear oil.

Disconnect the special device KM 6155.
Remove the differential.
Remove the working cylinder clutch.
Remove the discharge pipe and discharge pipe mounting sleeve.
Remove the main bearing and the shaft of the transmission housing.
Remove the 2 sealing rings of the shaft wheel.
Remove the transmission housing through a special device KM 6115.

Setting
Attach the new transmission housing to the special adaptation of the CM 6115.
Install the main bearings and shaft.
Install differential.
Install discharge pipe and discharge pipe mounting sleeve.
Install working cylinder clutch.
Attach a special device KM-6155 to the gearbox.
Replace the back cover.

NOTE
Pay attention to the magnet.

NOTE
Note the similarity of the bolts.

Attach the rear cover.
Replace it with a new gasket on the transmission housing.
Tighten the 4 bolts M7 moment 15 Nm
Tighten the 5-bolt M8 moment 20 Nm
Replace the cover gearbox.
Set switch reversing lamps.
Tighten the switch reversing lamps moment 20 Nm

NOTE
Use new O-ring.

Install 2-wheel shaft sealing ring.
Install the left engine damping block
Tighten the 3 bolts fastening point 55 Nm

Removing and installing the rear cover gearbox (F 13)

NOTE
Work is being carried on the established transmission.

Withdrawal

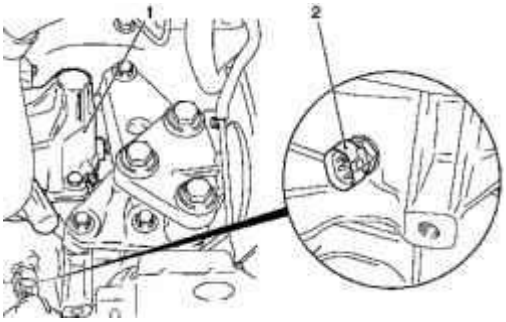


Fig. **3.54.** **Removing the gearbox: 1 - cover 2 - switch reversing lamps**

Remove the gearbox and switch reversing lamps (Figure 3.54).
Disconnect the wiring harness connector, switch reversing lamps.
Unscrew the switch reversing lamps
Remove the casing front axle.

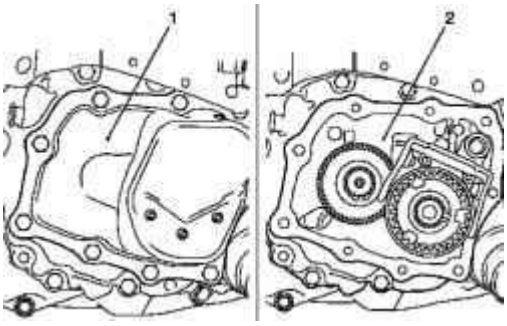


Fig. **3.55.** **Removing the back cover of gearbox: 1, 2 - lid**

Remove the back cover by unscrewing the mounting bolts 9 (see Figure 3.55).

NOTE
If necessary, loosen the fastening lid light strikes a rubber hammer.

Remove the rear cover gasket.

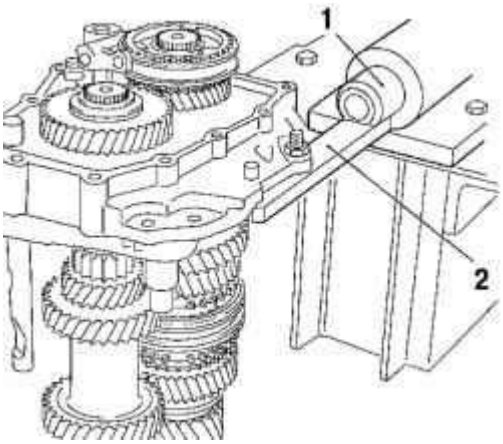


Fig. **3.56.** **Installation of special devices: 1, 2 - devices**

Attach the back cover of a special adaptation of KM 552 (Fig. 3.56).
Attach the back cover of a special adaptation of KM-113-2 using a special device KM-552.

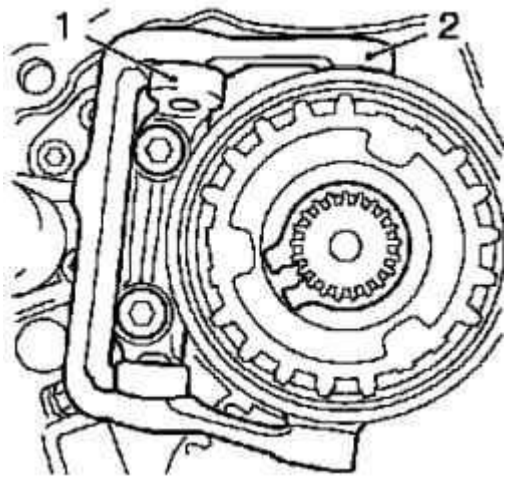


Fig. **3.57.** **Withdrawal of support bearing with a yoke with the back cover: 1 - a support bearing 2 - rocker**

Remove the support bearing with the yoke with the back cover (Figure 3.57).

NOTE
If the mounting bolts do not turn away, the back cover of a hair dryer heat to a temperature of about 80 ° C.

Unscrew the 2 screws fastening.
Remove the fifth gear transmission (slave).
Remove the retaining ring from the body synchronizer.

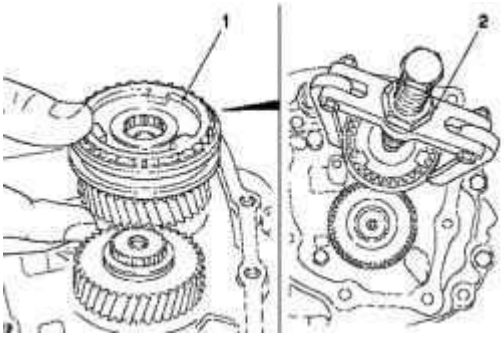


Fig. **3.58.** **Removing the gear wheels, gear fifth gear and fifth gear synchronizer body with the main shaft: 1 - body synchronizer 2 - adaptation**

Remove the cog wheel, gear fifth gear and fifth gear synchronizer body with the main shaft with a special device KM-161-B (Figure 3.58).
2 Remove the needle bearing gear fifth gear.

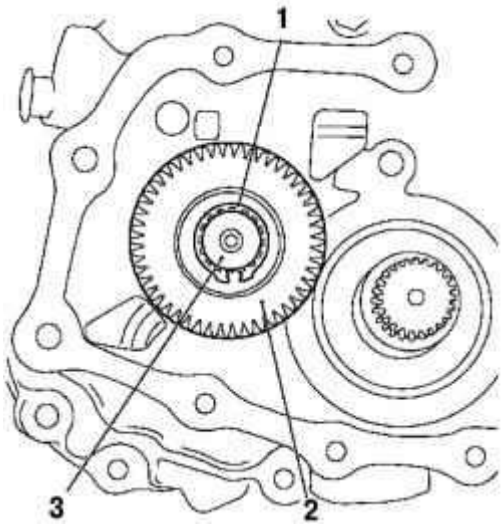


Fig. **3.59.** **Removing the gear from shaft: 1 - Holder, 2 - fifth gear transmission, 3 - drive shaft**

Remove the fifth gear transmission (lead) (2) of the shaft and remove the holder (Figure 3.59).

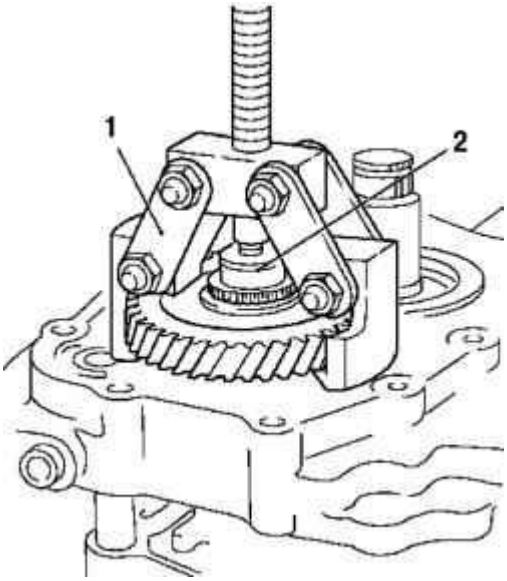


Fig. **3.60.** **Removing the gear with the help of a special device: 1 - a special device, 2 - thrust bush**

Remove the fifth gear wheel transmission, (lead) from the shaft using a special device KM-553-A (Figure 3.60).

NOTE
Monitor the proper installation of special devices KM-553-A at the toothed wheel 5-th channel (lead).

Set stubborn bush from KM-553-A on the driving shaft.

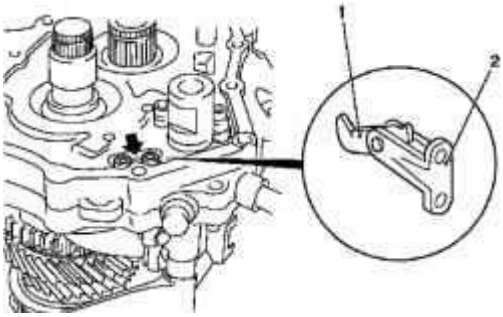


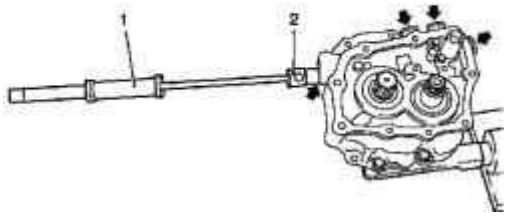
Fig. **3.61. Removing the support bearing: 1 - Latch, 2 - bearing bearing**

Disconnect the support bearing with a clip on the back cover (Figure 3.61).
Unscrew the 2 screws (arrow in Figure 3.61).

NOTE
If the mounting bolts do not turn away, the back cover of a hair dryer heat to a temperature of about 80 ° C.

Remove the plugs (arrows in Figure 3.62) from the back cover.

Fig. **3.62. Removal of plugs: 1, 2 - a special tool**



Remove the cap using a special tool for KM 727 and KM-328-B (Figure 3.62).

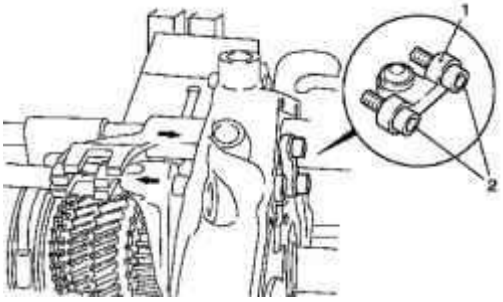


Fig. **3.63. Removing the bridge clamping bolt back cover: 1 - Bridge 2 - bolts fixing**

Disconnect the bridge clamping bolt rear cover by unscrewing 2 screws fastening (Figure 3.63).

NOTE
The bridge can be removed if it included the 3rd transfer.

Turn 2-S transmission and 5-S transmission.
Turn 2 transfers with the holder of the switch (arrows in Figure 3.63).

NOTE
Reduce the pressure on the guide rod gear-changing - for this, support rods change gear on top a wooden block.

Remove the fork gear, 3rd / 4 th gear and reverse gear.
Vybeyte cylindrical pins of the shift fork 3rd / 4 th gear and forks include reverse gears c using a special tool KM 308.
Remove the core of the gear rod include reverse gears and fork gear.

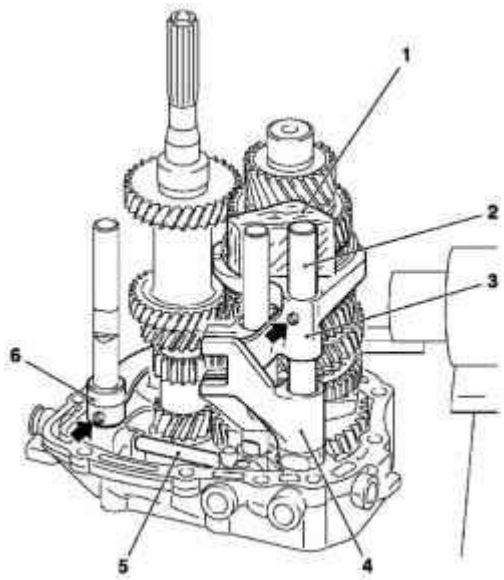


Fig. **3.64.** **Removing the components of the switching mechanism of 5-th transmission: 1 - wooden block, 2 - shaft gear-changing, 3 - plug switch 3 / 4 gears, 4 - switching mechanism 5-th transmission, 5 - splint, 6 - fork include reverse gears**

Remove the shifter 5-th transmission with the rear cover (Figure 3.64).
Remove the cotter pin and remove the cylinder latch the back cover.

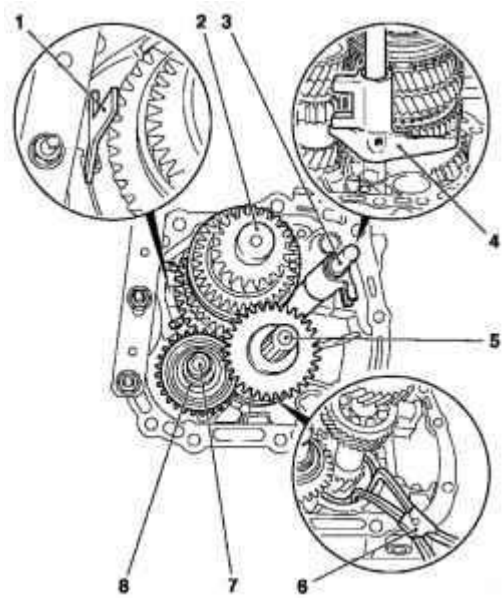


Fig. **3.65.** **Removing the components of the switching mechanism of reverse gears: 1 - plate 2 - retaining rings of the main shaft, 3 - gear shift fork rod 1 st / 2 nd, 4 - gear shifting fork 5 - a drive shaft; 6 - a special tool, 7 - axle gear reversing 8 - idler reverse**

Remove the 2 retaining rings of the main shaft and drive shaft with a special tool KM-443-B (Figure 3.65).

NOTE
When withdrawing, hold the retaining ring of the main shaft under tension corresponding to the plate (Figure 3.65).

Remove the main shaft from the rear cover.
Remove the drive shaft from the rear cover.
Remove the idler reverse of the back cover.
Remove the fork gear shift and gear shift fork rod 1 st / 2 nd transmission of the back cover.
Remove the axle gears reverse from the back cover.
Clamp the rear axle pinion in a vise with copper sponges.
Gently Destroy the back cover of a copper rod.

NOTE
Note that holding the ball utaplivaetsya.

Clear all items and sealing surfaces.
Check all items for damage.

NOTE
Replace damaged parts.

Setting
Lubricate the rotating elements and contact surface of the liquid from the gearbox.

NOTE
Pay attention to the loading position.

Zapressuyte axle gears in the rear of the rear cover.

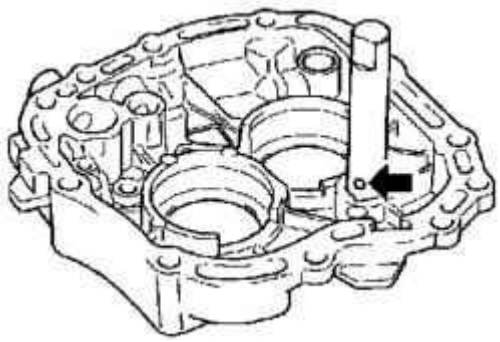


Fig. **3.66.** **Fixing ball**

Set fixing ball (arrow) (Figure 3.66).
Zapressuyte axle gear reversing all the way

NOTE
Coat the bearing and the hole reverse transmission oil.

Install the main shaft in the bearing.
Install drive shaft into the rear cover.
Install reverse gear in the rear cover.

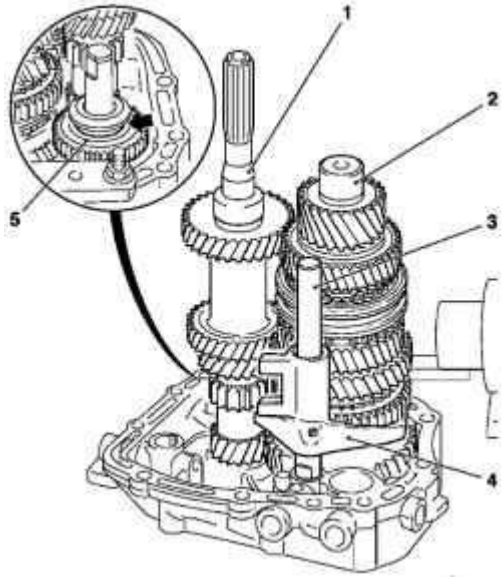


Fig. **3.67.** **Installing the gear mechanism components: 1 - drive shaft, 2 - the main shaft, 3 - gear shift fork rod 1 st / 2 nd, 4 - gear shifting fork, 5 - reverse gear**

Paz forks gear (arrow in Figure 3.67) reverse gear facing upwards.
Insert fork gear shift rod with a 1 st / 2 nd gear in the rear cover.
Install new retaining rings.
Install snap rings with a special tool KM-443-B.
Install tightening bolts, gears, reverse and 3-rd / 4 th transmission.
Reduce the load on the guide rod gear in the back.
When installing the pins podoprite rod gear wooden wedge.
Install the plug shifting gears and reverse gear-changing stock.
Install a cylindrical pin with a special tool KM-308.

NOTE
Protrusion of the new pin is approximately 2 mm / 0,08 (Size I).

Install the plug switch 1 st / 2 nd transfer and stock transfer switch. Install a cylindrical pin with the KM 308.

NOTE
Protrusion of the new pin is approximately 2 mm / 0,08 (Size I).

Insert holder 5-th transmission.
Install the gearshift fork and stem forks gear, 3rd / 4 th transmission.
Install a cylindrical pin with the KM 308.

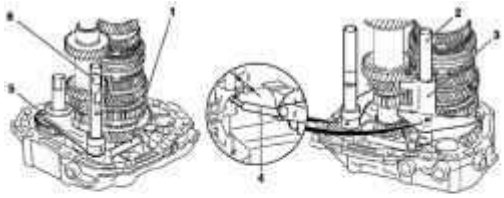


Fig. **3.68.** **Installation of components switching mechanism 1 st / 2 nd Shows: 1 - clamping bolts 2 - stock transfer switch, 3 - plug switch 1 st / 2 nd transmission, 4 - a special tool, 5 - fork shifting gears reverse 6 - rod change gear**

Set 4 Blank.

Drive in stoppers to stop nylon with a hammer or a soft metal rod.
Slide the fork gear shift in neutral position.
Turn 3 assists.
Turn 2-S transmission.

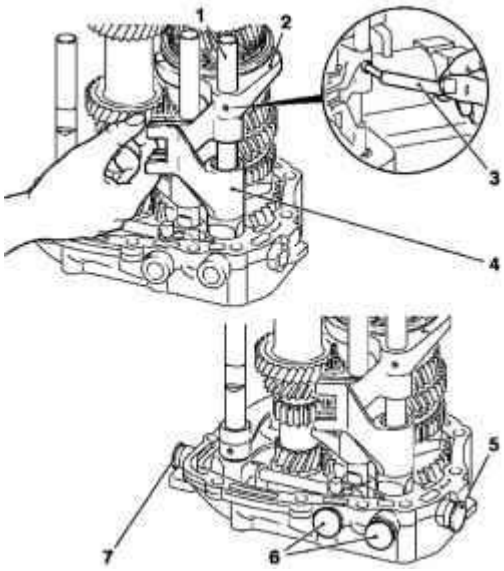


Fig. **3.69.** **Removing the components of the switching mechanism of 5-th transmission: 1 - gear shift fork rod 1 st / 2 nd 2 - gear shifting fork, 3 - a special tool, 4 - holder of 5-th transmission, 5, 6,7 - Stoppers**

Turn on the 3rd gear.

Including 5-S transmission.
Attach a bridge clamping bolt rear cover.

NOTE
Cover the bolts fixing composition.

Tighten the 2 new bolt.

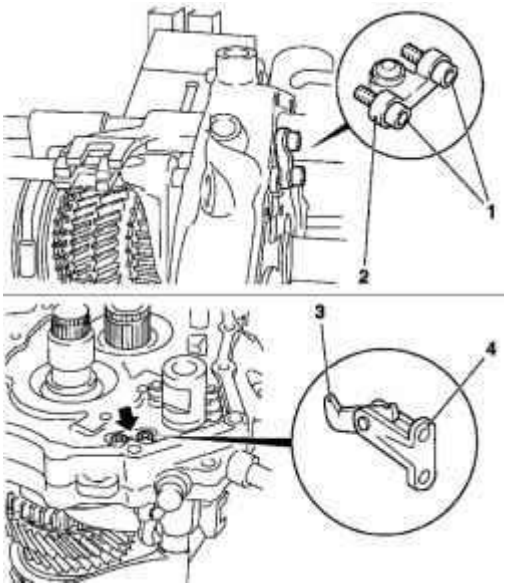


Fig. **3.70.** **Installation of the bridge: 1 - clamping bolts 2 - Bridge 3 - Latch, 4 - bearing bearing**

Slide the fork switch 1 st / 2 nd gear in neutral position.

Secure the 2 screws of the bridge point 7 Nm
Slide the fork gear shift in neutral position.
Secure the support bearing in the rear cover latch.

Tighten the 2 bolts moment 9 Nm
Remove the back cover with the help of special devices KM 552 KM-113-2.

NOTE
Long hub gear facing toward the back.

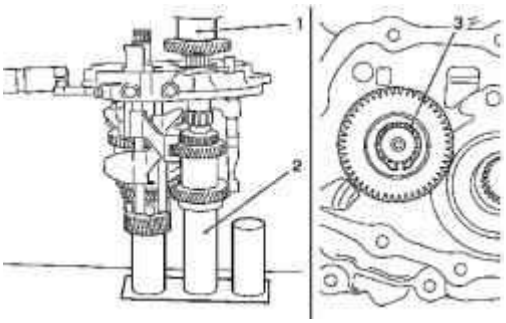


Fig. **3.71.** **Press-fit pinion 5-th transmission: 1 - a special tool, 2 - a special tool, 3 - circlip**

Press the pinion 5-th transmission (lead) on the driving shaft by means of KM 514 (Fig. 3.71).
Replace the back cover from the main shaft and drive shaft in a special adaptation of the CM 554.
Install a new circlip.
Attach the rear cover to the KM-113-2 with a special tool KM-552.

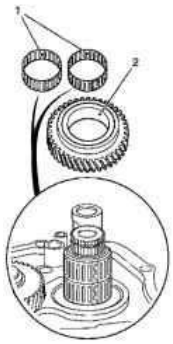


Fig. **3.72.** **Installing the gear 5-second transfer to the main shaft: 1 - Pinion 2 - needle bearings**

Install pinion 5-th transmission to the main shaft (Fig. 3.72).
Cover 2 needle bearing transmission oil.
Install 2 needle bearings on the main shaft.

NOTE
Make sure the landing needle bearing.

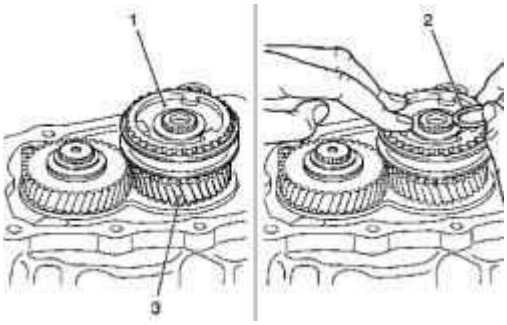


Fig. **3.73.** **Installing the gear, gear and fifth gear fifth gear synchronizer body with the main shaft: 1 - body synchronizer, 2 - retainer ring, 3 - fifth gear transmission**

Install gear, fifth gear transmission, and building on the main synchronizer shaft (Fig. 3.73).
Coat the bearing surface of the main shaft and housing synchronizer transmission oil.
Install a new circlip.

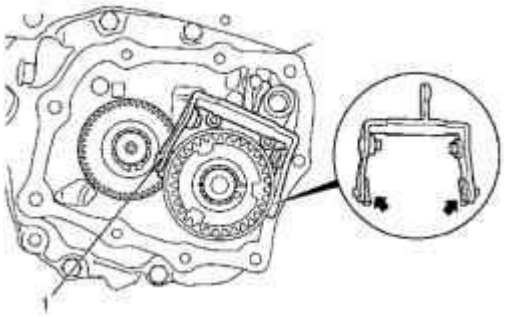


Fig. **3.74.** **Installing the shoe to activate the plug-fifth transmission: 1 - body synchronizer**

Replace shoe (arrows) on the fork inclusion fifth gear (Fig. 3.74).
Attach the support bearing with a yoke to the back cover.
Tighten the 2 new bolts moment 22 Nm

NOTE
Install bolts with a fixing composition.

Set friction washer axle gears reverse.

NOTE
Friction washer fix grease.

Check the position and placement of components listed below.
Stock switch 3rd / 4 th gear.
Fork shift 3rd / 4 th gear.
The control for 5-th transmission.
Stock switch 1 st / 2 nd gear.
Fork switch 1 st / 2 nd gear.
Pin restrictor inclusion transmission.
Fork include reverse gears.
Stock activate reverse gears.
Replace the back cover.

NOTE
Note the similarity of the bolts.

Attach the back cover with new gasket to the transmission housing.
Tighten the 4 bolts M7 moment 15 Nm

Tighten the 5-bolt M8 moment 20 Nm
Install the front axle housing.
Tighten the switch reversing lamps moment 20 Nm

NOTE
Use new O-ring.

Replace the cover gearbox.
Check the fluid level in the gearbox.

Removal and assembly of the differential (gearbox F13)

NOTE
Transmission is installed.

Withdrawal
Disconnect the shafts of the wheels of the gearbox.

NOTE
Shafts wheels remain in the wheel hubs.

Remove the back cover by unscrewing the mounting bolts 9.
Remove the back cover.

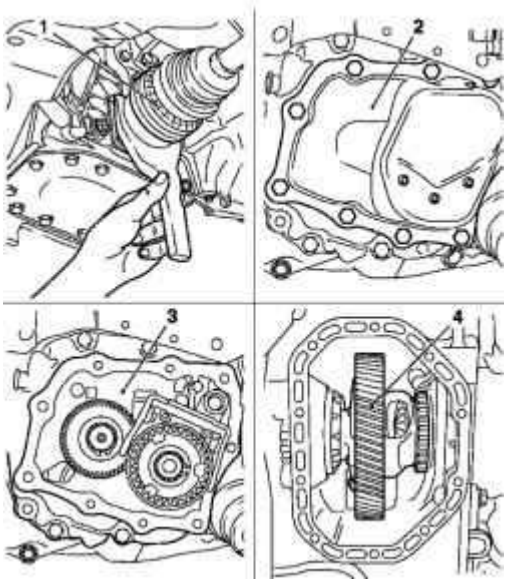


Fig. **3.75.** **Removal of the differential: 1 - shafts of the wheels 2, 3 - back cover, 4 - differential**

Remove the differential (Figure 3.75).
Remove the 2 sealing rings of the shaft of the wheel cage and gearbox.

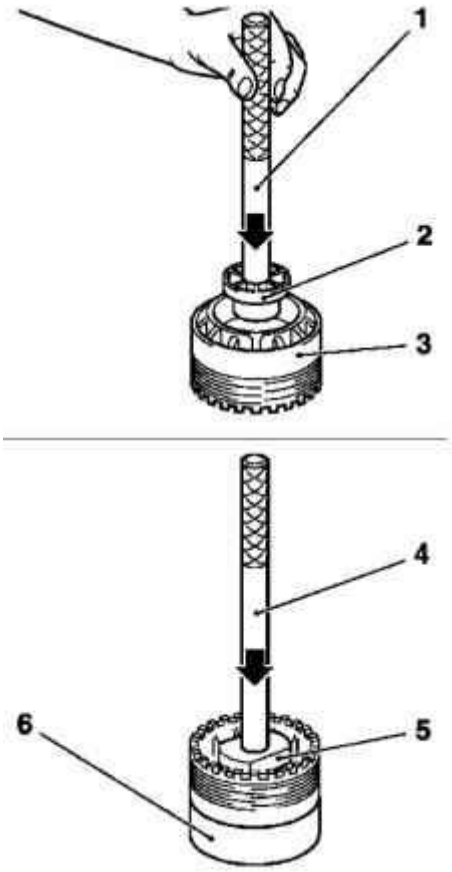


Fig. **3.76.** **Removing the sealing rings and the tapered roller bearing: 1, 2 - special tools, 3 - cage, 4, 5, 6 - Special tools**

Remove the O-ring shaft wheels with special instruments KM-454-2 and KM-454-4 (Figure 3.76).
Remove the outer ring of taper roller bearing of the cage.

NOTE
It is only necessary in case of replacement of the bearing.

Install the outer ring taper roller bearing seats in the 303 IM.
Remove the outer ring of a taper roller bearing with special instruments KM 304 and KM 451 (Fig. 3.76).
Remove the outer ring of a taper roller bearing of the gearbox

NOTE
It is only necessary when replacing the bearing in the gearbox.

Remove 2 internal rings of tapered roller bearings from the differential.
Do not change the place of external and internal ring when reusing bearings.
When repairing the speedometer gear (drive) must be destroyed. During the assembly is not installed again.

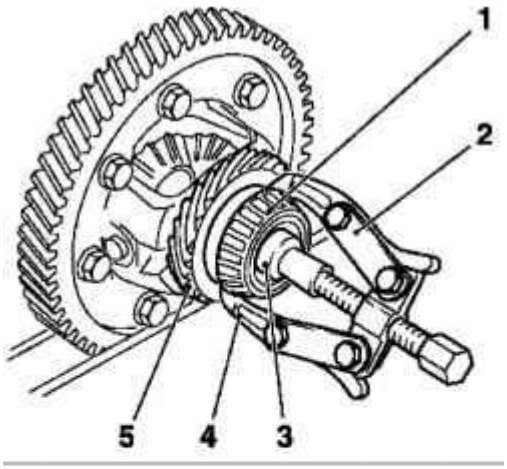
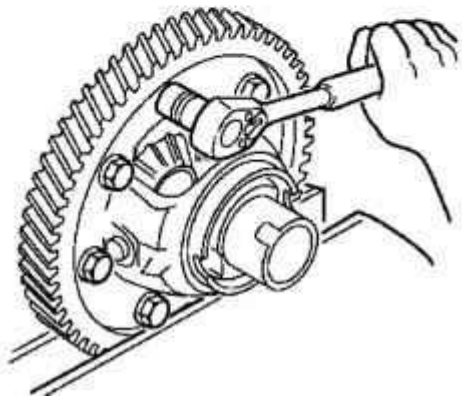


Fig. **3.77.** **Removing the inner rings of roller bearings: 1 - inner ring of tapered roller bearings, 2, 3, 4 - special tools; 5 - speedometer gear (lead)**



Remove the inner ring of the taper roller bearing with pomoschyuspetsialnyh tool KM-161-B, KM-161-3 and KM-161-4 (Figure 3.77).
Remove the gear ring with the differential housing.

NOTE
Use protective vise.

Remove the differential housing.

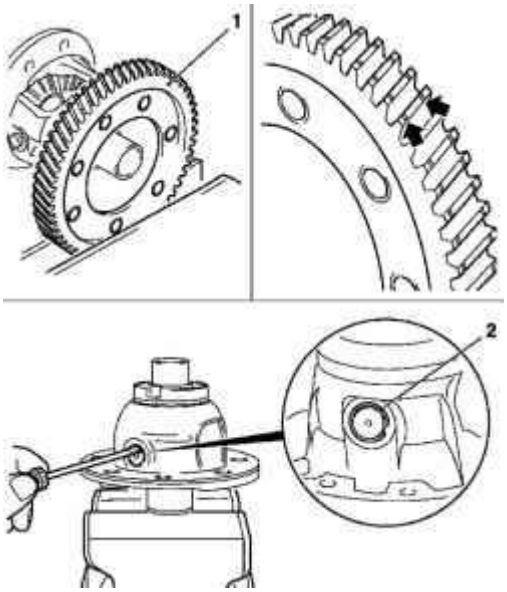


Fig. **3.78.** **Removing the locking rings: 1 - toothing differential 2 - retaining rings**

Remove the 2 retaining rings with a conical axis.

Remove the cone axis.
Remove the wheels and shafts poluosevye gears with a special tool KM-458-A.
Remove the plastic clip.

Clear all the elements and the transmission housing. Check all items for damage.

Setting
Insert the plastic clip in the differential.

NOTE
Lubricate the rotating elements, bearings and the surface of contact transmission oil.

NOTE
It should be possible to set the ring (1) plastic clips in the guide leading the gears in the housing

Assemble the differential housing.
Replace gears and satellite differential in housing differential.

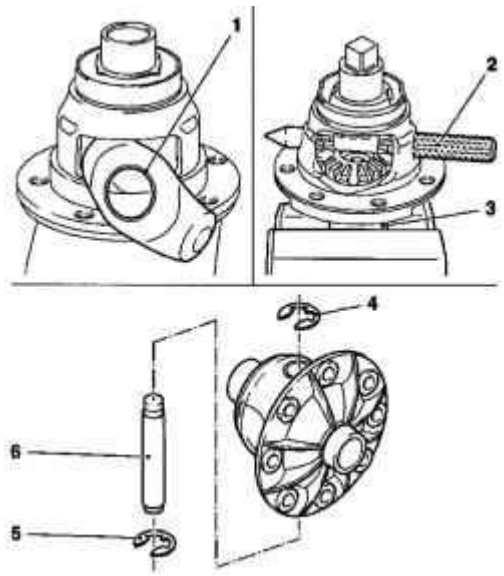


Fig. **3.79.** **Building housing the differential: 1 - Ring 2, 3 - a special tool, 4, 5 - retaining rings, 6 - cone axis**

Hold the differential housing in a vise using a special device KM-458-A (Figure 3.79).

NOTE
Use protective vise.

Install central satellite differential with special prisposobleniyaKM 456.
Install the conical axis.
Install 2 new retaining rings (Fig. 3.79).
Attach the gear ring (1)

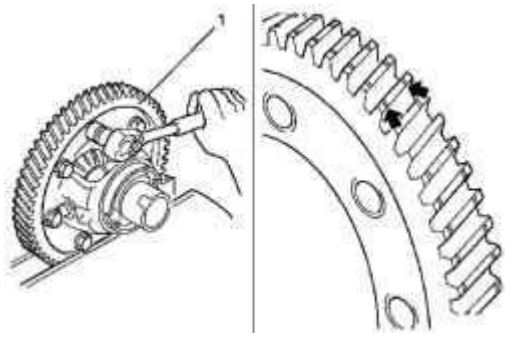


Fig. **3.80.** **Accession toothed crown: 1 - toothing**

NOTE
Replace top gear only in pairs. Pay attention to the identification groove (arrows in Figure 3.80) in the upper part of the tooth.

Tighten the 8 new bolts fastening point 40 Nm (+30 +15) °.

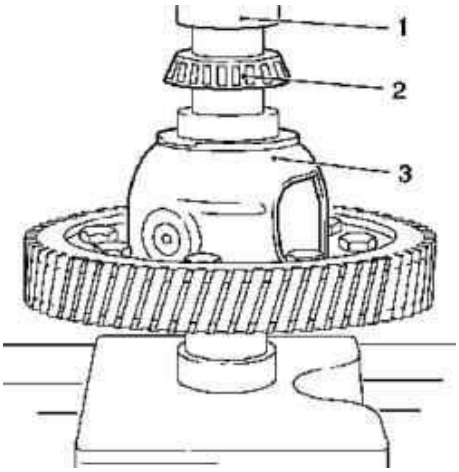


Fig. **3.81. Installing the inner rings: 1 - a special tool, 2 - inner ring, 3 - differential housing**

Set 2 internal rings of tapered roller bearings (Figure 3.81).

Install the inner ring of taper roller bearing with a special tool KM-453 in the case of the differential (Figure 3.81).

Insert the 2 outer rings of tapered roller bearings.

Install exterior ring taper roller bearing with the help of special instruments KM 304 and KM 451 in the gearbox and cage.

Install O-rings, shafts of the wheels.

Install O-rings, shaft wheel with a special tool KM-446 in the cage and the transmission housing.

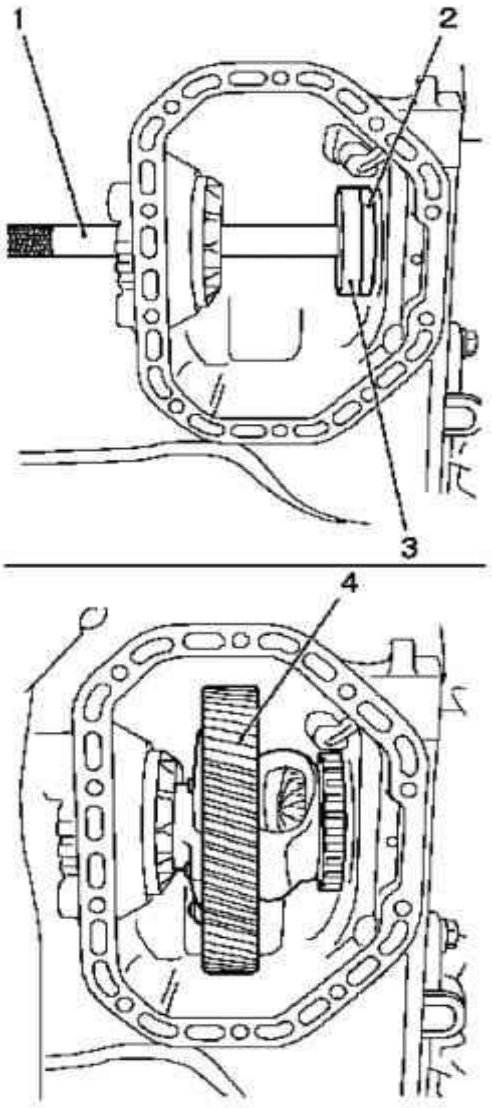


Fig. **3.82. Installation of external rings of roller bearing: 1, 3 - a special tool, 2 - roller bearing, 4 - differential**

Install differential (Figure 3.82).
Replace the back cover.

NOTE
Note the similarity of the bolts.

Attach the rear cover.
Replace it with a new gasket on the transmission housing.
Tighten the 4 bolts M7 moment 15 Nm
Tighten the 5-bolt M8 moment 20 Nm
Set shafts of the wheels.
Check the fluid level in the gearbox.

Removal and installation of the main shaft (gearbox F 13)

NOTE
Transmission is installed.

Withdrawal
Remove the gearbox.
Remove the switch reversing lamps.
Disconnect the wiring harness connector, switch reversing lamps.
Remove the casing front axle.

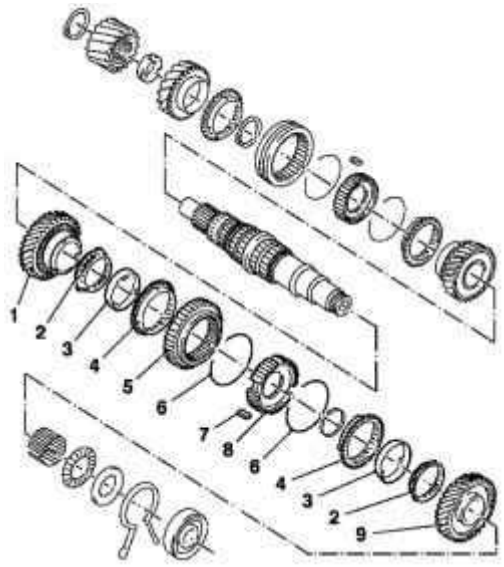


Fig. **3.83.** **General view of the main shaft and the mechanism of synchronization: 1 - Leading 2-nd gear transmission, 2 - inner synchronizer ring, 3 - intermediate ring, 4 - outer synchronizer ring, 5 - switching hub; 6 - Spring synchronizer; 7 - sliding blocks, 8 - housing synchronizer; 9 - Leading pinion 1-th transmission**

Remove the back cover by unscrewing the mounting bolts 9.

NOTE
If necessary, loosen the fastening lid light strikes a rubber hammer.

Remove the rear cover gasket.
Remove the back cover.
Remove the main shaft.

NOTE
If the gears are damaged, the entire block of gears must be replaced.

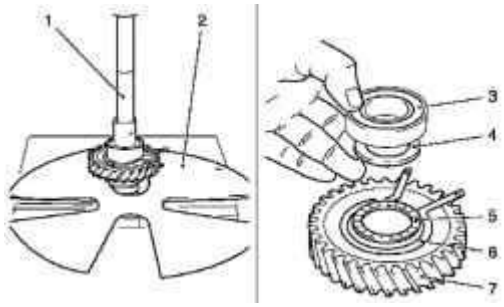


Fig. **3.84.** **Removing the components of 1-th transmission: 1, 2 - a special tool, and 3 - ball bearing, 4 - thrust washer, 5 - Axial needle bearing, 6 - circlip; 7 - gear 1-th transmission**

Remove the pinion 1-th transmission (Fig. 3.84).
Cpressuyte 1st transfer from the main shaft with a special tool KM-307-B, and KM 736 (Fig. 3.84).
Remove the ball bearing and thrust washer.
Remove the axial needle bearing and retaining ring.
Disconnect the 3 ring synchronizer and gear 1-th transmission.

3.3. Automatic transmission

General

Automatic transmission serves as a seamless integration with the clutch when starting place and the best gear when driving a car.
Automatic box equipped with four driven gears to move forward. The third and fourth gears when locked coupling can be switched mechanically bypassing the torque converter.
The main units of the automatic transmission are as follows:
- Gidrotrasformator that transfers torque from the engine to the gearbox. Blocking allows you to bypass the torque converter clutch and mechanically switch the third and fourth gears;
- Planetary gearbox. Is a mechanical unit of automatic transmission, with which by the continuous engagement of gears and brakes and the interaction of the satellites can change gear almost without breaking the flow of power;
- Controlled oil pressure multi-disk clutches and brakes, as well as band-brake can without breaking the flow of power to establish the necessary gear ratios and stop the rotating parts. In contrast to the clutches, brakes attached to the gearbox housing;
- Oil pump and the radiator;
- Freewheel to optimize load transfer;
- The main channel;
- Electronic control system with a hydraulic control unit for automatic transmissions. The control unit performs the gear shift. Elements affecting the work of the control unit are the sensor throttle position and engine speed sensors, speed of the output shaft gear, oil temperature in the gearbox, etc.

Torque

On cars Opel establish different torque converters. They are marked on the butt end, which indicates the compatibility of the transformer with a gearbox is the same markings.
Torque is located between the engine and gearbox, for transferring torque from the engine to the box through the hydrodynamic flow motion of the working fluid. The engine drives a torque converter oil pump. Impeller, which is also housing the transformer, converts the energy of the engine to kinetic energy of the working fluid, which acts on the turbine wheel.
Pump and turbine wheels rotate at different speeds. So, for example, when moving from place transformation ratio is very high, and then with increasing speed of the turbine wheel, he goes down. However, even at high speeds there is a certain "slip" of the liquid. Even at high speed the engine crankshaft to the shaft frame is transmitted only 85% of torque. Therefore, engines, equipped with automatic transmission, spend a bit more fuel than engines with a manual. This drawback is eliminated with the help of the locking clutch.

Main gear

Transmission converts engine torque, which is a small and large gears main gear is transmitted further. Most gear is fixed to the housing main gear. Drive shafts connecting the transmission with semi wheels. The main gear with the gearbox mounted in one housing.
There also are four related to each other bevel gear (differential), two of which are connected to the diversion (cardan) shaft, which in turn transmit torque to the drive wheel of the car. Installed on the shafts of constant velocity joints (such as "tripod") provide the necessary transfer of torque at varying angles of inclination shafts.

During straight-line motion on a perfectly smooth surface, both wheels have the same rotational speed equal to the speed main transmission. Differential rotates with the same speed, and conical gears are in a state of rest. When turning or hitting on the uneven one wheel is greater distance than the other. In this case, comes into force differential that distributes torque between the wheels and allows the driven shafts to rotate with different angular velocities.

Adjust the cable selector switch automatic transmission

Lift and set the car on stands or on the observation pit.
Selector set to position "P".
Squeeze the top ball-bearing rope from the axis of the selector switch.
Switch the selector from the position "P" in position "1". This drive should be easy to navigate. Otherwise, replace the cable.
Switch the selector to position "P". This should be enabled parking lock, front wheel should not rotate.
In this position the cable selector should be no effort to press on the lever axis switching. Otherwise Perform adjustment of the cable.
Switch the selector to position "P".
Click on the axis of the switch in the gearbox in the rearmost position. Blocking parking should be fixed.
Few loosen the bolt 3 supports a gear. Pull the prop so that the cable can be free to push on the lever axis switching. In this position, tighten the bolt the moment 25 Nm
Go through to the car and check the action selector. The engine can be started only in the position of the selector "P" and «N».
Turn on the ignition. At stationary car selector should be evacuated from the provisions of "P" or «N» only when simultaneously pressed the brake pedal.

3.4. Propulsion mechanism

General

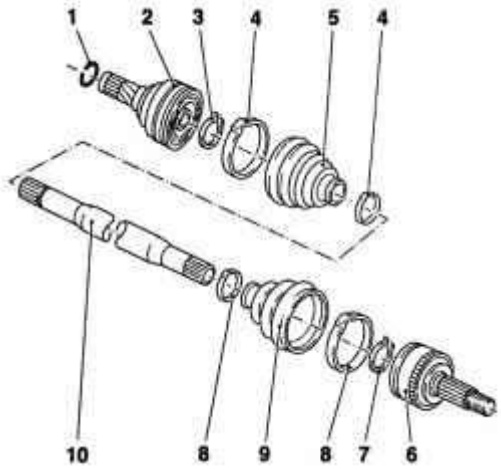


Fig. **3.98.** **Drive shaft with constant velocity joints of double compensation: 1 - snap ring, 2 - inner CV Joints, 3 - internal locking ring joint; 4 - Mounting clamp, 5 - anthers, 6 - outer constant velocity joints; 7 - internal locking ring joint; 8 - Mounting clamp; 9 - anthers; 10 - drive shaft**

Drive shafts transmit torque from the engine, gearbox and differential on the front wheels. In the transmission housing, drive shafts are mounted splines with poluosevymi gear differential. Spline Fixing the tip of the internal hinge shaft in poluosevoy gear is carried by a spring circlip. When installing the retainer ring is compressed, entering into the groove of the shaft. After, that as the shaft will be completely installed in poluosevuyu gear differential, locking ring decompressed and fixes splined tip of the axial displacement. Outside hinges are attached to the drive shafts of front wheel hubs mounted on the bearings. A shaft is fastened to the hub nut.

On the drive shaft from the differential set universal joint-velocity (CV Joints) tripodnogo type, providing a low level of vibration.
Constant-velocity joint (CV Joints) are protected by rubber covers, which are fastened with clamps and protect from water and dirt.

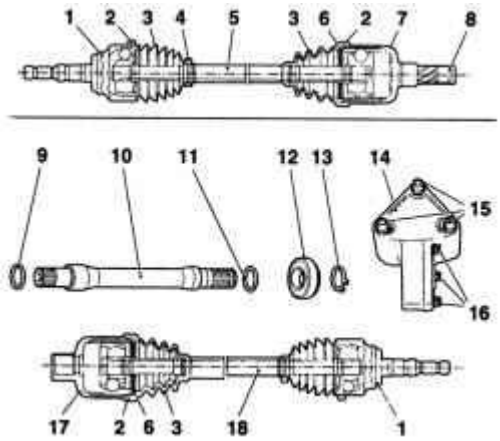


Fig. **3.99.** **The drive shaft with internal tripodnogo type constant velocity joints and intermediate shaft: 1 - outer constant velocity joints (double compensation); 2 - Mounting clamp, 3 - anthers 4 - Mounting clamp, 5 - left drive shaft; 6 - circlip hinge; 7 - inner CV Joints tripodnogo type 8 - snap ring, 9 - O-ring, 10 - intermediate shaft; 11 - locking ring, 12 - journal-bearing intermediate shaft; 13 - locking ring, 14 - intermediate support 15 - fixing screws intermediate support 16 - tie intermediate shaft flange bolts, 17 - inner CV Joints tripodnogo type (with slots for intermediate shaft), 18 - right drive shaft**

Carry case must periodically inspect for the presence of traces of damage, leakage of the lubricant or cuts. Damaged covers CV Joints must be immediately replaced by new ones, otherwise the constant velocity joints can be damaged. Replacing the cover includes the operation of removing drive shafts. The signs of wear or damage to the constant velocity joints, in addition to leakage of the lubricant, are snapping when moving and turning, the roar when accelerating after a motion by inertia or vibration at high speeds on the highway.

Measurement of radial and lateral runout of the bearing wheels

Withdrawal

Remove the rear wheel.

Remove the brake disc or brake drum.

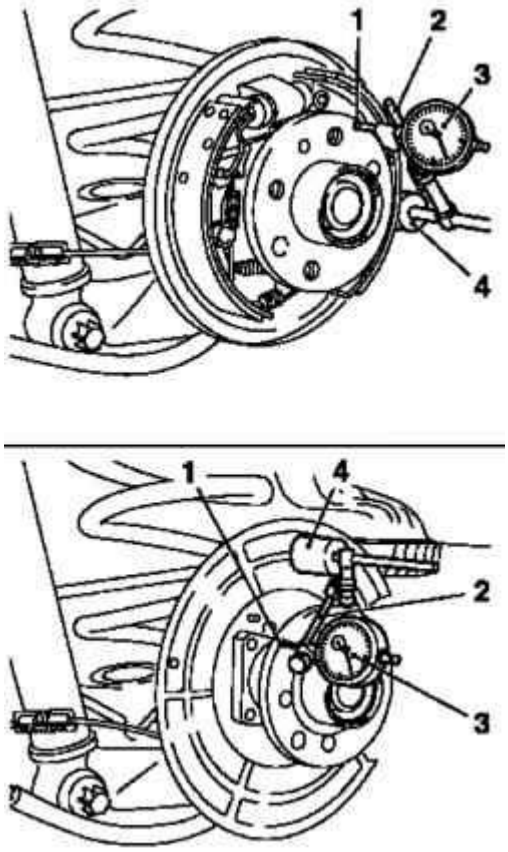


Fig. **3.100.** **Measurement of the radial runout: 1 - The clock display type sensor 2 - LED clock type 3 - a special tool, 4 - magnetic holder**

Attach special tool MKM-571-B with bracket clock-type indicator and a magnetic holder to the brake shield or cover (Fig. 3.100).

Install sensor type indicator hour in front of the outer edge of the bearing wheels.

Set the indicator to "0".

Slowly turn the wheel bearing.
Measure the radial run.
Allowable lateral beating is: 0,04 mm.

NOTE
If the value is not specified, replace the wheel bearing.

Install special tool MKM-571-B (3) The clock display type, the bracket (1) and a magnetic holder (2) on the brake shield.

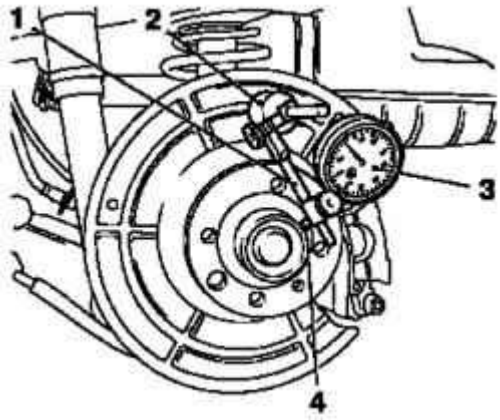


Fig. **3.101.** **Measurement of lateral runout: 1 - Bracket 2 - magnetic holder, 3 - a special tool, 4 - sensor type indicator time**

Install sensor type indicator hour front wheel bearing (as shown in Figure 3.101).
Set the indicator to "0".
Slowly turn the wheel bearing.
Measure the lateral separation.
Allowable lateral beating: not more than 0,05 mm.

NOTE
If the value is not specified, replace the wheel bearing.

Setting
Remove the special tool MKM-571-B with the bracket clock-type indicator and a magnetic holder.
Install the brake disc or brake drum.
Install the rear wheel and tighten the bolts fastening point 110 Nm

Measurement oblique gap block bearing

NOTE
If you have a wheel is significant gap, measure it, as indicated below.

Withdrawal
Remove the appropriate rear wheel.
For cars with drum brake mechanisms: remove the brake drum.

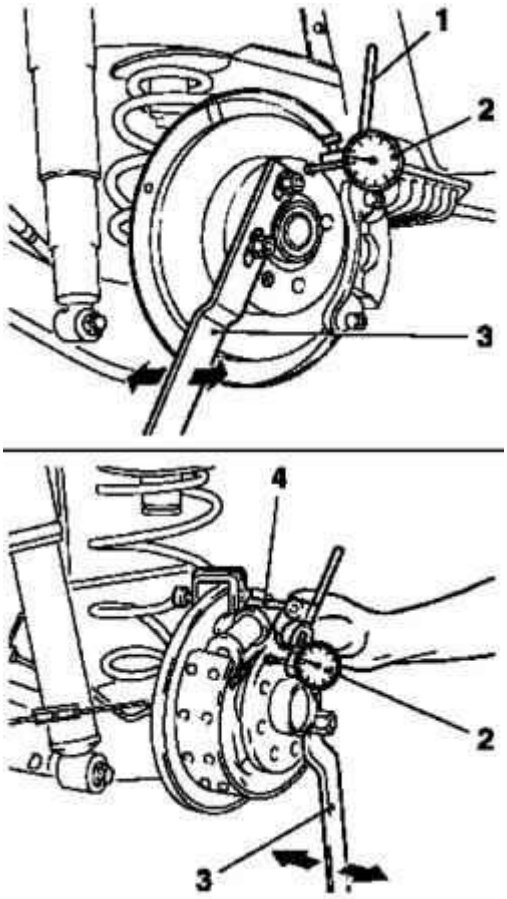


Fig. **3.102.** **Measurement oblique gap block bearing: 1 - magnetic holder, 2 - a special tool, 3 - Bracket 4 - a special tool**

Attach special tool KM-468-B of the wheel hub (see Figure 3.102).
Attach special tool MKM-571-B, to the brake calipers or backplate brake mechanism with a magnetic holder, or bracket.
Replace the sensor if a special tool MKM-571-B on the outer edge of the brake disc or wheel bearing.
Check the clearance of raising a little bit special tool KM-468-B.
The maximum permissible slope of the gap: 0,1 mm.

NOTE
If this value is exceeded, replace the wheel bearing.

Setting
Remove the special tool MKM-571-B with the bracket or magnetic holder.
Remove the special tool KM-468-B.
For cars with drum brake mechanisms: Set the brake drum
Install the rear wheel, tighten the bolts fastening point 110 Nm

Removing and installing shaft wheel

Withdrawal
Remove the corresponding front wheel.
Disconnect the wheel shaft of the wheel hub.
Unscrew the nut on the shaft of the wheel.

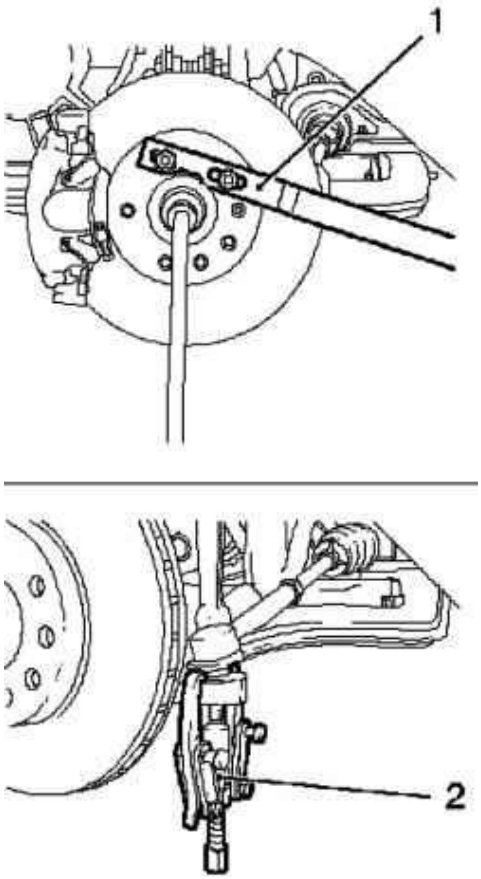


Fig. **3.103.** **Extrusion tie rod from steering knuckle: 1, 2 - a special tool**

Hold with a special tool KM-468-B on the front wheel hub (see Figure 3.103).
Remove the steering pull to the steering knuckle, remove the nuts.
Vypressuyte steering thrust of the steering knuckle, using a special tool KM-161-B, together with a device KM-161-2 (Fig. 3.103).
Disconnect the brake hose from the pipe supporting spring rack.
Remove the strap.
Disconnect the brake hose from the bracket.

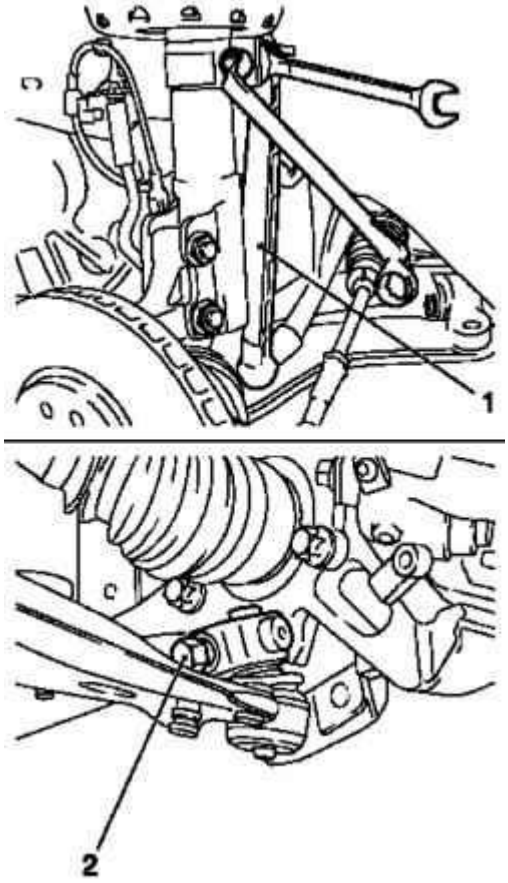


Fig. **3.104.** **Removing the rotary arm supporting the pipe from the spring rack: 1, 2 - a special tool**

Disconnect the swivel lever (1) of the supporting spring tube rack (Fig. 3.104).
Hold for Lyskov open wrench.
Remove the hinge from the steering knuckle, unscrewing bolts.
Take the steering knuckle using special tool KM 915 (Fig. 3.104).
Remove the joint from the steering knuckle.
Squeeze the shaft of the wheel hub of the wheel.

