01-217

Electronic Stabilization Program (ESP) Bosch 5.3

The Electronic Stabilization Program (ESP) is a driving dynamics regulation system. It stabilizes the vehicle both in understeer and oversteer situations.

ESP is an additional extension of the well-known driving safety systems ABS/EDL and ABS/EDL/ASR.

ESP increases the ability to control the vehicle during critical driving situations. It reduces the likelihood of skidding relative to the well-known safety systems and improves steering control.

It can only function within physical limits.

01-218

ESP system sensors and components, description

Control module for ABS with EDL/ASR/ESP -J104-

The control module is combined with the hydraulic unit as one unit. It controls the ESP, ABS, EDL, ASR, EBD and ETR (Engine Torque Reduction) functions. When ignition is switched on, the control module performs a self-test. All electrical connections are monitored constantly and the solenoid valves are periodically checked for function. If the control module fails entirely, only the normal brake system will be available.

Steering angle sensor -G85-

The steering angle sensor is housed together with the airbag spiral spring/return spring with slip ring. It is located on the steering column between the steering column switch and steering wheel. It transmits the steering wheel's steering angle to the ABS control module -J104 for ABS/ASR/ESP via the CAN-bus. After replacing the control module or the sensor, a zeroing must be performed. For malfunctioning sensor, the ESP function is not available.

Sensor for transverse acceleration -G200-

The sensor for transverse acceleration transmits the values of lateral acceleration (cornering force) to the ABS control module -J104 for ABS/ASR/ESP. After replacing the control module or the sensor, a zeroing must be performed. For malfunctioning sensor, the ESP function is not available.

Sender for rotation rate -G202-

The sender for rotation rate collects data, so-called yaw moments or rotation rates, that attempt to spin the vehicle on the vertical axis and it sends these to control module -J104- for ABS/ASR/ESP. For malfunctioning sensor, the ESP function is not available.

Sender 1 for brake booster -G201-

The brake pedal position sensor recognizes the current brake pressure in the brake circuit and sends this data to the ABS control module (w/EDL) -J104-. From this, the control module calculates the wheel braking powers and therefore the vertical forces affecting the vehicle. If the sensor fails, the ESP function is not available.

ASR/ESP button -E256-

The button enables the driver to switch off the ESP function. By operating the brake pedal or by pressing the button again, it is switched back on. If re-activation is forgotten, the system automatically reactivates itself once the vehicle is restarted. The system cannot be switched off when ESP is actively engaged and above a specific speed.

Brake recognition switch (ESP) -F83-

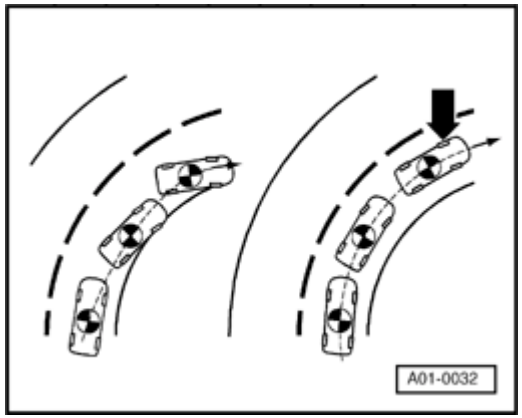
The brake recognition switch (ESP) is also identified as a release switch and it functions like a pole-changing switch. When the driver brakes, the switch changes from signal terminal 1 to signal terminal 2. Since only one signal terminal is ever closed, the system easily recognizes the current condition and the release switch thereby offers a high degree of personal safety.

Hydraulic pump for traction control -V156-

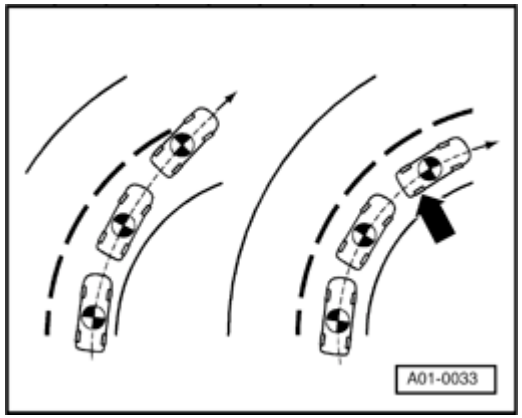
In order to generate the required admission pressure on the intake side of the return flow pump, an additional hydraulic pump is necessary. Boost pressure is limited via a throttle in the main cylinder, the hydraulic pump for traction control -V156- itself is not regulated.

