

How to beat brake faults with ease

There can be no compromises when it comes to making sure safety-critical braking systems are working on your customers' cars. Here, *The Technical Book* discovers how to get to the bottom of ABS faults and when you should – and should not – turn to your scan tool for help

MOST modern vehicles are at least fitted with ABS, if not a full traction control system (TCS). It may be known as ESP, ASR, SCS or any one of the many abbreviations vehicle manufacturers use for their own systems but, fundamentally, they're all very similar. It's a complex system designed to keep the vehicle under control during acceleration, braking and cornering, and it consists of many components. The input sensors on a typical TCS are:

Wheel speed (ABS) sensor

This senses whether a wheel has lost grip and is spinning or whether it has locked-up and is skidding.

Throttle position sensor

Combined with the brake pedal position sensor, the steering wheel angle sensor and the gear selection sensor, this sensor decides what the driver of the car is out to achieve in terms of desired acceleration – and whether or not to allow it!

Engine management system

This determines available torque using inputs including engine speed.

Yaw-rate sensor and lateral acceleration sensor

Together, these calculate if the car is spinning or rolling out of control.

The TCS ECU takes all these inputs into consideration and compares the data with how far away the car is from an ideal level of control. This means it calculates whether the car is going where the driver intends and, if not, it usually intervenes in one of two ways:

- The engine management system controls the fuel and ignition to increase or reduce torque at the wheels.
- The brakes on each individual wheel can be controlled by an electronically operated valve to either increase or decrease braking effort – regardless of whether the driver is braking or not. If more braking effort is required, a hydraulic pump provides the extra pressure in the system.

A system that is so safety critical is very good at providing accurate fault codes. But remember this is just a pointer in the right direction. A good diagnostic scanner with an ability to read several channels of live data is a must when dealing with TCS systems.

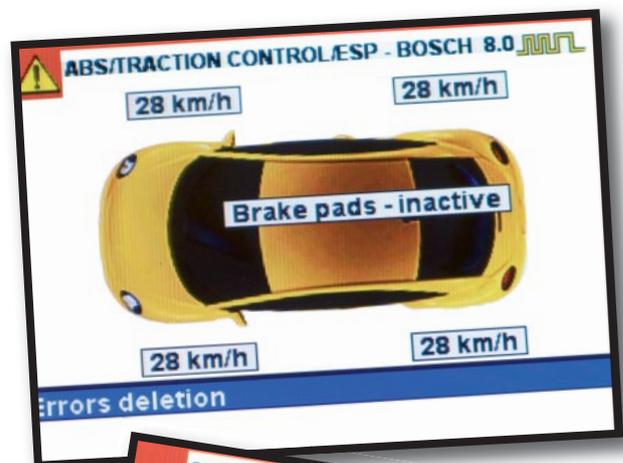
Avoiding mis-diagnosis

The wheel speed sensors alone use 4 data channels. The scanner can be used to check and see that the speed recorded at all four wheels is the same when going in a straight line, or that the outer wheels should be travelling faster than the inner wheels when cornering. Wheel speed sensor faults are one of the most common found on TCS systems simply because the sensors are among the units most exposed to the rigours of driving. Along with MAF sensors, they are arguably one of the most mis-diagnosed sensors around. Often, the sensors are needlessly replaced simply on the strength of a fault code produced by a scan tool.

Back to basics

The wheel speed sensor is a component that should be checked using the good old basics; voltage at the sensor (which changes as the wheel rotates) and continuity in the circuit back to the ECU. Even a basic square waveform is easy to check on a scope before replacement is considered.

Other variables such as the accelerator and brake pedal switch positions can be read as live data and checked accordingly.



Parameter	Value	Unit
LH front wheel speed	24	km/h
RH front wheel speed	24	km/h
LH rear wheel speed	24	km/h
RH rear wheel speed	24	km/h
Vehicle speed	24	km/h
Engine rpm	24	Rpm
steering angle	1220	°
Steering rotation speed	-5.0	°/s
Acceleration pedal	12.0	%
Transverse acceleration	26	m/s ²
Left front wheel speed	22.0	km/h



IN ACTION (above and top): Screen shots from the Socio 500 scan tool show the brake system diagnostics procedure taking place thanks to easy-to-understand diagrams.

FUNCTION FUN (left): The Socio 500 scan tool has function-based menus that help technicians save time on jobs involving the replacement of electronic parts.

Save time with a scan tool

Another important test when looking at braking systems is that of the electronic valve and hydraulic pump. Here, we find out more...

The Tecnomotor Socio 500 scan tool has a complete step-by-step test routine that activates the hydraulic pump and tests each wheel circuit individually by activating and releasing the valve while the technician tries to spin the wheel.

Once a faulty component has been identified and replaced, the ECU will need to be told to reset any so-called 'learned' values that were set to compensate for the failure of the component.

Alternatively, in the situation where either the tracking has been adjusted; the steering angle sensor replaced; or the steering wheel sensor swapped, several parameters will need to be reset.

On system-based scanners, you may need to perform up to three separate reset functions in three separate ECUs to complete the operation. On scanners which have function-based menus, such as the Tecnomotor Socio 500, it's as simple as choosing the 'steering reset' function from the menu.

GSF DIAGNOSTICS

t: 020 8917 3960

e: diagnostics@gsfcarparts.com

www.gsfdiagnostics.com