NOTE
When turning a fist Take this out, if necessary, use the puller wheel hub.

Remove the bottom cover of the engine compartment

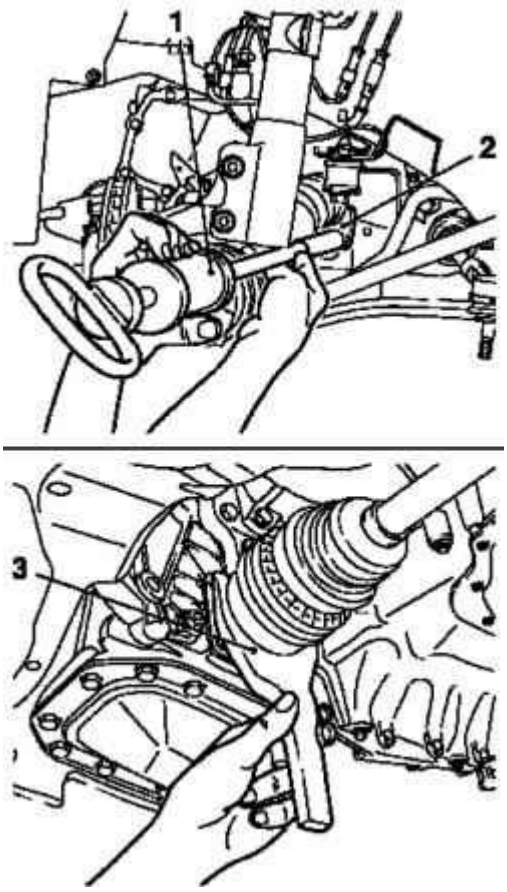


Fig. **3.105.** **Removing the shaft wheel: 1, 2, 3 - special tool**

Remove the wheel drive shaft of the gearbox and surmount it with an intermediate shaft (Fig. 3.105).

NOTE
Collect the oil in a pan and close the hole plugs.

Observe the orderly handling of the shaft wheel.

Setting
Install wheel shaft in the gearbox.
Install a new circlip on the shaft wheel.
Cover the slots and supports oil for gearboxes

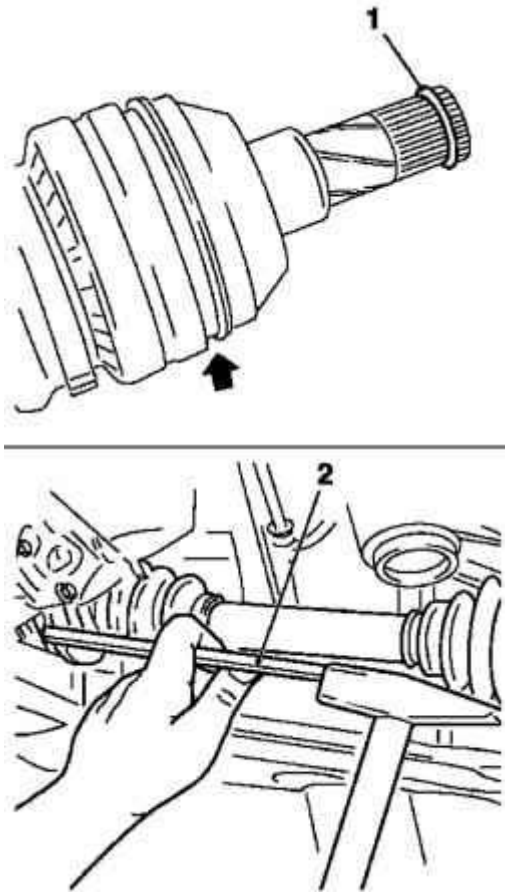


Fig. **3.106. Install locking ring: 1 - snap ring, 2 - piercer**

Install wheel shaft in the gearbox, Drive in a gear box with a rubber hammer and a suitable soft metal beard (Fig. 3.106) until it snaps into the locking ring.
On vehicles with an intermediate shaft - set the wheel shaft to the intermediate shaft.
Replace the retaining ring on the intermediate shaft.
Secure the right wheel drive shaft on the intermediate shaft.

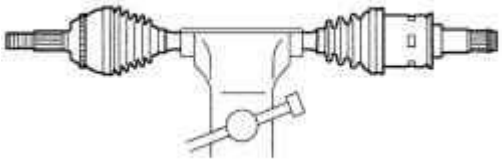
NOTICE
Be careful not to damage the slots, zapressuyte intermediate shaft using a suitable soft metal beard until it snaps into the locking ring (Fig. 3.106).

Install shaft wheel in the wheel hub.
Attach the hinge to the steering knuckle and tighten the moment 50 Nm
Use new nut.
Attach a swivel arm for supporting the pipe rack and tighten the spring are 55 Nm
Use new nut.
Hold for Lyskov open wrench.
Attach the steering pull to the steering knuckle and tighten the moment of 30 Nm + 90 ° +15 °.
Use new nut.
Attach the brake hose to the pipe supporting spring rack.
Install the brake hose bracket to the supporting tube spring rack.
Secure the strap.
Install shaft wheel in the wheel hub and tighten the moment of 150 Nm, loosen at 45 °, and then tighten the moment of 250 Nm
Use new nut.
Hold with Specials tool KM-468-B of the wheel hub.
Install the front wheel and tighten the bolts fastening point 110 Nm
Check the fluid level in the gearbox.

Replacing the internal velocity joints

NOTE
Internal Constant-velocity joint is beyond repair, and in case of its failure, should replace the hinge assembly.

Fig. **3.107.** **Mounting shaft in a vise**



Attach the drive shaft in a vise with soft sponges (Fig. 3.107).

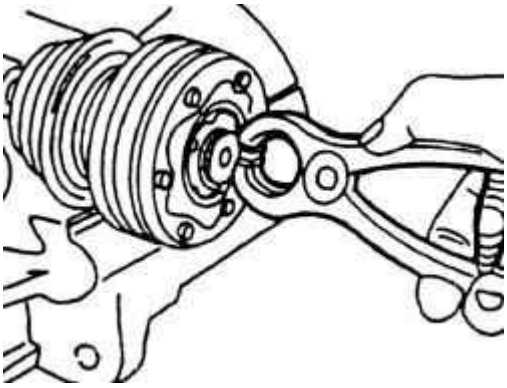


Fig. **3.108.** **Removing the locking ring**

Using special pliers for removing spring locking ring, remove the circlip from the end of the internal velocity joints (Fig. 3.108).

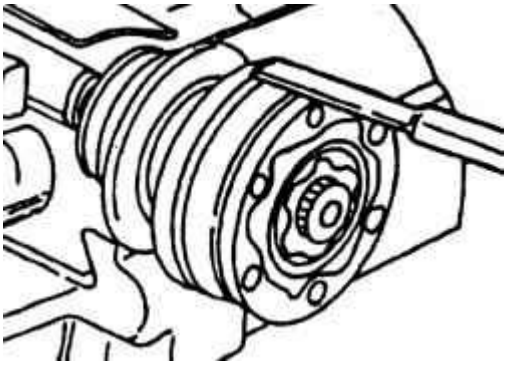


Fig. **3.109.** **Removing the protective cover**

Using the mandrel, surmount the protective cover from the hinge (Fig. 3.109).
Mandrel must in turn be installed in various points around the perimeter of the shell to his uniform withdrawal. Slide the protective cover of mid-shaft.

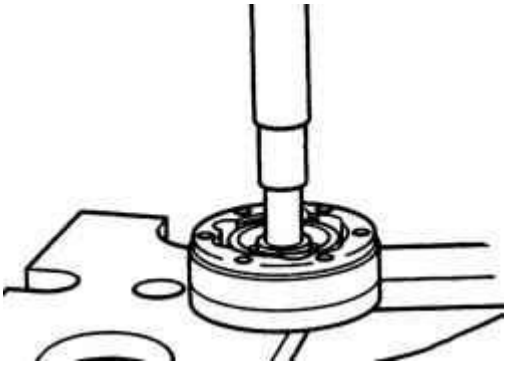


Fig. **3.110.** **Removing the drive shaft of the hinge**

Mount the hinge in a vise, then remove from the drive shaft. If the drive shaft can not be extract from the joint, the joint is set into a press and using the device, squeeze from the drive shaft (Fig. 3.110).
Remove the drive shaft disc springs washer, pre-noting its position. Washer has slots, and the convex side of the washer is on the part of the hinge.
Before installing the new hinge thoroughly clean the drive shaft.
Install a spring plate washer on the shaft so that the convex side of the puck was at the hinge, and the internal splines compatible with the puck shaft splines.

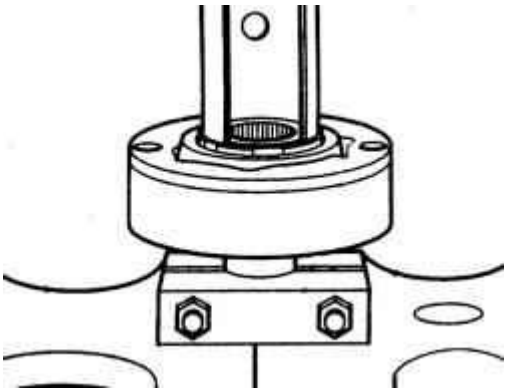


Fig. **3.111. Mounting shaft in the hinge**

Mount the joints of equal angular velocity in a vise with soft lips and insert the drive shaft. If the shaft is not included in the hinge, zapressuyte hinge on the shaft on the press, with the shaft bottom must rely on the support (Fig. 3.111).
Set the groove shaft new spring-loaded locking ring.
Fill the inner hinge 120 grams of lubricant, with one half of lubrication in the joint mortgage on the one hand, and the second half - the other side.
Replace the protective cover. Before mounting a protective cover with clamps, screwdriver, lift the inner edge of the cover, to equalize the air pressure under the cover.

Replacing the external velocity joints

Remove the clamps mount a protective cover and slide the cover to hinge on the driving shaft.
Thoroughly clean the inside of the hinge and remove the spring-loaded locking ring on the inside hinge.

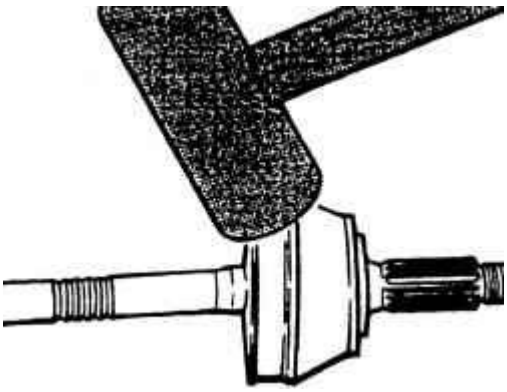


Fig. **3.112. Removing the hinge to the drive shaft**

Attach the drive shaft in a vise with soft sponges and aluminum or copper with a hammer Destroy joint with drive shaft (Fig. 3.112).
Remove the spring-loaded locking ring, gasket and plate washer from the end of the shaft.
Fill the inner hinge 90 grams of lubricant.
Install the drive shaft plate washer, convex side to the hinge.
Install the new drive shaft, spring-loaded locking ring, secure the shaft in a vise with soft lips, and an aluminum or copper hammer nabeyte hinge on the drive shaft, and the retaining ring must clearly fall into the groove on the inner side of the hinge.

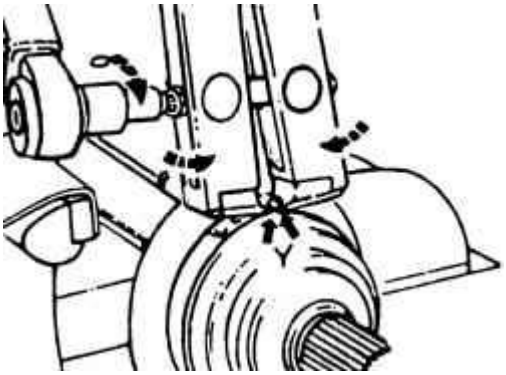


Fig. **3.113. Mounting clamps**

Replace the hinge protective cover and secure it with clamps, screwdriver, lift the inner edge of the cover, to equalize the air pressure under the cover. For mounting clamps to the application of the special tool (see Figure 3.113).

Sponge tool set at the corners of clamp time, and in this position tighten the screw sponges.

Disassembly outer constant velocity joints

Mark the position of clips and body joint. Turn the hub joint in the body and pull each ball. Tie balloons in the order of removal, for subsequent re-installation in the original position.

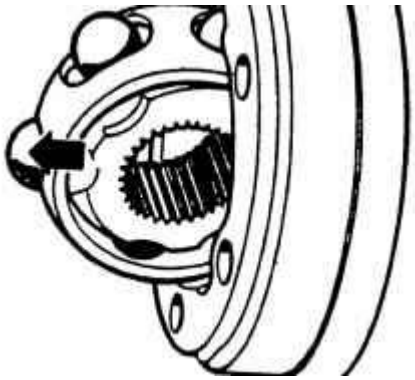


Fig. **3.114.** **Fetching balls**

Turn the cage pivot, so that two rectangular slits were combined with the shell, then remove the separator and the clip (Fig. 3.114).

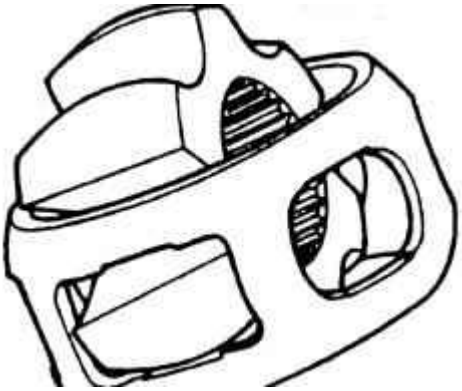


Fig. **3.115.** **Removing the separator and clips**

Rotate the clip in the cage so that one part of the clips came in one of the rectangular slit in the cage, turn the clip and remove it (Fig. 3.115).

Clear all the details of joint and check their status. If there are signs of wear or corrosion, replace the hinge.

Apply 45 grams of body joint, then set the separator with an internal clamp into the body joint. Successively insert the balls into the clip, and check that the clip in the cage and the body established in the initial position (as previously made mark). Install a new circlip, then push in the remaining half of the joint lubrication (45 grams).

3.5. Tables

Table 3.1 Potential problems of adhesion, their causes and solutions

Возможные причины неисправности	*Способ устранения*
Неполное выключение сцепления (сцепление «ведет»)	
Недостаточный полный ход педали сцепления	Отрегулируйте привод сцепления
Коробление ведомого диска (торцовое биение более 0,5 мм)	Выправьте или замените диск
Заедание ступицы ведомого диска на шлицах первичного вала	Очистите шлицы, промойте уайт-спиритом. При износе шлицев замените первичный вал или ведомый диск
Перекос или коробление нажимного диска	Замените кожух сцепления в сборе с нажимным диском и пружиной
Ослабление заклепок или поломка фрикционных накладок ведомого диска	Замените накладки, проверьте торцовое биение диска
Нарушение работоспособности троса привода сцепления	Замените трос
Неполное включение сцепления (сцепление «буксует»)	
Повышенный износ или пригорание фрикционных накладок ведомого диска	Замените фрикционные накладки или ведомый диск в сборе
Замасливание фрикционных накладок ведомого диска, поверхностей маховика и нажимного диска	Тщательно промойте уайт-спиритом замасленные поверхности, замените изношенные или поврежденные сальники коробки передач и двигателя. Проверьте отсутствие течи масла через болты крепления маховика; при наличии течи установите болты на герметик, как указано в главе
Повреждение или заедание привода сцепления	Устраните причины, вызывающие заедание. Замените поврежденные детали
Рывки при работе сцепления	
Замасливание фрикционных накладок ведомого диска, поверхностей маховика и нажимного диска	Тщательно промойте уайт-спиритом замасленные поверхности, замените изношенные или поврежденные сальники коробки передач и двигателя. Проверьте отсутствие течи масла через болты крепления маховика; при наличии течи установите болты на герметик
Заедание в приводе сцепления	Устраните причины, вызывающие заедание. Замените поврежденные детали
Повреждение поверхности или коробление нажимного диска	Замените кожух сцепления в сборе с нажимным диском
Повышенный шум при включении сцепления	
Поломка демпферных пружин ведомого диска	Замените ведомый диск в сборе
Повышенный шум при выключении сцепления	
Износ, повреждение, утечка смазки из подшипника выключения сцепления	Замените подшипник

Table 3.2 Possible malfunctions of the INC, their causes and solutions

Возможные причины неисправности	*Способ устранения*
Вибрация, шум в коробке передач	
Возможная причина неисправности	Способ устранения неисправности
Ослабление крепления или повреждение опор подвески двигателя и коробки передач	Затянуть крепления или заменить опоры
Осевой зазор валов не соответствует норме	Отрегулировать осевой зазор
Износ или повреждение шестерен	Заменить шестерни
Залито масло несоответствующей марки	Залить масло требуемой марки
Недостаточный уровень масла	Долить масло до нормы
Нарушение регулировки холостого хода двигателя	Отрегулировать холостой ход двигателя
Утечка масла	
Разрушение или повреждение сальников или уплотнительных колец	Заменить сальники или уплотнительные кольца
Затрудненное переключение передач	
Неисправность троса привода переключения передач	Заменить трос привода переключения передач
Неплотное прилегание или износ блокирующих колец и конусов синхронизаторов	Устранить неисправность или заменить детали
Ослабление пружин синхронизаторов	Заменить пружины синхронизаторов
Залито масло несоответствующей марки	Залить масло требуемой марки
Самопроизвольное выключение передач	
Износ вилок переключения передач или поломка пружин фиксаторов	Заменить вилку или фиксатор
Увеличенный зазор муфты синхронизатора на ступице	Заменить ступицу и муфту синхронизатора

Table 3.3 Volume of transmission oil

Коробка передач	*Заправочный объем*
F13	Примерно 1,6 л
F17+ F17+MTA	Примерно 1,6 л
F23	Примерно 1,75 л
M20	Примерно 2,4 л
M32	Примерно 2,4 л

Table 3.4 Troubleshooting the drive wheels, their causes and solutions

Возможные причины неисправности	*Способ устранения*
Увод автомобиля в сторону	
Заедание шарикового шарнира вала привода колеса	Заменить шарнир
Износ, биение или заедание подшипника ступицы	Заменить подшипник
Нарушение углов установки передних колес, неисправность передней подвески и рулевого управления	Отрегулировать или заменить изношенные или поврежденные детали
Вибрация	
Износ, повреждение или деформация вала привода колеса	Заменить вал
Биение вала привода колеса и задиры в ступице	Заменить
Износ, биение или задиры в подшипнике ступицы	Заменить
Шимми передних колес	
Нарушение балансировки колес	Отбалансировать или заменить колеса
Нарушение углов установки передних колес, неисправность передней подвески и рулевого управления	Отрегулировать или заменить изношенные или поврежденные детали
Шум, стук со стороны переднего колеса при движении автомобиля	
Износ, повреждение или деформация вала привода колеса	Заменить вал
Биение вала привода колеса и задиры в ступице	Заменить
Биение вала привода колеса и задиры на полуосевой шестерне дифференциала	Заменить
Износ, биение или заедание подшипника ступицы	Заменить
Ослабления затяжки гайки крепления ступицы	Затянуть или заменить гайку
Нарушение углов установки передних колес, неисправность передней подвески и рулевого управления	Отрегулировать или заменить изношенные или поврежденные детали

4. Chassis

4.1. General

Building front axle

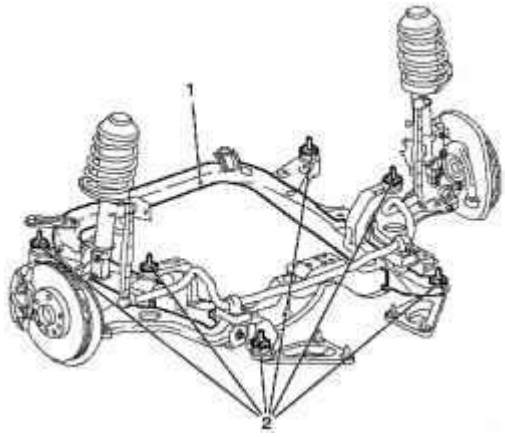


Fig. 4.1. **Building front axle: 1 - the front suspension subframe, 2 - rubber sleeve**

Install the front suspension subframe to the body via rubber bushings will significantly reduce the transmission of vibrations and noise from the drive to the body and, ultimately, to the car. In the event of an impact in the area of the front suspension subframe, the forces transmitted to the body through the damping bushes in the six mounting points. Subframe front suspension has front and rear bearings for jet engines and transmissions. The static load on the engine and gearbox spars absorbed by the body.

Service

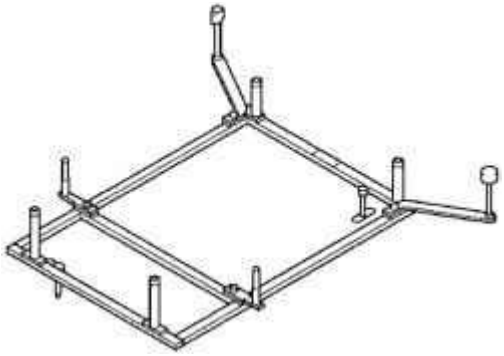


Fig. **4.2.** **Device for removal of the front suspension subframe**

Removing and installing the front suspension subframe are described in the Instructions for maintenance Astra-H, the group «E» and implemented with the help of a hydraulic jack, and a frame 904 KM and the new device for the alignment of KM 6390. It is essential that these special instruments are used in order to properly remove and install the front suspension subframe, as well as the correct target sub-frame of the front suspension on the bottom of the car. In contrast to the Astra-G, the direction of the CM 6390 - are now in the front mounting points. Therefore, when lifting the car, pay special attention to the fact that the holes for the alignment of the CM 6390 has not been closed.

Rear axle

The modified rear axle from Astra-G is used in Astra-H.

The levers are welded to the body of the rear axle. Mounts damping bushings increased to install a larger diameter bushings, mounting the rear axle changed. Thanks to optimized design of the rear axle, the Astra-H was possible to do without the stabilizer.

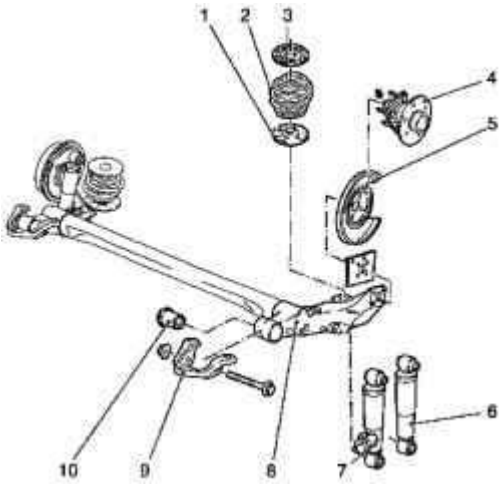


Fig. **4.3.** **Components of the rear axle: 1 - the bottom cushion ring, 2 - Rear spring, 3 - upper shock-absorbing ring, 4 - wheel bearing module with a sensor mounted on the wheels of the vehicle (arrow), 5 - cap 6 - shock absorbers, 7 - shock absorber system CDC; 8 - rear axle; 9 - arm rear axle, 10 - damping bush**

For optimal settings chassis, there are a total of six different versions of the rear axle. The following table gives an overview of the different structures of the rear axle.

Service

Rear axle must be removed and installed using a hydraulic jack and special adaptations KM 904 and KM-6002, to ensure proper installation of the rear axle.

Damping sleeve

The diameter of the damping of the rear axle bushings on Astra-H for 10 mm more than the Astra-G and Zafira. Changing the damping sleeve has helped reduce the transmission of vibrations from the rear axle of the car body, thus improving ride comfort and stability control. Controllability and longitudinal stability was also improved by changing the damping sleeves and an increase in rut.

Service

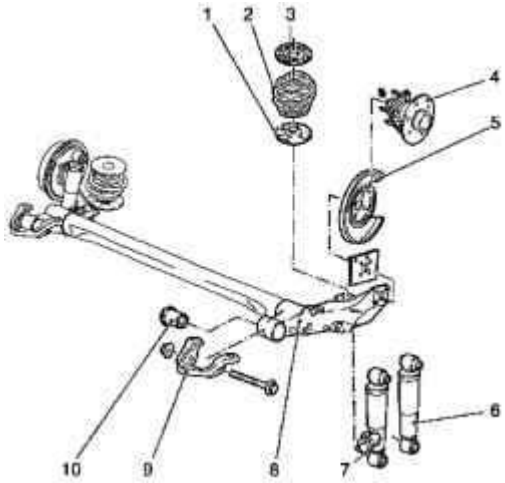


Fig. **4.3.** **Components of the rear axle: 1 - the bottom cushion ring, 2 - Rear spring, 3 - upper shock-absorbing ring, 4 - wheel bearing module with a sensor mounted on the wheels of the vehicle (arrow), 5 - cap 6 - shock absorbers, 7 - shock absorber system CDC; 8 - rear axle; 9 - arm rear axle, 10 - damping bush**

In order to aftermarket rear axle comes complete with sealing sleeves. Special device KM-6006, which was used for Astra-G and Zafira is not suitable for damping sleeves Astra-H. New device for removing and installing the damping of the rear axle bushings scheduled for delivery in 2004

Shock Absorber - rear axle

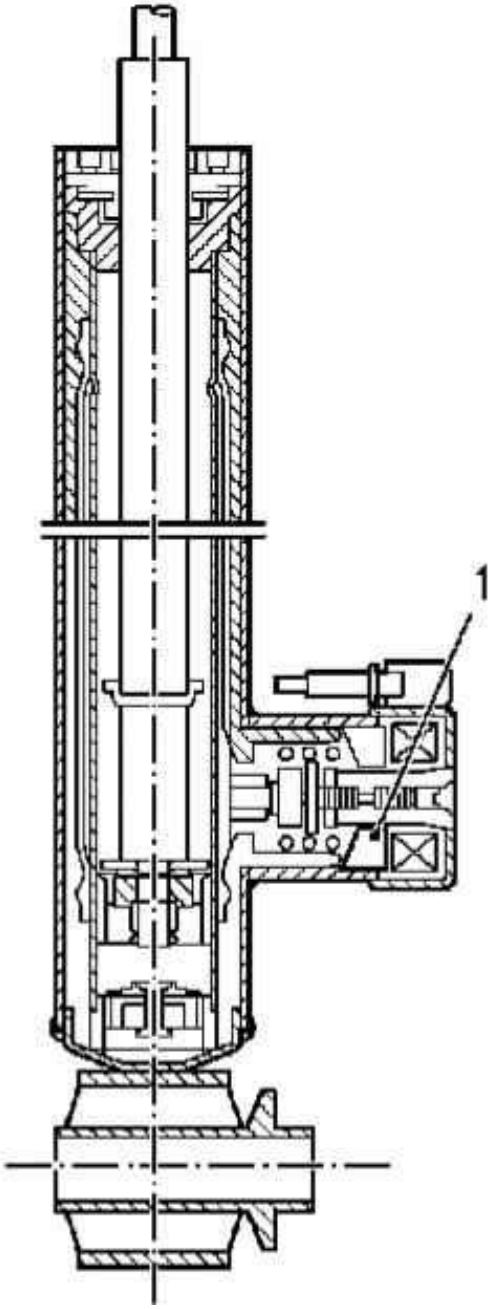


Fig. **4.4.** **Construction absorber rear axle counters: 1 - proportional valve**

Rear shock absorbers for Astra-H are available in different versions. As spring front rack, rear bumpers of cars with the chassis CDC are proportional valve that is installed on the outside and works as a bypass valve.

Service

For the operation of the service, shock absorbers and their corresponding numbers in the catalog can be found in the electronic catalog of parts for each version of the equipment of the car. Rear shock absorbers are removed and installed using a hydraulic jack, special adaptations KM 904 and KM 6002.

Spring rack with springs of the all-clear

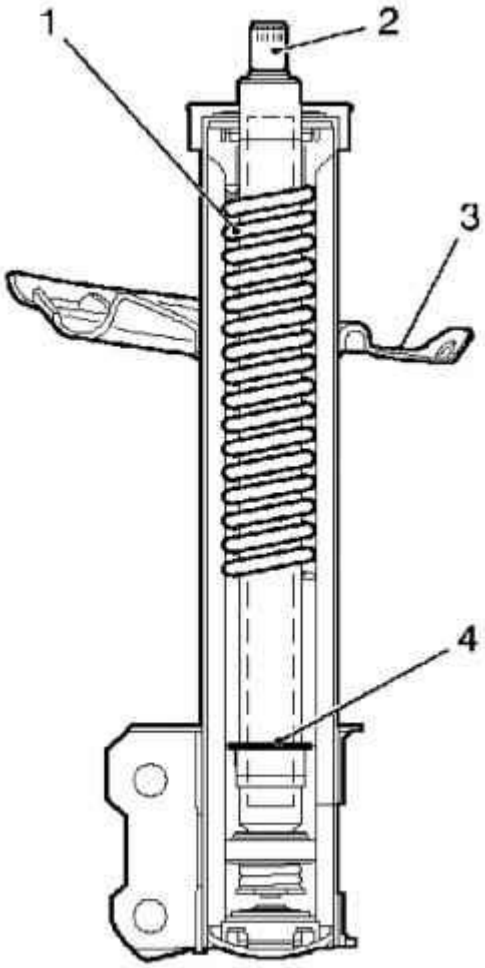


Fig. **4.5.** **Spring rack with springs of the all-clear: 1 - spring of the all-clear, 2 - piston, 3 - spring plate on the shock absorber, 4 - limiter on the piston rod**

Spring of the taps, which, depending on the version of the equipment installed in the shock absorber, provides greater lateral stability and to counter the trend buildup, especially on cars with high center of gravity. Spring rack with a spring of the taps used in the models, with a panoramic roof (additional equipment), because the use of safety glass in the roof leads to higher center of gravity of the car. Exceptions are models with petrol engines, Z 18 XER and Z 16 XEP. These options do not have the springs of the taps, even in the complete set with a panoramic roof. All models, with "sports chassis' have a system of springs of the all-clear. The surface of the shock absorber with spring-clear can be distinguished from conventional shock absorber only when it is not installed on the car. In the normal shock absorber, piston, under the influence of gas pressure in the cartridge damper, is brought out. In the spring of the shock absorber piston-clear to put forward as long as the force produced by spring of the taps does not exceed the gas pressure, so the rod will not pull out completely.

Spring rack

New spring and a new rack mount system spring rack to the dome spring racks are specially designed for Astra-H. Spring-loaded rack with gas-filled shock absorbers have a lightweight design. The new valve system improves the properties of a car shock absorber and the work of the steering. Newly developed separate supporting bearing also provides better noise isolation and damping. Two halves of the plastic retaining ring used to connect the spring stand with body (dome spring rack). Springs, which have been specially selected for the spring poles, provide a linear displacement of the piston rod in the spring rack, thus minimizing the friction between the piston and seal spring rack. The result is reduced wear and tear. This, in turn, has a positive influence on ride comfort.

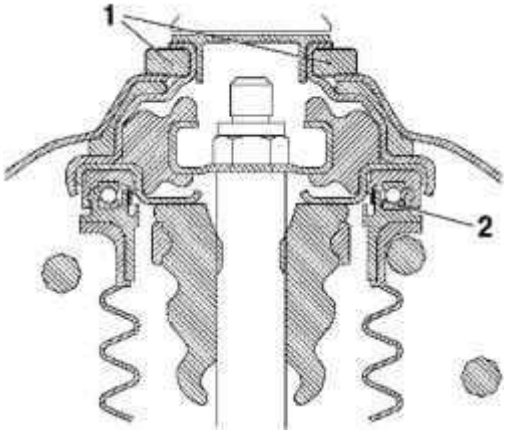


Fig. **4.6.** **The design of spring rack: 1 - plastic retaining ring, 2 - supporting bearing**

Electronically controlled shock absorber damping is used in conjunction with the damping system CDC, which is new for this class of cars.

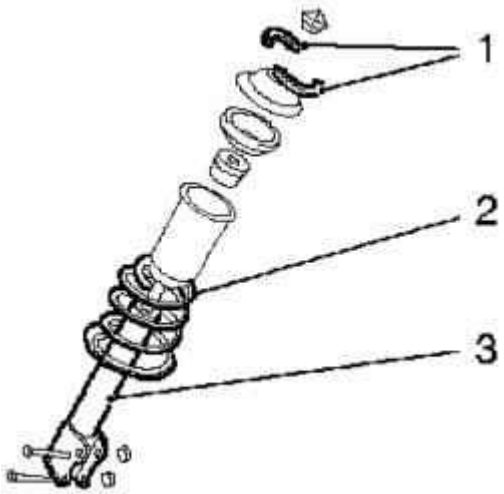


Fig. **4.7.** **Components spring rack: 1 - halves of the locking ring, 2 - spring, 3 - Spring rack**

Service

To dismantle a spring rack should be used a new special tool KM 6399, together with the usual holder of MKM-6066 and KM-6068 puller springs. The new tool is required to reduce and tighten the nuts pillow block.

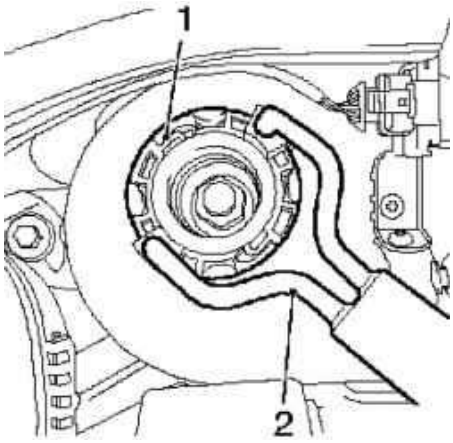


Fig. **4.8.** **Puller for locking rings: 1 - retaining rings, 2 - smnik**

It is possible to remove and install a spring rack without the need to dismantle the suspension arms and wheel shafts. When mounting the spring rack, always use a new retaining rings for attaching spring rack to the body. Retainer rings (1) shall be established using a new special tool KM 6384 (2).

Stabilizer / swivel arm

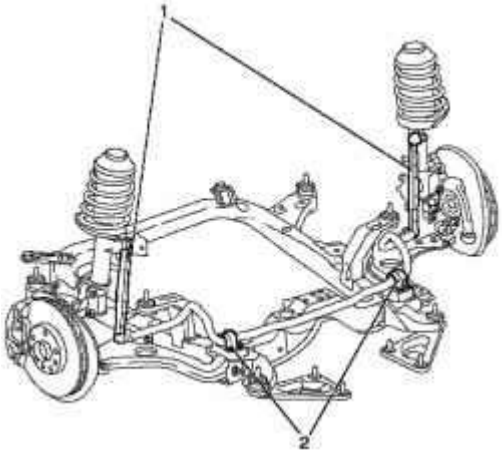


Fig. **4.9.** **Stabilizer / swivel lever: 1 - turning the lever, 2 - Brackets**

The stabilizer is attached to the front suspension subframe by means of two rubber bearings and brackets. The stabilizer is attached to a spring reception at both ends by turning a lever made of plastic or steel. For cars with chassis CDC steel rotary instruments in a certain area have a bend, it is connected with the need to provide space for the valve control spring rack.

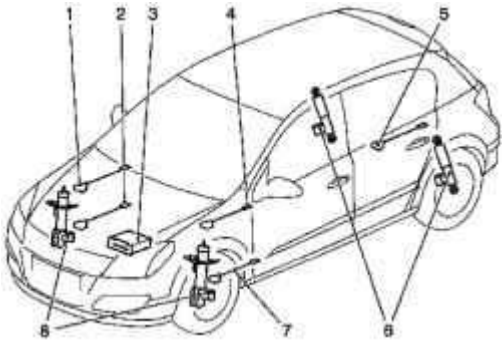


Fig. **4.10.** **System Components (CDC): 1 - front right sensor on a body (acceleration body), 2 - right sensor spring supports (the acceleration of the wheel), 3 - control unit CDC, 4 - front left sensor on a body (acceleration body), 5 - rear sensor on the body (acceleration body) 6 - rear shock absorber CDC; 7 - Left sensor spring rack (wheel speed) 8 - rack front springs CDC**

Continuous Damping Control (CDC)

Continuous Damping Control (CDC) is a management system damping and is a new system for cars in this class. CDC regulates the damping characteristics of shock absorbers car in accordance with traffic conditions and quality of road surface. System uses the principle of CDC «Skyhook». Principle «Skyhook» is to keep the body as possible in a stable state at the expense of variable damping, regardless of traffic conditions. For this, the system uses as a reference point "so to speak" imaginary virtual plane (eg the sky above the car), which is stored as a computational model in the control unit of CDC. The aim is to keep the body of the car as far as possible horizontally, on this plane. All vertical movements are compensated to the fullest extent possible, actuated shock absorbers. These actions are carried out within milliseconds.

Dampers

Shock absorbers can be smoothly adjusted electronically. CDC system continuously monitors the movement of the wheels and the car and immediately changes the damping of each shock absorber. Chassis thus configured optimally under conditions of motion. As a result, Astra-H offers excellent ride comfort without compromising safety. Brake performance on uneven roads is also optimized, as well as to a certain extent offset by the depreciation shock absorbers.

Adjustable shock absorber control unit and is calculated based on the following information:

- Road conditions;
- Speed of the vehicle;
- Braking force;
- Acceleration of the wheel;
- Move the steering wheel;
- Angle of the vehicle in the longitudinal and lateral direction (lift, tilt, swinging);
- Lateral acceleration (the angular velocity of yaw);

- Position switch - normal or sport driving style;
- ESP signal for correction of attenuation.

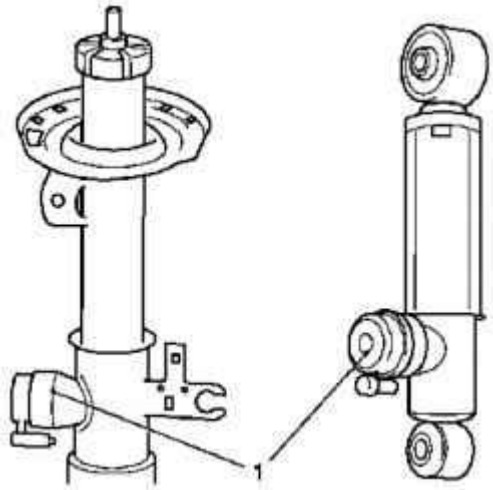


Fig. 4.11. **Proportional valves: 1 - Valves**

The flow of oil in the damper, and thus the damping force is regulated for each wheel depending on driving conditions and load. This is done within milliseconds by continuously adjustable proportional valve (1) located outside the damper. The valve operates as a bypass and replace check valves that are not used in shock absorbers CDC.

Sensors

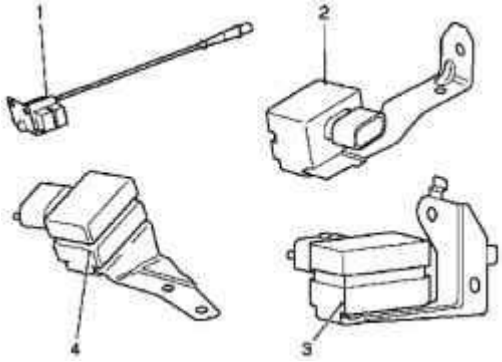


Fig. 4.12. **Sensors system CDC: 1 - sensor left and right spring rack (wheel speed), 2 - front left sensor on a body (acceleration body), 3 - front right sensor on a body (acceleration body), 4 - rear sensor on a body (acceleration body)**

CDC system for Astra-H also has 5 sensors on the body, needed to calculate the acceleration of the body and wheels. Two are located on two racks near the front springs steering knuckle, two spring mounts on the top rack about partitions, while the fifth is located behind the right rear rack, under the steering wheel above the castle door.

Indicator Control

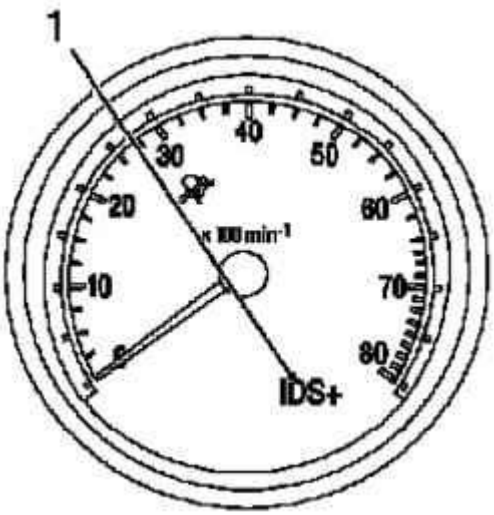


Fig. 4.13. **Indication system CDC: 1 - LED**

Indicator control in the instrument cluster is lit if the system is a failure, and does not distinguish the category of failure.

4.2. Wheels and tires

General

Alignment wheels

The design of cars is the most important development of safe systems, steering and suspension. Each component must be strong enough to withstand and absorb the load limiting steering control, and front and rear suspension should operate geometrically with the body of the car. Steering system and suspension requires that the front wheels were self-returning, and to grip the rotating wheel and the road surface guarantees low driving force with the least effort and the greatest comfort.

Full check of installation angles of the wheels should include measurement of convergence and collapse of the rear wheels.

Adjustable mounting angles of the four wheels ensures that all wheels will roll strictly in one direction. When adjusted adjusting the angles of the wheels, saving fuel consumption and resource path reaches its maximum value, improves handling.

Convergence

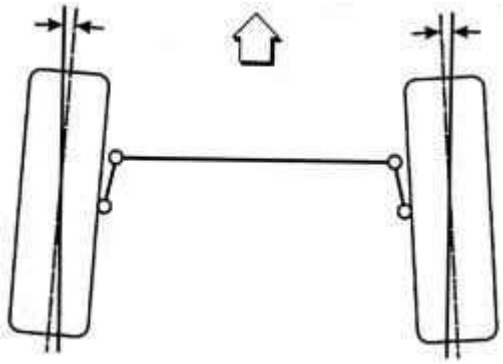


Fig. **4.14.** **Scheme of convergence (wheels are installed inside forward)**

Convergence is turning the wheels inside, opposite toe-wheels - wheels that turn outward from the center line. Convergence of the wheels provides parallel planes of rotation of the wheels.

Convergence is used to neutralize the small deviations of the wheel, taking place when the vehicle is moving forward. Installed the angle of convergence - the ability to install that angle at which the 0 ° between the planes of rotation of the front wheels and the center line of a moving car (no convergence).

Incorrect toe or toe back wheel leads to premature tire wear and increase fuel consumption. Individual components of steering and suspension wear, depending on the mileage, an additional toe necessary to equalize wear. Always adjust the angle of convergence in the least.

The angle of inclination of the axis of kingpin

Angle of inclination of the axis of the hinge pivot is the highest point of the axis of the kingpin forward or backward from the vertical at the sight of the car on the side.

Tilt back and forth is a positive - negative. The angle of inclination of the axis of kingpin affect the control of the direction of steering control, but does not affect tire wear. Weak (with a draft of) a spring or an overloaded vehicle affect the angle of inclination of the axis of kingpin. One wheel with a large positive slope of the axis of kingpin pulled to the center of the car. This causes a movement or tilt the vehicle towards the wheel with a smaller positive angle of inclination of the axis of kingpin. Angle is measured in degrees, but not regulated.

Collapse

The collapse of the wheels is the angle between the longitudinal axis of the wheels and the vertical to the plane of the road.

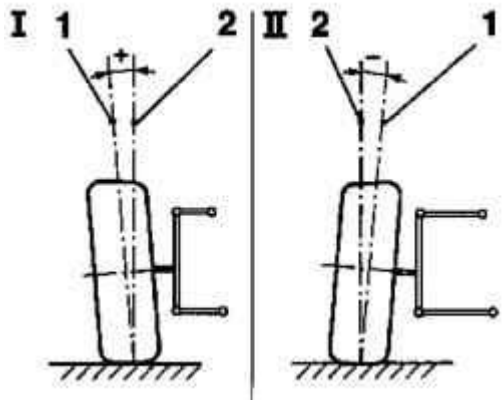


Fig. **4.15.** **The breakdown: 1 - the angle between the longitudinal axis of the wheels, 2 - vertical**

The collapse of the wheels - positive (I), if the center line wheel is tilted outward from the vertical line. The collapse of the wheels - a negative (II), if the center line wheel is tilted inward relative to the vertical line.

To achieve high lateral forces and, consequently, better handling when driving in turn, modern cars are usually designed with a negative camber.

Effect of irregular angles of the wheels

The collapse of the wheels, too big (negative value):
- An improved lateral control when driving in the turn;
- At high speed and high axle load, invalid shoulder heating zones tires;
- Damage to the tire overheating;
- Premature wear on the internal bus.

The collapse of the wheels are too small (positive value):
- Deterioration of transverse controllability of the motion in the rotation;
- Increased wear on the outside of the tires (only if the simultaneous convergence of the improper adjustment of the wheels).

Angle of the longitudinal axis of rotation of the wheels

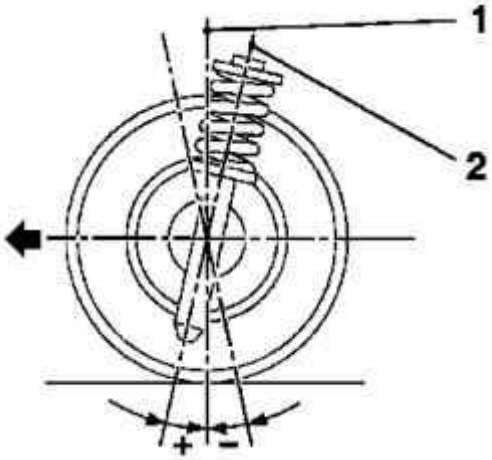


Fig. **4.16.** **Angle of the longitudinal axis of rotation of the wheels: 1 - the angle between the line passing through the axis of the kingpin, 2 - direction of the axis of symmetry**

Angle to the longitudinal axis of rotation of the wheels is the angle between the line passing through the axis of the kingpin in the direction of the axis of symmetry, and the vertical to the road, passing through the center of the wheel.

Angle of the longitudinal axis of rotation of the wheels is negative if the point of intersection of this imaginary line to the plane of the road - the rear wheel contact point. Angle of the longitudinal axis of rotation of the wheels - yes, if - before the point of contact with the plane of the road wheels.

A positive angle to the longitudinal axis of rotation of the wheels creates a force on the wheels, which helps to bring the wheels in position rectilinear motion after passing the bend.

Effect of irregular angles of the wheels

Angle of the longitudinal axis of rotation of the wheels are too negative:
- Incomplete return of the steering in the initial position;

- Susceptibility to defects in the tires (taper, corner effect);
- May cause distortion;
- Beat wheel;
- Sensitivity to lateral wind.

Angle of the longitudinal axis of rotation of the wheels too positive:
- Increased effort on the steering wheel and the effort to keep the car.

Angle of inclination of the longitudinal axis of rotation of the wheels on the left differs from the angle of inclination of the longitudinal axis of rotation of the wheels on the right:
- Susceptibility to distortion.

Caster

Caster is the angle between the center line of the kingpin and the vertical to the road crossing the axis of symmetry.

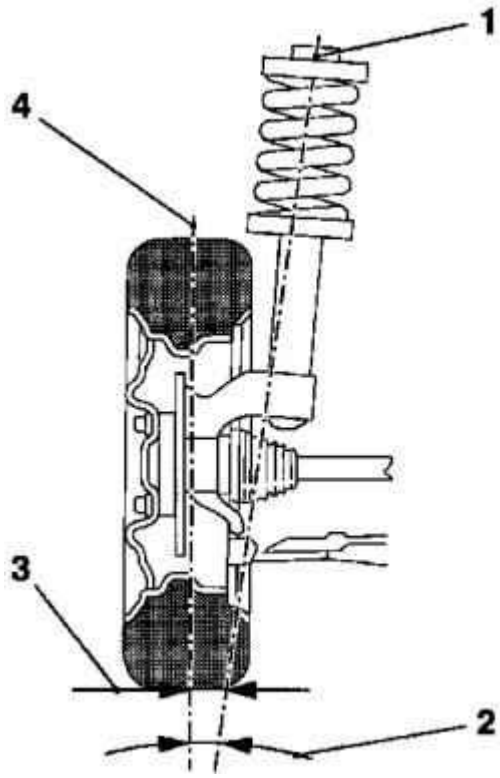


Fig. **4.17. Caster: 1 - center line of the kingpin, 2 - angle; 3 - horizontal displacement, 4 - vertical road**

Caster - positive (the normal situation), if the center line of the kingpin is directed inwards to the top of the vertical line.

Positive caster wheels provide a return to the position of the rectilinear motion after cornering and prevents "self-oscillation" wheels.

Effect of irregular angles of the wheels

Caster is too small:
- Incomplete return of the steering in the initial position;
- Susceptibility to defects in the tires (taper, corner effect);
- May cause distortion.

Too much caster:
- Increased effort on the steering wheel and the effort to keep the car.

Caster on the left differs from the caster on the right
- Susceptibility to distortion.

Maximum angle of rotation from stop to stop (angle)

The maximum angle of the front wheels is the angle through which the wheels are turning (left and right) about the axis of symmetry. It defines the circle of rotation of the car.

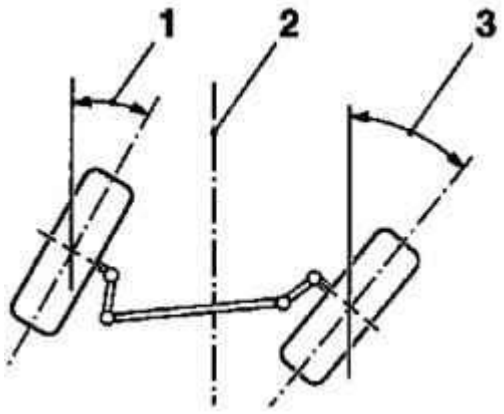


Fig. **4.18.** **Maximum angle of rotation from stop to stop (the angle of rotation): 1, 3 - angle of the front wheels, 2 - axis of symmetry**

Maximum angle of the front wheels is manifested as distinct angles of convergence on the left and right, and also gives information about the state of the steering linkage and steering mechanism.

Because the regulation of the maximum angle the front wheels are usually available only in vehicles off-road, it should be checked only on the cars of this type.
Maximum angle of the front wheels is measured at full lock when turning the inner wheel. Depending on the steering linkage, external rotation with the wheel should have the same negative difference, within a specified tolerance.

Sample

Maximum angle of the front wheels on the right: 34 °.
Angle lock, left: 32 ° ± 1 °.
Difference: 2 °.
Tolerance: ± 1 °.

Effect of irregular angles of the wheels

Difference of the circle of rotation of the vehicle (with the right and left turn).

Identification of the wheel and tire

Wheels

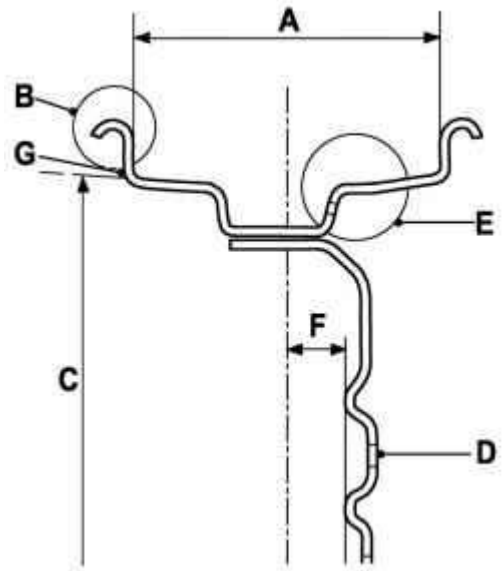


Fig. **4.19.** **Identification marking discs**

Code may be present in full or in abbreviated form. For example: 6 J 16.

Tires

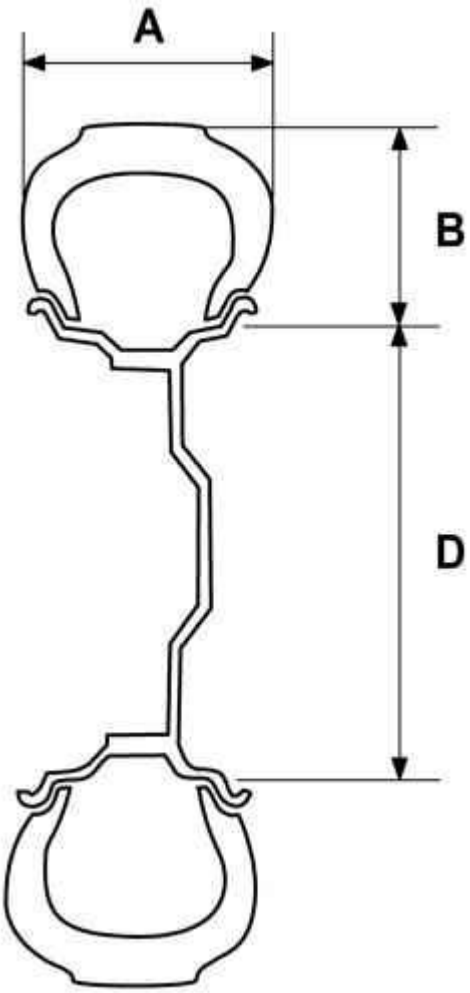


Fig. **4.20.** **Identification marking tires**

Each bus can be identified by code. Narimer: 195 / 70 R 13 108 L

NOTE
An explanation of the identification value, see the summary table 4.6.

Dates
Rim width: The distance between the bead board.
Profile height: half the difference between the outer diameter and the nominal rim diameter.
Nominal width: width set for the size of an inflated tire, which is installed on the geometrically correct rim.
Width: the distance between the outer sides of side walls of an inflated tire, excluding the area with distinguishing mark, decorative edges and wear strips.
Overall width: the distance between the outside of the side walls beefiest tire, including higher field due to distinguishing mark, decorative edges and strips of abrasion.
Outer diameter: the diameter of an inflated tire in the most remote point of a race surface.
Nominal attitude profile: multiplied by one hundred ratio of the height to width of a tire on its rim, presumably established.
Payload Bus: The maximum load capacity of a tire which is valid for the specified conditions of use.
Tire pressure: The tire pressure refers to the tire pressure at ambient temperature, and does not include an increase in air pressure caused by the tires.
Speed index: the index indicates the speed limit the speed at which the tire has a load capacity corresponding to the code of duty for specified conditions.

4.3. Front suspension

Adjusting the front suspension

Preparing Vehicle
Before adjusting the chassis, must satisfy the following conditions:
- Should use regular wheels and tires;

- Check the profile tires - wear and tear should be uniform;
- Make sure the tire pressure corresponds to full load. The pressure in the left and right tires of each axle must be the same;
- All the wheels and wheel bearings must be in excellent condition;
- Chassis must be undamaged, and the gaps in the ball joints (steering) or nodes of suspension are not allowed.

Check the collapse of the wheels, the angle of the longitudinal axis of rotation of the wheels and toe.

The following operations must be performed before the adjustment of the chassis:

- Fuel tank is refueled by half;
- The car must be unloaded;
- Set the car in position for adjustment. In all operations the car must be on a horizontal surface;
- Check and adjust the equipment to adjust the chassis of a car in accordance with the manufacturer's instructions;
- Set the steering wheel in position rectilinear motion.

Camber

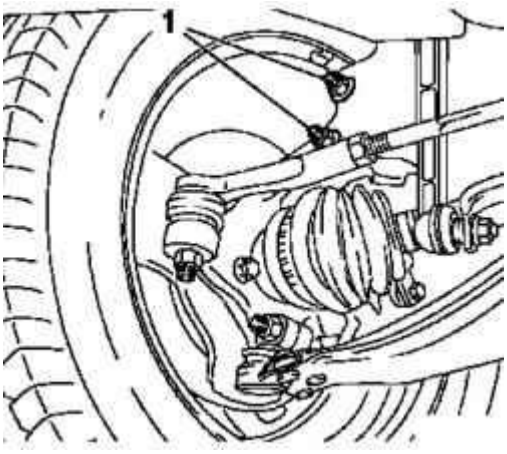


Fig. **4.24.** **Bolts supporting pipes spring stands at a turning fist: 1 - Bolts**

Raise the front of the car. The corresponding front wheel must be posted. Unscrew the two bolts supporting the pipe spring stands at a turning fist. Install new bolts and nuts - set threaded screw connection freely (Fig. 4.24).

NOTE
The operations described below may be used only to adjust the collapse of the wheels in a limited range.

Pull the front wheel on top and set the maximum positive disintegration. Tighten the two bolts supporting the pipe spring stands at a turning point fist 10 N * m to hold down a spring rack in the steering knuckle.

Slowly lower the car on wheels. The collapse of the change in "negative" side - if necessary, turn the front wheel with his hands. When the "nominal value" collapse, tighten the bolt, a spring connecting the rack with swivel - torque 80 Nm +60 ° +15 °.

Test / inspection

Swing the car several times and then check the camber of the wheels.

Adjusting the convergence of the front wheels.

NOTE
Adjustments should always be performed on both rods. After adjustment, traction may be the difference in length not more than 5 mm.

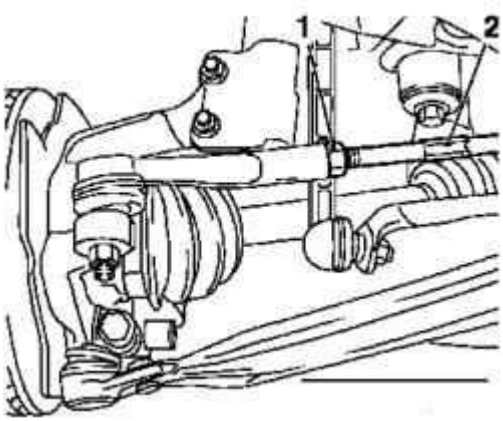


Fig. **4.25.** **Adjusting the convergence of the front wheels: 1 - nuts, 2 - draft**

Set the steering in the position of the rectilinear motion. Loosen the lock nut on the left and right rods - hold the draft open wrench. Adjust the toe-rotation rods - to "nominal value" (Figure 4.25).

NOTE
Due to the nominal values, allowed both types of convergence of the wheels (+ toe) and divergence (- toe). Tie rods should be adjusted so that both front wheels have the same positive or negative toe.

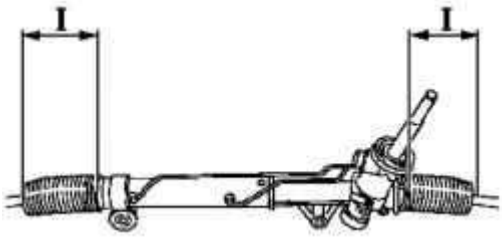


Fig. **4.26.** **Domestic covers steering rods**

Tighten the nuts on both rods - torque 60 Nm Hold open rod wrench - with protective covers on the steering mechanism will not be knotted. If necessary, loosen the clamp cover, eliminate twisting and re-install the clamp.