01-221

Examples:



- During oversteering, the rear of the vehicle breaks out toward the outside of the curve. The vehicle rotates more on its vertical axis than required to maneuver through the curve. Braking the outside front wheel counters the oversteering effect.



- In understeering, it is the front of the vehicle that does not follow the curve. The front of the vehicle breaks out. The vehicle rotates less on its vertical axis than is required to maneuver through the curve. By braking the rear inside wheel, the braking force generated intensifies the rotational movement of the vehicle.

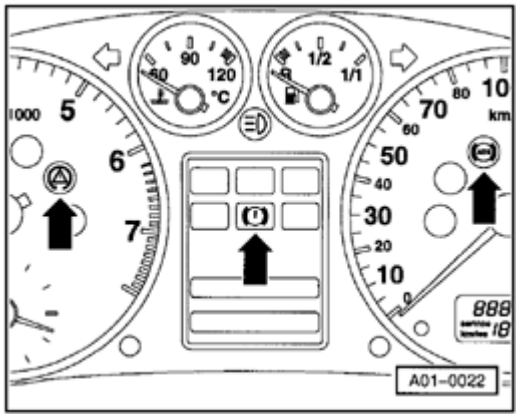
Component locations (except for new components) are the same as for the Bosch 5.3 components. The procedures for removal and installation of the components are found in:

⇒ *Repair manual, Brake System, Repair Group 45*

01-222

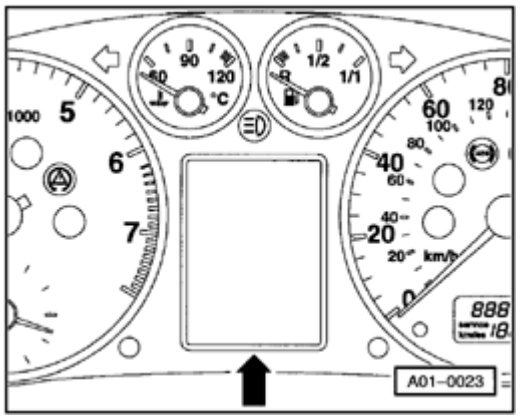
Warning light functions, overview

- If On Board Diagnostic (OBD) has detected a malfunction in the system, it indicates the malfunction by lighting up warning lamps when ignition is switched on. The warning lamps are located in the instrument cluster.



Instrument cluster without DIS

- The illustration shows the ABS/EDL warning light -K47- (right arrow), the warning light for brake system -K118- (center arrow, red symbol for "brake system malfunction") and the traction control indicator light -K86- (left arrow).



Instrument cluster with DIS

- For DIS, there is no warning light for brake system -K118-. The red "brake system malfunction" symbol appears in the display.
- If the ABS/EDL warning light -K47 and the red symbol for "Brake system malfunction" are not lit, but the brake system is not functioning properly, check for malfunctions in the mechanical/hydraulic brake system components.

⇒ *Repair manual, Brake System, Repair Group 46*

⇒ *Repair manual, Brake System, Repair Group 47*

01-223

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	off	♦ All indicator lights go out after the self-test (approximately three seconds after the ignition is switched on). All systems are OK. Pay attention to the notes on the next page
off	off	blinking	♦ ASR/ESP is in adjustment mode. The ASR/ESP indicator light blinks approximately 3 times per second.

01-224

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	**A self-test is performed after the ignition is switched on. If all systems are OK, warning lights, the ABS warning light -K47- and traction control indicator light -K86- go out after approximately three seconds. If the indicator lamps do not light up, check the relevant lamps ⇒ carry out "Electrical Test", steps 17 and 19. The possible causes are as follows:** ♦ The battery voltage is insufficient. None of the lamps in the instrument cluster light up. Check the battery. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* ⇒ *Repair Manual, Electrical Equipment, Repair Group 90.* ♦ The ABS warning light -K47- does not light up during the self-test. There is a short to Ground (GND) in the wiring that controls the ABS/EDL warning light between terminal 32 of the ABS control module -J104- and the instrument cluster. This malfunction does NOT influence the control of the traction control indicator light.

