

Electronic Stability Programs - ESP & Trailer Stability Programs - T-ESP



ES-P - What is it and how does it function?

For a number of years, Vehicle manufacturers have been focusing their vehicle designs around integral safety systems. With NCAP (New Car Assessment Program) testing on vehicles becoming more stringent, particular for vehicles built in and imported into Europe, safety features have become paramount.

The original ABS (Anti-Lock Braking System) was a major breakthrough for manufacturers and quickly became widespread throughout automotive design. As with any of the developing safety features now deployed, it is developments in the truck industry which has set the standard for the passenger car producers. The singularly most alarming event that stimulated a greater need for ESP was the Mercedes A class that was easily flipped over on cornering.

With the introduction of multiplexing within vehicles, it was possible to design a braking system which would incorporate a wider operating specification of the braking mechanism. The introduction of EBCM's (Electronic Braking Control modules) which were able to enhance the ABS system to include systems such as ASR (Anti-Slip Regulator) and ASD (Adjustable Speed Drive). Mercedes Benz were the first car company to incorporate these technologies into the nominal ABS system. Traction Control was also incorporated at this time.

With the wide spread use of CANbus systems, manufacturers were now able to add the new safety braking system we now call ESP. Various manufacturers have named their systems accordingly:

Audi: Electronic Stability Program (ESP).

BMW: Dynamic Stability Control (DSC).

Jaguar: Dynamic Stability Control (DSC).

Lexus: Vehicle Skid Control (VSC)

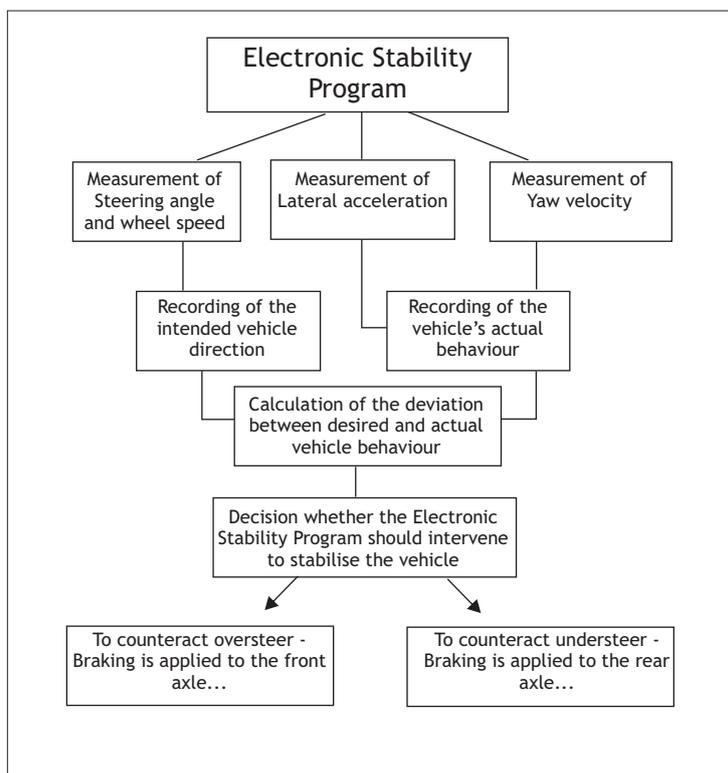
Porsche: Porsche Stability Management (PSM).

Volkswagen: Electronic Stability Program (ESP).

Volvo: Dynamic Stability Traction Control (DTSC).

