

2006 Porsche Cayenne

2003-08 SUSPENSION PSM - 9pa_Cayenne

2003-08 SUSPENSION

PSM - 9pa_Cayenne

PSM

INTRODUCTION

Porsche Stability Management (PSM)

Diagnosis software number: PSM 0101

Cayenne model year 2003

General instructions/safety instructions

CAUTION: *Danger of damage due to improper handling of batteries and control module plug connections!*

- *Never disconnect battery with engine running.*
- *Never start engine if battery terminal clamps are not connected securely.*
- *Never pull off or push on plug connections for the control modules or other electronic components when the ignition is switched on.*
- *Always disconnect the negative terminal of the battery and pull off all plug connections to the vehicle electrical system control module when carrying out welding work on the vehicle.*

WARNING: *Danger of injury and damage as a result of the vehicle's unusual handling behavior caused by disconnected plugs or components!*

- *Never disconnect plugs while driving or drive with them disconnected.*
- *Drive only with fully installed and connected parts.*

WARNING: *Danger to life and limb while working on steering (releasing steering rod from steering gear) and on running gear (toe/camber)! The repair instructions must always be observed when carrying out repair work in the areas listed here!*

- *The battery must be disconnected before releasing the steering rod from the steering gear.*
- *When releasing the steering rod from the steering gear, make sure that the position of the steering wheel is not changed! Running gear*

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locked or steering lock engaged.

- *The steering-angle sensor must be recalibrated on the measuring platform each time the steering rod is released. The steering-angle sensor must be reinitializes whenever the power supply is interrupted (PSM indicator light comes on).*
- *After carrying out work on the running gear and steering, the spiral spring (airbag coil) must be centered.*

NOTE: *The following conditions must be met to ensure the faultless operation of the system:*

- The battery terminal clamps must be secure.
- The brake fluid level must be at the correct level.
- The system must not leak.
- Tyre size, air pressure and the condition of the tires must be satisfactory.

NOTE: *The following points must be observed during vehicle diagnosis:*

- The steering-angle sensor must be initialized whenever the power supply is interrupted (PSM indicator light on).
- The steering-angle sensor must be recalibrated after all work on the running gear.
- After troubleshooting or repairs: Erase the fault memory using the Porsche System Tester II No. 9588 and carry out a test drive.
- Read out the fault memory again after the test drive.

Communication between PSM control module and the Porsche System Tester II No. 9588

NOTE: *The following conditions must be met in order to establish communication between the PSM control module and the Porsche System Tester II No. 9588:*

- Porsche System Tester II No. 9588 connected to data link connector
- Wheel speed is less than 10 km/h (6 mph)
- ABS/ASR/PSM control operation is not functioning
- PSM control module must be switched on for at least 100 msec
- The battery voltage must be greater than 6.7 V

General information on the fault memory

The fault memory of the control module can save up to ten different faults simultaneously. If all ten fault memories are occupied, the new fault overwrites the oldest fault. The fault memory content of the 'PSM control module' is maintained even in removed state.

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Fault code setting conditions

Fault codes can be set in several circumstances, e.g.:

- Battery is disconnected
- Plug connections are disconnected
- Coding is faulty
- Power failure
- etc.

In these circumstances, no fault is present in the system and the fault memory must be erased.

Troubleshooting procedure

Troubleshooting can only be performed when the fault is present. In other words, specific troubleshooting can only be performed in accordance with instructions (given under Diagnosis/troubleshooting for each fault code) if the entry has the status 'present' in the fault memory.

If the fault is currently 'not present', please check the following:

- Diagnostic conditions are met
- All plug connections and ground points of the affected current path are OK
- View the fault frequency counter in the Porsche System Tester II No. 9588 using the [F8] Info key under 'Extended fault memory' and try to close alignments in any loose contacts in the system

Diagnostic conditions

IMPORTANT: Always connect a suitable battery charging device to the vehicle electrical system battery before starting diagnosis. All unnecessary loads must also be switched off.

NOTE: *The fault can only be identified if the requirements listed under 'Diagnostic conditions' are met. For this reason, the specified procedure must be observed after a fault is repaired:*

1. Erase fault memory
2. Satisfy the requirements listed under 'Diagnostic conditions'
3. Read out fault memory again

Possible causes of fault

NOTE: *The 'possible causes of fault' that are responsible for creating the fault are listed here. Please note that in certain circumstances further faults can be stored in the fault memory after troubleshooting (e.g. if plugs are*

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disconnected). These must be erased following repair work.

Diagnosis/troubleshooting

NOTE: The fault memory Info key [F8] on the Porsche System Tester II No. 9588 can be used to access the 'extended fault memory'. The following information can be displayed:

Fault type

The following fault types are possible:

- No display
- Upper limit value exceeded
- Lower limit value not reached
- Mechanical fault
- No signal/communication
- No or incorrect basic setting/adaptation
- Short circuit to B+
- Short circuit to ground
- Implausible signal
- Open circuit/short circuit to ground
- Open circuit/short circuit to B+
- Open circuit
- Electrical fault in electric circuit
- Please read out fault memory
- Faulty
- Cannot be checked now

Fault status

The following status types are possible:

- Present
- Not present

This information should be saved using the Save key [F4] and printed out.

NOTE: ***Visual inspection: During troubleshooting, please check first that the affected pins on the control module plug connection are neither damaged nor corroded. The wiring and plugs of the affected components must also be checked for external damage and correct contacts. Repair damaged or corroded pins if***

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possible, otherwise replace affected pins. Repair or replace damaged wiring.

NOTE: ***Battery voltage: A battery voltage of between 11.4 and 14.5 V is required for troubleshooting. This must be checked and provided, if necessary. On the vehicle electrical system, voltage to the components and fuses (input side) must be guaranteed.***

Freeze frame

Freeze frame data is standardized and secures operating conditions in the event of a fault. Freeze frames have varying priorities, this can be significant when outputting to a scan tool. They can be seen in the "extended fault memory" of the Porsche System Tester II No. 9588.

Different operating conditions can also be saved for each fault. These can provide reference points to the cause of the fault in difficult diagnoses. These can be seen in the "extended fault memory" of the Porsche System Tester II No. 9588.

Fault deletion counter

An individual deletion counter runs for every fault detected. It determines the memory storage time of the respective fault.

The deletion counter is set to 80 (presumed error), for example, the first time a fault is detected.

If an unshedded fault is recognized as healed, the fault deletion counter is set to 10, for example (fault did not occur often enough to be confirmed).

The deletion counter is set to 40, for example, each time an unshedded error is identified. It retains this value until fault healing is identified.

The deletion counter is decremented by 1 after every warm-up cycle, if it is an unshed fault or a fault that has been identified as healed (faults that have been confirmed but not identified as healed are not decremented in the deletion counter). If the deletion counter has reached the value 0, the fault is deleted from the fault memory.

Fault frequency counter

This shows how often a fault has occurred since the first time it appeared. If the value given is 1, the error has only occurred once. It may therefore be "present" or "not present". Whenever this fault occurs again (in other words, whenever the fault healing counter has been decremented in the meantime, i.e. an OK test took place) the fault frequency counter is incremented. A higher value in the fault frequency counter can therefore indicate a loose contact.

TOOLS

WARNING: Danger of personal injury while working with special tools

- 9588 Never hang the Porsche System Tester II over the steering wheel

NOTE: Plug contacts are optimally designed to suit the plug system. Operations on pins can cause contact problems. Always use suitable measurement tools, adapter plugs and test cables.

BATTERY CHARGING DEVICE

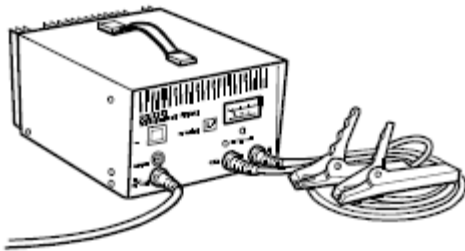


Fig. 1: Identifying Battery Charging Device
Courtesy of PORSCHE OF NORTH AMERICA, INC.

9588 PORSCHE SYSTEM TESTER II



Fig. 2: Identifying Porsche System Tester II (9588)
Courtesy of PORSCHE OF NORTH AMERICA, INC.

COMMERCIALLY AVAILABLE DIGITAL MULTIMETER

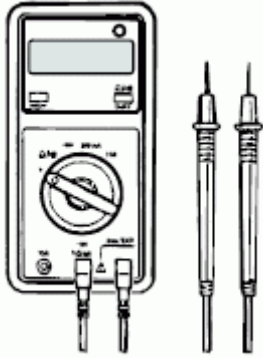


Fig. 3: Identifying Commercially Available Digital Multimeter
Courtesy of PORSCHE OF NORTH AMERICA, INC.

9684 MEASUREMENT TOOL SET

97



9684

000 721 968 40

Fig. 4: Identifying Measurement Tool Set (9684)
Courtesy of PORSCHE OF NORTH AMERICA, INC.

COMPONENT ARRANGEMENT

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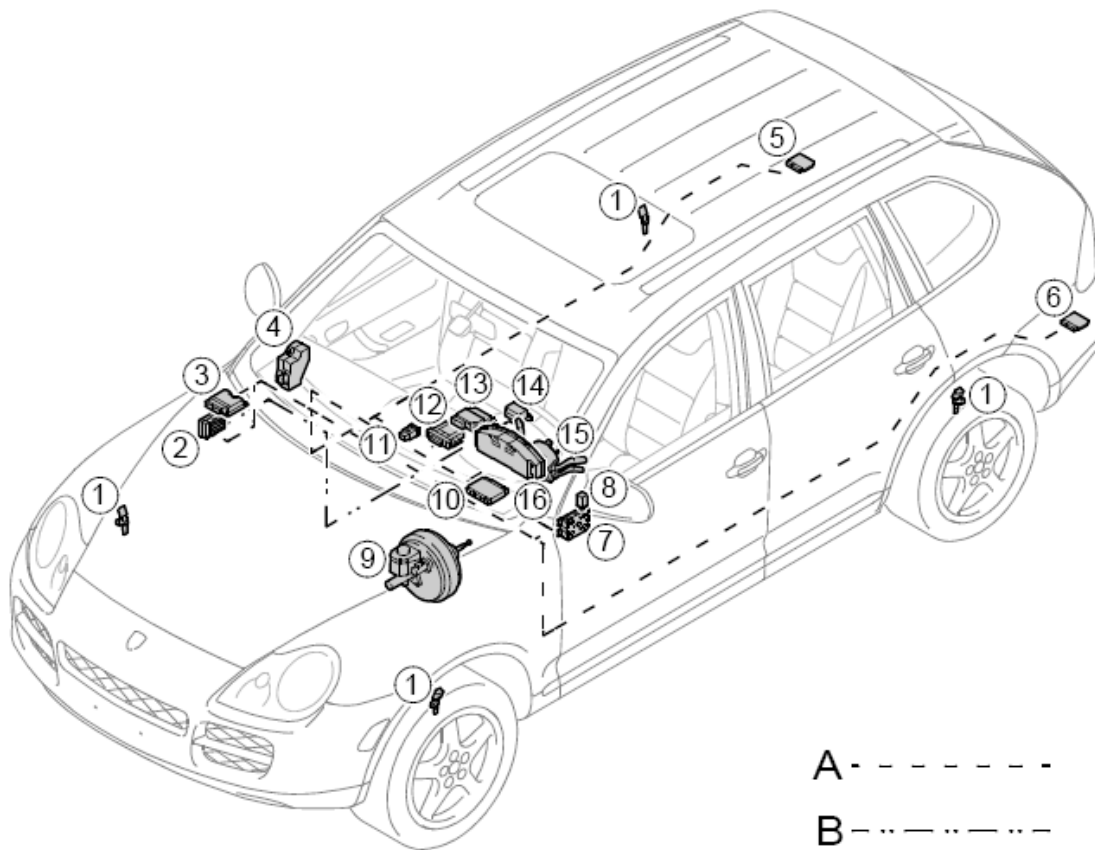


Fig. 5: Identifying Porsche Stability Management Component Arrangement
Courtesy of PORSCHE OF NORTH AMERICA, INC.

- a. a - CAN drive (CAN-C)
- b. b - CAN-internal

1. Speed sensor (wheel)

- Front left
- Front right
- Rear left
- Rear right

2. PSM control module and hydraulic unit

- Located in right radiator tank with hydraulic unit screwed on, under DME control module

3. DME control module

- Located in right radiator tank, above hydraulic unit with PSM control module

4. Fuse carrier at right of dashboard

- Integrated into right-hand side of dashboard

5. Level control module

- Located between rear right wheel housing and closing panel

6. **Transverse lock control module**
 - Located in the left rear area
7. **Brake light disabling relay**
 - Located in relay carrier at left of dashboard
8. **Servotronic control module**
 - Located in relay carrier at left of dashboard
9. **Active brake booster with components (in left radiator tank)**
 - Brake master cylinder
 - Pressure sensor
 - Brake pedal pulse sender actuated (with release switch)
 - Distance sensor
10. **Vehicle electrical system control module**
 - Located on right side of steering column near KESSY control module
11. **PSM OFF switch**
 - Located in center console
12. **Tiptronic control module**
 - Located on vehicle floor under passenger's seat
13. **Transfer box control module**
 - Located on vehicle floor under passenger's seat
14. **Combination sensor**
 - Located on center tunnel behind gearshift console
15. **Steering-angle sensor**
 - Integrated into steering column switch with electronic unit
16. **Instrument cluster (with Gateway)**
 - Integrated into dashboard

SYSTEM DESCRIPTION

PSM 0101

Information and warning lights

The driver is informed of the PSM control activities by means of the display lights in the instrument cluster. All display lights illuminate for a lamp check when the ignition is switched on. The information and warning lights are triggered via the CAN drive in Cayenne.

1. ABS warning light: illuminates if the ABS is faulty.
2. Brake warning light: illuminates if brake system is faulty.
3. ASR/PSM warning light: illuminates if PSM is faulty or if the 'PSM OFF switch' is off. The warning light flashes if ASR or PSM control is on.

PSM OFF switch

The ASR/PSM function can be switched on/off using the PSM OFF switch.

- Switch on ignition, internal PSM control module function test complete, control lamps are off, PSM is switched on.
- Actuate PSM OFF switch, PSM is switched off and the control lamp comes on.
- Actuate PSM OFF switch again, PSM is switched on and the control lamp is off. For safety reasons, the driving dynamics control is reactivated temporarily for the duration of one brake pedal actuation.

Steering-angle sensor**Steering-angle sensor 'A' integrated into steering column switch**

The steering-angle sensor supplies information about the slip angle of the front wheels to the PSM control module (intention of driver in relation to direction of travel). Vehicle behavior with respect to its transverse dynamics is calculated in the PSM control module based on the information received from the steering-angle sensor and the vehicle speed. The steering-angle sensor is integrated into the steering column switch and sends messages via the CAN drive. Without the information from the steering-angle sensor, the PSM control module cannot produce a picture of the desired direction of travel.

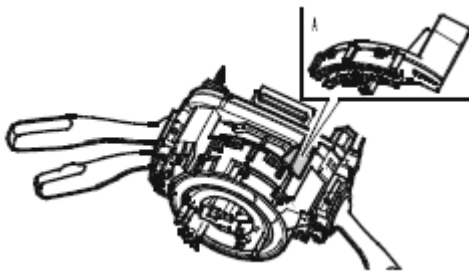


Fig. 6: Identifying Steering-Angle Sensor
Courtesy of PORSCHE OF NORTH AMERICA, INC.

INITIALIZING

The steering-angle sensor in Cayenne must be initialized after the following work is carried out:

- Whenever the power supply to terminal 30 is interrupted (PSM indicator light on).
- The steering-angle sensor must be calibrated after all work on the running gear.