Adjusting convergence - re-inspection. The steering wheel must be in the position of the rectilinear motion - is determined by results of a trial trip. Check / set the position of the rectilinear motion.

NOTICE
After exposure to the steering mechanism, in any case, check the position of the rectilinear motion of the steering. Situation rectilinear motion is achieved when the protective covers do not have the internal stress along the entire length I between the grooves on traction and steering body and the wheels are in the position of the rectilinear motion.

Difference Base chassis

The difference is the base of the chassis produced by shifting the angle of the wheels (front and / or rear) between the lines of contact points of contact of the wheels front and rear axles.
Angle - positive, if the base of the right wheel, more than the base of the left wheel drive chassis and negative, if the base of the left wheels more than the right.

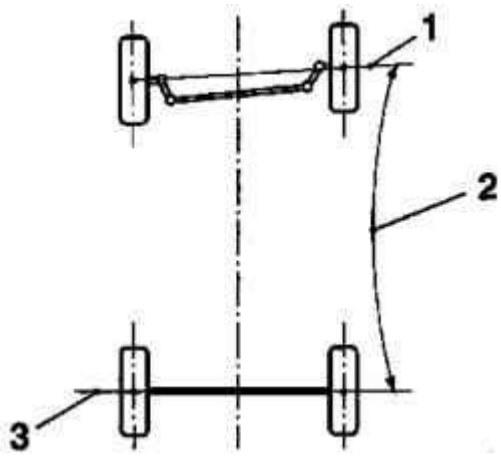


Fig. **4.27.** **Difference base chassis: 1, 3 - lines of contact, 2 - offset angle wheel**

Difference base wheels generally measured in degrees. If the nominal value of the base is known, these data can also be expressed in units of length.

Center line wheel

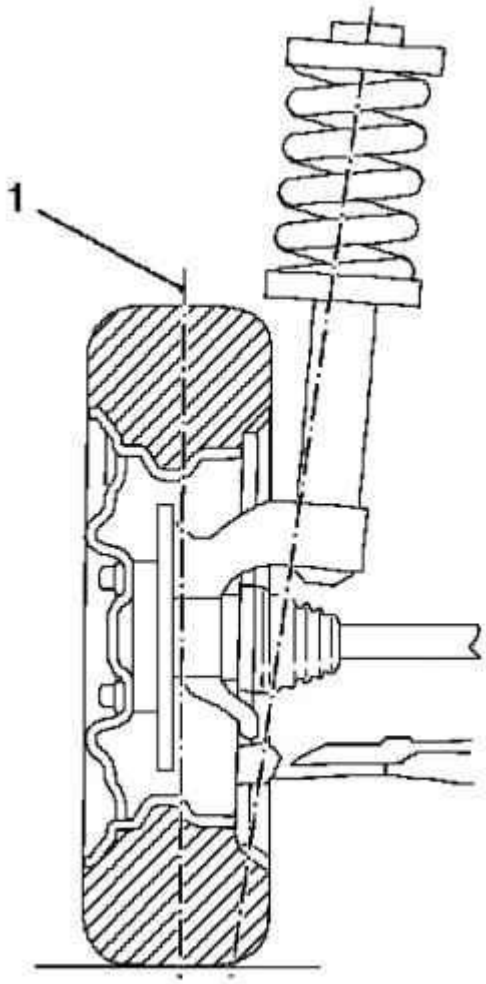


Fig. **4.28.** **Center line wheel: 1 - a plane wheel**

Diametral plane of the wheel is the longitudinal axis of the vertical bus to the axis of rotation of the wheels.

Offset wheels

Offset wheel represents the angular deviation between the line connecting the points of contact of the wheels on one axis and perpendicular to the axis of symmetry, passing through one point of contact of the wheels.

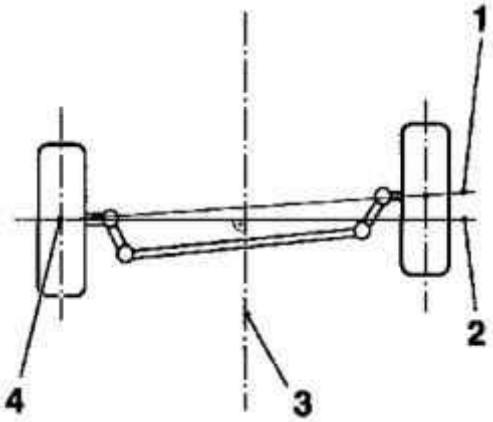


Fig. **4.29.** **Wheel Offset: 1 - line of angular deviation, 2 - axis perpendicular, and 3 - axis of symmetry, 4 - wheel contact point**

The angle is negative if the right wheel is shifted to the front left wheel and positive if the left wheel is shifted to the front right wheel.

Offset wheel measured in degrees. If you know your gauge, then these data can also be expressed in units of length.

Removal and installation of arm suspension

Withdrawal

Remove the front wheel.
Disconnect steering knuckle from the lever.
Remove the bolt connection.

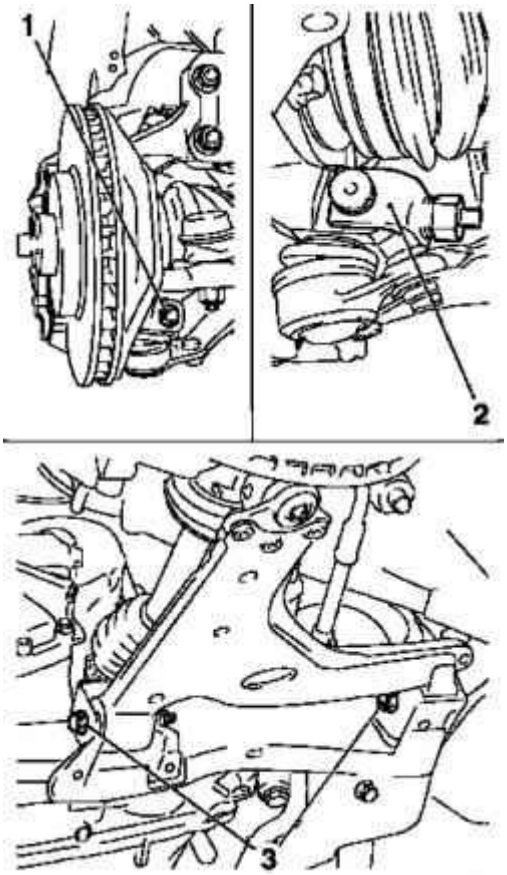


Fig. **4.30.** **Withdrawal lever podveki: 1 - bolted connection, 2 - a special device, 3 - bolted connection**

Take the steering knuckle using a special device KM-915 (Fig. 4.30).
Remove the joint from the steering knuckle.
Remove the lever from the module front.
Loosen the 2 bolts.
Remove the lever from the holders in the front suspension subframe.

Setting

Set the lever in the front suspension subframe.

NOTE
Tighten the bolt connection freely. Bolts fastening the lever to the front suspension subframe tightened under load (the car must be on four wheels), while both front seats loaded with cargo in the 70 kg.

Use 2 new bolt.
Tighten the 2 new nuts.
Attach the lever to the steering knuckle and tighten the moment 50 Nm
Set joint to steering knuckle.
Assemble bolted connection - use new nuts.
Install the front wheel and tighten the bolts fastening point 110 Nm
Tighten the 2 screws fastening the lever to the front suspension subframe.
Load both front seats in the 70 kg weight.
Install 2 new threaded connection of the lever to the front suspension subframe and tighten the moment 90 Nm +75 ° +15 °.

NOTE
The car must be on wheels (check stand or pit).

Removing and installing racks CDC spring with shock absorbers

Withdrawal

Remove the front wheel.
Disconnect the wiring harness from the spring bar.
Move the locking mechanism down.

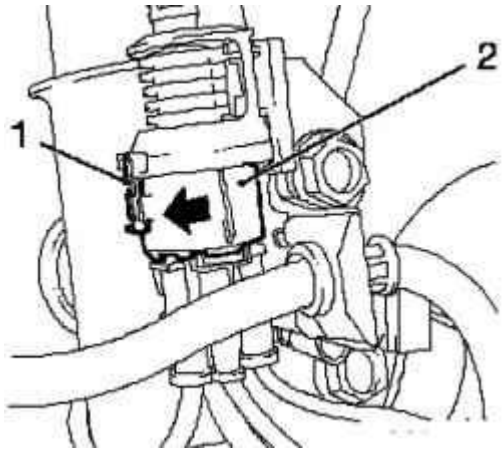


Fig. **4.31.** **The blocking mechanism: 1 - locking mechanism, 2 - a secondary locking mechanism**

Turn the secondary locking mechanism in the direction of the arrow (Fig. 4.31).
4 Disconnect the wiring harness connector from the wiring harness.
Disconnect the wiring harness from the spring bar.
Remove the sensor spring rack CDC from spring rack.
Loosen the screw.

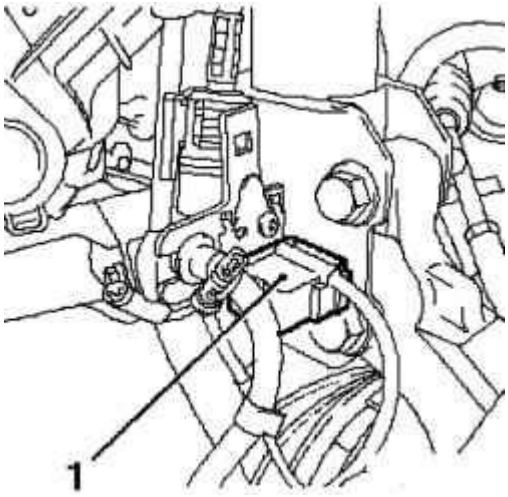


Fig. **4.32.** **Sensor spring rack CDC: 1 - Sensor**

Remove the sensor spring CDC from rack mount the sensor on the spring supports (Fig. 4.32).
Disconnect the brake hose from the pipe supporting spring rack.

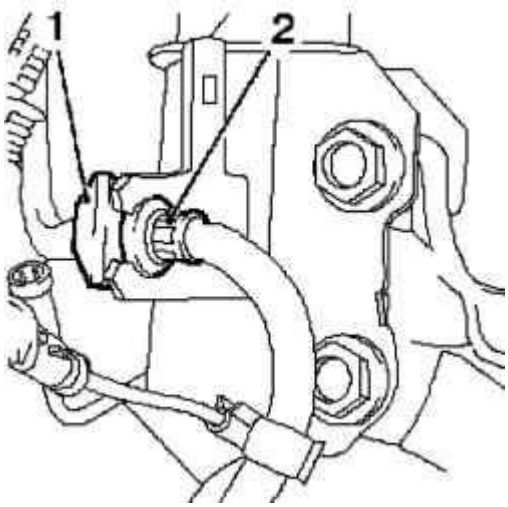


Fig. **4.33.** **Removing the brake hose: 1 - clip 2 - brake hose**

Remove the clamp and pull the brake hose from the bracket (Figure 4.33).

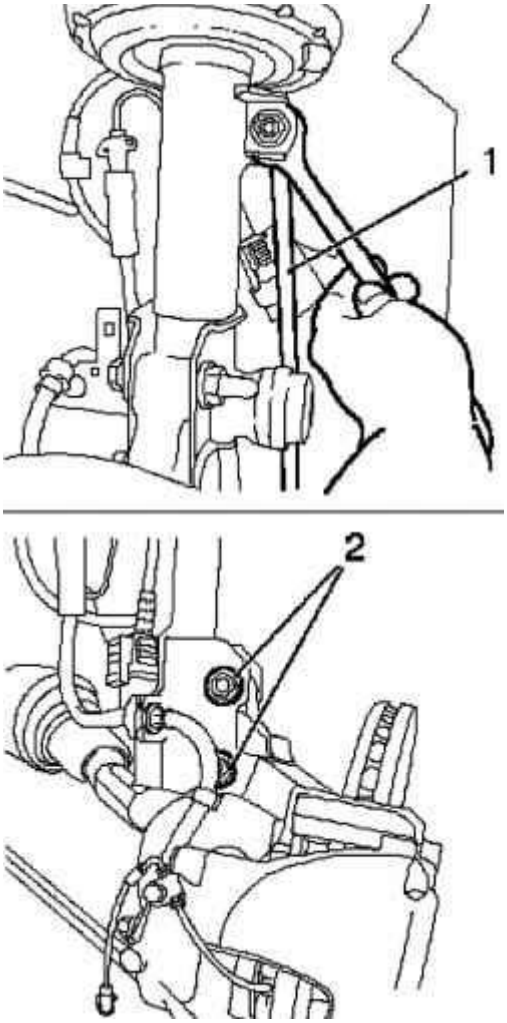


Fig. **4.34.** **Removing the rotary arm: 1 - turning the lever, 2 - Bolting**

Disconnect the swivel arm from the spring supporting tube rack (see Figure 4.34).
Hold for Lyskov open wrench.
Disconnect steering knuckle from the spring rack, unscrewing 2 bolts.
Tilt steering knuckle outwards.

NOTE
Before removing the locking ring to attach a spring rack.

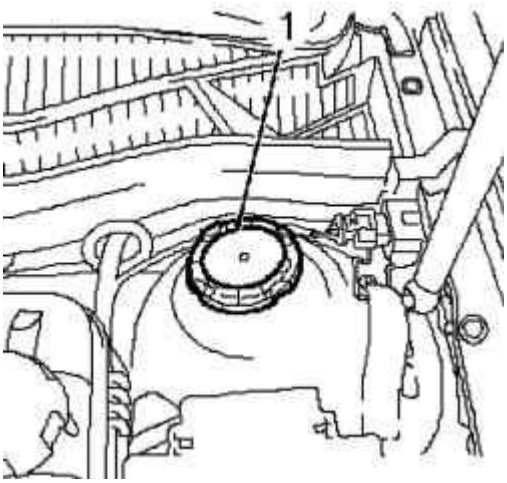


Fig. **4.35.** **Snap ring: 1 - Ring**

Remove the retaining ring (Fig. 4.35).
Remove the spring-rack.

Setting
Set a rack in a spring wheel arch.
Replace the spring-rack in the wheel arch.

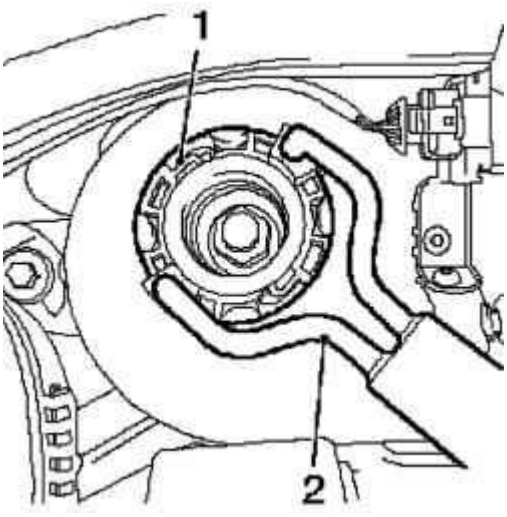


Fig. **4.36.** **Installing a new ring: 1 - snap ring, 2 - adaptation**

Attach the new circlip using appliances KM 6384 (Fig. 4.36).
Set a rack in a spring swivel fist.
Install 2 bolts.

NOTE
Install the bolts in the front. Do not tighten up camber of the wheels.

Use 2 new bolt.
Use 2 new nuts.
Attach a swivel arm for supporting the pipe rack and tighten the spring element 65 Nm
Use new nut.
Hold for Lyskov open wrench.
Attach the brake hose to the bracket supporting the tube spring rack.

NOTE
Correctly lay the hose.

Install the brake hose bracket.
Attach the brake hose using a clamp.
Install the sensor spring rack CDC to mount the sensor on a spring rack.
Tighten the attachment bolt.
Install the wiring harness on a spring rack.
Attach the wiring harness in the clamp spring rack.
Connect 4 x wiring harness to the wiring harness.
Turn the secondary locking mechanism.
Slide the locking mechanism up.
Install the front wheel and tighten the bolts fastening point 110 Nm
Check and adjust the collapse of the wheels.
Check and adjust the collapse of the wheels.
2 Tighten the hinge that supports the spring the pipe rack to the steering knuckle, in 3 hours.
I. Tighten the 2 bolts moment 50 Nm
II. Tighten the 2 new joint torque 85 Nm
III. Dauvergne 2 new joint by 75 ° and +15 °.

Replacing the front damping arm bushings

NOTE
In the general case, both damping bushings must be replaced. ,

Withdrawal
Remove the lever.

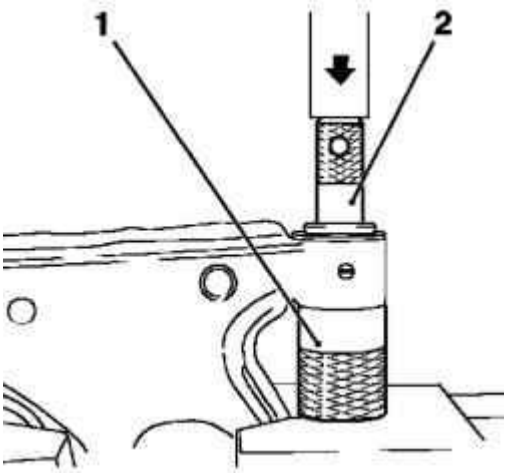


Fig. **4.37.** **Extrusion front damping sleeve: 1, 2 - a special tool**

Vypressuyte front damping sleeve with Specials instruments KM-508-A-1 and KM-508-A-3 (Figure 4.37).

Setting

Cover the front damping sleeve (1), adaptation of KM-508-A-2 and the lever soapy water before mounting.

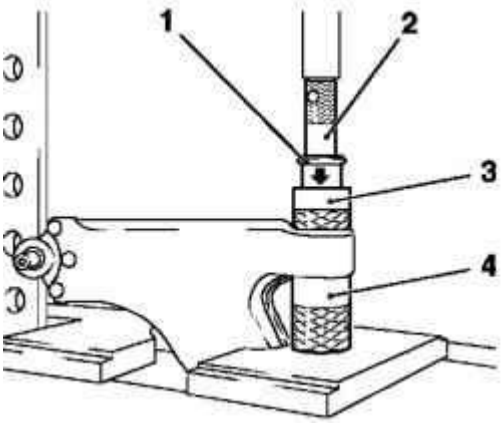


Fig. **4.38.** **Mounting the front damping sleeve: 1 - damping sleeve, 2, 3, 4 - a special tool**

Zapressuyte front damping sleeve with special devices KM-508-A-3, KM-508-A-2 and KM-508-A-1 (Figure 4.38).

Install lever.

Replacing the rear damping arm bushings

NOTE
In the general case, both damping bushings must be replaced.

Withdrawal

Remove the lever.

Attach special tool MKM-6615-10 to the lever.

Attach MKM-6615-12 to MKM-6615-11.

Attach special tool KM-6005-2 to the special adaptation MKM-6615-11 and MKM-6615-12 from the ring.

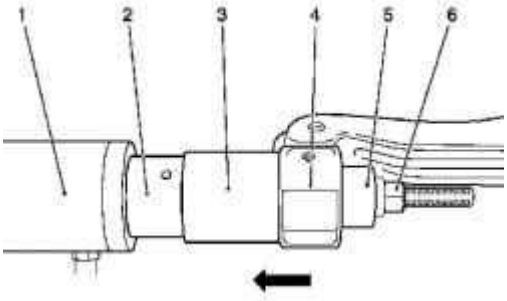


Fig. **4.39.** **Extrusion rear damping sleeve: 1, 2, 3, 5, 6 - a special tool, 4 - damping bush**

Insert a special device through the hole damping sleeve. Attach special tool KM-6005-1-A from the inside to MKM-6615-11. Screw the special tool MKM-6615-13 (Fig. 4.39).

NOTE
Make sure the correct location of the instrument. Arrow in Figure 4.39 indicates the direction of Extrusion.

Connect the hand pump MKM-6616 with the adaptation MKM-6615-11.

NOTE
Watch for increasing pressure on the manometer MKM-6616. Check the installation position of a special device. Maximum load hydraulic rod 6615-10 is 70 kN or 260 bar.

Vypressuyte sleeve
Remove the sleeve from the device KM-6005-2.

Setting
Install the new hub, using a special tool.

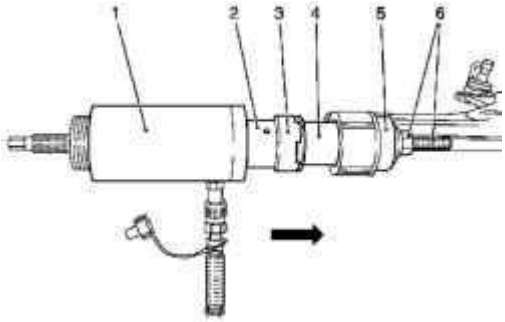


Fig. **4.40.** **Mounting the rear damping sleeve: 1, 2, 3, 5, 6 - a special tool, 4 - damping bush**

Attach the KM-6005-3 to MKM-6615-11 jointly with MKM-6615-12. Toothing KM-6005-3 should be aligned with a toothed crown damping sleeve. Set KM-6005-4-A at MKM-6615-11 and MKM-6615-12 (Fig. 4.40).

NOTE
Be sure to install screws MKM-5515-13. Arrow in Figure 4.40 indicates the direction of pressing.

Tighten using prisposobleniyaKM-6615-13.

NOTE
Watch for increasing pressure on the manometer MKM-6616. Check the installation position of the special tool. Maximum load hydraulic rod 6615-10 70 kN or 260 bar.

Zapressuyte sleeve.

NOTE
Cover sleeve with silicone grease.

Remove the special tool.
Install lever.

Replacing the spring supporting tube rack

NOTE
Replace springs in pairs. Replace the shock absorbers in pairs. When replacing the springs and shock absorbers, use the elements that correspond to versions of the car and the level of assembly.

Withdrawal
Remove the spring-rack.
Set a rack in a spring device.

NOTE
Make sure that the pressure regulator on the spring supporting tube rack no harm (cars with CDC).

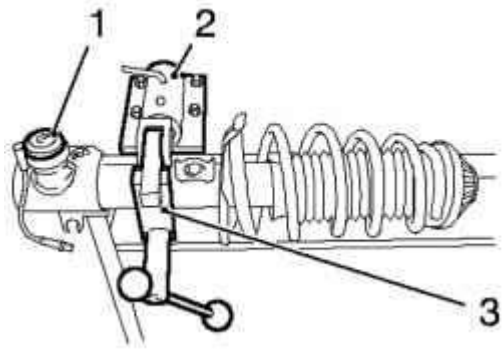


Fig. **4.41.** **Install special tool on the pipe rack spring: 1 - pressure regulator, 2, 3 - special tool**

Install special tool KM 6066 on a spring rack, attach a spring rack with a special tool KM 6066 to KM-113-2 (Figure 4.41).
Mark the layout and installation of

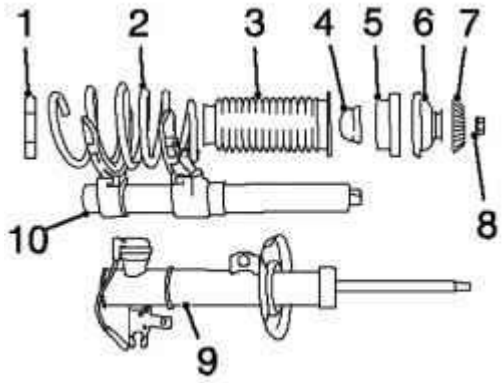


Fig. **4.42.** **Components of spring rack: 1 - the bottom bracket, 2 - spring, 3 - bearing springs, 4 - limiter, 5 - supporting bearing, 6 - plate springs; 7 - damper ring; 8 - supporting bearing; 9 - front desk, 10 - a special tool**

Remove the spring-rack.

Attach special tool MKM-6068 to the spring.
Squeeze the spring before discharge pillow block.
Unscrew the nut pillow block. using a special tool KM 6399.
Remove the main damping ring and a plate spring.
Remove the supporting bearing and restraint.
Remove the upper support springs and spring with lower support.

Setting
Assemble a spring rack.

NOTE
Pay attention to the previously marked mounting position and arrangement of elements.

Install the spring in the spring supporting the pipe rack.
Install the upper support spring to spring.
Set buffer limiter.
Install supporting bearing with the upper plate of the spring and damper ring.

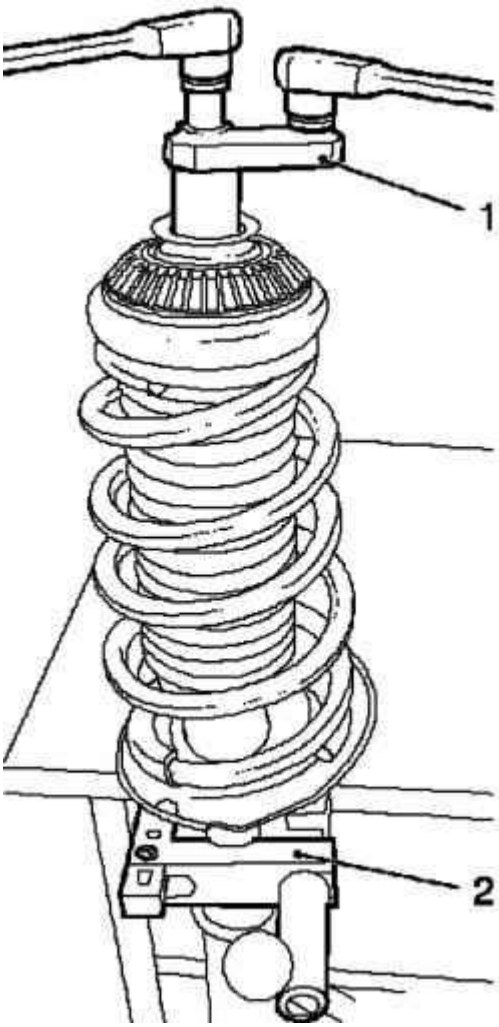


Fig. **4.43.** **Compiling spring rack: 1 - a special tool KM 6399; 2 - a special tool KM 6066**

Install new bolts pillow block with a special tool KM 6399 for piston shock absorber and tighten the moment of 80 N m (Fig. 4.43).
Unload a special tool MKM-6068 and remove the spring.

NOTE
Make sure that the springs are installed correctly.

Remove the rack from the spring-KM 6066 (Fig. 4.43).
Install a spring rack.
Check the collapse of the wheels and adjust if necessary.
Adjust the chassis.
2 Tighten the hinge that supports the spring the pipe rack to the steering knuckle, in three stages.
I. Tighten the 2 bolts moment 50 Nm
II. Tighten the 2 new joint torque 85 Nm
III. Dauvergne 2 new hinge further 75 ° and + 15 °.

Replacement Stabilizer

Withdrawal
Remove the front suspension subframe
Disconnect the swivel arm of the stabilizer on both sides.
Hold for Lyskov open wrench.
Disconnect the right and left holding the brackets with rubber mountings on the front suspension subframe.

NOTE
Check the loading position, the rubber bearings.

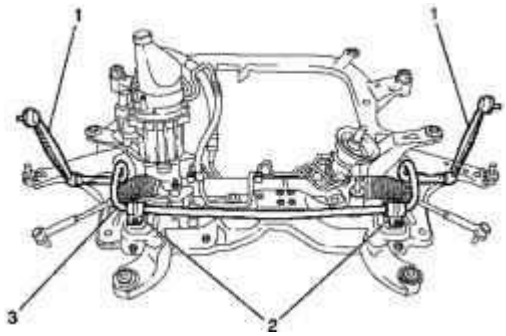


Fig. **4.44.** **Stabilizer front suspension complete with subframe: 1 - turning the lever, 2 - retaining brackets, 3 - stabilizer**

Remove the stabilizer (Fig. 4.44).

Setting
Attach the stabilizer to the front suspension subframe.
Install stabilizer on the front suspension subframe.
Install rubber support stabilizer.

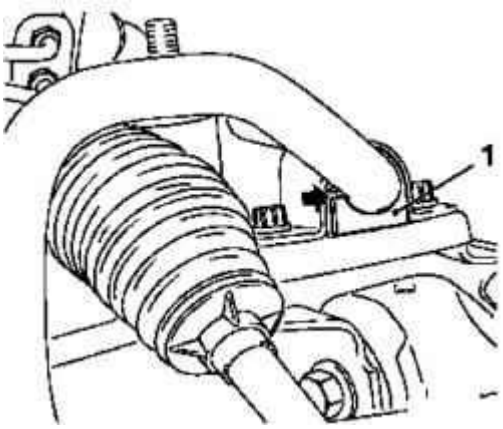


Fig. **4.45.** **Reliance stabilizer: 1 - bracket**

NOTE
Check the loading position, the rubber bearing - a groove (arrow in Figure 4.45) should be turned forward (in the direction of motion).

Install retaining bracket.
Attach the retention bracket to the front suspension subframe and tighten the moment 20 Nm
Attach the swivel arm to the stabilizer on both sides and tighten the moment 55 Nm
Use 2 new nuts.
During installation, hold for Lyskov open wrench.
Install the front suspension subframe.

Replacing the rotary lever

Withdrawal
Remove the front wheel.
Remove the rotary levers.
Disconnect the swivel arm from the supporting tube spring rack.
Hold for Lyskov bolt steering knuckle open wrench.

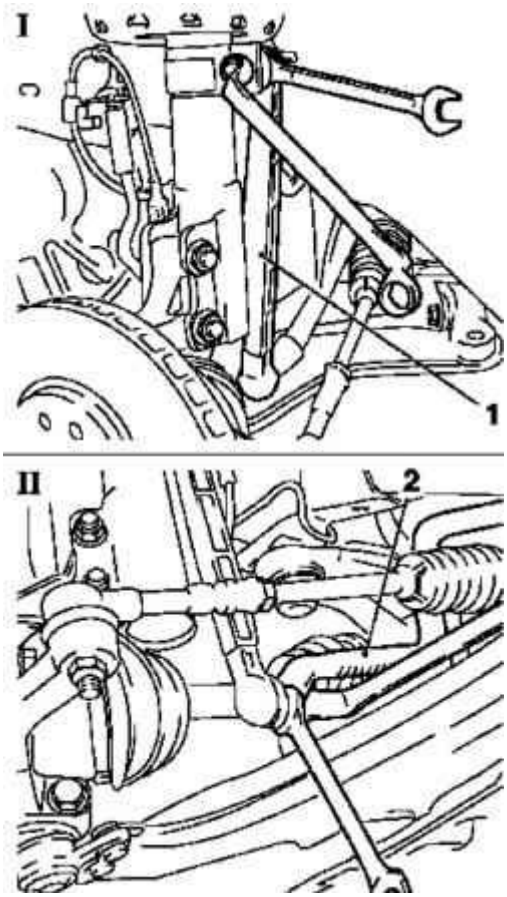


Fig. **4.46.** **Removing the rotary arm: 1 - turning the lever, 2 - Stabilizer**

Disconnect the swivel arm of the stabilizer (Figure 4.46).
During the hold lever for Lyskov bolt swivel pin wrench.

Setting
Attach the swivel arm to the stabilizer, and tighten the mounting bolts are 55 Nm
Use 2 new nuts.
Hold for Lyskov bolt steering knuckle open wrench.
Attach a swivel arm for supporting the pipe rack and tighten the spring mounting bolts are 55 Nm
Install the front wheel and tighten the bolts fastening point 110 Nm

4.4. Rear suspension

Elastic beam rear suspension, Astra-G, Astra-H, Zafira - rear axle

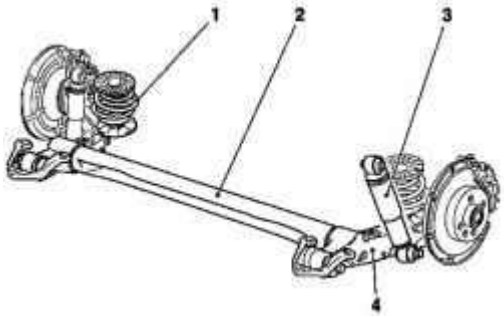


Fig. **4.47.** **Rear suspension: 1 - Rear spring, 2 - elastic profile (crossbar), 3 - shock absorbers, 4 - lever with a longitudinal mounting of the rear axle**

The rear suspension on these models is a continuous bridge, working on torsion. Profile of torsion is welded to two longitudinal levers. Depending on the model profile is used in different thicknesses, torsional profile itself is welded to the levers at different angles. This allows you to adjust the rear suspension to the weight and design (eg sports suspension) of the car.

Removing and installing wheel bearing

Withdrawal

Turn off the parking brake systems.

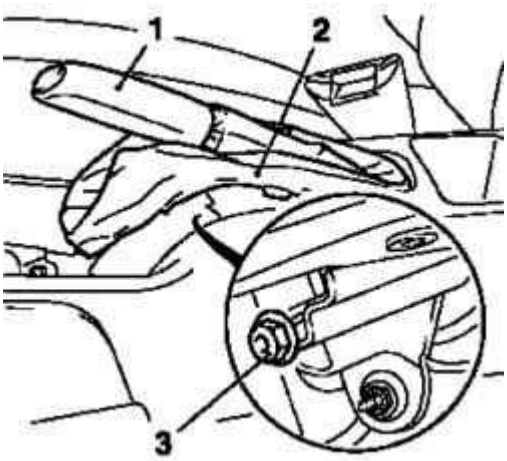


Fig. **4.48.** **Reducing the parking brake cable: 1 - hand brake lever, 2 - cover hand brake lever, 3 - adjusting nut**

Release the handbrake lever (1) and disconnect the hand brake lever cover (Figure 4.48).
Loosen the parking brake cable adjusting nut return.
Remove the rear wheel.
In cars with drum brake mechanisms: remove the brake drum.

NOTE
To prevent the fall of the brake shield and damage the brake line, tie the brake line to the back of a spring near the brake wheel cylinder, using cable ties.

In cars with disc brakes: unplug the cable from the parking brake caliper brake.
Take control lever caliper brake mechanism with a screwdriver.
Remove the parking brake cable system.
Remove the clamp.
Pull the parking brake cable from the bracket.
Remove the brake caliper with brake suspension of the base plate.

NOTE
If not possible to withdraw caliper brake mechanism to guide and brake pads from the brake disc, for example, due to wear of brake disc: remove the brake pads rear wheel brake mechanism.

Unscrew the 2 screws fastening the suspension of the brake mounting plate.
Take the caliper brake with a guide from the brake disc.
Hang the caliper brakes and rear spring guide to using a suitable wire.
Remove the brake disc rear wheel.
Attach the mounting plate to the rear spring, using the cable styazhkie
Disconnect the wiring harness connector from the sensor installed on the wheel of the car.
Disconnect the module from a wheel bearing rear axle.

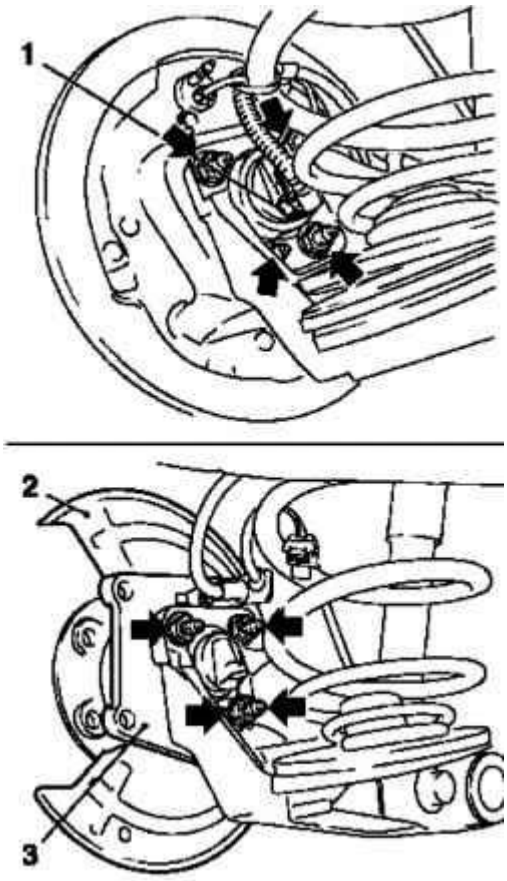


Fig. **4.49.** **Mounting the module bearing wheels: 1 - the wiring harness connector, 2 - housing, 3 - mounting plate**

Loosen the 4 nuts (arrows) from the module bearing wheels (Fig. 4.49).
Remove the wheel bearing module with a lid (2 - in cars with disc brakes).

Setting

In cars with disc brakes: attach the wheel bearing unit, the housing and mounting plate to the rear axle and tighten the bolts fastening point 50 N * m, Dauvergne at +30 ° and +15 ° (see Fig. 4.49).
Tighten the 4 new nuts.
In cars with drum brake mechanisms: Set the module bearing wheels and a brake plate to the rear axle and tighten the moment of 50 Nm, Dauvergne at +30 ° and +15 °.
Tighten the 4 new nuts.
Connect the wiring harness sensor mounted on the wheels of the car.
In cars with disc brakes, install the brake disc brake rear wheel.
Attach the brake caliper with a guide to the anchor plate and tighten the mounting point 100 Nm
Slide the caliper brake mechanism to the brake disc.
Tighten the 2 screws fastening.

NOTE
Clean the threads and install the bolt with a fixing composition.

If you have been removed, install the brake pads rear wheel brake mechanism.
Attach the parking brake cable to the caliper brake.
Set the parking brake cable system in the bracket on the caliper brake.
Attach the clip to the cable of the parking brake system.
Take control lever caliper brake mechanism with a screwdriver.
Set the parking brake cable system.
In cars with drum brake mechanisms, set the brake drum.
Install the rear wheel and tighten the bolts fastening point 110 Nm
Adjust the hand brake.

4.5. Tables

Table 4.1 Potential problems, their causes and solutions

Возможная причина неисправности	*Способ устранения*
Предварительные проверки	
Проверьте давление в шинах и равномерность износа шин	Доведите до требуемого давление в шинах
Проверьте на ослабление или износ шарниры от рулевого вала до промежуточного вала	Затяните стяжные болты соединительного фланца
Проверьте на ослабление или износ шарниры от промежуточного вала до рулевого механизма	При необходимости заманите промежуточный вал
Проверьте на ослабление или повреждение деталей переднюю и заднюю подвеску, рулевой механизм и шарниры	Затяните болты и гайки крепления передней и задней подвесок. Затяните болты крепления кронштейна рулевого механизма. При необходимости замените переднюю и заднюю подвески. При необходимости замените рулевой механизм. При необходимости замените соедини тельный фланец
Проверьте овальность шин	Выполните проверку при свободном вращении колеса. При необходимости замените шины
Проверьте шины на наличие дисбаланс, деформацию колес и износ или ослабление подшипников колеса	Отбалансируйте колеса. Замените колеса. Замените подшипники колеса
Проверьте ремень привода насоса усилителя рулевого управления	Натяните ремень привода насоса усилителя рулевого управления
Проверьте систему усилителя рулевого управления и уровень жидкости в бачке усилителя рулевого управления	Устраните утечки Проверьте усилитель рулевого управления Добавьте жидкость в систему усилителя рулевого управления
Увод/ дергание автомобиля	
Неправильный подбор шин или шины разного типа	Замените шины
Поломка или прогиб пружины подвески	Замените пружину
Нарушен угол установки передних колес	Отрегулируйте угол схождения передних колес
Смещение рулевого механизма	Переустановите рулевой механизм в сборе Замените рулевой механизм в сборе
Заедание передних тормозов	Отрегулируйте передние тормоза
Неравномерный или чрезмерный износ шин	
Чрезмерное схождение	Отрегулируйте угол схождения
Поломка или уменьшение жесткости пружины подвески	Замените пружину
Нарушена балансировка шин	Отбалансируйте шины
Изношены амортизационные стойки	Замените амортизационные стойки
Неправильное вращение шин	Измените направление вращения шин При необходимости замените шины
Автомобиль перегружен	Не перегружайте автомобиль
Низкое давление в шинах	Доведите до требуемого давление в шинах
Изношенные шины	
Неправильное схождение	Отрегулируйте угол схождения
Искривленный или деформация рычага подвески	Замените рычаг подвески
Угловое (поперечное) колебание колеса	
Несбалансированная шина или колесо	Отбалансируйте шину или колесо
Нарушена работа амортизационной стойки	Замените амортизационную стойку
Угловые колебания, тряска или вибрация	
Дисбаланс шины или колеса	Отбалансируйте шину или колесо
Чрезмерное биение ступицы колеса	Измерьте люфт фланца ступицы. При необходимости замените ступицу
Чрезмерный дисбаланс тормозного барабана или диска	Отрегулируйте тормоза. При необходимости замените тормозной диск или тормозной барабан

Неустойчивое рулевое управление при торможении	
Износ или ослабление подшипников колес	Замените подшипники колеса
Поломка или прогиб пружины подвески	Замените пружину
Утечка тормозной жидкости из суппорта	Замените суппорт
Деформация дисков	Замените диски
Неправильный угол наклона стойки	Если угол наклона передней стойки превышает установленную величину, проверьте кузов, при необходимости произведите ремонт
Низкий или неравномерный клиренс автомобиля	
Поломка или прогиб пружины подвески	Замените пружину
Автомобиль перегружен	Не перегружайте автомобиль
Потеря упругости пружины подвески (осадка пружины)	Замените пружину
Езда слишком мягкая	
Износ амортизационной стойки	Замените амортизационную стойку
Поломка или прогиб пружины	Замените пружину
Езда слишком жесткая	
Дефектные амортизационные стойки	Замените амортизационную стойку
Дефектная пружина	Замените пружину
Поперечный крен или поперечные колебания кузова	
Ослабление крепления стабилизатора поперечной устойчивости	Закрепите стабилизатор
Износ амортизационной стойки или крепления амортизатора	Замените амортизационную стойку. Затяните гайки крепления амортизатора
Автомобиль перегружен	Не перегружайте автомобиль
Поломка или прогиб пружины подвески	Замените пружину
Осадка подвески	
Износ амортизационной стойки	Замените амортизационную стойку
Автомобиль перегружен	Не перегружайте автомобиль
Поломка или прогиб пружины подвески	Замените пружину
Отдача рулевого колеса (с усилителем рулевого управления)	
Наличие воздуха в системе усилителя рулевого управления	Удалите воздух из гидросистемы усилителя рулевого управления
Ослабление крепления рулевого механизма	Затяните болты крепления кронштейна рулевого механизма
Ослабление соединений или износ шарнира от рулевого вала до промежуточного вала	
Ослабление соединений или износ шарнира от промежуточного вала до рулевого механизма	Затяните соединительные стяжные болты При необходимости заменит промежуточный вал
Ослабление наконечников рулевых тяг	Затяните наконечники рулевых тяг При необходимости замените наконечники рулевых тяг
Ослабление или износ подшипников колеса	Затяните гайку вала привода При необходимости замените подшипники колеса
Дергание или толчки на рулевом колесе (с усилителем рулевого управления)	
Низкое давление в системе усилителя рулевого управления	При необходимости замените сальники и шланги
Медленное срабатывание клапана рулевого механизма (недостаточная эффективность усилителя рулевого управления)	Прочистите рулевой механизм в сборе При необходимости замените рулевой механизм в сборе
Ослабление приводного ремня усилителя рулевого управления	Отрегулируйте натяжение приводного ремня усилителя рулевого управления
Покоробленные шины	
Нарушена регулировка углов установки передних и задних колес	Отрегулируйте углы установки передних и задних колес

Table 4.2 Recommended tightening torques - front suspension, wheels and tires

Компонент	*Момент затяжки, Н·м*
Вал колеса к ступице колеса	Затянуть до 150 Н·м, отвернуть на 45°, затянуть до 250 Н·м 5)
Опора аккумуляторной батареи лонжерону	15
Треугольная пластина корпуса передней оси к корпусу	90 Н·м = 45°+15°[1; 2; 5]
Пружинная стойка к поворотному кулаку	85 Н·м + 75°+ 15°[5]
Пружинная стойка к нише колеса	55
Шарнир к поворотному кулаку	50
Шарнир к рычагу	35
Кронштейн радиатора к корпусу передней оси	15
Кронштейн заднего кронштейна демпфирующего блока двигателя к коробке передач	80[3]
Кронштейн заднего кронштейна демпфирующего блока двигателя к демпфирующему блоку двигателя	55
Кронштейн направляющей переключения к корпусу передней оси	20
Стабилизатор кронштейн к корпусу передней оси	20
Кронштейн блока управления CDC к боковой перегородке	2,2
Кронштейн промежуточного вала к блоку цилиндров	55
кронштейн крышки подшипника промежуточного вала	18
Задний датчик кузова CDC к стенке	2
Передний датчик кузова CDC к куполу пружинной стойки	2
Шток поршня к опорному подшипнику	80
Корончатая гайка к наконечнику рулевой тяги	60
Воздуховод наддува к кронштейну (Z 17 DTL)	3
Передняя и задняя часть рычага к корпусу передней оси	90 Н·м + 75°+ 15°[4; 5]
Крышка двигателя к двигателю	8
Задний демпфирующий блок двигателя к корпусу передней оси (M10)	55
Передний демпфирующий блок двигателя к корпусу передней оси	55
Нижняя часть панели моторного отсека к нижней части кузова	5
Поворотный рычаг к пружинной стойке и стабилизатору	55
Колесо к ступице колеса	110
Модуль подшипника колеса к поворотному кулаку	90 Н·м + 30°+ 15°[5]
Датчик пружинной стойки CDC к пружинной стойке	6
Датчик давления шины к ободу	9
Соединительная муфта рулевой тяги к поворотному кулаку	30 Н·м + 90°+ 15°[5]
Кузов передней оси к кузову	90 Н·м + 45°+ 15°[1; 2; 5]
Промежуточный вал к рулевому механизму	24[3]

1 otvorachivanie Fastening and mounting bolts or a pulsed power-driven not allowed.
2, see "Operation Corps front axle, removing and installing.
3 Clean the threads and install the bolts with a fixing composition.
4 Covering joints must be carried out under the load on each front seat must be load of 70 kg.
5 Bolt (s) attachment, use the new nuts.

Table 4.3 Options for design of the rear axle

Вариант	*1*	*2*	*3*	*4*	*5*	
Двигатель	Z14XEP; Z16XEP	Z14XEP; Z16XEP	Z17DTL	Z14XEP; Z16XEP; Z17DTL	Z18XE; Z20LEL; Z17DTH	Z18XE; Z17DTH
Конструкция	Только на экспорт	Без спортивного шасси	Без спортивного шасси	Со спортивным шасси	Без спортивного шасси	Со спор шасси
Тормоза	Тормозной барабан 20,64	Тормозной диск 36	Тормозной диск 38	Тормозной диск 38	Тормозной диск 38	Тормозн
Крепление колес	4 отверстия	4 отверстия	5 отверстий	5 отверстий	5 отверстий	5 отвер
Сечение профиля торсиона	13 171 150	13 171 150	13 171 150	13 156 030	13 171 149	13 15
Задняя ось в сборе	13 171 148	13 171 148	13 171 148	13 156 027	13 171 147	13 15

Table 4.4 Recommended values tightening torques - rear axle, rear suspension

Параметр	*Технические характеристики*
Тормозной шланг к трубке тормозной системы	16
Держатель трубки тормозной системы на задней оси	8
Кронштейн троса стояночной тормозной системы к задней оси	8
Кронштейн задней оси к демпфирующей втулке	90 Н·м + 60°+ 15°* **
Держатель задней оси к нижней части автомобиля	90 Н·м + 30°+ 15°* ***
Колесо к ступице колеса	110
Модуль подшипника колеса к задней оси	50 Н·м + 30°+ 15°**
Амортизатор к нижней части автомобиля	90
Амортизаторы к задней оси	110

** Use new bolts*
*** Use new nuts*
**** Fastening and mounting bolts otvorachivanie pulse or power tool is not permissible.*

Note
Bolts, which tightened the moment and on the corner (beyond the elastic limit) can not be reused, as to turn away.

Table 4.5 Angles adjustment wheels, Opel Astra-H 2006

Регулировка передних колес	*Седан*	*Седан со «спортивным» оборудованием (уменьшенный дорожный просвет)*	*Седан для «плохих дорог»*	*Разница право/ лево максимум*
Развал колес	−0°30' ±45'	−0°30' ±45'	−0°30' ±45'	1°
Угол наклона продольной оси поворота колеса	4°00' ±1°	4°00' ±1°	4°00' ±1°	1°
Схождение колес*	+0°00' ±10'	+0°00' ±10'	+0°00' ±10'	–
Изменение схождения колес с внутренним отклонением колеса 20°	1°20' ±45'	1°20' ±45'	1°20' ±45'	–
Внешнее отклонение колеса для 20° внутреннее отклонение колеса	18°40' ±45'	18°40' ±45'	18°40' ±45'	–
Регулировка задних колес				
Развал колес**	−1°15' ±30'	−1°15' ±30'	−1°15' ±30'	35'
Схождение колес* **	+0°10' $^{+30'}_{-20'}$	+0°14' $^{+30'}_{-20'}$	+0°07' $^{+30'}_{-20'}$	25'
Регулировка передних колес	***Универсал***	***Универсал со «спортивным» оборудованием (уменьшенный дорожный просвет)***	***Универсал для «плохих дорог»***	***Разница право/ лево максимум***
Развал колес	−0°30' ±45'	−0°30' ±45'	−0°30' ±45'	1°
Угол наклона продольной оси поворота колеса	3°30' ±1°	3°30' ±1°	3°30' ±1°	1°
Схождение колес*	0°00' ±10'	0°00' ±10'	0°00' ±10'	–
Изменение схождения колес с внутренним отклонением колеса 20°	1°20' ±45'	1°20' ±45'	1°20' ±45'	–
Внешнее отклонение колеса для 20° внутреннее отклонение колеса	18°40' ±45'	18°40' ±45'	18°40' ±45'	–
Регулировка задних колес				
Развал колес**	−1°20' ±30'	−1°20' ±30'	−1°20' ±30'	35'
Схождение колес* **	+0°02' $^{+30'}_{-20'}$	+0°07' $^{+30'}_{-20'}$	+0°02' $^{+30'}_{-20'}$	25'

** Positive values = toe-wheels, negative values = variance*
*** These values are set in manufacturing. Adjusting for servicing is not possible.*

Note
Values refer to vehicles with a load of 70 kg for each front seat and filled up to half of the fuel tank.

Table 4.6 Values of the wheels for the Zafira - B 2006

Регулировка передних колес	*Уменьшенный дорожный просвет*	*Для «плохих дорог»*	*Разница право/ лево максимум*
Развал колес	−0°30' ±45'	−0°30' ±45'	1°
Угол наклона продольной оси поворота колеса	3°15' ±1°	3°15' ±1°	1°
Схождение колес*	0°00' ±10'	0°00' ±10'	–
Изменение схождения колес с внутренним отклонением колеса 20°	1°20' ±45'	1°20' ±45'	–
Внешнее отклонение колеса для 20° внутреннее отклонение колеса	18°40' ±45'	18°40' ±45'	–
Регулировка задних колес			
Развал колес**	−1°20' ±30'	−1°20' ±30'	35'
Схождение колес* **	+0°08' $^{+30'}_{-20'}$	+0°03' $^{+30'}_{-20'}$	25'

** Positive values = toe-wheels, negative values = variance*
*** These values are set in manufacturing. Adjusting for servicing is not possible.*

Note
Values refer to vehicles with a load of 70 kg for each front seat and filled up to half of the fuel tank.

Table 4.7 Potential problems, their causes and solutions

Возможные причины неисправности	*Способ устранения*
Износ центральной части протектора шины	
Низкое давление в шине	Доведите до нормального давление в шине
Неправильная перестановка шин	Переставьте шины
Износ боковых частей протектора шины	
Высокое давление в шине	Доведите до нормального давление в шине
Неправильная перестановка шин	Переставьте шины
Широкий износ боковых частей протектора шины	
Неправильный угол схождения передних колес	Отрегулируйте угол схождения передних колес
Узкий износ боковых частей протектора шины	
Неправильные углы развала передних колес или наклона оси шкворня	Проверьте поворотный кулак, рычаги, привод и подвеску
Неисправна подвеска	Выполните ремонт и, при необходимости, замените детали
Нарушена балансировка колес	Отбалансируйте колеса
Неправильная перестановка шин	Переставьте шины

5. Steering Gear

5.1. General

Principle of operation EHPS

Electro-hydraulic power steering reduces the force on the steering mechanism. The hydraulic system also acts as the steering system with power used on other models, but it comprises a hydraulic pump with electric drive, independent of the motor vehicle. The control unit and hydraulic pump form a single unit and can be replaced only in the collection.

The force of EHPS regulated by a control unit as a function of engine speed and in accordance with the three-dimensional characteristics of the adjusting motor.

At Astra-H uses two different systems EHPS.

EHPS production TRW used on versions with petrol engines of small power and Z 17 DTL and not included in the system bus CAN. This system EHPS is the same as EHPS II used in the Astra G. For diagnostic purposes, this system has its own line of diagnosis (diagnostic output 7). EHPS production TRW offers two-stage, depending on the load, the regulation speed of the pump (2 speed). Value is determined by the load current that the motor consumes electrical system of the car.

EHPS ZF is used in the production of gasoline engines and heavy-duty Z 17 DTH and is connected with bus HS CAN Astra-H. EHPS production ZF operates depending on the speed and load, and uses two different adjustment card. Appropriate traffic conditions are determined by the speed of the car as a function of displacement of the steering wheel and steering servousilie decreases with increasing speed. On cars with sports chassis, adjusting the second card can be activated power button sport mode.

The visual differences between the systems, TRW and ZF

TRW System

Pail hydraulic round.

Wiring harness associated with electro-hydraulic module can not be separated.

Pipelines hydraulic system, laid individually to the electrohydraulic module and are fastened through the coupling nut or clamp.

System ZF

Pail hydraulic circular shape, with two flat areas.

Wiring harness, connected with electro-module via two connectors.

Pipelines hydraulic system attached to an electrohydraulic module and the steering mechanism through the central bolt.

Principle of operation - EHPS ZF

The control unit controls the system EHPS on the map, depending on the angular velocity of rotation of the pump hydraulic system. A car's speed is transmitted to the control unit via the bus EHPS CAN.

Sensor angle

EHPS production TRW, which is not associated with the bus CAN, does not have a sensor angle. Instead, the information is used to increase the pressure in the steering mechanism, which occurs when you turn the steering wheel.

Vehicles with antilock brake system ESP MK60 have a rotation angle sensor in the CIM. On cars with EHPS ZF, information from the sensor angle CIM is transmitted through HS CAN bus control unit EHPS. Because of the large power consumption of hydraulic pump is not activated until the engine is not working. If during the trip is the refusal of an alternator, hydraulic pump is switched off to protect the battery from the discharge.

Wiring harness connector electrohydraulic module

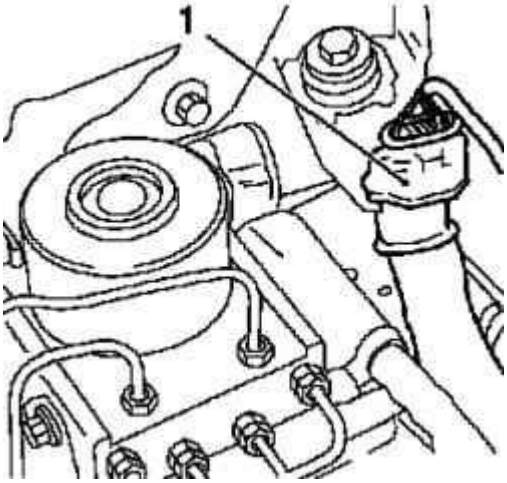


Fig. 5.3. **Wiring harness connector electrohydraulic module: 1 - connector**

Wiring harness connector located under the coolant expansion tank, close to the control unit anti-lock braking / hydraulic modulator.

Pin - wiring harness connector 2-pin (X2) (ZF)

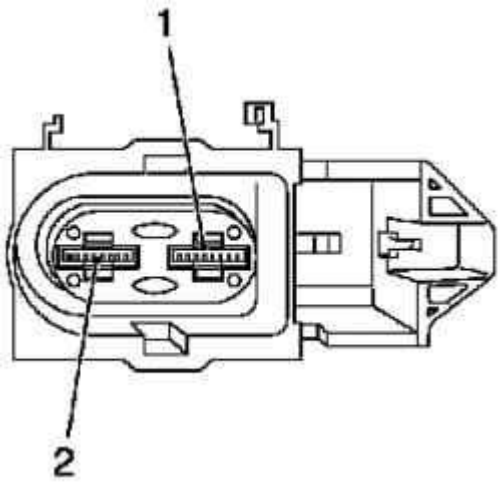


Fig. 5.4. **Connector wiring harness 2-pin (X2) (ZF)**

Wiring harness connector located on the electrohydraulic module.

Pin - wiring harness connector 3-pin (ZF)

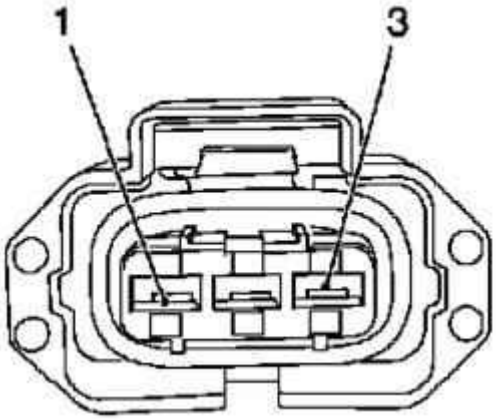


Fig. 5.5. **Wiring harness connector 3-pin (ZF)**

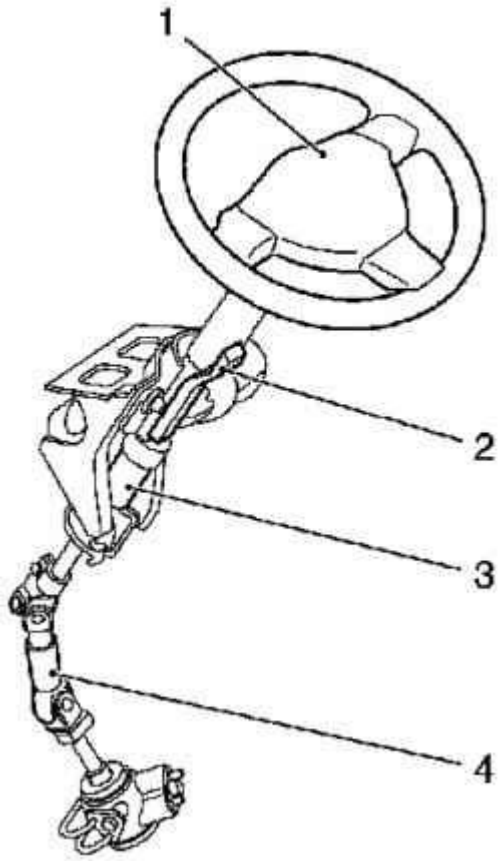
Wiring harness connector located on the electrohydraulic module ZF.