			♦ The traction control indicator light -K86- does not light up during the self-test; ⇒ carry out "Electrical test", step 19.This malfunction does NOT influence the control of the ABS warning light.

01-225

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	off	♦ There is an irregularity. The indicator lamps go on during the self-test and then go out. The possible causes are as follows: ♦ The voltage supply for the ABS control module -J104- is between 7 and 10 volts and the vehicle speed is < 6 km/h. Carry out "Electrical test", step 21. ♦ The DTC "01119 gear recognition signal" is stored in the DTC memory. Check DTC memory ⇒ page 01-356 . ♦ The signal indicating whether the parking brake is set or released is not being sent to the ABS control module -J104-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 2 ⇒ page 01-261 . ♦ Check the brake light switch -F-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 2 ⇒ page 01-261 . ♦ Check the zero position of the steering angle sensor -G85-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 5 ⇒ page 01-270 .

01-226

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	♦ The indicator lights did not go out after the self-test. However, the red "brake system malfunction" symbol did not go on. The On Board Diagnostic recognized a malfunction, which deactivated the ABS/EDL/ASR/ESP. However, the "Electronic Brake Distribution" (EBD) remained activated. Check DTC memory ⇒ page 01-356 . ♦ The ESP driving test may have been activated ⇒ page 01-250 ♦ Check the voltage supply for the red "brake system malfunction" symbol. Carry out "Electrical test", step 18. If the control is malfunctioning, see the next example for lighted indicator lights. ♦ During the last drive, a dynamic malfunction of the wheel speed sensor occurred or a malfunction in the ABS return flow pump -V39- occurred. In this case, the indicator lights automatically go off after the vehicle is started, and has exceeded a speed of 2.75 km/h or a check of the return flow pump indicated it is OK. **Also observe notes on the next page.**

01-227

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	**Continuation from preceding page.** ♦ A DTC is stored in the DTC memory the first time the vehicle exceeds 6 km/h, if the voltage supply to the ABS control module -J104- is between 7 and 10 volts and the indicator lights go on. If during the drive, the voltage supply to the ABS control module -J104- exceeds 10 volts, the indicator light go out. The DTC remains in the memory. "Check DTC memory" ⇒ page 01-356 .
off	on	off	♦ The ESP driving test was not completed; ⇒ page 01-250

01-228

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
on	on	on	The ABS and traction control indicator lights go on, and three seconds after the ignition is switched on the red "brake system malfunction" symbol goes on. ♦ A malfunction deactivated the ABS/EDL, ASR/ESP and the "Electronic Brake Distribution" (EBD).Check DTC memory ⇒ page 01-356 . **WARNING!** **The brake system is only partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels can lock even during light braking (excessive braking at rear axle). This can cause the rear of the vehicle to break loose and thereby cause and accident.** Note: For vehicles with automatic transmission, the red "brake system malfunction" symbol does not appear immediately after the ignition is switched on. Instead, the note "Depress brake pedal before engaging gear" appears in the display. Press the brake pedal and select a gear. The red brake warning light appears, if the light control is working properly.

01-229

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	on	**The traction control indicator light does not turn off after the self-test.** ♦ There is a malfunction that only affects the traction control. The ABS/EDL and EBD systems are not deactivated. Check DTC memory ⇒ page 01-356 . ♦ Traction control has been switched off using the traction control button. If the traction control indicator light does not light up in this case, check the switch and the indicator light, carry out the "Electrical test", steps 19 and 20. ♦ Short circuit to B+ in the ASR/ESP button: The traction control indicator light goes out five minutes after the ignition is switched on. Carry out "electrical test", step 20. ♦ There is a short to Ground (GND) in the wiring that controls the traction control indicator light between terminal 31 of the ABS control module -J104- and the instrument cluster. Carry out "electrical test", step 19.