Combination sensor

1 - Plug connection

x - Vehicle transverse axle 'transverse acceleration'

y - Vehicle direction of travel 'axial acceleration'

z - Vehicle high axle 'rate of turn/yaw speed'

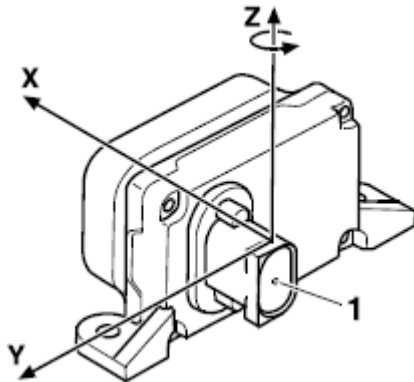


Fig. 7: Identifying Combination Sensor Plug Connection

Courtesy of PORSCHE OF NORTH AMERICA, INC.

NOTE:

- After installing/replacing the combination sensor, the integrated sensors for axial and transverse acceleration must be calibrated using the menu with the Porsche System Tester II No. 9588.
- Calibration is required in order to enter the PSM system and must only be performed when 'vehicle is positioned horizontally and brake is not actuated'.

The combination sensor is fastened to the center tunnel near the center console. The functions of the sensors listed below are integrated into the combination sensor:

- Rate-of-turn sensor
- Axial acceleration sensor
- Transverse acceleration sensor

The combination sensor communicates (signal transfer) with the PSM control module via the separate CAN data bus 'internal CAN'.

The functions that are integrated into the combination sensor are described below:

- Rate-of-turn sensor:

The rate of turn is recorded using a micromechanic system (Coriolis force). Without measurement of the rate of turn, it is not possible for the PSM control module to detect whether the vehicle is developing a tendency for spinning.¹⁾

¹⁾ Coriolis force: named after the French mathematician Gustave Gaspard Coriolis (1792-1843). Coriolis force occurs in rotating systems.

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- Axial acceleration sensor:

Axial acceleration is measured in order to support the theoretically determined vehicle speed. In unfavorable conditions, the actual vehicle speed of four-wheel drive vehicles could not be determined reliably without the axial acceleration measurement.

- Transverse acceleration sensor:

The transverse acceleration sensor supplies the PSM control module with information about the transverse accelerations occurring in the vehicle. Together with the information from the steering-angle sensor and the rate-of-turn sensor, the current vehicle handling behavior with respect to its transverse dynamics is calculated. The sensor element is a damped spring-and-mass system. Without measurement of the transverse acceleration, it is not possible for the PSM control module to detect which vehicle movements must be managed in a stable way in given road conditions.

Active speed sensor

CAUTION: Resistance measurement destroys the active speed sensor.

The wheel speed sensors supply the PSM control module with information about the current wheel speed.

The speed sensors installed in Cayenne are called 'active speed sensors'.

Active speed sensors require an external power supply. Two-wire cable is used to connect to the control module. The control module supplies the active speed sensor with power and ground. The function of the sensor element integrated into the active speed sensor is based on the effect of thin metal layers of 'permalloy', which change their electrical resistance as a function of the strength and direction of a magnetic field (anisotropic magnetoresistive effect).

The pulse sender for the active speed sensor is integrated into the wheel bearing 'wheel bearing with multiple-pole ring'. 48 magnetic plates (north/south poles), distributed at equal distances, are integrated into the sealing ring of the wheel bearing. Contact to the active speed sensor is established via an air gap. The rotary motion of the wheel bearing/sealing ring changes the resistance of the metal layers in the sensor element of the active speed sensor.

An electronic circuit in the sensor element converts the alternating multiple or reduced power consumption, which is determined by the changing resistance, into a digital speed signal and sends this to the PSM control module. The speed signal that is received is processed further in the PSM control module. The amplitudes of the signal remain constant, do not depend on the speed of the wheel, and are sent until the vehicle is stationary. ¹⁾ ²⁾

Hydraulic unit

The hydraulic unit is screwed to the PSM control module and installed in the radiator tank. The hydraulic unit contains a dual-circuit pump, which is controlled via a plug connection located on the underside of the 'PSM control module'. The required pressure is built up here and distributed to the affected wheels.

NOTE: In the event of damage, the hydraulic unit can only be replaced together with the PSM control module.

Active brake booster

Brake booster with components (tandem brake booster)

1. Brake booster (tandem brake booster)
2. Brake pedal pulse sender actuated (with release switch)
3. Pressure sensor
4. Brake master cylinder
5. Distance sensor
6. Brake fluid expansion tank

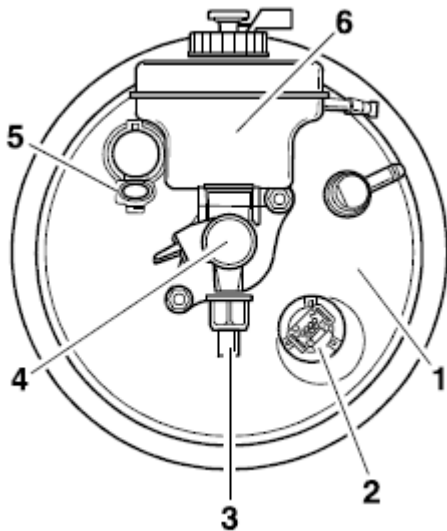


Fig. 8: Identifying Active Brake Booster Components
Courtesy of PORSCHE OF NORTH AMERICA, INC.

Brake booster

The brake booster is separated by two membranes into two chambers - a vacuum chamber and a pressure chamber (atmospheric pressure). It also contains a magnetic coil, metal piston and ventilation valves for vacuum control. The magnetic coil is connected electrically to the PSM control module.

1) Permalloy: soft magnet (Ni-Fe alloy), exceptionally suitable as base material for sensors/weak magnetic fields.

2) Anisotropic magnetoresistive effect: change in electrical resistance in accordance with the strength and direction of a magnetic field. Frequently used for recording weak magnetic fields.

Brake pedal pulse sender actuated

The 'release switch' (designed as a changeover switch) is integrated into the 'brake pedal pulse sender actuated' and is used for brake detection. When the driver actuates the brake pedal, the magnetic coil in the 'active brake booster' moves towards the brake master cylinder and the release switch changes the contact position, thereby changing the signal output from 1 to 2. 'Signal 2' informs the PSM control module that the driver is braking. If the release switch is in position 1 (driver is not braking) and the PSM control module detects on the basis of the values of the incoming signal that driving dynamics control via the brakes is required, the PSM control module activates the magnetic coil on the voltage side. A magnetic field forms in the magnetic coil through which current flows and this magnetic field attracts a metal piston, which in turn releases ventilation valves. The vacuum that builds up in the brake booster presses through the membranes on to the brake master cylinder piston and the brake pressure is built up. The PSM control module controls the vacuum that builds up via the voltage supply to the magnetic coil. Magnetic coil activation is set when the driver actuates the brake pedal.

Active pressure sensor

The brake pressure sensor records the brake pressure (desired deceleration), which is used by the PSM control module to calculate the wheel brake forces (longitudinal forces). If driving dynamics control is necessary during the braking procedure, the existing wheel brake forces are included to calculate the lateral traction.

Distance sensor

The membranes in the brake booster are connected to a potentiometer. The potentiometer changes its resistance to reflect the movement of the membranes. The distance of the membranes in the brake booster is calculated using the measured resistance.

PSM 0101 CONNECTOR ASSIGNMENT

PSM CONTROL UNIT CONNECTOR

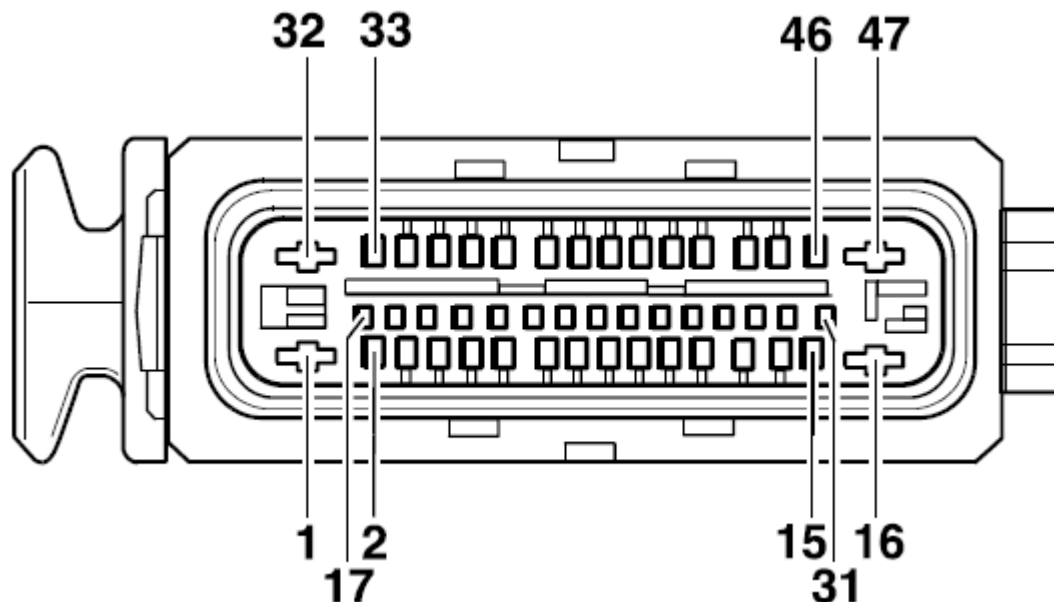


Fig. 9: Identifying PSM Control Unit Connector Terminals

Courtesy of PORSCHE OF NORTH AMERICA, INC.

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CONNECTOR TERMINALS REFERENCE CHART

Pin	Designation	Pin	Designation
1	Terminal 30 power supply via 'fuse F56/right fuse carrier'	2	Not assigned
3	Signal from 'distance sensor in brake booster, pin B3'	4	'Terminal 15' power supply via 'fuse F38/ right fuse carrier' Power supply to 'PSM OFF switch, pin 4'
5	Ground to distance sensor in brake booster 'pin B2'	6	Power supply to 'combination sensor, pin 1'
7	Not assigned	8	Output for rear right wheel speed; not assigned
9	Coding jumper to PSM control unit, 'pin 14'	10	Output, rear left wheel speed Output for Servotronic
11	CAN drive (high)	12	Output for front right wheel speed; not assigned
13	From 'PSM OFF switch, pin 3'	14	Output, front left wheel speed Coding jumper to 'pin 9' on PSM control unit
15	CAN drive (low)	16	Ground from 'body ground point 14'
17	Voltage activation of solenoid coil in active brake booster, measured on connector 'brake pedal applied pulse sender/in brake booster, pin 6'	18	Power supply to 'pressure sensor, pin 4'
19	Ground to 'pressure sensor, pin 1'	20	Analog signal from 'pressure sensor, pin 2'
21	Not assigned	22	Not assigned
23	Not assigned	24	Ground to combination sensor, 'pin 3'
25	CAN internal (low) to 'combination sensor, pin 2'	26	Power supply to 'distance sensor in brake booster, pin B1'
27	From release switch 'signal 2' (brake pedal actuated), integrated into 'brake pedal applied pulse sender/in brake booster, pin 2'	28	Power supply to release switch, integrated into 'brake pedal applied pulse sender/in brake booster, pin 3'
29	CAN internal (high) to 'combination sensor, pin 4'	30	From release switch 'signal 1' (brake pedal not actuated), integrated into 'brake pedal applied pulse sender/in brake booster, pin 4'
31	Ground supply of solenoid coil in active brake booster, via 'brake pedal applied pulse sender/in brake booster, pin 1'	32	Terminal 30 power supply via 'fuse F6/fuse carrier right of dashboard'
33	Ground to front right speed sensor 'pin 2'	34	Signal lead of front right speed sensor 'pin 1'
35	Up to model year '05: Ground activation of brake light relay in relay carrier/left of dashboard As of model year '05: 'brake light' for 'trailer hitch control unit' and 'rear convenience system control unit'	36	Signal lead of rear left speed sensor 'pin 1'
37	Ground for rear left speed sensor 'pin 2'	38	Not assigned
39	Not assigned	40	Clutch switch (manual transmission)
41	Not assigned; parking brake switch	42	Ground for rear right speed sensor 'pin 2'

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43	Signal lead of rear right speed sensor 'pin 1'	44	Not assigned
45	Signal lead of front left speed sensor 'pin 1'	46	Ground for front left speed sensor 'pin 2'
47	Ground from 'body ground point 14'	-	-

GROUND POINTS

- Ground point 14
- Ground point 21
- Ground point 22
- Ground point 23

CONTROL MODULE FUNCTION (CODING/PROGRAMMING)

Installation location of PSM control module

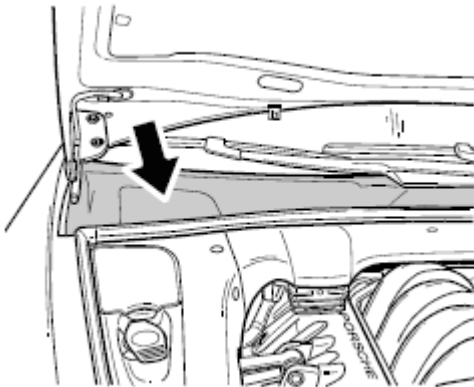


Fig. 10: Locating PSM Control Module Location
Courtesy of PORSCHE OF NORTH AMERICA, INC.

INTEGRATED FUNCTIONS

The PSM control module includes the functions listed below:

- PSM (Porsche Stability Management)
- ABD (automatic brake differential)
- ABS (anti-lock brake system)
- ASR (anti-slip regulation)
- EBD (electronic brake distributor)
- FDR (driving dynamics control)
- MSR (engine drag torque control)
- Porsche Drive Off Assistant (manual transmission)

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COMMISSIONING

When the ignition 'terminal 15' is switched on, an internal function test (initialization phase) is performed in the PSM control module. During this internal function test, all warning lights on the instrument cluster light up. When the internal function test is completed successfully, all functions integrated into the PSM control module are released and the indicator lights are switched off.

OPERATING CONDITION

The PSM control module is in operating condition once the internal function test is completed successfully. Within the defined limits for terminal 30 voltage '10.0 V to 16.0 V and temperature, all incoming signals are processed by the integrated software and the appropriate hydraulic and electrical components are activated.

SAFETY FUNCTIONS

NOTE: The ABS, ASR or PSM functions are switched off if the following criteria are met:

- Terminal 30 undervoltage detected '< 9.4 V
- One speed sensor fault
- Hydraulic pump fault

Switching off/on

NOTE: The PSM control module is switched off if the following criteria are met:

- Voltage drops below the functional operating voltage at terminal 15 '4.5 V'
- Overvoltage detected at terminal 15 '22.0 V' or overvoltage threshold reached at terminal 30 '16.0 V to 20.0 V'
- Two speed sensor faults
- Valve fault (hydraulic unit)
- Hydraulic pump fault

Effects when PSM control module is switched off:

- No valve actuations are performed
- Hydraulic pump is switched off
- All actuators are switched off
- Warning lights light up (if terminal 15 is live)

NOTE: The PSM control module switches on again when the minimum operating voltage is reached at terminal 15 '5.0 V'.

DATA TRANSFER

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The PSM control module sends and receives data/information via the 'CAN data busses' listed below:

- CAN drive (CAN-C)
- CAN internal

CAN drive

The PSM control module exchanges data with the following components:

- Steering-angle sensor (in steering column switch)
- Airbag control module
- DME control module
- Tiptronic control unit
- Instrument cluster
- Level control module
- Transverse lock control unit
- Transfer box control unit

NOTE: **Data transfer via CAN data bus and the EBD function (electronic brake distributor) are guaranteed when the voltage at terminal 30 is more than '8.5 V'. The PSM control unit sends brake data via the CAN drive. A non-coded PSM control module does not send any brake data via the CAN drive.**

CAN internal

CAN internal is a separate CAN data bus between the PSM control module and the combination sensor. This is used for data exchange of the sensors integrated into the combination sensor: longitudinal and lateral acceleration sensor and rate-of-turn sensor.