Casing steering column

New steering column cover for Astra-H is adjustable in length and slope. The steering wheel can be adjusted in length by 50 mm, the slope of - 40 mm.

Working steering column in a collision has also been improved. Steering column is equipped with a safety device that prevents a drop in the steering column in case of collision. The protective device consists of a pin, which in a collision is in a groove. This prevents the fall of the steering column, thus ensuring protection of the driver.

Fig. **5.6.** **Headset: 1 - steering wheel, 2 - steering wheel, 3 - adjustment lever on the length and angle, 4 - intermediate shaft**



In the locked position of the adjusting lever is fixed in a secure position in facing the steering wheel.

Steering Gear / tie rods

Steering mechanism Astra-H rack, as in the Astra-G. The steering mechanism is connected with the front suspension subframe by damping sleeves. There are two different gear ratio. The main version has a gear ratio of 15:1, and the sport version - 14:1. As with the Astra-G, the change gear ratio is achieved by various designs of axial joints tie rod.

Steering Gear

Changing of the slats is achieved through the use of different axial joints.

There are three different designs of axial joints tie rod.

5.2. Preliminary checks

Check wheel play

At the stationary vehicle, setting the wheels in motion in a straight position, rock the steering wheel from side to side with little effort. If the gap exceeds the allowable, perform repairs.

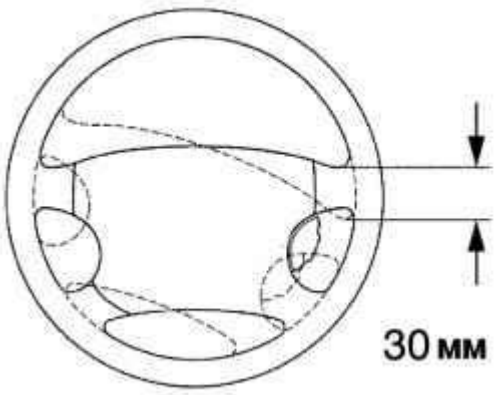


Fig. **5.7.** **Scheme verification wheel play**

Maximum backlash: 30 mm.

Checking the efforts of the steering wheel

NOTE
Before the test, check tire pressure, tire type and surface contact.

Install the steering wheel in a central position.
Remove the steering wheel pad.
Start the engine and check idle.

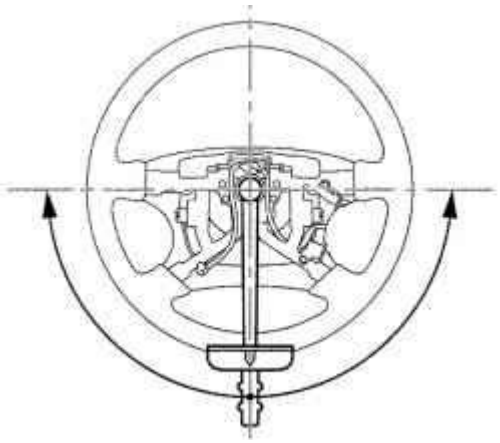


Fig. **5.8.** **Measurement of effort on the steering wheel in both directions**

Using a torque wrench, measure the force on the steering wheel in both directions (Fig. 5.8).
Maximum allowable load: 6 Nm
If the force on the steering wheel more tolerance, repair power steering.
Tighten the nut fixing steering wheel.
Tightening torque: 35 Nm
Install the steering wheel pad.

The flow of power steering

Check the working fluid in the tank.
Raise the front of the car and set it on the stand.
When the engine is off, turn the steering wheel from lock to lock several times.
Lower the car.
Start the engine and check idle.
Turn the steering wheel from stop to stop holding it in the extreme position 2-3 with. Repeat this procedure three - four times.
Turn off the engine.
Verify that no foaming or emulsification of the liquid. If foaming or emulsification verify the absence of leaks in the system.
Check the working fluid.

Check tie-rod ends and seals

Raise the car so that the front wheels were displayed. Tie rods are mounted in clusters levers left and right body axis. From moisture and dust protected by rubber gaskets tips (covers). Check the tips and the seal on the absence of cracks and damage and ensure the reliability of their landing.
Rock the wheel and make sure not to play in the tip rods. Check that the tips were secured into the receiving slots levers.

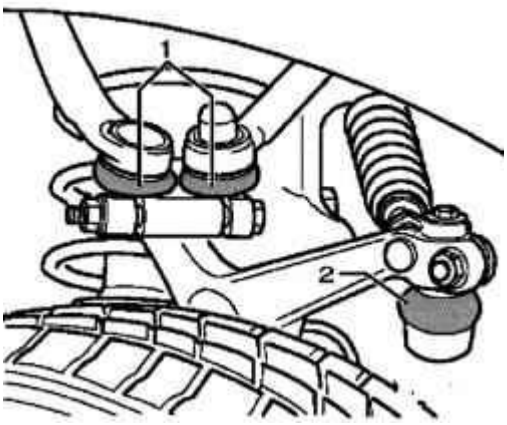


Fig. **5.9.** **Dirt covers on the levers and tie-rod: 1 - tips 2 - Seal**

Salvage Dirt bag and tip, having a gap, you need to be replaced.

Check constant velocity joints

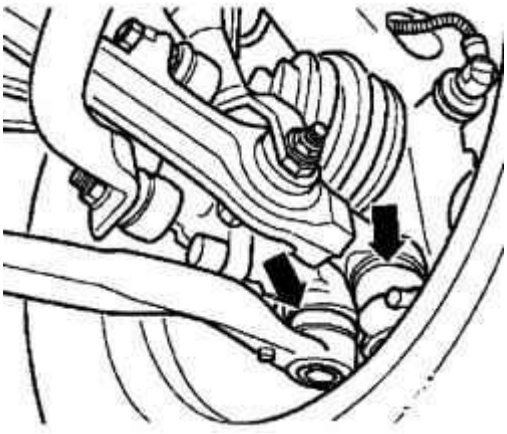


Fig. **5.10.** **Seals joints**

Turn the steering wheel in any direction until it stops. Joints are sitting firmly in the long-term grease-filled plastic liners rotary instruments. From moisture and dirt are protected by plastic covers (Figure 5.10).
Penetrate inside the metal chips, sand and moisture can lead to corrosion and destruction of the joint.
Check the covers on hinges. In case of detection of cracks and damage, replace them.

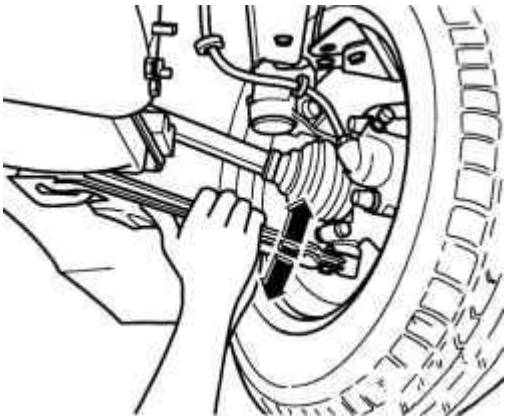


Fig. **5.11. Check axial backlash vsharnirah**

Check end-play in the joints (Figure 5.11).

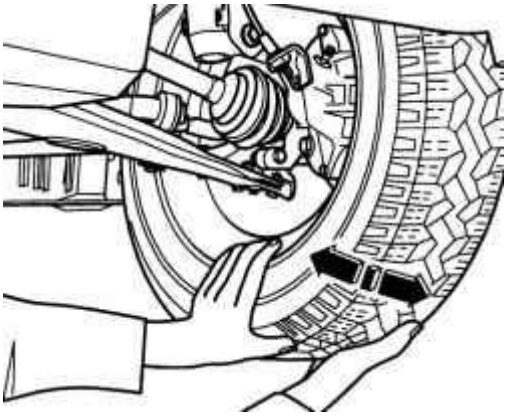


Fig. **5.12. Check cross backlash vsharnirah**

Check the transverse gap (Fig. 5.12).

Check power steering leak

Open the clamps on the shell casings and move in the direction of the steering mechanism.
Start the engine.

NOTE
To check if not longer than 5 seconds, otherwise can be damaged pump hydraulic system.

Turn the steering wheel to lock and hold it for a while in this position. When the pressure rises to the highest possible value.
Check for tightness of the following elements:
- O-ring on the valve body gear steering mechanism;
- All joining hoses;
- O-rings rack.

Turn the steering wheel all the way to the other side, hold for a while in this position and repeat the test.
Replace the guards and secure them with clamps.

NOTE
If there is oil in the steering gear housing and / or protective covers, replace the steering mechanism.

Check level of hydraulic fluid hydraulic

Check the vehicle's wheels in the position directly. If the working fluid in the hydraulic system is cool, let the engine do not. You can conduct an audit and cold butter.

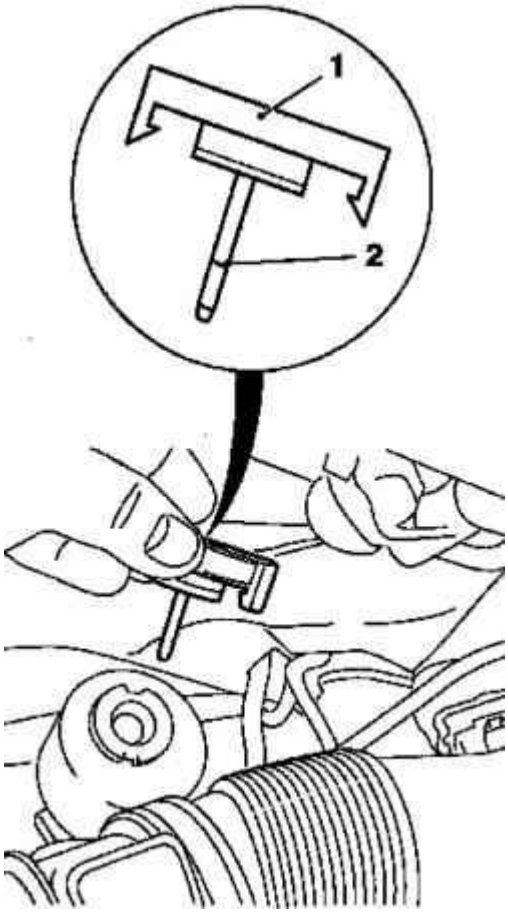


Fig. **5.13.** **Check the fluid level in hydraulic tank: 1 - tank lid, 2 - probe for measuring**

Pail hydraulic steering system is located behind the engine compartment. Check the level with the pointer on the lid. Unscrew the lid, wipe clean with a cloth rod pointer and tightly screw in place. Again, loosen the lid: the level should be 2 mm below or above the tag «MIN» (Figure 5.13).

If the working fluid temperature is 50 ° C, measure the level in the same way. The level should be between the marks «MIN» and "MAX".

If the level of higher than normal, it is necessary to select the liquid. If it is below normal, check the system to leak or top up the hydraulic fluid.

Filling and removal of air from the hydraulic system

NOTE
Do not work electrohydraulic module without lubrication. Merged liquid should not be reused. The hydraulic system is filled with special liquid.

Use a funnel with a flexible tube to fill the hydraulic system.

Pail combined with electro-hydraulic module and located on the right side of the engine compartment between the engine and bulkhead (cars with left-hand steering) or the left side of the engine compartment between the gearbox and bulkhead (cars with right-hand-steering).

Filling and removing air from the hydraulic system should be carried out at room temperature.

To remove air from the hydraulic system, start the engine and turn the steering wheel from left to right limiter limiter three times with the engine running.

Turn off the engine and check the fluid level, if necessary top up to the top mark on schupe for level measurement.

Test the Power assisted steering, turning the steering wheel from left to right the limiter a few times with the engine running.

Check all connection points Power assisted steering visually for leakage

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5.3. Steering Gear

Replacing the steering column module (CIM)

NOTE
When replacing the control unit, before removing the control unit restart with the device CLOSE 2.

Withdrawal
Disconnect the battery.
Remove the steering.
Remove the lining of the lower steering column, unscrewing 5-bolt attachment (arrows in Figure 5.14).

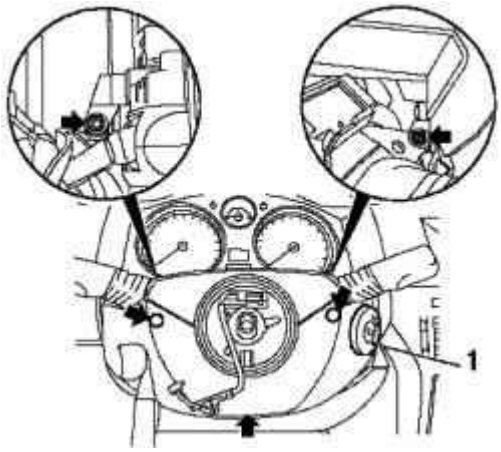


Fig. **5.14.** **Removing the panel ignition lock: 1 - panel lock**

Remove the ignition switch (Figure 5.14).
Remove the column module (CIM), 3 unscrewing bolts.

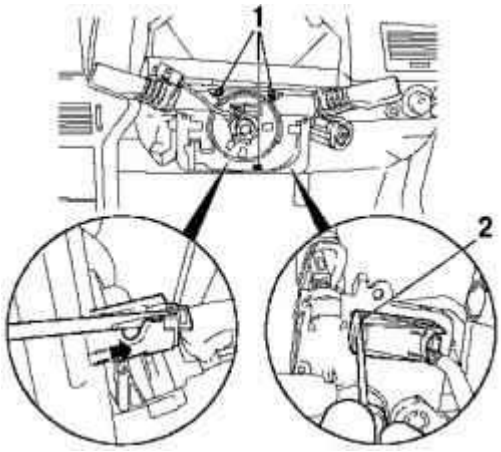


Fig. **5.15.** **Removing the module: 1 - mounting screws, 2 - the wiring harness connector**

Disconnect the wiring harness holder (arrow) and disconnect the wiring harness connector (Fig. 5.15).

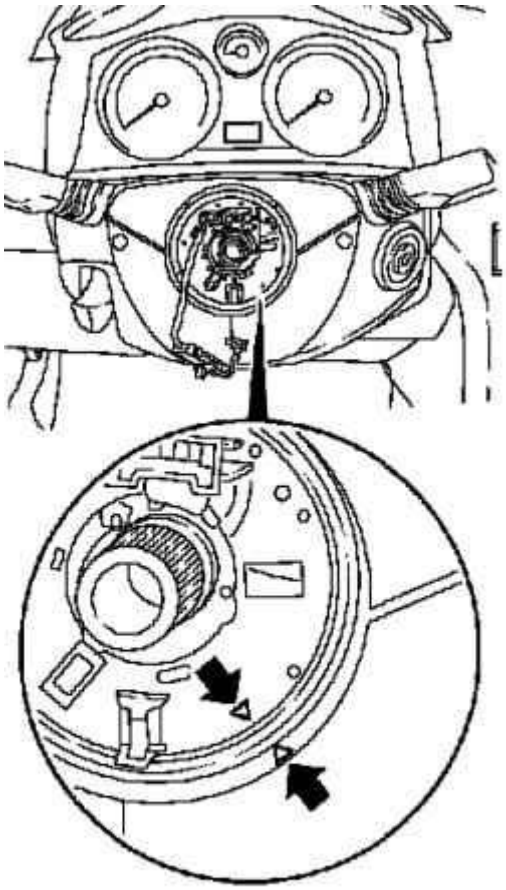


Fig. **5.16.** **Tags combining to install the module**

NOTE
Contact module can not twist when lifting. When removing and installing, make sure that the label (arrows) are located opposite each other, as shown in Figure 5.16.

Setting
Set column module (CIM).
Connect and lock the wiring harness connector and attach the wiring harness in the holder.
Tighten the 3 bolts.
Attach the bottom facing the steering column.
Install the ignition socket and tighten the 5 screws fastening.
Install the steering.
Connect the battery pack.

NOTE
When replacing the control unit, after connecting the control unit, do programming with the instrument CLOSE 2.

Program volatile memory.

Replacing the steering column

NOTE
Before installing the system, acting upon the air bag, observe security measures for pyrotechnic systems.

Withdrawal
Lock the steering
Set the steering in the position of the rectilinear motion.
Remove the ignition key.
Give the trigger lock the steering column.
Remove the pad upholstery of the driver.

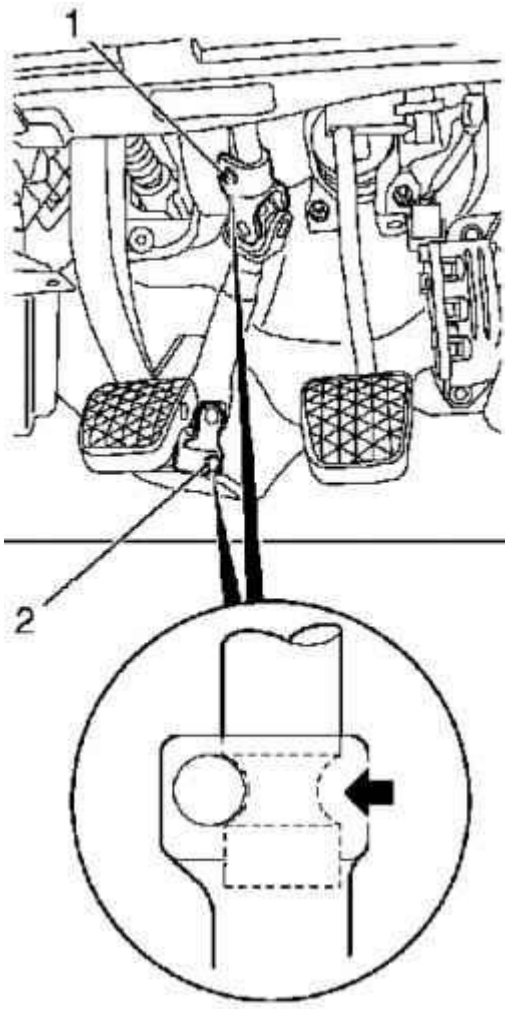


Fig. **5.17.** **Removing the clamp bolts: 1, 2 - Bolts**

2 Loosen the clamp bolt (Figure 5.17).

NOTE
Check the loading position, clamping bolts.

Remove the intermediate shaft slightly squeezing it.
Disconnect the mass wire from the battery.

NOTE
Wait 1 Mindl discharge the capacitor.

Remove the air bag module.

NOTE
Module air bag should not be subjected to excessive loads, and should always be placed face up.

Separate wiring harness connector audio signal.

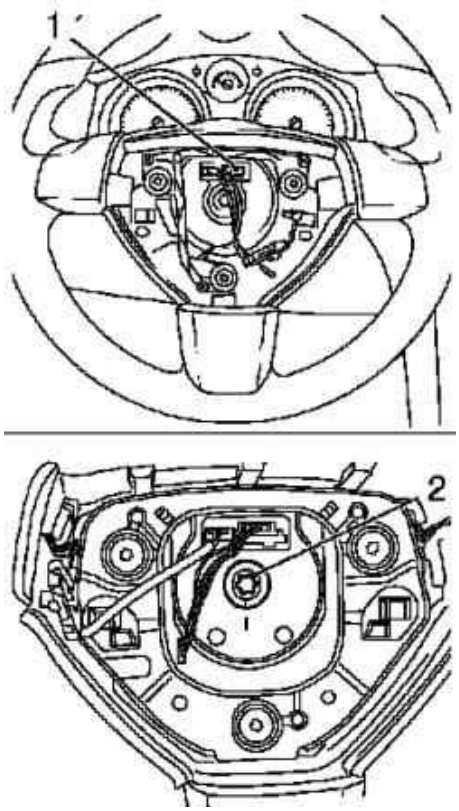


Fig. **5.18.** **Removing the steering wheel: 1 - the wiring harness connector audio 2 - bolt mount**

Remove the steering wheel with power steering column, unscrewing fastening bolt (Figure 5.18).
Remove the steering wheel from the steering shaft.
Remove the top upholstery of the steering column by unscrewing 2 screws fastening.
Remove the lining of the lower steering column, 3 unscrewing bolts.
Remove the module CIM, separating the wiring harness connector and unscrewing 3 bolts.
Remove the light switch module.

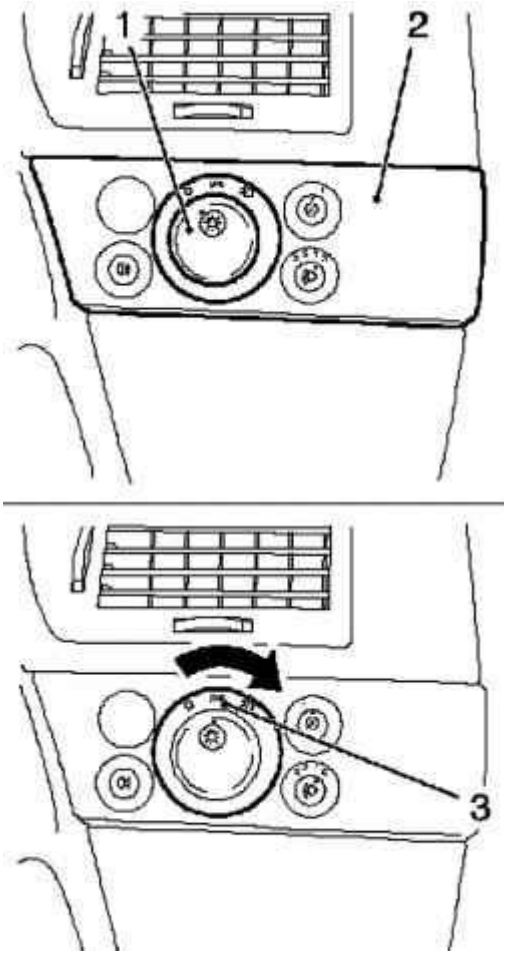


Fig. **5.19.** **Removing the module light switch: 1 - Grip 2 - central location, 3 - light switch module**

NOTE
To remove the light switch module, to drown the handle (1) in position "0", move the knob to the center position and remove the light switch module (Fig. 5.19).

Remove the light switch module.

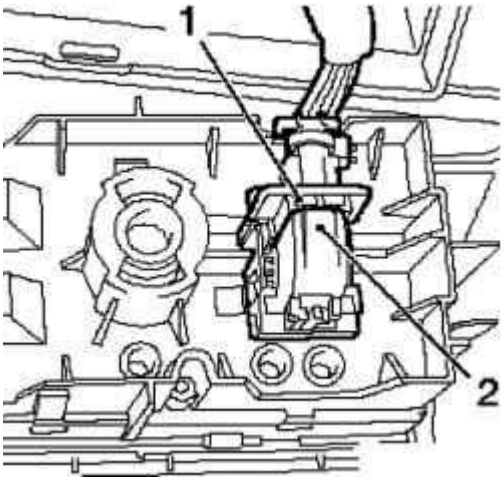


Fig. **5.20. Removing the wiring harness connector module light switch: 1 - secondary fuse, 2 - fuse**

Separate wiring harness connector module light switch. To do this, push the secondary fuse and unlock the fuse (Figure 5.20).
Remove the bottom pad of the instrument panel by unscrewing 4 bolts fastening.
Remove the wiring harness power steering column, unscrewing bolts.
Remove the steering column with the cross, turning away 3bolta attachment.

NOTE
Check the loading position cotter pin at the top of the steering column.

Remove the steering / ignition unit with the steering column.
Turn the ignition switch to the starting position.

Setting
Attach the steering / ignition switch to the block of the steering column.
Install and tighten the clamp bolts.
Attach the power steering column to the crossbar and then block the steering column, tighten the 3 bolts.

NOTE
Cotter pin must be properly installed in the crossbar.

Attach the wiring harness to the block of the steering column.
Attach the wiring harness in the holder.
Lock the steering.
Install the steering column in the position of the rectilinear motion. Check on the steering column should be turned down.
Remove the key from the ignition.
Give the trigger lock the steering column.
Install the lower instrument panel pad.
Connect the wiring harness connector module light switch.
Install light switch module.

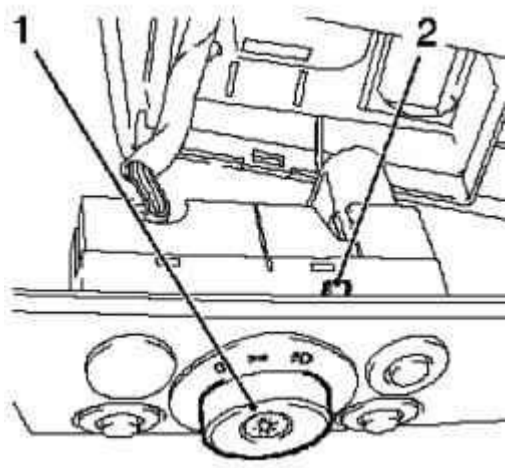


Fig. **5.21. Installation of the module light switch: 1 - Rotary switch, 2 - retainer**

Free module switch light. To do this, turn the rotary switch to position "0", fix the light switch (Figure 5.21).
Install module CIM.
Connect the wiring harness connector.
Install the bottom facing the steering column.
Install the upper facing of the steering column.
Insert the wiring harness air bag through the hole in the steering wheel hub.
Attach the steering wheel to the steering shaft.
Install the steering wheel on the block steering column.

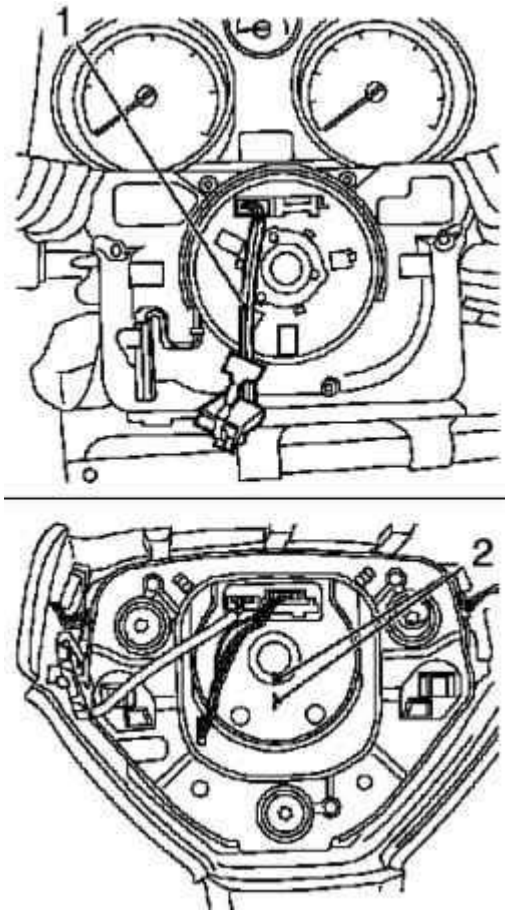


Fig. **5.22. The combination of tags on the steering wheel and the steering shaft: 1 - wiring harness inflatable airbags, 2 - tags**

NOTE
Align the mark on the steering wheel and the steering shaft (Fig. 5.22).

Tighten the attachment bolt moment 30 Nm

NOTE

Clean the threads and install a new bolt fixing composition.

Connect the wiring harness connector audio
Install air bag module security.
Attach the intermediate shaft to the steering shaft and tighten the moment 24 Nm
Insert the intermediate shaft on the steering shaft.
Attach the clamping bolt.

NOTE
Before installing the clamping bolt, make sure that the groove of the steering shaft (arrow in Figure 5.17) combined with a hole in the intermediate shaft. Clean the threads and install the bolt with a fixing composition. Check the loading position, the clamping bolt.

Install intermediate shaft on the steering mechanism and attach the clamping bolt.

NOTE
Make sure that the wheels are in the position of the rectilinear motion

Install the lower trim.
Check the position of the rectilinear movement, adjust if necessary.
Connect a massive wire to the battery.

Replacing the steering mechanism (ZF)

NOTE
To remove the steering mechanism must be removed the front suspension subframe.

Withdrawal
Remove the front suspension subframe.
The vehicles left-hand steering clear bracket damping engine block rear damping block engine.

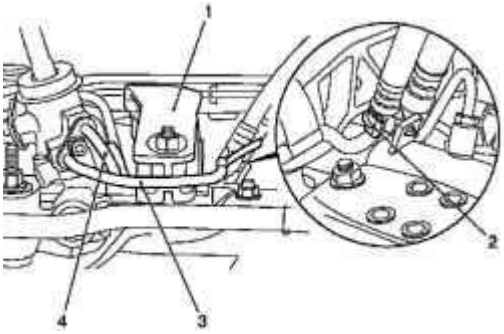


Fig. 5.23. **Removing the front suspension subframe: 1 - bracket damping engine block, 2 - holder, 3 - supply pipeline, 4 - reusable tube**

Remove the holder and disconnect the supply pipeline and return pipe from the steering mechanism (Fig. 5.23).

NOTE
To collect oil flowing, use the tray.

Remove the electrohydraulic module with the front suspension subframe.

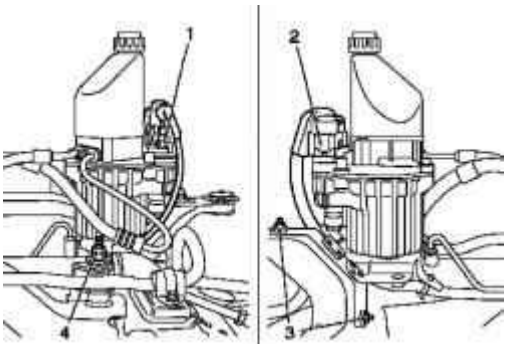


Fig. 5.24. **Removing the electrohydraulic module: 1, 2 - connectors wiring harnesses, 3, 4 - nuts**

Disconnect the 2 connectors wiring harness and remove them from the electrohydraulic module (Fig. 5.24).
Loosen the 3 screws from the steering mechanism and the front suspension subframe.

Remove the electrohydraulic module with return pipe from the steering mechanism and the front suspension subframe.
Remove the tie rod ends on both sides of the steering mechanism.
Remove the 2 fixing brackets.
2 Remove the cover of the steering mechanism.

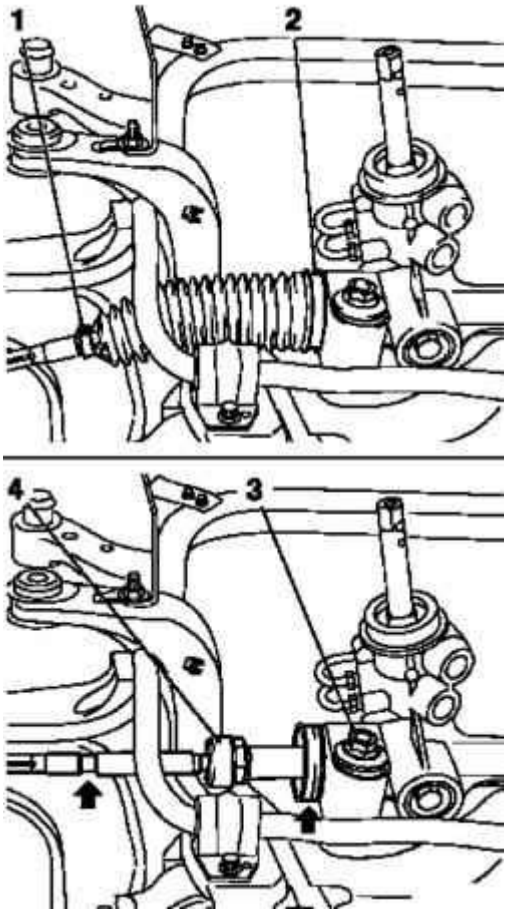


Fig. **5.25. Removing the steering rods: 1, 2 - Fixing brackets, 3 - nut, 4 - tie rod ends**

Disconnect the 2 tie rod ends from the steering mechanism by means of devices KM-6004-2 (Figure 5.25).
Hold open rod wrench for Lyskov rack from the steering shaft.
Remove the steering mechanism with the front suspension subframe.
Loosen the 2 nuts from the front suspension subframe.
Unscrew the 2 screws and remove the steering mechanism with the front suspension subframe.

Setting
Attach the steering mechanism to the front suspension subframe and tighten the moment 45 Nm, Dauvergne on + 45 ° and + 15 °.
Install 2 new bolt.
Tighten the 2 new nuts.
Attach 2 tie rod ends to the steering mechanism by means of devices KM-6004-2 point 90 Nm

NOTE
Clean the threads on the rail and cover with a fixing composition.

Hold open rod wrench for Lyskov rack from the steering shaft.
2 Attach the cover to the steering mechanism, and set them on the steering mechanism.

NOTE
Make sure that the cover is located in the grooves of the steering rod and steering mechanism.

Attach 2 new retaining clamp to the steering mechanism by means of devices KM-J-22610.
Install 2 cover on the steering traction, using a new fixing bracket.

NOTE
Make sure that the cover is located in the grooves of the steering rod.

Attach the electrohydraulic module with bracket to the front suspension subframe and tighten the moment 22 Nm
Place electrohydraulic module with a holder on the steering mechanism and front suspension subframe.

NOTE
Obratiet attention to the wiring harness of steering control.

Connect the wiring harness 2 x electrohydraulic module.
Attach the tube to the steering mechanism and tighten the moment 16 Nm
Use 2 new o-rings.
Attach the holder of the tubes to the steering mechanism.
On vehicles with left-hand steering: connect rear bracket. damping to the damping of the engine block engine block and tighten the moment 55 Nm
Install the front suspension subframe.
Fill the hydraulic system and remove the air from the hydraulic system.
Check the position of the rectilinear movement, adjust if necessary.
Check the convergence of the wheels, adjust if necessary.

Replacement Tie rod

Withdrawal
Remove the front wheel.

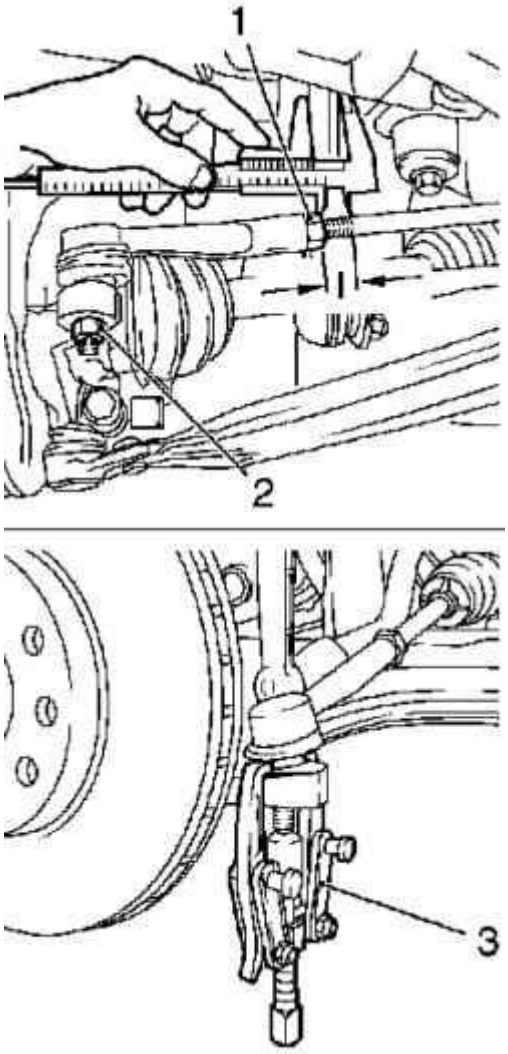


Fig. **5.26.** **Measuring the length of thread from a lock nut to the threaded end of tie rod and tie rod tip overflow: 1 - nut, 2 - nuts, 3 - special tool**

Measure the length of thread from a lock nut to the threaded end of tie-rod (Fig. 5.26).
Loosen the locknut and hold open wrench for the steering rod tip.
Disconnect the tie rod tip from steering knuckle.

Remove the nut.
Vypressuyte Tie rod from steering knuckle, using a special tool KM-161-B together with the KM-161-2 (Figure 5.26).
Remove the tip from the tie rod tie rod.

Setting
Attach the tip to the steering tie rod and tighten the thrust torque 60 Nm

NOTE
First check the length of the thread.

Secure the tip of the steering rod and hold open the lock nut wrench for the steering rod tip.
Attach the tie rod tip to the new steering knuckle nut, tighten the moment of 30 Nm, Dauvergne at +90 ° and +15 °.
Fasten the front wheel moment of 110 Nm
Check the convergence of the wheels, adjust if necessary.

Replacing the tie rod

NOTE
Steering ZF has 3 different tie rod ends, depending on the model. When replacing a tie rod record the number of necessary details to avoid mistakes.

Withdrawal
Remove the tip of the corresponding tie rod with tie rod.
Remove the appropriate case.

NOTE
On cars with right-hand-steering, to remove and install the left-hand steering thrust should also be disconnected from the steering mechanism of the right case. On vehicles with left-hand steering, to remove and install the right-hand steering thrust should also be disconnected from the steering mechanism of the left pouch.

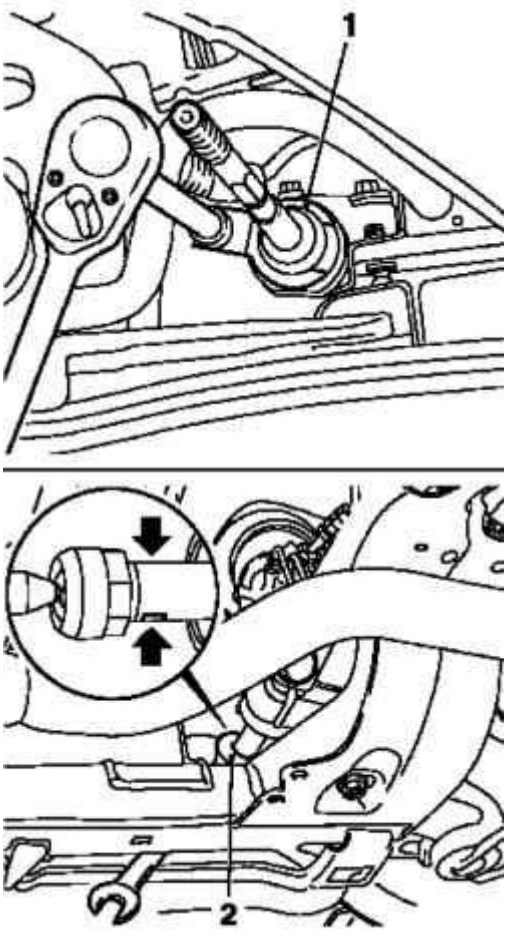


Fig. **5.27.** **Otsoedineie tie rod: 1 - a special tool, 2 - Wrench**

Disconnect the steering traction with a special tool KM-6004-2 from the steering rack and hold an open wrench for Lyskov on rack (see Figure 5.27).

Setting

Attach the steering pull to the steering mechanism and tighten the moment 90 Nm
Clean the threads on the rail and cover with a fixing composition.
Attach the steering pull to the rail with a special tool KM-6004-2, and hold an open wrench for Lyskov on rack (arrow in Figure 5.27).
Replace cover or covers.
Install the appropriate tip steering traction.
Check the position of the rectilinear movement, adjust if necessary.
Check the convergence of the wheels, adjust if necessary.

Replacing the steering mechanism (TRW)

NOTE
To remove the steering mechanism must be removed the front suspension subframe.

Withdrawal

Remove the front suspension subframe.
On vehicles with left-hand steering clear bracket damping engine block rear damping block engine.
Remove the holder.

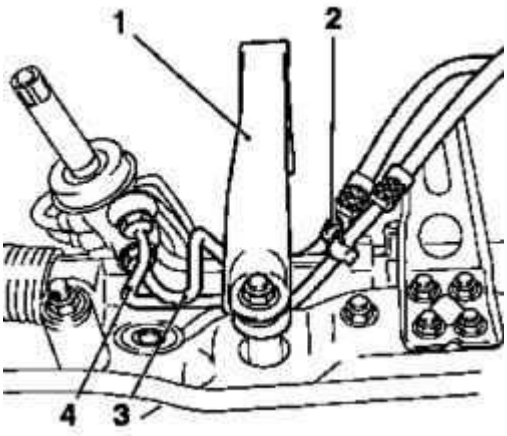


Fig. **5.28.** **Removing the pipe from the steering meanizma: 1 - bracket damping engine block, 2 - holder, 3 - supply pipeline, 4 - return pipeline**

Remove the supply pipeline and the return pipeline from the steering mechanism (Fig. 5.28).

NOTE
To use the resulting oil tray.

Wiring harness and unleash the power steering of the front suspension subframe.

NOTE
Pay attention to the laying bundle.

Remove the electrohydraulic module with the front suspension subframe.

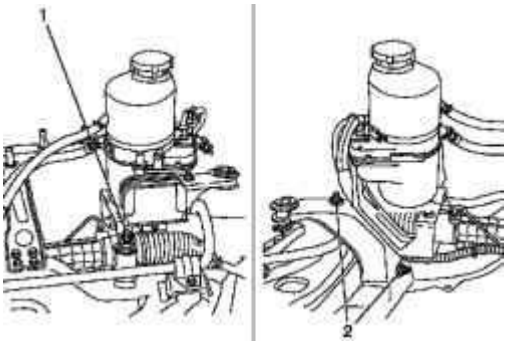


Fig. **5.29.** **Mounting electrohydraulic module: 1, 2 - Nuts**

Loosen the 3 nuts from the steering and front suspension subframe (Figure 5.29).

Remove the electrohydraulic module with feed and return pipeline to the steering and front suspension subframe.

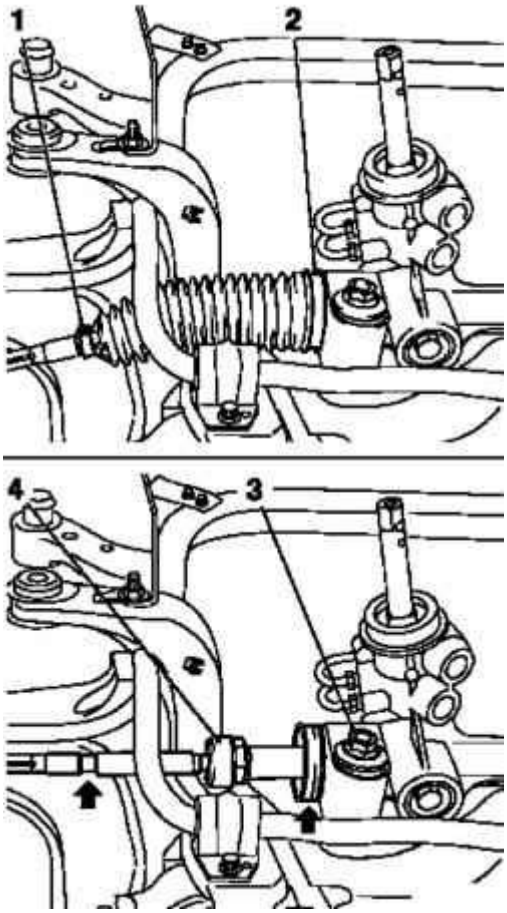


Fig. **5.30. Removing the steering rods: 1, 2 - Fixing brackets, 3 - nut, 4 - tie rod ends**

Disconnect the 2 tie rod ends from the steering mechanism by means of devices KM-6004-2 (Figure 5.30).
Hold open rod wrench for Lyskov rack from the steering shaft.
Remove the steering mechanism with the front suspension subframe.

Setting
Attach the steering mechanism to the front suspension subframe, install 2 new bolts and 2 noyh nuts and tighten the moment 45 Nm +45 ° +15 °.
Attach 2 tie rod ends to the steering mechanism by means of devices KM-6004-2, and tighten the moment 90 Nm

NOTE
Clean the threads on the rail and cover with a fixing composition.

Install 2 cover of the steering mechanism.
Place 2 cover on the steering mechanism.

NOTE
Make sure that the cover is located in the grooves of the steering rod and steering mechanism.

Attach 2 new retaining clamp to the steering mechanism by means of devices KM-J-22610.
Install 2 mantle on the tie rod ends, using a new fixing bracket.

NOTE
Make sure that the cover is located in the grooves of the steering rod.

Attach the electrohydraulic module with bracket to the front suspension subframe and tighten the nuts the moment 22 Nm
Place electrohydraulic module with a holder on the steering mechanism and front suspension subframe.

NOTE
Pay attention to the wiring harness of steering control.

Attach the wiring harness of steering control to the front suspension subframe.

NOTE
Make sure that the wiring laid out properly.

Attach the feed and return pipe to the steering mechanism and tighten the moment 30 Nm
Use 2 new o-rings.
Attach the holder submitting and return piping to the steering mechanism.
On vehicles with left-hand steering: connect rear bracket. damping to the damping of the engine block engine block and tighten the moment 55 Nm
Install the front suspension subframe.
Fill the hydraulic system and remove the air from the hydraulic system.
Check the convergence of the wheels, adjust if necessary.

Replacing the covers on the steering mechanism

Withdrawal

Remove the front wheel.
Remove the engine compartment.
Remove the tip of the steering rod.
Remove the retaining collar / locking brackets.

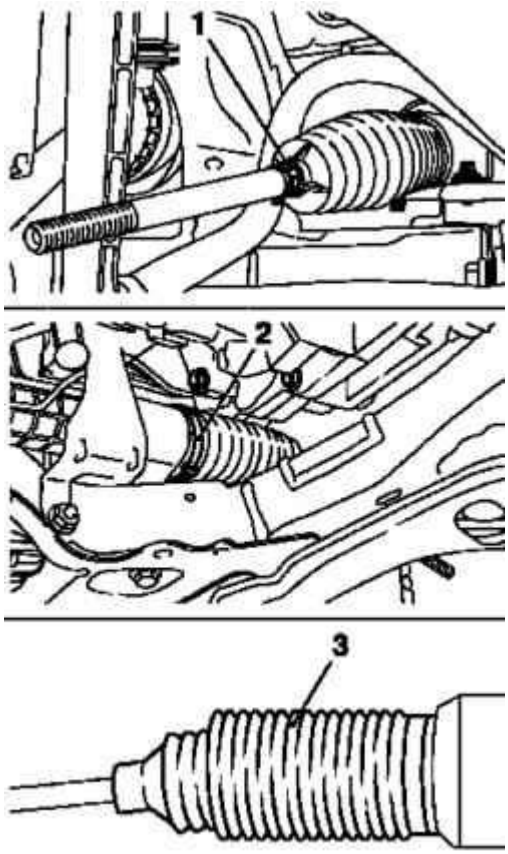


Fig. **5.31. Removing the shroud tie rod: 1, 2 - Fixing brackets, 3 - cover**

Remove the cover tie rod (Fig. 5.31).

Setting

Tighten cover on the steering traction and steering mechanism.
Lubricate grease groove.

NOTE

Make sure that the bag sits in the grooves of the steering rod and steering mechanism.

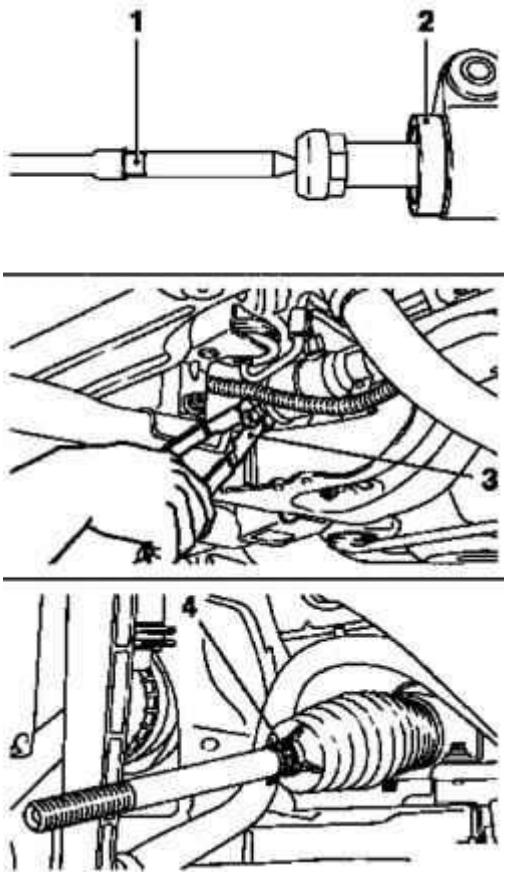


Fig. **5.32.** **Installing the cover on the steering traction: 1, 2 - slots, 3 - adaptation, 4 - fixing bracket**

Attach the cover to the steering mechanism with a new restraint with a collar device KM-J-22610 (Fig. 5.32).
Fasten the cover of the new retention bracket to the steering traction.

NOTE
Make sure that the bag sits in the grooves of the steering rod.

Insert the tip of the steering rod.
Install the bottom cover of the engine compartment.
Fasten the front wheel bolts with torque 110 Nm

Replacement of pipelines hydraulic steering system with amplifier (ZF)

Withdrawal

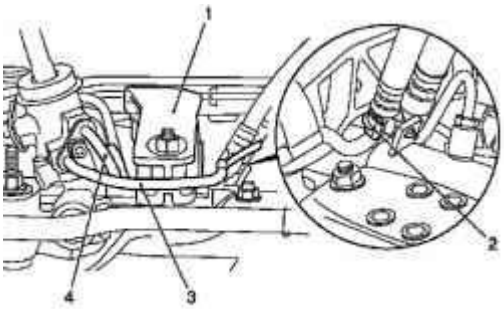


Fig. **5.33.** **Removing the front suspension subframe: 1 - bracket damping engine block, 2 - holder, 3 - supply pipeline, 4 - reusable tube**

Remove the front suspension subframe.

The vehicles left-hand steering clear bracket damping engine block rear damping block engine.

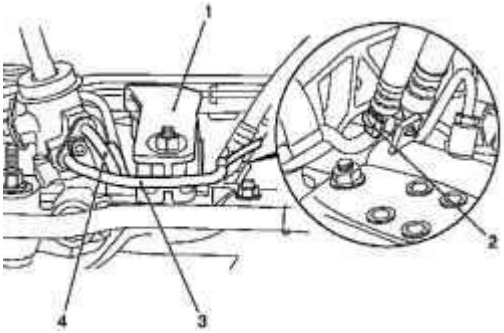


Fig. **5.23. Removing the front suspension subframe: 1 - bracket damping engine block, 2 - holder, 3 - supply pipeline, 4 - reusable tube**

Remove the holder and disconnect the supply pipeline and return pipe from the steering mechanism (Fig. 5.23).

NOTE
To collect oil flowing, use the tray.

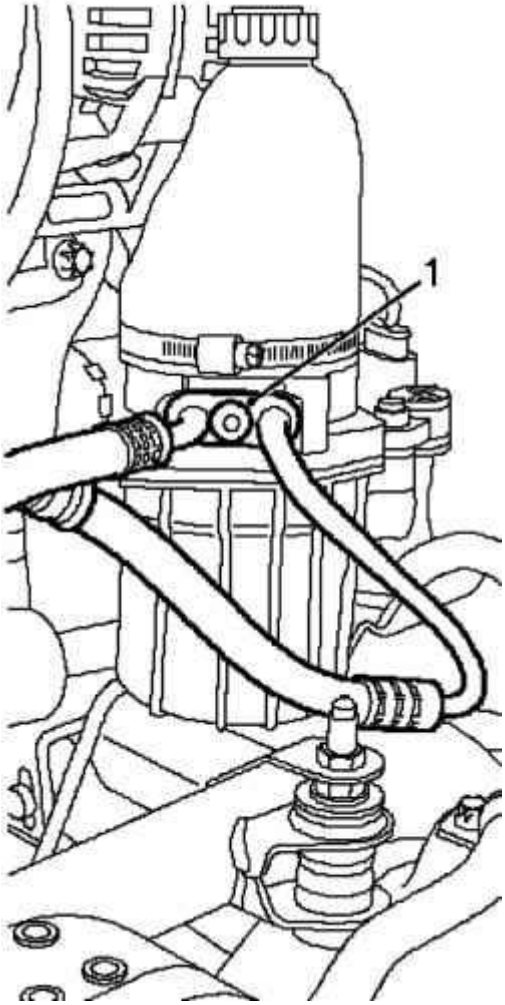


Fig. **5.34. Bolt mounting fuel line: 1 - Bolt**

Remove the feed and return pipe electrohydraulic module, remove the attachment bolt (Figure 5.34).

Setting

Attach the feed and return pipe to the steering mechanism with the new. O-rings and tighten the attachment bolt moment 16 Nm

Attach the feed and return pipeline to the electrohydraulic module with the new. O-rings and tighten the attachment bolt moment 16 Nm

Attach the feed and return pipe in the holder the steering mechanism.

Install the front suspension subframe.

Fill the hydraulic liquid and remove it from the air.

5.4. Tables

Table 5.1 Recommended values of the moments

Компонент	*Момент затяжки, Н·м*
Трубка подачи и возврата к электрогидравлическому модулю ZF	16
Подводящий трубопровод к электрогидравлическому модулю (TRW)	30
Трубка подачи и возврата к рулевому механизму ZF	16
Подводящий трубопровод рулевого механизма (TRW)	30
Демпфирующая втулка кронштейна и электрогидравлического модуля (TRW)	7
Кронштейн электрогидравлического модуля к рулевому механизму	22
Кронштейн электрогидравлического модуля к подрамнику передней подвески	22
Кронштейн демпфирующего блока двигателя к задней части коробки передач	80
Кронштейн демпфирующего блока двигателя к задней части демпфирующего блока двигателя	55
Кронштейн направляющей переключения к подрамнику передней подвески	20
Тепловой экран к рулевому механизму	4
Зажимной болт блока рулевой колонки	22
Рулевая тяга к контргайке рулевой тяги	60
Рулевой механизм к подрамнику передней подвески	45 Н·м + 45°+ 15°*
Рулевое колесо к рулевому валу	30***
Блок рулевой колонки к поперечине	22
Возвратная трубка к рулевому механизму (TRW)	30
Рулевая тяга к рейке рулевого механизма	90**
Наконечник рулевой тяги к поворотному кулаку	30 Н·м + 90°+ 15°
Промежуточный вал к валу рулевого механизма	24***
Промежуточный вал к рулевому валу	24***

** Use new nuts and bolts.*
*** Clean the threads on the rail and cover with a fixing composition.*
**** Clear the threads and install the bolt with a fixing composition.*

Note
Bolts, which tightened the moment and on the corner (beyond the elastic limit) can not be reused, as to turn away.

Table 5.2 Technical data of hydraulic steering

Двигатели	*TRW*	*ZF*
Версии	Автомобили с правым расположением рулевого управления и автомобили с левым расположением рулевого управления	
Передаточное отношение	15:1	15:1; 14:1*
Рабочая жидкость Качество рабочей жидкости № по каталогу. (1 л) № запасной части. (1 л) Заправочный объем	Специальное масло Pentos 19 40 90 54 675 мл	sinCHF202/11S 0766 4116 600 мл**; 700 мл***

Table 5.3 Potential problems, their causes and solutions (Power steering)

Возможные причины неисправности	*Способ устранения*
Увеличенный свободный ход рулевого колеса	
Ослабление затяжки регулировочного винта упора рейки	Затянуть
Ослабление затяжки болтов крепления рулевого механизма	Затянуть
Ослабление крепления или износ шаровых шарниров рулевых тяг	Затянуть крепление или заменить шарниры
Тугое вращения рулевого колеса (недостаточное усиление)	
Проскальзывание ремня привода насоса гидроусилителя	Отрегулировать натяжение ремня
Повреждения ремня привода насоса	Заменить ремень
Недостаточный уровень рабочей жидкости	Восстановить уровень жидкости до нормы
Попадание воздуха в гидросистему	Удалить воздух
Перекручивание или повреждение шлангов	Устранить перекручивание или заменить шланги
Недостаточное давление насоса гидроусилителя	Устранить неисправность или заменить насос
Заедание распределителя	Заменить
Повышенные внутренние утечки в насосе	Заменить дефектные детали насоса
Повышенные утечки жидкости из рулевого механизма	Заменить дефектные детали
Перекос или повреждение уплотнений рулевого механизма или распределителя	Заменить уплотнения
Нечеткий возврат рулевого колеса в среднее положение	
Повышенный момент проворачивания шаровых шарниров наконечников рулевых тяг	Заменить
Чрезмерная затяжка регулировочного винта упора рейки	Правильно затянуть винт
Затрудненное проворачивание внутренних шарниров и/или шарниров наконечников рулевых тяг	Заменить
Ослабление затяжки болтов крепления рулевого механизма к подрамнику	Затянуть болты
Износ карданного шарнира рулевого вала и/или уплотнителя	Устранить неисправность или заменить
Деформация рейки рулевого механизма	Заменить
Повреждение подшипника приводной шестерни	Заменить
Перекручивание или повреждение шлангов	Устранить перекручивание или заменить шланги
Повреждение клапана регулирования давления	Заменить
Повреждение подшипника валика ротора насоса	Заменить подшипник
Шум (стук) в рулевом управлении	
Касание шлангов о кузов	Правильно проложить шланги
Ослабление крепления кронштейна рулевого механизма	Затянуть крепление
Ослабления крепления рулевых тяг и/или шаровых шарниров наконечников тяг	Затянуть крепление
Износ рулевых тяг и/или шаровых шарниров	Заменить
Повышенная шумность насоса гидроусилителя	
Недостаточный уровень рабочей жидкости	Восстановить уровень жидкости до нормы
Попадание воздуха в гидросистему	Удалить воздух
Ослабление затяжки болтов крепления насоса	Затянуть болты

Table 5.4 Elements of a EHPS

Элемент	Конструкция	Элемент	Описание
Блок управления		Элемент отображения	
A1 A75	Блок управления – электрогидравлическое рулевое управление с усилителем	P3	Комбинация приборов
A65	Блок управления – управление светом фар (ксеноновые фары)	P6	Информационный дисплей
A84	Модуль управления двигателем	P9	Тройной информационный дисплей
A105	Модуль колонки	разъемы	
		X110	Диагностический разъем

Table 5.5 Pin - wiring harness connector with a 5-pin (X1) (TRW)

Вывод	Назначение	Тип сигнала
1	Зажигание включено (вывод 15)	I
2	HS CAN высокий (только ZF)	I/O
3	HS CAN низкий (только ZF)	I/O
4	K-линия (только TRW)	I/O
5	Сигнал оборотов двигателя (только TRW)	I

Table 5.6 Pin - wiring harness connector 2-pin (X2) (ZF)

Вывод	Назначение	Тип сигнала
1	Батарея + (вывод 30)	I
2	Масса – (вывод 31)	I/O

Table 5.7 Pin - wiring harness connector 3-pin (ZF)

Вывод	Назначение	Тип сигнала
1	Зажигание включено (вывод 15)	I
2	HS CAN высокий (только ZF)	I/O
3	HS CAN низкий (только ZF)	I/O

Table 5.8 Change of the slats is achieved through the use of different axial joints

Производитель	Отношение	Ход рейки	Применение
TRW	15:1	68,3 мм	Базовое шасси
ZF	15:1	72,5мм	Базовое шасси
ZF	14:1	68,3 мм	Спортивное шасси
ZF	14:1	66,8 мм	Спортивное шасси с 18" колесами

Table 5.9 Structures of axial joints tie rod

Конструкция:	Размер I
Базовое	7,2 мм
Спортивное	3,0 мм
Спортивное с 18" колесами	

6. Brakes

6.1. General

Front brakes

Depending on the model of the engine and auxiliary equipment, Astra-H can be equipped with brakes of various sizes. The brake caliper is bolted to the steering knuckle. The following table gives information about the brake calipers and brake discs for various models of engines and options configuration.

