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APPLICATION OF GAS CYLINDER EQUIPMENT TO THE SYSTEM OF INTERNAL COMBUSTION ENGINES IN UZBEKISTAN

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ABSTRACT

This article describes the types of gas cylinders used in modern cars, operating conditions and their improvement

Keywords: Gas cylinder, equipment, converting, pressure, dispenser, injectors, evaporator petrol modes, gas miture.

Today, there are 4 generations of equipment for converting cars to gas (currently the 5th generation is being tested). The most common of these are the second and fourth-generation gas cylinder equipment.

1st generation gas cylinder equipment:

Vacuum-controlled mechanical networks. They are installed in petrol and carburetor cars. The principle of operation of the first-generation gas cylinder equipment is in the following sequence. The gas cylinder is filled with methane under a pressure of 200 atm and it is connected to the reducer via a steel pipe. In the gearbox, the gas is reduced to 1 atm and enters the mixer and the combustion chamber. A mechanical pressure regulator is installed before the mixer. The petrol-gas connector separates the two solenoid valves.

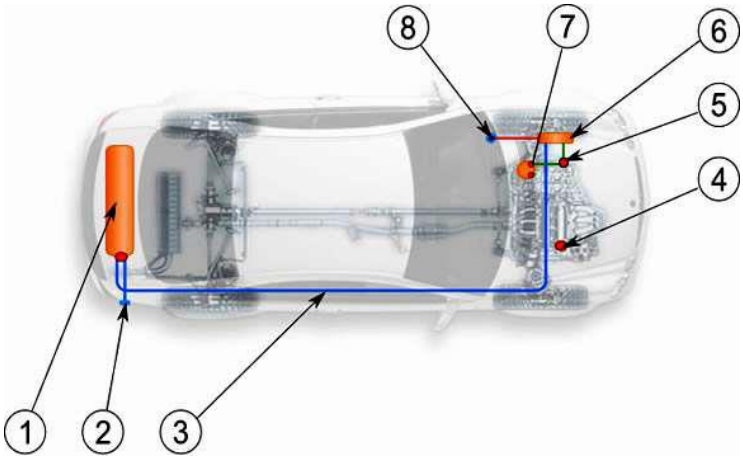

Figure 1.1. Installation scheme of Í generation gas cylinder equipment.
1-gas cylinder; 2 refueling stations; 3- metal gas pipe; 4-solenoid valve; 5th power register; 6-reducer; Mixer 7; 8 fuel type connector

2nd generation gas cylinder equipment:

Mechanical networks are equipped with special electronic measuring equipment. They are designed for cars with injectors

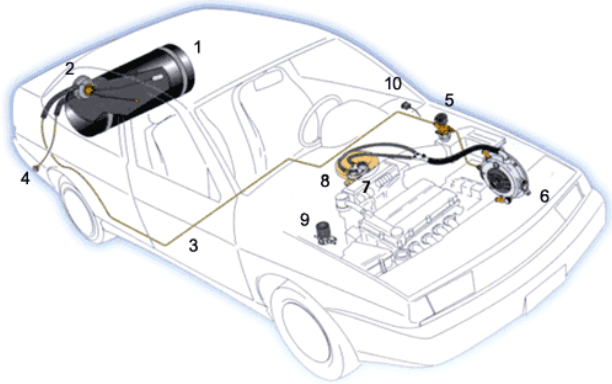

Figure 1.2 Installation scheme of III generation gas cylinder equipment.
1-ballon; 2-valve; 3 high-pressure gas main; 4- refueling device; 5- gas solenoid valve-filter; 6th evaporator reducer; 7-dispenser; 8 gas-air mixers; 9-petrol solenoid valves; 10-"Gas-gasoline" connector.

The compressed gas comes under pressure from cylinder 1 to the high-pressure gas main 3. The gas flow from the cylinder is carried out utilizing a multi-valve 2, through which fuel is also pumped utilizing a refueling device 4. The gas coming out of the cylinder comes to the gas valve-filter 5 through the gas main, where it is cleaned of residues of various additives and resins in the gas. The valve filter also shuts off the incoming gas when the engine stops and runs on gasoline. The purified gas then enters the first stage of the two-stage reducer evaporator 6 along the pipes. Here, the gas pressure decreases to 0.2 MPa, and then, after the second stage, the gas pressure decreases to the

atmospheric pressure value. Due to the reducer and evaporator and coolant, the gas passes from the liquid phase to the gaseous state. The reducer-evaporator enters the gas dosing device from the second stage under the influence of suction generated in the inlet manifold by the operation of the car engine. It then flows through a small pressure hose through a dispenser 7 into an air filter and a mixer 8 mounted between the carburetor throttle. Control of engine operation in gas or petrol modes is carried out using the fuel type switch 10 mounted on the panel where the instruments are located. When the “Gas” position is selected, the voltage at the solenoid gas valve 5 decreases and the solenoid closes the fuel valve. And conversely, when switching from gas to gasoline, the switch closes the gas valve and opens the fuel valve. LEDs are used to control how much fuel the engine is running. The coupler also has a special button that controls the enrichment of the gas mixture.