CODING/PROGRAMMING

Coding of the PSM control module is menu-prompted using 9718 PIWIS Tester.

- A static test and the swap test must be performed with 9718 PIWIS Tester.

Extract coding

The coding can be displayed with this menu item.

MODIFY CODING

Follow the instructions of the diagnostic tester.

- PASM

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- Porsche Drive Off Assistant (manual transmission)

INITIALIZING

The steering-angle sensor in the Cayenne must be initialized after the following work is carried out:

- Whenever the power supply is interrupted (PSM indicator light on).
- The steering-angle sensor must be calibrated after all work on the running gear.

Initialization procedure:

- Switch on ignition
- Position wheels straight ahead
- From the straight-ahead position, turn the steering wheel approx. '15°' to the left and '15°' to the right (past the straight-ahead position).
- Drive the vehicle straight ahead at a speed of more than 4 km/h for at least one second.

After successful initialization, the stored fault code is erased from the fault memory.

CAUTION: Initialization must be performed whenever the battery is disconnected. The indicator light goes out following initialization.

CALIBRATING

The PSM control module must first have been coded successfully. The following sensors must be calibrated using the menu with 9718 PIWIS Tester under the specified test conditions:

Steering-angle sensor:

- Switch on ignition.
- Internal PSM control module function test
- Steering-angle sensor initialized (the battery must not be disconnected again, otherwise the sensor will have to be re-initialized)
- Running gear set according to Porsche specifications
- Wheels in straight-ahead position and steering wheel horizontal
- Steering wheel may deviate by max. '± 2.0°' from the horizontal position for driving straight ahead.

After successful calibration, the stored fault code is erased from the fault memory.

NOTE: The procedure for calibrating the steering-angle sensor is the same for the other sensors.

Pressure sensor:

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- Switch on ignition.
- Internal PSM control module function test
- Brake pedal not actuated

After successful calibration, the stored fault code is erased from the fault memory.

Longitudinal acceleration sensor:

- Switch on ignition.
- Internal PSM control module function test
- Stop vehicle on a horizontal surface

After successful calibration, the stored fault code is erased from the fault memory.

Lateral acceleration sensor:

- Switch on ignition.
- Internal PSM control module function test
- Stop vehicle on a horizontal surface

After successful calibration, the stored fault code is erased from the fault memory.

SWAP TEST [UNDER MENU ITEM 'DRIVE LINKS' IN THE 9718 PIWIS TESTER]

NOTE: The swap test must be carried out after the hydraulic unit has been replaced.

Two persons are necessary for this test. All 4 wheels of the vehicle must be free-turning (lift on a platform lift). The swap test is used to check the allocation of the brake pressure lines to the wheel brake cylinders. A hydraulic and an electrical test are carried out.

BLEEDING

The brake system can be bled using this menu item.

FAULT OVERVIEW

FAULT REFERENCE CHART

Fault code	Fault text	Fault effects
<u>0003</u>	Control unit faulty	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off• The EBD function is switched off
		<ul style="list-style-type: none">• The PSM/ASR function is switched off

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<u>0283</u>	Speed sensor, front left	<ul style="list-style-type: none">• The ABS function is switched off
<u>0285</u>	Speed sensor, front right	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>0287</u>	Speed sensor, rear right	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>0290</u>	Speed sensor, rear left	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>0493</u>	Combination sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>0495</u>	Combination sensor power supply	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>0538</u>	Reference voltage (PSM)	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>0650</u>	Clutch switch	<ul style="list-style-type: none">• Failure of 'Porsche Drive Off Assistant' function (manual transmission)
<u>0668</u>	Vehicle voltage, terminal 30	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>0778</u>	Steering-angle sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>0812</u>	Brake pedal applied pulse sender/in brake booster	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>0814</u>	Active brake booster	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1044</u>	Control unit coded incorrectly	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off• The EBD function is switched off
<u>1130</u>	ABS operation	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>1164</u>	PSM operation	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>1276</u>	Hydraulic pump	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>1279</u>	Axial-acceleration sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>1310</u>	Level adjustment control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1312</u>	CAN drive	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1314</u>	DME control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1315</u>	Tiptronic control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1317</u>	Instrument cluster	<ul style="list-style-type: none">• -

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<u>1324</u>	Transfer box control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1423</u>	Lateral-acceleration sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1435</u>	Pressure sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off• The ABS function is switched off
<u>1542</u>	Rotation-rate sensor	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>1550</u>	Reverse gear signal	<ul style="list-style-type: none">• -
<u>1673</u>	Distance sensor in brake booster	<ul style="list-style-type: none">• -
<u>1765</u>	DME control unit system deviation	<ul style="list-style-type: none">• -
<u>2053</u>	Transfer box control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>2054</u>	Rear-differential lock control unit	<ul style="list-style-type: none">• The PSM/ASR function is switched off
<u>2231</u>	Brake actuated signal (PSM)	<ul style="list-style-type: none">• -
<u>2349</u>	Parking brake switch	<ul style="list-style-type: none">• -
<u>P1612</u>	DME control unit coded incorrectly	<ul style="list-style-type: none">• The PSM/ASR function is switched off

TROUBLESHOOTING WITH NO CONTROL MODULE CONNECTED

NOTE: The Porsche System Tester II No. 9588 and the 'PSM control module' are not connected.

OVERVIEW

Diagnostic conditions

- Ignition on
- The fuses of the 'PSM control module' are OK
- The fuses of the 'gateway' in the instrument cluster are OK
- Battery voltage is OK
- Plug on 'PSM control module' attached correctly

Possible cause of fault

- Incorrect vehicle type selected in the Porsche System Tester II No. 9588
- The Porsche System Tester II No. 9588 is not connected correctly or is faulty
- Power supply to the 'PSM control module' is not OK
- 'K lead' to 'gateway' in instrument cluster does not function
- 'Gateway' in instrument cluster does not function
- 'CAN drive' does not function
- 'PSM control module' does not function

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Affected pins

PSM control module plug:

- Pin 4 'terminal 15 power supply via fuse F38/fuse carrier at right of dashboard'
- Pin 1 'terminal 30 power supply via fuse F56/fuse carrier at right of dashboard'
- Pin 32 'terminal 30 power supply via fuse F6/fuse carrier at right of dashboard'
- Pin 16 'ground for body ground point 14'
- Pin 47 'ground for body ground point 14'
- Pin 11 'CAN drive (high)'
- Pin 15 'CAN drive (low)'

Diagnostic box in driver's footwell

CONNECTOR TERMINALS REFERENCE CHART

Pin	Designation	Pin	Designation
1	Terminal 15	9	Not used
2	Not used	10	Not used
3	K' lead (communication with Tester)	11	Not used
4	Ground	12	Not used
5	Ground	13	Not used
6	CAN high diagnosis (instrument cluster)	14	CAN low diagnosis (instrument cluster)
7	K lead	15	Not used
8	Not used	16	Terminal 30

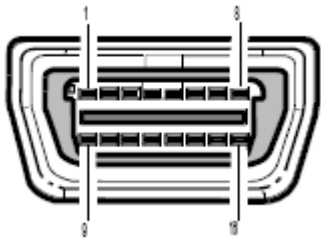


Fig. 11: Identifying Diagnostic Box Connector Terminals
Courtesy of PORSCHE OF NORTH AMERICA, INC.

DIAGNOSIS/TROUBLESHOOTING PSM 0101

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
		<ul style="list-style-type: none">• Check that the data link connector Porsche System Tester II No. 9588 is connected correctly to the		

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1	Check the Porsche System Tester II No. 9588 connections	<p>diagnostic box in the vehicle.</p> <ul style="list-style-type: none"> • Check the Porsche System Tester II No. 9588 connection cable for damage. • Check function of the Porsche System Tester II No. 9588 on another vehicle, if necessary. 	Go to Step 2	Repair the Porsche System Tester II No. 9588 --> End
2	Check fuses and adjacent voltage in fuse carrier at right of dashboard	<ul style="list-style-type: none"> • Terminal 30 power supply 'fuse F6/F56' • Terminal 15 voltage 'fuse F38' 	11.4 to 14.5 V Go to Step 3	Replace any faulty fuse(s) (before doing so, check that the correct fuse was used). If the fuses are intact but there is no voltage, check the wires and repair them if necessary. If the wires are intact, check the fuse box and replace it if faulty. --> End
3	Check terminal 30 power supply to 'PSM control module'	<ul style="list-style-type: none"> • Switch off ignition. • Pull off plug on 'PSM control module'. • Measure voltage between 'pin 1' and ground and 'pin 32' and ground. 	11.4 to 14.5 V Go to Step 4	Repair terminal 30 power supply to 'PSM control module' --> End
4	Check terminal 15 power supply to 'PSM control module'	<ul style="list-style-type: none"> • Switch ignition on. • Measure voltage between 'pin 4' and ground. 	11.4 to 14.5 V Go to Step 5	Repair terminal 15 power supply to 'PSM control module' --> End
5	Check terminal 31 ground supply for open circuit	<ul style="list-style-type: none"> • Switch off ignition. • Measure resistance between 'pin 16' and ground and 'pin 47' and ground. 	< 5 ohms Go to Step 6	Between PSM control module plug and 'body ground point 14': open circuit, contact resistance/corroded or loose connection on 'body ground point 14'. Repair wire or fasten it to ground pin. --> End
6	Check 'K lead' for short circuit to B+	<ul style="list-style-type: none"> • Switch on ignition • Measure voltage between 'pin 3' of K' lead on diagnostic box in the vehicle and ground. 	< 0.3 V Go to Step 7	Repair K' lead --> End
7	Check 'K lead' for short circuit to ground	<ul style="list-style-type: none"> • Switch off ignition • Measure resistance between 'pin 3' of K' lead on diagnostic box in the vehicle and ground. 	infinity ohms Go to Step 8	Repair K' lead --> End
	Check 'K lead' for	<ul style="list-style-type: none"> • Measure resistance of K' lead 	< 0.5 ohms	Repair K' lead

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8	open circuit	from diagnostic box in the vehicle 'pin 3' to plug on instrument cluster gateway 'pin A25'.	Go to Step 9	--> End
9	Check gateway in instrument cluster using the Porsche System Tester II No. 9588	Gateway in instrument cluster is OK if: <ul style="list-style-type: none">it is possible to connect to at least one control module connected to the instrument cluster gateway.	Go to Step 10	Replace instrument cluster. --> End
10	CAN drive, check connection to 'PSM control module'	<ul style="list-style-type: none">Follow <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u>.	If CAN drive is OK: Go to Step 11	
11	Replace PSM control module		Code new 'PSM control module' and calibrate sensors. --> End	

FAULT CODE 0003

CONTROL MODULE FAULTY

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- PSM control module faulty

Affected pins

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE:

- Before replacing the control module, the ground connections, power supply and plug connections on the control module must be checked.
- If the control module is damaged (PSM 0101), only the PSM control module must be replaced.
- When replacing the PSM control module, observe the coding of the control module.
- After the test drive, read out the fault memory again with the Porsche System Tester II No. 9588. Additional causes of faults that could damage the PSM control module should be detected and remedied.

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DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Replace PSM control module	--> End	

FAULT CODE 0283

SPEED SENSOR, FRONT LEFT

NOTE: This fault can also be caused by a wheel bearing mounted on the wrong side! The multiple-pole ring on the wheel bearing is only integrated on one side. When repairing, always make sure the installation position of the wheel bearing is correct. The correct side (magnetic side) can be determined using a paper clip. Refer to FRONT WHEEL SUSPENSION, DRIVE SHAFTS ; Running gear.

Diagnostic conditions

- Ignition on
- Internal PSM control unit function test

Possible cause of fault

- Multiple-pole ring on wheel bearing/speed sensor soiled or damaged (mechanical fault)
- Open circuit in circuit (electrical fault in electric circuit)
- Short circuit to B+ in circuit (electrical fault in electric circuit)
- Short circuit to ground in circuit (electrical fault in electric circuit)
- Incorrect signal/speed sensor faulty/wheel bearing was mounted incorrectly (implausible signal from speed sensor or the magnetic strength of magnetic plates integrated in the multiple-pole ring is significantly reduced)

Affected pins

PSM control unit plug:

- Pin 45 'signal lead'
- Pin 46 'ground'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

CAUTION: When checking the wheel bearing with multiple-pole ring, never use magnetized tools or magnets. This destroys the magnetic plates in the multiple-pole ring.

CAUTION: Resistance measurement destroys the active speed sensor.

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2003-08 SUSPENSION PSM - 9pa_Cayenne

NOTE: The PSM control unit supplies '7 mA' of current via signal lead to the active speed sensor when 'ignition is on and during driving'.

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control unit plug connection and the 'pins' on the speed sensor plug connection are neither damaged nor corroded. Check speed sensor, multiple-pole ring on wheel bearing and front left wire for external damage. Remove any soiling or corrosion/oxidation. Replace damaged parts. Cables '12/13/35' from measurement tool set No. 9684 are needed for measuring the current on the speed sensor.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1 Check power and ground supply of the speed sensor	<ul style="list-style-type: none">• Switch ignition off• Disconnect plug on the speed sensor.• Connect the disconnected plug to 'pin 2' on the control unit and speed sensor using a jumper.• Connect a digital multimeter to the open signal lead on the disconnected plug 'pin 1' and switch the measuring range to 'mA'.• Switch on ignition and read off the value.	approx. 7.0 mA Go to Step 2	Go to Step 3
2 Replace front left speed sensor		--> End	If fault is not remedied by replacing speed sensor, the wheel bearing with multiple-pole ring must be replaced. --> End
3 Check signal lead of the speed sensor for open circuit	<ul style="list-style-type: none">• Switch ignition off• Pull plug off the PSM control unit.• Measure resistance between 'pin 45' of PSM control unit plug and 'pin 1' of speed sensor plug.	< 5 ohms Go to Step 4	Open circuit between 'pin 45' of PSM control unit plug and 'pin 1' of front left speed sensor plug. Repair wire or replace. --> End
4 Check ground lead of speed sensor for open circuit	<ul style="list-style-type: none">• Measure resistance between 'pin 46' of PSM control unit plug and 'pin 2' of speed sensor plug.	< 5 ohms Go to Step 5	Open circuit between 'pin 46' of PSM control unit plug and 'pin 2' of front left speed sensor plug. Repair wire or replace. --> End

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5	Check signal lead of speed sensor for short circuit to B+	<ul style="list-style-type: none">• Connect plug on the speed sensor.• Switch ignition on.• Measure voltage on 'pin 45' of PSM control unit plug and ground.	< 0.3 V Go to Step 6	Short circuit to B+ between 'pin 45'/'pin 46' on PSM control unit plug and 'pin 1'/'pin 2' of front left speed sensor. Repair wire or replace speed sensor. --> End
6	Check ground supply lead of speed sensor for short circuit to B+	<ul style="list-style-type: none">• Measure voltage on 'pin 46' of PSM control unit plug and ground.	< 0.3 V Go to Step 7	Short circuit to B+ between 'pin 45'/'pin 46' on PSM control unit plug and 'pin 1'/'pin 2' of front left speed sensor. Repair wire or replace speed sensor. --> End
7	Check signal lead of speed sensor for short circuit to ground	<ul style="list-style-type: none">• Switch ignition off• Set digital multimeter measuring range to 'kohms' and measure resistance between 'pin 45' on PSM control unit plug and ground.	infinity ohms Go to Step 8	Short circuit to ground between 'pin 45'/'pin 46' on PSM control unit plug and 'pin 1'/'pin 2' of front left speed sensor. Repair wire or replace speed sensor. --> End
8	Replace front left speed sensor		--> End If fault is not remedied by replacing the speed sensor: Go to Step 9	
9	Replace PSM control unit		--> End	

FAULT CODE 0285

SPEED SENSOR, FRONT RIGHT

NOTE: This fault can also be caused by a wheel bearing mounted on the wrong side! The multiple-pole ring on the wheel bearing is only integrated on one side. When repairing, always make sure the installation position of the wheel bearing is correct. The correct side (magnetic side) can be determined using a paper clip. Refer to FRONT WHEEL SUSPENSION, DRIVE SHAFTS ; Running gear.