Depending on the version of equipment, brake pad wear indicator may be a mechanical / acoustic, and can be displayed visually on the dashboard, through the use of front electrical contact pads.

Rear brakes

In addition to models for Germany, Austria and Switzerland versions with engines Z 14 XEP, Z 14 and Z 16 XEL XEP equipped with drum brakes. For all other models of engines and the aforementioned countries are used disc rear brakes. Mechanical or electronic brake pad wear indicators for the rear brakes are not provided. The following table gives information about the different versions of the rear brakes.

Power Brakes

Astra-H is equipped with a two-step brake booster with the emergency braking function, which in situations of emergency braking sverhproportsionalno increases the braking pressure, thus reducing the braking distance.

Brake line

At Astra-H for the first time used a new brake line. The brake line has a larger outer diameter of 5.14 mm and replaces the familiar to Astra-G brake lines, which had a diameter of 4.75 mm. Both the brake lines have the same internal diameter.

New brake lines offer better protection against corrosion and have a coating without chromium content (and heavy metals).

Service

Brake lines are delivered in parts with unprepared for the installation ends.

When you use these brake lines for maintenance, observe the following guidelines for preparing the ends (beading). Can be used two types of compounds with beading:

- Beading type E (SAE) and the flaring-type F (ISO).

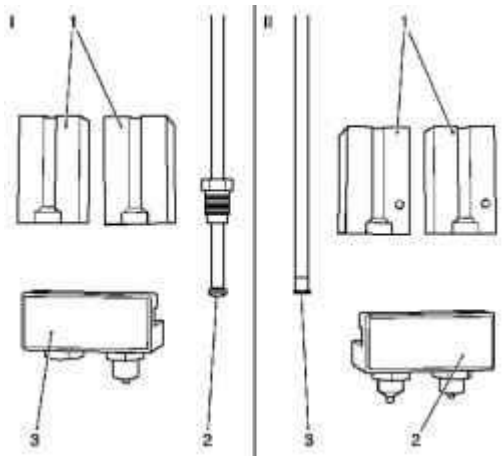


Fig. **6.1.** **Flared grips types F and E**

To connect the two brake lines can be used beading type E and type F. To connect with the individual nodes (eg, hydraulic modulator, brake caliper) is used beading type F. The ends of the tubes with beading should be lightly coated with oil.

The procedure for expanding

1. Using a steel brush, remove the pipe cover the length of 6,5 mm from the end, which will be laminated.
2. Clamp the brake lines to adjust for the 5 mm brake lines.
3. Use a tool for expanding (E or F) for the brake lines with a diameter 4,75 mm.
Expanding the type F - I.
Capture (Workholding, 5 mm).
Brake line with expanding type F.
Tool for expanding the type F (4,75 mm).
Expanding the type E - II.
Capture (Workholding, 5 mm).
Tool for expanding the type E (4.75 mm).
Brake lines with expanding the type E.

The main brake cylinder

Brakes new master cylinder and new brake booster

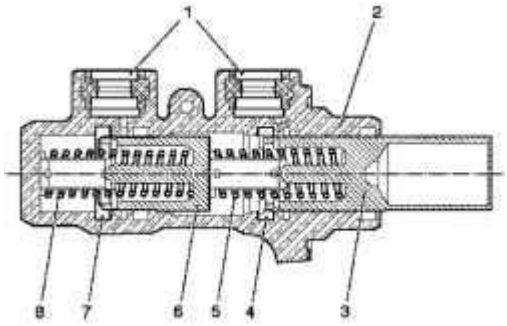


Fig. **6.2.** **General view of the tandem master brake cylinder: 1 - socket compensating reservoir, 2 - building a tandem master brake cylinder type, and 3 - the primary piston (piston pusher), 4 - sealing sleeve of the primary circuit; 5 - compression springs, 6 - secondary piston (floating piston) 7 - sealing sleeve in the secondary circuit, 8- return spring**

Restrictions on the size marker in all models of Astra-H engine Z19DTH and Zafira to the left-hand steering led to the need to design new, more compact master brake cylinder. Effect of this tandem cylinder based on the principle of "plunger".

Unlike conventional master brake cylinder, sealing plugs are embedded in the body instead of being installed on the piston, as before. The hole in the hull, thus directly sends pistons. This design reduces the length of the tandem master brake cylinder by 25%. In addition, the number of nodes is reduced to 15, thus significantly lowered weight, reduced size and length of service.

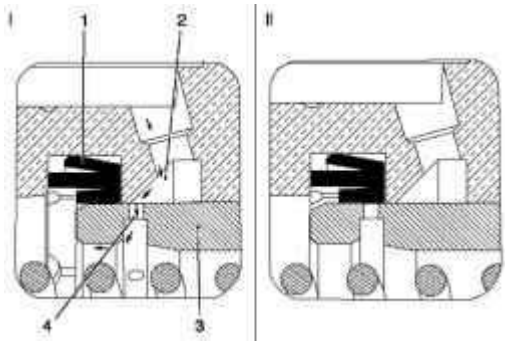


Fig. **6.3.** **The scheme of the master brake cylinder in a free state and after a free running: I - tandem master cylinder in a free state; II - Tandem master cylinder after free running; 1 - sleeve sealing 2 - ring groove 3 - primary or secondary piston; 4 - hole in the piston**

"Plunger" tandem master cylinder like the 2nd generation, like almost all the brake cylinders, provides the dual-circuit brake system. Contours of pressure are consistent. Force the driver is passed as usual, from the stock brake booster to the primary pistons. Creates a preliminary pressure of compression springs mounted on the end of the primary piston, and it provides a virtually simultaneous transfer efforts to the secondary piston (floating piston). Joint action of two pistons in one spring would reduce the free running and causes the secondary braking circuit to react more readily than it does in conventional tandem master cylinder.

In the system used to date the secondary piston is driven by the pressure in the primary circuit brake system. This leads to an increase in free running, because at first the pressure should increase up to

a specified level. Second compression spring is located behind the secondary piston is returnable. It must be tough enough to ensure that the overcoming of friction sealing sleeves, but at the same time soft enough to protect the ability to compress under the action of the spring the first circuit when the brakes are activated.

Initially there is depressurized the connection between the master brake cylinder, a tandem type and Countervailing reservoir. This provides pressure compensation and productivity in the brake system. When the brake is actuated cylinder piston includes a sealing sleeve, after a short free running. Connect with encapsulated compensation reservoir ceases. Once the rubber sealing elements provided, the amount of brake fluid begins to move and brake system is under pressure. Once the brake is released, return spring attaches pistons back to recovery to seal the connection between the tandem brake master cylinder reservoir and compensation.

In cars equipped with an ESP and Traction Control performance brake system in case of intervention by the system should be provided with additional supply. Since the time for the working mode of the pump ABS depends on the resistance in the suction system, the cross section of holes and channels should be as much as possible.

In the case of intervention traction control system proivzoditelnost braking system is provided by an annular groove, which is located opposite the holes in the piston, when the master cylinder is in a free state. When the brakes are included in the work in the regulatory process, the additional brake fluid, which was filed with the brakes traction control system, comes back to the relief tank pressure. The degree of pressure increase on the return is determined by the instantaneous performance braking system and the pressure in the brake system, which was established traction control system.

If, when you use the brakes, the control system moves from traction control to harness the anti-lock braking system, compensating the hole can open up the pressure in the main brake cylinder as a result of the need to return the brake fluid in the master cylinder during the phase of pressure decrease in the anti-lock braking system. Pressure relief tank in the outflow depends on the pressure in the main cylinder, which is operated by the driver. The quantity of liquid that flows back into the reservoir at this time, depends essentially on the performance of the braking system and the current control settings.

The combination of stress, overflow and output during operation of the brakes is possible, as the state of the system.

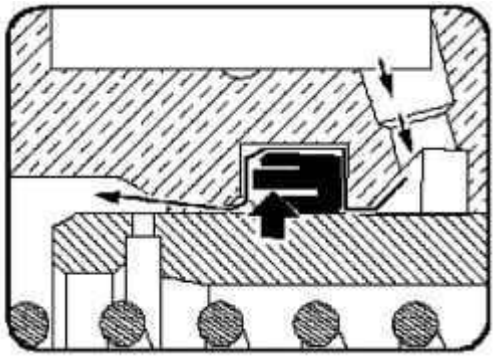


Fig. **6.4.** **Primary bush master brake cylinder tandem type**

Primary bush master brake cylinder tandem type remains under pressure created by excess capacity in the brake circuit, until not reached final position.

Inner projection of the primary hub is under pressure and on the outside and from the piston to compensate for the total pressure on the sleeve. This prevents damage to the sleeve edges (sealing edge) at the exit of the piston to limit, as happens in the main brake cylinder tandem type with Vent hole where there is a drop in pressure in the bush.

In principle, the change due to reverse filling (decrease in productivity at constant pressure) is the same as the change when you release the pedal (pressure decrease with a decrease in performance) because edge sleeve is in contact with the piston with a decrease in productivity.

In the case of the system ESP, however, brake fluid should also be made whenever the master cylinder is activated. In this case the pump antilock braking system applies additional brake fluid from the compensation tank. Then the brake fluid passes through the primary hub, causing folding sealing protrusion, while between the piston and the hole created by the annular gap. Brake fluid can now get the pitcher to the corresponding socket.

Arrows - current direction of brake fluid.

Arrow provisions - outer edge of the sealing sleeve is bent inwards.

Faulty circuit

In case of cancellation circuit brake system free lift increases. In case of failure of the primary circuit, the primary piston is based on the secondary piston and rod brake booster brings the latest in motion by a mechanical connection (I).

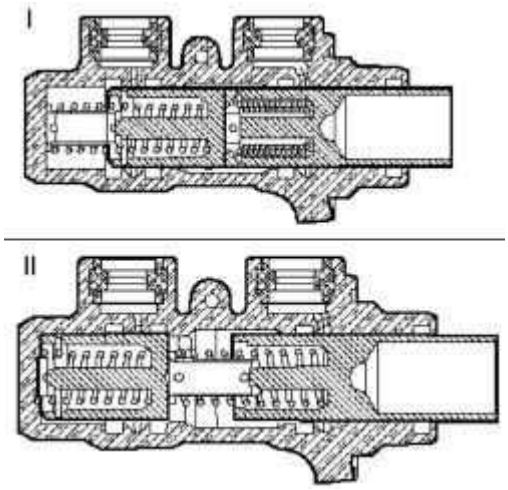


Fig. **6.5. Job master brake cylinder with a failure of the primary and vtoroichnogo circuit brake system**

Upon cancellation of the secondary circuit, the secondary piston rests on the limiter at the end of the opening of the cylinder, then the pressure rises in the primary circuit (II) (Fig. 6.5).

-Lock braking system ESP MK60

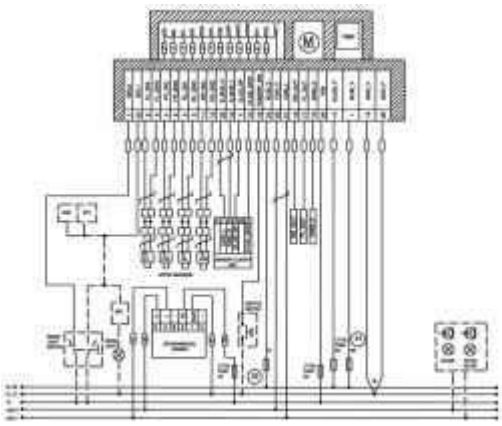


Fig. **6.6. Schematic diagram of the anti-lock braking system MK60**

ESP is currently the most modern active control system and prevents the emergence of critical situations in the movement at the beginning.

Anti-lock braking system ESP MK60 Astra-H includes the following systems:
- Anti-lock braking system (ABS system);
- Traction Control System (TCS);
- Program electronic stability control (ESP).

and has the following main functions:
- Logical control scheme understeer (UCL);
- Control braking force when the motion in the rotation (CBC);
- Trailer stability control program (TSP);
- Integral control body (ICC).

Depending on the version of equipment, anti-lock braking system ESP MK60 may also have the following additional features:
- Detection system pressure drops (DDS) controls the loss of tire pressure through the wheel speed sensors in the event of loss of tire pressure monitoring (TPMS / DDS).
- Hydraulic power Brake Assist (HBA);
- Assistance when starting on a slope (HSA) to prevent slipping back into the car for two seconds, thus facilitating moving off on a slope.

The following table contains general information about using different versions of systems installed in vehicles Astra-H.

Service

The anti-lock braking system ESP MK60 / HSA, a control unit can not be separated from the hydraulic modulator. The control unit anti-lock braking / hydraulic modulator should always be replaced as a single unit.

Description connectors - anti-lock braking system ESP MK60

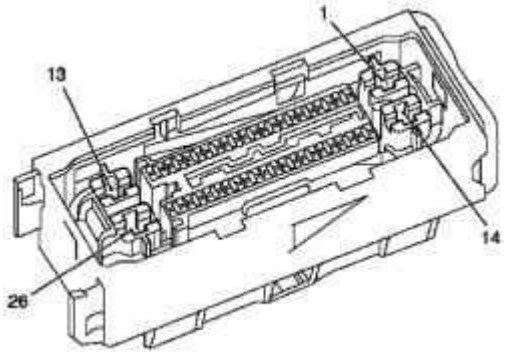


Fig. **6.7.** **Connector ABS control unit**

The control unit is an anti-lock braking system is connected to a power source through a wiring harness connector with 26 contacts, which Pin below.

Sensor / group yaw angular velocity

Yaw angular velocity sensor is installed on the Astra-H, together with the control system ABS ESP MK60. This sensor calculates the instantaneous speed of the vehicle yaw rate (angular velocity) and lateral acceleration. These data require a power control anti-lock braking system for calculating the beginning of the critical traffic situations.

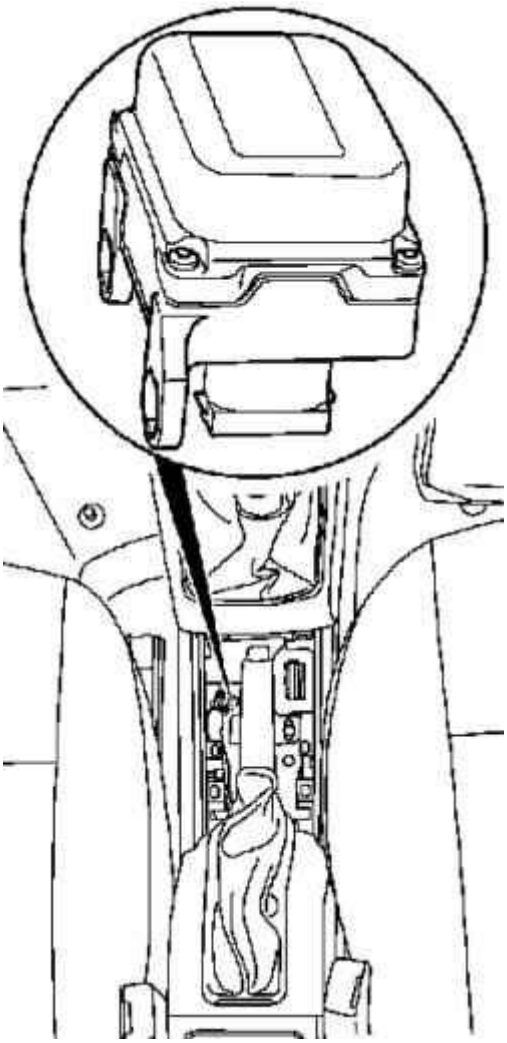


Fig. **6.8.** **Location connector angular velocity sensor raskaniya**

Data exchange between the sensor and the yaw angular velocity control unit anti-lock brake system via a special bus CAN (private bus CAN) in order to reduce the load on the tire HS. Private HS CAN bus works the same way as "normal» HS CAN.

Diagnostic yaw angular velocity sensor

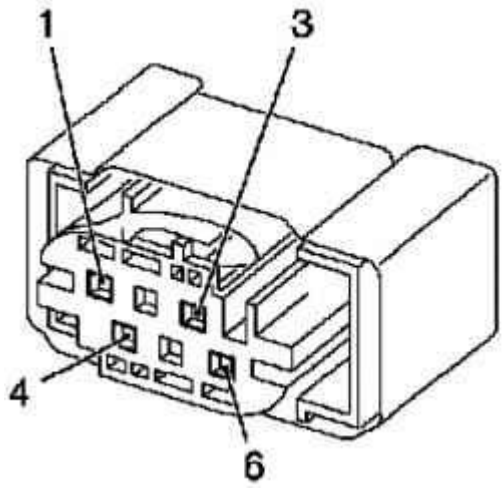


Fig. **6.9.** **Sensor connector angular velocity raskaniya**

Yaw angular velocity sensor has its own diagnostic tool. It is controlled by a control unit antilock braking system, ie, the control unit antilock braking system receives information on all faults yaw angular velocity sensor via a private bus HS CAN. The corresponding fault codes stored in the control unit anti-lock braking system, with activated warning lights.

-Lock braking system ESP MK70

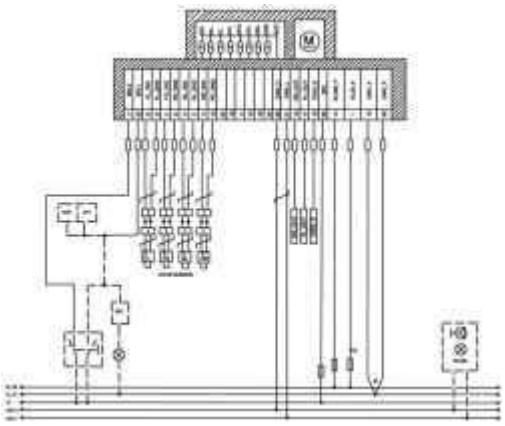


Fig. **6.10.** **Schematic diagram of the anti-lock braking system MK70**

Anti-lock brake system MK70 is a simple anti-lock brake system with diagonal contours. This is - the further development of anti-lock braking system MK60. The control unit is an anti-lock braking system / power hydraulic modulator has been optimized for weight, its dimensions were reduced. The four active sensors, mounted on wheels car supply control unit of anti-lock brakes with necessary information about the speed of rotation. If set, the control unit anti-lock braking system communicates with the hydraulic modulator and can not be disconnected from the modulator, it requires lift hydraulic modulator assembly with the control unit.

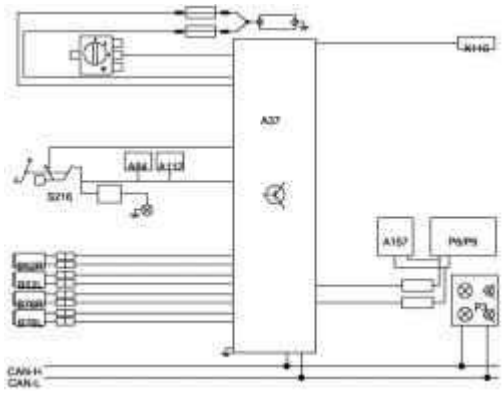


Fig. 6.11. **Block diagram of an anti-lock braking system MK70**

NOTICE
The electric motor of the pump should not be disconnected from the hydraulic modulator.

6.2. General test procedures

Checking and adjustment of the brake system

Check brakes on a dry, clean, relatively smooth and level road. The results of brake testing will be unreliable if the road is wet, slippery or covered with mud. Because of this, adhesion of all tires are different. At the test results will also influence the road, which were biased, because the tires will roll somewhat misleading.

Check your brakes at various speeds the car with light and slam on your brakes to avoid locking the brakes and skidding tires. Lock the wheels when braking does not provide complete information on the effectiveness of the brakes as compared to inhibition when the wheels can rotate and the braking distance is less than the. This is because a locked wheel sliding traction coefficient less than when it was rolling.

In the process of braking affect three main factors:

- On different wheels will vary in terms of tire adhesion, resulting in uneven braking forces. Air pressure and retreading must be the same;
- Brake force on the front and rear axles should be proportional to the force at which the vertical loads;
- Violation of the angles of the wheels may cause that the car is under braking to pull to the side.

To check the leakage of brake fluid, press the brake pedal when the engine speed at idle and the gear lever in neutral position. If the pedal gradually falls at constant pressure, then there is a leak in the system. Visually check for leaks and brake fluid level in the tank master brake cylinder. Slight drop in brake fluid level is due to normal wear pads. Abnormally low levels of interpretation of a leak in the system. In the hydraulic system is possible both internal and external leakage. If the brake fluid level is normal, check the length of the rod of the vacuum brake booster. If found inadequate length of the rod, adjust the length or replace the rod.

Check the master cylinder in the following order:

- Check for damage master cylinder or the lack of leakage of brake fluid around the master brake cylinder. Lowering the level of brake fluid can only talk about leaking. Abnormal conditions is also moisturizing the surface of the master brake cylinder;
- Check your connection to pull the pedal and the length of the rod. If they are normal, disassemble the master cylinder and check for stretching or swelling of the glands of the cylinder, then there is no wear rubber parts, If you have swollen glands, possibly using non-standard or contaminated brake fluid. If found contaminated brake fluid, all components should be dismantled and cleaned, and all rubber parts replaced. All piping should also be washed.

Unsuitable brake fluid, or mineral oil or water in the fluid can cause boiling brake fluid, or damage to rubber components. If the main oil seals of the piston in the master cylinder swelled, it means that the rubber components are corrupted. This malfunction can be confirmed by the swollen glands cylinder piston brake drum on wheels. If you wear rubber is confirmed, sort out all the details of the hydraulic system, rinse them with alcohol. Before building dry details of the flow of compressed air. Replace all rubber parts in the system, including hoses. When using the brake mechanism to verify the absence of fluid seals. If liquid is detected, replace the gaskets. If the condition of oil seals piston in the master brake cylinder is normal, check for leaks or overheating. If these conditions are not detected, drain the brake fluid, fill the master cylinder and re-drain the fluid from the system.

Check brake fluid level in the cistern hydraulic braking system

Tank for the brake fluid is located in the engine compartment.
Pail has a transparent casing, so the level of brake fluid can be controlled from the outside.

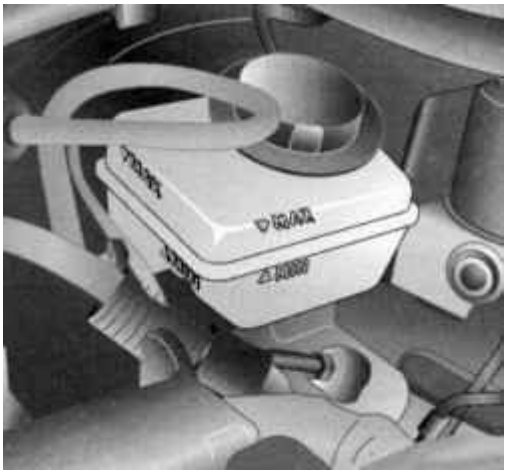


Fig. **6.12.** **Tank for brake fluid**

The level of brake fluid should always be closer to the mark "MAX" (Fig. 6.12).
If the brake fluid level is too low, before removing the cork from the compensation tank clean cloth wipe the cork and place near the cork from contamination, to prevent their falling into the hydraulic circuit brakes.
Top up the recommended brake fluid into the tank. Mixing different types of brake fluid can damage the hydraulic system.

Removal of air from the hydraulic braking system

Use only fresh brake fluid DOT 3 or DOT 4.
Remove air (pumping) of the hydraulic braking system is needed to remove the air, significantly reducing the effectiveness of inhibition. The air can get into the hydraulic drive system due to leakage in the repair, replacement of individual units or brake fluid. The presence of air in the drive indicated by an increase brake pedal and its "softness". Before removing the air leak, check all sites in the drive brakes and their compounds.
In the process of pumping the brake system, brake fluid level should not drop below the middle of a tank of hydraulic braking system.

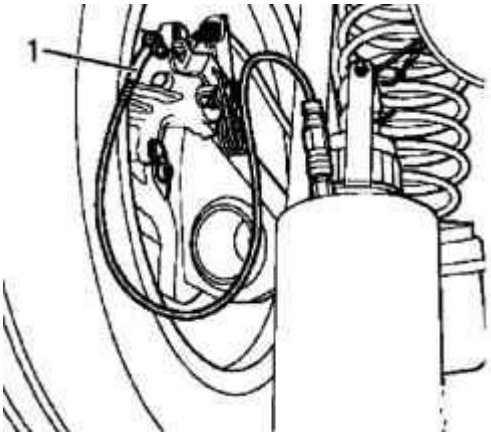


Fig. **6.13.** **Removal of air from the brake system: 1 - hose to remove air**

Pumping is performed with an assistant.

Ride the brakes in the following order:
1 - rear right brake cylinder working;
2 - rear left brake cylinder working;
3 - Right front caliper brakes;
4 - front left brake caliper.
Raise the car.
Remove the dust cap with pumping connections, clean it, put it on one end of the clean, clear hose, pull down the other end into a container partially filled with brake fluid.
Sharply press the brake pedal 3-5 times at intervals of 2-3 sec, and while holding down the brake pedal to loosen the choke half traffic throughput. Continuing to press the pedal, and to remove the

fluid in the system with air through a hose into a container. When the pedal reaches its most forward position and the outflow of liquid through the hose end, screw the fitting volume to failure. Repeat the procedure until the end of the exit of air hose.
Hold the pedal is pressed, screw socket volume to stop and remove the hose from the choke pumping.
Clean the socket and then pumping the protective cap.
Repeat these steps for other wheels.

Brake hoses

Brake hoses carry mobile communications between mobile and immobile parts of the car.
Hoses brake system should be checked at least twice a year.
To prevent a sudden failure of the braking system thoroughly check the condition of all piping and connections, paying particular attention to the following:
Metal pipes should not have nicks, scratches, scoring, active corrosion centers and should be located away from the sharp edges that could damage them.
The brake hose must be elastic, not to have tears and cracks. The hose must be securely enclosed in the tip. Thread handpiece hose shall not be damaged. If the brake pedal tube is inflated, it means that the threads are severed cord. If you notice any of these defects, the hose must be replaced. At the hoses should not be exposed to mineral oils and lubricants, solubilizing rubber.
All bracket pipelines must be safe and well secured. Looseness or destruction of the brackets leads to vibration of pipelines, which causes them to breakdown.
Or leaking brake fluid from the joints of the master cylinder with the pipes and the tank.
If you find faults, replace damaged parts with new ones. Flexible hoses, regardless of their condition, are replaced with new after 120 thousand kilometers, or after five years of operation of the vehicle to prevent sudden discontinuities of the aging of rubber. The brake hose rubbing on the suspension parts, wear out and eventually fails.
To check, use a mirror and light.

6.3. Operation adjustment and replacement of the brake system

Adjusting the parking brake system

For cars with drum brake mechanisms: Adjust drum brake.
Remove the diagnostic connection.
Separate lever parking brake system on the center console and lift it up.
Loosen the adjustment nut completely.

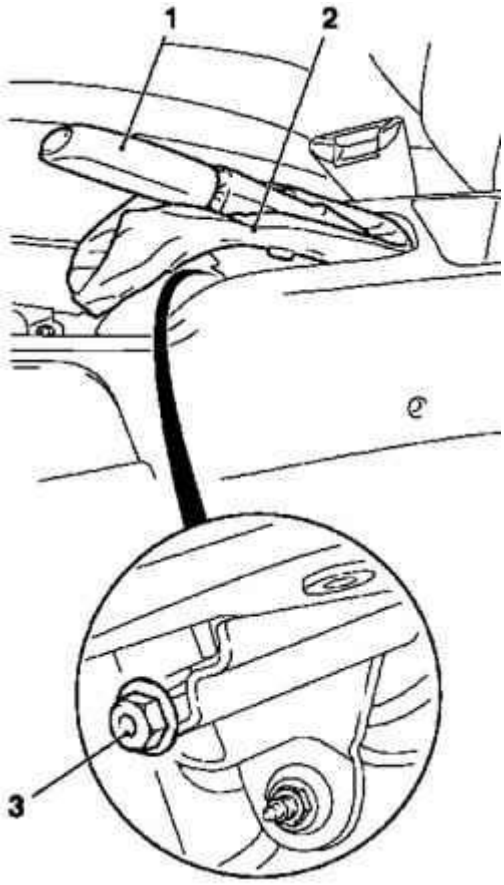


Fig. **6.14.** **Adjusting the parking brake system: 1 - lever of the parking brake system, 2 - center console, 3 - adjusting nut**

Set the parking brake lever system in the position "0" (off) (Figure 6.14)
Click on the brake pedal completely for at least 5 times.

NOTE
To adjust the status of the parking brake in the brake caliper or brake drum - make sure that every time when you turn on the parking brake, the brake pedal is returned to its original position (fully unloaded). In cars with drum brake adjuster lever mechanisms of the work can not hear.

Lift the lever of the parking brake system 5 times until it stops and then pull down.
Lift the lever of the parking brake for 2 clicks.
Turn the adjusting nut on the parking brake lever system before any appreciable resistance to rotation of the rear wheels.

NOTE
Inhibitory force must be equal on both wheels.

Lift the lever of the parking brake system on the 3 steps.

NOTE
The wheels should be blocked by 3 clicks.

Attach the corrugated cuttings of the parking brake lever on the center console.
Attach the lid of the diagnostic compounds.

Replacing the brake pedal

Withdrawal

Remove the casing pipe supporting the steering column from the top by unscrewing 2 screws fastening.
Remove the casing pipe supporting the steering column from the bottom, unscrewing 3 bolts.

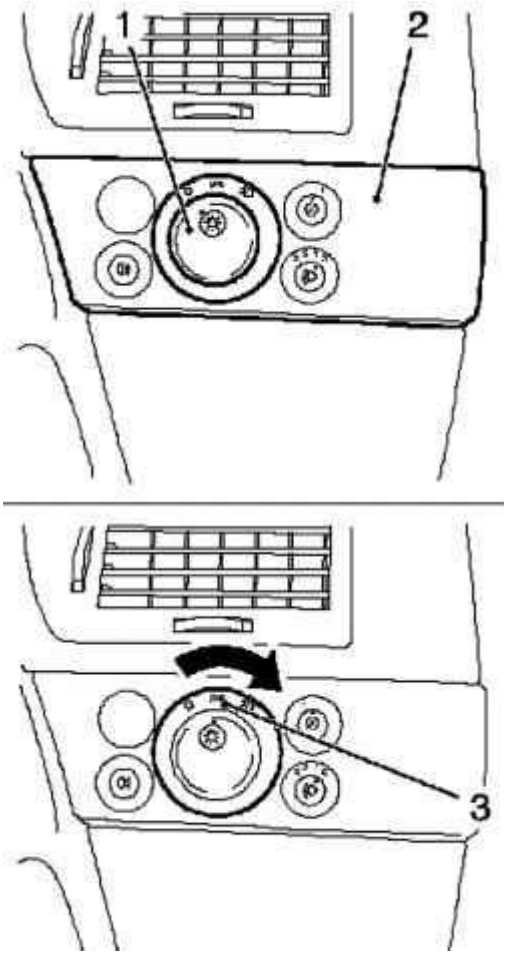


Fig. **6.15. Removing the module light switch: 1 - Grip 2 - central location, 3 - light switch module**

To remove the light switch module, to drown the knob in position "0", move the knob to the center position and remove the light switch module (Fig. 6.15)
Remove the light switch module.

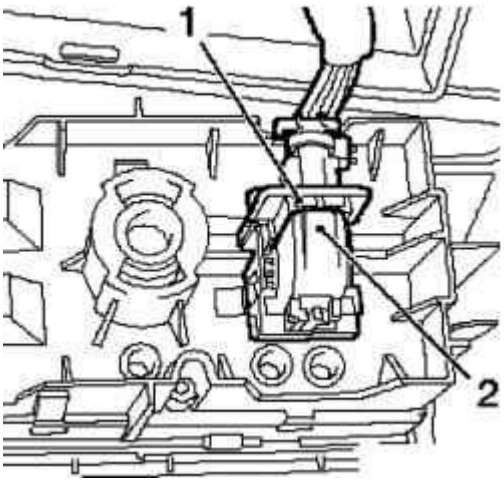


Fig. **6.16.** **Removing the wiring harness connector module light switch: 1 - secondary fuse, 2 - fuse**

Separate wiring harness connector module light switch. To do this, push the secondary fuse and unlock the fuse (Figure 6.16).
Remove the lining of the bottom lining of the instrument panel by unscrewing the 4 screws fastening.
Remove the lining of the driver, removing the 2 time.
Remove the duct from the driver.
Remove the rivet.
Lock the steering wheel in the position of the rectilinear motion.
Turn the steering wheel in position rectilinear motion.
Remove the key from the ignition.
Block locking steering column.

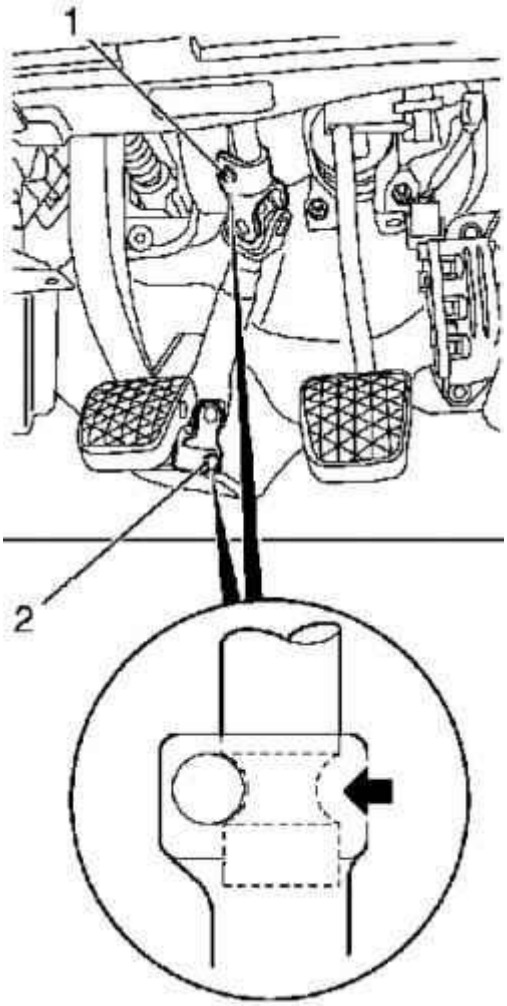


Fig. **6.17.** **Clamping bolts, steering column: 1, 2 - clamping bolts**

2 Loosen the clamp bolt (Figure 6.17).

NOTE
Check the loading position, clamping bolts.

Remove the intermediate shaft.
Disconnect the wiring harness.
Disconnect the wiring harness connector switch signal inhibition.
Unleash the bracket.
Disconnect the wiring harness connector, the sensor pedal.
Remove piston brake booster from the brake pedal.
Loosen the screw fastening the brake pedal.
Remove the fixing spring.
Remove the bolt on brake pedal.
Remove the damping unit.
Remove the brake pedal with the support of the bearing by unscrewing 2 screws and 4 nuts.

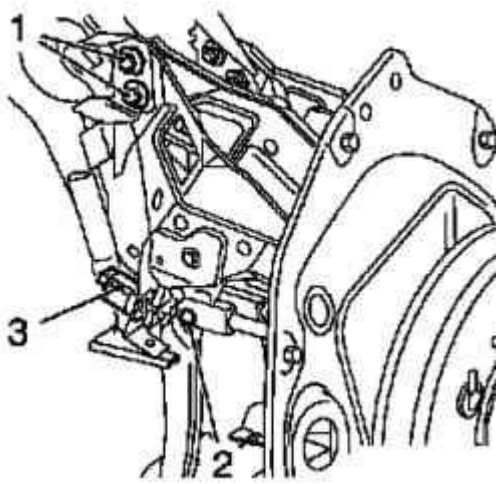


Fig. **6.18.** **Removing the brake pedal: 1 - bolts, 2 - attachment bolt the brake pedal, 3 - switch braking signal**

Disconnect the brake switch signal from the holder (Figure 6.18).

Setting
Install signal inhibition.
Install the brake pedal with the support bearing tighten the mounting moment 20 Nm
Set damping unit.
Attach piston brake booster to the brake pedal.

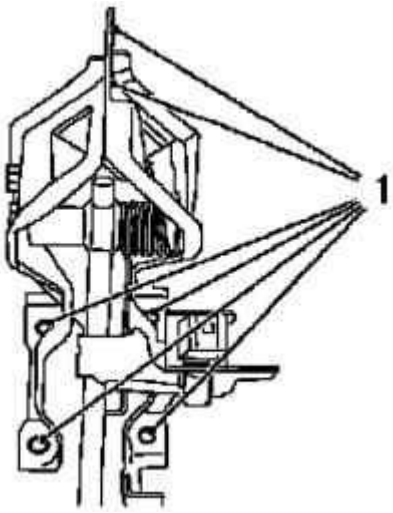


Fig. **6.19.** **Bolt fastening the brake pedal: 1 - bolts, 2 - screw fixing**

Install bolt brake pedal.

Attach the fixing spring.

Attach the wiring harness.
Connect the wiring harness connector to the sensor pedal.
Attach a bracket.
Connect the wiring harness connector switch signal inhibition.
Attach the intermediate shaft to the steering shaft, tighten the moment 24 Nm
Slide the intermediate shaft on the steering shaft.
Attach the clamping bolt.

NOTE
Before installing the clamping bolt, make sure that the groove (arrow in Figure 6.17) the steering shaft is combined with a hole in the intermediate shaft.

Clean the threads and install the bolt with a fixing composition.
Pay attention to the loading position, the clamping bolt.
Attach the intermediate shaft to steering gear and tighten the moment 24 Nm
Insert the intermediate shaft in the steering mechanism.

NOTE
Make sure that the wheels are in the position of the rectilinear motion.

Attach the clamping bolt.

NOTE
Before installing the clamping bolt, make sure that the groove (arrow) of the steering shaft is combined with a hole in the intermediate shaft.

Clean the threads and install the bolts with a fixing composition.
Check the position of the rectilinear movement, adjust if necessary.
Install ducting from the driver.
Insert rivet.
Set facing the driver's side.
Install 2 time.
Install the lower instrument panel pad.
Install central light switch.
Connect the wiring harness connector.
Install central light switch.
Install central light switch in the leftmost position.
Install casing pipe supports the steering column below.
Replace the cover ignition.
Install casing pipe supports the steering column top.

Removing and installing front brake hoses

Withdrawal
Fill the tank hydraulic brake system to the mark «MAX» and close with a special tool MKM-558-10.
Remove the front wheel.
Loosen the screw type "Banjo" (3) of the brake caliper.

NOTE
Assemble the brake fluid flowing, and close the hole.

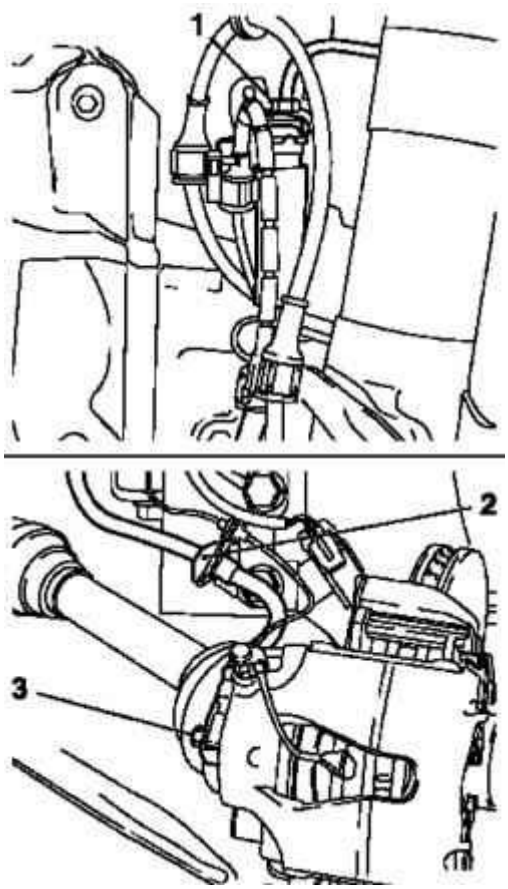


Fig. **6.20. Disconnect the brake hose: 1 - tube of the braking system, 2 - strap, 3 - screw type "banjo"**

Remove the strap and choke tubes braking system (1) of the brake hose (Fig. 6.20).
Remove the brake hose with attachment.

Setting
Attach the brake hose to caliper bolt type "banjo" with the new O-rings and tighten the moment 40 Nm
Attach the brake pipe to the brake hose and tighten the moment 14 Nm

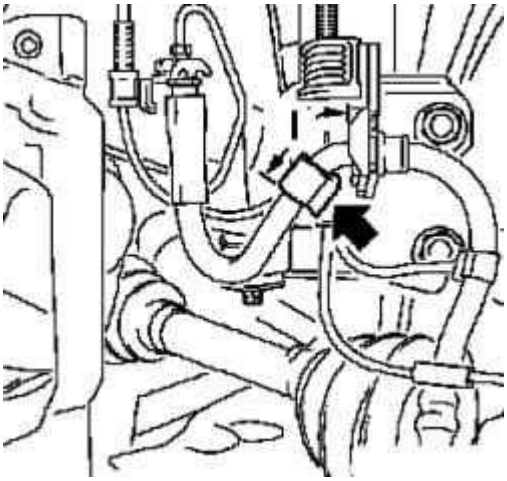


Fig. **6.21. Mounting size tread**

NOTE
Install the brake hose to the chassis IDS +. Write down the size of the assembly (I) of the tread (arrow in Figure 6.21).

Mounting dimensions (I): 53 mm.

NOTE
Make sure that the brake hose is not twisted during installation.

Install the brake hose bracket and slide the strap.

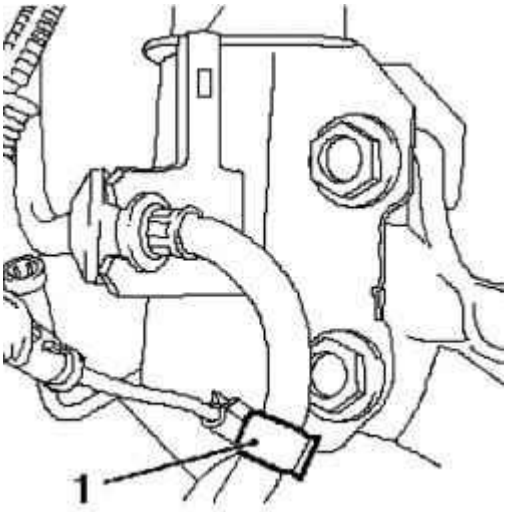


Fig. **6.22.** **Fixing wiring harness sensor: 1 - time**

Attach the wiring harness in time sensor mounted on the wheel of a car (Figure 6.22).
Install the front wheel and tighten the moment of 110 Nm
Remove air from the brake system and check the tightness.
Adjust the level of brake fluid so that it was at the tag «MAX».

Replacing brake pipes

Withdrawal

Fill the tank hydraulic brake system to the mark «MAX» and close with a special tool MKM-558-10.

NOTE
Tubes braking system is mainly supplied without connecting bolts and razvaltsovok. Use the connecting bolts of the diameter of the tubes, if necessary making the braking system. Install the appropriate connecting bolt on the brake pipe and tube razvaltsuyte end of the braking system.
Pay attention to the type of initial flaring.

Fold the new brake pipes, using pipe braking system, which will be replaced, as a model.

NOTE
Use tube expanders to avoid changes in cross section.

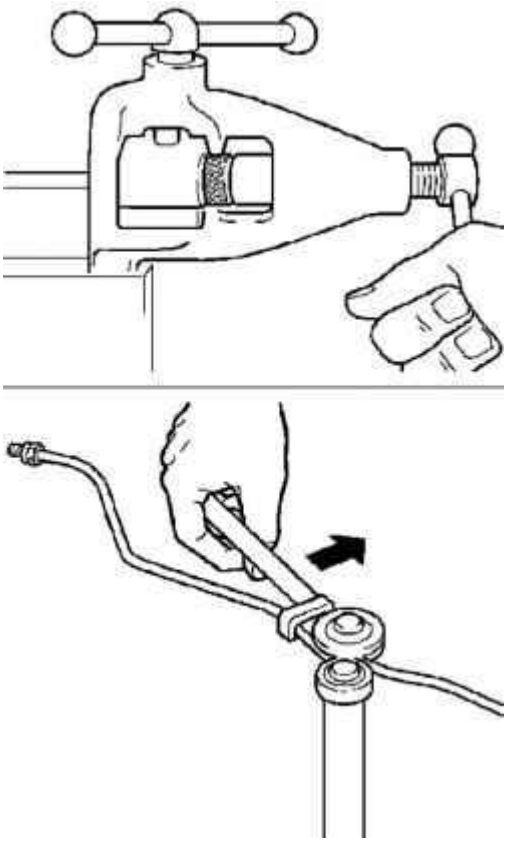


Fig. **6.23.** **Expanding brake pipes**

Additional protective shells for tubes of the braking system must be installed in the original location (Figure 6.23).

Setting
The fixing bolts of the brake system of pipes tightened moment 14 Nm

NOTICE
When replacing brake pipes, check to see that they pass between the electrical lines. Abrasion leading to failure of the electrical system. The distance between the brake pipes and electrical lines must be at least 25 mm.

Remove the special tool MKM-558-10 tank with hydraulic brake system.
Remove air from the brake system and check the tightness.
Adjust the level of brake fluid so that it was at the tag «MAX».

Replacing the tank hydraulic brake

Withdrawal
Remove the tank lid hydraulic brake system.
Pump out as much brake fluid.
Disconnect the wiring harness from the reservoir.

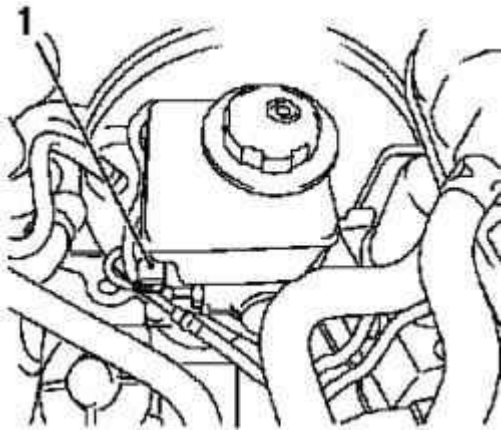


Fig. **6.24.** **Connector wiring harness brake fluid level sensor: 1 - connector**

Disconnect the wiring harness connector from the brake fluid level sensor (Figure 6.24).
Disconnect the tank hydraulic brake system of the master brake cylinder.

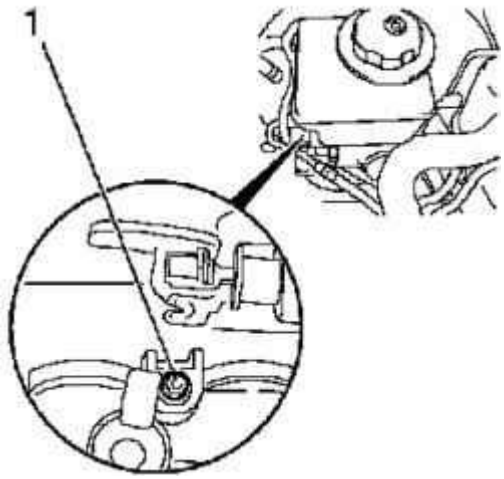


Fig. **6.25.** **Bolt fixing tank hydraulic brake system: 1 - Bolt**

Loosen the screw (Figure 6.25).
Carefully remove the tank hydraulic brake system with master brake cylinder.

NOTE
Assemble the brake fluid and close the hole.

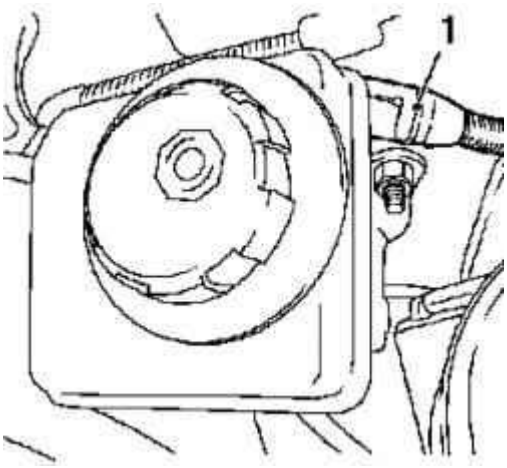


Fig. **6.26.** **Disconnecting the supply pipeline clutch master cylinder: 1 - feeding the pipeline**

For cars with manual gearbox: disconnect the feed pipe from the clutch master cylinder reservoir hydraulic brake system (Figure 6.26).

NOTE
Assemble the brake fluid and close the hole.

Disconnect the brake fluid level sensor.

Setting

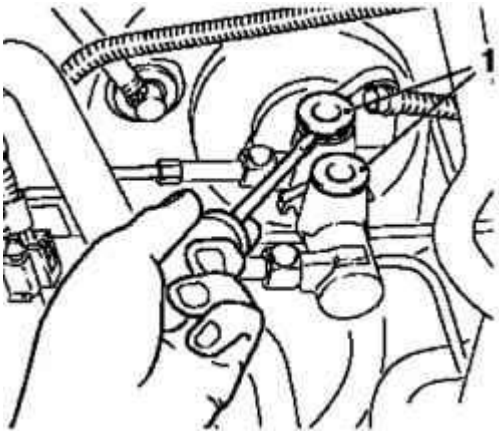


Fig. **6.27.** **Replacing the seal on the master brake cylinder: 1 - Seal**

Replace the seals on the master brake cylinder (Figure 6.27).

NOTE
Do not use mineral oils or greases, when installing seals or the supply line clutch master cylinder to the tank fitting hydraulic brake system. If necessary, the paste should be used for the brake cylinders.

Attach the brake fluid level sensor.
For cars with manual gearbox: Attach the feeder pipe to the clutch master cylinder Backa hydraulic brake system.
Attach the tank to the hydraulic brake system master cylinder.

NOTE
Make sure that the tank hydraulic brake system is properly installed.

Attach the tank to the hydraulic brake system master cylinder.
Connect the wiring harness brake fluid level sensor.
Attach the wiring harness clamp on the tank hydraulic brake system.
Remove air from the brake system.
Fill the tank hydraulic brake system to the mark «MAX».
Close the tank hydraulic brake system lid.

Removing and installing brake booster vacuum line

Withdrawal

Remove the vacuum line from the elbow to the brake booster.

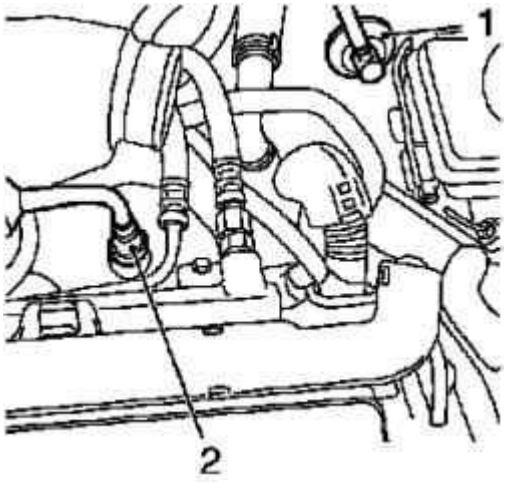


Fig. **6.28.** **Disconnecting the vacuum magastrali: 1 - elbow pipe, 2 - latch mounting vacuum line**

Disconnect the latch mounting the vacuum line from the front intake manifold (for cars with gasoline engines) or from the vacuum pump (for diesel vehicles) (Figure 6.28).
Disconnect the latch by pressing on the latch (arrow).
Remove the vacuum line.

Setting

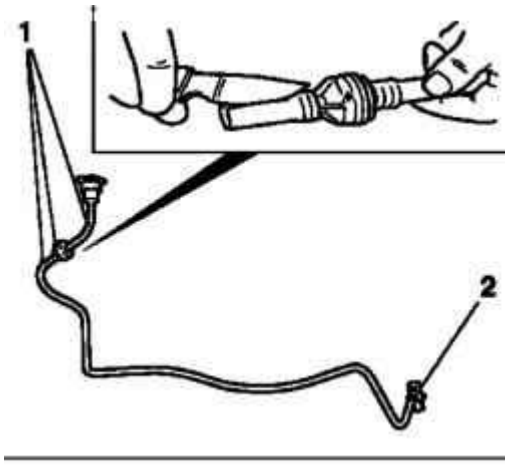
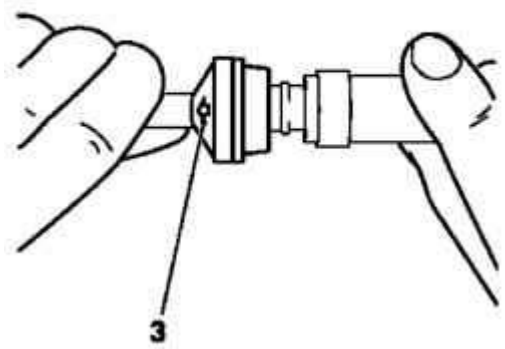


Fig. **6.29.** **Removing the vacuum magastrali with fittings: 1, 2 - place paring 3 - pointer at the non-return valve**



Cut open the vacuum line to the choke and remove from the nozzles (Fig. 6.29).
Cut a new vacuum line (rubber hose with textile base) the required length and attach the new clamps with a special tool KM-J-22610.

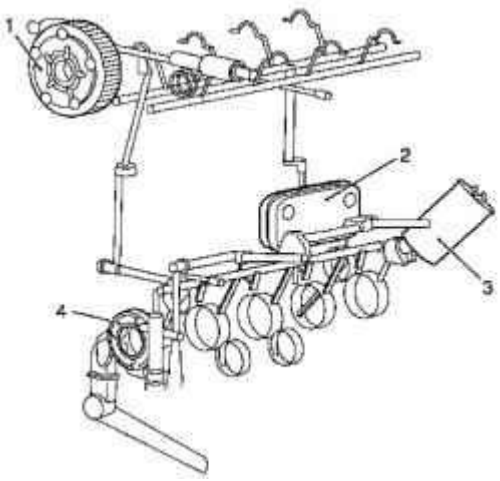


Fig. 2.29. **Contour grease gasoline engine Z 18 XER DOHC-I: 1 - regulators of camshaft, 2 - oil cooler, 3 - Oil filter, 4 - oil pump**

NOTE
Make sure that the arrow (Fig. 2.29) for non-return valve points towards the intake manifold or vacuum pump.

Zapressuyte vacuum flow line with the elbow in the brake booster.
Attach the vacuum line socket on the intake manifold or vacuum pump.

NOTE
Make sure that the connection is securely sealed.

Test the brake booster.

Replacing the control unit ABS (ESP MK60)

NOTICE
It is important to follow instructions for working with the hydraulic modulator and a control unit antilock braking system.

Withdrawal
Remove the hydraulic modulator with a control unit antilock braking system.
Attach a draft attachment to the hydraulic modulator.
Loosen the 2 plugs from the hydraulic modulator.

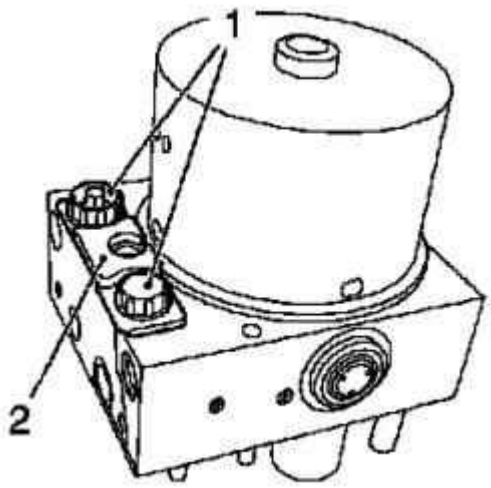


Fig. 6.30. **Removing the hydraulic modulator: 1 - cap 2 - thrust restraint**

Set restraining power (Fig. 6.30).
Tighten the 2 plugs in the hydraulic modulator.

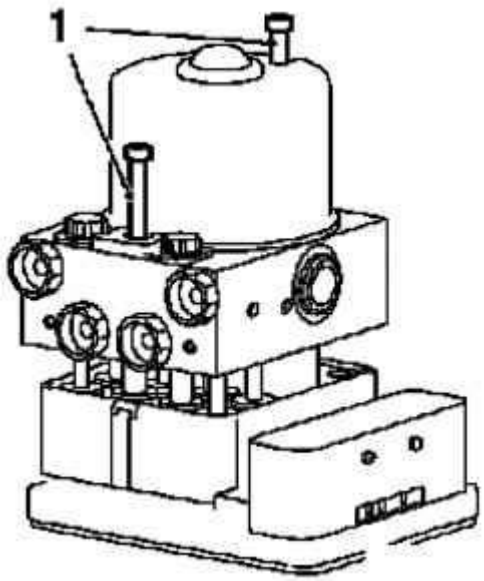


Fig. **6.31.** **Mounting the control unit: 1 - Bolts**

Disconnect the control unit anti-lock braking system on the hydraulic modulator, unscrewing 2 screws fastening (Figure 6.31).

NOTICE
Remove the control anti-lock braking system with hydraulic modulator, without tilting it.

Disconnect the control unit anti-lock braking system on the hydraulic modulator.

Setting

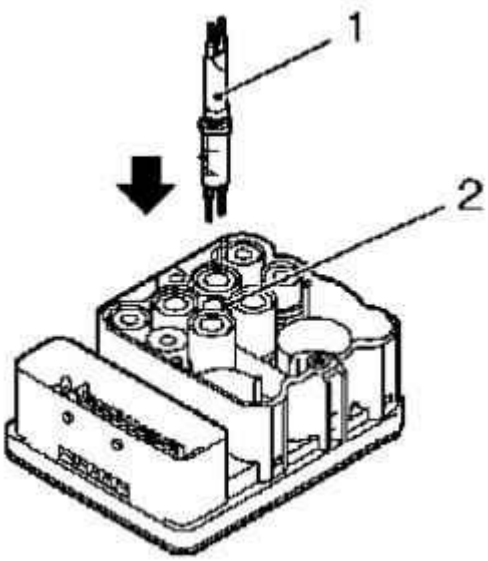


Fig. **6.32.** **Installing the adapter: 1 - Adapter 2 - slide**

Connect the adapter to the pump motor control unit anti-lock braking Install the adapter in the guide (Figure 6.32).

