Inspection of Automotive Controllers for Stability via Communication Systems with Specialized Diagnostic Software

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Abstract. Electronic Stability Program (ESP) is a system that increasingly widely occurs and applies in all modern cars. Its basic purpose is to maintain the path of the car according to the specified direction by the driver via the steering. Maintenance and reliability of this system is maintained with certain diagnostic software Delphi ds150e its purpose is through this software tool we can achieve the desired positive results in no time. Also, without this device we can't risk to make repairs of car electronics with a naked eye.

Keywords: Automotive Diagnostic, ESP, Inspection Service.

1. INTRODUCTION

Electronic Stability Program (ESP) it means electronically stabilizing program. This is a system, which is seen and used in most of the present vehicles. Its main purpose is to keep the trajectory of vehicle (Fig. 1).

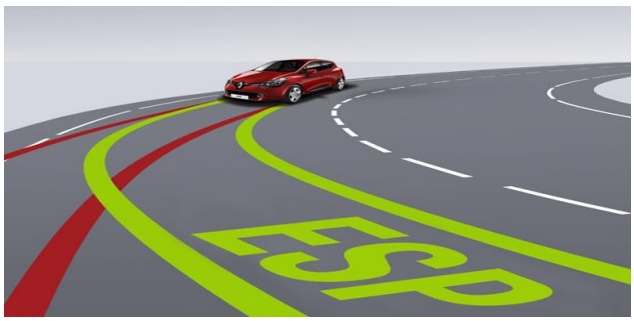

Fig. 1 Trajectory of vehicle

Communication between CPU and the vehicles aggregate ESP. In a present vehicle 90% of the system are controlled from CPU. Inside the computer are implemented so called controls which follow and communicate whit the different aggregates. True there communication they register the parameters inside the memory of CPU which can be faults due to loss of communicative field. Example: Fault Found:

00526 - Brake Light Switch-F

36-00 - Open Circuit

2. ELECTRONIC STABILIZING SYSTEM, MAIN PRINCIPLES

ESP is a safety system of high level and it includes itself in the following systems:

- Anti-blocking system **ABS**;
- Electronic brakeforce distribution **EBD**;
- Emergency detection system **EDS**;
- Anti-slip regulation **ASR**.

In the device are included:

- sensor;
- block for management of the system;
- Hydraulic block.

An example of ESP scheme is shown in Fig. 2:

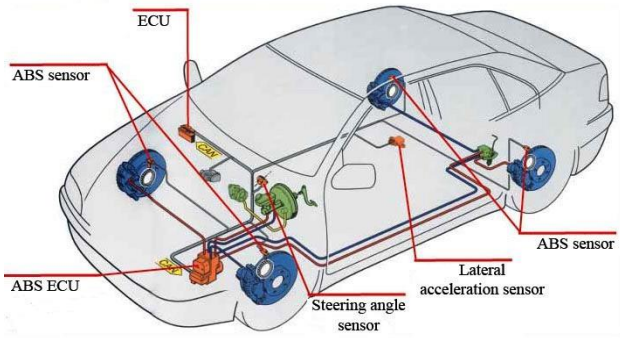

Fig. 2 ESP scheme

The sensors are fixing and transmit in the block for management. The system dynamically accentuates situations to the data base from the reactions of the driver and the parameters from the movement of the vehicle and the sensors and undertakes different kind of decisions to stabilize the vehicle (if needed) true the hydraulic block and the executed devices (ABS, EBD, EDS and ASR). The management block for ESP also interacts whit the systems for management of the engine and the blocks management of the vehicles transmission.

The stabilization of the movement of the vehicle ESP is done true a few ways:

- Regulated transmission to the specified wheels;
- Modifying of the torque of the engine.

Common look of ESP management is shown in Fig. 3:

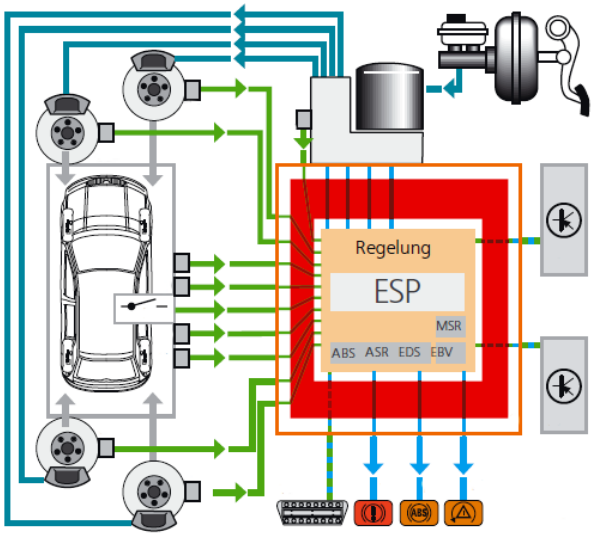

Fig. 3 ESP management

The transmission of the breaking effort to certain wheel can be in a direction of increase, delaying or decreasing of the breaking system and it is done true the following systems ABS, EBD and ASR. The amendment of the engines torque is done true the control unit of the engine and happens true the regulation of the fuel injection and regulation of the submission of the electrical burst impulses. Also the change of the torque may occur due to its pre-distribution between the front and back axis, in the event of drive 4×4.

To the Electronic stabilization system ESP true a program can be add and the following systems:

- Control of a hydraulic amplifier to the brakes;
- Rollover pre-rolling system;
- Collision avoidance system;
- Stabilization system for spinning;
- System for increasing the efficiency of brakes on heating;
- A system for removing moisture from brake discs and other.

System against roll over *ROP (Roll over Prevention)* stabilizes the vehicle in the event of a hazard by reducing the lateral acceleration through the breaking system, and decreases the torque of the engine. The integration to the system of Braking Guard is only possible whit an adaptive cruise control system *ACC (Adaptive Cruise Control)*. Collision prevention through this system is accomplished by automatically delivering audible and visual waves and automatically stops in more critical situations. The system of stabilization when wheels are spinning on place simply stabilizing the vehicle in order to keep it in a steady state when towing a trap device. The system that increases the brake efficiency while overheated *FBS (Fading Brake Support or Over Boost)* prevents insufficient entrainment of heated brake discs, True increase of the pressure of the breakers system. The moisture removal system is activated at a speed higher than 50km/h and when the wipers are switched on. In this mode, the brake is briefly applied to the brakes and the friction and water temperature evaporate.

3. DAMAGE AND COLLAPSE OF ESP SYSTEM. CAUSES AND LOCALIZATION WHITH THE HELP OF THE SOFTWARE

One of the most common problems that comes in ESP system is interruption of the bandwidth.

The consequences of a broken wire lead to the occurrence of a warning alert. ESP light warning is shown in Fig. 4:

Fig. 4 ESP light warning

The alert is indicated in red.

Resolving of the fault:

- way to the spiral band on Fig. 5;

Fig. 5 Way to the bandwidth

- Declaration of ESP trough the software (Fig. 6);

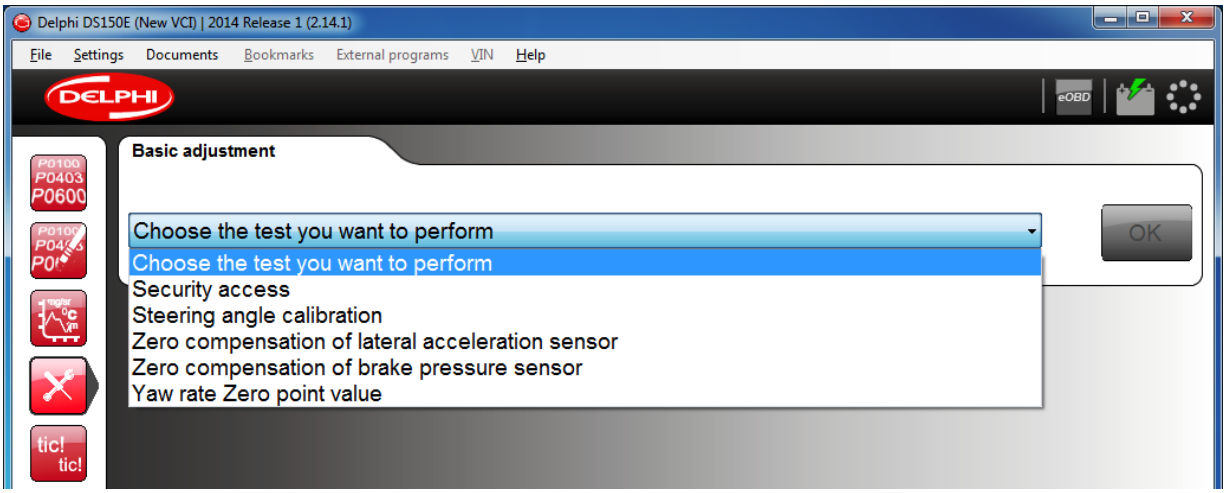

Fig. 6 - Declaration of ESP trough the software

- View of the error is shown in Fig. 7:

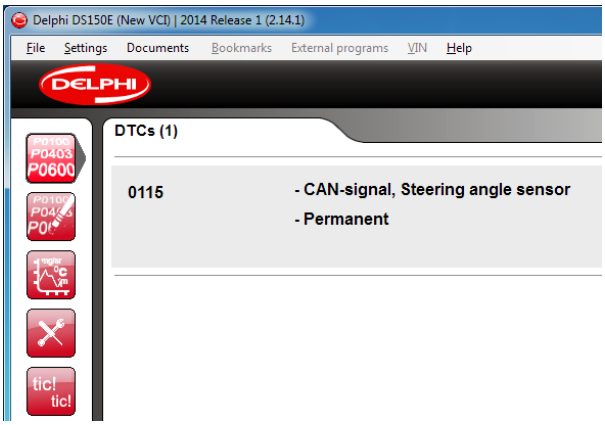

Fig. 7 Viewing of the error

- Changing the ribbon module. The spiral band is shown on Fig. 8;

Fig. 8 Spiral band

- The software intervention for activation is required after the switch true ESP (Fig. 9a);
- Checkup, from the steering wheel after changing the cable and calibrating the

ESP module. On Fig. 9b is message from software;

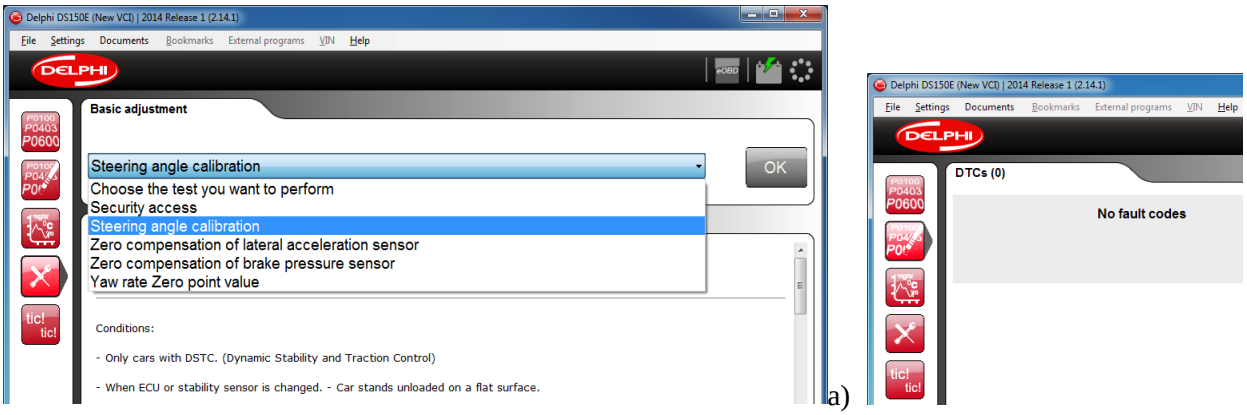

Fig. 9 Checking with software a) and final message b)

4. THE NECESSITY OF ESP

Published in facts: The ever-increasing demands on road safety posed the issue of mandatory vehicle equipment whit ESP. This is expected to take effect gradually – for example, first on trucks carrying dangerous materials. It will later also cover light weight cars what it actually represents ESP and how this system works? Short answer to this question we will try to give now.

ESP is the most common of many existing system redundancies, which helps the driver to overwhelm the vehicle in critical situations through electronics. Depending on the manufacturer, the names are different - ESC, VDC, VSC, DSC, DSTC, but whit every one of them the principle of action is identical.

The aim of ESP is electronics to control the so-called transverse dynamics of the vehicle, thus by this way is preventing slipping and lateral slipping.

The prototype of ESP, under a name "Control Unite", patented by the company Daimler-Benz in year of 1959. However, it was actually introduced into the car not until 1994. From 1995 the system enters in the standard equipment of Mercedes-Benz CL 600, and then as a result in all S-Class. In present day the dynamic stabilization system is virtually available for from the steering wheel.

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