

WORKING OF AIRBAG SYSTEM

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In an extreme situation, the airbag system protects a person from a fatal impact on the dashboard, steering wheel, windshield and other parts of the car interior. And airbags are triggered not only when the car collides with another object. In case of a strong impact of the car, the corresponding sensors send a signal to the airbag control module, which determines the severity of the collision with the help of algorithmic calculations. Several kinematic parameters such as acceleration, velocity, jerk, path, energy density, etc. are evaluated. These values determine whether the safety system is triggered or not. If they are above the preset thresholds, the module eventually commands the detonator to open the airbags. In this case, as a result of a chemical reaction, an air bag made of nylon fabric is instantly inflated with gas from a cylinder - ozone or argon. After that, the filled bags are gradually deflated at a certain speed due to small ventilation holes. It is important that the system has time to work in the shortest possible time, before a person comes into contact with an obstacle in the car interior. As a rule, this moment varies within 15-30 milliseconds. The first models of the safety system did not take into account the individual characteristics of the passengers. Later, manufacturers took into account possible differences in size and weight of people by creating a “smart” generator. In it, two squibs are triggered, the first of which triggers 80% of the gas, and if the cushioning is insufficient, a secondary filling occurs to increase the rigidity of the cushion. The mechanism only triggers properly if the driver and passenger are wearing a seatbelt. Each manufacturer has its own airbag system settings. As a rule, airbags react to a direct frontal collision of the car with a rigid obstacle at speeds above 22 km/h, as well as a tangential impact to the front of the car, directed within a 60-degree sector. But that's not all. The airbag system can be triggered by a hard landing after a ski jump or a fall

into a ditch, by hitting a curb or other heavy and solid object or a bump, and even by hitting a deep pothole. The airbags may not deploy depending on the force and direction of the vehicle's impact with the obstacle: for example, when an oblique front end collision is accompanied by longitudinal deceleration. In this case, the parameters may not exceed the set value at which the airbags will deploy. In modern cars, the electronics independently diagnose the airbags by scanning all components of the airbag system. If a malfunction or incorrect operation is detected, a corresponding signal appears on the instrument panel. It looks different for different manufacturers, but most often it is airbag or SRS inscriptions or an icon with a sitting person. Such an indicator lights up in test mode when starting the engine and if it does not go out, there is a problem in the system, although theoretically the cause may be in a simple malfunction of the bulb. In any case, this is an alarm bell and a serious reason to urgently contact a car service, where specialists with the help of appropriate equipment will carry out the necessary diagnostics. And it is better to refuse from various ways to cope with it on your own. Owners of used cars with decent mileage and unknown history should be most concerned about this. Most often there are two reasons for the malfunction of this function - the end of the expiration date or the absence of airbags due to the fact that they have worked and someone has already been safely saved. It is not a secret that in most cases on the restoration of the car, which has been in an accident, try to save as much as possible, and such repairs are often cosmetic in nature. In such a situation, the installation of expensive airbags is usually not included in the plans, and to silence the on-board computer, which controls their technical condition, it is not difficult for a specialist. There are a lot of ways to imitate the operability of the safety system. In addition, instead of real airbags, masters may put a simple piece of cloth for disguise. So the risk of buying a car without airbags on the secondary market is extremely high, so when choosing a car with mileage, you can't do without qualified help. All that an ordinary buyer can do in such a situation is to conduct a more thorough visual inspection of the interior to detect suspicious signs.

References

1. Air Bag Deployment [Electronic resource] – Mode of access: www.avtovzglyad.ru/sovety/ – Date of access: 10.03.2024.