Diagnostic conditions

- Ignition on
- Internal PSM control unit function test

Possible cause of fault

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2003-08 SUSPENSION PSM - 9pa_Cayenne

- Multiple-pole ring on wheel bearing/speed sensor soiled or damaged (mechanical fault)
- Open circuit in circuit (electrical fault in electric circuit)
- Short circuit to B+ in circuit (electrical fault in electric circuit)
- Short circuit to ground in circuit (electrical fault in electric circuit)
- Incorrect signal/speed sensor faulty/wheel bearing was mounted incorrectly (implausible signal from speed sensor or the magnetic strength of magnetic plates integrated in the multiple-pole ring is significantly reduced)

Affected pins

PSM control unit plug:

- Pin 34 'signal lead'
- Pin 33 'ground'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

CAUTION: When checking the wheel bearing with multiple-pole ring, never use magnetized tools or magnets. This destroys the magnetic plates in the multiple-pole ring.

CAUTION: Resistance measurement destroys the active speed sensor.

NOTE: The PSM control unit supplies '7 mA' of current via signal lead to the active speed sensor when 'ignition is on and during driving'.

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control unit plug connection and the 'pins' on the speed sensor plug connection are neither damaged nor corroded. Check the speed sensor, multiple-pole ring on the wheel bearing and the front right wire for external damage. Remove any soiling or corrosion/oxidation. Replace damaged parts. Cables '12/13/35' from measurement tool set No. 9684 are needed for measuring the current on the speed sensor.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
	<ul style="list-style-type: none">• Switch ignition off• Disconnect plug on the speed sensor.• Connect the disconnected plug to		

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1	Check power and ground supply of the speed sensor	<p>'pin 2' on the control unit and speed sensor using a jumper.</p> <ul style="list-style-type: none"> Connect a digital multimeter to the open signal lead on the disconnected plug 'pin 1' and switch the measuring range to 'mA'. Switch on ignition and read off the value. 	7.0 mA Go to Step 2	Go to Step 3
2	Replace front right speed sensor		--> End	If fault is not remedied by replacing the speed sensor, the wheel bearing with multiple-pole ring must be replaced. --> End
3	Check signal lead of the speed sensor for open circuit	<ul style="list-style-type: none"> Switch ignition off Unplug PSM control unit plug. Measure resistance between 'pin 34' of PSM control unit plug and 'pin 1' of speed sensor plug. 	< 5 ohms Go to Step 4	Open circuit between 'pin 34' of PSM control unit plug and 'pin 1' of front left speed sensor plug. Repair wire or replace. --> End
4	Check ground lead of speed sensor for open circuit	<ul style="list-style-type: none"> Measure resistance between 'pin 33' of PSM control unit plug and 'pin 2' of speed sensor plug. 	< 5 ohms Go to Step 5	Open circuit between 'pin 33' of PSM control unit plug and 'pin 2' of front left speed sensor plug. Repair wire or replace. --> End
5	Check signal lead of speed sensor for short circuit to B+	<ul style="list-style-type: none"> Connect plug on the speed sensor. Switch ignition on. Measure voltage on 'pin 34' of PSM control unit plug and ground. 	< 0.3 V Go to Step 6	Short circuit to B+ between 'pin 34'/'pin 33' on PSM control unit plug and 'pin 1'/'pin 2' of front right speed sensor. Repair wire or replace speed sensor. --> End
6	Check ground supply lead of speed sensor for short circuit to B+	<ul style="list-style-type: none"> Measure voltage on 'pin 33' of PSM control unit plug and ground. 	< 0.3 V Go to Step 7	Short circuit to B+ between 'pin 34'/'pin 33' on PSM control unit plug and 'pin 1'/'pin 2' of front right speed sensor. Repair wire or replace speed sensor. --> End
7	Check signal lead of speed sensor for short circuit to ground	<ul style="list-style-type: none"> Switch ignition off Set digital multimeter measuring range to 'kohms' and measure resistance between 'pin 34' on PSM control unit plug and ground. 	infinity ohms Go to Step 8	Short circuit to ground between 'pin 34'/'pin 33' on PSM control unit plug and 'pin 1'/'pin 2' of front right speed sensor. Repair wire or replace speed sensor. --> End

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8	Replace front right speed sensor	--> End If fault is not remedied by replacing the speed sensor: Go to Step 9
9	Replace PSM control unit	--> End

FAULT CODE 0287

SPEED SENSOR, REAR RIGHT

NOTE: This fault can also be caused by a wheel bearing mounted on the wrong side! The multiple-pole ring on the wheel bearing is only integrated on one side. When repairing, always make sure the installation position of the wheel bearing is correct. The correct side (magnetic side) can be determined using a paper clip. Refer to REAR WHEEL SUSPENSION, DRIVE SHAFTS ; Running gear.

Diagnostic conditions

- Ignition on
- Internal PSM control unit function test

Possible cause of fault

- Multiple-pole ring on wheel bearing/speed sensor soiled or damaged (mechanical fault)
- Open circuit in circuit (electrical fault in electric circuit)
- Short circuit to B+ in circuit (electrical fault in electric circuit)
- Short circuit to ground in circuit (electrical fault in electric circuit)
- Incorrect signal/speed sensor faulty/wheel bearing was mounted incorrectly (implausible signal from speed sensor or the magnetic strength of magnetic plates integrated in the multiple-pole ring is significantly reduced)

Affected pins

PSM control unit plug:

- Pin 42 'ground'
- Pin 43 'signal lead'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

CAUTION: When checking the wheel bearing with multiple-pole ring, never use magnetized tools or magnets. This destroys the magnetic plates in the multiple-pole ring.

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2003-08 SUSPENSION PSM - 9pa_Cayenne

CAUTION: Resistance measurement destroys the active speed sensor.

NOTE: The PSM control unit supplies '7 mA' of current via signal lead to the active speed sensor when 'ignition is on and during driving'.

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control unit plug connection and the 'pins' on the speed sensor plug connection are neither damaged nor corroded. Check the speed sensor, multiple-pole ring on the wheel bearing and the rear right wire for external damage. Remove any soiling or corrosion/oxidation. Replace damaged parts. Cables '12/13/35' from measurement tool set No. 9684 are needed for measuring the current on the speed sensor.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1	Check power and ground supply of the speed sensor <ul style="list-style-type: none">• Switch ignition off• Disconnect plug on the speed sensor.• Connect the disconnected plug to 'pin 2' on the control unit and speed sensor using a jumper.• Connect a digital multimeter to the open signal lead on the disconnected plug 'pin 1' and switch the measuring range to 'mA'.• Switch on ignition and read off the value.	7.0 mA Go to Step 2	Go to Step 3
2	Replace rear right speed sensor	--> End	If fault is not remedied by replacing the speed sensor, the wheel bearing with multiple-pole ring must be replaced. --> End
3	Check signal lead of the speed sensor for open circuit <ul style="list-style-type: none">• Switch ignition off• Unplug PSM control unit plug.• Measure resistance between 'pin 43' of PSM control unit plug and 'pin 1' of speed sensor plug.	< 5 ohms Go to Step 4	Open circuit between 'pin 43' of PSM control unit plug and 'pin 1' of front left speed sensor plug. Repair wire or replace. --> End
4	Check ground lead of speed sensor for open circuit <ul style="list-style-type: none">• Measure resistance between 'pin 42' of PSM control unit plug and 'pin 2' of front left speed sensor plug.	< 5 ohms Go to	Open circuit between 'pin 42' of PSM control unit plug and 'pin 2' of front left speed sensor plug.

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	of speed sensor plug.	Step 5	Repair wire or replace. --> End
5	Check signal lead of speed sensor for short circuit to B+	<ul style="list-style-type: none">• Connect plug on the speed sensor.• Switch ignition on.• Measure voltage on 'pin 43' of PSM control unit plug and ground.	< 0.3 V Go to Step 6 Short circuit to B+ between 'pin 43'/'pin 42' on PSM control unit plug and 'pin 1'/'pin 2' of rear right speed sensor. Repair wire or replace speed sensor. --> End
6	Check ground supply lead of speed sensor for short circuit to B+	<ul style="list-style-type: none">• Measure voltage on 'pin 42' of PSM control unit plug and ground.	< 0.3 V Go to Step 7 Short circuit to B+ between 'pin 43'/'pin 42' on PSM control unit plug and 'pin 1'/'pin 2' of rear right speed sensor. Repair wire or replace speed sensor. --> End
7	Check signal lead of speed sensor for short circuit to ground	<ul style="list-style-type: none">• Switch ignition off• Set digital multimeter measuring range to 'kohms' and measure resistance between 'pin 43' on PSM control unit plug and ground.	infinity ohms Go to Step 8 Short circuit to ground between 'pin 43'/'pin 42' on PSM control unit plug and 'pin 1'/'pin 2' of rear right speed sensor. Repair wire or replace speed sensor. --> End
8	Replace rear right speed sensor	--> End If fault is not remedied by replacing the speed sensor: Go to Step 9	
9	Replace PSM control unit	--> End	

FAULT CODE 0290

SPEED SENSOR, REAR LEFT

NOTE: This fault can also be caused by a wheel bearing mounted on the wrong side! The multiple-pole ring on the wheel bearing is only integrated on one side. When repairing, always make sure the installation position of the wheel bearing is correct. The correct side (magnetic side) can be determined using a paper clip. Refer to REAR WHEEL SUSPENSION, DRIVE SHAFTS ; Running gear.

Diagnostic conditions

- Ignition on

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- Internal PSM control unit function test

Possible cause of fault

- Multiple-pole ring on wheel bearing/speed sensor soiled or damaged (mechanical fault)
- Open circuit in circuit (electrical fault in electric circuit)
- Short circuit to B+ in circuit (electrical fault in electric circuit)
- Short circuit to ground in circuit (electrical fault in electric circuit)
- Incorrect signal/speed sensor faulty/wheel bearing was mounted incorrectly (implausible signal from speed sensor or the magnetic strength of magnetic plates integrated in the multiple-pole ring is significantly reduced)

Affected pins

PSM control unit plug:

- Pin 36 'signal lead'
- Pin 37 'ground'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

CAUTION: When checking the wheel bearing with multiple-pole ring, never use magnetized tools or magnets. This destroys the magnetic plates in the multiple-pole ring.

CAUTION: Resistance measurement destroys the active speed sensor.

NOTE: The PSM control unit supplies '7 mA' of current via signal lead to the active speed sensor when 'ignition is on and during driving'.

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control unit plug connection and the 'pins' on the speed sensor plug connection are neither damaged nor corroded. Check the speed sensor, multiple-pole ring on the wheel bearing and the rear left wire for external damage. Remove any soiling or corrosion/oxidation. Replace damaged parts. Cables '12/13/35' from measurement tool set No. 9684 are needed for measuring the current on the speed sensor.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
	<ul style="list-style-type: none">• Switch ignition off		

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1	Check power and ground supply of the speed sensor	<ul style="list-style-type: none"> • Disconnect plug on the speed sensor. • Connect the disconnected plug to 'pin 2' on the control unit and speed sensor using a jumper. • Connect a digital multimeter to the open signal lead on the disconnected plug 'pin 1' and switch the measuring range to 'mA'. • Switch on ignition and read off the value. 	7.0 mA Go to Step 2	Go to Step 3
2	Replace rear left speed sensor		--> End	If fault is not remedied by replacing speed sensor, the wheel bearing with multiple-pole ring must be replaced. --> End
3	Check signal lead of the speed sensor for open circuit	<ul style="list-style-type: none"> • Switch ignition off • Unplug PSM control unit plug. • Measure resistance between 'pin 36' of PSM control unit plug and 'pin 1' of speed sensor plug. 	< 5 ohms Go to Step 4	Open circuit between 'pin 36' of PSM control unit plug and 'pin 1' of front left speed sensor plug. Repair wire or replace. --> End
4	Check ground lead of speed sensor for open circuit	<ul style="list-style-type: none"> • Measure resistance between 'pin 37' of PSM control unit plug and 'pin 2' of speed sensor plug. 	< 5 ohms Go to Step 5	Open circuit between 'pin 37' of PSM control unit plug and 'pin 2' of front left speed sensor plug. Repair wire or replace. --> End
5	Check signal lead of speed sensor for short circuit to B+	<ul style="list-style-type: none"> • Connect plug on the speed sensor. • Switch ignition on. • Measure voltage on 'pin 36' of PSM control unit plug and ground. 	< 0.3 V Go to Step 6	Short circuit to B+ between 'pin 36'/'pin 37' on PSM control unit plug and 'pin 1'/'pin 2' of rear left speed sensor. Repair wire or replace speed sensor. --> End
6	Check ground supply lead of speed sensor for short circuit to B+	<ul style="list-style-type: none"> • Measure voltage on 'pin 37' of PSM control unit plug and ground. 	< 0.3 V Go to Step 7	Short circuit to B+ between 'pin 36'/'pin 37' on PSM control unit plug and 'pin 1'/'pin 2' of rear left speed sensor. Repair wire or replace speed sensor. --> End
				Short circuit to ground

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7	Check signal lead of speed sensor for short circuit to ground	<ul style="list-style-type: none">• Switch ignition off• Set digital multimeter measuring range to 'kohms' and measure resistance between 'pin 36' on PSM control unit plug and ground.	infinity ohms Go to Step 8	between 'pin 36'/'pin 37' on PSM control unit plug and 'pin 1'/'pin 2' of rear left speed sensor. Repair wire or replace speed sensor. --> End
8	Replace rear left speed sensor		--> End If fault is not remedied by replacing the speed sensor: Go to Step 9	
9	Replace PSM control unit		--> End	

FAULT CODE 0493

COMBINATION SENSOR

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

Actual value of functions integrated in the combination sensor:

- Rate-of-turn sensor
- Axial acceleration sensor
- Transverse acceleration sensor

is evaluated and displays an implausible value (implausible signal).

- Internal CAN: Wire faulty (no signal/communication)
- Short circuit to B+ (electrical fault in electric circuit)
- Short circuit to ground (electrical fault in electric circuit)
- Open circuit in circuit to control module (electrical fault in electric circuit)
- Combination sensor faulty

CAUTION: The combination sensor must not be dropped and must be protected from severe impact.

NOTE: The transverse and axial acceleration sensor and the rate-of-turn sensor are integrated into the combination sensor housing. If a fault is detected in one of

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these three sensors, the combination sensor must be replaced. The integrated transverse and axial acceleration sensor must be calibrated after replacement.

Affected pins

PSM control module plug:

- Pin 6 'voltage'
- Pin 24 'ground'
- Pin 25 'internal CAN (low)'
- Pin 29 'internal CAN (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE:

- Calibration of the transverse and axial acceleration sensor completed, or checked and found to be OK.
- During calibration, the flashing frequency of the ABS warning light increases to 1.9 Hz. The brake warning light flashes with a lower frequency (1.1 Hz).