01-230

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
on	on	off	♦ No DTCs are stored in DTC memory. The ABS and traction control warning lights do not go out after the self-test, and three seconds after the ignition is switched on the red "brake system malfunction" symbol goes on. ♦ There is an open circuit or short circuit to B+ in the wiring that controls the traction control indicator light between terminal 32 of the ABS control module -J104- and the instrument cluster; ⇒ carry out "Electrical test" step 17. ♦ Voltage supply for control module less than 7 volts; ⇒ carry out "Electrical test" step 21.
on	off	off	**No DTCs are stored in DTC memory. The red "brake system malfunction" symbol remains lit after the ignition is switched on.** ♦ The brake fluid level is too low ♦ Malfunction in instrument cluster: Carry out "Electrical test", step 18.

01-231

Check Control Module Version (function 01)

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

Note:

The following explanation of how to perform On Board Diagnostic (OBD) is based on use of the VAG1551 scan tool. Performing On Board Diagnostic (OBD) using the VAS5051 tester is similar.

- Advance through program sequence by pressing the → button.

01-232

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -1- to select "Check Control Module Version" 01. Press -Q- button to confirm input.

Note:

- *For allocation of ABS control module -J104-, also refer to parts catalog.*

8D0 907 389E 1) ABS/ESP AWD 2) D01 3)	
Coding 06397	**WSC xxxxx**

Indicated on display:

Index 1): ABS control module Part. No. including control module index

Index 2): Indicates system identification.

Index 3): Indicates hardware and software status

01-233

Control module versions

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	CAN terminal resistance in control module:
All Wheel Drive (AWD); ABS/ESP	1AT:	4B0 907 389	-	coding not possible	CAN-bus	120 Ω
Front Wheel Drive (FWD); ABS/ESP	1AT:	8D0 907 389	-	Can be coded	CAN-bus	120 Ω
All Wheel Drive (AWD); ABS/ESP	1AT:	8D0 907 389	A	Can be coded	CAN-bus	120 Ω
Front Wheel Drive (FWD); ABS/ESP	1AT:	8D0 907 389	D	Can be coded	CAN-bus	2600 Ω
All Wheel Drive (AWD); ABS/ESP	1AT:	8D0 907 389	E	Can be coded	CAN-bus	2600 Ω

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

01-234

Code Control Module (function 07)

After installing a new ABS control module (w/EDL) -J104- or a new steering angle sensor -G85-, the ESP system must be coded again. After the coding, the steering angle sensor must be calibrated.

The coding of the ESP control module is used for adaptation of the control module to the vehicle.

Coding is only possible if a dealership number is stored in the VAG1551 scan tool.

Note:

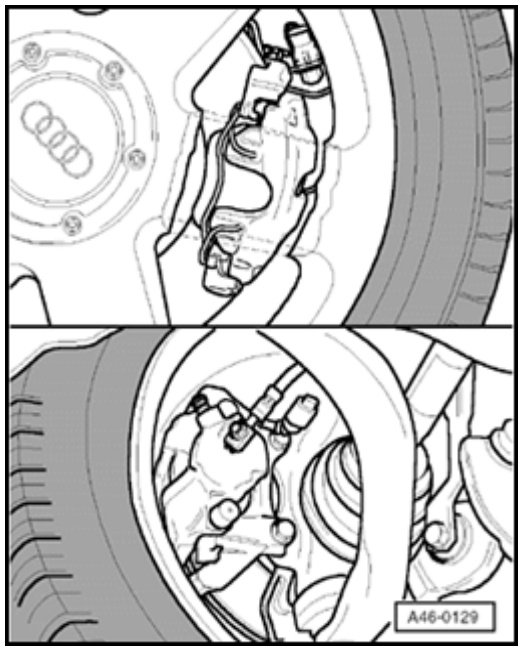
If the control module is coded with code 00000 or with a code that does not match the vehicle, the ABS warning light -K47- and the traction control indicator light -K86- remain continuously lit, and the DTC 01044 - Control module incorrectly coded - is stored in DTC memory of the control module.

Before the control module can be coded, "Login Procedure" function 11 must be successfully carried out using the VAG1551/1552 scan tool.

