

Evaluation of the Efficiency of the Universal Supply System of Gas Cylinder Vehicles.

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Abstract. This article analyzes the gas supply system cars with gas cylinders, its principle of operation and the types of gas equipment installed in cars.

Key words: car, engine, supply system, compressed natural gas, gas cylinder, safety, gas equipment.

It is known that road transport plays an important role in the development of the country's economy. In order to further stabilize the economy, it is necessary to increase and improve the production structure of cars that emit less harmful substances to the environment and have high fuel efficiency. With the increase in the number of cars, the demand for gasoline and diesel fuels, which are used as car fuel, is growing proportionally, and this in turn requires the use of alternative fuels for cars. Today, inexpensive natural gas is widely used as fuel for cars. Our republic has many reserves of natural gas, and these reserves contain high-quality natural gases that can be used as fuel for automobile engines directly without the use of excess gas processing or chemical treatment technologies. can be used as fuel[1]. In addition, natural gas used as motor fuel has several advantages over petroleum products. When using them, high technical and economic indicators of the engine are achieved, because natural gas has very good anti-detonation properties, and the property of forming a mixture with air is very good. In gas engines, the mixture burns almost completely, and the environment is less harmed due to the fact that the toxicity of the used gases is much lower. Therefore, approximately 70-80% of cars in our republic run on natural gas [2].

Compressed natural gas is in a gaseous state under normal conditions at any pressure, and its composition consists mainly of methane and hydrogen. The use of gases eliminates the washout of the oil film from the walls of the piston and sleeve, reduces the formation of soot in the combustion chambers, due to the absence of gasoline vapors, the oil on the walls of the cylinder liners does not burn, as a result, the life of the engine and the oil change period are 1.5 - Extends by 2 times. The use of gas fuel reduces the total amount of harmful carbon monoxide, nitrogen dioxide and hydrocarbons in the exhaust gases from the engine. In particular, used gas does not contain any lead at all[1]. The toxicity of exhaust gases is 3 times lower when burning gas fuel than when working with gasoline, the level of noise emitted from the engine when the operating mode is selected correctly is low, and this is especially important in urban conditions[3].

The main thing is that switching to gas fuel does not require a radical change in the design of cars with mainly carburetor and injection engines. But since gas takes up more volume when mixed with air than gasoline, the power of gas engines decreases by 10-20% compared to gasoline engines. Also, one of the main disadvantages of natural gas as a motor fuel is the low volume concentration energy. If the heat of combustion of one liter of liquid fuel is 31426 kDj, under normal conditions this value is 33.52–35.62 kDj for natural gas, so the engine power is slightly reduced[1]. Therefore, in order to stabilize the power, fuel-economic efficiency, traction and dynamic characteristics of natural gas vehicles, which have several advantages, it is necessary to further improve their supply system. Nowadays, the fuel supply system of cars running on gas fuel is much improved, and cars are equipped with several modern types of gas equipment. In order to increase the power of the engine running on gas fuel, it is necessary to transfer their supply system to a universal or combined supply system.

In general, gas engine supply systems are adapted for single fuel and multi-fuel (usually dual) operation. Single-fuel supply systems work on only one type of fuel, for example, gas, gasoline or diesel fuel. In turn, the supply system operating on several types of fuel is divided into universal (scheme "or") and combined (scheme "and") types according to the methods of using different types of fuel.

The universal supply system works according to the "or" scheme, that is, such systems allow the engine to use one fuel at a time, and the driver can switch from one type of fuel to another with the help of an electric button.

The combined supply system works according to the "and" scheme, that is, it supplies several (usually two) types of fuel to the engine at the same time [2]. In this case, depending on the voltage of the engine, another type of fuel, such as gasoline, is added automatically, and the engine works without voltage. The working procedure and principle scheme of the universal gas supply system is as follows(Fig.1).