NOTE
Trigger assembly can be up to 130 N.

Attach the new control unit anti-lock braking system to the hydraulic modulator and tighten the moment 5,5 Nm
Install the control unit antilock braking system on the hydraulic modulator carefully, without tilting it.
Remove the restraining pull of the hydraulic modulator.
Remove 2 plugs hydraulic modulator.
Remove the thrust restraint.
Tighten 2 Stoppers hydraulic modulator.
Install hydraulic modulator with a control unit antilock braking system.

When replacing the control unit anti-lock braking system, after installation is complete, programming using TECH2.

Removing and installing brake caliper front wheel

Withdrawal

Remove the brake caliper.
Remove the piston from the brake caliper.
Tighten the brake caliper in a vise.
Insert wooden block in the brake caliper shaft.
Gently squeeze the piston with compressed air.
Gently squeeze out the protective cover from the brake caliper plastic wedge.

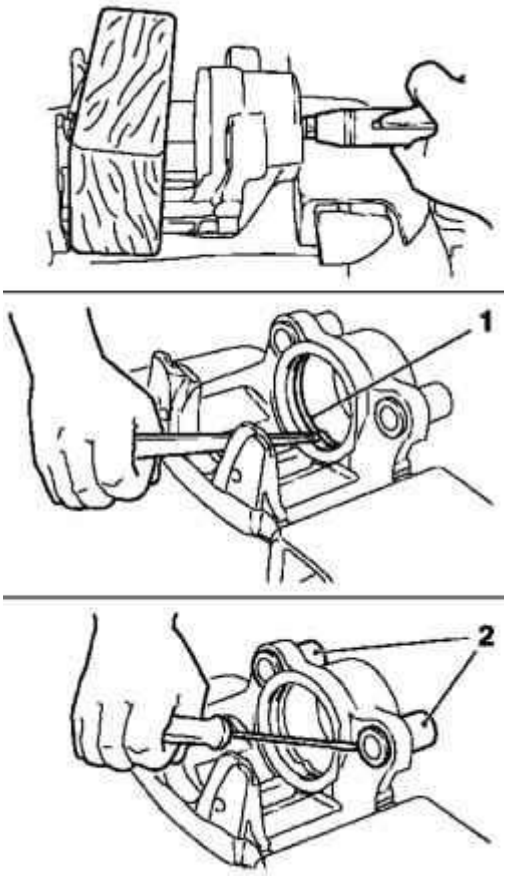


Fig. **6.33.** **Removing the seal ring and sliding sleeve: 1 - O-ring, 2 - sliding sleeve**

Gently squeeze a plastic wedge-shaped sealing ring from the groove in the housing slide and vypressuyte sliding sleeve (Figure 6.33).
Clean the piston and cylinder walls.

NOTE
Only brake fluid or alcohol, never use other liquids.

Replace the O-ring and a protective cover.
Check the wear of the piston and cylinder wall.

NOTE
If the piston is defective or captured with rust: replace all the brake caliper.

Setting

Install the piston in the brake caliper.
Cover the cylinder walls, piston and sealing ring for brake cylinder paste.
Zapressuyte new sliding sleeve.

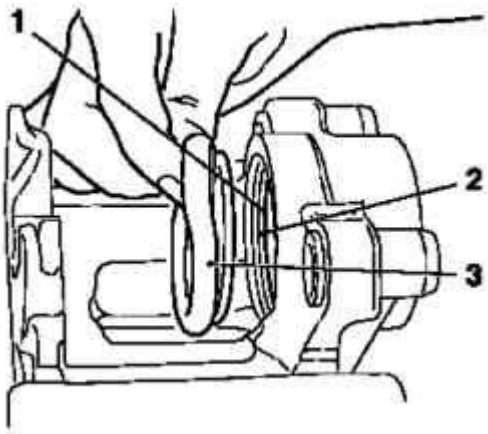


Fig. 6.34. **Install the new seal ring: 1 - O-ring, 2 - edge, 3 - groove**

Install new O-ring (Fig. 6.34).
Install a protective cover to the brake caliper.

NOTE
Edge of a protective cover should be located in a groove of the brake caliper (Figure 6.34).

Gently insert the plunger.

NOTE
While the internal ledge of a protective cover will not fall into a groove on the piston.

Make sure that the piston is not tilted.
Install the brake caliper.

Removing and installing brake shoes lining the front wheel

NOTE
All linings brake pads on one axle must be replaced.

Withdrawal
Remove the 2 front wheels.
Remove the sensor pads brake pad on the inside lining of the pad, if any.
Remove the fixing spring lever brake caliper with a screwdriver.

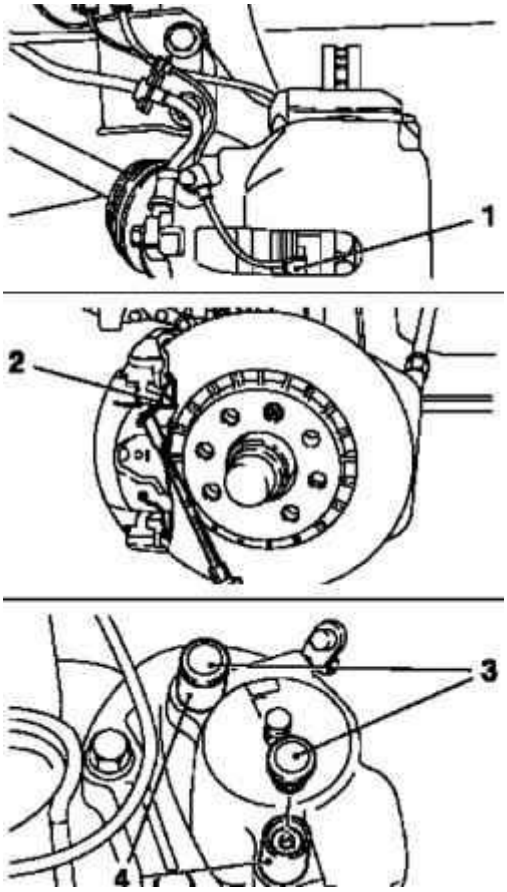


Fig. 6.35. **Removing the front brake components: 1 - sensor pads brake pads, 2 - retainer spring lever, 3 - dust caps, 4 - protective sleeve guide bolts**

Remove the protective dust cap sleeves guide bolts (Figure 6.35).
Loosen the brake caliper guide bolts.
Remove the brake caliper with the guide blocks.

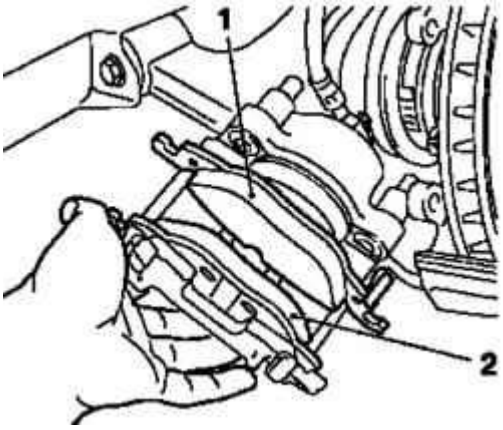
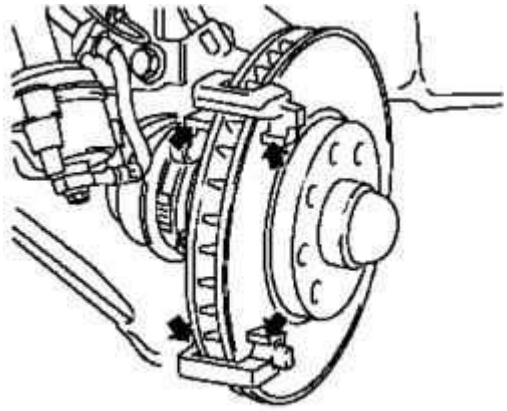


Fig. **6.36.** **Removing the brake pad linings: 1 - the inner lining of the pad, 2 - outer lining brake pad**

Remove the outer pad brake shoe brake caliper and the inner pad brake shoe hold down clamp with pistons (Figure 6.36).
Check brake pad linings and brake discs.



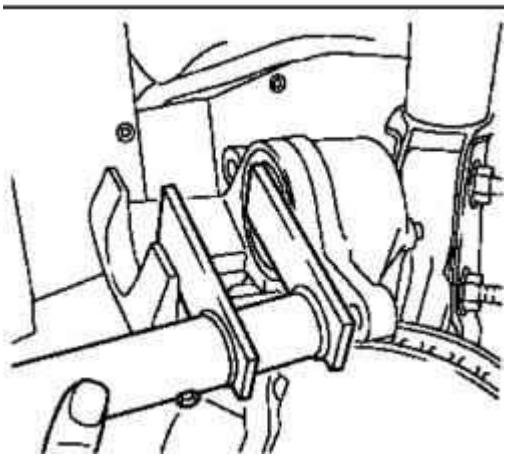


Fig. **6.37.** **Places cleaning guides**

Clean the guides (arrows) in the guide shoe with a soft wire brush (Fig. 6.37).
Cover guides protivoskripnym composition.
Drown the piston inside.

NOTE
The level of brake fluid in the tank hydraulic braking system rises. If necessary, pump out the brake fluid bag. If the brake caliper leaks or damaged protective cover on the brake caliper: Repair brake mechanism.

Setting
Install the inner pad brake pads in the piston and secure restraint clamp.

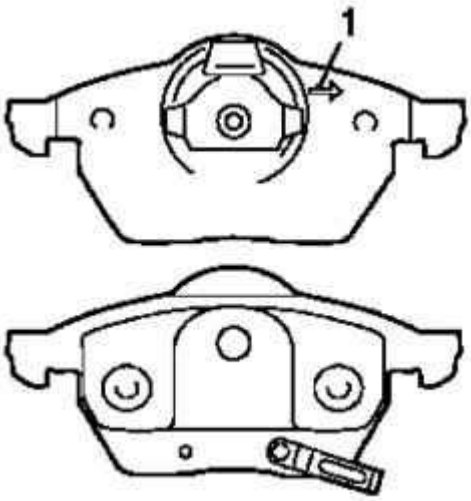


Fig. **6.38.** **Arrow direction of rotation of the brake disk: 1 - Arrow**

NOTE
When assembling the linings of brake shoes, make sure to it that the arrows on the back of the lining pointed in the direction of rotation of the brake disk when the vehicle is moving forward (Fig. 6.38).

Install the outer pad brake pad in the brake caliper.
Install the brake caliper on the guide shoes with pads.

NOTE
Make sure that the brake hose is not kinked.

Attach the brake caliper to the guide blocks and tighten the moment 28 Nm
Install dust caps.
Install secures the spring to the slide.
Attach the brake lining wear sensor pads to the inner lining of the pad, if any.
Install the front wheel and tighten the moment of 110 Nm
Several times, press on the brake pedal.
Replenish the brake fluid up to the mark «MAX».

Removing and installing protective casing brake front wheel

Withdrawal
Remove the front wheel.
Remove the brake disc.
Loosen the screw shaft of the wheel.

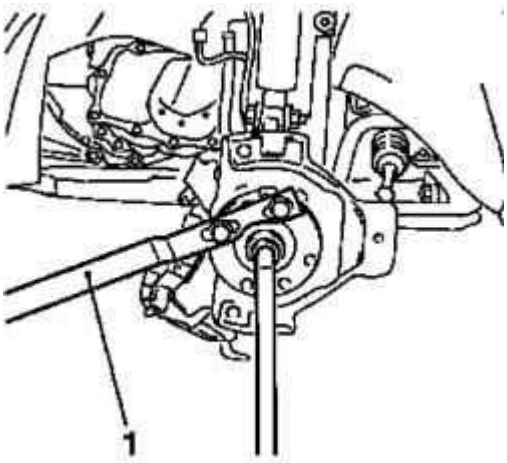


Fig. **6.39.** **Special key: 1 - key**

Hold the wheel hub with the key KM-468-B (Figure 6.39).
Disconnect the wiring harness connector sensor mounted on the wheels of the car.
Disconnect module bearing wheels, unscrewing 3 bolts.
Loosen the 3 bolts.
Disconnect the module bearing wheels with protective housing from the steering knuckle and the wheel shaft.

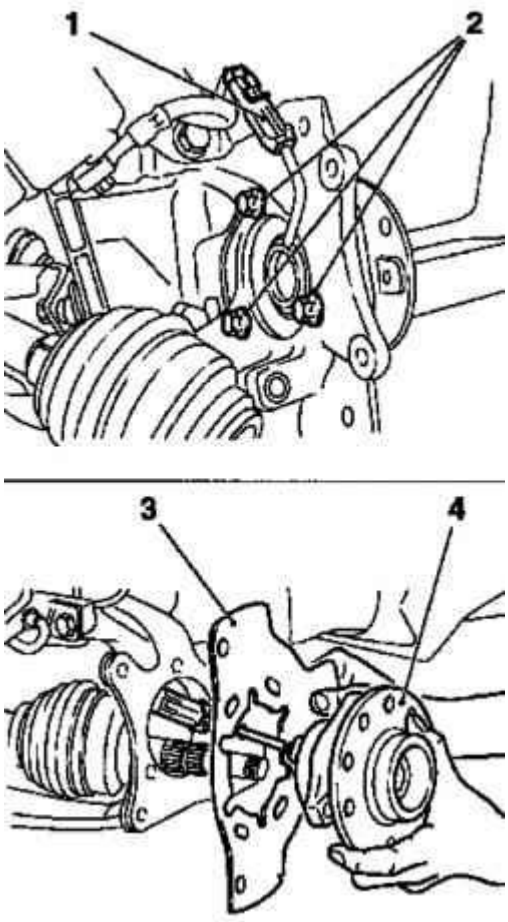


Fig. **6.40.** **Removing the protective cover: 1 - the wiring harness connector, 2 - mounting screws, 3 - blade guard, 4 - wheel bearing module**

Remove the protective cover from the module bearing wheels.

NOTE
Check the loading position, the module bearing wheels and a jacket.

Setting
Attach the module bearing wheels.
Install a protective cover on the module bearing wheels.
Set mdul bearing wheels with protective housing to the shaft of the wheels and steering knuckle.

NOTE
Check the loading position. Tighten the 3 new bolts and tighten the moment 90 Nm Dauvergne at + 30 ° and + 15 °.

NOTE
Clean the threads and install the bolts with a fixing composition.

Connect the wiring harness connector sensor mounted on the wheels of the car.
Secure the shaft wheel hub wheel of a new nut, tighten the moment of 150 Nm, loosen at 45 °, then tighten the moment of 250 Nm
Hold the wheel hub with a special tool KM-468-B.
Install the brake disc.
Install the front wheel and tighten the moment of 110 Nm

Replacing the brake disc front wheel

NOTE
In the general case, always replace both the brake disc on the same axis.

Withdrawal
Remove the front wheel.
Release the brake hose from the spring-mounting rack.
Disconnect the strap brake hose.
Pull the brake hose from the mounting.

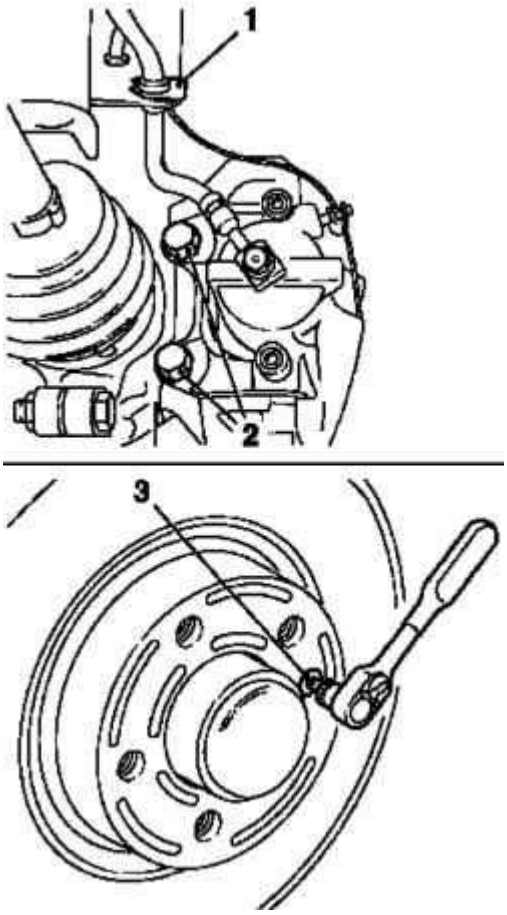


Fig. **6.41.** **Removing the brake disk: 1 - spud, 2 - bolts fastening the guide pads 3 - Tightening bolt**

Remove the bolts fastening the guide shoes on the steering knuckle (Fig. 6.41).
Remove the brake caliper with pad and rail hang it on the spring rack.
Loosen the clamping bolt.
Remove the brake disc.

Setting
Clean the mating surfaces of brake disc and wheel hub.

NOTE
Make sure that the contact surface is not deformed and are not scoring.

Attach the brake disc to hub front wheel then tighten the screw element 7 N m.
Attach guide shoes to steering knuckle with brake caliper and pads brake shoes tighten the moment 100 Nm

NOTE
Clean the threads and install the bolts with a fixing composition.

Attach the brake hose to the spring reception.
Attach the brake hose to the anchorage.
Set spud.

Install 2 front wheels and tighten the moment of 110 Nm

Removing and installing rear wheel brake shield

Withdrawal
Fill the tank hydraulic brake system to the mark «MAX» and close with a special tool MKM-558-10.
Remove the rear wheel.
Remove the brake drum.
Remove the brake pads brake rear wheel.
Remove the brake cylinder wheel.

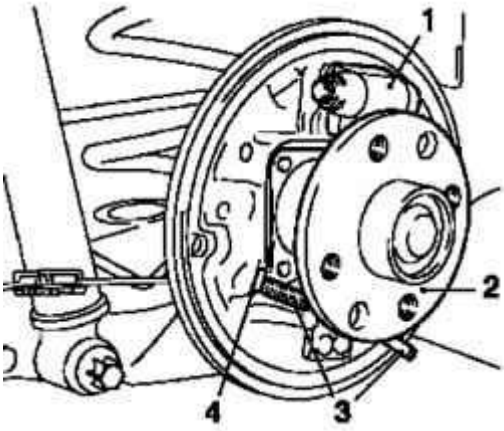


Fig. **6.42.** **Removing the brake disk: 1 - wheel brake cylinder, 2 - wheel bearing unit, 3 - wire the parking brake system, 4 - Clamp**

Remove the clamp and remove the cable of the parking brake system with brake shield (Figure 6.42).
Disconnect the module bearing wheels with brake shield from the rear axle.

Setting
Attach the brake shield module bearing wheels to the rear axle.
Set the parking brake cable system in the brake shield and attach the new clip.
Install the brake cylinder wheel.
Check brake pads rear wheel.
Install the brake drum.
Fasten the rear wheel moment of 110 Nm
Remove air from the brake system and check the tightness.
Several times, press on the brake pedal.
Replenish the brake fluid up to the mark «MAX».

Removing and installing rear wheel brake caliper

NOTE
Brake pads should be removed to remove the brake caliper rear wheel.

Withdrawal
To release the parking brake cable system.
Release the lever of the parking brake system.
Remove the corrugated tube of the parking brake system.
To release the parking brake cable unscrewing the adjusting nut.
Fill the tank hydraulic brake system to the mark «MAX» and close with the MKM-558-10.
Remove the appropriate rear wheel.

NOTE
Mark the position relative to the center of the wheel.

Remove the brake caliper.
Unhook the parking brake cable system.
Squeeze the lever caliper with a screwdriver and disconnect the cable of the parking brake system.
Remove the blank.
Pull the parking brake cable from the mounting on the brake caliper.
Loosen the 1 screw.

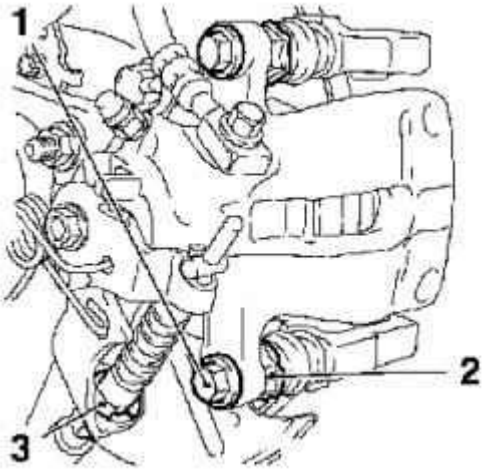


Fig. **6.43.** **Removing the brake disk: 1 - rotor, 2 - guide pin, 3 - emphasis**

Hold for hexagon guide pin (Fig. 6.43).
Take cupport brakes up.
Loosen the brake piston.

NOTE
The level of brake fluid in the reservoir rises, if necessary. pumped with pears.

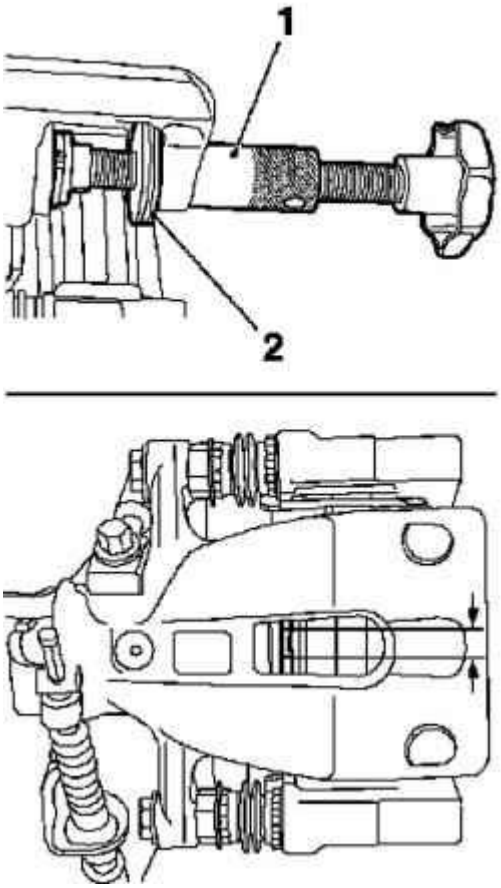


Fig. **6.44.** **Vvorachivanie brake piston: 1, 2 - special tools**

Replace the brake piston with the help of special instruments KM-6007-A and KM-6007-30 (Fig. 6.44).

NOTE
Shoulder on the KM-6007-30 should indicate in the direction of the electric drive or a hexagon of the KM-6007-A.

Replace the plunger to the limiter.

Remove the plunger again to reconcile the notch in the brake piston with a hole in the brake caliper (arrows in Figure 6.44).
Remove the brake caliper with a guide.

NOTE
The brake caliper must be completely removed from the guide pads before installing the brake pads.

Loosen the screw.

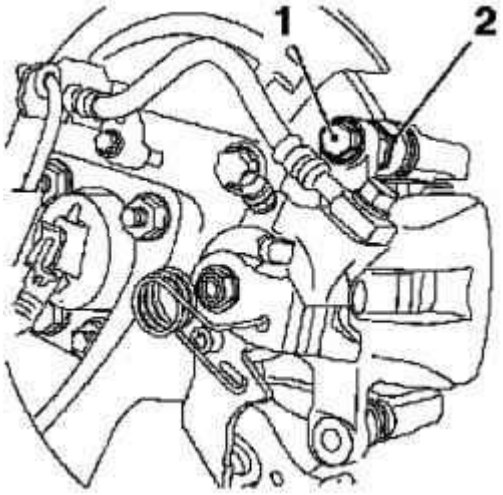


Fig. **6.45.** **Guide pin: 1 - pin 2 - pin**

Hold for hexagon guide pin (Fig. 6.45).
Remove the brake caliper from the guide pads.
Hang the brake caliper to the rear springs on a suitable wire.
Remove the brake pads and guide plates.
Disconnect the brake hose from the brake caliper

NOTE
Assemble the brake fluid flowing, and close the hole.

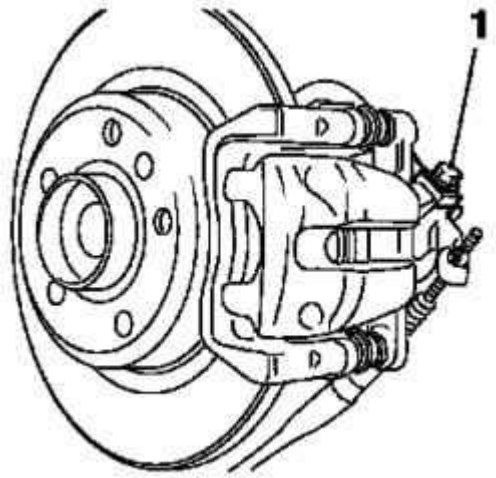
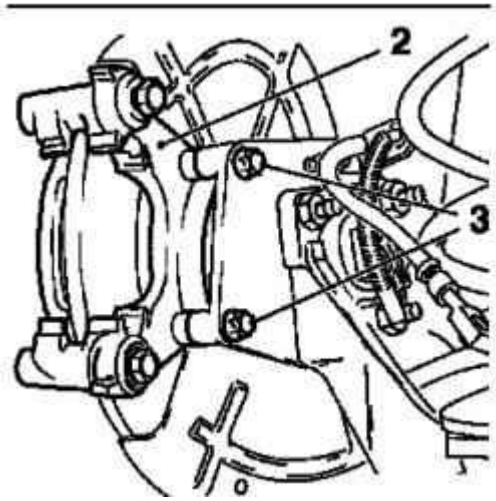


Fig. **6.46.** **Withdrawal of the guide blocks: 1 - brake hose, 2 - guide pads 3 - Bolts**



Loosen the bolts guide blocks from the base plate of the inhibitory mechanism and remove the guide blocks (Fig. 6.46).

Setting

If the brake caliper leaks, will be damaged by a protective cover on the brake caliper or sealing sleeve guide pads: Replace the brake caliper / guide blocks.

Attach the brake caliper to the guide blocks and tighten the moment of 100 Nm

NOTE
Clean the threads and install the bolts with a fixing composition.

Install the brake pads with new adhesive foil.

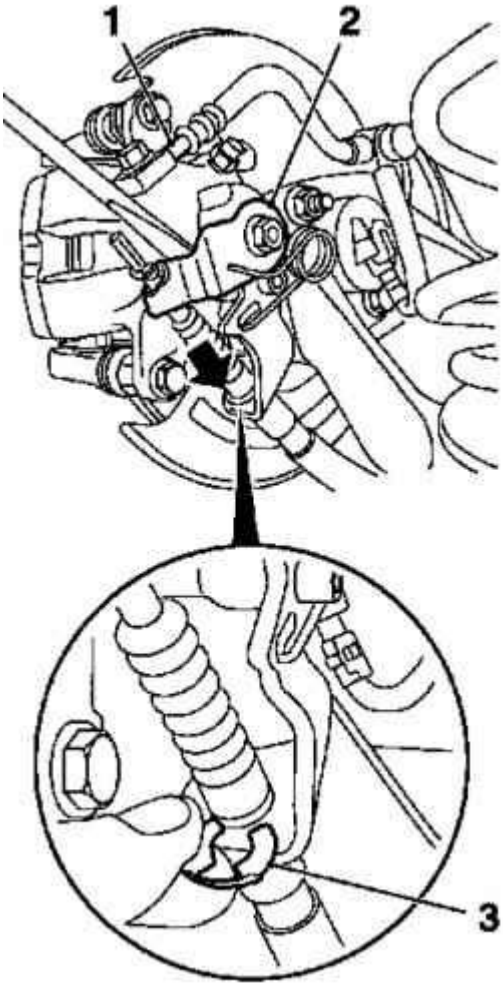


Fig. **6.47.** **Withdrawal of the guide blocks: 1 - brake hose, 2 - lever, 3 - retention clamp**

Attach the parking brake cable system to mount a new restraint clamp (Figure 6.47).
Squeeze the lever down with a screwdriver.
Pull the parking brake cable system.
Attach the brake hose with the new O-rings to the brake caliper and tighten the moment 40 Nm
Install the rear wheel and tighten the moment of 110 Nm
Remove air from the brake system and check the tightness.
Several times, press on the brake pedal.
Replenish the brake fluid up to the mark «MAX».
Adjust the parking brake.

Removing and installing brake pads rear wheel

Withdrawal

Remove the rear wheel.
Remove the brake drum.
Remove the upper spring pliers brake spring.
Remove the retaining collar.
Remove the adjusting lever with a spring.

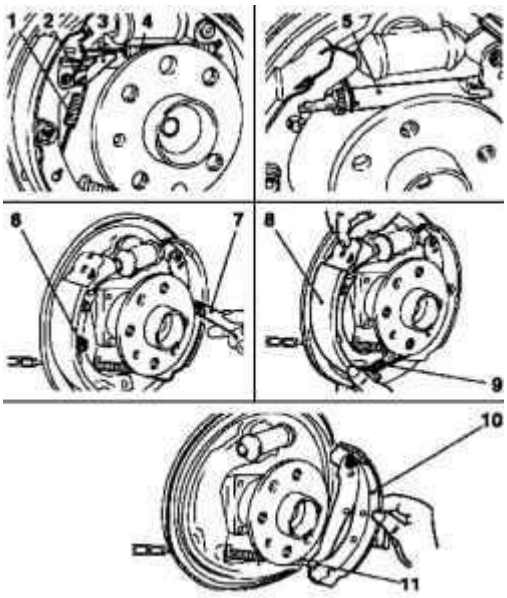


Fig. **6.48.** **Removing the rear wheel brake pads: 1 - Spring 2 - retaining clamp, 3 - the adjusting lever, 4 - upper spring 5 - adjusting module 6 - cups of compression springs, 7 - a special tool, 8 - front brake pads; 9 - Spring , 10 - Rear brake pads; 11 - the parking brake cable**

Remove the adjusting module Heatshrink, dilute with a little brake pads.

Turn the cup compression springs on both sides with a special tool KM-346 to release the springs.
Remove the front brake pads and remove the spring.
Disconnect the rear brake shoe from the parking brake cable and remove.

Setting

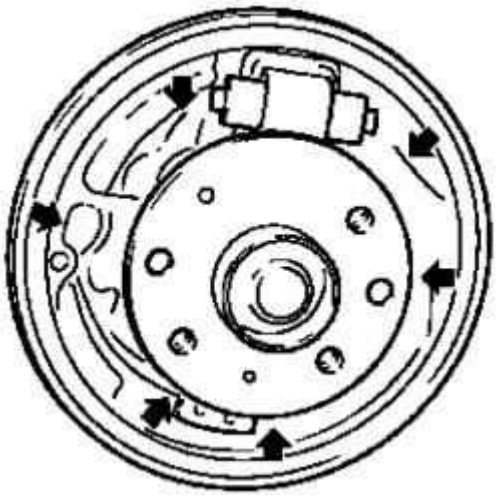


Fig. **6.49.** **Places-to-clean grease protivoskripnoy**

Clean the brake shield and cover both sides protivoskripnoy grease all mating surfaces of brake pads in the hands (Fig. 6.49).
Clean the brake drum.
Check the wheel brake cylinder for leaks, replace if necessary.
Check the lock springs and mounting for damage, replace if necessary.
Check brake pads for cracks, lubricating and wear, replace the brake pads if necessary.
Check brake drums for cracks and the surface of brake pads for the presence of ticks - if necessary: protochite brake drum or replace the brake drum.
Install the rear brake shoe in the parking brake cable system.

NOTE
Before installing the brake pads, make sure that the parking brake cable system is located in the guide on the brake shield.

Install retainer, spring compression and the plate with a special tool KM-346.
Fasten the fixing spring and set the shoe front brake mechanism on the guide.
Install a catch in the spring compression plate and the front brake pads.
Install the adjusting module.

Coat the threads with silicone grease.

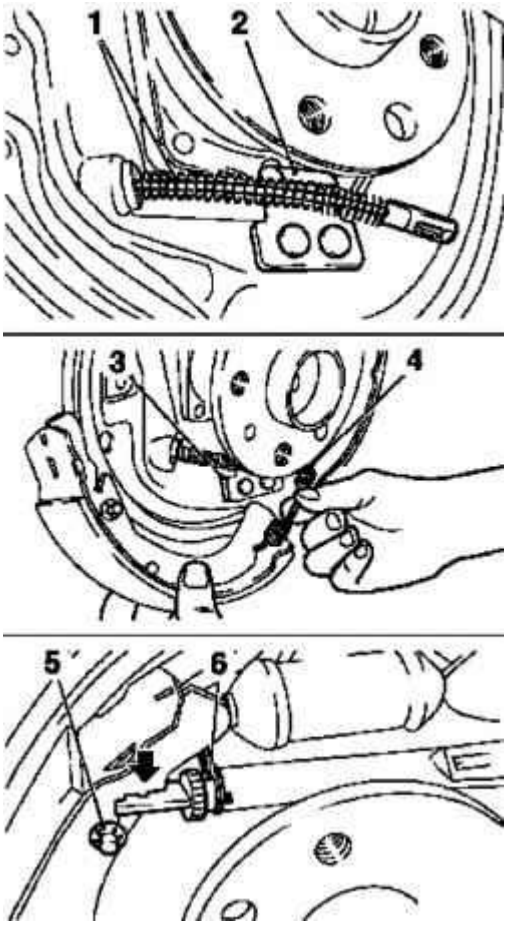


Fig. 6.50. **Installing the rear wheel brake pads: 1 - the parking brake cable, 2 - guide-rope, 3 - slide the front brake mechanism; 4 - fixing the spring, 5 - spring washer 6 - ratchet**

NOTE
Ratchet should not be blocked at the end of the module control.

Install module control Heatshrink - be sure to install (arrow).
Make sure that the spring washer was installed before the installation of the adjusting lever.

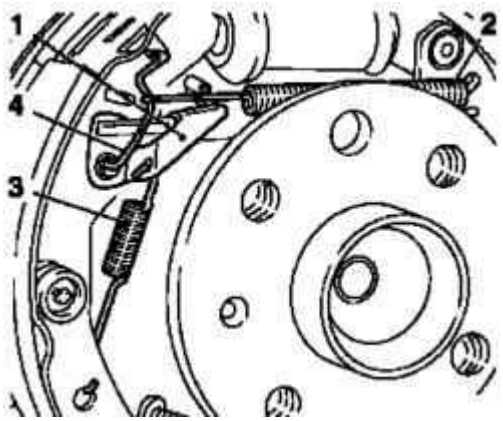


Fig. 6.51. **Install the adjuster lever and spring: 1 - the adjusting lever, 2 - upper spring, 3 - spring, 4 - holding clamp**

NOTE
Install the new spring washer when installing new brake pads.

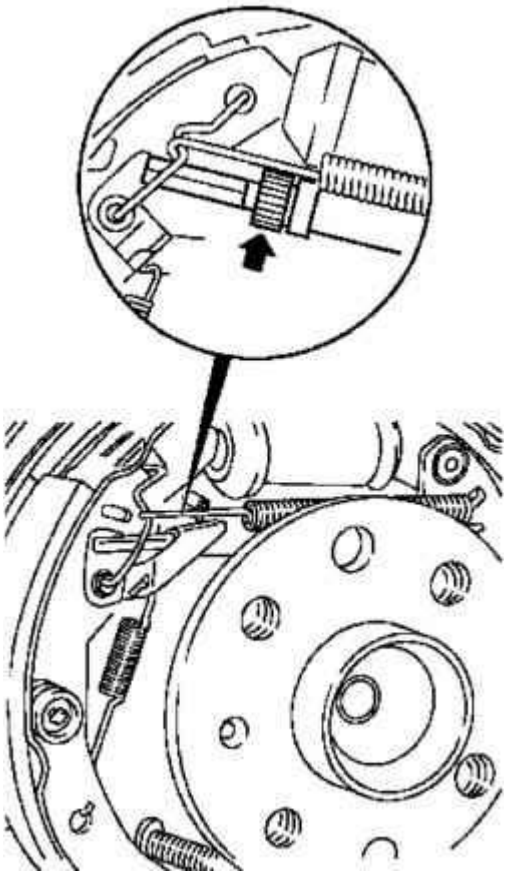
Install the adjusting lever with a spring.
Install holding clamp and the upper spring pliers brake spring.
Install the brake drum.
Install the rear wheel and tighten the moment of 110 Nm
Adjust drum brake and parking brake systems.

Adjust drum brake mechanism

NOTE
Adjust drum brake mechanism is needed only after removing the brakes, replace the brake drum or replacing brake pads, as the adjustment is automatic. Make sure that the lever of the parking brake was released before the adjustment. If the inequality of braking forces on the wheels, brake drum assemblies should be checked and replaced if necessary.

Remove the rear wheel.
Disconnect the brake drum.

Fig. **6.52.** **Adjust drum brakes**



Regulator module (arrow) must be fully svinchen (Figure 6.52).
Gear should not be blocked at the end of the module control.
Install the brake drum.
Install the rear wheel and tighten the moment of 110 Nm
Click on the brake pedal for at least 20 times.

NOTE
Until no Heard pushes the adjustment lever, with the brake pads budut be in contact with the brake drum.

After adjusting the brake drum to adjust the parking brake systems.
Take running for a short trip of about 300 m at low speed, the parking brake lever should be slightly raised.

Replacing brake pads disc brake rear wheel

NOTE
Typically, all brake pads on one axle must be replaced.

Withdrawal
Loosen the parking brake cable system.
Release the lever of the parking brake system.
Remove the lid of the diagnostic compounds.
Remove the bellows of the parking brake system.
Loosen the parking brake cable adjusting nut screwing.
Remove the rear wheels.

Disconnect the parking brake cable from the brake caliper.
Squeeze the lever downward slide in the direction of the arrow, using a screwdriver, and disconnect the cable of the parking brake system.
Note: Make sure that the king pin bushing between the lever and the brake caliper is not damaged.
Remove the clamp and pull the parking brake cable from the bracket
Remove the brake pads iztormoznogo slide.
Loosen the bolt from the brake caliper.
Take the caliper up.

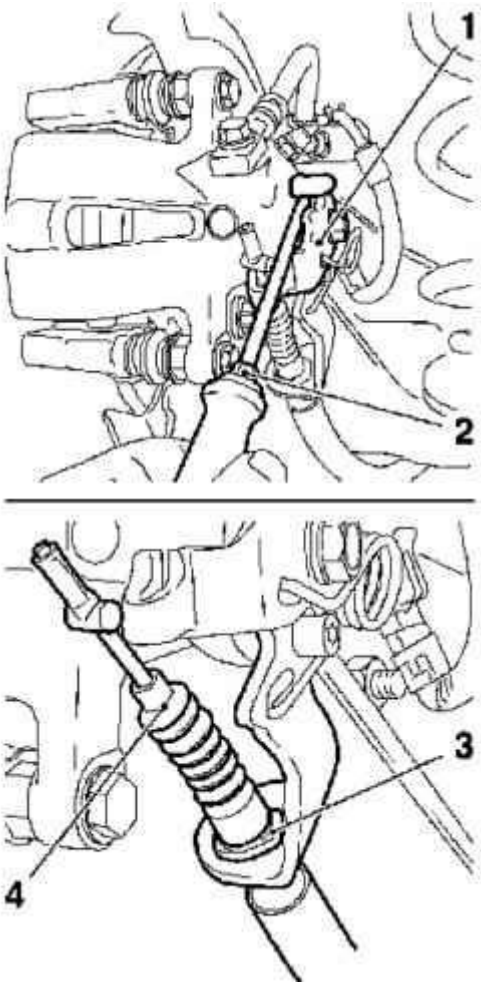


Fig. **6.53.** **Removing the brake pads (pre-surgery): 1 - lever caliper, 2 - screwdriver 3 - clip 4 - wire the parking brake system**

Loosen the brake piston.

NOTE
The level of brake fluid in the tank hydraulic braking system rises. Pump out the brake fluid in the bulb if necessary.

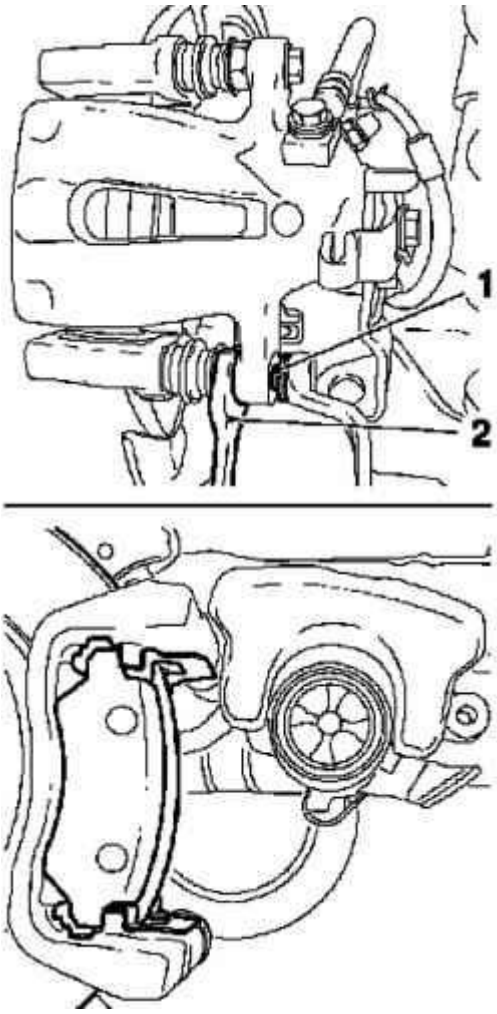


Fig. **6.54.** **Install special tool to support team: 1 - caliper, 2 - adaptation**

Place the device KM-6007-A on the brake caliper with the KM-6007-30 (Fig. 6.54).
Click the device KM-6007-30 KM-6007-A.

NOTE
Make sure that the bead (arrow) KM-6007-30 indicates a knob or hexagonal part KM-6007-A.

Loosen the brake piston to the limiter, then remove it from the brake caliper to the combination of the groove in the brake piston with a hole in the brake caliper.
Remove the brake caliper from the support.

NOTE
Before installing the brake pads brake caliper must be completely removed from the guide pads.

Remove the upper bolt from the brake caliper, holding it open wrench.
Remove the brake caliper from the guide pads.
Hang the brake caliper to the rear springs on a suitable wire.
Remove the brake pads and guide plates.
Clear guide brake pads on the top and bottom of the rail pads and the contact surface with the brake pads on the brake piston and the opposite surface (arrows) (Fig. 55).

NOTE
Make sure that the glue residue removed from the surface of the pad.

Check the wear of brake discs.

Setting
Install the new guides in the guide blocks.

NOTICE

If the brake caliper leaks, damaged the protective cover on the brake piston or sealing sleeve guide pads, replace the brake caliper and / or the guide blocks.

Apply grease to the guide blocks below guides (labeled surface - a thickening of 1).
Install guides.

NOTICE
Protective film on the brake pads must be removed after installation of brake pads. Brake shoe with a mechanical wear indicator (if any) should be on the inside.

Install new brake pads in the guide blocks.
Attach the brake caliper to the guide shoes.
Install the brake caliper on the guide shoes.

NOTE
Make sure that the guides are not deformed, and sticky surface of the lining of brake shoes came in contact with the brake caliper only after they have been properly installed.

Slide the brake caliper in the direction of the arrow from the rear to the front of the guide blocks.
Attach the caliper brake mechanism bolts to the guide shoes.
Clean the threads and install new bolts with fixing the composition hold open wrench, torque 25 Nm

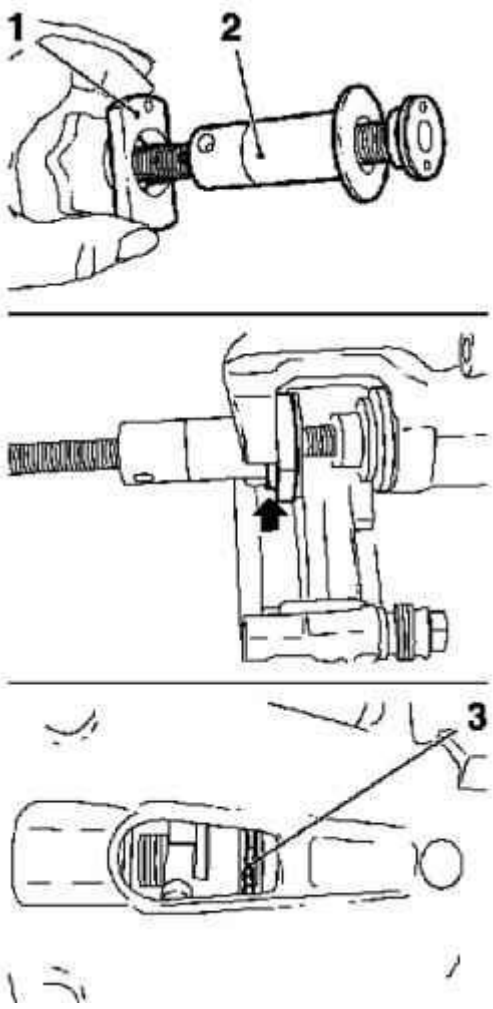


Fig. **6.55.** **Cleaning the brake pads at the top and bottom of the guide blocks: 1 - brake piston, 2 - guides for brake pads**

Attach the parking brake cable to the brake calipers.

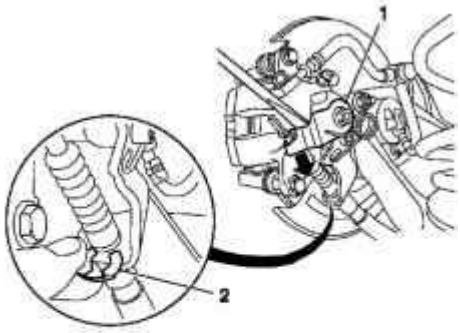


Fig. **6.56.** **Joining the parking brake cable system: 1, 2 - wire ropes of the parking brake system**

Attach the parking brake cable to the bracket clamp (Figure 6.56).
Squeeze the lever downward slide in the direction of the arrow, using a screwdriver, and attach the cable of the parking brake system.
Install rear wheel and tighten the moment Nm
Several times, press on the brake pedal.
Start the engine.
Keep the pedal down for about 30 seconds with an average effort.
Top up the brake fluid up to the mark «MAX».

6.4. Tables

Table 6.1 Specifications front brake mechanism

Двигатель	*Z14XEL; Z14XEP; Z16XEP*	*Z18XE; Z13DTH; Z17DTL; Z17DTL; Z19DTH*	*Z20LEL; Z20LER*	*Z20LEH*
Суппорт				
Диаметр поршня, мм	52,0	57,0	57,0	57,0
Диск				
Наружный диаметр, мм	256,0	280,0	308,0	321,0
Толщина (нового), мм	24,0	25,0	25,0	28,0
Допустимая остаточная толщина*, мм	22,0	23,0	23,0	26,0
Минимальная толщина, мм	21,0	22,0	22,0	25,0
Допустимое биение, мм	0,11	0,11	0,11	0,11
Допустимая глубина царапины, мм	0,4	0,4	0,4	0,4
Неравномерность толщины (допуск), мм	0,01	0,01	0,01	0,01
Накладки				
Толщина без опорной пластины (новый), мм	12,0	14,0	14,0	14,0
Допустимая остаточная толщина без опорной пластины, мм	2,0	2,0	2,0	2,0

Table 6.2 Specifications rear drum brake mechanism

Тормозной цилиндр колеса	
Номинальный диаметр, мм	19,05
Тормозной барабан	
Внутренний диаметр (новый), мм	230,0
Ширина, мм	40,0
Наибольший допустимый внутренний диаметр, мм	231,0
Допустимая овальность, мм	0,05
Тормозные колодки	
Толщина без опорной пластины тормозной колодки (новый), мм	5,0
Допустимая остаточная толщина без опорной пластины тормозной колодки, мм	1,0

Table 6.3 Specifications rear brake mechanism

Двигатель	*Z14XEL; Z14XEP; Z16XEP*	*Z18XE; Z13DTH; Z17DTL; Z17DTL; Z19DTH*	*Z20LEL; Z20LER*	*Z20LEH*
Суппорт				
Диаметр поршня, мм	36	38	38	38
Материал поршня				
Тип	С плавающим поршнем			
Диск				
Наружный диаметр, мм	240	264	264	278
Толщина, мм	10	10	10	10
С внутренней вентиляцией, да/нет	нет	нет	нет	нет
Накладки				
Диаметр, мм	230	–	–	–
Толщина, мм	40	–	–	–
Тип	Сплошной литой			
Диаметр, мм	20,64	–	–	–
Накладки				
Толщина без опорной пластины (новый), мм	10,5	10,5	10,5	10,5
Допустимая остаточная толщина без опорной пластины, мм	2,0	2,0	2,0	2,0

Table 6.4 Recommended tightening torques values of threaded connections

Компонент	*Момент затяжки, Н·м*
Блок управления антиблокировочной системы тормозов к гидравлическому модулятору (MK70)	2,0
Блок управления антиблокировочной системы тормозов к гидравлическому модулятору (ESP MK60)	5,5*
Усилитель тормозов к опоре педали (педаль тормоза) и перегородке	20**
Трубка тормозной системы к тормозному цилиндру	16
Суппорт заднего тормозного механизма к крепежному элементу заднего тормозного механизма	25
Суппорт переднего тормозного механизма к крепежному элементу тормоза переднего колеса (поворотный кулак без интегрированной опоры суппорта)	28
Диск заднего тормозного механизма к ступице заднего колеса	4
Диск переднего тормозного механизма к ступице переднего колеса (M10x1.25)	7
Тормозной шланг к суппорту заднего тормозного механизма	40
Направляющая колодок к поворотному кулаку (M12x1.5)	100***
Крепежный элемент заднего тормозного механизма к крепежному элементу заднего тормозного механизма	100***
Тормозной барабан к ступице колеса	4
Штуцер для удаления воздуха к заднему тормозному механизму	10
Винт штуцера для удаления воздуха к тормозному суппорту, перед	10
Винт штуцера для удаления воздуха к тормозному цилиндру	6
Кронштейн гидравлического модулятора к кузову	20
Рычаг привода стояночной тормозной системы к нижней части автомобиля	8
Главный тормозной цилиндр к усилителю тормозов (кроме Z 19 DTH)	15
Главный тормозной цилиндр к усилителю тормозов (Z 19 DTH)	21
Тепловой экран центрального глушителя к нижней части автомобиля	2
кронштейн гидравлического модулятора / держателя реле к кронштейну гидравлического модулятора	8
Кронштейн педали к поперечине рулевого управления (болты и гайки),	20**
Опора педали (педаль тормоза) к перегородке	20**
Колесо к ступице колеса	110
Тормозной цилиндр колеса к анкерной плите	9
Соединительные гайки трубок тормозной системы (M10x1, M12x1)	14
Вакуумная магистраль к вакуумному насосу (Z 17 DTL, Z 17 DTH)	18

** Use new bolts.*
*** Use new nut.*
**** Clear the threads and install the bolts with a fixing composition.*

Table 6.5 Potential problems, their causes and solutions

Возможные причины неисправности	*Способ устранения*
Контрольная лампа тормоза включена	
Утечка тормозной жидкости	Устраните утечку или долейте жидкость
Включатель стояночного тормоза замкнут на «массу»	Отремонтируйте замыкание на «массу»
Неисправность датчика уровня тормозной жидкости	Замените датчик
Сигнал торможения включен	
Неисправность включателя фонаря сигнал торможения	Замените включатель фонаря сигнала торможения
Длина штока вакуумного усилителя меньше необходимой длины	Отрегулируйте длину штока вакуумного усилителя
Цепь включателя фонаря сигнал торможения замкнута на положительную клемму аккумуляторной батареи	Отремонтируйте или замените электропроводку
Неэффективное торможение	
Утечка или отсутствие тормозной жидкости	Устраните утечку или долейте жидкость
Загрязнение тормозной жидкости	Замените тормозную жидкость
Наличие воздуха в тормозной жидкости	Удалите воздух из тормозной системы
Повреждение тормозных шлангов	Замените тормозные шланги
Повреждение вакуумного шланга или неисправность контрольного клапана	Замените вакуумный шланг или контрольный клапан
Прихваты ванне (заедание) тормоза	
Отсутствует люфт педали тормоза	Отрегулируйте люфт
Ослабление возвратной пружины педали тормоза	Замените возвратную пружину
Неисправность главного тормозного цилиндра	Замените главный цилиндр
Наличие воздуха в тормозной системе	Удалите воздух из тормозной системы
Большой ход педали тормоза	
Утечка или отсутствие тормозной жидкости	Устраните утечку или долейте жидкость
Ненадлежащая регулировка люфта педали тормоза	Отрегулируйте длину штока вакуумного усилителя тормоза
Неравномерное торможение передних колес	
Неисправный суппорт	Замените суппорт
Заклинивание поршня в суппорте	Произведите ремонт или, при необходимости, замените суппорт в сборе
Заедание (прихватывание) тормозов передних колес	
Заклинивание поршня в суппорте	Произведите ремонт или, при необходимости, замените суппорт в сборе
Шум и вибраций передних колес при торможении	
Чрезмерное биение тормозного диска	Замените диск
Мешающее воздействие пылезащитного кожуха	Произведите ремонт пылезащитного кожуха
Ослабление болтов крепления суппорта	Затяните болты крепления
Недостаточная тормозная сила задних колес	
Сильный износ накладок тормозных колодок	Замените тормозные колодки
Попадание масла или тормозной жидкости на накладку тормозной колодки	Проверьте на отсутствие утечки из рабочего тормозного цилиндра и, при необходимости, замените рабочий цилиндр или тормозные колодки
Неисправность рабочего тормозного цилиндра	Замените рабочий тормозной цилиндр
Неисправность в работе саморегулировки	Отремонтируйте саморегулировку
Неравномерное торможение задних колес	
Попадание масла или тормозной жидкости на накладку тормозной колодки	Проверьте отсутствие утечки из рабочего тормозного цилиндра; при необходимости замените рабочий цилиндр или тормозные колодки

Table 6.6 versions of systems installed in vehicles Astra-H

Двигатель	*Z14XEP; Z16XEP; Z17DTL*	*Z18XE; Z20LEL; Z17DTH*
Стандарт	ABS MK 70	ABS MK 60 ESP
Дополнительно	ABS MK 60 ESP	
Расширяемый	TPMS/DDS	TPMS/DDS
	HBA	HBA
	HSA	HSA

Table 6.7 Pin connector ABS control unit

Вывод	*Описание*	*Тип сигнала*
1	Электромагнитные клапаны – аккумуляторная батарея + (вывод 30)	I
2	Задний левый датчик скорости колеса – масса	0
3	Задний левый датчик скорости колеса – сигнал	I
4	Источник питания датчика угловой скорости рыскания	0
5	Передний датчик скорости правого колеса – сигнал	I
6	Передний датчик скорости правого колеса – масса	0
7	Выключатель сигнала торможения	I
8	Передний левый датчик скорости колеса – масса	0
9	Передний левый датчик скорости колеса – сигнал	I
10	Масса датчика угловой скорости рыскания	0
11	Задний датчик скорости правого колеса – сигнал	I
12	Задний датчик скорости правого колеса – масса	0
13	Электромагнитные клапаны и блок управления антиблокировочной системы тормозов – масса (вывод 31)	I
14	Возвратный насос – положительное напряжение аккумуляторной батареи (вывод 30)	I
15	Выходной сигнал – задний датчик скорости правого колеса	0
16	Не назначено	–
17	Выходной сигнал – передний левый датчик скорости колеса	0
18	Диагностика	I/O
19	Частный CAN высокий	I/O
20	Зажигание (вывод 15)	I
21	HS CAN низкий	I/O
22	Выключатель сигнала торможения	I
23	HS CAN высокий	I/O
24	Не назначено	–
25	Частный CAN низкий	I/O
26	Возвратный насос – масса (вывод 31)	I

Table 6.8 Pin assignment connector yaw angular velocity sensor

Вывод	*Описание*
1	Шина CAN низкий
2	Шина CAN высокий
3	Источник питания датчика (+)
4	Не назначено
5	Масса датчика (–)
6	Не назначено

7. On-board electrical

7.1. General

Principle of CAN

Instead of a separate wire for each signal uses only two common wire that allows you to simultaneously receive information on the status of the majority of devices and sensors, without using a separate toggle switches and switches.

Bus CAN, getting important information (for example, a fault), registers it in his memory.

Safety

For the repair of electrical power supply system of the engine and disconnect the wire from terminal "-" battery.

When replacing fuses is prohibited to use a screwdriver and a metal tool as this could lead to a short circuit in the electrical circuits.

Do not disconnect the ignition switch and battery in the engine is running, as this will lead to failure of the voltage regulator and the elements of electronic equipment of the car.

When checking the electrical circuits is forbidden to bring up the "mass" of wire (check the serviceability of chains "a spark"), as this may lead to failure of electrical components.

Do not even briefly join output "30" generator with "mass" (check the work of the generator "to spark"), as this will lead to failure of the diode rectifier unit generator. Check the generator on a car can only voltmeter and ammeter. To avoid failure of the diode rectifier unit is prohibited to check their megger or control the lamp voltage for more than 12 in and check the electrical circuit such devices in a vehicle without disconnecting the wires from the generator. Check the insulation resistance of generator stator winding high voltage necessary for the alternator, removed from the car, if you disconnect from the rectifier unit findings of the stator winding.

When conducting electrical welding work on the car to disconnect the wires from the battery terminals and the generator.

Do not touch the elements of the ignition system and high-voltage wires to the engine running.

Do not route the wires of low and high voltage in a tourniquet.

When recharging the battery in a car with charger disconnect the wires from the battery terminals.

Check for voltage

Check for voltage produced in the event of disruption of the electrical circuit. Connect one wire from the tester electrical circuits or to the negative pole of the battery, or to the well-grounded point of the car body. Another tester, connect the wire to the terminal electrical connectors verifiable chain, preferably next to the battery or fuses. If the control lamp tester lights up, the supply voltage at a given interval of the chain is present, which confirms the serviceability of the chain between a given point of the chain and battery. Continuing to act in a similar manner, explore the rest of the chain. Detection of the lack of voltage indicates a failure between a given point of the chain and the last of the previously tested (where the voltage present). In most cases, the cause of failure is the weakening of electrical connectors and a violation of the quality of the contacts (oxidation).

Search of the short circuit

One way to search for short-circuit is to pull the fuse and connection instead lamp or voltmeter probe. Tension in the chain must be absent. Pull wires, watching the lamp-probe. If the light starts to blink, somewhere in the wiring harness is the closure of the mass, possibly caused by wiping insulation of wires. A similar test can be performed for each of the components of the circuit by incorporating appropriate switches.