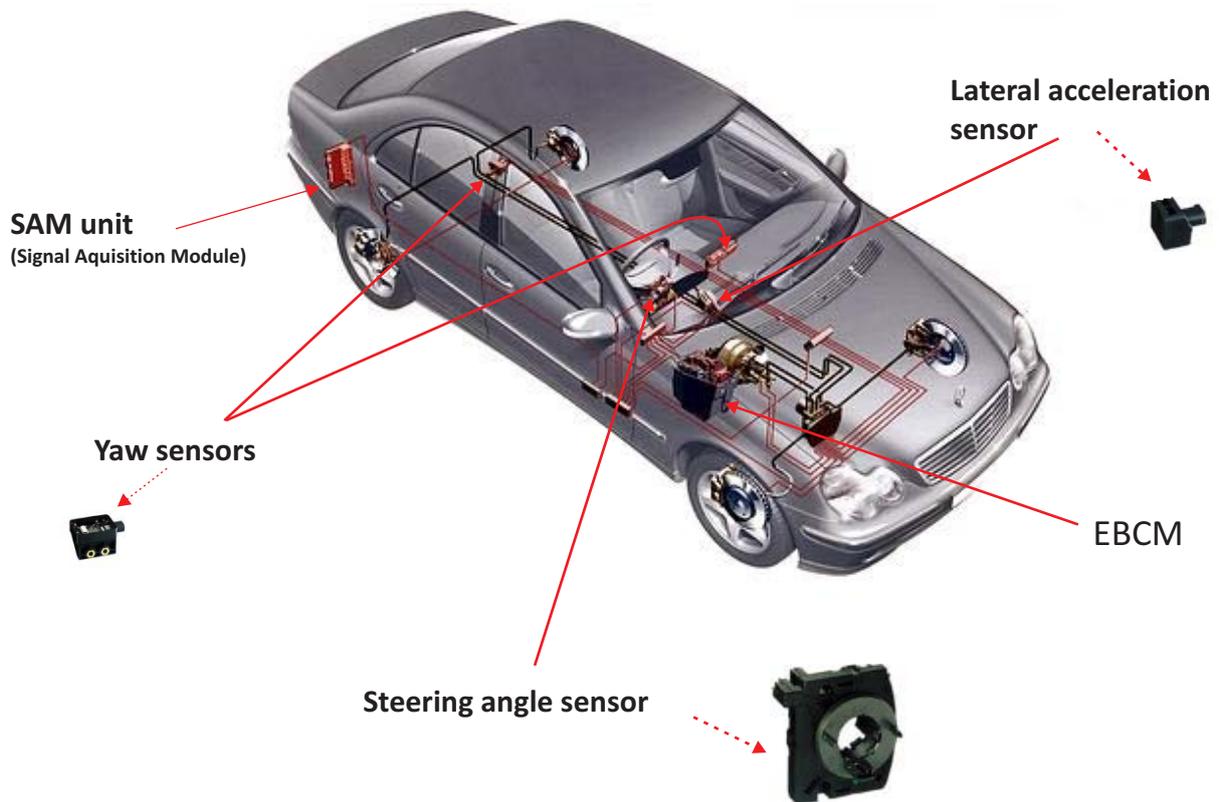
The principal of ESP

I have made a short algorithm here to give an idea the sequence when the EBCM receives a signal down the network. Of course, all of this sequence happens within a split second!



In this algorithm, there is a mention of a 'Yaw velocity'. This function is the crucial part of an ESP system and it is explained on the next page.

Layout in the car - E.g MB E class



How the ESP system operates.

When the car moves into a position which is determined by the yaw sensors to be outside of the parameter set by the system, the ESP will activate. For the driver, certain functions in the car will activate which the driver has no control over. Depending on the manufacturer of the system (Bosch, Continental Teves, Delphi), there will be functions in the car which are linked together and will operate together to bring the car back under control.

If the car begins to skid, the driver will usually attempt to brake and hopefully try to drive into the direction of the skid. In practice, this does not always happen, so the car will do it itself.

The vehicle will:

- take over the accelerator and operate this independently
- apply pressure through the braking system regardless of how much pressure the driver applies.
- alter the steering angle (if the vehicle is equipped with electronic steering wheel control - e.g VW, BMW)

During this time, it is usual to see the ESP lamp light and can be accompanied by a continuous 'pinging' noise.

The duration that ESP operates is variable and dependent on how quickly the car comes back under control.

I mentioned the 'Yaw Velocity' on the previous page. This is measured by the Yaw sensor(s) and in principle, it operates like a gyroscope. Thereby monitoring the rotational angle of the car. The sensors convert movement into electrical data current and thereby send information through the bus to the EBCM

We now move forward into understanding the additional feature of:

T-ESP - Trailer Stability Program

TSP's are really an extended software application for the existing ESP system. You cannot have a T-ESP system without having an ESP system.

This feature has been borne out of the truck industry where manufacturers had been trying to combat the 'Jack knifing' effect of trailers. With additional yaw sensors and software applications, they were able to create a trailer stability program using the existing ESP.

T-Esp is known under a number of different titles.

For example:-

TSP - Trailer Stability Program - (VW, BMW)

TSA - Trailer Stability Assist - (Honda, Mercedes)

TSM - Trailer Sway Mitigation - (product brand produced by Bosch)

TSC - Trailer Sway Control - (Chrysler USA, Jeep USA - currently on US models but will be on UK models from 2008!)