NOTE:

Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection and the 'pins' on the combination sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power and ground supply of combination sensor	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on combination sensor.• Switch ignition on.• Measure voltage between 'pin 1' and 'pin 3' of combination sensor plug.	11.4 to 14.5 V Go to Step 6	Open circuit or short circuit in circuit between PSM control module plug 'pins 6/24' and combination sensor plug 'pins 1/3', or PSM control module faulty. Go to Step 2
2	Check ground supply line for short circuit to B+	<ul style="list-style-type: none">• Measure voltage between combination sensor plug 'pin 3' and ground.	< 0.3 V Go to Step 3	Short circuit to B+ in wiring of PSM control module plug 'pin 24' and combination sensor plug 'pin 3', or PSM control module faulty. Repair wire or replace PSM control module.

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				--> End
3	Check power supply line for short circuit to ground	<ul style="list-style-type: none">• Switch off ignition.• Unplug PSM control module plug.• Measure resistance between PSM control module plug 'pin 6' and ground.	infinity ohms Go to Step 4	Short circuit to ground in wiring of PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
4	Check ground supply line for open circuit	<ul style="list-style-type: none">• Measure resistance between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'.	< 5 ohms Go to Step 5	Open circuit between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'. Repair wire. --> End
5	Check power supply line for open circuit	<ul style="list-style-type: none">• Measure resistance between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'.	< 5 ohms Go to Step 8	Open circuit between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
6	<u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .		Go to Step 7	Repair wire. --> End
7	Replace combination sensor		--> End	
8	Replace PSM control module		--> End	

FAULT CODE 0495

COMBINATION SENSOR POWER SUPPLY

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Short circuit to B+ (electrical fault in electric circuit)
- Short circuit to ground (electrical fault in electric circuit)
- Open circuit in circuit to control module (electrical fault in electric circuit)

CAUTION: The combination sensor must not be dropped and must be protected from severe impact.

NOTE: The transverse and axial acceleration sensor and the rate-of-turn sensor are integrated into the 'combination sensor' housing. If a fault is detected in one of these three sensors, the combination sensor must be replaced. The integrated

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transverse and axial acceleration sensor must be calibrated after replacement.

Affected pins

PSM control module plug:

- Pin 6 'voltage'
- Pin 24 'ground'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection and the 'pins' on the combination sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power and ground supply of combination sensor	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on combination sensor.• Switch ignition on.• Measure voltage between 'pin 1' and 'pin 3' of combination sensor plug.	11.4 to 14.5 V Go to Step 6	Open circuit or short circuit in circuit between PSM control module plug 'pins 6/24' and combination sensor plug 'pins 1/3', or PSM control module faulty. Go to Step 2
2	Check ground supply line for short circuit to B+	<ul style="list-style-type: none">• Measure voltage between combination sensor plug 'pin 3' and ground.	< 0.3 V Go to Step 3	Short circuit to B+ in wiring of PSM control module plug 'pin 24' and combination sensor plug 'pin 3', or PSM control module faulty. Repair wire or replace PSM control module. --> End
3	Check power supply line for short circuit to ground	<ul style="list-style-type: none">• Switch off ignition.• Unplug PSM control module plug.• Measure resistance between PSM control module plug 'pin 6' and ground.	infinity ohms Go to Step 4	Short circuit to ground in wiring of PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
4	Check ground supply line for open	<ul style="list-style-type: none">• Measure resistance between PSM control module plug	< 5 ohms	Open circuit between PSM control module plug 'pin 24' and combination

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	circuit	'pin 24' and combination sensor plug 'pin 3'.	Go to Step 5	sensor plug 'pin 3'. Repair wire. --> End
5	Check power supply line for open circuit	<ul style="list-style-type: none">Measure resistance between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'.	< 5 ohms Go to Step 7	Open circuit between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
6	Replace combination sensor		--> End	
7	Replace PSM control module		--> End	

FAULT CODE 0538

REFERENCE VOLTAGE (PSM)

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

This fault is set if the voltage of terminal 15 to the PSM control module falls below '10.0 V'. The low voltage may be caused by the circuit of the sensors to be supplied, the power supply of terminal 15 of the PSM control module or because of an internal fault in the PSM control module. The possible causes are listed below:

- Short circuit to ground in the power supply circuit for sensors or PSM control module (electrical fault in electric circuit)
- Open circuit/contact resistance in terminal 15 circuit to PSM control module (electrical fault in electric circuit)
- Short circuit in PSM control module

Affected sensors:

- Combination sensor
- Speed sensors (all four)

Affected pins

PSM control module plug:

- Pin 4 'terminal 15 power supply input, via fuse F38, to fuse carrier at right of dashboard'
- Pin 6 'combination sensor power supply'
- Pin 34 'front right speed sensor signal wire'
- Pin 36 'rear left speed sensor signal wire'

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- Pin 43 'rear right speed sensor signal wire'
- Pin 45 'front left speed sensor signal wire'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE:

- If other fault codes are stored in the fault memory in addition to fault code '538', the circuit of the affected components must be checked for short circuits. The diagnostic instructions for the stored fault codes must be observed for the test.
- If only fault code '538' is stored in memory, this indicates a short circuit in the PSM control module or in the terminal 15 circuit to the PSM control module, or an open circuit in the terminal 15 wire.

NOTE:

Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Terminal 15 power supply to PSM control module	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on PSM control module.• Switch ignition on.• Measure voltage between 'pin 4' and ground.	11.4 to 14.5 V Go to Step 4	Go to Step 2
2	Measure terminal 15 power supply at the fuse	<ul style="list-style-type: none">• Measure voltage between fuse 'F38' in right fuse carrier and ground.	11.4 to 14.5 V Go to Step 3	Short circuit/contact resistance/corroded or loose connections in fuse carrier. Repair if possible, otherwise replace fuse carrier at right of dashboard. --> End
3	Repair wire between PSM control module plug and fuse F38 in fuse carrier at right of dashboard.		--> End	
4	Replace PSM control module		--> End	

FAULT CODE 0650

CLUTCH SWITCH

NOTE:

In the case of Cayenne vehicles with manual transmission, this fault can cause

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the following message to appear on the instrument cluster: 'PHC failure'

'PHC' was switched off by the 'Porsche Drive Off Assistant' monitoring function and is no longer available for this driving cycle!

Follow the following procedure to restart the PHC function:

1. Erase fault memory
2. Start engine and allow to run in idle
3. Take foot off the clutch pedal
4. Depress clutch pedal again (once)
5. Take foot off the clutch pedal again
6. Switch off engine

The 'PHC function' will be available again when the ignition is switched on again!

Follow the procedure described below to remedy the fault in the clutch switch circuit:

Diagnostic conditions

Internal function test: The PSM control unit initially tests internal function sequences when the ignition is switched on (terminal 15). If they are OK, all diagnosable outputs are then tested and any faults are stored.

- Switch on ignition
- Depress clutch pedal
- Take foot off the clutch pedal again

Possible cause of fault

- Implausible signal: 'Fuse 26' in the fuse carrier in the left side of the dashboard is faulty
- Implausible signal: Short circuit to B+ in the line from the PSM control unit to the clutch switch
- Implausible signal: Short circuit to ground in the line from the PSM control unit to the clutch switch
- Implausible signal: Open circuit in the clutch switch input/output line
- Implausible signal: Clutch switch faulty
- Implausible signal: Control unit faulty

Affected pins

PSM control unit connector:

- Pin 40 'clutch switch'

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NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected pins on the PSM control unit plug connection are neither damaged nor corroded. The wiring and connectors of the affected components must also be checked for external damage and correct contacts. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wires.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1	<p>Check position of the clutch switch:</p> <ul style="list-style-type: none">Using the 9718 PIWIS tester, select the 'Input signals' menu in the PSM system and read the status of the 'clutch switch' and 'clutch switch (via CAN)'. <p>The following procedure must be followed in order to test the function:</p> <ul style="list-style-type: none">Clutch pedal in idle position; input signal 'clutch switch' and 'clutch switch (via CAN)' indicates 'not actuated'. <p>Depress the clutch pedal until the Tester display changes from 'not actuated' to 'actuated'.</p> <ul style="list-style-type: none">Clutch pedal travel should be between '11 mm' and '15 mm' (pedal travel).	<p>Check whether the plug connection and clutch switch are securely seated; repair if necessary.</p> <ul style="list-style-type: none">Check whether faults are entered in the fault memory.The fault has been entered again. <p>Go to Step 6</p> <ul style="list-style-type: none">The fault is no longer present. <p>--> End</p>	<p>Go to Step 2</p>
	<ul style="list-style-type: none">Switch on ignition.		<ul style="list-style-type: none">No voltage from the 'fuse carrier in the left side of the dashboard':<ol style="list-style-type: none">The power supply to the 'fuse carrier in the left side of the dashboard' is faulty; repair the power supply. <p>--> End</p>

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2	Check power supply at the fuse:	<ul style="list-style-type: none"> Measure voltage between input/output of 'fuse 26' in the 'fuse carrier in the left side of the dashboard' and ground. 	11.4 to 14.5 V Go to Step 2	<p>2. The power supply to the 'fuse carrier in the left side of the dashboard' is OK, then:</p> <p>Go to Step 7</p> <ul style="list-style-type: none"> 'Fuse 26' is faulty; replace the fuse. If 'fuse 26' is faulty again: <p>Go to Step 4</p> <ul style="list-style-type: none"> If the fuse remains intact: <p>--> End</p>
3	Check wire harness for short circuit to B+:	<ul style="list-style-type: none"> Switch off ignition. Pull connector off clutch switch. Switch on ignition. On the removed clutch switch connector, measure the line voltage to 'pin 4' on the PSM control unit and ground. 	< 0.3 V Go to Step 5	Repair wiring. --> End
4	Check wire harness for short circuit to ground:	<ul style="list-style-type: none"> Switch off ignition. Pull connector off the PSM control unit. Connect connector to clutch switch. Clutch pedal in idle position. Measure resistance between PSM control unit connector 'pin 40' and ground. 	infinity ohms Go to Step 5	Repair wiring. --> End
		<p>Perform measurements with ignition off and the clutch switch connector and PSM control unit connector removed.</p> <ul style="list-style-type: none"> Measure resistance 		

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5	Check wire harness for open circuit:	<p>between clutch switch connector 'pin 4' and 'pin 40' on the PSM control unit connector.</p> <ul style="list-style-type: none">• Measure resistance between clutch switch connector 'pin 1' and 'fuse 26' in the 'fuse carrier in the left side of the dashboard'.	<p>< 5 ohms Go to Step 6</p>	<p>Repair wiring. --> End</p>
6	Replace clutch switch:	<p>If the fault is entered again after replacement of the clutch switch and the lines/plug connections tested OK, continue with: Go to Step 8 If the fault no longer appears after replacement of the clutch switch, then: --> End</p>		
7	Replace fuse carrier in left side of dashboard:	--> End		
8	Replace PSM control unit:	--> End		

FAULT CODE 0668

VEHICLE VOLTAGE, TERMINAL 30

Diagnostic conditions

- Ignition on
- Internal PSM control module function test
- Engine speed > 2,000 rpm

Possible cause of fault

- Overvoltage/terminal 30 power supply more than 16.0 V
- Undervoltage/terminal 30 power supply less than 10.0 V

Affected pins

PSM control module plug:

- Pin 1 'terminal 30 power supply'
- Pin 32 'terminal 30 power supply'
- Pin 16 'body ground point 14 ground supply'
- Pin 47 'body ground point 14 ground supply'

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DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected fuses are not faulty. Replace faulty fuse(s) and determine and remedy the cause according to troubleshooting instructions. The affected 'pins' on the PSM control module plug connection must not be either damaged or corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Measure charge voltage/current on three-phase generator	<ul style="list-style-type: none"> Engine speed > 2,000 rpm. Measure charge voltage/current of generator. 	11.4 to 14.5 V Go to Step 2	Wires/regulator or diodes faulty. Repair wires or generator. --> End
2	Check terminal 30 power supply to PSM control module	<ul style="list-style-type: none"> Switch off ignition. Pull off plug on PSM control module. Measure voltage between 'pin 1 and ground' and 'pin 32 and ground'. 	11.4 to 14.5 V Go to Step 3	Check whether fuses are faulty, check power supply lines for short circuit to ground: Go to Step 4
3	Check terminal 31 ground supply to PSM control module	<ul style="list-style-type: none"> Measure voltage between 'pin 16 and battery positive connection' and 'pin 47 and battery positive connection'. 	11.4 to 14.5 V Go to Step 4	Check ground lead for short circuit to B+: Go to Step 5
4	Check power supply lines for short circuit to ground	<ul style="list-style-type: none"> Switch off ignition. Unplug PSM control module plug. Measure voltage between 'pin 1 and battery positive connection' and 'pin 32 and battery positive connection'. 	< 0.3 V Go to Step 5	Repair short circuit to ground in PSM control module plug leads 'pin 1 and fuse F56' or 'pin 32 and fuse F6' in right fuse carrier. Repair wire and replace faulty fuse (s). --> End
5	Check ground supply lines for short circuit to B+	<ul style="list-style-type: none"> Measure voltage between 'pin 16 and body ground' and 'pin 47 and body ground'. 	< 0.3 V Go to Step 6	Short circuit to B+ in PSM control module plug leads and 'body ground point 14'. Repair wire and replace faulty fuse (s). --> End
	Check power supply	<ul style="list-style-type: none"> Switch off ignition. Unplug PSM control module plug. 	< 0.5 ohms	Open circuit in PSM control module plug leads 'pin 1 and fuse F56' or 'pin 32 and fuse F6' in fuse

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6	lines for open circuit	<ul style="list-style-type: none">Measure resistance between 'pin 1 and fuse F56' and 'pin 32 and fuse F6' in fuse carrier at right of dashboard.	Go to Step 7	carrier at right of dashboard. Repair wire(s). --> End
7	Check ground supply lines for open circuit	<ul style="list-style-type: none">Measure resistance between 'pin 16 and body ground' and 'pin 47 and body ground'.	< 0.5 ohms Go to Step 8	Open circuit in PSM control module plug leads 'pin 16 and body ground point 14' or 'pin 47 and body ground point 14'. Repair wire(s). --> End
8	Check terminal 30 power supply at fuse	<ul style="list-style-type: none">Measure voltage between fuse plug 'F6 and body ground' and 'F56 and body ground' in right fuse carrier.	11.4 to 14.5 V Go to Step 9	Short circuit/contact resistance/corroded or loose connections near or in fuse carrier. Repair if possible, otherwise replace fuse carrier at right of dashboard. --> End
9	Replace PSM control module		--> End	

FAULT CODE 0778

STEERING-ANGLE SENSOR

CAUTION: The steering-angle sensor must always be initialized 'control lamp on' whenever the battery terminal is disconnected.

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Initialization/calibration not performed (no display/no or incorrect basic setting/adaptation)
- Mechanical fault
- The signal received from the PSM control module about the CAN drive does not correspond to the expected signal (implausible signal)
- CAN drive faulty (no signal/communication)
- Steering-angle sensor faulty

Affected pins

PSM control module plug:

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- Pin 11 'CAN drive (high)'
- Pin 15 'CAN drive (low)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

INITIALIZING

The steering-angle sensor in Cayenne must be initialized after the following work is carried out:

- Whenever the power supply is interrupted (PSM indicator light on).
- The steering-angle sensor must be calibrated after all work on the running gear.