01-235

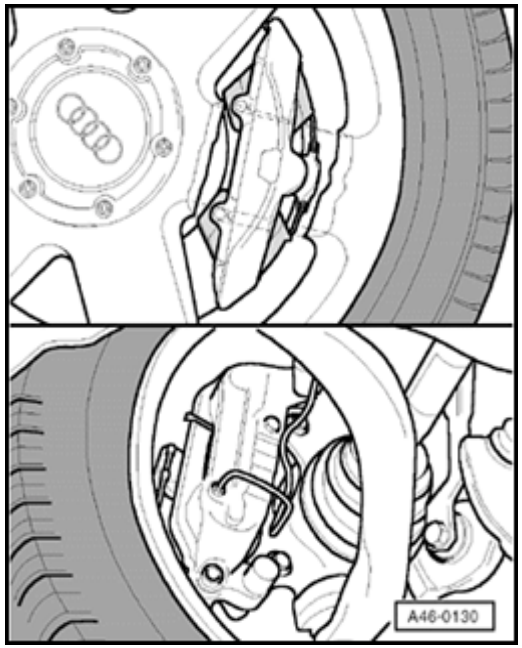
To perform the login procedure and the coding, the brake caliper type must be determined (see the following illustrations).

Front brake caliper type



- Illustration shows the brake type FN3 made by Teves/Ate (recognized by: clip on brake pad carrier).

01-236



- Illustration shows the brake type HP2 made by Lucas (recognized by: dual piston housing).

01-237

Performing login

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press the -1- button twice to select the function "login procedure".

Rapid data transfer	**Q**
11 - Login procedure	

Indicated on display:

- Press -Q- button to confirm input.

Login procedure	**Q**
Enter code numbers XXXXX	

Indicated on display:

- Enter code according to the following table and press -Q- button to confirm input.

01-238

Login code table ESP

Engine type	Transmission type	Brake caliper type (front)	Login code
4 cylinder gas engine	Manual transmission	Lucas C54	09675
4 cylinder gas engine	Manual transmission	FN3 Teves/ATE	09575
4 cylinder gas engine	Automatic transmission	Lucas C54	09677
4 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	09577
6 cylinder gas engine	Manual transmission	FN3 Teves/ATE	09595
6 cylinder gas engine	Manual transmission	FN 2/ HP2 dual-piston brake caliper	09495
6 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	09597
6 cylinder gas engine	Automatic transmission	HP2 double-piston brake caliper	09497
4 cylinder diesel engine	Manual transmission	Lucas C54	09655
4/6 cylinder diesel engine	Manual transmission	FN3 Teves/ATE	09555
4 cylinder diesel engine	Automatic transmission	Lucas C54	09677
4/6 cylinder diesel engine	Automatic transmission	FN3 Teves/ATE	09557

01-239

Code control module

- Check the control module version and press the → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 03.

Rapid data transfer	**Q**
07 - Code control module	

Indicated on display:

- Press -Q- button to confirm input.

Code control module	**Q**
Enter code number	**XXXXX**

Indicated on display:

- Enter code according to the following table and press -Q- button to confirm input.

01-240

Code table ESP

Engine type	Transmission type	Brake caliper type (front)	Code
4 cylinder gas engine	Manual transmission	Lucas C54	04175
4 cylinder gas engine	Manual transmission	FN3 Teves/ATE	04275
4 cylinder gas engine	Automatic transmission	Lucas C54	04177
4 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	04277
6 cylinder gas engine	Manual transmission	FN3 Teves/ATE	04295
6 cylinder gas engine	Manual transmission	FN 2/ HP2 dual-piston brake caliper	04395
6 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	04297
6 cylinder gas engine	Automatic transmission	HP2 double-piston brake caliper	04397
4 cylinder diesel engine	Manual transmission	Lucas C54	04155
4/6 cylinder diesel engine	Manual transmission	FN3 Teves/ATE	04255
4 cylinder diesel engine	Automatic transmission	Lucas C54	04177
4/6 cylinder diesel engine	Automatic transmission	FN3 Teves/ATE	04257

01-241

8D0 407 389D ABS/ESP front D16 →

Coding 06255 WSC XXXXX

VAG1551 scan tool display indicates control module coding, e.g.: 8D0 407 389D ABS/ESP front.

- Press → button.