Check serviceability of earth

This check is performed to determine the reliability of grounding circuit element. Disconnect the battery and connect one wire having a self-contained power source lamp probe to a known good ground point. Another wire tubes connect verifiable burned wiring or terminal electrical connector. If the lamp lights up, grounding in the order (and vice versa).

Checks in the absence of breakage

Verification is performed in order to identify breaks the electrical circuit after a power circuit, check it with the lamp-probe, equipped with autonomous power supply. Connect the probe wires to both ends of the chain, if the control lamp lights up, break in the chain missing. If the lamp is not lit, it indicates the presence of chain breakage. Similarly, the same way you can check and serviceability of a switch,

plugging in the probe to its terminals. When transferring the power switch to "On" lamp shall be illuminated by the probe.

Localization location of the break

When diagnosing a suspect in the presence of breakage of the circuit area to visually locate the cause of failure is rather difficult, as inspection of terminals on the presence of corrosion or violation of the quality of their communication is difficult, in view of the limited access to them (usually terminal closed body electric socket). Sharp twitching body connector on the sensor or its wiring harness, in many cases leads to the restoration of the contact. Keep this in mind when trying to localization of the reasons were suspected for the presence of chain termination. Instability arises failures may be caused by oxidation of terminals or violation of the quality of contacts.

Troubleshooting electrical circuits, does not constitute an intractable problem, provided a clear idea of what an electric current goes to all consumers (lamps, electric, etc.) from the battery through the wires through the switches, relays, fuses, fuse, and then returned the battery through the mass of the vehicle body. Any problems associated with electrical failure may have caused his only cut off the flow of electric current to them from a battery or return it to her.

Wires, fuses and relays

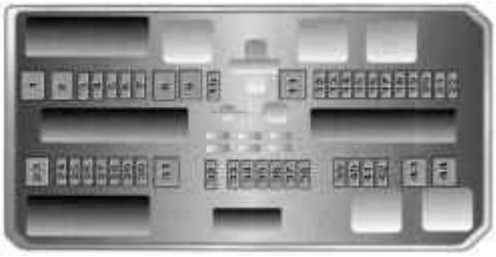


Fig. **7.1.** **Fuse block in-car Opel Astra**

Protection of electrical circuits of the car from a short circuit is achieved by using combined fuses, circuit breakers and fuse. Burnt fuse easily distinguished from the healthy by examining its transparent plastic case. Carefully inspect the fuse to identify his burnout. If the fuse has the appearance of normal, but the suspicions of his problem persisted, the inspections conductivity between terminals knife protruding from his body.

When replacing the fuse, the conformity of the nominal face value of the new fuse old. Designed for a variety of amperage fuse may outwardly look the same, so special attention should be paid to the marking. Replacing burned-out fuse designed for a smaller - and more especially - the current strength is undesirable. Every electrical circuit needs a different degree of protection. Make sure that the markings on the body of the fuse in line with current intensity, which is calculated corresponding to the chain. If a replacement fuse immediately fuse, not reasonable to continue his replacement. First of all, should identify and eliminate the cause of his burnout. In most cases, such is a short circuit in the electrical circuit caused by the breakage or damage to the insulation of the wire.

Fuse

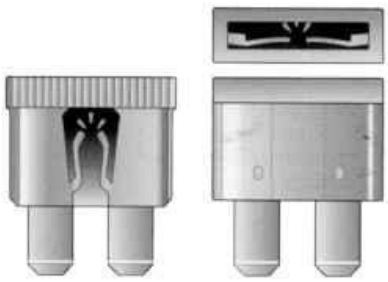


Fig. **7.2.** **Healthy and burnt-out fuse**

Protection of certain electrical circuits carried out by including fuse. Inserts are typically used to protect circuits not equipped with safety devices such as a chain ignition system.

Fuse like a fuse in the sense that the output of their failure (melting) is easily determined visually.

To replace the fuse, disconnect the negative wire from the battery. Remove the burnt-box and install in its place a new one. Before replacing the insert must try to determine the cause of the overload that caused the insert out of order.

Circuit breakers (thermal relay)

Overload Relays are used to protect components such as electric windows, door locks and adjust the headlight (elektrokorrektory). Some of the chopper circuits installed in the mounting block. Return of the thermal relays in the initial state on some models is carried out automatically, ie in the event of thermal overload relay in the circuit immediately opened, and then, after cooling, returns to its original state. If the return path to the operating position does not occur, you should immediately make an inspection. Normal functioning of the thermal relay confirms the serviceability of the circuit. Some of the choppers are equipped with buttons for manual forced to return to its original state.

Replacing Fuse

To prevent short circuit and overload electricity consumers separate circuits protected by fuses. The vehicles used Opel fuses corresponding to the latest technological advances, these fuses have knife contacts.

Before replacing the fuse, first disconnect necessarily appropriate consumer.

Poddente unit cover fuses narrow screwdriver and remove it.

A blown fuse is identified by the molten metal strip. Location fuses shown on the inside of the lid unit fuses.

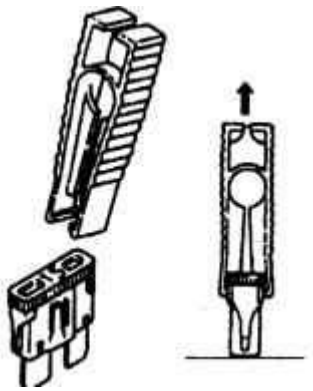


Fig. **7.3.** **Forceps, to replace fuses**

Remove the defective fuse plastic tweezers, located in the lid of fuse box (Fig. 7.3).

Insert the new fuse of the same denomination (amperage).

If the newly inserted fuse fuse in a short time, you should check the relevant circuit.

Do not replace the fuse wire or similar aids, as well as because of the electrical system of the car can cause serious damage.

Recommended to always have a spare set of car fuses different denomination. To store them in the fuse block provided the appropriate place.

Par fuse is coated on the reverse side of the fuse body. In addition, the housing has a corresponding color, which can determine the nominal amperage.

For the supply of electricity to some elements of the electrical relays used car. Violation of the correct functioning of the relay leads to a refusal to serve his element. In the event of a suspected malfunction of any of the relay, it should be removed and tested at a service station or in a specialized vehicle workshop. Replacement of a failed relay is in the collection.

Battery

Viewed in this manual have the car electrical system, under a voltage of 12 V. The mass of the body is connected to the negative terminal of the battery. The battery pack is located in the engine compartment or under the rear seat (the model with air conditioning, as well as some diesel versions).

Battery performs three major functions in the electrical system of a vehicle:

- An electrical current to start the engine;
- Stabilizes the voltage in an electrical system;
- May in a short time to provide a current, when energy consumption exceeds the power output of the generator.

Sealed batteries standard for all vehicles. They are on the case there is no flood jams. The battery pack is fully waterproof, not counting the two small side holes for ventilation. These vents allow evaporate formed gases.

Sealed batteries have the following advantages over conventional batteries:

- For the life of batteries do not need to top up the water;
- Battery is protected from the charge. If too much voltage is supplied to the battery, it will not take as much current as conventional battery. Increasing the voltage will continue to charge the normal battery, which leads to gassing and loss of electrolyte;

- Be self-charging battery like a normal battery. It is very important when the car is in one place for a long time;
- With smaller size and weight of voltage and current remained unchanged.

The battery pack has two indicators:

- Indicator of battery capacity is determined at 27 ° C, which when fully charged, provides in 10.5 and more;
- Battery indicator when starting a cold engine is determined by testing at -18 ° C, which shows the battery power when cranking a cold engine.

Backup battery power is defined as the maximum length of time for traffic at night with a minimum electrical load without the use of output of the generator. Expressed in minutes reserve capacity (or rate of E) is the necessary time to fully charged battery at 27 ° C and discharge current of 25 A to achieve at the terminals of voltage 10,5 V.

Testing sipy current during start cold engine is performed at -18 ° C. Minimum rate of current strength, which should be maintained battery at a given temperature, while there is a minimum voltage of 7.2 V.

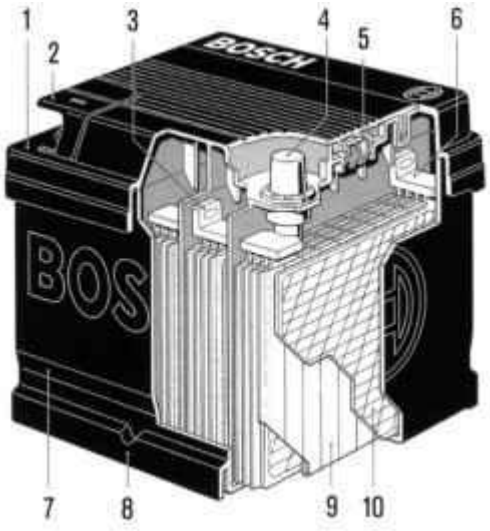


Fig. **7.4.** **Modern maintenance-free battery: 1 - housing cover, 2 - protective cover terminal blocks, 3 - interelement compound, 4 - the final terminal, 5 - plug elements (below the lid) 6 - plate holder, 7 - body, 8 - amplifier heads; 9 - positive plate, closed separator, 10 - negative plate**

This indicator is measured at starting a cold engine.

The service life of the battery is not limitless. Nevertheless, with proper care the battery will last for many years.

If the battery been tested well, but detected malfunction for no apparent reason, malfunction or failure may be the following factors:

- Any device was left on all night;
- In short periods of a car moving at low speed;
- Vehicle electrical load exceeded the power output of the generator, often with the inclusion of non-standard equipment;
- Failure in the system of charging: slipping belt generator, malfunction or failure of the generator voltage regulator and so on;
- Improper use of batteries: failure cleansing, consolidation terminals or weakening of times;
- Mechanical failure of the electrical system: Shorted or pinch wires.

Sealed batteries have a built-in hydrometer temperature compensated in its upper part, used for the following diagnosis:

- When looking at the hydrometer, make sure that the upper part of the battery clean;
- During normal operation must be received two indications:

The visible green dot-emergence of green, called "green dot" means that the battery is ready for testing;

Dark green unseen point - if there are complaints about the start of a cold engine requires testing battery. At the same time must be verified by the electrical system and charge. Sometimes it may be a third condition:

Clear or light yellow color - the liquid level below the tip of the hydrometer. This may cause excessive or prolonged charging excessive or normal wear of the battery. Therefore, charging and electrical systems may need to check if there are complaints about the cold start. If the battery - the reason for the complaint to the bad start a cold engine, replace it.

Check charge level

The density of the electrolyte in conjunction with measuring the voltage across the battery terminals can make an accurate conclusion about the charge level. To test serves hydrometer, which can be

purchased at specialty shops. The greater the density of the electrolyte, the higher rise (pops) float hydrometer. On a scale hydrometer values are expressed in units of density (g / cm $^{3).}$

When measuring the density of electrolyte should be to ensure that the surface of the battery box and other parts of the pipette hydrometer is not falling droplet of electrolyte containing sulfuric acid, which causes corrosion and leakage current.

When measuring the density of the electrolyte temperature of the electrolyte must be between 20-30 ° C. The density of the electrolyte must be measured in each cell (the Bank) battery. After measuring the density of the electrolyte can set the level of discharge of the battery.

All the elements of the electrolyte should have the same density.

The density of the electrolyte in a fully charged battery is 1.28 g / cm $^{3.}$

Density of the electrolyte the battery discharged to 25%, is 1.24 g / cm $^{3.}$

The density of the electrolyte the battery discharged to 50%, is 1.20 g / cm $^{3.}$

The battery, discharged more than 25% in winter and more than 50% in the summer, remove from the car and charging.

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Charging the battery

Battery with a green dot indicates that the charge is not needed, the remaining battery power, such as when starting a cold engine.

When charging the battery with sealed terminals outside the car, install the adapter. Make sure that all connections charger are clean and reliable. For best results, the battery must be recharged when the electrolyte and plates are at room temperature. Extremely cold battery may not charge a few hours after the start of charging.

Charge the battery until you see the green dot. In the process of charging the battery should be checked every 30 minutes. Tilt or agitation may be necessary for the emergence of a green dot.

After charging the battery should be tested.

The time required for charging the battery depends on:

- Size batteries - for a fully discharged battery high capacity, designed for heavy-duty applications, you need time to 2 times greater than for charging the battery of a car;
- Temperature - for charging the battery at -18 ° C would require more time than at 27 ° C. When the charger is connected to a cold battery, first degree charge is very low, but as the temperature of the battery state of charge will rise;
- The ability charger - the charger with a current of 5 A charge will take longer to charge than the charger with charging current 30 A or more;
- The state of charge - for charging a fully discharged battery should be twice the charge, than to charge the two half-discharged batteries, because in a fully discharged battery, the electrolyte is approaching the composition of nearly pure water and is a poor conductor. Then, as the charging current leads to an increase in the content of acid in the electrolyte, respectively, increases and the degree of charging.

Before charging the battery disconnect the positive cable and the masses, first cable mass.

Before charging, check the electrolyte level, if necessary top up the distilled water.

Frozen battery (battery, the electrolyte in which froze) before charging thaw. A fully charged battery freezes at a temperature of -65 ° C, half-charged battery - at a temperature of -30 ° C, discharged battery - at a temperature of -12 ° C.

Charge the battery only in well ventilated area. When charging the battery installed, leave the hood open.

During normal charging the charging current value is approximately 10% of battery capacity. (ie, battery capacity of 50 Ah to be charged current value of approximately 5.0 A). As the charging time can take a value of 10 h.

Connect the positive battery terminals with a wire-date transport, minus the withdrawal from the battery minus the charger.

During charging the electrolyte temperature should not exceed +55 ° C, if necessary, interrupt or reduce the charge current of charge.

Charge the battery for as long as all elements of the battery will not take copious evolution of gas and the following one after the other in an hour 3-dimensions, will not cease to increase the density of the electrolyte and voltage.

After charging, check the electrolyte level, if necessary top up the distilled water.

Charging a fully discharged battery

Use the following procedure to recharge a fully discharged battery:

- Measure the voltage at the battery terminals are accurate voltmeter. If the value of the measured value below 10 V, the charge current is very low, and it may take some time before the battery will take a few milliamperes excess;
- Put the charger on a high place. Some chargers have a protection scheme against reverse polarity, preventing

charged with improper connection to the battery terminals. Fully charged battery has sufficient voltage to give effect to this scheme, even if the wires are connected correctly. This will cause the battery will not charge. Therefore, the following special instructions of the manufacturer of chargers for charging device is turned on and started to charge the battery with low voltage;

- In the chargers provide voltage regulators and current strength. The time required to charge the battery depending on the different voltage values are listed below.

Charging the battery depending on the source voltage of the battery

Исходное напряжение на выводах батареи, В	*Время зарядки, час*
16,0 или более	до 4
14,0–15,9	до 8
13,9 или менее	до 16

If the resulting battery charge can be measured after a charging time, the battery should be replaced.

If the resulting charge is measured in the process of charging, the battery correctly, is charging should be completed as usual.

If the resulting battery charge is not measured after a charging time, calculated by the above method, the battery should be replaced.

If the resulting charge is measured during the time of charging, the battery is charging properly and should be completed in the usual way.

Care battery

From time to time to perform the following work to serve longer battery and its power to maintaining the highest.

You should always contain a battery and its surrounding parts clean. The surface of the battery should always be dry, as otherwise, between the individual banks may have the surface leakage currents, due to which the battery is discharged itself.

The electrolyte level should always be a ring, located on the underside of the filler cells. For topping, use distilled water.

In cold weather did not keep the battery in the uncharged state, as it is (more precisely, the electrolyte in it) freeze. Poor battery packs are frozen at a temperature of about -10 ° C.

Storage battery

Batteries are not used for a long time, discharged themselves and may be subject sulfatatsii plates. If these batteries charged charger, they do not accept charging current and because of the so-called surface charge.

Before you rubbish the battery, you should check it:

Check the density of the electrolyte. If the density of all elements differ by no more than 0,02 g / cm ^{3,} the battery should charge the battery charger.

Check the battery after charging under load. If the values do not meet the required, the battery is defective.

Check the density of the electrolyte. If the density of the electrolyte in one or more banks is significantly lower than in the others (for example, five banks, the density is 1.16 g / cm ^{3,} and one 1,08 g / cm $^{3),}$ Battery has internal short circuit.

To avoid premature aging of the battery should charge the battery, in storage, every 3 months.

Self-Discharge Battery

Depending on the modification of the car to the normal process of self-discharge the battery adds energy consumption permanent consumers of energy. Therefore, the battery is not operated on a car should be charged once a month and a half. If you suspect the presence of surface leakage currents, should check the on-board network of the car.

To check, use a fully charged battery.

Set the ammeter (with a limit of measurement of 0-5 mA and 0-5 A) the highest limit of measurement. Include an ammeter between the minus terminal of the battery and cable mass. The positive wire, connect the ammeter to the positive terminal of the battery, minus the wire ammeter - to the negative terminal of the battery.

Turn off all electricity consumers, close all doors and trunk, turn off the ceiling lights, engine compartment.
Change the limit of measurement ammeter downward until yet have any evidence (acceptable value is 1.3 mA). You remove the fuses one by one from the fuse box, opens the series all electrical circuits. If disconnecting one of the chains of evidence fall to 0, then this circuit should look for the source of the problem. Potential problems: corroded or contaminated by contact electrical connectors, abraded wires, internal circuit in electrical components.
If a fuse-protected circuits fault is not detected, you should disconnect the wires from the fuse unprotected devices: the generator, starter, ignition system components.
If you disable one of the unprotected circuit testimony ammeter will drop to 0, will repair or replace the appropriate item. When leakage current in the starter or the ignition system always check (in accordance with the scheme), ignition switch and starter.

Removing and installing the battery
When disconnecting the battery from the memory of the central block of the engine management and transmission, antilock braking system, as well as from the memory of other electrical equipment such as radio, clock and erase data on the fault occurred. After connecting the appropriate devices re Program. Some commercially installed radios have the security code. Security code prevents unauthorized use of the radio, if its power is turned off. Feeding the radio and clock is turned off, if, for example, turns off the battery, removed the receiver or the appropriate fuse fuse.
Loosen nuts and remove the "negative" terminal and then "positive" terminal from the battery.
Loosen the nut fastening the bracket supporting the battery.
Remove the bracket supporting the battery.
Remove the battery.
Before installing the battery connections clean the battery, this ideal brass wire brush.

7.2. System power

Generator

The generator - a source of power car. When the engine is running, it provides power to all units and charges the battery. Powerful three-phase synchronous generator is the power power plant in your vehicle. Even at idle, it provides electricity to all consumers. In modern cars generator capable of producing power to 2 kW. The generator is powered by a V-belt.
Three-phase generator produces three-phase alternating current. Since the battery must be recharged by direct current, then with the help of powerful diode converts AC to DC.
Rectifiers also prevent battery discharge when parked. The generator requires virtually no maintenance. Self-brush generator can be replaced after run 100 000 km. In the case of serious malfunction Turn the generator for repair.

Removing and installing the generator
Remove the wire from the negative battery terminals.
Remove V-belt, to follow the correct installation please tick one of its sides to the direction of motion. Loosen the belt tensioner rotation and remove it.

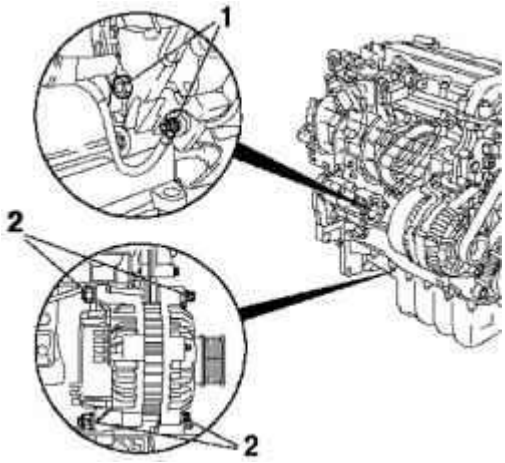


Fig. **7.6.** **Mounting generator: 1 - nuts contacts generator, 2 - stud fastening**

Remove from the generator contact "B +" (Fig. 7.6).
At the generator contact designated as "B1 +". New generators are equipped with a closed oval plug socket for the plug to double, while the old generator plugs rectangular shape.
Loosen generator mounting bolts and pull it up.

Installation of generators spend in the reverse order. Vybeyte threaded bushing mounting bolts on the back 1 mm. Tighten the nut contact "B +" ("B1 +", contact "30") around 15 N m. If the nut does not tighten the required point, then there is the following hazards:
- Rechargeable battery is not fully charged;
- Onboard electrical and electronics can not work;
- Sparking may cause a fire;
- Surges can knock out individual parts and assemblies.
Electrical and reactivate radiokodirovku.

Starter

Automobiles Opel, as well as on most other cars, install a starter, consisting of electric motor, gear drive and freewheel (freewheel). At such starters solenoid switch connected to a thick cable plus battery (pin "30") and a thin wire through the ignition switch (pin "50").
If you turn the ignition key to position "start" voltage is applied to the retractor relay contacts, which is mounted on top of the starter. Anchor relay through the lever pushes forward the starter gear, which engages with a toothed crown wheel.
When the starter gear engages with a toothed crown wheel, the motor starter contacts are closed and he begins to turn the crankshaft of the engine.

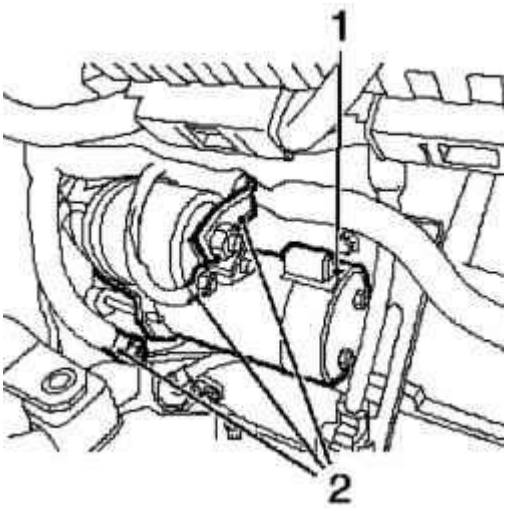


Fig. **7.7. Mounting the starter: 1 - Starter 2 - retention**

After starting the engine speed flywheel increases sharply. As a consequence, increases the speed of rotation of starter gears, as it is still engaged with the flywheel. In order to avoid transmission of high speed gears on the rotor of the starter pinion is connected to the roller freewheel. If you turn the ignition key to the starting position the chain opened, anchoring the retractor relay under the action of the return spring returns, and with a lever release from meshing gear starter.

Voltage regulator

Checking the voltage regulator
Connect the tester between the contact "+" generator, and "mass".
Set engine speed from 3000 to 4000 min $^{-1}$ and leave it for 2 minutes to ensure that the generator has reached operating temperature (approximately 80 ° C). When starting the engine the voltage should drop to 8 V (at ambient temperature +20 ° C).
Turn the parking lights, radio or fan, which corresponds to the load current from 3 to 7 A. If the voltage regulator is in the range 13,5-14,8 V, hence the generator and voltage regulator operable. Voltage generator (and an onboard network) should be higher than the battery voltage, so that it can recharge while driving.
Turn on the beam and repeat the measurement with engine speed of 3000 min $^{-1.}$ Voltage must not change compared with the previous more than 0.4 V.
If the voltage is greater, then the regulator is defective and should be replaced.
If the voltage is too low, then worn generator brushes. Length of new brushes is 12 mm, the allowable depreciation - 5 mm. The difference in the lengths of the two brushes should not exceed 1 mm. If not, remove the generator and give it for repair.

7.3. On-board electrical

Removing and installing windshield washer nozzles

Remove the cowl grille.
Squeeze the latch on the back of the grid and remove the nozzle from the seed slot. Disconnect the hose from the nozzle.
Installation is performed in reverse order of removal.

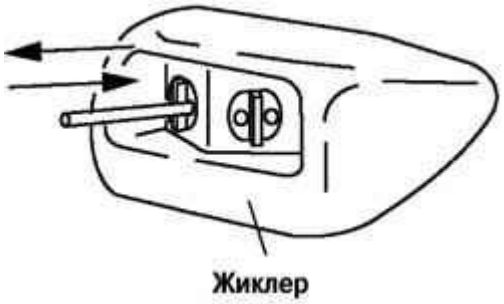


Fig. **7.8. Adjustable jet nozzle**

If necessary, adjust the direction of the jet supply washer fluid on the windshield, which enter in the appropriate nozzle needle and direct the nozzle to the desired point (Fig. 7.8).

Removing and installing rear window washer nozzles

Remove the back of the door trim.
Remove the upper stop light.

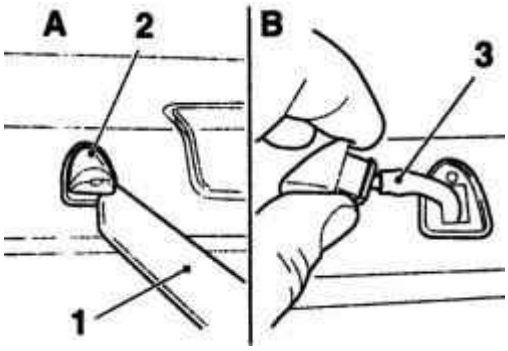


Fig. **7.9. Removing the nozzle: 1 - plastic wedge, 2 - burner, 3 - inlet hose**

On models "Hatchback" remove the nozzle assembly of the stop light at the Astra GTC, you must first overcome 2 release (Fig. 7.9).
Installation is performed in reverse order of removal.

Removing and installing faroomyvateley

Remove the pad front bumper.
Disconnect the hose washer lights on the back side lining.

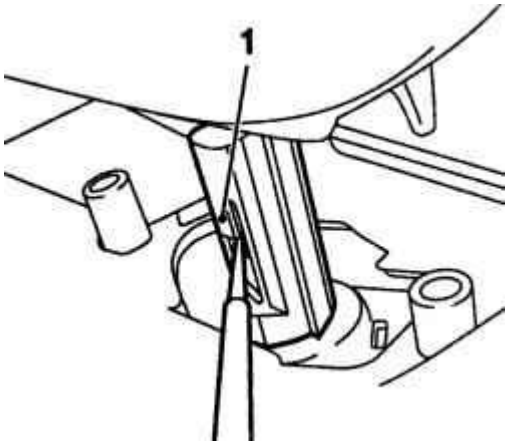


Fig. **7.10. Velcro faroomyvatelya: 1 - lock**

Use a screwdriver to press the lid down faroomyvatelya of lining the front bumper (Figure 7.10).
Squeeze the latch and remove faroomyvatel of the lining.
Squeeze the latches and remove the cover faroomyvatelya.

Removing and installing the tank / pump for washer fluid

Remove the decorative grille.

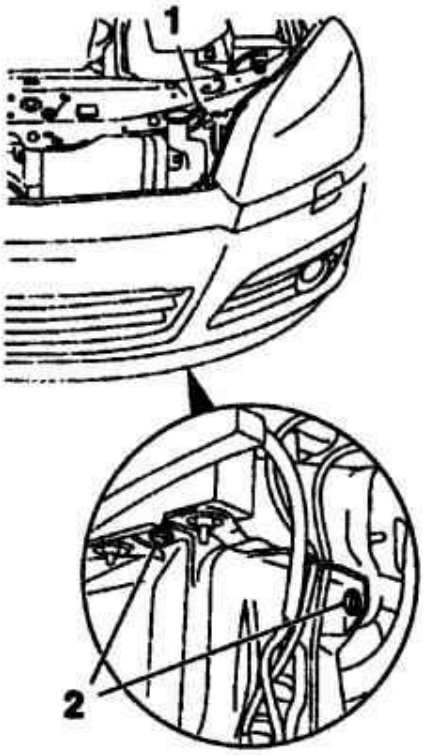
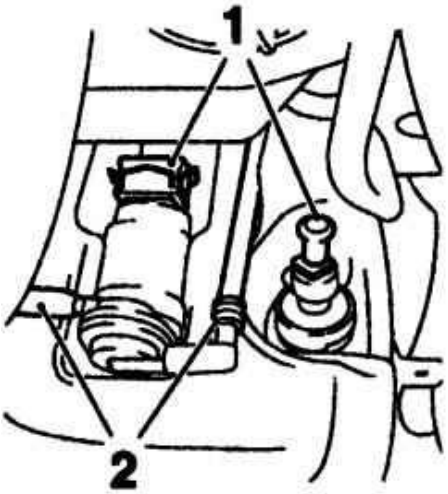


Fig. **7.11.** **Bolts fastening faroomyvatelya: 1, 2 - Bolts**

Remove the bolts fastening the tank to the washer fluid (Figure 7.11).
Disconnect the wiring (see conj. Illustration) from the pump stack loomyvatelya and washer fluid level sensor.



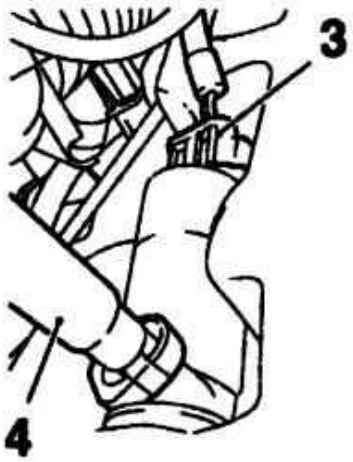


Fig. **7.12.** **Disconnecting the hoses and wiring: 1,2 - hoses, 3, 4 - electrical**

Disconnect hoses from the pump windscreen, while try to prevent leaking washer fluid (Fig. 7.12).
Disconnected electrical connector and hose from the pump faroomyvateley.
Remove the washer fluid reservoir through the bottom and disconnect the hose from the tank.
Release the pump from the holders of the tank.
If necessary, remove the liquid level sensor.
Installation is performed in reverse order of removal.
Upon completion of works fill the new reservoir with fluid.

Removing and installing front wiper levers

Withdrawal

Wash the windshield, turn on and shut down the windshield wipers - they must be in its lowest position.

Mark the position of the rubber wiper blades, which affix to the windshield tape or adhesive tape along the brush.

Open the hood.

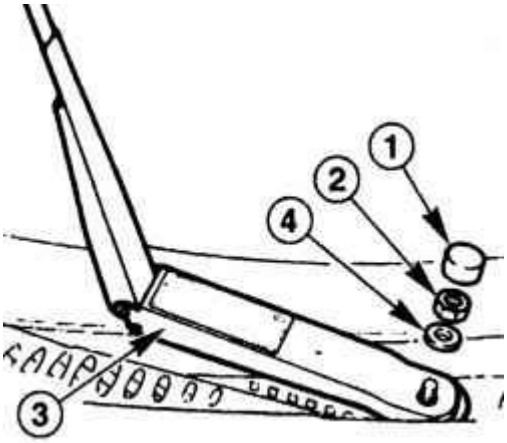


Fig. **7.13.** **Components wiper arm: 1 - cap 2 - fastening nut, 3 - lever 4 - Puck**

Poddente protective cap with a screwdriver and remove it from the spindle axis of the lever (Fig. 7.13).

NOTE
Caps are equipped with a threaded connection, pry them manually until such time until a sufficient gap between the caps and lever.

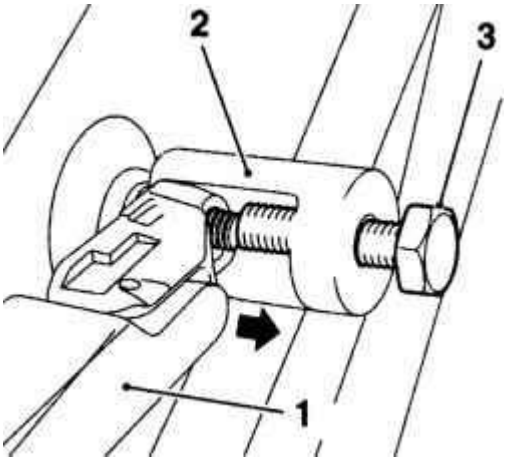


Fig. **7.14.** **Removing wiper arm: 1 - lever, 2 - a special tool, 3 - bolt**

Loosen the nuts for about 2 turns. Slightly swinging arm wipers from side to side, download it from the landing bushing axis, if necessary, use the appropriate tool (Figure 7.14).

Completely unscrew the nut and remove the wiper arm from the spindle.

Setting

Make sure that the position of the drive blades corresponds to an extreme situation, if necessary, turn the drive and install the desired position.

Set the lever on the landing bushing so that the brush wiper coincided with the previously affixed with adhesive tape (scotch).
Tighten the nuts by hand lever. Close the hood, wash the windshield and over time turn the wipers - when working wiper blades should not go beyond the glass, but when you turn off the drive should return to the lowest position. Otherwise, release the nut and repeat the installation of the lever.
After adjustment tighten the nuts required time and reinstall the protective caps.

Removing and installing the electric motor cleaners windscreen

Remove the wiper levers.
Remove the cowl grille.
Disconnect the wire from the negative terminals of the battery.
Remove the 3 bolts.

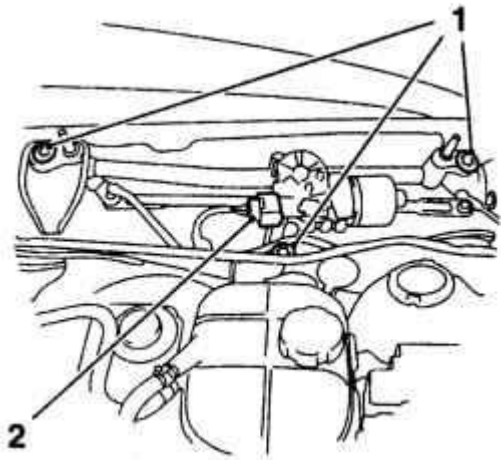


Fig. **7.15. Mounting wiper motor: 1 - bolts, 2 - electric**

Disconnected the wiring connector and remove the motor drive assembly of the cleaners hood space (Figure 7.15).
Poddente screwdriver and separate the driving thrust from the motor pivot.
Marker mark the loading position, the hinge electric panel assembly.
Loosen the nut and remove the hinge from an electric motor.
Remove the 3 mounting bolts and remove the motor from the panel assembly.
Installation is performed in reverse order of removal.
Make sure that the drive motor is in the proper position, if necessary, connect the motor to the connector (connect the battery) and set the desired position.
Check the levers of cleaning the windshield.

Removing and installing rear window wiper motor

Disconnect the wire from the negative terminals of the battery.
Remove the wiper arm.
Remove the door trim back of the cart.

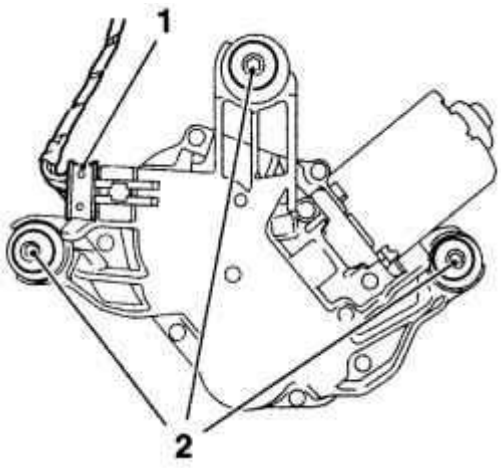


Fig. **7.16. Mounting wiper motor: 1 - slot 2 - bolts fixing**

Disconnected to remove the motor wiring connector 3 bolt mounting (Figure 7.16).
Remove the electric motor from the back of the door.
Installation is performed in reverse order of removal.
Make sure that the drive motor is in the proper position, if necessary, connect the motor to the connector (connect the battery) and set the desired position.
Check the lever cleaner.

Removing and installing a rain sensor

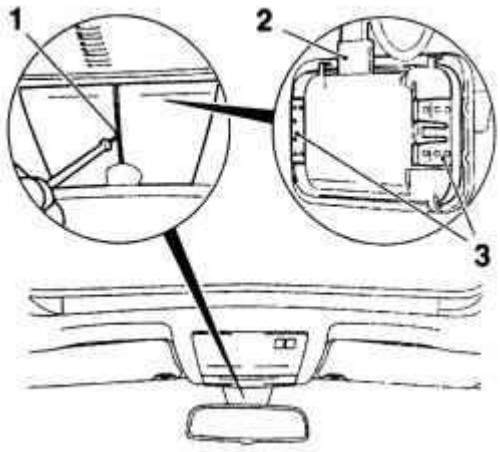


Fig. 7.17. **Removing the salon mirrors: 1 - plastic wedge, 2 - connector wiring, 3 - latches**

Separate with a plastic wedge cap rack salon mirrors (Fig. 7.17).
Disconnected connector wiring rain sensor.
2 Squeeze the release and remove the sensor.
Installation is performed in reverse order of removal.

Removing and installing the instrument cluster

NOTE
Condition of all components installed in the combination is checked using a special diagnostic instrument. Based on this test is determined by the need to replace the instrument cluster.

Disconnect the battery.
Remove the lower steering column shroud.

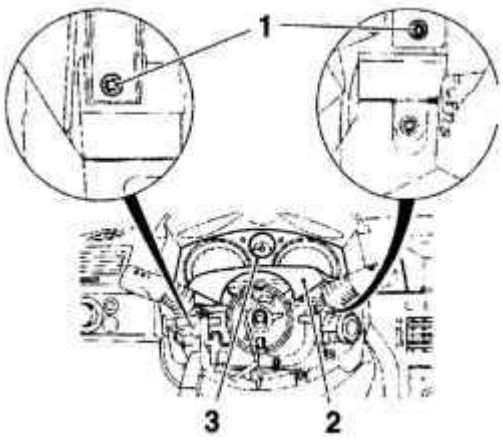


Fig. 7.18. **Removing the instrument cluster: 1 - bolts, 2 - the upper steering column shroud, 3 - a combination of devices**

Remove the 2 screws fastening (Figure 7.18).
Remove the combination of instruments, together with the upper steering column jacket.
Disconnected the wiring harness connector from the back of the instrument cluster.
2 Squeeze the release and remove the upper shroud steering column with a combination of instruments.
Installation is performed in reverse order of removal.
Turn on the ignition and check the correct functioning of the warning lights and other components of the combination of instruments.

Removing and installing the information display

Remove the pad section of the dashboard console with air vents.
Remove the 2 screws fastening.

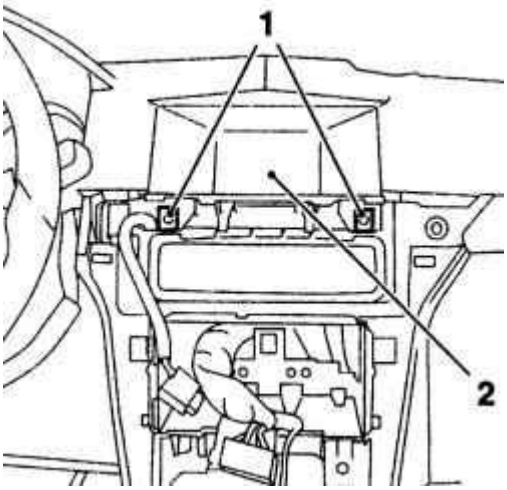


Fig. **7.19.** **Mounting Information Display: 1 - bolts, 2 - Information Display**

Remove the information display together with the adjustment of the instrument panel (Figure 7.19).
Disconnected the wiring harness connector from the back of the screen.
2 Squeeze the release and remove the top pad display.
Installation is performed in reverse order of removal.
Set time and date.

Removing and installing outdoor lighting panel switches / lighting devices

Withdrawal

Disconnect the wire from the negative terminals of the battery.
Turn the rotary switch modes of operation of outdoor lighting the way (position "0" or «AUTO», depending on the configuration).

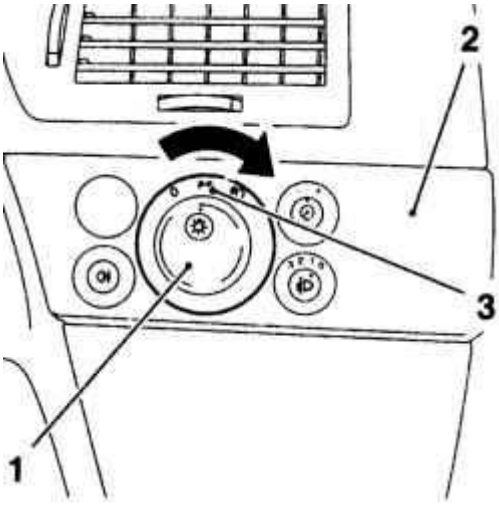


Fig. **7.20.** **Removing the panel switches, outdoor lighting / illumination devices: 1 - handle rotary switch 2 - the panel switches, 3 - the central position switch**

Click on the handle of a rotary switch and turn it into a central position (Fig. 7.20).
Remove the panel switches of the dashboard.
Disconnected the wiring connector on the back side panel.

Setting

Connect the wiring to the panel switches.

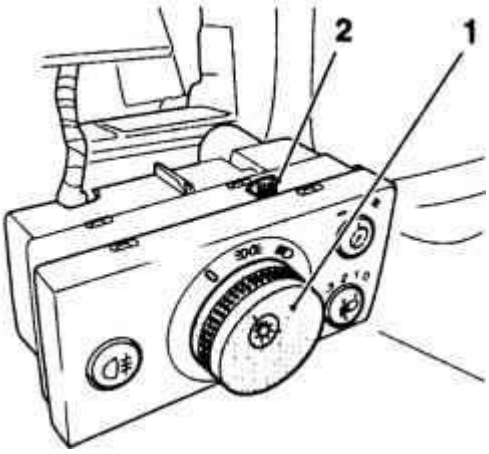


Fig. **7.21.** **Velcro panel buttons moves up or down while turning the handle rotary switch: 1 - lever, 2 - retainer**

Click on the handle of a rotary switch and turn it right until the lock bar switch is not fully sink in deeper (Fig. 7.21).
Hold the handle in this position, insert the panel in the landing slot, and turn the knob to the left to lock the panel.
Check the operation of the switch in all positions and is mounted panel.

Removing and installing the module gearshift paddles

NOTE
Gearshift paddles are installed in the pin block on the steering column. To remove the levers, you must first remove the pin block.

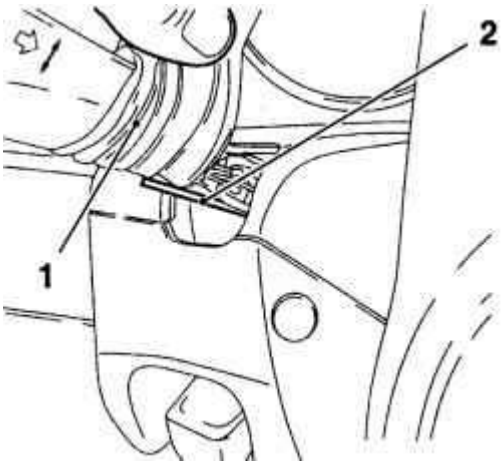


Fig. **7.22.** **Installing knockout: 1 - anther 2 - hammered**

Slide the lever toward the anther edge grip, insert the punch diameter of 1.5 mm as shown in Figure 7.22.
Squeeze punch retainer and separate from the lever assembly of the contact block.
When installing, enter the lever assembly of the contact block and press it into place.
Further installation is in reverse order of removal.

Removing and installing the block switches console section of dashboard

NOTE
Depending on the configuration of the block may include various switches.

Remove the pad section of the dashboard console with air vents.

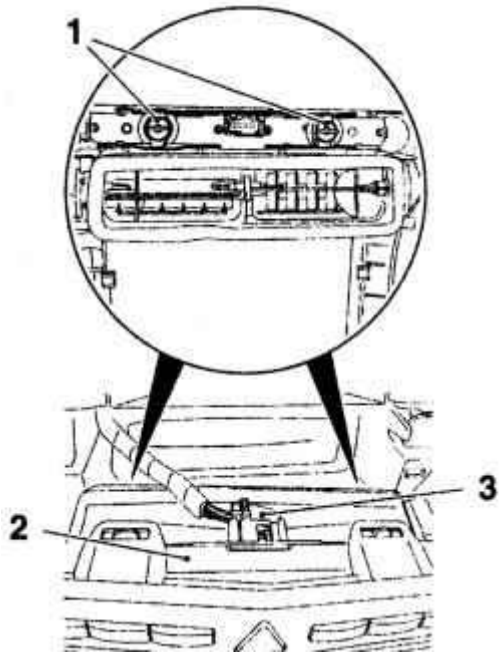


Fig. **7.23.** **Removing the console switch section of the dashboard: 1 - rotary latches, 2 - block of switches, 3 - connector wiring**

Disconnected the wiring harness connector from the back side side switches (Fig. 7.23).
2 Turn the retainer and disconnect the power switch on the console cover plate section.
Installation is performed in reverse order of removal.

Removing and installing the switch of the winter driving mode

NOTE
Button switch activation / deactivation of the winter driving mode (model AT) is located on the panel selector lever and marked by a symbol.

Disconnect the wire from the negative terminals of the battery.
Remove the base selector lever with a central console.

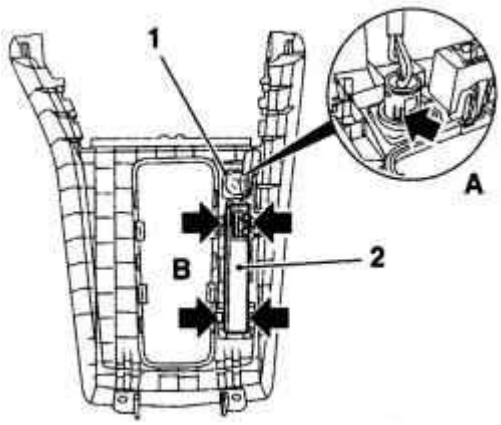


Fig. **7.24.** **Withdrawal of release: 1 - Switch 2 - lining**

Squeeze the lock switch on the back side and remove it (Figure 7.24).
4 Squeeze the latch and remove the pad light indicators.
Installation is performed in reverse order of removal.

Removing and installing switches, electric windows front door

Disconnect the wire from the negative terminals of the battery.
Remove the door trim.
Disconnected from the electrical connector assembly of the main panel of switches on the back side door upholstery.

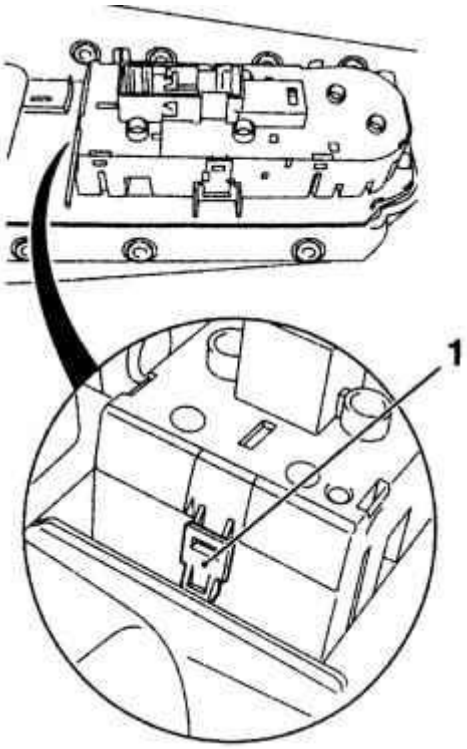


Fig. **7.25.** **Latch main panel switches control electric windows: 1 - lock**

Squeeze the latch and remove the assembly of the main panel switches from finishing arm (Fig. 7.25).
Installation is performed in reverse order of removal.

Removing and installing switches, electric windows rear door

Disconnect the wire from the negative terminals of the battery.

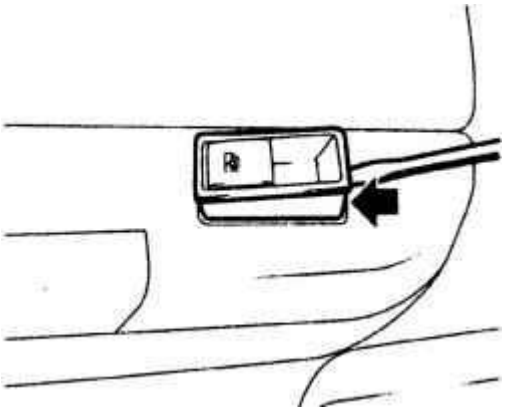


Fig. **7.26.** **Removing the individual gear window openers**

Carefully poddente with a screwdriver in the switch arm of the door and wring it out (Figure 7.26).
Remove the switch and disconnected the wiring harness connector from the back of the switch.
Installation is performed in reverse order of removal.

Removing and installing panels remote control switches on the steering wheel

NOTE
With an appropriate level of configuration in the steering wheel can be mounted into the remote control infotainment system.

Disconnect the wire from the negative terminals of the battery.

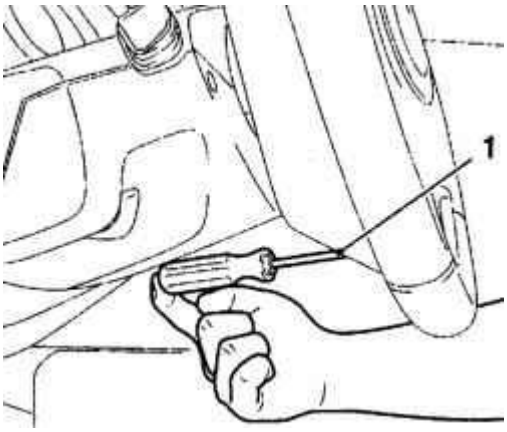


Fig. **7.27.** **Bolt fastening lining panel switches remote control: 1 - Bolt**

Turn the steering wheel to the left by 90 ° and remove the fixing screw (Figure 7.27).
Bring back the steering wheel to its former position and carefully remove the pad panel, steering wheel switches.

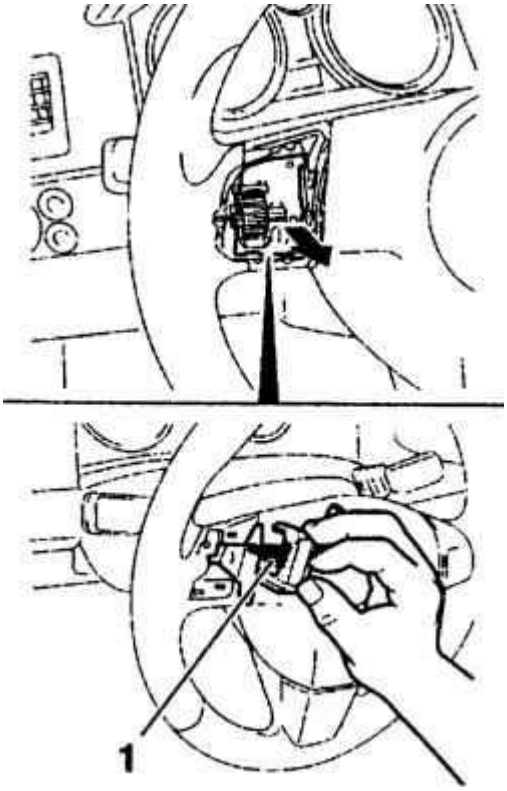


Fig. **7.28.** **Panel switches remote control: 1 - connector wiring**

Separate panel switches on the steering wheel and disconnected the wiring harness connector from the back side panel (Figure 7.28).
Installation is performed in reverse order of removal.

Removing and installing sensor-switch hood (model with anti-theft system)

Disconnect the wire from the negative terminals of the battery.
Open the hood.

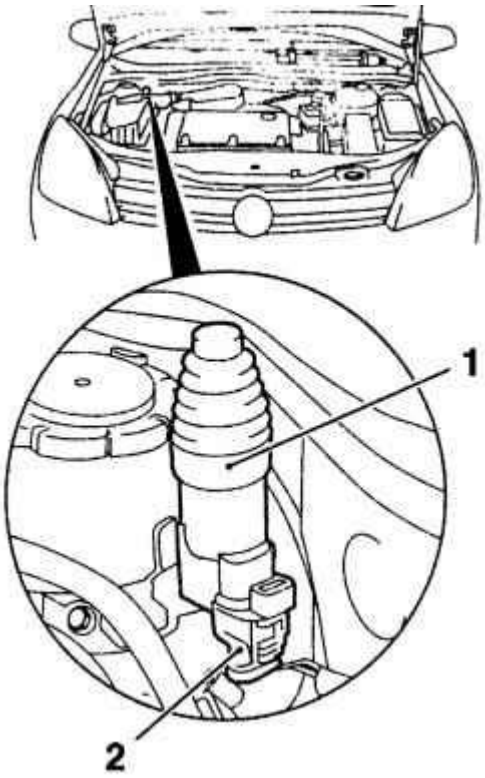


Fig. **7.29. Sensor connector wiring harness, switch the hood: 1 - connector wiring, 2 - sensor-switch hood**

Squeeze the latch and remove the sensor-switch of the holder (Figure 7.29).
Disconnected sensor wiring connector.
Installation is performed in reverse order of removal.

Removing and installing the sensor-back of the door lock switch

Disconnect the wire from the negative terminals of the battery.
Remove the two backlight plate.
Remove the back of the door trim.
Remove the decorative overlay back of the door.
On the wagon models, and Astra GTC pull the fastening bolts on the sides of the holder of decorative lining.
Use a screwdriver to press the lock and disconnected the wiring harness connector.
Remove it from the holder of the laths together with cable.

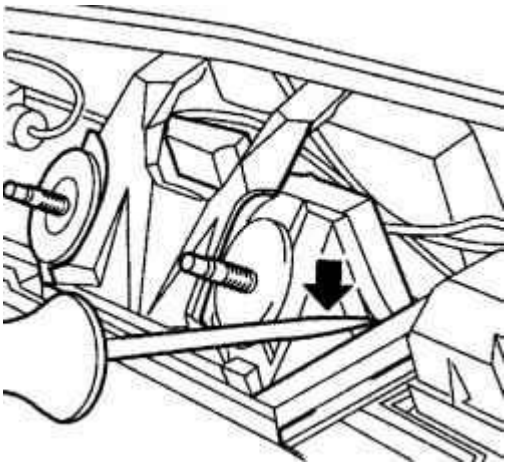


Fig. **7.30. Removing the sensor-back of the door lock switch**

2 Squeeze the release and remove the sensor-switch with the cable from the laths (Figure 7.30).
Installation is performed in reverse order of removal.
Pay attention to the cabling.

Removing and installing speakers

Broadband speakers (front and rear)

To access the loudspeaker clear trim / finish of the corresponding door / sidewall.

NOTE
Loudspeakers are enshrined in door assemblies. At the Astra GTC rear speakers attached to the sidewalls of the luggage compartment.

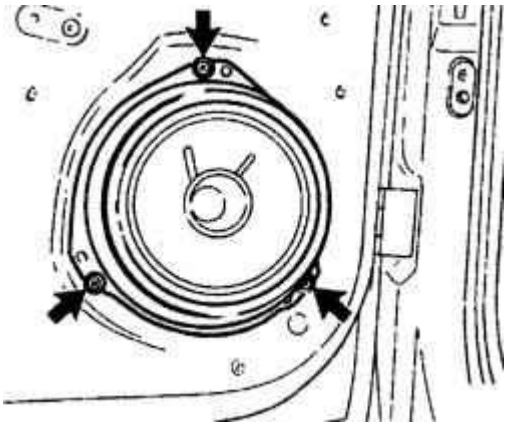


Fig. **7.31.** **Mounting speaker**

Remove the 3 mounting screws and remove the speaker, then disconnected the wiring harness connector (see Figure 7.31).

Installation is performed in reverse order of removal.

Front tweeter

Using a plastic wedge separate triangular pad the front door, remove the foam insert.

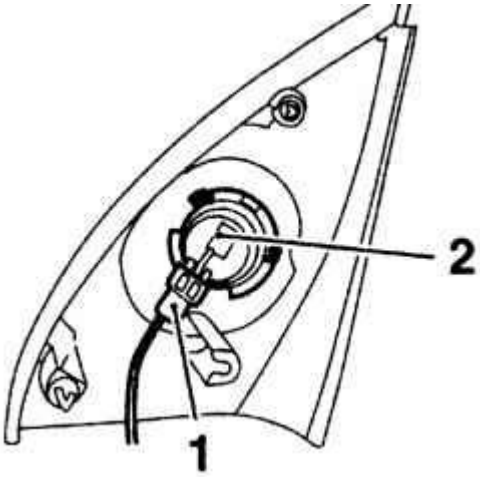


Fig. **7.32.** **Connector wiring Tweeter: 1 - connector wiring, 2 - speaker**

Disconnected connector wiring Tweeter, press the latch and remove the speaker from the seed the jack (Figure 7.32).

Installation is performed in reverse order of removal.

Loudspeaker on the dashboard

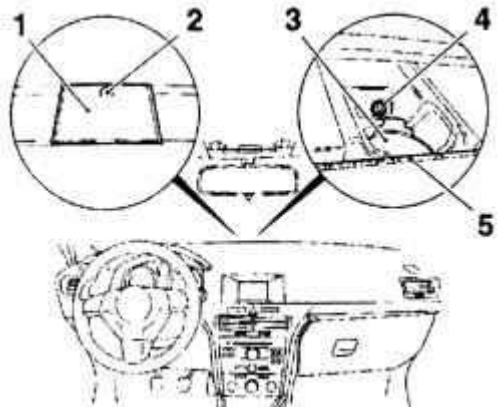


Fig. **7.33.** **Removing the speaker from the dashboard: 1 - cover the loudspeaker, 2 - sensor sunlight, 3 - speaker 4 - machine screw, 5 - Deflection blowing the windscreen**

Using a plastic wedge poddente and separate the cover from the loudspeaker of the instrument panel (Figure 7.33).

With the appropriate configuration disconnected the wiring connector and remove the sensor of sunlight on the back side of the cover.

NOTE
Do not miss the cable hole in the dashboard.

Separate deflectors blowing the windscreen of the dashboard and remove the fixing screw located beneath them.
Remove the mounting screw, remove the speaker and disconnected the wiring harness connector.
Installation is performed in reverse order of removal.

Removing and installing the outdoor antenna

Open the back of the door.
Remove with a plastic wedge rear ceiling pad.
Remove the top trim rack C / D (back).
Gently pull down the ceiling panel upholstery.

NOTE
Rear ceiling upholstery is fastened to the roof with the help of Velcro.