NOTE: Calibration of the steering-angle sensor must be performed on a measuring platform. First, the PSM control module must be coded successfully and the steering-angle sensor must be initialized. The steering-angle sensor must be calibrated after work has been carried out on the running gear in the area of the front axle.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Initialize steering-angle sensor	<ul style="list-style-type: none">• Switch ignition on.• Position wheels straight ahead.• From the straight-ahead position, turn the steering wheel approx. '15° to the left and '15° to the right (past the straight-ahead position).• Drive the vehicle straight ahead at a speed of '> 4 km/h for at least 1 second'.	After successful initialization, the stored fault code is erased from the fault memory and the PSM control lamp goes out. --> End	Go to Step 2
2	Check steering-angle sensor calibration using the Porsche System Tester II No. 9588	<ul style="list-style-type: none">• Running gear set according to Porsche specifications.• Wheels in straight-ahead position and steering wheel horizontal.• Steering wheel may be turned by max. $\pm 2.0^\circ$ from the horizontal position for driving straight ahead.	After successful calibration, the stored fault code is erased from the fault memory. --> End	Go to Step 3
3	Mechanical fault	<ul style="list-style-type: none">• Examine moving parts for damage	Go to Step 4	The steering-angle sensor is integrated into the steering column switch and must be replaced along

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		and check mobility.		with this if its functionality is impaired mechanically. --> End
4	Read out steering column switch control module, fault memory and check circuit for short or open circuit	<ul style="list-style-type: none">Carry out fault localization in accordance with 'Diagnosis/troubleshooting' for steering column switch control module.	If electric circuit is OK: Go to Step 5	Repair wiring harness circuit. --> End
5	Check CAN drive	<ul style="list-style-type: none">Carry out fault localization in accordance with <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u>.	If CAN drive is OK: Go to Step 6	Repair wiring harness. --> End
6	Replace steering-angle sensor		The steering-angle sensor can only be replaced together with the steering column switch. --> End	

FAULT CODE 0812

BRAKE PEDAL PULSE SENDER ACTUATED/IN BRAKE BOOSTER

NOTE: A brake light switch set incorrectly (or sticking) on the brake pedal can result in the brake pedal not returning to its initial position (normal position). If the fault code specified above is stored in the fault memory together with the fault type 'implausible signal', first check the setting of the brake light switch and correct it if necessary.

Diagnostic conditions

- Ignition on
- Internal PSM control module function test
- Brake pedal not actuated/actuated

Possible cause of fault

- The signal that was received is different from the expected signal. Mechanical problem: the brake pedal does not return to its original position/brake light switch is not set properly (implausible signal)
- Short circuit to B+ (electrical fault in electric circuit)
- Short circuit to ground (electrical fault in electric circuit)
- Short circuit with respect to each other (electrical fault in electric circuit)

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- Open circuit in wiring harness (electrical fault in electric circuit)

Affected pins

PSM control module plug:

- Pin 27 'release switch signal 2 (brake pedal actuated)'
- Pin 28 'power supply to release switch'
- Pin 30 'release switch signal 1 (brake pedal not actuated)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection and the 'pins' on the 'brake pedal pulse sender actuated' plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power supply to release switch	<ul style="list-style-type: none">• Switch off the ignition.• Disconnect plug from 'brake pedal pulse sender actuated'.• Switch on ignition.• Measure voltage on removed plug 'pin A3' and ground.	4.5 to 5.0 V Go to Step 2	If no voltage is measured or voltage is too low (< 4.5 V): Go to Step 7 If voltage is approx. 11.0 V: Go to Step 4
2	Check 'signal 1' when brake pedal is not actuated	<ul style="list-style-type: none">• Switch off the ignition.• Pull plug off the PSM control module.• Plug connected to 'brake pedal pulse sender actuated'.• 'Do not actuate brake pedal!'• Measure resistance between 'pin 28' and 'pin 30' on 'PSM control module' plug.• Measure resistance between 'pin 28' and 'pin	< 5.0 ohms Go to Step 3 infinity ohms Go to Step 3	If measured resistance is 'infinity ohms': Go to Step 12 If measured resistance is '< 5.0 ohms': Go to Step 10

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		27'.		
3	Check 'signal 2' when brake pedal is actuated	<ul style="list-style-type: none"> • 'Actuate brake pedal.' • Measure resistance between 'pin 28' and 'pin 27' on 'PSM control module' plug. • Measure resistance between 'pin 28' and 'pin 30'. 	<p>< 5.0 ohms Go to Step 5</p> <p>infinity ohms Go to Step 5</p>	<p>If measured resistance is 'infinity ohms': Go to Step 13</p> <p>If measured resistance is '< 5.0 ohms': Go to Step 10</p>
4	Check power supply to release switch for short circuit to B+	<ul style="list-style-type: none"> • Switch off the ignition. • Pull plug off the 'PSM control module'. • Plug connected to 'brake pedal pulse sender actuated'. • Switch on ignition. • Measure voltage between 'pin 28' and ground on 'PSM control module' plug. • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure voltage again between 'pin 28' and ground on 'PSM control module' plug. 	<p>< 0.3 V</p> <p>Measurement 'with' and 'without' plug connected to 'brake pedal pulse sender actuated' Go to Step 15</p>	<p>If voltage 'with' plug connected to 'brake pedal pulse sender actuated' measures 'approx. 11.0 V' and voltage 'without' plug connected is '< 0.3 V': Go to Step 14</p> <p>Otherwise: Repair wire. --> End</p>
5	Check 'signal 1' wire for short circuit to B+	<ul style="list-style-type: none"> • Switch off the ignition. • Pull plug off the 'PSM control module'. • Switch on ignition. • Plug connected to 'brake pedal pulse sender actuated'. • Measure voltage between 'pin 30' and ground on 'PSM control module' plug. • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure voltage again 	<p>< 0.3 V</p> <p>Go to Step 6</p>	<p>If voltage 'with' plug connected to 'brake pedal pulse sender actuated' measures 'approx. 11.0 V' and voltage 'without' plug connected is '< 0.3 V': Go to Step 14</p> <p>Otherwise: Repair wire. --> End</p>

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		between 'pin 30' and ground on 'PSM control module' plug.		
6	Check 'signal 2' wire for short circuit to B+	<ul style="list-style-type: none"> • Plug connected to 'brake pedal pulse sender actuated'. • Switch on ignition. • Measure voltage between 'pin 27' and ground on 'PSM control module' plug. • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure voltage again between 'pin 27' and ground on 'PSM control module' plug. 	< 0.3 V Go to Step 8	<p>If voltage 'with' plug connected to 'brake pedal pulse sender actuated' measures 'approx. 11.0 V' and voltage 'without' plug connected is '< 0.3 V': Go to Step 14 Otherwise: Repair wire. --> End</p>
7	Check power supply to release switch for short circuit to ground	<ul style="list-style-type: none"> • Switch off the ignition. • Pull plug off the 'PSM control module'. • Plug connected to 'brake pedal pulse sender actuated'. • Measure resistance between 'pin 28' and ground on 'PSM control module' plug. • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure resistance again between 'pin 28' and ground on 'PSM control module' plug. 	<p>infinity ohms Measurement 'with' and 'without' plug connected to 'brake pedal pulse sender actuated' Go to Step 11</p>	<p>If measurement with plug connected to 'brake pedal pulse sender actuated' is '< 5.0 ohms' and 'infinity ohms' without plug connected: Go to Step 14 If both measurements are less than '< 5.0 ohms': Repair wire. --> End</p>
	Check 'signal 1'	<ul style="list-style-type: none"> • Switch off the ignition. • Pull plug off the 'PSM control module'. • Plug connected to 'brake pedal pulse sender actuated'. • Measure resistance between 'pin 30' and 		<p>If measurement with plug connected to 'brake pedal pulse sender actuated' is '< 5.0 ohms' and 'infinity ohms'</p>

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8	wire for short circuit to ground	<p>ground on 'PSM control module' plug.</p> <ul style="list-style-type: none"> • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure resistance again between 'pin 30' and ground on 'PSM control module' plug. 	<p>infinity ohms Go to Step 9</p>	<p>without plug connected: Go to Step 14 If both measurements are less than '< 5.0 ohms': Repair wire. --> End</p>
9	Check 'signal 2' wire for short circuit to ground	<ul style="list-style-type: none"> • Plug connected to 'brake pedal pulse sender actuated'. • Measure resistance between 'pin 27' and ground on 'PSM control module' plug. • Disconnect plug from 'brake pedal pulse sender actuated'. • Measure resistance again between 'pin 27' and ground on 'PSM control module' plug. 	<p>infinity ohms Go to Step 10</p>	<p>If measurement with plug connected to 'brake pedal pulse sender actuated' is '< 5.0 ohms' and 'infinity ohms' without plug connected: Go to Step 14 If both measurements are less than '< 5.0 ohms': Repair wire. --> End</p>
10	Check power supply and signal wires for short circuit with respect to each other	<ul style="list-style-type: none"> • Switch off the ignition. • Disconnect plug from 'brake pedal pulse sender actuated' and from 'PSM control module'. • Measure resistance between the following pin combinations on PSM control module plug: 'Pin 28 and pin 27'Pin 28 and pin 30'Pin 27 and pin 30' 	<p>infinity ohms Check signal wires for open circuit: Go to Step 12 If resistance measured in 'Step 2' between 'pin 28' and 'pin 27' was '< 5.0 ohms': Go to Step 14</p>	<p>< 5.0 ohms Repair wire. --> End</p>
11	Check power supply to release switch for open circuit	<ul style="list-style-type: none"> • Switch off the ignition. • Disconnect plug from 'brake pedal pulse sender actuated' and from 'PSM control module'. • Measure resistance between 'pin 28' on 'PSM control module' plug and 	<p>< 5.0 ohms Go to Step 15</p>	<p>Repair wire. --> End</p>

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		'pin A3' on 'brake pedal pulse sender actuated' plug.		
12	Check 'signal 1' wire for open circuit	<ul style="list-style-type: none">• Switch off the ignition.• Disconnect plug from 'brake pedal pulse sender actuated' and from 'PSM control module'.• Measure resistance between 'pin 30' on 'PSM control module' plug and 'pin A4' on 'brake pedal pulse sender actuated' plug.	< 5.0 ohms Go to Step 14	Repair wire. --> End
13	Check 'signal 2' wire for open circuit	<ul style="list-style-type: none">• Measure resistance between 'pin 27' on 'PSM control module' plug and 'pin A2' on 'brake pedal pulse sender actuated' plug.	< 5.0 ohms Go to Step 14	Repair wire. --> End
14	Replace active brake booster		The release switch is integrated into the 'brake pedal pulse sender actuated' plug and must be replaced along with the brake booster in the event of damage. --> End	
15	Replace PSM control module		<ul style="list-style-type: none">• Signal input is not detected.• No power supply to release switch.• Power supply to release switch '> 5.0 V' (approx. 11.0 V). --> End	

FAULT CODE 0814

ACTIVE BRAKE BOOSTER

Diagnostic conditions

- Ignition on
- Internal function test on PSM control unit

Possible cause of fault

- Leaking membranes or faulty solenoid valves or stiff metal piston (mechanical fault)
- Short circuit to B+ (electrical fault in electric circuit)

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- Short circuit to ground (electrical fault in electric circuit)
- Short circuit in solenoid coil winding (electrical fault in electric circuit)
- Open circuit in wire harness or in solenoid coil winding (electrical fault in electric circuit)

Affected pins

PSM control unit connector:

- Pin 17 'voltage activation of solenoid coil in active brake booster'
- Pin 31 'ground of solenoid coil in active brake booster'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: For a 'mechanical fault', the vacuum and pressure chambers as well as the vacuum hoses of the brake booster must be checked for leaks before checking the electrics.

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control unit plug connection and the 'pins' on the 'brake pedal applied pulse sender' plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded 'pins' if possible, otherwise replace affected 'pins'. Repair or replace damaged wires.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1 Check resistance of solenoid coil (in brake booster)	<ul style="list-style-type: none">• Switch off ignition.• Disconnect connector from 'brake pedal applied pulse sender'.• Measure resistance of solenoid coil directly at 'brake pedal applied pulse sender' input between 'pin A1' and 'pin A6'.	approx. 2.0 ohms Go to Step 2	Solenoid coil faulty Go to Step 7
2 Check ground supply of 'solenoid coil in brake booster'	<ul style="list-style-type: none">• Switch on ignition.• Measure ground between 'pin A1' and battery positive connection on 'brake pedal applied pulse sender' connector.	11.4 V to 14.5 V To check voltage activation line: Go to Step 3	To check for short circuit to B+: Go to Step 3
	<ul style="list-style-type: none">• Switch on ignition.• Measure voltage between 'pin A1 and ground' and 'pin A6 and ground' on 'brake pedal applied		

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3	Check voltage activation and ground supply for short circuit to B+	<ul style="list-style-type: none">pulse sender' connector.• Switch off ignition.• Pull connector off the PSM control unit.• Switch on ignition.• Measure voltage between 'pin A1 and ground' and 'pin A6 and ground' on 'brake pedal applied pulse sender' connector.	< 0.3 V Go to Step 4 < 0.3 V Go to Step 4	Go to Step 8 Repair wiring. --> End
4	Check voltage activation for short circuit to body ground and to ground supply line	<ul style="list-style-type: none">• Switch off ignition.• Measure resistance between 'pin A6' and body ground and between 'pins A1 and A6' on 'brake pedal applied pulse sender' connector.	infinity ohms Go to Step 5	Repair wiring. --> End
5	Check voltage activation for open circuit	<ul style="list-style-type: none">• Switch off ignition.• Pull connector off the PSM control unit.• Measure resistance between 'pin A6' on 'brake pedal applied pulse sender' connector and 'pin 17' on 'PSM control unit' connector.	< 5 ohms Go to Step 6	Repair wiring. --> End
6	Check ground supply for open circuit	<ul style="list-style-type: none">• Measure resistance between 'pin A1' on 'brake pedal applied pulse sender' connector and 'pin 31' on 'PSM control unit' connector.	< 5 ohms Go to Step 8	Repair wiring. --> End
7	Replace active brake booster		<ul style="list-style-type: none">• The solenoid coil (short or open circuit in coil) is integrated into the 'active brake booster' and cannot be replaced individually.• Mechanical fault in brake booster (metal piston stiff or it sticks) --> End	
8	Replace PSM control unit		--> End	

FAULT CODE 1044

CONTROL MODULE CODED INCORRECTLY

Diagnostic conditions

- Ignition on

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- Internal PSM control module function test

Possible cause of fault

- Control module was replaced, but was not coded
- Control module was not coded correctly

NOTE: If PSM control module is not coded or is coded incorrectly, both ABS and brake warning lights flash with a frequency of 1.1 Hz.

Affected pins

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Code control module correctly	--> End	

FAULT CODE 1130

ABS OPERATION

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Short circuit to ground in power supply to sensors (implausible signal)
- Hardware fault in PSM control module (faulty)

Affected pins

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE:

- If additional fault codes are stored when reading out the fault memory, the fault memory must be cleared and another test drive must be performed on the vehicle. Read out the fault memory again after the test drive. If the fault codes are stored again, this indicates a short circuit to ground in the power supply to the sensors (see Fault code).

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- If only fault code '1130' is stored in the fault memory, this indicates a fault in the 'PSM control module'.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1 Check power supply of sensors stored in fault memory.	<ul style="list-style-type: none">• Carry out check in accordance with Diagnosis/troubleshooting based on stored fault code.	If check does not indicate a fault: Go to Step 2	Repair wiring harness. --> End
2 Replace PSM control module		Internal hardware fault. --> End	

FAULT CODE 1164

PSM OPERATION

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Implausible signal from 'rate-of-turn sensor' in combination sensor

Affected pins

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1 Check function and circuit of 'rate-of-turn sensor'		Use Diagnosis/troubleshooting for rate-of-turn sensor, 'fault code 1542'. --> End	

FAULT CODE 1276

HYDRAULIC PUMP

WARNING: Increased water level in radiator tank can cause damage! The hydraulic unit and PSM control module are integrated into the radiator tank. To counteract the risk of an increase in water level, please make sure that the

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water drains in the radiator tank are not blocked. Do not use a steam jet cleaner on hydraulic unit + PSM control module!