TSP's have been an exciting application for the avid towing consumer. Likewise, as with most manufacturers, they designate a particular vehicle model to be marketed as their tow car. For example, VW choose the Passat. GM choose the Vectra. Honda have the CR-V and so on.

It is on these marketable vehicles that TSP will be installed.

This application is dependent on the operating system of the car. If the vehicle uses a CANbus network system, then the application is activated usually by the connection of a towing plug. (*See vehicle specific towbar wiring later on..*) In the case of the Honda, the TSP is activated when the vehicle detects the 'fishtailing' action of the caravan and if this movement transferred to the car, falls within the set parameter and actual vehicle motion (i.e side to side rear end movement), then the TSP will operate until the vehicle comes back under control within the acceptable movement. I must stress that the CR-V cannot be 'steered' into making the caravan snake to activate the TSP. It has to occur naturally.

For the CANbus vehicles, T-Esp operates differently.

To enable the system to function or activate, the car MUST know when it is towing. This information is through the towing socket. Therefore, the use of by-pass electrical installations will NOT under any circumstances, allow this system to operate. The use of *vehicle specific CANbus wiring kits will allow this feature to be active provided the towing module is a module which the car can communicate with and recognises. There are a number of CANbus towing modules which are termed 'read' only and in this case, they are not visible to the car.

How do these work?

When the vehicle is determined to be towing, then the yaw sensors that would normally operate with the ESP system, allow for an additional movement which is detected when 'fishtailing' occurs. A separate software application has been entered into the brake electronics to allow T-Esp to function. In a number of cases, this needs to be activated using *diagnostic equipment (see next page). In the case of the VW systems, when the T-Esp system activates, it is applied for maximum 30 seconds or until the vehicle/caravan combination is back under control. If it still remains out of control, then the system re-energises for another 30 seconds. In the case of the Mercedes system (ML class), the T-Esp system activates for initially 10 second in a reduced or 'gentle' fashion. If the vehicle is brought under control, then the system reverts back to standard ESP. If, however, within 10 seconds, the vehicle/caravan is still out of control, then the system upgrades to a 2nd stage, more 'aggressive' approach which again, activates for a further 10 seconds. Once again, the driver is informed the system is in operation by the dash warning lamp and/or pinging tone.

What is happening when T-Esp operates?

When the system activates, the driver really has to concentrate on steering the vehicle within as straight a line as possible. While he is engaged in this, the vehicle is automatically decelerating and braking individual wheels to control the snake. It is also possible that it will have to accelerates marginally to help control the snake. The driver has no control over the brakes or accelerator during this phase, but when the vehicle has been corrected, control will be passed back to the driver.

IMPORTANT!! It is essential that any owner of vehicles with T-Esp that have a wiring installation which allows for this to be an active system, must be informed what will happen should the system engage.

It could be that vehicle dealers have informed them, but it will most likely come from the individual towbar technician.

Diagnostic Equipment

T-Esp is currently pre-installed into BMW's, Mercedes Benz, Honda, GM

For VAG vehicle derivatives, this feature is 'coded' into the vehicle using diagnostic equipment.

This is a relatively simple operation and entails the changing of one of the number sequences in the relevant control module.

It is hoped that a bespoke diagnostic tool will be available in early 2008 to allow towbar technicians to 'code' the vehicle for this feature as well as other trailer associated functions.

T-Esp is currently available on:

Audi

A4 - NEW 2008 model

A5

A6

Q7

BMW

3 ser (E90/91/92)

5 ser (E60/61)

7 ser (E65/66)

X3 (E83)

X5 (E53)

X5 (E70)

Ford

No T-Esp as yet. Will be introduced soon.. (Mondeo, S-Max)

Honda

CR-V II 2006 >>

Land Rover

Freelander II (to be introduced during/late 2008)

Range Rover

Vauxhall

Astra - only on vehicles with ESP plus (NOTE: it is not certain if this function is pre-ordered at factory only)

Vectra - Only on vehicles with ESP plus

VW

Golf V - late 2007 >> models

Jetta

Passat (B6) - 2005 >> models (No need to code from July 2007 >>)

Tiguan SUV - 2008 >>

Touran - facelifted 2007 >> models

Touareg - from 2003

NOTE: T-Esp to be introduced into Skoda & Seat during 2008.