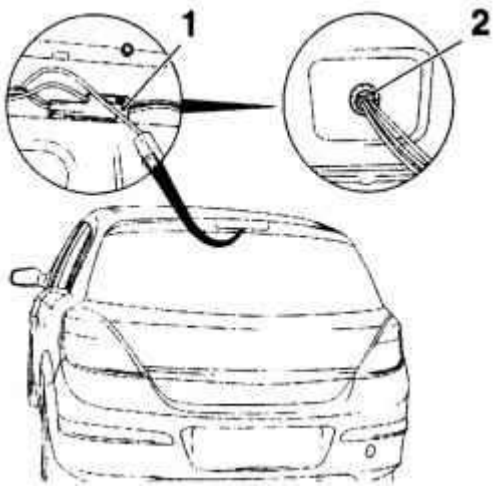


Fig. **7.34.** **Connector wiring and nuts outdoor antenna: 1 - connector wiring, 2 - nuts**

Disconnected the wiring harness connector from the base of the antenna (Figure 7.34).
Loosen the lock nuts, disconnect the cable and pull the antenna out of the hole in the roof of the car.
Installation is performed in reverse order of removal.
Tighten the nut fastening the base antenna required moment 5 Nm

7.4. Tables

Table 7.1 Generator (Bosch)

Параметр	*Значение*
Идентификационный номер	0 124 225 024
Тип	6CB2 14V70A
№ по каталогу Опель	91 92 823
Номинальное напряжение*, В	14
Максимальный ток, А	71,4
Ток, А:	
при 1500 мин$^{-1}$	29,1
при 6000 мин$^{-1}$	70
Контактные кольца (новые), мм	15,6
Минимальный диаметр, мм	14,9
Щетки (выступание), мм	13,2
Обмотка возбуждения (сопротивление), Ом	1,8–2,8
Обмотка статора (сопротивление), Ом	max. 0,10–0,11
Напряжение регулятора**, В	14,5

Table 7.2 Starter (Valeo)

Параметр	*Значение*
Идентификационный номер	D6RA162
Тип	24 B9 1007 FP
№ по каталогу Опель	091 308 38
Испытания в режиме холостого хода	
Ток, А	<70
Частота вращения, мин$^{-1}$	2500
Напряжение, В	11,5
Испытания в режиме короткого замыкания	
Напряжение, В	5,6
Ток, А	450–650
Момент, Н·м	
Частота вращения, мин$^{-1}$	
Электромагнитное реле	
Напряжение срабатывания, В	<7,5
Ток, А	<30
Зазор между ламелями коммутатора	
Степень износа, мм	0,3
Щетки	
Минимальная длина, мм	13

8. Body

8.1. Design Features

Central and door locks

8.2. Suspended elements

Removal and installation of body linings (moldings)

NOTE
Front bumper moldings are made as part of a common bumper moldings and removed along with it.

Thresholds for bumpers
To remove the rear bumper molding, you must first remove foam insert pads from the rear bumper.

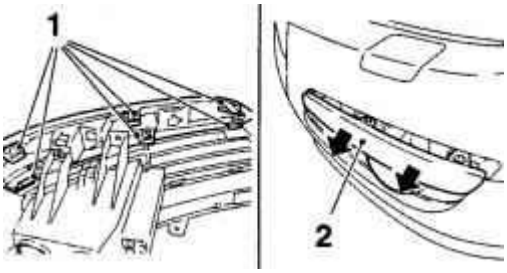


Fig. **8.1.** **To remove the pads to squeeze the latches on the back of the lid rear bumper: 1 - latches, 2 - lining**

Squeeze the latches on the back of the bumper cover and remove the pad (Fig. 8.1).
Installation is performed in reverse order of removal.

Laths in the back of the door

Disconnect the wire from the negative terminal of the battery (see Chapter 5).
Remove the back of the door trim (see Section 15).
Disconnected electrical connector near the back of the door with a decorative cover plate.

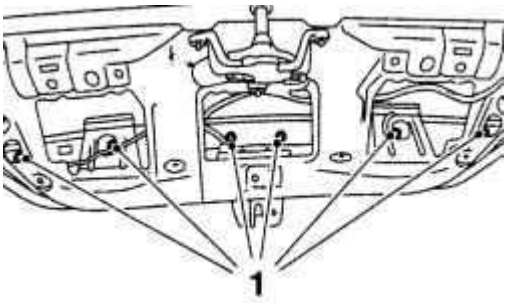


Fig. **8.2.** **Nuts decorative lining the back of doors: 1 - Nuts**

Loosen nuts and remove the laths (Fig. 8.2).
Installation is performed in reverse order of removal.

NOTE
Central studs decorative strips when installing additional smearing sealant.

Removing and installing fairing lattice

Remove the wiper levers.
Disconnect and remove the rear engine compartment bulkhead rubber seal.
Lift the grate of the fairing of the rear engine compartment bulkhead.

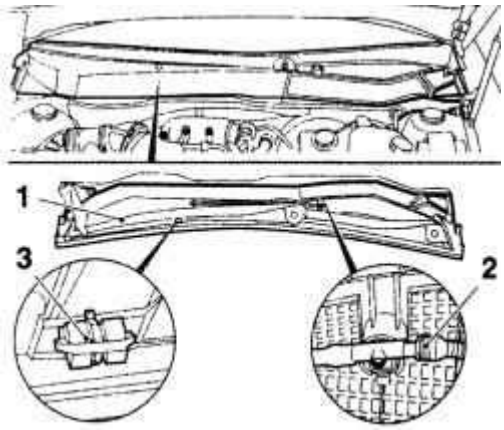


Fig. **8.3.** **Rivets mounting lattice fairing: 1 - fairing, 2 - clamps, 3 - hose washers**

Inside wring 5 internal fixation devices (Fig. 8.3).
On the back of the grid disconnect the hose washers.
Installation is performed in reverse order of removal.

Removing and installing wheel arch protection

Remove the appropriate wheel.

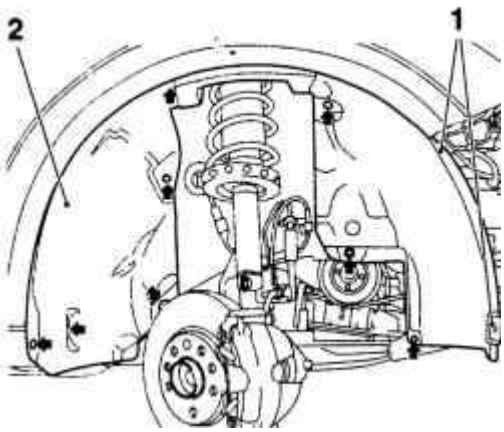


Fig. **8.4.** **Mounting security front wheel arch - the arrows indicate spacers rivets arch: 1 - mounting screws and 2 - protection of the arch**

To remove the front wheel arch protection remove the 2 fixing screws, remove the spacers 8 rivets, and on the back of the arch - 2 fixing screws and 2 lock nuts and remove the protection (Fig. 8.4).
Installation is performed in reverse order of removal.

Removing and installing the front bumper / bumper moldings

Remove the decorative grille.

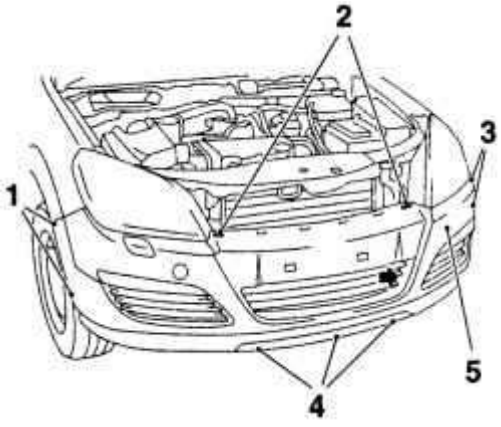


Fig. **8.5.** **Mounting pads front bumper: 1, 3 - mounting screws, 2, 4 - locks, 5 - lining**

Remove the front bumper mounting plates (Fig. 8.5).
Release the temperature sensor of the holder on the grille bumper moldings.
With proper configuration, disconnect the wiring fog lamps, and headlamp washer hose from the tank with the liquid for washing of glass - collect spilled liquid.

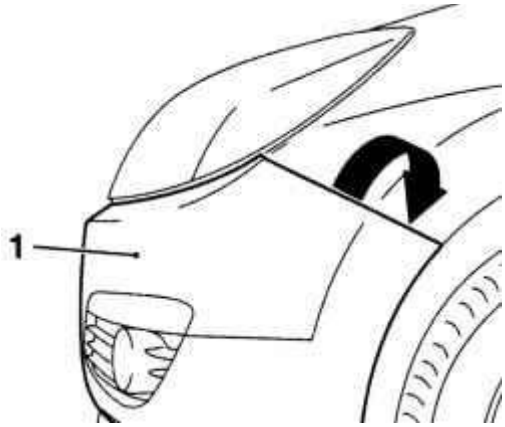


Fig. **8.6.** **Push down on the side fasy lining the front bumper and release the pad from the side rails: 1 - lining**

Click on the side fasy bumper pads in the direction of up and release the pad of the side rails (Fig. 8.6).

NOTE
Be careful - do not damage the attachment bumper moldings.

Release the bumper pad of the front guide, located on the beam between the bumper lights, and with the help of an assistant remove the pad.
Remove the headlamp.

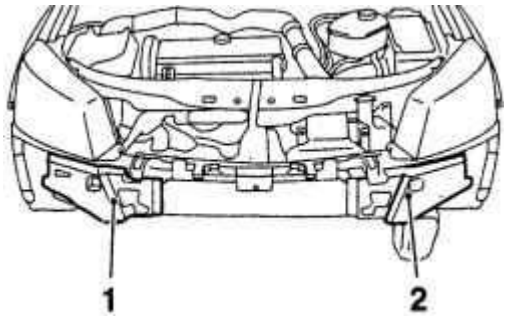


Fig. **8.7.** **Lateral support pads bumper**

Remove the side support pads bumper (see Figure 8.7).

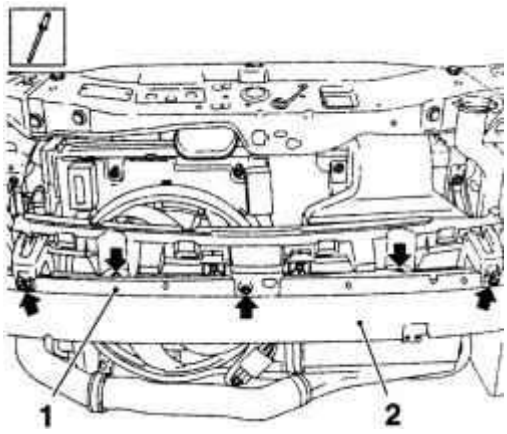


Fig. **8.8.** **Concealed rivets (indicated by arrows) front mounting rail to the front bumper beam: 1 - mount the front rail, 2 - front bumper**

Rassverlite heads of the five hidden rivets, vybeyte rivets and remove the front bumper beam to the guide (Figure 8.8).
Cut the mounting wiring and remove the tourniquet from the bumper beam.

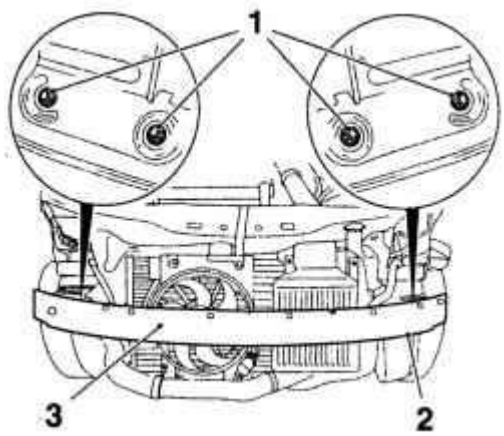


Fig. **8.9.** **Bolts fixing the front bumper beam: 1 - bolts, 2 - place the fluid retention reservoir for washing of glasses, 3 - the front bumper beam**

Remove the fixing screw and remove the bumper beam tank with liquid for washing of glasses (Fig. 8.9).
Loosen the 4 nuts, remove the mounting bolts and remove the beam from the frame.
When you install a beam to use the new mounting bolts and nuts. Flange beams bumper after tightening the bolts for protection should be sealed with wax.
Further installation is in reverse order of removal. To mount the front rail using new rivets, and the slide should be displayed on the center hole.

Removing and installing decorative radiator grille

Open the hood and remove the 4 spacers from the rivet plate holder lock the hood.

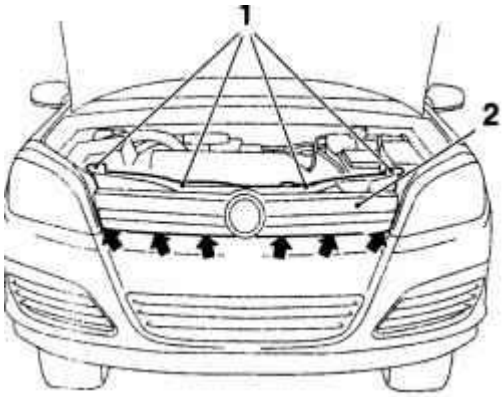


Fig. **8.10.** **Rivet fastening decorative radiator grille (the arrows indicate the location of catches): 1 - rivet fastening, 2 - decorative grille**

B. Squeeze the retainers and remove the grille from the bumper pads (Figure 8.10).
Installation is performed in reverse order of removal.

Removing and installing front wings

Remove the lamp, side repeater flashers.
Remove the protection of wheel arches.
Remove the pad front bumper.
Upon removal of the right wing on gasoline models, release nuts, remove the carbon adsorber system EVAP, take him aside.

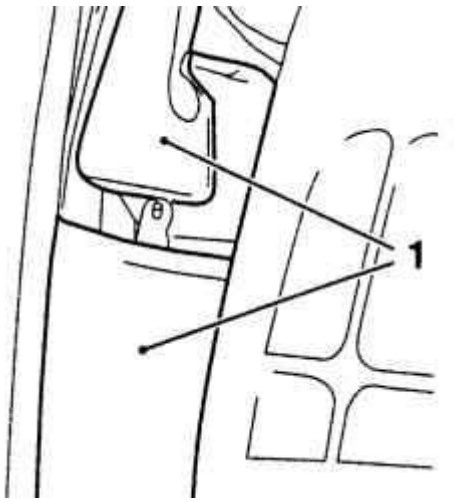


Fig. **8.11.** **Isolation wing: 1 - isolation**

Remove the isolation of the wing (Figure 8.11).

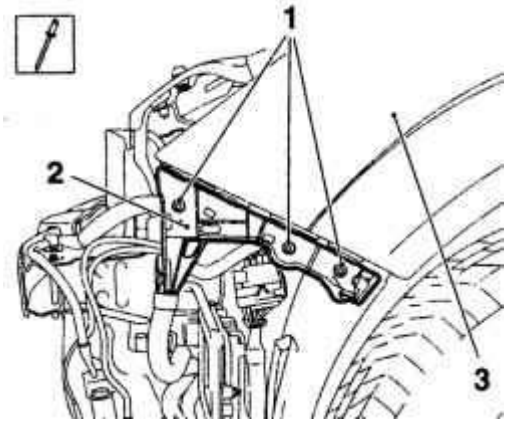


Fig. 8.12. **Rivets side guide front wing: 1 - rivets, 2 - side slide 3 - wing**

If the removal of the wing is made with a view to its eventual replacement, must be removed from his side rail (Figure 8.12).
Rassverlite heads of the three rivets and rivet vybeyte of planting holes.

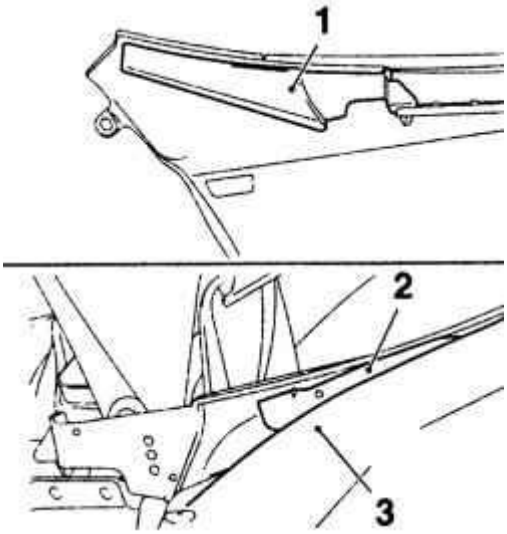


Fig. 8.13. **Tape for installation lining the front wing on the frame of the windscreen: 1 - tape 2 - lining, 3 - frame of the windscreen**

Remove with a plastic wedge pad wing of the windshield, then remove the tape from the frame (Figure 8.13).
Stick the edge of the wing tape.

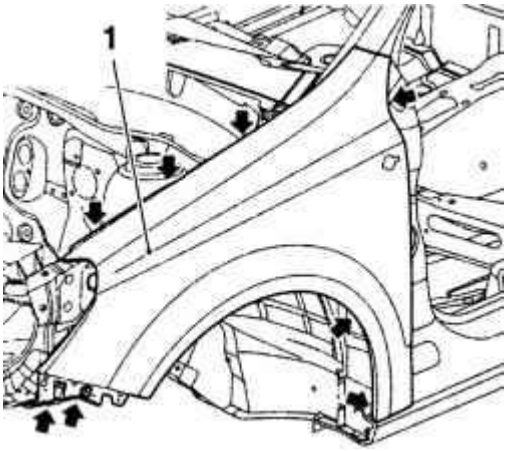


Fig. 8.14. **Bolts (indicated by arrows) front wing mount**

Open the front door, remove the 8 fixing screws and remove the wing (Figure 8.14).

NOTE
When replacing the wing remove the old and install a new clamping nuts headlights, hood seal and overlay of the wing.

When installing a new wing of the stick, a length of 5 cm, two-sided adhesive tape on the pad of the wing.
Keep a pad under the windscreen sealant and glue to the windscreen.
Cover the surface with a special varnish those new wing, which after installation will be inaccessible.
Clean the mating surface of the wing, where necessary to align them.
Install the wing and set a uniform gap between adjacent elements of the bodywork.
Fasten the wing onto the pad, replace the bolts.
Installation is performed in reverse order of removal.

Removal, installation and adjustment of the hood

Withdrawal

Open the hood and disconnected from the gas-filled telescope focus, for which little lift a screwdriver locking bracket and bring out a rack from the top of the spherical bearing.
To install circle marker position hinges on the bonnet.
Remove the 4 fixing screws (for 2 on each side), then with the help of an assistant remove the hood and set it aside.

Setting

With the help of an assistant, install the hood, align the hinge plates on the inflicted in the process of dismantling tags, then tighten the mounting bolts by hand.
Close the hood and align it in the Touring Car doorway.
At the end of adjustment tighten the bolts and secure the upper end of gas-filled lock on the bonnet.

Adjustable hood clearances

Loosen the bolts fastening the bonnet (if before it was carried out to remove it).
Close the hood and make sure that the gaps pair it with the right and left wings are the same, if necessary, make appropriate adjustments, then tighten the bolts fastening the bonnet with the required effort.
By rotation of the two damping stops, mounted on a bracket holder lock the hood, adjust the height of the front edge of the latter. The front edge of the hood must rise above the surface of the wings of no more than 2 mm.
Check and adjust the hood latch lock (see below), then remove the rubber emphasis on the 1 rotation. Deviation from the provisions of the closed hood "flush with the surface of the wings" should be not more than 1 mm.

Removing and installing transmission cable release hood latch lock

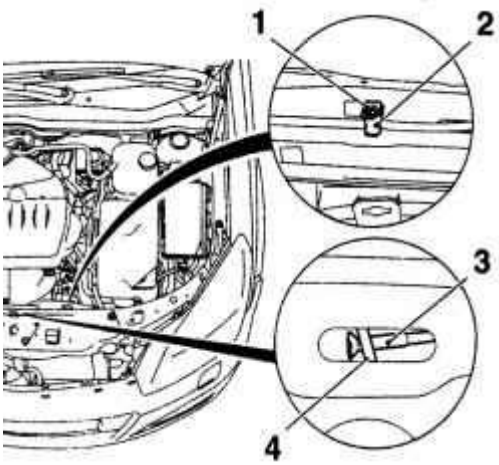


Fig. **8.15.** **Mounting a drive cable to lock the hood: 1 - attachment bolt, 2 - cable holder, 3 - drive cable, 4 - locking bonnet**

Open the hood, remove the screws and remove the cable holder (Figure 8.15).
Disconnect the drive cable from the lock hood.
Remove the cowl grille.
Remove from the back of the engine compartment rubber sleeve, through which the threaded cable drive.
Remove the left lower decorative cover the instrument panel.
Pull the handle of the lever releasing the hood latch lock on the left under the dashboard and release the cable from the holder, then Pull the cord through the salon and disconnect from the lever.
When you install it thread the rope through the hole in the back of the engine compartment, carefully not bend the cable, to lay him to lock the hood, connect and adjust - the tip should be installed at the site of attachment without backlash.

Installation is performed in reverse order of removal.
Before closing the hood test the cable.

Removal, installation and adjustment of the back of the door

Disconnect the wire from the negative terminals of the battery.
Doors open and remove the back of the shelf in trunk (with appropriate configuration).
Remove the door trim from the back of the window frame and seal the edge of the back of the door with tape.
Disconnected wiring connector back of the door and disconnect the hose washer rear window (see conj. Illustration).

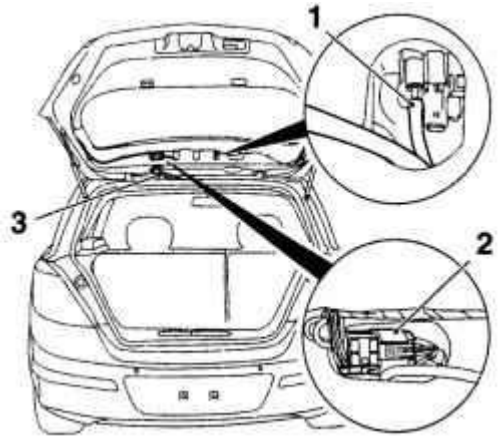


Fig. **8.16.** **The supply line of the back of doors: 1 - hose washer rear window, 2 - electrical connector, 3 - rubber duster wiring**

Pull the wiring from the back of the door (Fig. 8.16).

NOTE
To facilitate the subsequent assembly to attach to the end of the wire cord, which, after pulling the wires will remain in the back of the door.

Few small screwdriver, lift the locking bracket and disconnect the gas-filled alternately rests on the upper spherical bearings back of the door.

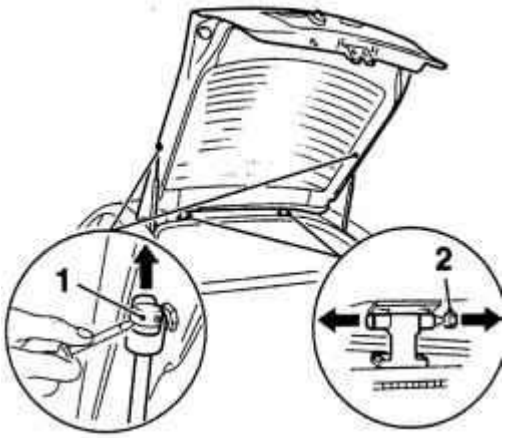


Fig. **8.17.** **Mounting the back of doors: 1 - Lock clamp a gas-filled counters, 2 - retainer axis of the hinge**

Remove the clamps (see illustration 14.6) vybeyte axial finger loops and with the help of an assistant remove the back of the door (Fig. 8.17).
Installation is performed in reverse order of removal. After installing the axial fingers of the hinge pin to close the back of the door and make an adjustment.

Adjustment
Remove the lining of the back of the door threshold.
Remove the 2 screws mounting bracket lock on the bottom edge of the back of the door frame and remove the bracket.
If necessary, remove the trim at the top of the rear rack of the vehicle (C or D - depending on model).
Gently pull down the ceiling panel upholstery and loosen the screws holding the hinge pin.

NOTE
Rear ceiling upholstery is fastened to the roof with the help of Velcro.

Close the door and check the back of the uniformity of the gap between adjacent elements of the bodywork.
The back of the door is adjusted correctly when in the closed position around the perimeter is a uniform gap, and the door is flush with the surrounding bodywork surfaces.
If necessary, adjust gap is shifting back of the door in the appropriate direction.
To adjust the depth of planting the back of the door in the doorway to release the rubber dampers.
Turning to the clips on the angle from 60 to 80 ° counterclockwise. Then install the dampers on both sides so that the back of the door in the closed position freely adjoined to them. Note: To facilitate the adjustment apply to the doughy mass dampers - for a spot on the mass determine if adjacent door.
After setting back the catch to its original position - Installation labels must coincide.
Tighten the bolts fastening the hinge pin with the required effort.
Replace the back of the bracket of the door and tighten its mounting screws by hand. Gently close the door to the back of: clamp will lock into position. Open the door and tighten the bolts fastening brackets with the required effort.
Several times, close and open the door and make sure the back of the correctness of its control and correct functioning of the lock, if necessary, repeat adjustment.
Check the back of the door trim.

Removing and installing door lining the back of

Open the back of the door, remove the shelf in trunk and remove the retention cables shelves of upholstery window frame.

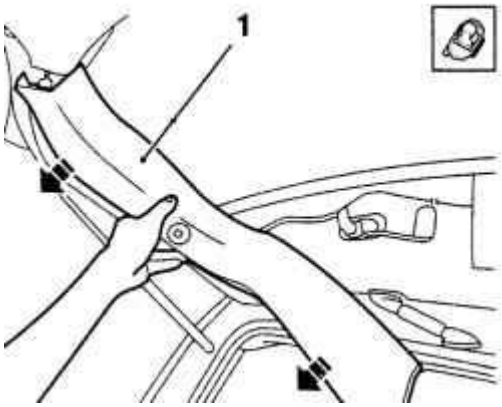


Fig. **8.18. Removing upholstery frame window back of the door: 1 - upholstery frame window**

Enter under the upholstery of the frame window plastic wedge, press 4 release and separate the trim from the window frame first with one, and then the other side (Fig. 8.18).
Remove the back of the pad lock the doors.

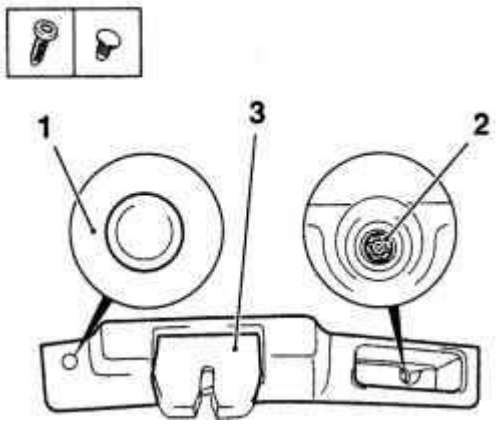


Fig. **8.19. Velcro fastening bolt and lock the doors lining the back of: 1 - lock, 2 - pin 3 - lining the back of the door lock**

Remove the clamp and remove the fixing screw in the frame of a door handle (Figure 8.19).
Enter under the plastic trim wedge or a lever, in turn, release 8 retainers and remove the door trim.
Installation is performed in reverse order of removal. Replace all damaged locks with new ones.

Removing and installing lock the door back of

Disconnect the wire from the negative terminals of the battery.
Remove the lower door trim and the back of the pad lock the door.
Disconnected electrical connector back of the door lock.

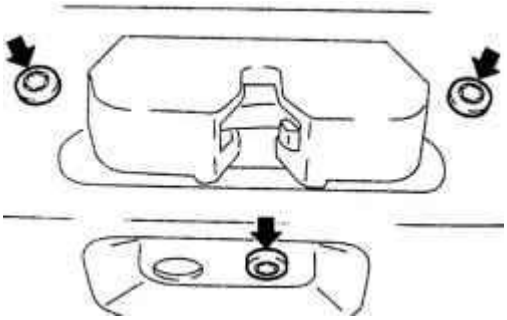


Fig. **8.20.** **Bolts (indicated by arrows) attachment of the door back of**

Remove the 3 mounting bolts and remove the lock from the back of the door (Fig. 8.20).
Installation is performed in reverse order of removal.
After installation, check the correct functioning of the locking mechanism at the back of the door is open.

Removal, installation and adjustment of the side doors

Disconnect the wire from the negative terminal of the battery (see Chapter 5).
Open the door and door seal edges with tape.

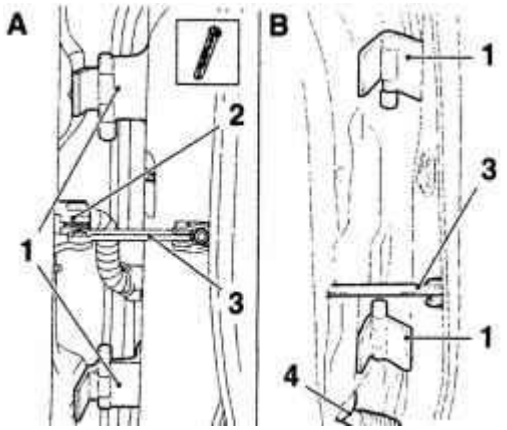


Fig. **8.21.** **Mounting Side Door: A - Front side door B - rear side door, 1 - hinges, 2, 4 - electrical connectors, 3 - door arrester**

Remove the mounting bolt and disconnect the arrester from the door bodywork Stoics.
For disconnecting the wiring connector (see illustration 17.3) front door pull the locking bar red, while turning the socket counter-clockwise, and on the connector back door push the locking bar is blue.
Remove the rubber caps on the door hinge, with the help of an assistant vybeyte axial fingers and remove the door hinges.

NOTE
Axial fingers hinge should stand out from the end, which was wearing the cap.

Installation is performed in reverse order of removal.
Before installing grease axial fingers hinge waterproof grease. After installing the door hinges on the adjustment made accordingly (see below). Tighten the bolts fastening the hinge pin with the desired momentum.
Remove the bracket lock.
Align door Touring Car aperture is accomplished by podgibaniya door hinges. This operation requires a certain experience - if not sure of yourself, contact the service station.
Close the door and check the gap between adjacent elements of the bodywork. The back of the door is adjusted correctly when in the closed position around the perimeter is a uniform gap, and the door is flush with the surrounding bodywork surfaces
If necessary, adjust the door. The front edge of the rear door may be deeper than the trailing edge of the front door no more than 1 mm.

Replace the bracket lock side door and tighten its mounting screws by hand. Gently close the side door, and the clamp will lock into position. Open the door and tighten the bolts fastening the bracket. Several times, close and open the door, check its position and the ease of opening / closing, if necessary, repeat adjustment, and repair damage to the coating, caused by podgibaniya loops.

Removing and installing lock side doors

Disconnect the wire from the negative terminals of the battery.
Remove the door trim.
At the front door clear the 2 fastening at the back of the door frame.
Remove the back of the insulation film, disconnected the wiring connector lock.

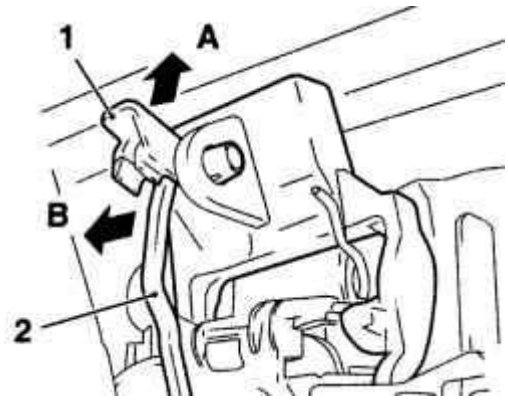


Fig. **8.22.** **Disconnecting the draft door lock (for example, lock the rear side door): 1 - Lock clamp 2 - pull door lock, 3 - lining the back of the door lock**

Take up locking bracket and disconnect the door lock from the thrust bearing (Fig. 8.22).
Remove the 3 mounting bolts on the rear end wall and separate the door lock from the door frame.
At the front door, disconnect traction cylinder door locks.
Remove the lock from the frame.

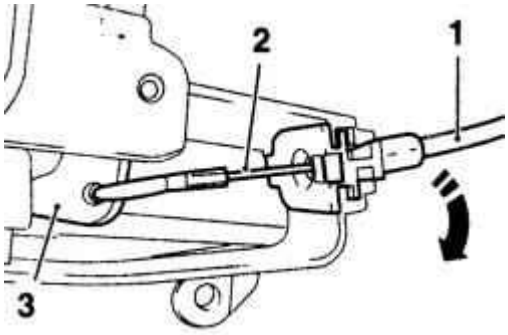


Fig. **8.23.** **The core is a flexible rod for turning the lever locking button: 1 - a flexible rod, 2 - core, 3 - turning the lever**

Release the flexible pull the holder of the door lock and remove the core thrust of the rotary lever locking button (Figure 8.23).
Installation is performed in reverse order snyaiyu.
Do not forget to replace the liner. Do not shut the door, test the locking mechanism.

Removing and installing exterior side door handles

Open the door. On models equipped with the system Open & Start, remove the door trim and disconnected the wiring connector automatic recognition.

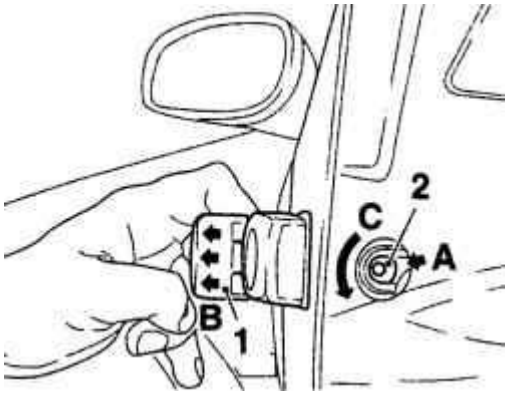


Fig. **8.24.** **Secure the outer knob dragged into position (arrow B): 1 - outer handle 2 - core, 3 - locking bolt**

Using a plastic wedge remove the plug holes on the rear end wall of the door, pull the outside handle of the door and turn the locking screw counterclockwise until it stops - handle should fix dragged into position (Fig. 8.24).
Remove the key cylinder with the body of the door.

NOTE
The front passenger and rear side door lock cylinder is absent.

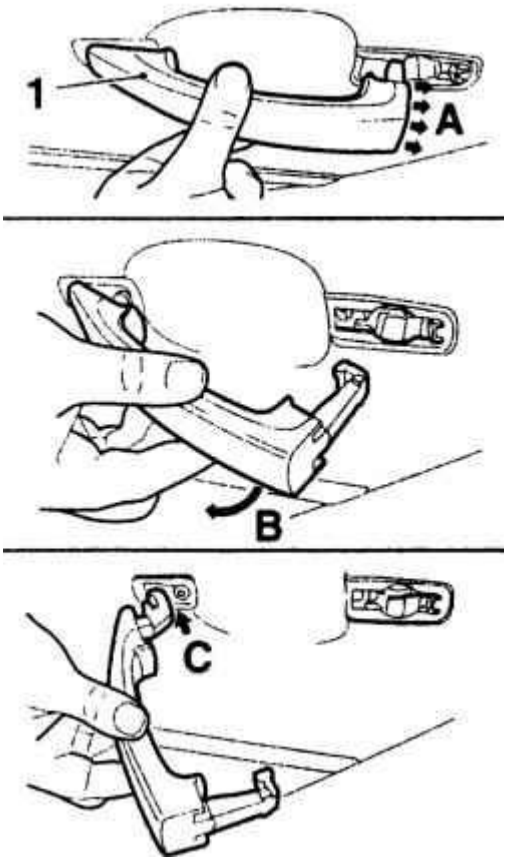


Fig. **8.25.** **Removing the outer door handle: 1 - outer handle**

The order lifting the door handle is shown in Figure 8.25.
Installation is performed in reverse order of removal. The locking bolt to rotate in a clockwise direction, with the need to hold in the situation dragged outside door handle and door lock housing from being rotated.

Removing and installing the base outside door handles

Remove the outer door handle.
Remove the door trim.
At the front door clear the 2 fixation. the back of the door frame.
Remove the back of the insulating film.
Remove the 5-speed propeller, located outside the front door handle anvil.

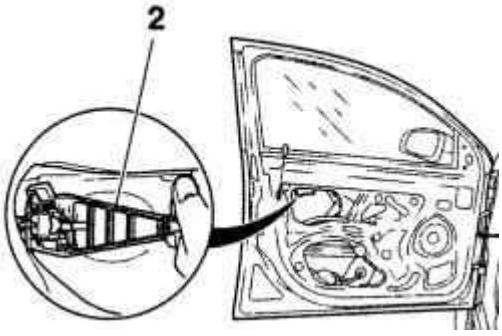


Fig. **8.26.** **Removing oporno1 staples outside of the door knob assembly**

Remove the thrust of the door from a support bracket and remove the bracket from the door assembly (Figure 8.26).
Installation is performed in reverse order of removal.

Removing and installing upholstery, side door

Disconnect the wire from the negative terminal of the battery (see Chapter 5).
Open the door.

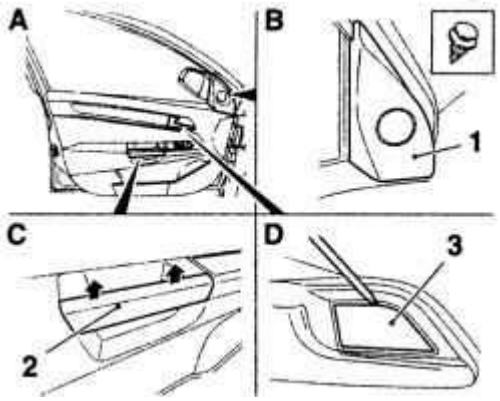


Fig. 8.27. **Removing the front door linings: 1 - the outer lining the front speakers, 2 - door armrest pad assembly, 3 - lining the interior door handle**

Using a plastic wedge separate overlay front speaker pressed the 3 release (Figure 8.27).
Speaker wiring connector disconnected from the inside and remove the pad.
Similarly, taking the pad to remove the armrest pad and door interior door handle. Be careful not to damage the lining.

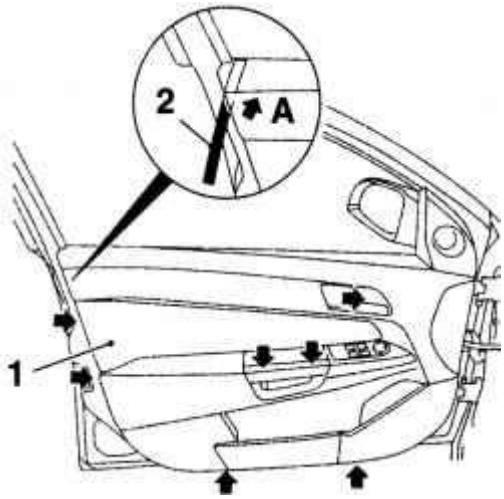


Fig. 8.28. **Studs (indicated by arrows) upholstery side door: 1 - the outer lining the front speakers, 2 - arm pad**

Remove the mounting bolts, using a plastic wedge, separate from the door trim assembly, squeeze clamps 5. Disconnected the wiring harness connector from the back of the upholstery (Figure 8.28).
Disconnect the draft door lock and remove the upholstery.
When removing the rear door upholstery, there are a few features - it is necessary to delete the rear glass door, window lifts off the handle (with appropriate configuration) and unscrew the 4 fixing screws: 2 screws at the door armrests, one bolt on the inside door handle and bottom upholstery.
Installation is performed in reverse order of removal. If necessary, replace damaged locks with new ones.

Care for car body

Removing small scratches

If you scratch the surface and does not affect the metal body panels, its repair is extremely simple. To remove particles peeling paint and wax coating lightly rub scratched area fine grinding paste. Rinse the treated surface with clean water.
Little brush paint scratch paint used for exterior body panels meet. Continue to apply paint layer by layer until, until its surface scratches inside it reaches the level of the surrounding surface refinishing panel. Give the new paint cure for at least two weeks, then abrade the surface of the transition is flush with the surface covering the rest of the panel using very fine grinding paste. Then cover the treated surface with wax.

If the scratch has penetrated through the layer of paint, reaching a metal body and causing its corrosion, you should use a different technology repair. Knife scrape from scratch powdered rust, then treat the surface of the corrosion inhibitor, to avoid the development of pockets of corrosion in the future. Rubber or plastic spatula cover the damaged area inhibitor-treated fillers. If necessary, and this is especially useful when puttying narrow scratches, to form a fine paste putty can be diluted with a solvent. Before the putty hardens within the scratches, wrap the tip of the thumb of a smooth cotton cloth. Then, soak your finger in a solvent, quickly spend it along the putty surface scratches. This will make the surface slightly concave. Now, after setting filler treated with a scratch can be painted in accordance with the instructions given for cases where the scratch does not affect the metal.

Repair dents

When repairing dents priority is extension of the deformed surface in order to launch it to the initial level. Attempts to achieve one hundred percent of the original does not make sense, since it is still impossible because of violations of the internal structure of the metal body panels on impact. The best is to remove the concave surface to a level of approximately 3 mm below the surface of the surrounding undamaged area of the body panel. If the dent is not deep, its full extension has no meaning.

In the case where a concave portion can be reached from the back of the panel should try otrihtovat dent from the inside with a hammer busiest of soft material (rubber, plastic). Tapping dent, tightly to her face of the mallet to absorb the shock pulse in order to avoid excessive bending outwards deformed metal panels.

If the crater formed on the two-layer section of panel, or access to it from the reverse side is not possible for any other reason, you should use a different method of extraction. Make a concave area panel several small holes, hoping that they were buried in most areas of bruising. Then screw the long screws into the holes, leaving their heads sticking out so that for them it was possible to grasp pliers. Now start pulling out dented forceps for screws.

At the next stage of processing dents should be removed from the damaged surface and the section width of approximately 3 cm around the remnants of paint coating. This work is best done with a wire stripping nozzles or disc in the chuck electric drills, but no less effective, and manual processing of sandpaper. The final phase of preparations for puttying is scratching paint peeled from the metal dents with a screwdriver or a fragment file or drilling small holes in it to ensure maximum adhesion of adhesives to the metal surface. Then you can begin to implement the procedures puttying and painting.

Repair of cross-cutting corrosion damage and leaks

With the grinding disc or wire attachments, caught in the chuck electric drill, remove all traces of paint from the damaged area and the section width of about 3 cm around it. In the absence of the possibility of using an electric drill can be accomplished as effectively by hand with sandpaper.

After removal of paint can estimate the extent of damage to metal corrosion and determine whether it makes sense to start would be wiser to repair or replace the entire panel (if it is in principle possible). The new panels can be purchased is not as expensive, as many motorists. Often, much faster and even more economical to install a new panel than to repair the extensive damage to the body.

Remove the damaged panel, all the elements of body decoration, except for those that can serve as a guide to recreate the original shape of the deformed areas (such as lining the block-corrector, etc.). Using scissors or Blades remove all dangling freely, weakly attached and hopelessly corroded metal parts. Then bend the hammer inside edge of the hole for the formation of depressions, which will be filled with putty material.

Use wire brush to remove the damaged metal powdered rust. If you have access to the back of the damaged area, process it, the corrosion inhibitor.

Before puttying hole must be plugged. This can be riveted or privernuv to the damaged section of the back of his hand a piece of tin or blocking the hole with wire mesh.

Once the hole is closed, the damaged section can be plastered and painted.

Puttying and painting

Make many types of body fillers, however, it should be noted that for this type of work best suited attached to a set of body panels to repair putty paste with hardener. In order to achieve the smoothness and accuracy of the contour surface of the putty, paste should be applied flexible plastic or nylon spatula. Strictly following the manufacturer's instructions fillers (violation may lead to incorrect pour putty) implicated a small number of filler on a clean wooden or cardboard surface (carefully use the hardener).

Spatula apply putty on a pre-prepared surface of the damaged section of body panels. To achieve the desired contour surface and the level of filler, each swab spatula must pass through the entire repair area. Once the contour of the surface will be plastered close to the desired, stop cause plaster, as it hardened, will begin to Scallawags spatula, forming clumps, leaving a tear-out on the workpiece. Continue to apply layers of pasta with intervals of about 20 minutes to as long as the level of plastered surface becomes slightly protrude from the surrounding metal panels.

After freezing putty, remove excess files. Next phase begins zashkurivaniya putty and sanding the surface. It is best suited for this purpose waterproof sandpaper. Starting with a coarse-grained paper number 180 and then successively reducing the grain, finish number 600. In order to achieve adequate flatness of the workpiece, the paper pre-wrap around the bar of solid rubber (wood or foam) or stick to it. Processing the paper regularly and frequently moistened with water. This technology allows to reach the absolute smoothness and evenness of the workpiece at the final stage.

As a result, the treated surface should be surrounded by a ring of pure metal. Rinse the treated surface with clean water, washing away from it all, formed during the grinding dust.

From the aerosol can with a thin layer of lotion to the treated surface a light coat, so-called Processing Layer. This will identify all violations committed during polishing defects, which can be eliminated by applying a new layer of putty. Repeat zashkurivanie and grinding. Repeat puttying, processing, and priming the surface to obtain a satisfactory (according to the quality of the surface) result. After rinse the treated surface water and dry it.

Now the surface is ready for painting. Apply the paint from an aerosol spray in a dry room. If circumstances compel to the body paint in the open air should take seriously the choice of suitable weather conditions. If one is painting a car body panels, cover the surrounding undamaged panel. This precaution will minimize the effect of slight differences in the colors of old and new colors. Elements such as chrome decorative trim strips, door handles, etc., should also cover (or rather - just remove). For the protection of non-paint surfaces, use a special adhesive tape (painter's "tape") and old newspapers stacked in several layers.

Before you begin to paint from an aerosol spray can, shake it thoroughly, then apply the paint on the surface of a test, practicing the technique of staining. Cover the prepared surface to paint primer in several stages. Do not spare the water, waterproof abrasive paper number 600, process primed surface, seeking its absolute smoothness. Before proceeding to the final paint, let the primer dry completely.

Apply a coat of paint, again achieving the required thickness by the multiple of its application. Streaking, start from the repaired area, making hand with spray circular motion. Increase the radius, spiraling up until not have covered all the damaged area and part of the old paint coating on the width of about five centimeters. After 10-15 minutes (not later, not to damage the edge of a start-freeze fresh paint) after applying the last layer of paint covering the separate body panels surrounding the newspaper and tape. The paint will cure completely in about two weeks, after which, to smooth the transition from fresh paint to spray before, treat the recovered very thin surface grinding paste. Finally, apply a protective layer on the panel means with wax.

Repair with considerable damage to the body

Repair of serious damage to the body has to take place in a specialized workshop, at the disposal of which has all the necessary equipment.

If there is extensive damage to the body, first and foremost, make sure it did not happen if the displacements of car body elements that could affect the controllability of the vehicle or cause increased wear of any of its nodes.

9. Electrical Circuits

9.1. The designations used on electrical circuits

The most important terminal

Terminal 15 (position «ON» ignition)

Receives power from the ignition. Wires are served food only when the ignition key, and in most cases are green or black with a stripe of another color.

Terminal 30 ("+" battery) This terminal is powered up the battery is in most cases, red or red with a stripe of another color.

Terminal 31 ("-" battery) leads to the mass. Wires are usually brown in color.

General notation

15, 30, 31 numbers of the terminals
5 A, 7,5 A. .. 80A Rated Current relevant elements of the circuit
ABS anti-lock system
AC Air-conditioning
ASP Outside rearview mirror
AT Automatic Transmission
BRAIK switch stop lamps
CLS Contact switch
COMP Compressor
CTS coolant temperature sensor
DWA antitheft alarm device

EU Engine cooling system
ESS (NECC) climate control (without climate-control systems)
EMP Radio
FB5 / FB6 Protectors
FE3, FE4 .. FE33 Fuse, located in the mounting block in the engine compartment with the corresponding
FR1, FR4 ... FR37 Fuse, located in the mounting block in the luggage compartment, with the corresponding
FFD Dvuhrozhkovy horn
FH Door Window
FIL heated fuel filter (diesel models)
FNX Headlamps (except xenon)
HEAT Heater
HSCAN-H Hi-Speed CAN High (1)
HSCAN-L Hi-Speed CAN Low (0)
HSH heater rear window
HZG / AC heater / air conditioner
INS Instrument cluster
IRL interior lighting
KSP Fuel Pump
KSR relay fuel pump
LHD left-hand steering
LMD in Light door
LSL Directional individual lamps rear seats
LSW lighting switch
M1S Microphone
MIR-L / R External rear-view mirror (left / right)
IC Engine cooling system
AIT Robotic Transmission
NAC Without air-conditioning
PPS gas pedal position sensor (general symbol)
PEDALSEN-D accelerator pedal position sensor - Diesel Models
PEDALSEN-P gas pedal position sensor - petrol models
PEPS Open & Start System
PP Help System with parking
PU Fuel Pump
RAIN Rain Sensor
RC Remote
RHD Right-hand steering
RSH heater rear window
SBUL switch reversing lamps
SCC switch center console
SD upper glass hatch
SDD driver's door switch
SLS brake switch signals
SMP Build ashtrays
STA System Start & Laden
STT switch system Easytronic
SW-HEAD Build outdoor lighting switches
TEL Telephone
TL Direction indicators
TWA Twin Audio system
XNL Xenon headlights
WA wipers (front / rear - a generic term)
WA-HL Headlamp washers
WI-F front windshield
Wl-in rear window wiper
ZV single lock

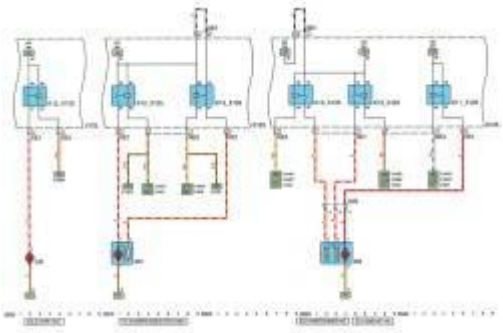
Electrical components
A1_A60 Distribution device heating and A / C
A1_H125 Electronic module assembly hood fuse block
A1_H131 Electronic module cabin mounting fuse block
A2_H131 Electronic module trailer coupling
A13 Building diffusers HVAC system
A40 ignition module

A60 Building diffusers HVAC system
A84 engine control module
A105 Built-in electronic module steering column
A111 regulator throttle position
V1_E68 Microphone
V1_M8 fuel level sensor in the tank
B1_Y21B sensor system Twinport
V2_E68 sensor antitheft sitemi
B9, V9N horn with the alarm
B18 Pressure Sensor A / C
B22 pedal position sensor
V28 camshaft sensor
OPV pulse sensor crankshaft
V39, V39A, V39V coolant temperature sensor
V57 Postkatalitichesky lambda probe
B64 temperature sensor incoming air stream
B65 Sensor firing angle
V67 absolute pressure sensor in the intake tract
V86 Rain Sensor
V135 Sensor Clean Air
V166 Heated dokatalitichesky lambda-probe
E1_E68 front cabin lamp
E1_E119 (L / R) Driving (left / right headlamp)
E2_E119 (L / R) Main beam (left / right headlamp)
EZ_E119 (L / R) Direction indicator lights (left / right headlamp)
E4_E119 (L / R) position (parking) light (L / R)
E62 lamp trunk
E67 front cabin lamp
E69 (L / R) fog lamp (left / right)
E72D lamp driver door
Fixture E72R front passenger door
E79 Brake light upper level
E82 lamp chief glove compartment
E94 Rear cabin lamp
E98 (L / R) lamp lights, license plate (left / right)
E106 (L / R) rear combination lamp assembly (left / right)
E106 (L / R) .1 Rear Clearance (L / R)
E106 (L / R) .3 reversing lamp (L / R)
E106 (L / R) .4 indicators (L / R)
E106 (L / R) .5 The rear fog lamp (L / R)
E106 (L / R) .6 The rear marker lamps / stop lamps
E119 (L / R) Building-block lights (left / right)
E120 (L / R) lighting vanity mirrors (left / right)
L2A Injector first cylinder
L2B Injector second cylinder
L2C Injector third cylinder
L2D Injector fourth cylinder
L7 Compressor Clutch A / C
M1_M8 Fuel Pump
Electric drive M1_A13 suction valve
M1_E119 (1_ / H) control the direction of optical axes of the headlights
M2_A60 Electric air mixing valve
MH, MZA, MZT Electric fan cooling system
MZ_A60 Electric valve air distribution
M4_A60 Electric damper system of air circulation
Electric drive M5_A60 suction valve
M8 Fuel Tank
M10D Electric window lifts the driver's door
M10R Electric passenger door window lifts
M11D Assembling left outside mirror
M11D. 1 Electric motor control of the left exterior mirror
M11 D. 2 Electric folding exterior mirrors left and transfer it into position
M11 D. 3 Heating of the left exterior mirror
M11R Building right outside mirror
M11R. 1 Electric motor control of right outside mirror
M11R. 2 Electric folding exterior mirrors and the right of translating it into position

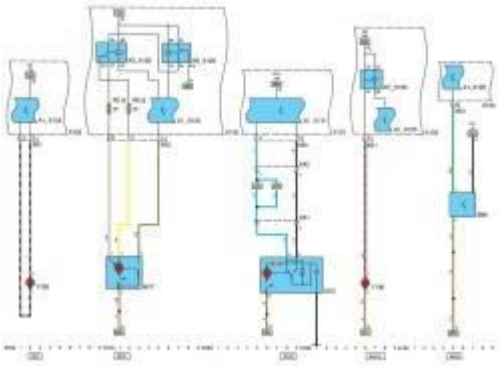
M11R. SW Heating right outside mirror
M12 Electric rear window wiper
M17 Electric windscreen wipers
RE Combination Devices
R1 cigarette lighter
R1_A60 resistive electric fan assembly of HVAC
R22 rear window heater
R27 heater fuel filter (diesel models)
S32 switch reversing lamps
S122 Building exterior lighting switches
5122.1 Rotary switch modes of operation of outdoor lighting
5122.2 control backlight brightness of the instrument panel (potentiometer)
5122.3 regulator directions of optical axes of the headlights
S 122.5 switch fog lamps
S122.6 switch back hazy lights
Build S112R switch passenger door window lifts
S218 Dual switch stop signals
Y1_A13 regulator air in the cabin
Y1_Y21B Electromagnetic valve system Twinport
Y21B Block Twinport system
Y56 Electromagnetic valve exhaust gas recirculation
Y105 pump windscreen and rear glass
Y106 pump light washers
Y123 Electromagnetic valve of the ventilation system of the fuel tank
Y158 Thermostat
Plug connectors
E68 body - the front section of the ceiling console
E68.1 front section of ceiling console - Sensor Alarm
E68.2 front section of ceiling console - a microphone
E68.3 front section of ceiling console - backlight
X1 Body - dashboard
HZ Body - the body (front)
X4 body - the front passenger door
X6 Body - driver's door
X10 Body - Fuel Tank
X16 Body - Roof
X24 Body (chuck) - engine cooling system
X26 Body (chuck) - engine cooling system
X38 trailer wiring connector
Õ41 Body (Zadok) - back of panel
X42 Body (Zadok) - the back of the door wiring harness connector
X44 Body (Zadok) - trailer wiring connector
X51 Connector wiring back of the door - the back of the door
X60 engine - the engine / gearbox
X62 positive terminal of the battery - the motor gearbox
X63 Engine - injector
Front socket H112FR PTO
H125 hood mounting fuse block
H131 exporter mounting fuse block
CS engine - engine control module
HS10 Engine / gearbox - the engine control module
HS40 dashboard - system control HVAC
HS41 dashboard - system control HVAC
HS47 steering wheel - built-in steering column
HE1 Body (chuck) - TV engine compartment
HE2 Body - TV engine compartment
HEZ Engine / gearbox - electric power in the engine compartment
XR1 Body (Zadok) - TV back of
XR4 body - the back of TV
XR5 body - the back of TV
XR7 Body (Zadok) - Rear electric power
Additional symbols
ASC Rosette PTO
ACSEN Sensor System A / C
AZV Trailer coupling
CIG cigarette lighter

FOG-F9 Fog lights
FL-NXNL Headlamps (except xenon)
GLOV-L Highlighting the main glove compartment
HOR horn with the alarm
Light, license plate KZL
LAMP-D Door Lamp (backlight door)
LIG-R rear light
SHL Lights vanity mirrors (in sunshield)
SL-M Stop-signal top-level TRUMPETDM switch the alarm
TRUNK-L Lights trunk

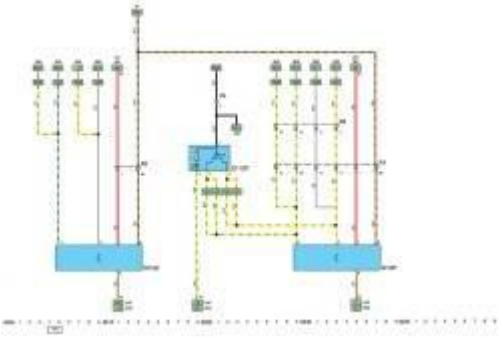
9.2. The cooling system of engine (engines Z14XEP, Z16XEP, Z18XE and Z17DTL)



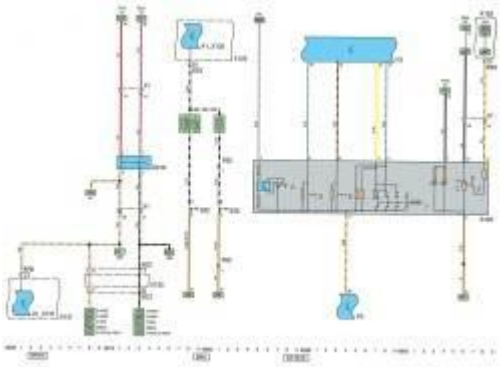
9.3. Front and rear steloochistiteli / rain sensor / headlamp washers



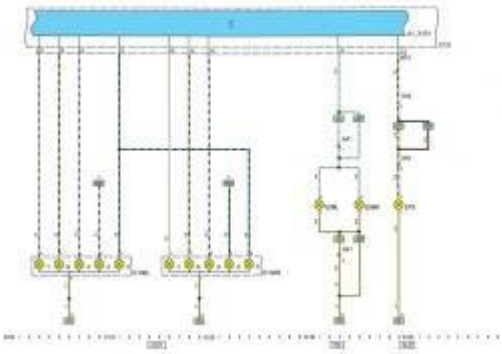
9.4. Windowlifter



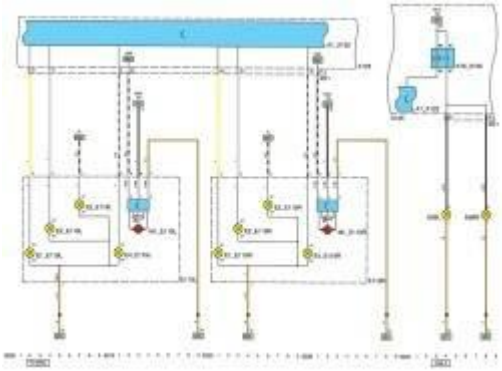
9.5. Switch stop-signalov/Vyklyuchatel reversing lamps / switches Control outdoor lighting / lighting of the dashboard



9.6. The rear combination lamps / Podssvetka license plate / brake light upper level



9.7. Headlamps (except Xenon) / Fog lights



9.8. Domestic interior lighting / PTO socket / cigarette lighter / Lighting bogazhnogo Branch