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Plug connection to PSM control module is corroded or damaged (faulty plug connection)
- Hydraulic pump (faulty)

Affected pins

Plug connection between PSM control module and hydraulic unit.

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: Before replacing the hydraulic unit, always check whether the plug connection between the PSM control module and hydraulic unit is corroded (caused by water leaking in) or damaged. If the plug connection is intact, but fault persists, the hydraulic unit must be replaced. The hydraulic unit can only be replaced together with the PSM control module.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Replace hydraulic unit	The pump is integrated into the hydraulic unit and must be replaced along with the complete unit in the event of a fault. --> End	

FAULT CODE 1279

AXIAL ACCELERATION SENSOR

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- The axial acceleration sensor was not calibrated or was not calibrated correctly (no or incorrect basic setting/adaptation).

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Actual value of function integrated in the combination sensor:

- Axial acceleration sensor

is evaluated and displays an implausible value (implausible signal).

- Internal CAN: Wire faulty (no signal/communication)
- Short circuit to ground (electrical fault in electric circuit)
- Short circuit to B+ (electrical fault in electric circuit)
- Open circuit in circuit to control module (no signal/communication)
- Axial acceleration sensor faulty

NOTE: The transverse and axial acceleration sensor and the rate-of-turn sensor are integrated into the 'combination sensor' housing. If a fault is detected in one of these three sensors, the combination sensor must be replaced. The integrated transverse and axial acceleration sensor must be calibrated after replacement.

Affected pins

PSM control module plug:

- Pin 6 'voltage'
- Pin 24 'ground'
- Pin 25 'internal CAN (low)'
- Pin 29 'internal CAN (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

- NOTE:**
- Calibration completed, or checked and found to be OK.
 - During calibration, the flashing frequency of the ABS warning light increases to 1.9 Hz. The brake warning light flashes with a lower frequency (1.1 Hz).
 - Visual inspection: In the next troubleshooting section, please check first that the affected pins on the PSM control module plug connection and the pins on the combination sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
	<ul style="list-style-type: none">• Switch off ignition.		

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1	Check power and ground supply of combination sensor (axial acceleration sensor)	<ul style="list-style-type: none"> • Pull off plug on combination sensor. • Switch ignition on. • Measure voltage between 'pin 1' and 'pin 3' of combination sensor plug. 	11.4 to 14.5 V Go to Step 6	Open circuit or short circuit in circuit between PSM control module plug 'pins 6/24' and combination sensor plug 'pins 1/3', or PSM control module faulty. Go to Step 2
2	Check ground supply line for short circuit to B+	<ul style="list-style-type: none"> • Measure voltage between combination sensor plug 'pin 3' and ground. 	< 0.3 V Go to Step 3	Short circuit to B+ in wiring of PSM control module plug 'pin 24' and combination sensor plug 'pin 3', or PSM control module faulty. Repair wire or replace PSM control module. --> End
3	Check power supply line for short circuit to ground	<ul style="list-style-type: none"> • Switch off ignition. • Unplug PSM control module plug. • Measure resistance between PSM control module plug 'pin 6' and ground. 	infinity ohms Go to Step 4	Short circuit to ground in wiring of PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
4	Check ground supply line for open circuit	<ul style="list-style-type: none"> • Measure resistance between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'. 	< 5 ohms Go to Step 5	Open circuit between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'. Repair wire. --> End
5	Check power supply line for open circuit	<ul style="list-style-type: none"> • Measure resistance between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. 	< 5 ohms Go to Step 8	Open circuit between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
6	<u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .		Go to Step 7	Repair wire. --> End
7	Replace combination sensor		The axial acceleration sensor is integrated into the combination sensor. --> End	
8	Replace PSM control module		--> End	

FAULT CODE 1310

LEVEL CONTROL MODULE

Diagnostic conditions

- Ignition on

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- Internal control module function test

Possible cause of fault

- Please read out fault memory
- Signal from level control module does not appear on CAN drive (no signal/communication)

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to 'CHECKING INSTRUCTIONS/CAN DATA BUS'.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Read out fault memory for level control module	For further fault localization, please follow the diagnosis/troubleshooting instructions for the level control module (refer to <u>LEVEL CONTROL</u> article) . --> End	
2 <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End	

FAULT CODE 1312

CAN DRIVE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

Communication problem with all control modules via CAN drive.

- Short circuit to ground (faulty)
- Short circuit to B+ (faulty)

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- Open circuit in wiring harness (faulty)

Affected pins

PSM control module plug:

- Pin 11 'CAN drive (high)'
- Pin 15 'CAN drive (low)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End	

FAULT CODE 1314

DME CONTROL MODULE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Signal from DME control module does not correspond to expected signal (please read out fault memory).
- Signal from DME control module does not appear on CAN drive (no signal/communication).

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to 'CHECKING INSTRUCTIONS/CAN DATA BUS' .

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK

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1	Read out DME control module fault memory	For further troubleshooting, please follow the diagnosis instructions for the DME control module (refer to <u>FUEL SYSTEM, ELECTRONIC INJECTION</u> article) . --> End
2	<u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End

FAULT CODE 1315

TIPTRONIC CONTROL MODULE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Signal from Tiptronic control module does not correspond to expected signal (please read out fault memory).
- Signal from Tiptronic control module does not appear on CAN drive (no signal/communication).

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to '**CHECKING INSTRUCTIONS/CAN DATA BUS**' .

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1	Read out the Tiptronic control module fault memory	For further troubleshooting, please follow the diagnosis instructions for the Tiptronic control module (refer to <u>AUTOMATIC - ACTUATION, ASSEMBLY HOUSING</u> article) . --> End
2	<u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End

FAULT CODE 1317

INSTRUMENT CLUSTER

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Signal from instrument cluster does not correspond to expected signal (please read out fault memory).
- Signal from instrument cluster does not appear on CAN drive (no signal/communication).

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to 'CHECKING INSTRUCTIONS/CAN DATA BUS'.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Read out instrument cluster fault memory	For further troubleshooting, please follow the diagnosis instructions for the instrument cluster (refer to <u>INSTRUMENT CLUSTER</u> article.) . --> End	
2 <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End	

FAULT CODE 1324

TRANSFER BOX CONTROL MODULE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

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Possible cause of fault

- Signal from transfer box control module does not correspond to expected signal (please read out fault memory).
- Signal from transfer box control module does not appear on CAN drive (no signal/communication).

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to 'CHECKING INSTRUCTIONS/CAN DATA BUS'.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Read out transfer box control module fault memory	For further troubleshooting, please follow the diagnosis instructions for the transfer box control module (refer to <u>TRANSFER BOX</u>). --> End	
2 <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End	

FAULT CODE 1423

TRANSVERSE ACCELERATION SENSOR

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- The transverse acceleration sensor was not calibrated or was not calibrated correctly (no or incorrect basic setting/adaptation).

Actual value of function integrated in the combination sensor:

- Transverse acceleration sensor

is evaluated and displays an implausible value (implausible signal).

- Internal CAN: Wire faulty (implausible signal)
- Short circuit to ground (electrical fault in electric circuit)
- Short circuit to B+ (electrical fault in electric circuit)
- Open circuit in circuit to control module (electrical fault in electric circuit)
- Transverse acceleration sensor faulty

NOTE: **The transverse and axial acceleration sensor and the rate-of-turn sensor are integrated into the combination sensor housing. If a fault is detected in one of these three sensors, the combination sensor must be replaced. The integrated transverse and axial acceleration sensor must be calibrated after replacement.**

Affected pins

PSM control module plug:

- Pin 6 'voltage'
- Pin 24 'ground'
- Pin 25 'internal CAN (low)'
- Pin 29 'internal CAN (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

- NOTE:**
- Calibration completed, or checked and found to be OK.
 - During calibration, the flashing frequency of the ABS warning light increases to 1.9 Hz. The brake warning light flashes with a lower frequency (1.1 Hz).
 - Visual inspection: In the next troubleshooting section, please check first that the affected pins on the PSM control module plug connection and the pins on the combination sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
Check power and	<ul style="list-style-type: none"> • Switch off ignition. • Pull off plug on 	11.4 to	Open circuit or short circuit in circuit between PSM control

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1	ground supply of combination sensor (transverse acceleration sensor)	<ul style="list-style-type: none">combination sensor.Switch ignition on.Measure voltage between 'pin 1' and 'pin 3' of combination sensor plug.	14.5 V Go to Step 6	module plug 'pins 6/24' and combination sensor plug 'pins 1/3', or PSM control module faulty. Go to Step 2
2	Check ground supply line for short circuit to B+	<ul style="list-style-type: none">Measure voltage between combination sensor plug 'pin 3' and ground.	< 0.3 V Go to Step 3	Short circuit to B+ in wiring of PSM control module plug 'pin 24' and combination sensor plug 'pin 3', or PSM control module faulty. Repair wire or replace PSM control module. --> End
3	Check power supply line for short circuit to ground	<ul style="list-style-type: none">Switch off ignition.Unplug PSM control module plug.Measure resistance between PSM control module plug 'pin 6' and ground.	infinity ohms Go to Step 4	Short circuit to ground in wiring of PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
4	Check ground supply line for open circuit	<ul style="list-style-type: none">Measure resistance between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'.	< 5 ohms Go to Step 5	Open circuit between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'. Repair wire. --> End
5	Check power supply line for open circuit	<ul style="list-style-type: none">Measure resistance between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'.	< 5 ohms Go to Step 8	Open circuit between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
6	<u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .		Go to Step 7	Repair wire. --> End
7	Replace combination sensor		The transverse acceleration sensor is integrated into the combination sensor. --> End	
8	Replace PSM control module		--> End	

FAULT CODE 1435

PRESSURE SENSOR

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

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Possible cause of fault

- The pressure sensor was not calibrated or was not calibrated correctly (no or incorrect basic setting/adaptation).
- Actual value of pressure sensor is evaluated as implausible (implausible signal)
- Short circuit to ground (electrical fault in electric circuit)
- Short circuit to B+ (electrical fault in electric circuit)
- Open circuit in circuit to control module (electrical fault in electric circuit)

Affected pins

PSM control module plug:

- Pin 18 'power supply'
- Pin 19 'ground supply'
- Pin 20 'analogue signal'

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NOTE:

- Calibration completed successfully, or checked and found to be OK.
- During calibration, the flashing frequency of the ABS warning light increases to 1.9 Hz. The brake warning light flashes with a lower frequency (1.1 Hz).
- Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection and the pins on the pressure sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power supply to pressure sensor	<ul style="list-style-type: none">• Switch off ignition.• Pull off pressure sensor plug.• Switch ignition on.• Measure voltage between 'pin 4' of pressure sensor plug and ground.	approx. 5 V Go to Step 2	<ul style="list-style-type: none">• 'Measured value < 0.3 V'• Short circuit to ground/open circuit in circuit between PSM control module plug 'pin 18' and pressure sensor plug 'pin 4'. Repair wiring harness. --> End

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				<ul style="list-style-type: none"> 'Measured value approx. 11 V'
				Go to Step 3
2	Check ground supply to pressure sensor	<ul style="list-style-type: none"> Pull off pressure sensor plug and measure voltage between 'pin 1' and 'pin 4'. 	approx. 5 V Go to Step 6	Short circuit to B+ or open circuit in circuit between PSM control module plug 'pin 19' and pressure sensor plug 'pin 1', or PSM control module faulty. Go to Step 4
3	Check power supply line to pressure sensor for short circuit to B+	<ul style="list-style-type: none"> Switch off ignition. Pull off plug on PSM control module. Switch ignition on. Measure voltage between 'pin 18' and ground on PSM control module plug. 	< 0.3 V Go to Step 10	Short circuit to B+ in wiring harness between PSM control module plug 'pin 18' and pressure sensor plug 'pin 4'. Repair wiring harness. --> End
4	Check ground supply line to pressure sensor for short circuit to B+.	<ul style="list-style-type: none"> Switch off ignition. Pull off plug on PSM control module. Switch ignition on. Measure voltage between 'pin 19' and ground on PSM control module plug. 	< 0.3 V Go to Step 5	Short circuit to B+ in wiring harness between PSM control module plug 'pin 19' and pressure sensor plug 'pin 1'. Repair wiring harness. --> End
5	Check ground supply line to pressure sensor for open circuit.	<ul style="list-style-type: none"> Measure resistance between disconnected pressure sensor plug 'pin 1' and PSM control module plug 'pin 19'. 	< 5 ohms Go to Step 10	Open circuit between pressure sensor plug 'pin 1' and PSM control module plug 'pin 19'. Repair wiring harness. --> End
6	Check signal wire of pressure sensor for short circuit to B+.	<ul style="list-style-type: none"> Switch off ignition. Unplug PSM control module plug. Switch ignition on. Measure voltage on pressure sensor plug between 'pin 2' and ground. 	< 0.3 V Go to Step 7	Short circuit to B+ between pressure sensor plug 'pin 2' and PSM control module plug 'pin 20'. --> End
7	Check signal wire of pressure sensor for short circuit to ground.	<ul style="list-style-type: none"> Switch off ignition. Measure resistance on pressure sensor plug between 'pin 2' and ground. 	infinity ohms Go to Step 8	Short circuit to ground between pressure sensor plug 'pin 2' and PSM control module plug 'pin 20'. Repair wiring harness. --> End
8	Check signal wire of pressure sensor for open	<ul style="list-style-type: none"> Measure resistance between pressure sensor plug 'pin 2' and PSM control module 	< 5 ohms Go to	Open circuit between pressure sensor plug 'pin 2' and PSM control module plug 'pin 20'.

	circuit.	plug 'pin 20'.	Step 9	Repair wiring harness. --> End
9	Replace pressure sensor		--> End	
10	Replace PSM control module		--> End	

FAULT CODE 1542

RATE-OF-TURN SENSOR

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

Actual value of function integrated in the combination sensor:

- Rate-of-turn sensor

is evaluated and displays an implausible value (implausible signal).

- Internal CAN: Wire faulty (no signal/communication)
- Short circuit to ground (electrical fault in electric circuit)
- Short circuit to B+ (electrical fault in electric circuit)
- Open circuit in circuit to control module (electrical fault in electric circuit)
- Rate-of-turn sensor faulty

NOTE: **The transverse and axial acceleration sensor and the rate-of-turn sensor are integrated into the combination sensor housing. If a fault is detected in one of these three sensors, the combination sensor must be replaced. The integrated transverse and axial acceleration sensor must be calibrated after replacement.**

Affected pins

PSM control module plug:

- Pin 6 'voltage'
- Pin 24 'ground'
- Pin 25 'internal CAN (low)'
- Pin 29 'internal CAN (high)'

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NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected pins on the PSM control module plug connection and the pins on the combination sensor plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power and ground supply of combination sensor (rate-of-turn sensor)	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on combination sensor.• Switch ignition on.• Measure voltage between 'pin 1' and 'pin 3' of combination sensor plug.	11.4 to 14.5 V Go to Step 6	Open circuit or short circuit in circuit between PSM control module plug 'pins 6/24' and combination sensor plug 'pins 1/3', or PSM control module faulty. Go to Step 2
2	Check ground supply line for short circuit to B+	<ul style="list-style-type: none">• Measure voltage between combination sensor plug 'pin 3' and ground.	< 0.3 V Go to Step 3	Short circuit to B+ in wiring of PSM control module plug 'pin 24' and combination sensor plug 'pin 3', or PSM control module faulty. Repair wire or replace PSM control module. --> End
3	Check power supply line for short circuit to ground	<ul style="list-style-type: none">• Switch off ignition.• Unplug PSM control module plug.• Measure resistance between PSM control module plug 'pin 6' and ground.	infinity ohms Go to Step 4	Short circuit to ground in wiring of PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
4	Check ground supply line for open circuit	<ul style="list-style-type: none">• Measure resistance between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'.	< 5 ohms Go to Step 5	Open circuit between PSM control module plug 'pin 24' and combination sensor plug 'pin 3'. Repair wire. --> End
5	Check power supply line for open circuit	<ul style="list-style-type: none">• Measure resistance between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'.	< 5 ohms Go to Step 8	Open circuit between PSM control module plug 'pin 6' and combination sensor plug 'pin 1'. Repair wire. --> End
6	<u>CHECKING INSTRUCTIONS/CAN DATA BUS .</u>		Go to Step 7	Repair wire. --> End

7	Replace combination sensor	The rate-of-turn sensor is integrated into the combination sensor. --> End
8	Replace PSM control module	--> End

FAULT CODE 1550

REVERSE GEAR SIGNAL

NOTE: The 'reverse gear signal' is sent as a digital signal via the CAN data bus from the vehicle electrical system control unit to the 'gateway control unit' and 'PSM control unit'.