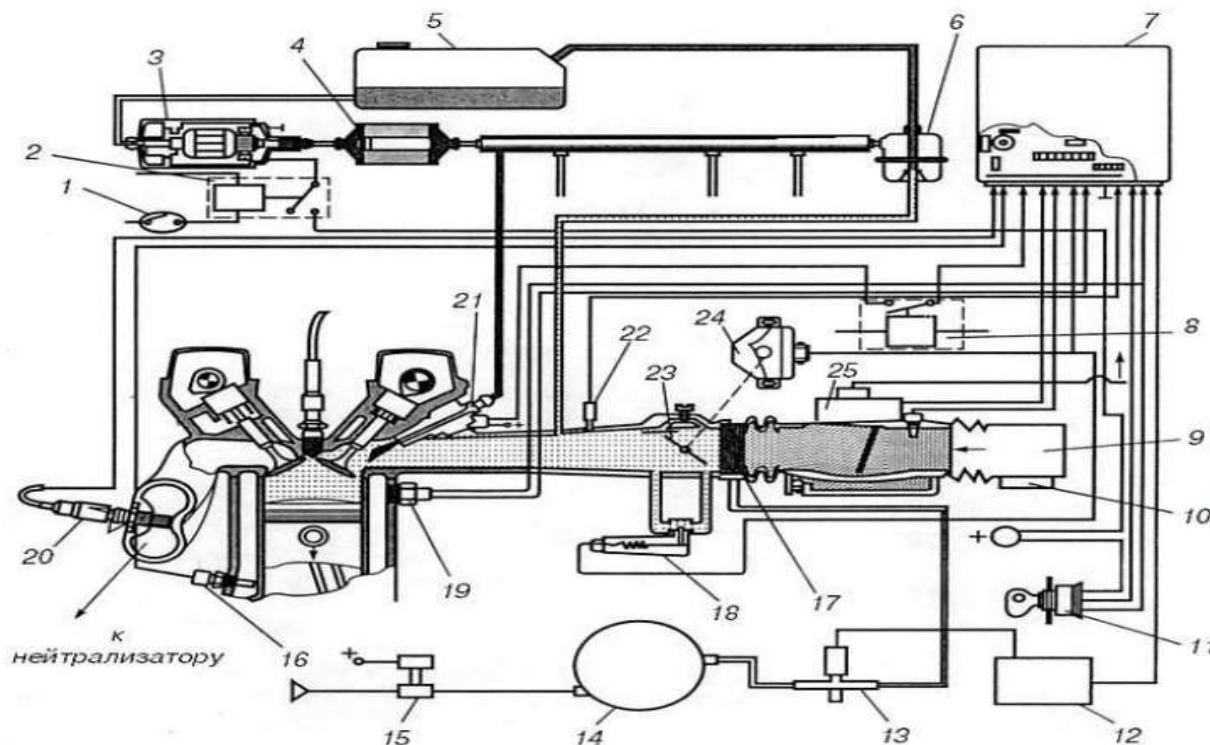


Figure 1 is the principal scheme of the universal supply system.

1 – a switch to "Benzin-Gas"; 2 – fuel pump activation relay; 3 – gasoline pump; 4 – fuel filter; 5 – benzobac; 6 – pressure regulator; 7 – EBV; 8 – injector relay; 9 – air filter housing; 10 – safety valve; 11 – ignition key; 12 – electronic block; 13 – gas dispenser; 14 – low pressure reducer; 15 – electromagnetic valve-filter; 16 – coolant temperature sensor; 17 – gas mixer; 18 – valve of single operation; 19 – detonation sensor; 20 – lambda probe; 21 – gasoline injector; 22 – air temperature sensor; 23 – throttle valve; 24 – throttle valve position sensor; 25 – air consumption meter.

Conversion of carburetor or injector engines to gas fuel allows them to work on two different fuel systems, i.e. on gas and gasoline fuels. The use of two fuel systems helps to increase the total power reserve of motor vehicles and expand their size.

The universal security system is widespread today (90% of car owners prefer this system). Despite having a relatively simple structure, it has excellent technical characteristics. The advantages of the universal supply system are as follows (Fig. 2)

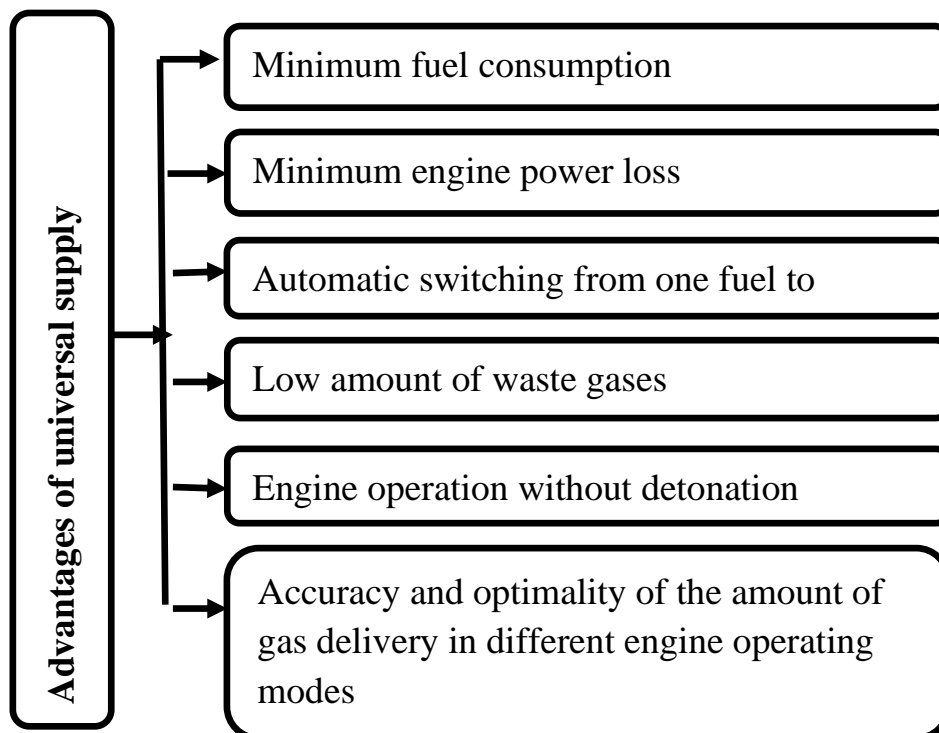


Figure 2. Advantages of the universal provision system.

This supply provides the necessary gas mixture in the system for the engine to work at high power. Installation of gas equipment with a universal and combined supply system on the engine leads to an increase in engine power, the distribution of the fuel mixture at the same rate for each cylinder, a decrease in fuel consumption due to the accuracy of the fuel transfer dose, and the release of toxic gases into the environment. leads to a decrease in the amount, improvement of the dynamic characteristics of the engine (vehicle), reliable engine start-up, and a quick return to normal engine operation mode. As a result of the improvement of this field in the automobile industry of our country, harmful gases can be reduced four times and oil products can be saved by 70%.

In order to achieve high efficiency and reduce the amount of toxic gases released into the air, it is advisable to equip the cars with modern universal and combined gas equipment.

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