3rd generation gas cylinder equipment:

Systems that deliver gas synchronously to the distribution dispenser are controlled by an electronic block. The gas passes to the collector through mechanical injectors. The opening of the nozzles is due to the high pressure in the trunk.

The scheme of the III generation (lambda-control system) retains the principle of operation of the equipment of the III generation, the difference is that the power register is controlled by an electronic circuit based on lambda-probe indicators in the engine output manifold. Liquefied petroleum gas (propane-butane) flows under pressure from the cylinder to the high-pressure gas main. Gas consumption from the cylinder is carried out through a multi-valve. This valve is filled with gas filling equipment.

The gas in the liquid phase enters the valve filter through the main. This filter cleans the gas of various wastes and prevents the passage of gas when the car is switched off or switched to gasoline.

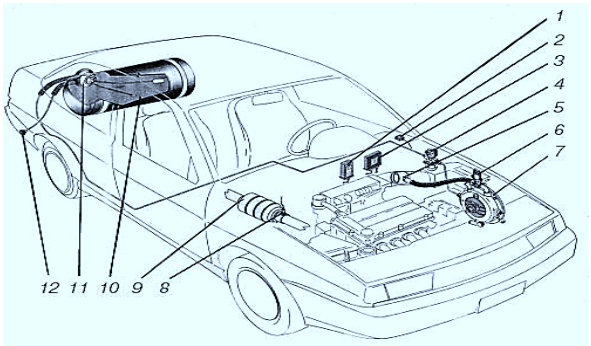

Figure 1.3. Installation scheme of III generation gas cylinder equipment.
1 - injector emulator; 2 - fuel type connector; 3 - control electronic block; 4 - solenoid gas valves; 5 - gasification device; 6 - dispenser; 7 - reducer evaporator; 8 - lambda-probe; 9 - neutralizer; 10 - gas cylinder; 11 - armature; 12 - Injection device.

It then enters the evaporator reducer through a purified gas pipe. Here the gas pressure drops from 16 atmospheres to 1 atmosphere. The gas evaporates quickly and cools the reducer, so the reducer is connected to the engine's water-cooling system. The circulation of the coolant prevents the reducer and its membranes from freezing. As a result of the discharge, the gas flows from the reducer through the low-pressure hose to the mixer located between the air filter and the throttle valves of the carburetor. Sometimes, instead of installing a mixer, gas nozzles are placed directly on the carburetor.

When operating mode (gas or gasoline), the types of fuel located on the instrument panel are switched on. When GAS is selected, the switch connector opens the gas solenoid valve and closes the gasoline solenoid valve. Conversely, during the transition from gas to gasoline, the gas valve closes and the fuel valve opens. By means of LEDs, the switch connector helps to control what fuel is currently being used.

The switch connector may also be equipped with a fuel level indicator on the cylinder (this must be provided with a multi-valve fuel level sensor). The installation of third-generation GBUs in injector cars differs in that an injector emulator is used instead of a gas valve to stop the flow of gasoline. When the gas arrives, this emulator acts as a fuel injector. This is done so that the computer does not go into emergency mode. For this reason, it is necessary to install lambda-probe emulators. This automatically adjusts the optimal composition of the mixture in the combustion chamber for the current operating mode of the engine. This saves fuel and reduces power loss. The lambda control system is used in injector vehicles equipped with a lambda probe.

4th generation gas cylinder equipment:

The electromagnetic injectors are controlled by a more advanced electronic block. As with previous generation systems, the gas injectors are located in the manifold next to the inlet valves of each cylinder. This type of gas cylinder equipment is designed for gas distribution.

Distributed gas injection is based on the principle of sequential spraying, which delivers the required amount of gas to each cylinder through separate injectors. Fourth-generation GBU systems differ in that the gas passes directly to the collector through special gas injectors. They are controlled by a special electronic block. This unit also acts as an emulator. In this case, the car engine is started using gasoline. After starting the engine, the transition to gas mode is made via the switch.

The compressed gas in the cylinder under pressure evaporates in the reducer depending on the composition and the ambient temperature. In this case, the outlet

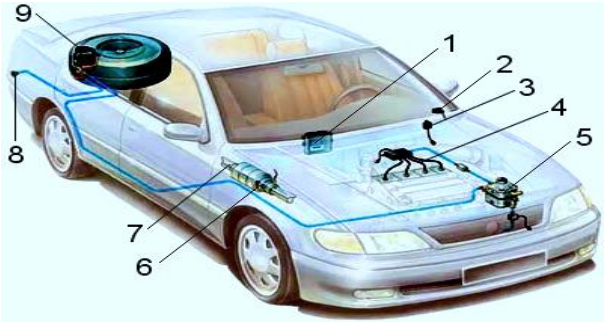

Figure 1.4. Installation scheme of IV generation gas cylinder equipment.
1 - injector emulator; 2 - fuel type connector; 3 - control electronic block; 4 - electromagnetic injectors; 5 - gasification device; 6 - lambda-probe; 7 - neutralizer; 8 - injection device; 10 - gas cylinder.

pressure is 0.95 bar higher than the pressure in the inlet manifold. When the engine temperature is warm enough to add gas, the solenoid valves on the multi-valve and reducer-evaporators open, allowing the connector to control and select the type of fuel.

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