Diagnostic conditions

- Ignition on
- Internal function test on PSM control unit
- Shift into reverse gear and out again.

Possible causes of fault

The 'reversing light switch' electric circuit may have one of the following faults:

- Fuse 43 in right fuse carrier faulty (electrical fault in electric circuit)
- Short circuit to B+ (electrical fault in electric circuit)
- Short circuit to ground (electrical fault in electric circuit)
- Open circuit (electrical fault in electric circuit)

Affected pins

PSM control unit connector:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

Vehicle electrical system control unit, connector [A]:

- Pin 20 to 'reversing light switch pin A1'

DIAGNOSIS/TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK

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1	Check fuse 43 in right fuse carrier	Go to Step 2	Replace fuse. Satisfy diagnostic conditions again. Fuse 43 remains intact. --> End Fuse 43 is faulty again. Go to Step 3
2	Carry out the following checks on the wiring from 'pin 20' on 'vehicle electrical system control unit' to 'pin A1' on 'reversing light switch': <ul style="list-style-type: none">• Short circuit to B+	Go to Step 4	Correct any existing faults. --> End
3	Carry out the following checks on the wiring from 'pin 20' on 'vehicle electrical system control unit' to 'pin A1' on 'reversing light switch' and between 'fuse 43' and 'pin A2' on 'reversing light switch': <ul style="list-style-type: none">• Short circuit to ground	Go to Step 5	Correct any existing faults. --> End
4	Carry out the following checks on the wiring from 'pin 20' on 'vehicle electrical system control unit' to 'pin A1' on 'reversing light switch' and between 'fuse 43' and 'pin A2' on 'reversing light switch': <ul style="list-style-type: none">• Open circuit	Go to Step 5	Correct any existing faults. --> End
5	Check the 'reversing light switch'	--> End	Go to Step 6
6	Replace reversing light switch	--> End	

FAULT CODE 1673

DISTANCE SENSOR IN BRAKE BOOSTER

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Actual value of 'distance sensor in brake booster' is evaluated as implausible (implausible signal)
- Short circuit to ground (electrical fault in electric circuit)

Short circuit to B+ (electrical fault in electric circuit)

- Open circuit in circuit to control module (electrical fault in electric circuit)

Affected pins

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PSM control module plug:

- Pin 26 'power supply'
- Pin 5 'ground supply'
- Pin 3 'signal'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected 'pins' on the PSM control module plug connection and the pins on the 'distance sensor in brake booster' plug connection are neither damaged nor corroded. The wiring of the affected components must also be checked for external damage. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wire.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction			Display OK	If not OK
1	Check power supply to 'distance sensor in brake booster'	<ul style="list-style-type: none">• Switch off ignition.• Pull off distance sensor plug.• Switch ignition on.• Measure voltage between 'pin B1' of distance sensor plug and ground.	approx. 5 V Go to Step 2	<ul style="list-style-type: none">• 'Measured value < 0.3 V' <p>Short circuit to ground/open circuit in circuit between PSM control module plug 'pin 26' and distance sensor plug 'pin B1'.</p> <p>Repair wiring harness.</p> <p>--> End</p> <ul style="list-style-type: none">• 'Measured value approx. 11 V' <p>Go to Step 3</p>
2	Check ground supply to 'distance sensor in brake booster'	<ul style="list-style-type: none">• Pull off distance sensor plug and measure voltage between 'pin B1' and "pin B2'.	approx. 5 V Go to Step 6	<p>Short circuit to B+ or open circuit in circuit between PSM control module plug 'pin 5' and distance sensor plug 'pin B2' or PSM control module faulty.</p> <p>Go to Step 4</p>
3	Check power supply line to 'distance sensor in brake booster' for short circuit to B+	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on PSM control module.• Switch ignition on.• Measure voltage on PSM control module plug	< 0.3 V Go to Step 10	<p>Short circuit to B+ in wiring harness between PSM control module plug 'pin 26' and distance sensor plug 'pin B1'.</p> <p>Repair wiring harness.</p> <p>--> End</p>

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		between 'pin 26' and ground.		
4	Check ground supply line to 'distance sensor in brake booster' for short circuit to B+	<ul style="list-style-type: none">• Switch off ignition.• Pull off plug on PSM control module.• Switch ignition on.• Measure voltage on PSM control module plug between 'pin 5' and ground.	< 0.3 V Go to Step 5	Short circuit to B+ in wiring harness between PSM control module plug 'pin 5' and distance sensor plug 'pin B2'. Repair wiring harness. --> End
5	Check ground supply line to 'distance sensor in brake booster' for open circuit	<ul style="list-style-type: none">• Measure resistance between disconnected distance sensor plug 'pin B2' and PSM control module plug 'pin 5'.	< 5 ohms Go to Step 10	Open circuit between distance sensor plug 'pin B2' and PSM control module plug 'pin 5'. Repair wiring harness. --> End
6	Check signal wire of 'distance sensor in brake booster' for short circuit to B+	<ul style="list-style-type: none">• Switch off ignition.• Unplug PSM control module plug.• Switch ignition on.• Measure voltage on distance sensor plug between 'pin B3' and ground.	< 0.3 V Go to Step 7	Short circuit to B+ between distance sensor plug 'pin B3' and PSM control module plug 'pin 3'. --> End
7	Check signal wire of 'distance sensor in brake booster' for short circuit to ground	<ul style="list-style-type: none">• Switch off ignition.• Measure resistance on distance sensor plug between 'pin B3' and ground.	infinity ohms Go to Step 8	Short circuit to ground between distance sensor plug 'pin B3' and PSM control module plug 'pin 3'. Repair wiring harness. --> End
8	Check signal wire of 'distance sensor in brake booster' for open circuit	<ul style="list-style-type: none">• Measure resistance between distance sensor plug 'pin B3' and PSM control module plug 'pin 3'.	< 5 ohms Go to Step 9	Open circuit between distance sensor plug 'pin B3' and PSM control module plug 'pin 3'. Repair wiring harness. --> End
9	Replace distance sensor in brake booster		--> End	
10	Replace PSM control module		--> End	

FAULT CODE 1765

DME CONTROL MODULE SYSTEM DEVIATION

NOTE: The fault is sent from the DME control module to the PSM control module via the CAN drive. The PSM system is not faulty!

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Diagnostic conditions

- Ignition on
- Internal PSM control module function test
- Engine running

Possible cause of fault

- Irregularities in DME control; the fault is sent from the DME control module via the CAN drive when the engine is running (no display)

Affected pins

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Read out DME control module fault memory	To localize further faults, please follow the diagnosis/troubleshooting instructions for the DME control module (refer to <u>FUEL SYSTEM, ELECTRONIC INJECTION</u> article) . --> End	

FAULT CODE 2053

TRANSFER BOX CONTROL MODULE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Please read out fault memory
- No signal from transfer box control module (no signal/communication)

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

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DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to CHECKING INSTRUCTIONS/CAN DATA BUS .

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Read out transfer box control module fault memory	To localize further faults, please follow the diagnosis/troubleshooting instructions for the transfer box control module (refer to <u>TRANSFER BOX</u>) . --> End	
2 <u>CHECKING INSTRUCTIONS/CAN DATA BUS</u> .	--> End	

FAULT CODE 2054

TRANSVERSE LOCK CONTROL MODULE

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

- Please read out fault memory
- No signal from transverse lock control module (no signal/communication)

Affected pins

PSM control module plug:

- Pin 15 'CAN drive (low)'
- Pin 11 'CAN drive (high)'

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: If there is no incoming signal via the CAN drive using several control modules, the CAN drive must be checked for open or short circuits. Refer to CHECKING INSTRUCTIONS/CAN DATA BUS .

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
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1	Read out transverse lock control module fault memory	To localize further faults, please follow the diagnosis/troubleshooting instructions for the transverse lock control module. --> End
2	<u>CHECKING</u> <u>INSTRUCTIONS/CAN DATA BUS</u> .	--> End

FAULT CODE 2231

BRAKE ACTUATED SIGNAL (PSM)

NOTE: This fault code is set if a difference is detected between the analog (brake light) and digital signal (CAN data bus).

Diagnostic conditions

- Ignition on
- Internal function test on PSM control unit
- Actuate brake pedal and then release it again

Possible causes of fault

- Short circuit to B+ (electrical fault in electric circuit)
- Short circuit to ground (electrical fault in electric circuit)

Affected pins

PSM control unit:

- Up to model year '05: Pin 35 'brake light' for relay carrier/left of dashboard
- As of model year '05: Pin 35 'brake light' for 'trailer hitch control unit' and 'rear convenience system control unit'

DIAGNOSIS/TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
Up to model year '05: Carry out the following checks on the wiring from 'pin 35' 'brake light' on 'PSM control unit' to relay carrier/left of dashboard: <ul style="list-style-type: none">• Short circuit to B+	Go to Step 2	Correct any existing faults. --> End

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1	<ul style="list-style-type: none">• Short circuit to ground As of model year '05: Carry out the following checks on the wiring from 'pin 35' 'brake light' on 'PSM control unit' to 'pin B3' on 'trailer hitch control unit' and 'rear convenience system control unit': <ul style="list-style-type: none">• Short circuit to B+• Short circuit to ground	Go to Step 3	Correct any existing faults. --> End
	2 Check the 'brake light relay' in relay carrier/left of dashboard	Go to Step 3	Correct any existing faults. --> End
3	Read out fault memory for trailer hitch control unit	For further troubleshooting, please follow the diagnosis instructions for the trailer hitch control unit (Rep. Gr. 66). --> End	

FAULT CODE 2349

PARKING BRAKE SWITCH

Diagnostic conditions

Internal function test: The PSM control unit initially tests internal function sequences when the ignition is switched on (terminal 15). If they are OK, all diagnosable outputs are then tested and any faults are stored.

- Switch on ignition
- Actuate (depress) parking brake and then release it again

Possible cause of fault

- Implausible signal: 'Fuse 51' in fuse carrier in the left side of the dashboard is faulty
- Implausible signal: Short circuit to B+ in the line from the PSM control unit to the parking brake switch
- Implausible signal: Short circuit to ground in the line from the PSM control unit to the parking brake switch
- Implausible signal: Open circuit in the parking brake switch input/output line
- Implausible signal: Parking brake switch faulty
- Implausible signal: Control unit faulty

Affected pins

PSM control unit connector:

- Pin 41 'parking brake switch'

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DIAGNOSIS/TROUBLESHOOTING PSM

NOTE: Visual inspection: In the next troubleshooting section, please check first that the affected pins on the PSM control unit plug connection are neither damaged nor corroded. The wiring and connectors of the affected components must also be checked for external damage and correct contacts. Repair damaged or corroded pins if possible, otherwise replace affected pins. Repair or replace damaged wires.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction		Display OK	If not OK
1. Check the position of the parking brake switch:	<ul style="list-style-type: none">Using the 9718 PIWIS tester, select the 'Input signals' menu in the PSM system and read the status of the 'parking brake switch' and 'parking brake switch (via CAN)'. <p>The following procedure must be followed in order to test the function:</p> <ul style="list-style-type: none">Parking brake switch in idle position; input signal 'parking brake switch' and 'parking brake switch (via CAN)' indicates 'not actuated'. <p>Depress the parking brake switch until the Tester display changes from 'not actuated' to 'actuated'.</p> <ul style="list-style-type: none">Parking brake travel should be approx. '7 mm'.	<p>Check that the plug connection and parking brake switch are seated securely; repair if necessary.</p> <ul style="list-style-type: none">Check whether faults are entered in the fault memory.The fault has been entered again. <p>Go to Step 6</p> <ul style="list-style-type: none">The fault is no longer present. <p>--> End</p>	<p>Go to Step 2</p> <ul style="list-style-type: none">No voltage from the 'fuse carrier in the left side of the dashboard': <ol style="list-style-type: none">The power supply to the 'fuse carrier in the left side of the dashboard' is faulty; repair the power supply.

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2	Check power supply at the fuse:	<ul style="list-style-type: none"> • Switch on ignition. • Measure voltage between input/output of 'fuse 51' in the 'fuse carrier in the left side of the dashboard' and ground. 	11.4 to 14.5 V Go to Step 2	<p>--> End</p> <p>2. The power supply to the 'fuse carrier in the left side of the dashboard' is OK, then:</p> <p>Go to Step 7</p> <ul style="list-style-type: none"> • 'Fuse 51' is faulty; replace the fuse. • If 'fuse 51' is faulty again: <p>Go to Step 4</p> <ul style="list-style-type: none"> • If the fuse remains intact: <p>--> End</p>
3	Check wire harness for short circuit to B+:	<ul style="list-style-type: none"> • Switch off ignition. • Pull off connector on parking brake switch. • Switch on ignition. • On the removed parking brake switch connector, measure the line voltage to 'pin 4' on the PSM control unit and ground. 	< 0.3 V Go to Step 5	<p>Repair wiring.</p> <p>--> End</p>
4	Check wire harness for short circuit to ground:	<ul style="list-style-type: none"> • Switch off ignition. • Pull connector off the PSM control unit. • Connect connector to parking brake switch. • Parking brake switch in idle position. • Measure resistance between PSM control unit connector 'pin 41' and ground. 	infinity ohms Go to Step 5	<p>Repair wiring.</p> <p>--> End</p>
		Perform measurements with ignition off and the parking brake switch connector and PSM control unit connector removed.		

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5	Check wire harness for open circuit:	<ul style="list-style-type: none">• Measure resistance between parking brake switch connector 'pin 4' and 'pin 41' on the PSM control unit connector.• Measure resistance between parking brake switch connector 'pin 3' and 'fuse 51' in the 'fuse carrier in the left side of the dashboard'.	< 5 ohms Go to Step 6	Repair wiring. --> End
6	Replace parking brake switch:	If the fault is entered again after replacement of the parking brake switch and the lines/plug connections tested OK, continue with: Go to Step 8 If the fault no longer appears after replacement of the parking brake switch, then: --> End		
7	Replace fuse carrier in the left side of the dashboard:	--> End		
8	Replace PSM control unit:	--> End		

FAULT CODE P1612

DME CONTROL MODULE CODED INCORRECTLY

Diagnostic conditions

- Ignition on
- Internal PSM control module function test

Possible cause of fault

DME control module was replaced and coded incorrectly or was not coded (no display)

- Engine type coded incorrectly
- Transmission type coded incorrectly

AFFECTED PINS

-

DIAGNOSIS/TROUBLESHOOTING PSM 0101

NOTE: For further troubleshooting, please follow the diagnosis/troubleshooting

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instructions for the DME control module.

DIAGNOSIS TROUBLESHOOTING PROCEDURE

Work instruction	Display OK	If not OK
1 Check DME control module coding and correct it if necessary	--> End	